ROBOTRAX® System

Cable carrier for 3D movements

product design award 2006

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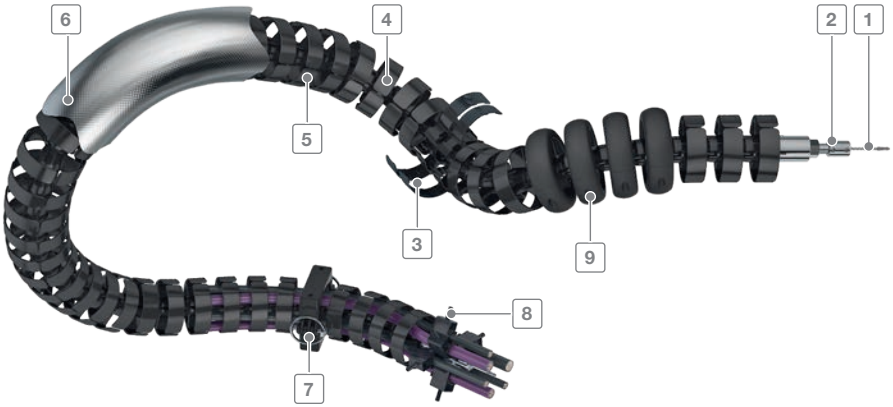
ROBOTRAX® System | Overview



1 Steel cable for transferring extremely high tensile forces

2 Tension piece for locking the chain links

3 Type with toolless opening swivel crossbars and divider module available

4 Open design
- Fast cable laying as the cables are simply pressed in
- Easy checking of all cables

5 Special plastic for long service life

6 Protective covers or heat shields made from different materials are available for different environmental conditions

7 Quick-release bracket for fixing and continuation

8 Strain relief with Line-Fix clamps

9 Protection against hard impacts, excessive abrasion and premature wear as well as limitation of the bending radius through protector

Features

- Suitable for three-dimensional swivel and rotation movements
- Ideal for a long service life of the cables:
  - The bending radius does not fall below the minimum when using protectors
  - The cables can be separated in three chambers
- Also ideal for turntables

Swiveling crossbars and divider module (R140X)

Active return mechanism with the PBU pull back unit (R040 – R100)

Fast cable laying by simply pressing in the cables (R040 – R100)

Strain relief for secure fixing of the cables

Subject to change.

ROBOTRAX® System | Overview

Type	Opening variant	h_i [mm]	B_i [mm]	D_a [mm]	t [mm]	KR [mm]	Radial link rotation on 1 m length [°]	Additional load ≤ [kg/m]	Cable-d_{max} [mm]	Page
R040										
		10	27	40	21.5	70 [75]	± 450	0,7	8,5	626
R056										
		14	39	56	32	90 [105]	± 300	1,1	11	626
R075										
		22	52	75	40	125 [140]	± 215	4	18	626
R085										
		24	54	85	40	130 [170]	± 215	5	20	626
R100										
		31	64	100	40	130 [175]	± 215	6	27	626

Values in [ ] apply when using protectors

Type	Opening variant	h_i [mm]	B_i [mm]	D_a [mm]	t [mm]	KR [mm]	Radial link rotation on 1 m length [°]	Additional load ≤ [kg/m]	Cable-d_{max} [mm]	Page
R140X										
		48	74	140	50	125 [225]	± 400	10	42	627

Values in [ ] apply when using protectors

Subject to change.

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27 – 74 Inner widths

10 – 48 Inner heights

ROBOTRAX® system

ROBOTRAX® System | Design principle

ROBOTRAX®

Pitch 21.5 – 40 mm

Inner heights 10 – 31 mm

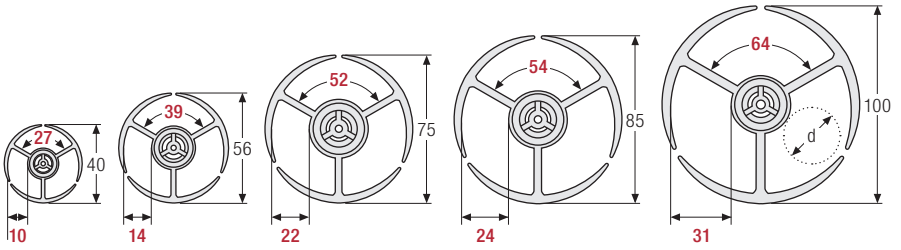
Inner widths 27 – 64 mm

Bending radii 70 – 130 mm

Chain links single part

The basic structure of ROBOTRAX® consists of plastic links. These have spherical snap-on connections on both sides. This allows the individual links to be snapped together to form a cable carrier.

Protectors ensure that the bending radius does not fall below the minimum in any direction. The links can be rotated in the radial direction (see table values). The cables can be separated in three chambers.



