SAIBO
Innovation in Motion

CURVED RAIL

About US

SAIBO is one of world recognized leaders in design and manufacturing of curve rail. SAIBO products are exported to over 30 countries and regions. We provide not only standard products, but also customized solutions. SAIBO means “Always reach for higher goals.” SAIBO is committed to excellence and linear motion innovation while guaranteeing its customers the best pricing in our industry.

SAIBO actively seeks to work with you on your next design and we promise the following:

- The right product for your application
- A quality product you can trust
- Engineering assistance that is proven and world renown.

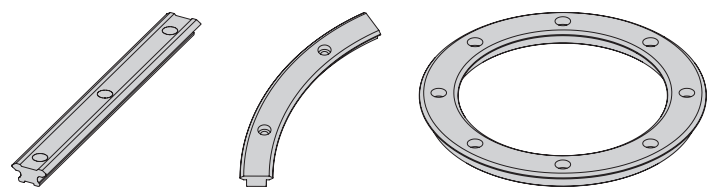
SAIBO is located in WUXI, east China. Wuxi is famous for being one of the birthplaces of Chinese modern industry. Welcome you visit us.

Straight Rail

Made of Germany high quality bearing steel
Deep hardened in working surfaces for high wear resistance
Ground Double 70° V working edges together to ensure parallelism
Soft rail body for customization machining process
Provide 3 standard sizes for customer's selection
Two precision rails G1 and G3 is optional, ground and un-ground
Precision G3 rail length could be up to 5.5meters without connection
Longer length (Unlimited) can be achieved by Connection

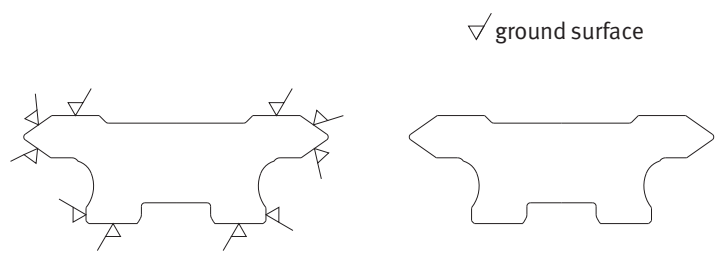
Ring Rail

Made of high quality bearing steel
Deep hardened in working surfaces for high wear resistance
Ground Double 70° V working edge ensure parallelism
All surfaces are ground for precision
Provide wide range of standard sizes
Customized assembly holes are available



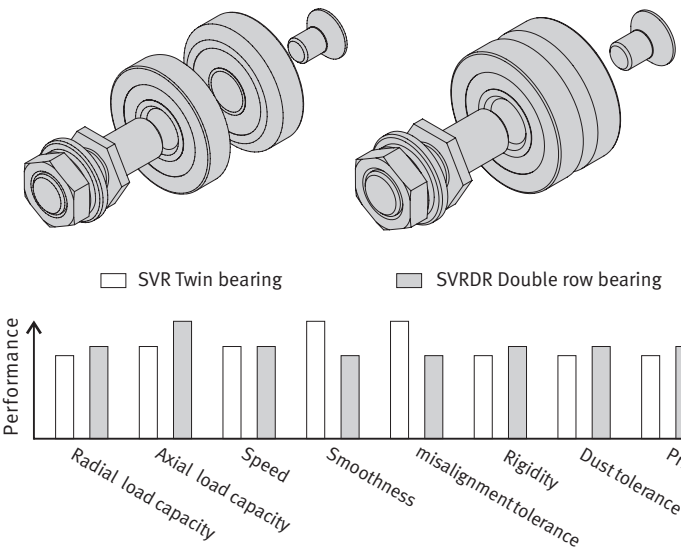
Precision

SAIBO provides two precision grades. G1 ground and G3 unground. Here we must emphasize that G3 grade's motion is also very smooth and stable. It is fit for smooth running without very high precision and low cost request. But when linear rail connect ring rail, it must be G1 grade.



