

3D-robotic e-chains[®] triflex[®] R





triflex® R - 3-dimensional e-chains® for robots

triflex® R (R for "round") is the third generation of multi-axis e-chains®. Design features include:

- Optional fibre rod for spring loading of the triflex® R
- Approximately $\pm 10^\circ$ twist per e-chain® link
- High tensile strength of the ball-and-socket joint
- Easy assembly and modification due to single moulded link design. No support elements (steel cables, spring suspensions etc.) are necessary

The triflex® R product family now comprises more than 100 components meeting all requirements ranging from those of small palleting robots to large welding robots.

Typical industries and applications

- Robotics/Automation
- Machine tools
- Handling machines - 6-axis
- Packaging machines
- General mechanical engineering, etc.



Video on the web ►
www.igus.de/triflexR_Film



IF-Design awards for
TRC and TRL-design



Series TRC - Electrically conductive
ESD/ATEX version upon request



Cleanroom suitability
upon request



UL94-V2
classification



**triflex® RS - universal module for safe
realisation of complex robotic movements**

triflex® RS attaches to the existing fixation point on the robot. Thanks to its low installation height, triflex® R runs parallel and tightly against the robotic arm. Even applications with heavy space restrictions can be realized.



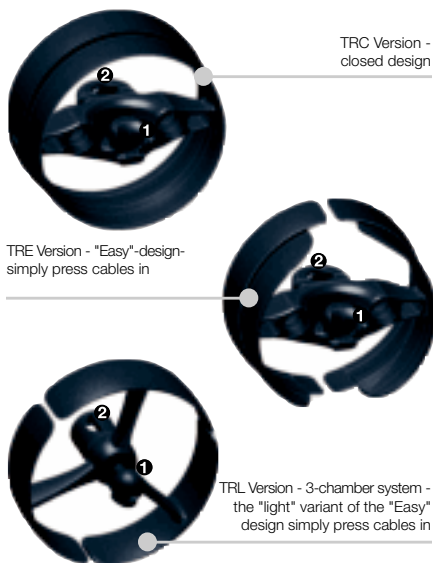
Video on the web ►
www.igus.de/RS_Film



Fiber rod module for directed pretension and
universal assembly kit for multifaceted adjustments



triflex® R Set - Routed closely on
the robotic arm for extreme flatness



Select this system for:

- The first choice for multi-axis-robots
- **Three variants are available:** **TRC:** Closed design,
TRE: "Easy"-design, easy to fill from outside,
TRL: The "light" variant of the "Easy"-design
- Universal for general machinery
- Multi-axis (3D) movement
- High torsional stability
- Easy shortening and lengthening
- Smooth interior and exterior edges (TRC)
- Small bend radius
- ① Ball-and-② socket principle
- Cables easy to assemble and to replace (TRE/TRL-version)
- triflex® R-Set - compact module for all movements on robots, which can be fixed on existing fastening points
- TRL - one piece, thus very lightweight
- High tensile strengths without additional elements like steel cable and spring elements etc
- You can find more technical data about the material, chemical resistance, temperatures ► **chapter design, from page 1.38**

Selection table

Series	Inner height		max. cable ø		Outer width <i>Ba</i> [mm]	Bending radii <i>R</i> [mm]	Pitch [mm]	Links per m	Page
	<i>Bi 1</i>	<i>Bi 2</i>	<i>d1</i>	<i>d2</i>					
"TRC" - triflex® R closed design, dirt-resistant									
TRC.30	12	10	10	8	34,5	50	11,3	89	2.12
TRC.40	15	13	13	11	43	58	13,9	72	2.12
TRC.60	22,5	19,5	20,5	17,5	65	87	20,4	49	2.12
TRC.70	28	24	26	22	81	110	25,6	39	2.12
TRC.85	33	28	31	26	94,5	135	30,6	33	2.12
TRC.100	37,5	32,5	35,5	30,5	108	145	34,5	29	2.12
TRC.125**	43,3	43,3	41	41	135	182	44,6	23	2.12
"TRE" - triflex® R "Easy"-design for fast installation of conduits									
TRE.30	12	10	10*	8*	34,5	50	11,3	89	2.14
TRE.40	15	13	13*	11*	43	58	13,9	72	2.14
TRE.60	22,5	19,5	20,5*	17,5*	65	87	20,4	49	2.14
TRE.70	28	24	26*	22*	81	110	25,6	39	2.14
TRE.85	33	28	31*	26*	94,5	135	30,6	33	2.14
TRE.100	37,5	32,5	35,5*	30,5*	108	145	34,5	29	2.14
TRE.125**	43,3	43,3	41*	41*	135	182	44,6	23	2.14
"TRL" - a light and economical alternative with an "Easy"-design									
TRL.30	12	10	10*	8*	34,5	50	11,3	89	2.16
TRL.40	15	–	13*	–	45	58	13,9	72	2.16
TRL.60	23	–	20,5*	–	65	87	20,4	49	2.16
TRL.70	28	–	26*	–	81	110	25,6	39	2.16
TRL.100	38	–	35,5*	–	108	145	34,5	29	2.16

* For quick and easy insertion / removal of cables using the easy chain® principle, we recommend a maximum cable diameter of 70% of the specified value.

** TRE.125/TRC.125 - max. cable diameter Ø 41 mm. Max. cable diameter changes to Ø 36 mm only, if shortening/lengthening of a filled triflex® R is required

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



Hold two pieces together at inner radius and move socket up against the ball's wedged end

Separating | TRC.30 · TRC.40 · TRC.60



Bend triflex® R into its radius and twist apart, counter-clockwise

Separating | TRC.70 · TRC.85 · TRC.100



Insert screw driver into the opening of the socket from the top. Then twist apart, counter-clockwise

Assembly | Separating | TRC.125 (C-Version)



Connector principle = Ball head clevis joint (similar to the proven trailer hitch design)
Improved assembly/disassembly for large sizes. Faster assembly with less effort

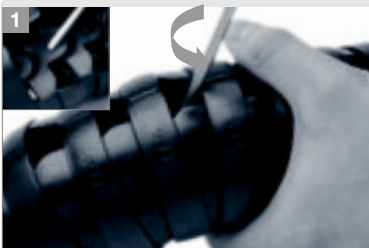
Assembly | TRE.30 · TRE.40 · TRE.60 · TRE.70 · TRE.85 · TRE.100


Hold two pieces together at inner radius and move socket up against the ball's wedged end.

Push until a clicking sound indicates a secure fit of ball into socket (e-chain" section exposed for the purpose of demonstration)

Separating | TRE.30 · TRE.40 · TRE.60


Bend triflex® R into its radius and twist apart, counter-clockwise

Separating | TRE.70 · TRE.85 · TRE.100


Insert screw driver into the opening of the socket from the top.

Then twist apart, counter-clockwise

Filling | TRE.30 · TRE.40 · TRE.60 · TRE.70 · TRE.85 · TRE.100


Easy to fill - simply press cables in...

...and easy to take the cables out

Assembly | TRL.30 · TRL.40 · TRL.60 · TRL.70 · TRL.100



igus® triflex® R TRL - very easy to assemble -
simply press the ball into the socket, ready!

Separating | TRL.30 · TRL.40 · TRL.60 · TRL.70 · TRL.100



Just twist the ball slightly to remove it from its socket

Filling | TRL.40 · TRL.30 · TRL.60 · TRL.70 · TRL.100



Easy to fill - simply press cables in...

