

TSUBAKI CABLEVEYOR (Cable Carriers) TKR28H52-EX

Hose and Cable Carrier System



Low particle generation × Long life



Clean & Long travel length

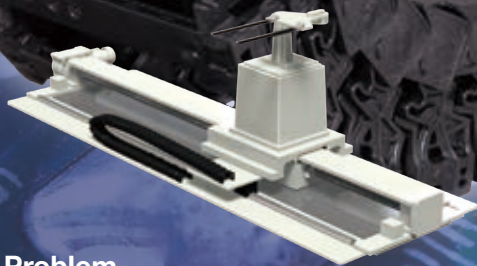
Larger wafers

Long transfer length for robots/sliders

Larger LCDs

Ideal for long transfer lengths in clean rooms, such as the semiconductor industry

Robots that transfer large wafers



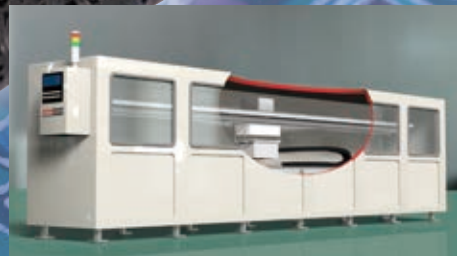
Problem

As wafer diameter increases, the robots used to transfer the wafers must now cover long transfer lengths.

► Proposal

The maximum travel length of 5.94 m protects the cables and ensures their cleanliness and long life, even for robots that travel long length.

Washer equipment



Problem

In fully automated washer equipment, the transfer distance is increased by the improved yield.

► Proposal

A single unit of TKR-EX protects the cables, even with the long transfer distances between processes in wafer cleaning. This improves yield and reduces the time required for cable replacements.

▶ Long transfer lengths in clean rooms

Long travel length

Integrating rigid and flexible materials in a single structure provides strength and flexibility. Enables long travel length and quiet operation thanks to its unique structure.

Integrated structure for sag section too

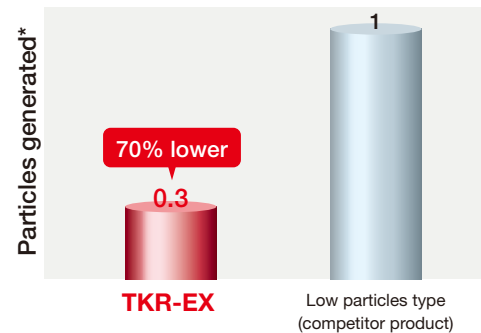


▶ Clean manufacturing

Low particle generation

Unlike the structure of the link, which wears as the pins and holes slide against each other, the bent section has a flexible sag structure without generating many particles.

■ Comparison of particle generation



In-house test conditions

- Installation: Standard (on floor)
- Velocity: 120 m/min
- Acceleration: 4 m/s²
- No cables/tubes

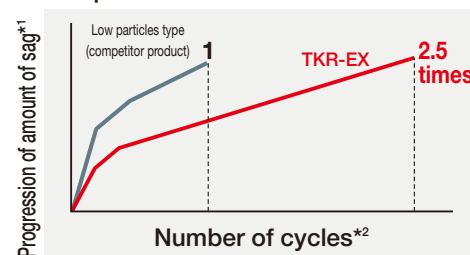
* The amount of generated particles is measured as the number of particles 0.1 μm or larger in one cubic foot, and is expressed as the ratio when the amount for the competitor's product is set at 1.

▶ Long lasting and easy to maintain

Long life

The flexible material comes in a new shape and is highly durable, showing minimal sag distortion whether in the straight or bent sections. In addition, the rigid material extends service life by suppressing the progression of sag in the sections for the unsupported length, which is critical for service life. This reduces the need for replacements.

■ Comparison of service life



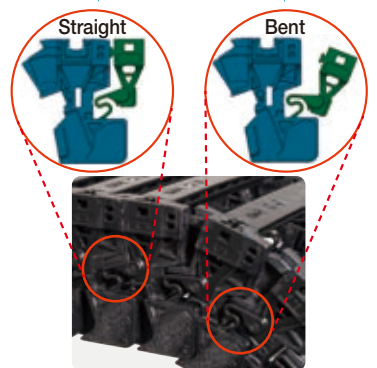
In-house test conditions

- Travel length: 5.78 m (Unsupported length: 2.95 m)
- Cable and tube mass: 0.3 kg/m
- Velocity: 300 m/min
- Acceleration: 2G

*1 Amount of sag is measured at the point where the unsupported length is greatest.

*2 The number of cycles is expressed as the ratio when the number for the competitor's product is set to 1.