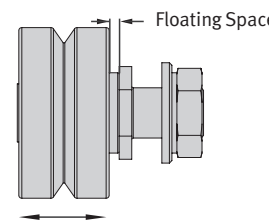
Rollers

Made of high quality bearing steel
Whole body hardened for high wear resistance
Supply Twin and Double row bearings
(See below figure)
Concentric / Eccentric bolt supplied



Floating Bearing

Outer ring could float in axial direction to compensate installation parallelism
Made of high quality bearing steel
Whole body hardened for high wear resistance
Concentric / Eccentric bolt supplied



Roller Type Selection

SS SVR 25 ZZ DR C

- C: Bolt Type, C :concentric, E: Eccentric, DE: Double Eccentric for Curve Rail
- DR: Roller Internal Structure (DR: Double row bearing, F: Floating bearing, Vacant is Twin Bearing.)
- ZZ: Seal Type(RS: Rubber seals, ZZ: Steel Shields, Vacant is Rubber seals.)
- 25: Roller Size
- SVR: Roller Type
- SS: Roller Material （ SS: Stainless Steel, Vacant is Bearing Steel ）

Roller Type Selection Please refer to page P11-P12.

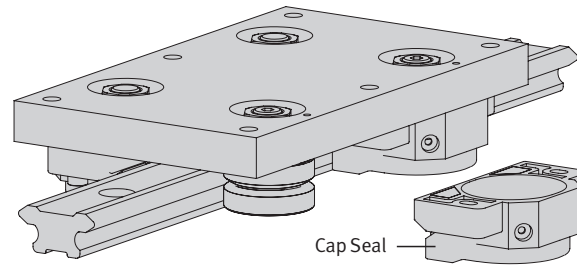
Cap Seal

Protect bearing against dust

Protect operator for safety

Lubricated felt wiper contact rail's working surface to increase load capacity and life

Standard and interchangeable



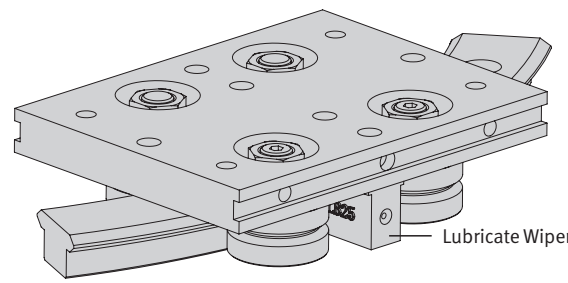
Lubricate Wiper

Lubricated felt wiper contact rail's working surface to increase load capacity and life

Lubricated felt wiper is pushed lightly by a small spring to ensure low friction with the rail's working surface

Easy to fill lubricate oil from its fill hole

Standard and interchangeable



Lubricate

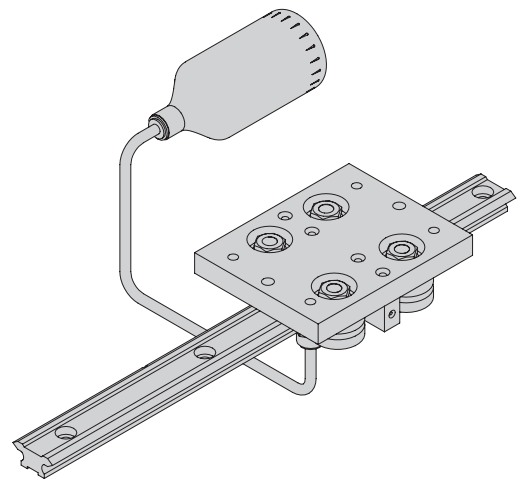
Lubricated felt wiper contact rail's working surface to increase load capacity and life

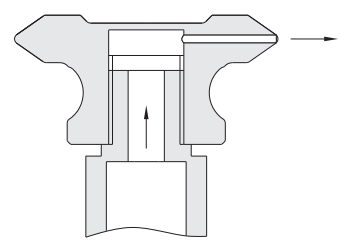
Lubricated felt wiper is pushed lightly by a small spring to ensure low friction with the rail's working surface