...and easy to take the cables out

Installation | Mounting bracket in this case, a "light" bracket with an intermediate connection



Easy assembly - to open, push a screwdriver against one side and prise apart

TRC - closed,
chip-resistant design

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

Able to move multi-dimensionally -
Twist up to approx. $\pm 10^\circ$ per link
possible in longitudinal axis

Impact-resistant, dirt-repelling,
rugged and abrasion-resistant

Smooth, rounded exterior

Easy assembly and dismantling -
one die-cast component

High stability - thanks
to exterior stop dogs

Small bending radii and short pitch

igumid NB: -40° up to $+80^\circ$ C
VDE 0304 IIC UL94 V2

Easy attachment and intelligent
accessories onto the robot/machine

Robotic applications, closed, chip-resistant

When to use Series TRC:

- If a secure, closed and chip-resistant energy supply is required for multi-dimensional (3D) movements
- If high torsional stability is required
- If the system has to be shortened or lengthened easily
- If small bending radii are required
- If high tensile strength is important
- If a smooth and robust exterior against interfering edges is required



When to use a different igus® Series:

- For circular movements with high loads
▶ **System twisterchain® new**, from page 2.56
- When a rugged, easy to fill variant is needed
▶ **triflex® R - TRE**, page 2.14
- If a more simple and low-cost 3D-solution is required
▶ **triflex® R - TRL**, page 2.16



triflex® R-Set - compact module for
all movements on robots available



Available from stock. Delivery in 24h or today!*

*Delivery time means time until shipping of goods



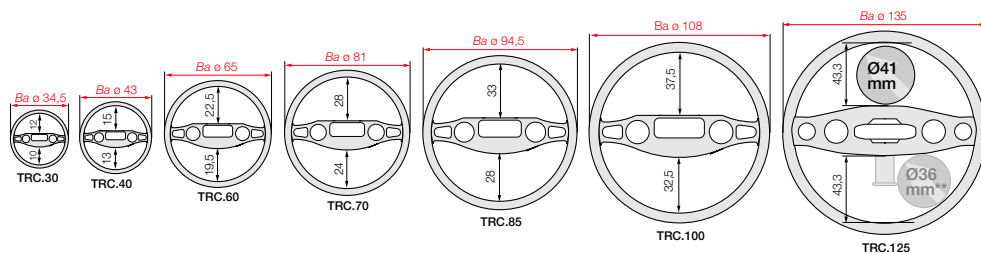
3D-CAD files, configurators, PDF ▶ www.triflex-r.eu

triflex® R | **Series TRC** | Closed design, dirt-resistant

igus® Series TRC Standard	Series TRC C-Version	Bi 1 [mm]	Bi 2 [mm]	Ba [mm]	R [mm]	d1 [mm]	d2 [mm]	Pitch [mm]	Links/m	Weight [kg/m]
TRC.30.050.0	–	12	10	34,5	050	10	8	11,3	89	≈ 0,27
TRC.40.058.0	–	15	13	43	058	13	11	13,9	72	≈ 0,37
TRC.60.087.0	–	22,5	19,5	65	087	20,5	17,5	20,4	49	≈ 0,85
TRC.70.110.0	–	28	24	81	110	26	22	25,6	39	≈ 1,32
TRC.85.135.0	–	33	28	94,5	135	31	26	30,6	33	≈ 1,75
TRC.100.145.0	TRC.100.145.0.C*	37,5	32,5	108	145	35,5	30,5	34,5	29	≈ 2,38
TRC.125.182.0	X ¹⁾	43,3	43,3	135	182	41	41 ²⁾	44,6	23	≈ 4,70

¹⁾ **TRC.125: C-version is standard!** ^{*}Available upon request. Delivery time approx. 6-8 weeks after order

²⁾ Max. cable diameter Ø 41 mm. Max. cable diameter changes to Ø 36 mm only, if shortening/lengthening of a filled triflex® R is required


Optional | C-version - quick assembly, 50% higher forces

NEW in this catalog

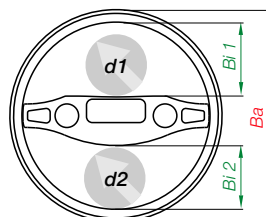

Now available with proven bolt connection for even faster assembly and disassembly

- Linear pull force capacity increased up to 4.000 N
- Up to 4 times stronger and improved bending radius strength
- C-version drastically reduces installation time
- Stronger lock for torsion limitation
- igubal® Spherical Bearing for non-slip traction ▶

www.igus.eu/3Dstabil


Order key
TRC. 40. 058. 0. C

Optional **C**-version
Standard color black
Bending radius **R**
Width index Ø
Series / Closed design



TRC - Closed design, dirt-resistant, with **Bi 40** mm inner width and **R 058** mm radius, color black = Part No. **TRC.40.058.0**

TRE- "Easy" Design -
simply press cables in

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

Able to move multi-dimensionally -
Twist up to approx. $\pm 10^\circ$ per link
possible in longitudinal axis

Easy opening mechanism for easy filling
with cable and hose packages

Excellent mechanical properties

Easy assembly and dismantling -
one die-cast component

High stability - thanks
to exterior stop dogs

Small bending radii and short pitch

igumid NB: -40° up to $+80^\circ$ C
VDE 0304 IIC UL94 V2

Easy attachment and intelligent
accessories onto the robot/machine

Robotic applications, easy filling

When to use Series TRE:

- If an easy to fill energy supply is required for multi-dimensional (3D) movements
- If high torsional stability is required
- If the system has to be shortened or lengthened easily
- If small bending radii are required
- If high tensile strength is important
- If an easy opening mechanism for easy filling with cable and hose packages is needed



When to use a different igus® Series:

- For circular movements with high loads
- ▶ **System twisterchain® new, from page 2.56**
- If a fully enclosed solution is required
- ▶ **triflex® R - TRC, page 2.12**
- If a more simple and low-cost 3D-solution is required
- ▶ **triflex® R - TRL, page 2.16**



triflex® R-Set - compact module for
all movements on robots available



Available from stock. Delivery in 24h or today!*

*Delivery time means time until shipping of goods



3D-CAD files, configurators, PDF ▶ www.triflex-r.eu

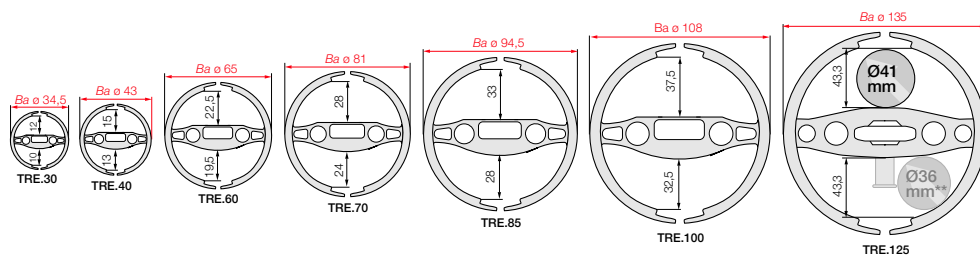
triflex® R | **Series TRE** | "Easy"-Design - simply press cables in

Series TRE Standard	Series TRE B-Version	Series TRE C-Version	Bi 1 [mm]	Bi 2 [mm]	Ba [mm]	R [mm]	d1** [mm]	d2** [mm]	Pitch [mm]	Links/m	Weight [kg/m]
TRE.30.050.0	–	–	12	10	34,5	050	10	8	11,3	89	≈ 0,26
TRE.40.058.0	TRE.40.058.0.B	–	15	13	43	058	13	11	13,9	72	≈ 0,36
TRE.60.087.0	TRE.60.087.0.B	–	22,5	19,5	65	087	20,5	17,5	20,4	49	≈ 0,83
TRE.70.110.0	TRE.70.110.0.B	–	28	24	81	110	26	22	25,6	39	≈ 1,30
TRE.85.135.0	TRE.85.135.0.B	–	33	28	94,5	135	31	26	30,6	33	≈ 1,67
TRE.100.145.0	TRE.100.145.0.B	TRE.100.145.0.C	37,5	32,5	108	145	35,5	30,5	34,5	29	≈ 2,35
TRE.125.182.0	–	X 1)	43,3	43,3	135	182	41	41 2)	44,6	23	≈ 4,40

1) TRE.125: C-version is standard!