Minimal sag distortion



▶ Length can be adjusted after installation

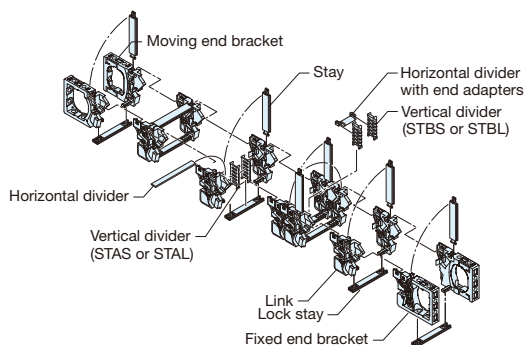
Easy to cut and add links

Uses a unique snap fit link structure that makes it just as easy to cut and add links as traditional plastic cable carriers.

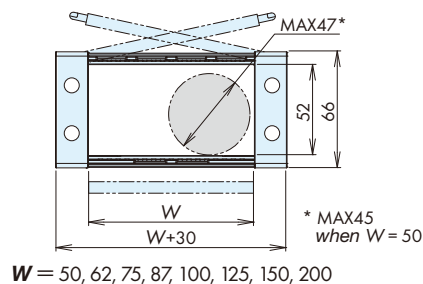
How to cut and join the links? Instruction manual here ▶



Structure



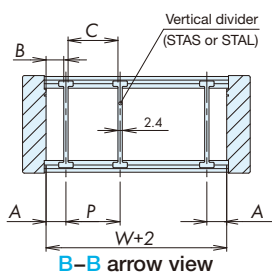
Cross-section dimensions



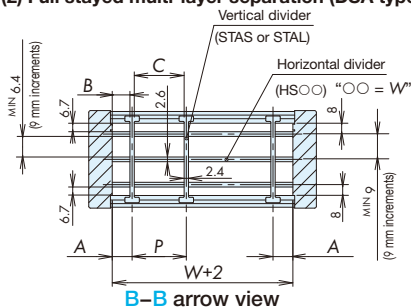
A-A arrow view

Divider dimensions

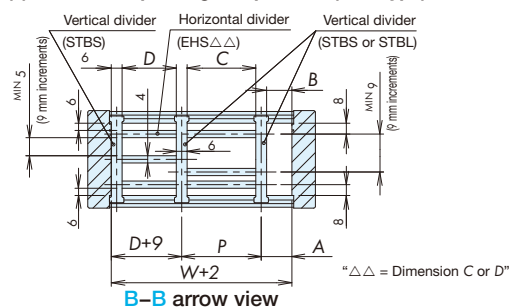
(1) When using only vertical dividers



(2) Full stayed multi-layer separation (DSA type)



(3) Partial multiple height separation (DSB type)

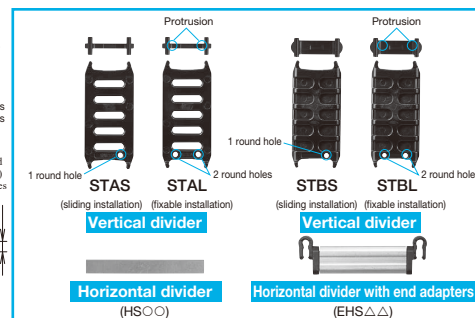
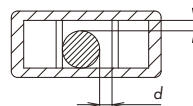


Vertical divider (fastening method)	Inner width W (mm)	A (mm)	B (mm)	P (mm)	C (mm)	D (mm)
STAS (sliding installation)	Common for all widths	4 to 65	2.8 to 63.8	8 to 130	5.6 to 127.6	
STAL (fixable installation)	50	6 to 38	4.8 to 36.8	8 to 40	5.6 to 37.6	
	62	8 to 48	6.8 to 46.8	8 to 48	5.6 to 45.6	
	75	6.5 to 62.5	5.3 to 61.3	8 to 64	5.6 to 61.6	
	87	4.5 to 64.5	3.3 to 63.3	8 to 80	5.6 to 77.6	
	100	7 to 63	5.8 to 61.8	8 to 88	5.6 to 85.6	
	125	7.5 to 63.5	6.3 to 62.3	8 to 112	5.6 to 109.6	
STBS (sliding installation)	150	8 to 64	6.8 to 62.8	8 to 124	5.6 to 121.6	
	200	5 to 65	3.8 to 63.8	8 to 124	5.6 to 121.6	
	50	6	4.8	8	5.6	20 to 36
	62	8	6.8	8	5.6	22 to 46
	75	6.5	5.3	8	5.6	20.5 to 40.5
	87	4.5	3.3	8	5.6	22.5 to 74.5
STBL (fixable installation)	100	7	5.8	8	5.6	21 to 85
	125	7.5	6.3	8	5.6	21.5 to 109.5
	150	8	6.8	8	5.6	22 to 134
	200	5	3.8	8	5.6	23 to 187
	50	6	4.8	8	5.6	20 to 36
	62	8	6.8	8	5.6	22 to 46