Oil charging holes supplied for the Track Motion System

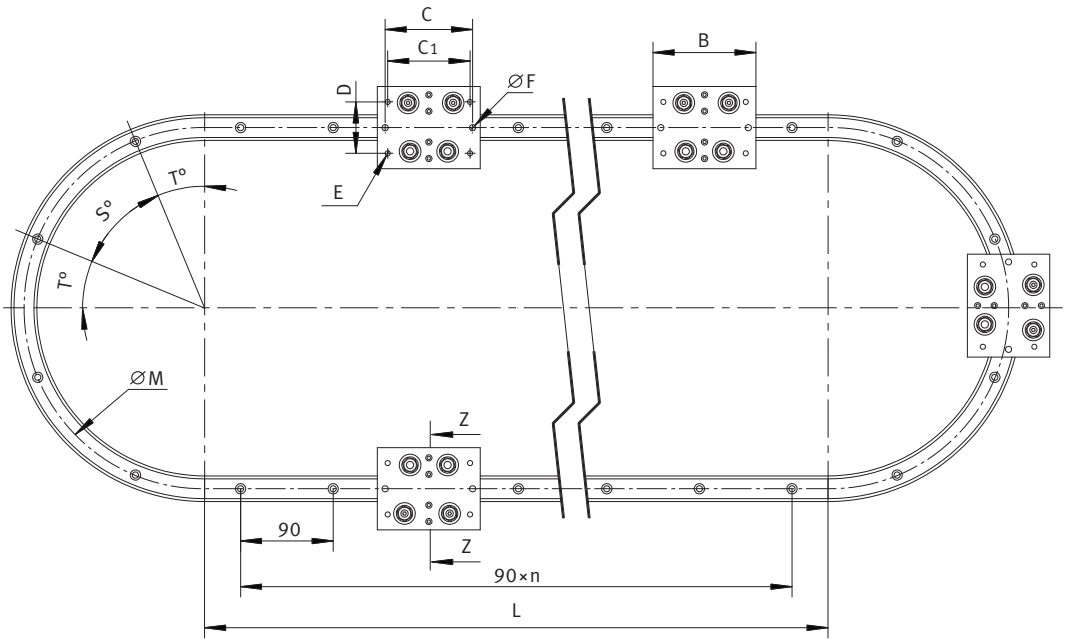
Automatic lubricate bleed could connect to the rail's oil charging holes very easily.

Standard and interchangeable

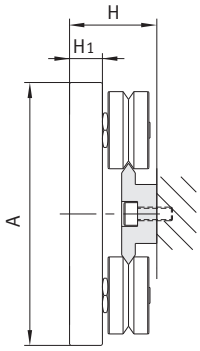




Oval Rail



Assembly code	Components				
	Straight Rail	Ring Rail	Carriage	A	B
SB-LGV25XL-CR25 159 R180	**SB-LGV25XL**	**CR25 159 R180**	**SRC25 159**	80	95
SB-LGV25XL-CR25 255 R180		**CR25 255 R180**	**SRC25 255**		100
SB-LGV25XL-CR25 351 R180		**CR25 351 R180**	**SRC25 351**		105
SB-LGV44XL-CR44 468 R180	**SB-LGV44XL**	**CR44 468 R180**	**SRC44 468**	116	145
SB-LGV44XL-CR44 612 R180		**CR44 612 R180**	**SRC44 612**		150
SB-LGV76XL-CR76 799 R180	**SB-LGV76XL**	**CR76 799 R180**	**SRC76 799**	185	190
SB-LGV76XL-CR76 1033 R180		**CR76 1033 R180**	**SRC76 1033**		210
SB-LGV76XL-CR76 1267 R180		**CR76 1267 R180**	**SRC76 1267**		250
SB-LGV76XL-CR76 1501 R180		**CR76 1501 R180**	**SRC76 1501**		270