2) Max. cable diameter Ø 41 mm. Max. cable diameter changes to Ø 36 mm only, if shortening/lengthening of a filled triflex® R is required

**For quick and easy insertion / removal of cables using the easy chain® principle, we recommend a maximum cable diameter of 70% of the specified value



Optional | B-version - 4 x higher torsion forces

NEW in this catalog


The advanced ball and socket connection now uses an additional arrester for even higher stability. Especially designed for heavy duty applications with high accelerations and top speeds. ● Up to 4 times stronger with improved bending radius strength ● Able to handle even higher torsion forces ● Made of only one single part per e-chain® link ► www.igus.eu/3Dstabil

Optional | C-version - quick assembly, 50% higher forces

NEW in this catalog


Now available with proven bolt connection for even faster assembly and disassembly ● Linear pull force capacity increased up to 4.000 N ● Up to 4 times stronger and improved bending radius strength ● C-version drastically reduces installation time ● Stronger lock for torsion limitation ● igubal® Spherical Bearing for non-slip traction ► www.igus.eu/3Dstabil

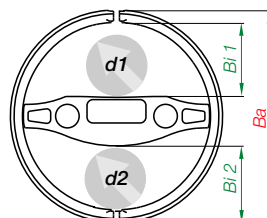
Order key



TRE. 100. 145. 0. B/C



Optional **B/-C**-version
Standard color black
Bending radius **R**
Width index Ø
Series / "Easy"-design


TRE - "Easy"-design, with **Bi 40** mm inner width and **R 058** mm radius, color black = Part No. TRE.40.058.0

TRL - light and low-cost alternative with "Easy" Design

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

Able to move multi-dimensionally - Twist up to approx. $\pm 10^\circ$ per link possible in longitudinal axis

Easy opening mechanism for easy filling with cable and hose packages

Extremely light due to one-piece design

Easy assembly and dismantling - one die-cast component

igumid NB: -40° up to $+80^\circ$ C
VDE 0304 IIC UL94 V2

Small bending radii and short pitch

Economical and light mounting bracket with strain relief or intermediate link

Robotic applications, light and low-cost

When to use Series TRL:

- When an easy to fill, economical 3D e-chain® is needed
- When 3D e-chain® for easily manageable operating conditions is needed
- If the system has to be shortened or lengthened easily
- If small bending radii are required
- If an easy opening mechanism for easy filling with cable and hose packages is needed



When to use a different igus® Series:

- For circular movements with high loads
- ▶ **System twisterchain® new, from page 2.56**
- If a fully enclosed solution is required
- ▶ **triflex® R - TRC, page 2.12**
- When a rugged, easy to fill variant is needed
- ▶ **triflex® R - TRE, page 2.14**



Available from stock. **Delivery in 24h or today!***

*Delivery time means time until shipping of goods

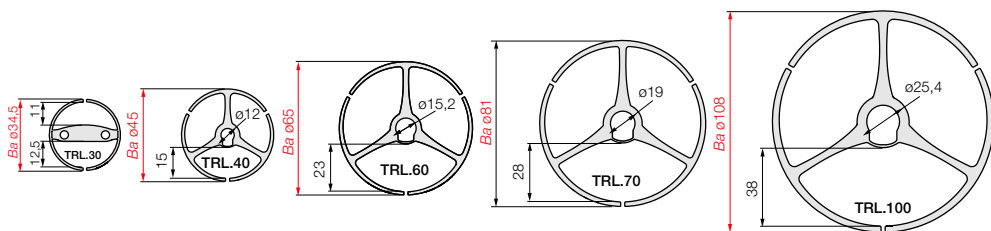


3D-CAD files, configurators, PDF ▶ www.triflex-r.eu

triflex® R | **Series TRL** | Light alternative with "Easy"-design

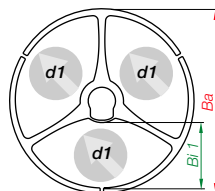
Series TRE Closed design	Bi 1 [mm]	Bi 2 [mm]	Ba [mm]	R mm	d1* mm	d2* mm	Pitch [mm]	Links/m	Weight [kg/m]
TRL.30.050.0	12	10	34,5	050	10	8	11,3	89	≈ 0,15
TRL.40.058.0	15	–	45	058	13	–	13,9	72	≈ 0,20
TRL.60.087.0	23	–	65	087	20,5	–	20,4	49	≈ 0,40
TRL.70.110.0	28	–	81	110	26	–	25,6	39	≈ 0,70
TRL.100.145.0	38	–	108	145	35,5	–	34,5	29	≈ 1,20

For quick and easy insertion / removal of cables using the easy chain principle, we recommend a maximum cable diameter of 70% of the specified value.



Order key

TRL. 70. 110. 0



**TRL.30. with
2-chamber system



TRL - Light design, with **Bi 70** mm inner width and
R 110 mm radius, color black = Part No. **TRL.70.110.0**



Option: Standard mounting brackets

- Quick and easy fixing
- Short downtimes when swapping a harnessed triflex® R system
- Mounting bracket ❶ with strain relief available
- Mounting bracket also as ❷ intermediate link
- Quick assembly by means of spring locks
- Bracket holes for common robot types
- End and intermediate fixing possible

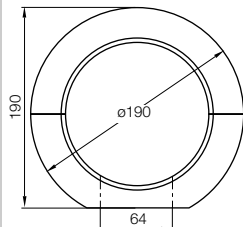
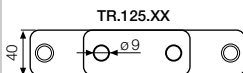


Dimensions and order configurations

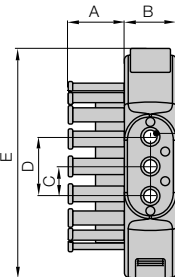
Part No. structure

TR.60. 01. M6

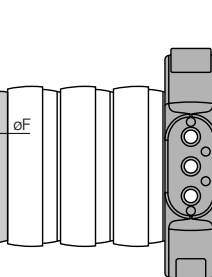
- Option with insert nuts
- With strain relief
- Mounting bracket



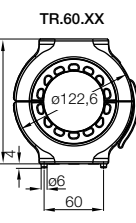
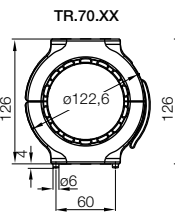
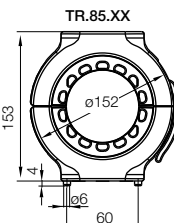
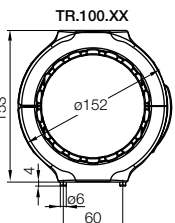
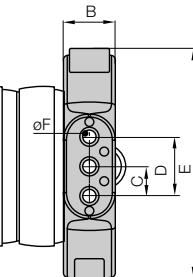
Mounting bracket with strain relief TR.XX.01