Notes:

- A : Distance from center of vertical divider to end face of link
 B : Gap between vertical divider and link
 P : Distance between the centers of neighboring vertical dividers
 C : Gap between neighboring vertical dividers
 D : Gap between neighboring vertical dividers when vertical dividers / dividers for both ends are installed

Note: Make the gap between cables/hoses and the divider or link (d in the right figure) to whichever of the following two values is larger: 2 mm or greater or the outer diameter of the cable or hose x 0.1.

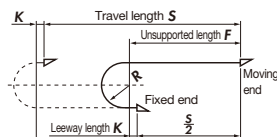


Note: The maximum values for A, B, P, and C are applied when using horizontal dividers.

Calculating no. of links

$$\text{Number of links} = \frac{\frac{S}{2} + \pi R + 2K}{P}$$

Note: When fixed end is at the center of the travel length.
 Always round up the value.



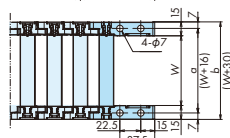
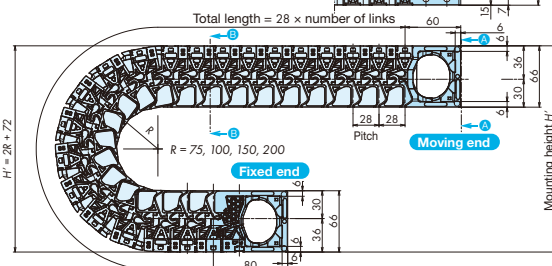
S: Travel length (mm)
 R: Bending radius (mm)
 P: Pitch = 28 mm
 K: Leeway length = 56 mm or greater

Note: If installing support rollers, set the leeway length K to 84 mm or greater. Set the installation distance of support rollers to 900 mm or less.

Dimensions & brackets

W mm	a mm	b mm	c mm	Strain relief comb n ₂ (toothed)
50	66	80	33	3
62	78	92	—	—
75	91	105	58	5
87	103	117	—	—
100	116	130	83	7
125	141	155	108	9
150	166	180	133	11
200	216	230	—	—

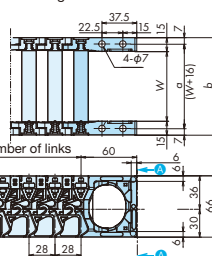
Bending radius R mm	Installation height H' mm
75	252 to 272
100	302 to 322
150	402 to 422
200	502 to 522



Fixed end bracket FU

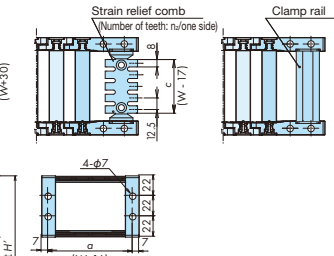
MU

Moving end bracket



MUCR

Moving end bracket



Note: Design and install according to the mounting height H' dimension.

- Notes: 1. Strain relief combs and clamp rails can be installed on the inside and outside.
 2. Note that strain relief combs and clamp rails cannot be added to MU and FU brackets.
 3. Only when W = 50, 75, 100, 125 or 150.