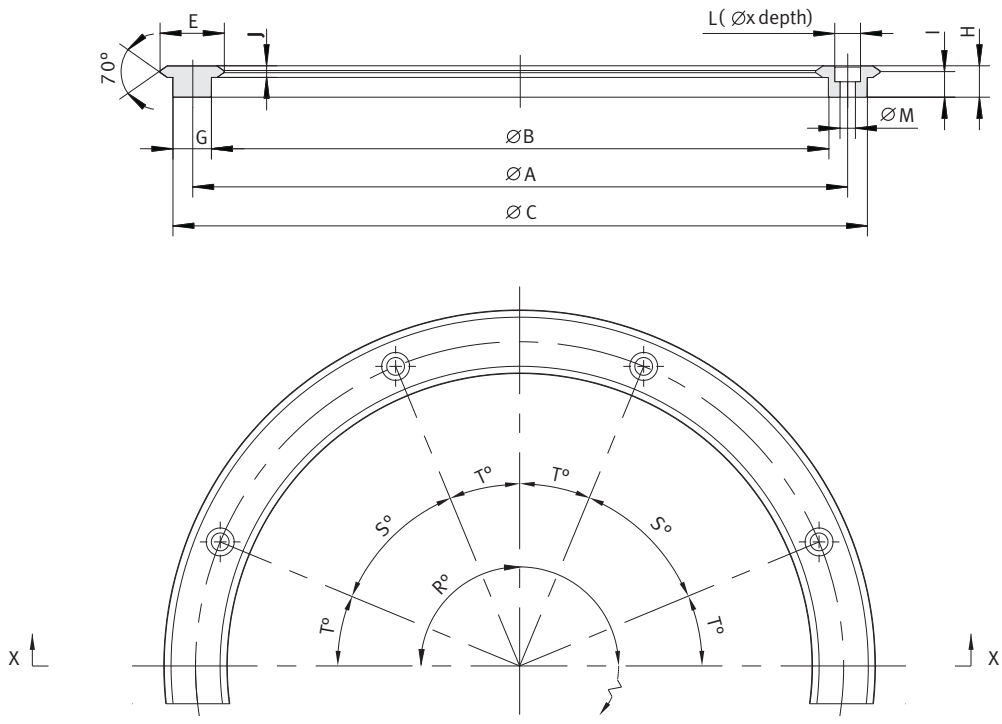
Type Code

SB- LGV 25 X2000 -CR25 159 R180

- R180: Segement angular: 180°
- 159: Ring railway diameter
- CR25: Ring railway size
- X2000: Railway length
- 25: Railway size
- LGV: Linear railway
- SB-: SAIBO motion symbol

Dimension									
C	C_1	D	E	ØF	H	H_1	M	S°	T°
80	85	50	4xM6	2-Ø6	30.5	11.5	159	45	22.5
85	80		4xM6	2-Ø6			255	45	22.5
90	85		4xM6	2-Ø6			351	30	15
125	120	75	4xM8	2-Ø8	38.5	14.5	468	30	15
130	125		4xM8	2-Ø8			612	22.5	11.25
165	160	100	4xM10	2-Ø10	58.5	20	799	22.5	11.25
185	180		4xM10	2-Ø10			1033	18	9
225	205		4xM10	2-Ø10			1267	18	9
245	225		4xM10	2-Ø10			1501	18	9

Ring Rail



Type	Applicable Bearing	A	B	C	E	G	H
CR25 159	SVR-25	159	144	174	25	15	12.25
CR25 255	SVR-25	255	240	270	25	15	12.25
CR25 351	SVR-25	351	336	366	25	15	12.25
CR44 468	SVR-34	468	442	494	44	26	15.5
CR44 612	SVR-34	612	586	638	44	26	15.5
CR76 799	SVR-54	799	749	849	76	50	24
CR76 1033	SVR-54	1033	983	1083	76	50	24
CR76 1267	SVR-54	1267	1217	1317	76	50	24
CR76 1501	SVR-54	1501	1451	1551	76	50	24

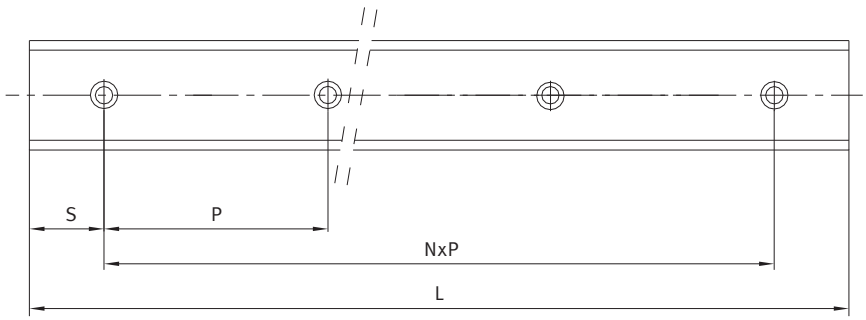
Type Code

CR25 351 R180 (N)

- Screw holes option
- Segement angular 90° 、180° 、full 360° Ring
- Ring rail size