Mounting bracket as intermediate link TR.XX.02



Mounting bracket without strain relief TR.XX.02



For Series	Mounting bracket with strain relief	Mounting bracket as intermediate link	Dim. A [mm]	Dim. B [mm]	Dim. C [mm]	Dim. D [mm]	Dim. E [mm]	Dim. ø F [mm]
TRC/TRE/TRL.30. ▶								
TRC/TRE/TRL.40. ▶	TR.40.01.M6	TR.40.02.M6	17,8	21	13,5	27	85	6,5
TRC/TRE/TRL.60. ▶	TR.60.01.M8	TR.60.02.M8	25	35	20	40	126	9
TRC/TRE/TRL.70. ▶	TR.70.01.M8	TR.70.02.M8	25	35	20	40	126	9
TRC/TRE.85. ▶	TR.85.01.M8	TR.85.02.M8	40	35	20	40	153	9
TRC/TRE/TRL.100. ▶	TR.100.01.M8	TR.100.02.M8	38	35	20	40	153	9
TRC/TRE.125. ▶	–	TR.125.02.M8						

TRC/TRE.125 Dimensions and delivery time upon request!

Strain relief is possible on the moving end and/or the fixed end.

Standard: Trough holes in ØF - Option: with insert nuts, steel, M6/M8

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Option: Light mounting brackets

- Standard for TRL version, also compatible with all triflex® R variants (TRC/TRE)
- Mounting bracket ❶ with strain relief available
- Mounting bracket also as ❷ intermediate link available
- Economical and light
- For simple 3D-movements and loads
- Comprising two halves - easy to assemble

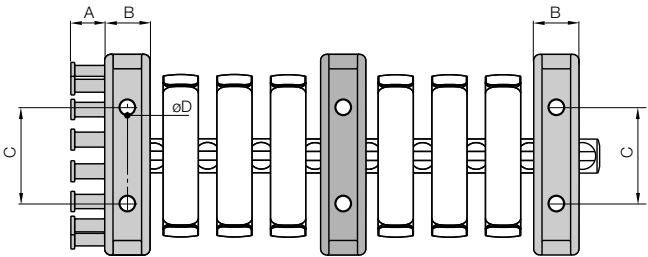


Mounting bracket with
strain relief TL.XX.01.Z2

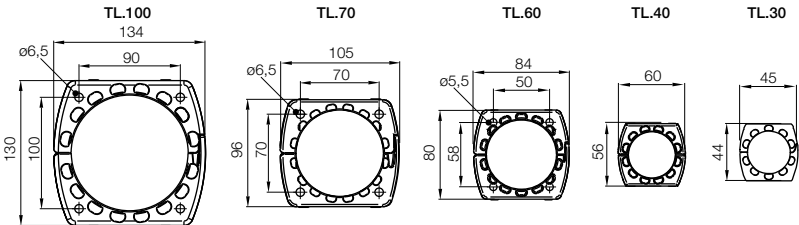
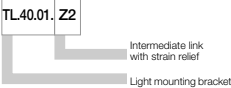
Mounting bracket as
intermediate link TL.XX.01.Z0

Mounting bracket without
strain relief TL.XX.01.Z0

Dimensions and
order configurations



Part No. structure



For Series	Part No.	Dim. A [mm]	Dim. B [mm]	Dim. C [mm]	Dim. ø D [mm]	For fixed end (socket)	For moving end (ball)	As inter- mediate link
TRC/TRE/TRL.30	TL.30.01.Z0	○	13	24	4,5	TRC/TRE/TRL	TRC/TRE/TRL	TRC/TRE/TRL
	TL.30.01.Z1	12,5	13	24	4,5	TRC/TRE/TRL	TRC/TRE/TRL	–
	TL.30.01.Z2	20	13	24	4,5	TRC/TRE/TRL	TRC/TRE/TRL	–
TRC/TRE/TRL.40	TL.40.01.Z0	○	14	36	5,8	TRC/TRE/TRL	TRC/TRE/TRL	TRC/TRE/TRL
	TL.40.01.Z1	12,5	14	36	5,8	TRC/TRE/TRL	TRL	–
	TL.40.01.Z2	20	14	36	5,8	TRC/TRE/TRL	TRC/TRE/TRL	–
TRC/TRE/TRL.60	TL.60.01.Z0	○	20	48	5,8	TRC/TRE/TRL	TRC/TRE/TRL	TRC/TRE/TRL
	TL.60.01.Z1	17	20	48	5,8	TRC/TRE/TRL	TRL	–
	TL.60.01.Z2	27	20	48	5,8	TRC/TRE/TRL	TRC/TRE/TRL	–
TRC/TRE/TRL.70	TL.70.01.Z0	○	27	64	6,5	TRC/TRE/TRL	TRC/TRE/TRL	TRC/TRE/TRL
	TL.70.01.Z1	17,5	27	64	6,5	TRC/TRE/TRL	TRL	–
	TL.70.01.Z2	27,5	27	64	6,5	TRC/TRE/TRL	TRC/TRE/TRL	–
TRC/TRE/TRL.100	TL.100.01.Z0	○	30	64	6,5	TRC/TRE/TRL	TRC/TRE/TRL	TRC/TRE/TRL
	TL.100.01.Z1	22,5	30	64	6,5	TRC/TRE/TRL	TRL	–
	TL.100.01.Z2	42,5	30	64	6,5	TRC/TRE/TRL	TRC/TRE/TRL	–

○ = without strain relief – = not possible

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Option: Swivel bearing - smooth motion

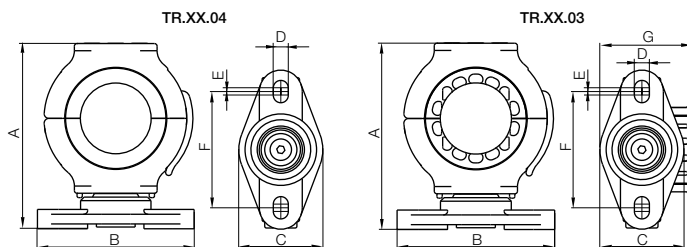
- To smoothen the motion of the cables requiring guidance, it is necessary to allow for extreme twisting and bending. This relieves cables with highly sensitive bending radii (such as fiber optic cables) when following a robot's movements. Swivel bearings are used to achieve this
- Available in 2 designs (with or without strain relief)
- Pivoted bearing with a maintenance-free igubal® ball-and-socket joint
- Minimization of critical bending cycles
- Gentler motion

Dimensions and order configurations

Part No. structure

TR.60. 03. / 04.