FUCR

Fixed end bracket

Fixed end bracket

Fixed end bracket

Fixed end bracket

Fixed end bracket

Fixed end bracket

Fixed end bracket

Fixed end bracket

Fixed end bracket

Fixed end bracket

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Fixed end bracket

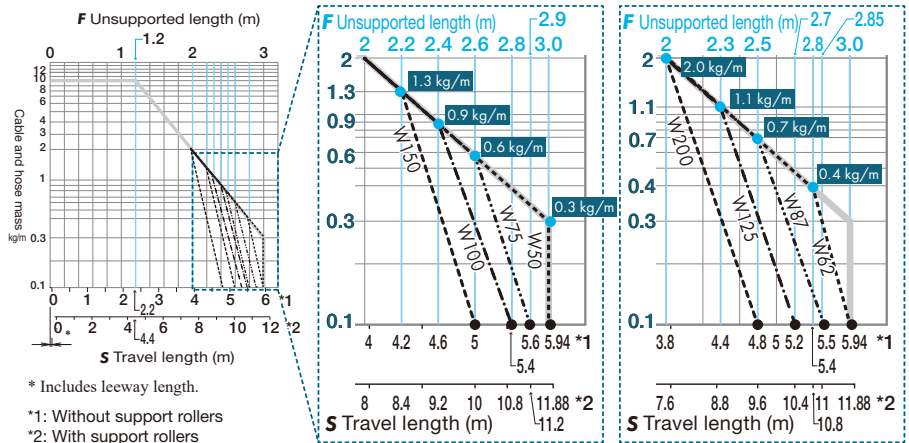
Fixed end bracket

Basic specifications

Maximum travel speed (m/min)			300 * ¹
Maximum acceleration (G)			2
Operating temperature range (°C)			-40 to 80
Materials	Link		Engineering plastic (black)
	Bracket		
	Vertical divider		
	Horizontal divider	For DSA type (HS)	Aluminum
		For DSB type (EHS)	Engineering plastic + aluminum (black)
Standard length (No. of links)			100

Notes: 1. 150 m/min for support roller arrangement.
2. Cannot be used in acidic or alkaline environments.
3. For use in low humidity environments, contact us about made-to-order types for dry environments.

Load diagram



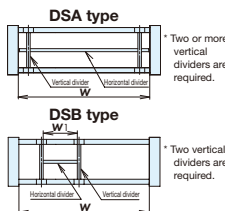
Model number

TKR28H52W	①	R	②	EX +	③	L -	④	-	⑤
	Inner width	Bending radius	Number of links	Fixed end	Moving end				
	50	75		FU	MU				
	62	100		FUCL *	MUCL *				
	75	150		FUCR	MUCR				
	87	200							
	100								
	125								
	150								
	200								

Notes: 1. Dividers, strain relief combs, and clamp rails are delivered uninstalled.
2. Brackets are delivered installed.
3. Required number of vertical dividers: (normally installed for every 2 links)
Number of links N for installing vertical dividers = (Total number of links + 1) ÷ 2
(N: Integer (round down decimals))
Required number of vertical dividers = N x n (n: Number of vertical dividers installed per spot on the link)
4. Those for W = 62, 87, and 200 cannot use the FUCL fixed end and MUCL moving end.

Divider

Method	Type	Model number	Part	Unit
DSA type	Vertical divider	Sliding installation	TKR28H52EX-STAS	1 vertical divider K (pcs)
		Fixable installation	TKR28H52EX-STAL	1 vertical divider K (pcs)
	Horizontal divider		TKR28H52EX-HS (Dimension W) W=50·62·75·87·100·125·150·200	1 horizontal divider K (pcs)
DSB type	Vertical divider	Sliding installation	TKR28H52EX-STBS	1 vertical divider K (pcs)
		Fixable installation	TKR28H52EX-STBL	1 vertical divider K (pcs)
	Horizontal divider with end adapters		TKR28H52EX-EHS△△	1 horizontal divider 2 end adapters K (pcs)



Vertical divider

Model number	For cable carrier model number	Mass (g/each)
TKR28H52EX-STAS	TKR28H52W**R**EX	4
TKR28H52EX-STAL		4
TKR28H52EX-STBS		7
TKR28H52EX-STBL		7

Horizontal divider with end adapters

Model number
TKR28H52EX-EHS△△

△△: 20 to less than 188 *Minimum 0.5 mm each

Bracket

Model number	For cable carrier model number	Mass (g/each)
TKR28H52W50EX-MU	TKR28H52W50R**EX	83
TKR28H52W50EX-FU		89
TKR28H52W62EX-MU		85
TKR28H52W62EX-FU		91
TKR28H52W75EX-MU	TKR28H52W75R**EX	88
TKR28H52W75EX-FU		94
TKR28H52W87EX-MU		90
TKR28H52W87EX-FU		96
TKR28H52W100EX-MU	TKR28H52W100R**EX	94
TKR28H52W100EX-FU		100
TKR28H52W125EX-MU		101
TKR28H52W125EX-FU		107
TKR28H52W150EX-MU	TKR28H52W150R**EX	106
TKR28H52W150EX-FU		112
TKR28H52W200EX-MU		118
TKR28H52W200EX-FU		124

Horizontal divider

Model number	For cable carrier model number	Mass (g/each)
TKR28H52EX-HS50	TKR28H52W50R**EX	3
TKR28H52EX-HS62	TKR28H52W62R**EX	4
TKR28H52EX-HS75	TKR28H52W75R**EX	5
TKR28H52EX-HS87	TKR28H52W87R**EX	6
TKR28H52EX-HS100	TKR28H52W100R**EX	7
TKR28H52EX-HS125	TKR28H52W125R**EX	9
TKR28H52EX-HS150	TKR28H52W150R**EX	11
TKR28H52EX-HS200	TKR28H52W200R**EX	15