Dimensions

Type	t [mm]	KR [mm]	Radial rotation possible on 1 m length [°]	d* [mm]	Number of links per m
R040	21.5	70 [75]	± 450	2 – 8.5	47
R056	32	90 [105]	± 300	2 – 11	31
R075	40	125 [140]	± 215	3 – 18	25
R085	40	130 [170]	± 215	3 – 20	25
R100	40	130 [175]	± 215	3 – 27	25

Values in [] apply when using protectors
*We recommend a maximum cable diameter of 70 % of the highest specified value

Order example

R040	.	010	.	70	-	1075
Type		Design*		KR [mm]		L_k [mm]

* Type 010: cables are simply pressed in

Calculating the cable carrier length

Cable carrier length L_k

$L_k = n \times t$

Subject to change.

Pitch 50 mm

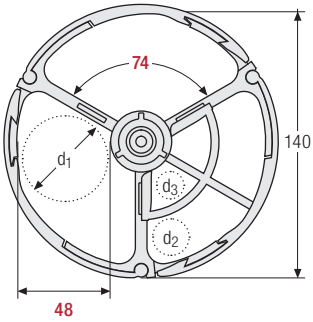
Inner height 48 mm

Inner width 74 mm

Bending radius 125 mm

Chain links with corssbars

The basic construction is similar to the ROBOTRAX® types with single part design. Swiveling crossbars with snap locks make it easy to open and safely close the cable carrier. In addition, the three chambers can be divided horizontally and vertically by a divider module for precisely separating cables and hoses.



R140X

Dimensions and order

Type	t [mm]	KR [mm]	Radial rotation possible on 1 m length [°]	d_1 [mm]	d_2 [mm]	d_3 [mm]	Number of links per m
R140X	50	125 [225]	± 200	42	18	15	20

Values in [] apply when using protectors

Order example

R140X	.	030	.	125	-	1500
Type		Design*		KR [mm]		L_k [mm]

* Type 030: Outside opening crossbars

Calculating the cable carrier length

Cable carrier length L_k

$L_k = n \times t$

Subject to change.

Key for abbreviations on page 16

Design guidelines from page 64

Technical support:
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Cable Carrier Configurator

ROBOTRAX® System | Design principle

Mounting kit

Fast movements of the robot arms generate high accelerations and therefore high tensile forces on the cable carrier.

To transfer these tensile forces, ROBOTRAX® has a hole at the center of each chain link through which the steel cable is pulled. This steel cable takes on the function of force transmission.

The steel cable is fixed with a clamping piece on one side. ROBOTRAX® permits accelerations up to 10 g.

The clamping piece can be used to easily set the chain links to the desired tension and adjust them at any time.

Long service life of the cables and hoses:
The forces are primarily transmitted by the cable carrier and not by cables and hoses.

The mounting set consists of steel cable, clamping and tension piece.

Dimensions

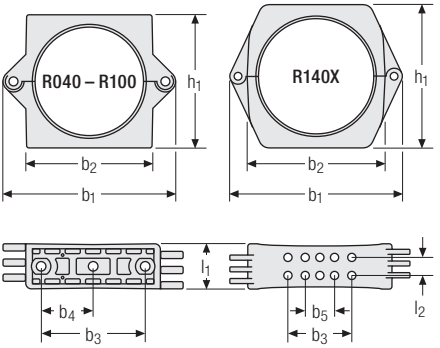
	R040	R056	R075	R085	R100	R140X
Ø cable [mm]	1.8	2.5	3.0	3.0	4.0	4.0

Quick-release brackets

The ROBOTRAX® is fixed and continued with quick-release brackets which are attached with screws. The quick-release brackets fit on any chain link of the respective size. This means the fixing points can be individually adjusted to the motion sequence.

Hinged plug:
Simply unlock, pull out and open the quick-release bracket without tools.

Locking bolt (R140X)**:**
100% recyclable, cost-effective locking bolt, optimized for installation space and environment. The bolt can be assembled and disassembled without tools.



Dimensions

	R040	R056	R075	R085	R100	R140X
h_1 [mm]	54	70	86	105	120	164
l_1 [mm]	15	22	28	30	32	50
l_2 [mm]	–	–	–	–	–	20
b_1 [mm]	82	86	110	133	150	197.4
b_2 [mm]	50	63	82	96	112	158
b_3 [mm]	36	48	64	72	70	70
b_4 [mm]	18	24	32	36	35	35
b_5 [mm]	–	–	–	–	–	32
Screws	2xM4	2xM4	2xM6	2xM8	2xM8	4xM8

Please state the desired type series and quantity when ordering.

Subject to change.

Heat shield/protective cover

Heat shield: The heat shield made from aluminum-coated textile fibers protects the ROBOTRAX® system and inserted cables against flying sparks, weld spatter and radiated heat.

Protective cover: The protective cover made from coated polyester protects against aggressive cutting fluids, hydraulic oils, fine dust and paint spatter.

Please state the desired type series and quantity when ordering.

Strain relief for cable ties

(available for all types)
For secure fixing of the cables.

The strain relief can be used on either end.

Please state the desired type series and quantity when ordering.