Intermediate link
With strain relief
Mounting bracket

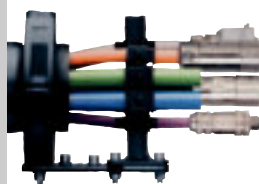


For Series	Standard	Swivel bearing with tiewrap plate	Swivel bearing as intermediate links	Dim. A [mm]	Dim. B [mm]	Dim. C [mm]	Dim. D [mm]	Dim. E [mm]	Dim. F [mm]	Dim. G* [mm]
TRC/TRE/TRL.40.	► TR.40.03	TR.40.04		105	89	47	8,4	4,1	65	51,8
TRC/TRE/TRL.60.	► TR.60.03	TR.60.04		152	118	65	10,5	5,5	87,5	73,5
TRC/TRE/TRL.70.	► TR.70.03	TR.70.04		152	118	65	10,5	5,5	87,5	73,5
TRC/TRE.85.	► TR.85.03	TR.85.04		179	118	65	10,5	5,5	87,5	88
TRC/TRE/TRL.100.	► TR.100.03	TR.100.04		179	118	65	10,5	5,5	87,5	88

*Only TR.XX.03

Strain relief systems (only for TRC/TRE) - Secure mounting of large cross sections with igus® standard chainfix clamps

- Available in 3 options per size
- Multiaxially adjustable, for ideal positioning
- Suits all additional axes: Ø 30 mm, Ø 32 mm, Ø 34 mm

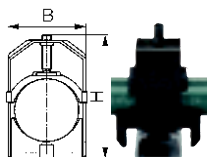


Product range clamps

Part No. Steel	Part No. Stain-less Steel*	ø [mm]	B [mm]	H [mm]
CFX12.1	CFX12.1.E	6 - 12	16	58
CFX14.1	CFX14.1.E	12 - 14	18	50
CFX16.1	CFX16.1.E	14 - 16	20	52
CFX18.1	CFX18.1.E	16 - 18	22	54
CFX20.1	CFX20.1.E	18 - 20	24	56
CFX22.1	CFX22.1.E	20 - 22	26	58

Part No. Steel	Part No. Stain-less Steel*	ø [mm]	B [mm]	H [mm]
CFX26.1	CFX26.1.E	22 - 26	30	67
CFX30.1	CFX30.1.E	26 - 30	34	71
CFX34.1	CFX34.1.E	30 - 34	38	75
CFX38.1	CFX38.1.E	34 - 38	42	79
CFX42.1	CFX42.1.E	38 - 42	46	83

*Material stainless steel: 1.4301



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triflex® R Quick exchange kit
TR.60/70/85/100.22.XX

- Ideal for triflex® R readychain®
- One-time-only alignment
- No repeat alignment upon exchange of readychain®
- Exchange of th triflex® R unit incl. cables without any tools

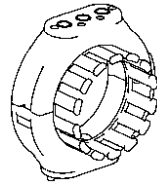


For e-chain®	Part No. Quick exchange kit
TRC/TRE.60 ▶	TR.60.22. 30 / 32 / 34
TRC/TRE.70 ▶	TR.70.22. 30 / 32 / 34
TRC/TRE.85 ▶	TR.85.22. 30 / 32 / 34
TRC/TRE.100 ▶	TR.100.22. 30 / 32 / 34

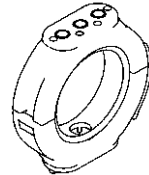
For required additional axes Ø 30, 32, 34 mm, please add appropriate Index e.g. TR.100.22 30

triflex® R pivot bracket
TR.60/70/85/100.21.XX

- Available in 2 options per size (with/without strain relief)
- Safe and simple securing of the cables with cable ties
- Possible also without strain relief (Strain relief in the application)



Pivot bracket with strain relief TR.XX21.01



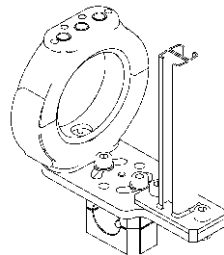
Pivot bracket with strain relief TR.XX21.02

For e-chain®	Part No. Pivot bracket with strain relief	Part No. Pivot bracket without strain relief
TRC/TRE.60 ▶	TR.60.21.01. 30 / 32 / 34	TR.60.21.02. 30 / 32 / 34
TRC/TRE.70 ▶	TR.70.21.01. 30 / 32 / 34	TR.70.21.02. 30 / 32 / 34
TRC/TRE.85 ▶	TR.85.21.01. 30 / 32 / 34	TR.85.21.02. 30 / 32 / 34
TRC/TRE.100 ▶	TR.100.21.01. 30 / 32 / 34	TR.100.21.02. 30 / 32 / 34

For required additional axes Ø 30, 32, 34 mm, please add appropriate Index e.g. TR.100.21.01 30

triflex® R connection
TR.60/70/85/100/125.20.XX

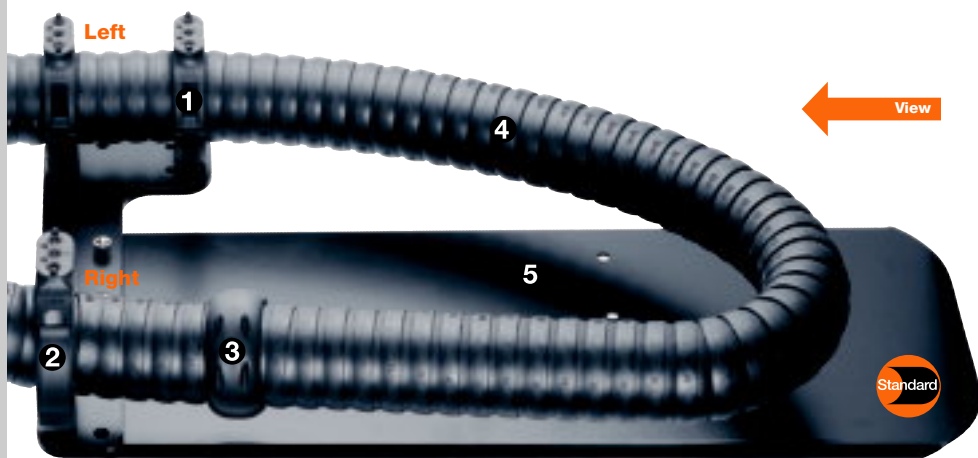
- In the use of cables with large cross section, e.g. welding applications or in heavy hydraulic hoses
- Double C rails for igus® CFX clips
- Rugged strain relief in "heavy-duty" applications
- igus® chainfix clamps made of stainless steel or steel can be used (see Table on the left)



For e-chain®	Part No. connection
TRC/TRE.60 ▶	TR.60.20. 30 / 32 / 34
TRC/TRE.70 ▶	TR.70.20. 30 / 32 / 34
TRC/TRE.85 ▶	TR.85.20. 30 / 32 / 34
TRC/TRE.100 ▶	TR.100.20. 30 / 32 / 34
TRC/TRE.125 ▶	TR.125.20. 30 / 32 / 34

For required additional axes Ø 30, 32, 34 mm, please add appropriate Index e.g. TR.100.20 30





triflex® RS - Extremely flat design,
guides close to the robotic arm



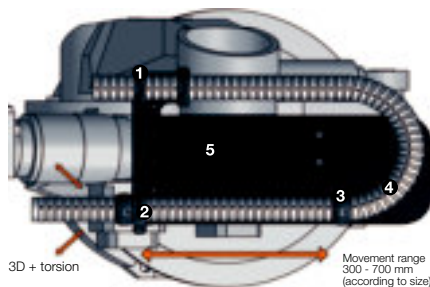
Integrated recuperating spring
prevents loop formations

Universal module for any robotic motion

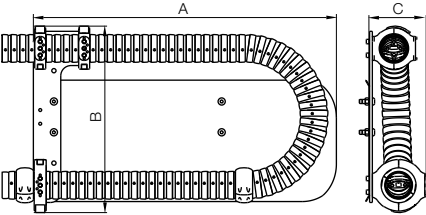
triflex® RS is a very compact universal module that can be attached to the fastening points on the robot. Applications in very limited space can be realized, thanks to the small installation height and to the fact that triflex® RS can be installed parallel to the robotic arm. triflex® RS with integrated spring mechanism allows efficient energy supply to the robotic head, without stress on the cables. The triflex® R kit offers all advantages of proven triflex® accessories, such as the FlexBar, universal assembly kit and fiber rod module in one system. All triflex® R features are also included in the universal triflex® RS module.