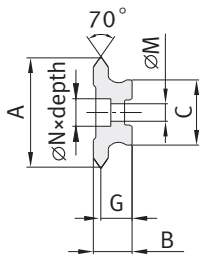
I	J	L (Ø×depth)	Ø M	Hole Number (R=360°)	Hole Position ±0.2		Weight (kg) (R=360°)
					S°	T°	
10	4.5	9.5x7	6	8	45	22.5	0.77
10	4.5	9.5x7	6	8	45	22.5	1.2
10	4.5	9.5x7	6	12	30	15	1.65
12.5	6	11x8	7	12	30	15	5.1
12.5	6	11x8	7	16	22.5	11.25	6.7
19.5	9	20x13	14	16	22.5	11.25	25
19.5	9	20x13	14	20	18	9	32
19.5	9	20x13	14	20	18	9	41
19.5	9	20x13	14	20	18	9	48.7

Straight Rail



Type	A		B		C	
	G1	G3	G1	G3	G1	G3
SB-LGV25XL	25	25.12	12.25	12.85	15	15.5
SB-LGV44XL	44	44.12	15.5	16.1	26	26.5
SB-LGV76XL	76	76.12	24	24.6	50	50.5

Type Code



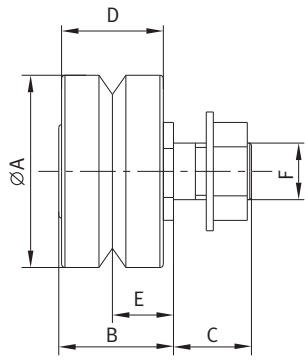
G1

SB- LGV 25 X1000 G1

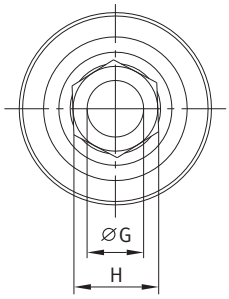
- G1: Precision grade G1 or G3
- X1000: Railway length
- 25: Railway size
- LGV: Linear railway
- SB-: SAIBO motion symbol

G		M	N x depth	P	S	Lmax	
G1	G3					G1	G3
10	10.25	6	9.5x7	90	45	2000	5500
12.5	12.75	7	11x8	90	45	2000	5500
19.5	19.75	14	20x13	90	45	1900	5500