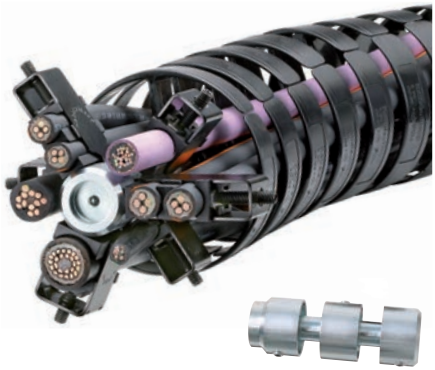
Strain relief LFR

(for types R075, R085, R100 and R140X)
Secure cable fixing, gentle on the cables.

Multi-layer cable fixing is also possible with double and triple LineFix® clamps. Several systems can be installed in sequence.

LineFix® strain reliefs – see page 836.

Please state the desired type series and quantity when ordering.



Key for abbreviations on page 16

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ROBOTRAX® System | System components

PBU pull back unit

(for types R040, R056, R075, R085 and R100)

Please state the number, robot type and type series when ordering.

PBU: With fast movement sequences and large work envelopes, the relatively long carriers knock against the robot arm. The repeated impact significantly reduces the service life of the cable carrier and the cables within, and the entire system can fail. Downtimes cause high costs and problems in the manufacturing process – so they have to be avoided.

- Compact design: fewer interfering contours and lower risk of collision
- Maximum flexibility for cable carrier routing
- No maintenance on the retraction element required
- Standard mounting for KUKA, ABB and FANUC

PBU is available for new robots, regardless of size, manufacturer, type or application, as well as retrofits and upgrades for existing workcells. It can be mounted vertically, horizontally or upside down. The extension length of the LSH 3 is 350 mm.

	R040	R056	R075	R085	R100
H_Z [mm]	187	187	221	221	268

Type	tensile forces F [N]
PBU Light	40.0
PBU Standard	80.0
PBU Heavy	110.0

Protector

The service life of the cable carriers and cables is significantly reduced by impact during fast movement sequences and in large work envelopes. The Protector protects the cable carrier against hard impacts, excessive abrasion and premature wear, while also acting as a limitation for the smallest bending radius. Downtimes are minimized. Not the entire cable carrier has to be replaced, but only the Protector in some cases.

Please state the desired type series and quantity when ordering.

Subject to change.

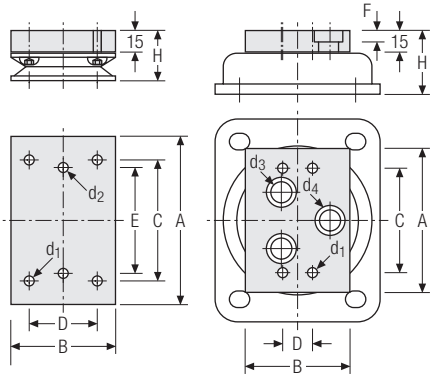
Turntable for quick-release bracket

One additional degree of freedom on the attachments points. When mounted on a turntable, the quick-release bracket can rotate as well, to offer increased flexibility during complex robot movements.

Dimensions

	R040	R056	R075	R085	R100	R140X
A [mm]	57	65	82	96	112	96
B [mm]	57	57	57	70	70	70
C [mm]	43	43	43	75	75	70
D [mm]	43	43	43	45	45	20
E [mm]	36	48	64	72	70	–
F [mm]	–	–	–	–	–	8
H [mm]	25	25	25	34	34	43
d_1 [mm]	M6	M6	M6	M6	M6	M8
d_2 [mm]	M4	M4	M6	M8	M8	–
d_3 [mm]	–	–	–	–	–	14
d_4 [mm]	–	–	–	–	–	20

Please state the desired type series and quantity when ordering.



Set consisting of

Sample image

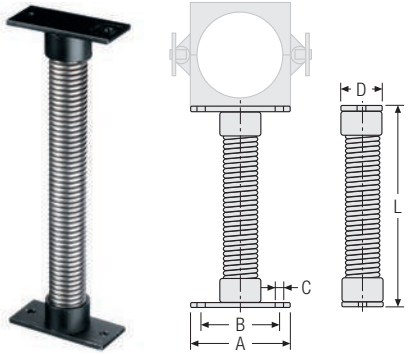
Coil spring for quick-release bracket

If the quick-release bracket is mounted on a coil spring, it can move elastically in all directions, deflect in 3 dimensions and spring back.

Dimensions

	R040	R056	R075	R085	R100
A [mm]	52	64	82	96	112
B [mm]	36	48	64	72	70
C [mm]	5	5	6.5	8.5	8.5
D [mm]	26	30	34	34	34
L [mm]	110	110	–	–	–
	150	150	–	–	–
	–	–	165	165	165
	–	190	–	–	–
	–	–	230	230	230
	–	–	315	315	315
	–	–	465	465	465

Please state the desired type series and quantity when ordering.



Subject to change.