- **Standard-package** for all applications for immediate installation
- **Integrated spring mechanism**
- **The first choice for robotic applications with limited space**
- **Saves space - small installation height and closely routed on the robotic arm**
- **Outstanding service life**
- **Universal installation**

- ① Mounting brackets for safe fastening
- ② Glide lead-through for a close and parallel guidance on the robotic arm
- ③ Limit stop dog for a defined free movement
- ④ Integrated recuperating spring prevents loop formations
- ⑤ Single module, space-saving and quickly mounted on robot



triflex® RS - Installation Dimensions



triflex® RS - Fastening point, right

Universal module	Part No.	A	B	C
TRS for Series		[mm]	[mm]	[mm]
TRC.40/TRE.40	► TRC/TRE.RS.40.R	620	301	95
TRC.60/TRE.60	► TRC/TRE.RS.60.R	885	528	150
TRC.70/TRE.70	► TRC/TRE.RS.70.R	885	545	167
TRC.85/TRE.85	► TRC/TRE.RS.85.R	885	565	167
TRC.100/TRE.100	► -	-	-	-

triflex® RS - Fastening point, right, with cover

Universal module	Part No.	A	B	C
TRS for Series		[mm]	[mm]	[mm]
TRC.40/TRE.40	► TRC/TRE.RS.40.RC	620	301	95
TRC.60/TRE.60	► TRC/TRE.RS.60.RC	885	528	150
TRC.70/TRE.70	► TRC/TRE.RS.70.RC	885	545	167
TRC.85/TRE.85	► TRC/TRE.RS.85.RC	885	565	167
TRC.100/TRE.100	► TRC/TRE.RS.100.RC	912,5	614	167

triflex® RS - Fastening point, left

Universal module	Part No.	A	B	C
TRS for Series		[mm]	[mm]	[mm]
TRC.40/TRE.40	► TRC/TRE.RS.40.L	620	301	95
TRC.60/TRE.60	► TRC/TRE.RS.60.L	885	528	150
TRC.70/TRE.70	► TRC/TRE.RS.70.L	885	545	167
TRC.85/TRE.85	► TRC/TRE.RS.85.L	885	565	167
TRC.100/TRE.100	► TRC/TRE.RS.100.L	912,5	614	167

triflex® RS - Fastening point, left, with cover

Universal module	Part No.	A	B	C
TRS for Series		[mm]	[mm]	[mm]
TRC.40/TRE.40	► TRC/TRE.RS.40.LC	620	301	95
TRC.60/TRE.60	► TRC/TRE.RS.60.LC	885	528	150
TRC.70/TRE.70	► TRC/TRE.RS.70.LC	885	545	167
TRC.85/TRE.85	► TRC/TRE.RS.85.LC	885	565	167
TRC.100/TRE.100	► -	-	-	-

Fastening point, right



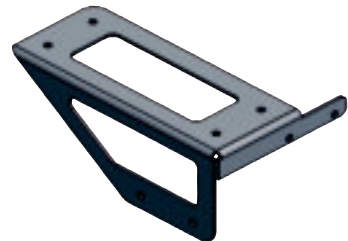
triflex® R-Set with cover for the additional support of switch cabinets or valve terminals

triflex® R - More accessories available now ...



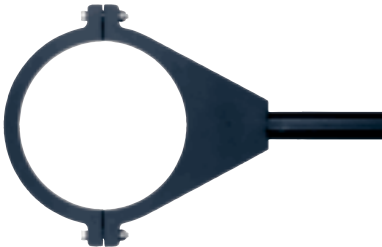
triflex® R-Set with cover (barrier)

- Creates more mounting space on robots - e.g. for switch cabinets or valve terminals
- For upside down applications
- Enables the use of triflex® RS in applications with extreme movements



43 Adapter brackets for robots from stock

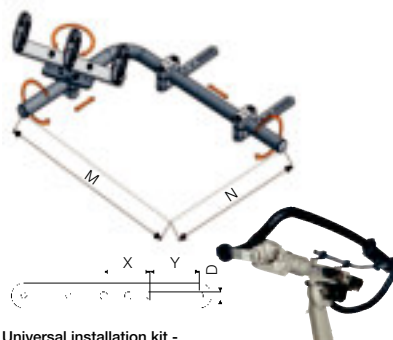
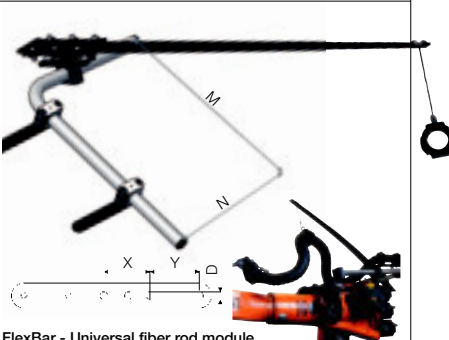
- 43 adapter bracket types from stock for many different robots
- For all triflex® RS modules
- For assembly to the side or on top
- Free download of 3D CAD files for many brackets ► www.igus.eu/triflexbrackets



triflex® R fixation to axis 6
Part No. TR.907.667.Inner Ø

- One axis diameter (Ø30 mm) for all robots
- Easy and fast assembly
- For triflex® R mounting bracket with CFX clamps (TR.XX.20.30)
- For triflex® R mounting bracket with tiewrap plates (TR.XX21.30)
- For TR.XX.22.30 Quick exchange kit



Other accessories available
for special applications...Fiber rod modules - Intelligent
problem solution through
directed pretension (for TRC/TRE)Universal installation kit -
Easy engineering of the
fiber rods (for TRC/TRE)FlexBar - Universal fiber rod module
for extreme robotic movements
(for TRC/TRE)The igus® universal module as
standard triflex® R-Set ► page 2.22Fiber rod module, universal assembly kit and
FlexBar as individual parts for triflex® R

Fiber rod module: For applications where too much flexibility is not desired. **Universal installation kit:** Universal installation kit allows the attachment of fiber rod modules in any given position, relative to the robotic arm. **FlexBar:** For robot-applications with extreme movements in the 4th to 6th axis and avoidance from loops