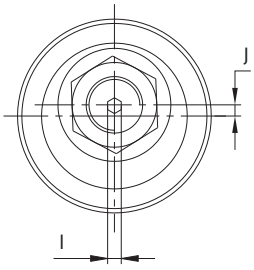
Rollers



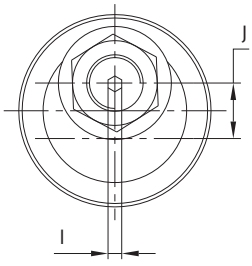
SVR— □C
SVR— □DRC



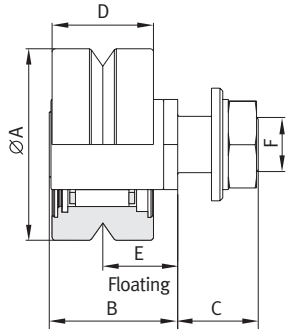
SVR— □E
SVR— □DRE



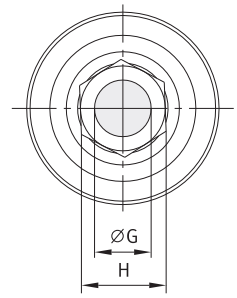
SVR— □DE
SVR— □DRDE



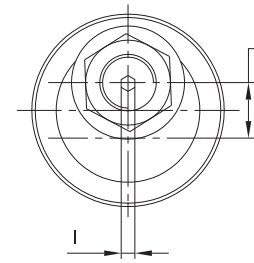
Type	Roller Category	Outer Diameter A	Eccentrical Distance J	Bearing Load Capacities(N)			
				Radial		Axial	
				Co	C	Co	C
SVR-25C	Twin bearing	25	-	1320	3320	330	800
SVR-25E			0.75				
SVR-25DE			2				
SVR-25DRC	Double row bearing		-	2535	7710	840	1650
SVR-25DRE			0.75				
SVR-25DRDE			2				
SVR-25FC	Floating bearing		-	6150	4980	-	-
SVR-25FDE			2				
SVR-34C	Twin bearing	34	-	2630	5980	560	1280
SVR-34E			1				
SVR-34DE			2.5				
SVR-34DRC	Double row bearing		-	5260	9690	1380	2540
SVR-34DRE			1				
SVR-34DRDE			2.5				
SVR-34FC	Floating bearing		-	12600	11000	-	-
SVR-34FDE			2.5				
SVR-54C	Twin bearing	54	-	6700	13700	1180	2350
SVR-54E			1.5				
SVR-54DE			5.5				
SVR-54DRC	Double row bearing		-	13400	22200	2800	4650
SVR-54DRE			1.5				
SVR-54DRDE			5.5				
SVR-54FC	Floating bearing		-	29000	21300	-	-
SVR-54FDE			5.5				



SVR— □FC

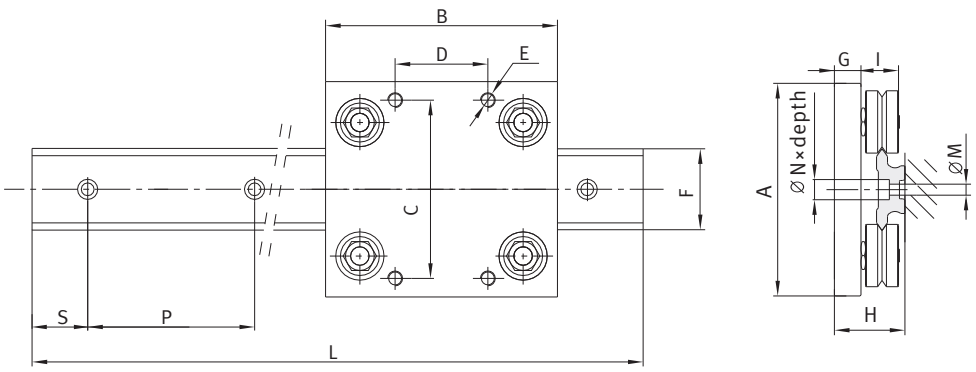


SVR— □FDE



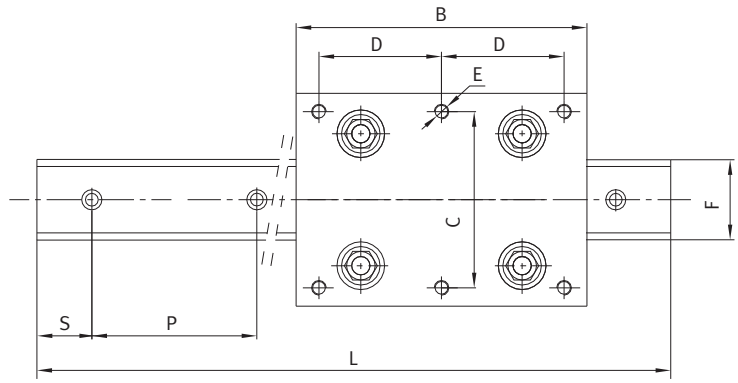
Dimension							
B	C	D	E		F	G	H	I
16.5	11.3	14	9		M8	8	13	3
18.1	11.3		Max 10.5	Min9				
21	14.3	18	11.5		M10	10	15	4
23.2	14.3		Max 13.5	Min11.5				
33.5	19.8	28	19		M14	14	27	6
37.2	19.8		Max 21.6	Min19				

Notes: SAIBO currently applied twin bearings by default.



SLC A

Rail	Carriage	Roller	Dimension					
			A	B	C	D	E	F
SB-LGV25XL	**SLC25A**	SVR-25C SVR-25E	80	80	65	24	4xM6	25
	SLC25B			135		60	6xM6	
	SLC25C			180		82	6xM6	
SB-LGV44XL	**SLC44A**	SVR-34C SVR-34E	116	125	96	50	4xM8	44
	SLC44B			180		80	6xM8	
	SLC44C			225		103	6xM8	
SB-LGV76XL	**SLC76A**	SVR-54C SVR-54E	185	200	160	90	4xM10	76
	SLC76B			300		135	6xM10	
	SLC76C			400		185	6xM10	