Bracket (with 1 strain relief comb)

Model number	For cable carrier model number	Mass (g/each)
TKR28H52W50EX-MUCL	TKR28H52W50R**EX	92
TKR28H52W50EX-FUCL		98
TKR28H52W75EX-MUCL		101
TKR28H52W75EX-FUCL		107
TKR28H52W100EX-MUCL	TKR28H52W100R**EX	111
TKR28H52W100EX-FUCL		117
TKR28H52W125EX-MUCL		122
TKR28H52W125EX-FUCL		128
TKR28H52W150EX-MUCL	TKR28H52W150R**EX	131
TKR28H52W150EX-FUCL		137

Strain relief comb (plastic)

Model number	Applicable bracket	Mass (g/each)
TKR28H52W50EX-CL-U	TKR28H52W50EX-MU/FU	9
TKR28H52W75EX-CL-U	TKR28H52W75EX-MU/FU	13
TKR28H52W100EX-CL-U	TKR28H52W100EX-MU/FU	17
TKR28H52W125EX-CL-U	TKR28H52W125EX-MU/FU	21
TKR28H52W150EX-CL-U	TKR28H52W150EX-MU/FU	25

Note: None for W62, 87, and 200.

Link

Model number	Inner width W	Bending radius R	Mass (kg/m)
TKR28H52W50R75EX	50	75	2.1
TKR28H52W50R100EX		100	
TKR28H52W50R150EX		150	
TKR28H52W50R200EX		200	
TKR28H52W62R75EX	62	75	2.2
TKR28H52W62R100EX		100	
TKR28H52W62R150EX		150	
TKR28H52W62R200EX		200	
TKR28H52W75R75EX	75	75	2.3
TKR28H52W75R100EX		100	
TKR28H52W75R150EX		150	
TKR28H52W75R200EX		200	
TKR28H52W87R75EX	87	75	2.4
TKR28H52W87R100EX		100	
TKR28H52W87R150EX		150	
TKR28H52W87R200EX		200	
TKR28H52W100R75EX	100	75	2.5
TKR28H52W100R100EX		100	
TKR28H52W100R150EX		150	
TKR28H52W100R200EX		200	
TKR28H52W125R75EX	125	75	2.7
TKR28H52W125R100EX		100	
TKR28H52W125R150EX		150	
TKR28H52W125R200EX		200	
TKR28H52W150R75EX	150	75	2.9
TKR28H52W150R100EX		100	
TKR28H52W150R150EX		150	
TKR28H52W150R200EX		200	
TKR28H52W200R75EX	200	75	3.4
TKR28H52W200R100EX		100	
TKR28H52W200R150EX		150	
TKR28H52W200R200EX		200	

Bracket (with 1 clamp rail)

Model number	For cable carrier model number	Mass (g/each)
TKR28H52W50EX-MUCR	TKR28H52W50R**EX	110
TKR28H52W50EX-FUCR		116
TKR28H52W62EX-MUCR		119
TKR28H52W62EX-FUCR		125
TKR28H52W75EX-MUCR	TKR28H52W75R**EX	128
TKR28H52W75EX-FUCR		134
TKR28H52W87EX-MUCR		137
TKR28H52W87EX-FUCR		143
TKR28H52W100EX-MUCR	TKR28H52W100R**EX	147
TKR28H52W100EX-FUCR		153
TKR28H52W125EX-MUCR		166
TKR28H52W125EX-FUCR		172
TKR28H52W150EX-MUCR	TKR28H52W150R**EX	184
TKR28H52W150EX-FUCR		190
TKR28H52W200EX-MUCR		222
TKR28H52W200EX-FUCR		228

Clamp rail (steel)

Model number	Applicable bracket	Mass (g/each)
TKR28H52W50EX-CRA	TKR28H52W50EX-MU/FU	27
TKR28H52W62EX-CRA	TKR28H52W62EX-MU/FU	34
TKR28H52W75EX-CRA	TKR28H52W75EX-MU/FU	40
TKR28H52W87EX-CRA	TKR28H52W87EX-MU/FU	47
TKR28H52W100EX-CRA	TKR28H52W100EX-MU/FU	53
TKR28H52W125EX-CRA	TKR28H52W125EX-MU/FU	65
TKR28H52W150EX-CRA	TKR28H52W150EX-MU/FU	78
TKR28H52W200EX-CRA	TKR28H52W200EX-MU/FU	104

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