Product range - Fiber rods

Part No. TRC/TRE with mounted fiber rods	Length ca. [m]	max. load [kg/m]
triflex® R 40	TRC.F.40.1000.1.0/TRE.F.40.1000.1.0	1,0 0,4
	TRC.F.40.0900.1.0/TRE.F.40.0900.1.0	0,9 0,5
	TRC.F.40.0800.1.0/TRE.F.40.0800.1.0*	0,8 0,6
	TRC.F.40.0700.1.0/TRE.F.40.0700.1.0	0,7 0,7
	TRC.F.40.0600.1.0/TRE.F.40.0600.1.0	0,6 0,8
	TRC.F.40.0500.1.0/TRE.F.40.0500.1.0	0,5 0,9
triflex® R 60	TRC.F.60.0400.1.0/TRE.F.60.0400.1.0	0,4 1,0
	TRC.F.60.1400.1.0/TRE.F.60.1400.1.0	1,4 1,0
	TRC.F.60.1200.1.0/TRE.F.60.1200.1.0	1,2 1,2
	TRC.F.60.1000.1.0/TRE.F.60.1000.1.0*	1,0 1,4
	TRC.F.60.0800.1.0/TRE.F.60.0800.1.0	0,8 1,6
	TRC.F.60.0600.1.0/TRE.F.60.0600.1.0	0,6 1,8
triflex® R 70	TRC.F.70.0400.1.0/TRE.F.70.0400.1.0	0,4 2,0
	TRC.F.70.1800.1.0/TRE.F.70.1800.1.0	1,8 1,4
	TRC.F.70.1600.1.0/TRE.F.70.1600.1.0	1,6 1,6
	TRC.F.70.1400.1.0/TRE.F.70.1400.1.0	1,4 1,8
	TRC.F.70.1200.1.0/TRE.F.70.1200.1.0*	1,2 2
	TRC.F.70.1000.1.0/TRE.F.70.1000.1.0	1,0 2,2
triflex® R 85	TRC.F.85.2000.1.0/TRE.F.85.2000.1.0	2,0 1,4
	TRC.F.85.1800.1.0/TRE.F.85.1800.1.0	1,8 1,7
	TRC.F.85.1600.1.0/TRE.F.85.1600.1.0	1,6 1,9
	TRC.F.85.1400.1.0/TRE.F.85.1400.1.0*	1,4 2,1
	TRC.F.85.1200.1.0/TRE.F.85.1200.1.0	1,2 2,3
	TRC.F.85.1000.1.0/TRE.F.85.1000.1.0	1,0 2,6
triflex® R 100	TRC.F.100.0800.1.0/TRE.F.85.0800.1.0	0,8 3,0
	TRC.F.100.2000.1.0/TRE.F.100.2000.1.0	2,0 1,6
	TRC.F.100.1800.1.0/TRE.F.100.1800.1.0	1,8 2,0
	TRC.F.100.1400.1.0/TRE.F.100.1400.1.0*	1,4 2,4
	TRC.F.100.1600.1.0/TRE.F.100.1600.1.0	1,6 2,2
	TRC.F.100.1200.1.0/TRE.F.100.1200.1.0	1,2 2,6
triflex® R 100	TRC.F.100.1000.1.0/TRE.F.100.1000.1.0	1,0 3,0

*recommended lengths of the fiber rods

Product range - Universal installation kit

Installation kit for Series	Part No.	X [mm]	Y [mm]	M [mm]	N [mm]	D [mm]
TRC/TRE.40	► TR.40.80	40	30	475	325	6,3
TRC/TRE.60	► TR.60.80	40	30	475	325	6,3
TRC/TRE.70	► TR.70.80	75	80	875	575	12,5
TRC/TRE.85	► TR.85.80	75	80	875	575	12,5
TRC/TRE.100	► TR.100.80	75	80	875	575	12,5

Product range - FlexBar

FlexBar for Series	Part No.	X [mm]	Y [mm]	M [mm]	N [mm]	D [mm]
TRC/TRE.60	► TR.60.90	40	30	475	325	6,3
TRC/TRE.70	► TR.70.90	75	80	875	575	12,5
TRC/TRE.85	► TR.85.90	75	80	875	575	12,5
TRC/TRE.100	► TR.100.90	75	80	875	575	12,5

triflex® R protectors - high safety under extreme operating conditions

- To achieve long life cycles under heavy loads resulting from impact or friction on the robot's e-chains®, optional protectors can be fitted at the contact points
- Easy assembly and quick replacement
- Abrasion-resistant TPU material
- Absorptive
- Light
- Easy gliding over edges
- Free positioning on any e-chain® link

For Series	Part No. protectors	Ø D [mm]	A [mm]
TRC/TRE.40	► TR.40.10 upon request	55	27
TRC/TRE.60	► TR.60.10 upon request	80	40
TRC/TRE.70	► TR.70.10 upon request	102	50
TRC/TRE.85	► TR.85.10 TR.85.30	118	59
TRC/TRE.100	► TR.100.10 upon request	133	67
TRC/TRE.125	► TR.125.10 upon request	170	82



triflex® R cover:

Heat shield - TR.XX.15

- Protection against weld spatter and metal splashes at temp. of up to 600°C (short-term)
- Base support: Fabric
- Coating: Aramid
- Easy to replace via longitudinally positioned velcro fastenings
- Elastic sealing strips
- Asbest-free
- Standard lengths available ex stock

For Series	TR.XX.15 Part No.	Standard lengths [mm]
	YY = Jacket length	
TRC/TRE/TRL.40	► TR.40.15 YY	500 1000 1500 2000
TRC/TRE/TRL.60	► TR.60.15 YY	500 1000 1500 2000
TRC/TRE/TRL.70	► TR.70.15 YY	500 1000 1500 2000
TRC/TRE.85	► TR.85.15 YY	500 1000 1500 2000
TRC/TRE/TRL.100	► TR.100.15 YY	500 1000 1500 2000



Standard protective jacket - TR.XX.16

- Temperature up to room temp.
- Base support: Fabric
- Coating: None
- Easy to replace via longitudinally positioned velcro fastenings
- Elastic sealing strips
- Silicon-free
- Standard lengths available ex stock

For Series	TR.XX.16 Part No.	Standard lengths [mm]
	YY = Jacket length	
TRC/TRE/TRL.40	► TR.40.16 YY	500 1000 1500 2000
TRC/TRE/TRL.60	► TR.60.16 YY	500 1000 1500 2000
TRC/TRE/TRL.70	► TR.70.16 YY	500 1000 1500 2000
TRC/TRE.85	► TR.85.16 YY	500 1000 1500 2000
TRC/TRE/TRL.100	► TR.100.16 YY	500 1000 1500 2000



Light protective jacket - TR.XX.17

- Temperature up to room temp.
- Base support: Fabric (spun-bonded web)
- Coating: None
- Easy to replace via longitudinally positioned velcro fastenings
- Elastic sealing strips
- Silicon-free
- Standard lengths available ex stock

For Series	TR.XX.17 Part No.	Standard lengths [mm]
	YY = Jacket length	
TRC/TRE/TRL.40	► TR.40.17 YY	500 1000 1500 2000
TRC/TRE/TRL.60	► TR.60.17 YY	500 1000 1500 2000
TRC/TRE/TRL.70	► TR.70.17 YY	500 1000 1500 2000
TRC/TRE.85	► TR.85.17 YY	500 1000 1500 2000
TRC/TRE/TRL.100	► TR.100.17 YY	500 1000 1500 2000



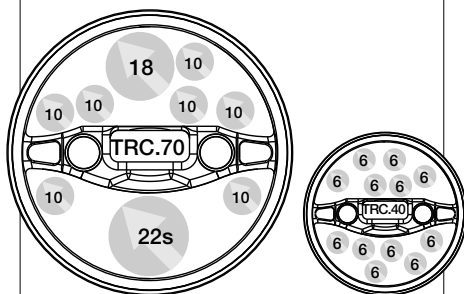
Determining the cable area



Mounting bracket TR.70.01 - Strain relief for electric cables



We would be glad to help you in the selection of the right size with our triflex® R project planning software



Examples of filling TRC.70 and TRC.40

Choice of the right e-chain® length

Filling and correct sizing - Clearance for cables and hoses is important when filling triflex® R, in order to compensate for friction forces due to relative movement between e-chain® and filling. The following serves as a rule of thumb: The total of all cable/hose diameters must not exceed 60% of the available cross section. A clearance of min. 10% (min. 1mm) needs to be maintained towards the next cable and the triflex® R. Please see the attached chart for available cross sections. igus® will be glad to run such calculations for you.

For Series	Effective areas [mm²]	For Series	Effective areas [mm²]
TRC/TRE.30	313	TRL.30	313
TRC/TRE.40	508	TRL.40	670
TRC/TRE.60	1144	TRL.60	1499
TRC/TRE.70	1788	TRL.70	2342
TRC/TRE.85	2431	-	-
TRC/TRE.100	3176	TRL.100	4125
TRC/TRE.125	4584	-	-

Example of determining cable area

$$A_{\text{Leitung}} = \frac{d^2 \times \pi}{4}$$

Examples :

$$\begin{aligned} A_1 &= (10 \text{ mm} \times 10 \text{ mm} \times \pi) / 4 \\ &= 78,5 \text{ mm}^2 \times 7 \text{ (number of cables)} \\ &= 549,50 \text{ mm}^2 \end{aligned}$$

$$\begin{aligned} A_2 &= (18 \text{ mm} \times 18 \text{ mm} \times \pi) / 4 \\ &= 254,34 \text{ mm}^2 \end{aligned}$$

$$\begin{aligned} A_3 &= (22 \text{ mm} \times 22 \text{ mm} \times \pi) / 4 \\ &= 379,94 \text{ mm}^2 \end{aligned}$$

$$A_{\text{Leitung}} = A_1 + A_2 + A_3 = 1183,7 \text{ mm}^2$$

The smaller the ratio between the effective area and the sum of the cable areas, the lower the load on the cables

Customer-specific special cable for robotic and torsion applications

● Control, motor, servo, bus and data cables ● Shielded and unshielded ● Outer jacket material: PVC, PUR, TPE ● Special cables from 500 m ● Torsion area according to requirement ● Sectors: Robotic and 3D applications

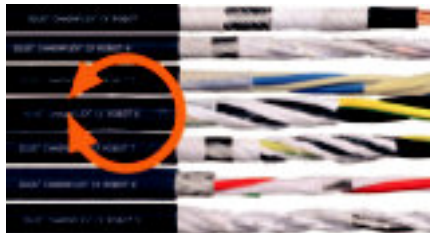
The service life of cables in torsion applications depend disproportionately on the exact progression of the angle of torsion and the cable length of the exact application. As a single test facility is often insufficient, chainflex® cables are tested on various constructional systems. Your torsion cables are tested as realistic as possible for your application. For this purpose, igus® uses up to 8 different test facilities in the in-house laboratory.

chainflex® robotic cables CF ROBOT - Twistable cables for robots available from stock

The proven CFROBOT cable family that is available from stock is now UL and CSA certified. All deliveries from 05/2011 are manufactured with the approvals.

- From 1 m, no minimum requirements
- $\pm 180^\circ$ on 1 m
- 3,000,000 cycles tested

More information ► www.igus.eu/chainflexnews



NEW in this catalog CF77.UL.D - chainflex® PUR control cable, $\pm 180^\circ$ twistable

For twistable load requirements

More information ► www.igus.eu/chainflexnews



triflex® R - readychain® cable packages for robots

High component holding times and low downtimes are of the highest priority in manufacturing plants. With a triflex® R readychain® we design and develop a customized readychain® system for you, consisting of the "construction kits" triflex® R, chainflex® and igus® connectors. An installation can of course be executed by our triflex® R installation engineers on your site.

Your advantages:

- Reduces your storage costs to zero for cables, e-chain® and connectors
- Cuts your running time by half
- Responds flexibly to order variations
- Minimize machine downtimes
- Reduce the number of suppliers and orders by 75%

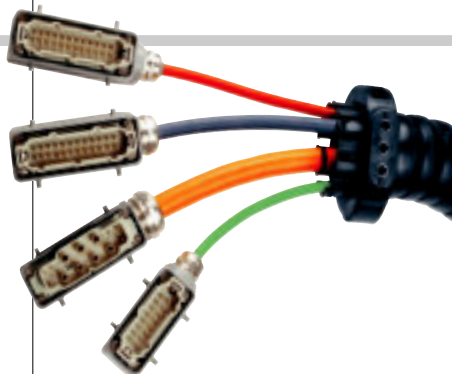
triflex® R - Tests in the igus® lab



Testing facility at the igus® laboratory



Torsion test of CF-ROBOT



Ready-made packages in 3 to 10 days

triflex® R

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On-location assembly by the igus® specialist team



igus® system warranty - igus® warranty certificates will be issued for your application individually. "chain, cable, warranty"

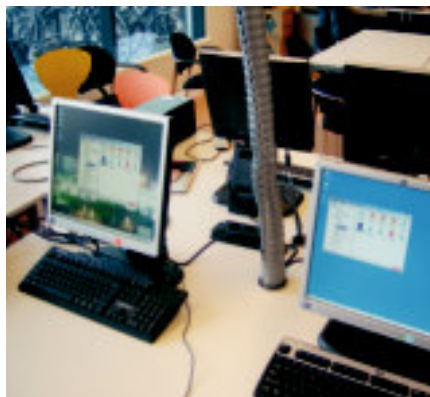
We maximize your robot application's service life

Robot applications are very diverse and sometimes extremely complex in terms of configuration. To maximize your robot application's service life with triflex® R, igus® has a specially trained, robotics planning and installation team which can install triflex® R e-chains® into your applications. Minimize your planning effort by delegating as many tasks as possible to us. Our trained staff offer support toward smooth project implementation every step of the way - whether you simply want to consult our assembly team or have an entire system of machines planned and installed. By telephone we can always provide answers to a host of questions and point out all the advantages of triflex® R for your company. On site, we can acquire all the data necessary for preparing detailed planning documents. From project planning through customized quotations right up to expert installation of the triflex® R on your site, we remain at your service round the clock.

- We also offer guarantee certificates for complete systems
- No minimum order quantities, no surcharges
- 1500 staff in Germany and at 26 international subsidiaries and offices. Stations in over 30 other countries

Your advantage

- We are wherever you need us
- Your service requirements are fulfilled quickly by experts on location
- Guaranteed, fast worldwide delivery
- Spare parts are available from stock at short notice
- Order tracking via igus® "i-net" - www.igus.de/en/i-net



IF-award-winning triflex® R TRE for a safe energy supply also in office equipment



Cable management in a TV studio with triflex® R



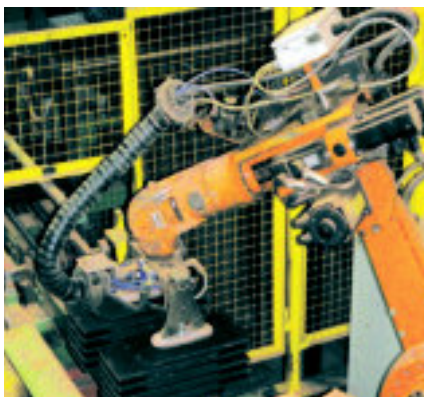
igus® System E6 and triflex® R TRE in a Y/Z-gantry



Torsion testing of triflex® R in the igus® laboratory, Cologne



igus® E2 e-tube and triflex® R in a processing machine



Optimal cable guidance even under extreme conditions, such as here in the Jungmeier roof tile plant

Many well-known companies are already taking advantage of triflex® R. For example: Alcan, Audi AG, BMW, DaimlerChrysler, Dürr, Eisenmann, Fanuc, Ford, Index, ISE, Kawasaki, Kuka, Land Rover, Opel, Renault, SCA Schucker, Tower Automotive, Toyota, Volkswagen.

triflex® R

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