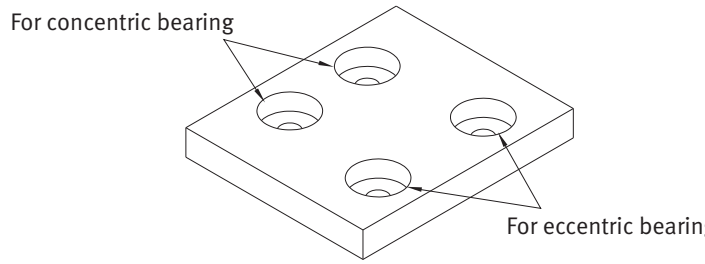
SLC B/C

G	H		I	M	N x depth	P	S	Lmax	
	G1	G3						G1	G3
11.5	30.5	30.75	16.5	6	9.5x7	90	45	2000	5500
14.5	38.5	38.75	21	7	11x8	90	45	2000	5500
20	58.5	58.75	33.5	14	20x13	90	45	1900	5500

Assembly manual

1. Match rollers to carriage plate

Please mount the concentric bearing to one side of carriage plate, and eccentric bearing to the other side following the direction of railway. In case of circle motion carriage, the concentric bearing should be mounted to the side where mounting-hole distance is shorter. Please refer to below picture.



Circle motion carriage plate

2. Mounting to railway

Carriage assembly should be mounted from the end of railway.Please do not put any overstress when mounting.

3. Adjust the clearance between bearing and railway

-Tighten concentric bearings first.

-Then rotate eccentric bearing via rotate hexagonal key at the end of stud to adjust the clearance between railway and bearing.

-Adjust the clearance to zero.

-Slide the carriage by hand and adjust to the extent where there causes a slight slipping resistance.

Correct condition is where moving power becomes the recommended value as below table by putting load by push-pull gauge to the running direction of carriage.

Recommended pre-load by push-pull gauge

V track bearing size	Pre-load(N)
25	4
44	8
76	12

-Keep eccentric bearing's position and tighten the nut.

Important note

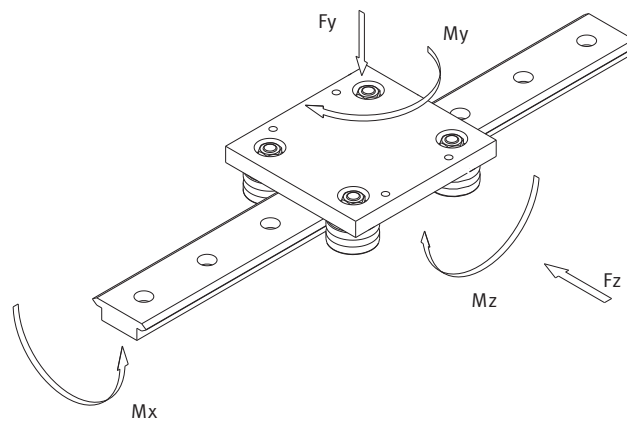
Appropriate pre-load provide the system rigidity. However, over preload will decrease system's life rapidly. Please be careful.

Load / Life calculation

Due to the hardness of the railway and fatigue analysis of railway and roller, the railway's life does not determine the system life. It is determined by roller's life. Load capacity of the motion guide system varies mainly by the size of bearing and railway, lubricated or not, and the load magnitude and direction. Other factors include speed and acceleration and environment etc. To calculate system life, loading factor LF should be calculated firstly. Here we provide two methods to calculate the loading factor.

Standard 4 bearings carriage calculation

If the system use SAIBO standard 4 bearings carriage, then calculation can use below formula.



$$LF = \frac{Fy}{Fymax} + \frac{Fz}{Fzmax} + \frac{Mx}{Mxmax} + \frac{My}{Mymax} + \frac{Mz}{Mzmax}$$

Fy - Actual load in Y direction. (N)

Fz - Actual load in Z direction. (N)

Mx - Actual moment in X direction. (N·m)

My - Actual moment in Y direction. (N·m)

Mz - Actual moment in Z direction. (N·m)

Below parameters can be taken from the table of Load capacity.

Fy max - Max load capacity in Y direction. (N)

Fz max - Max load capacity in Z direction. (N)

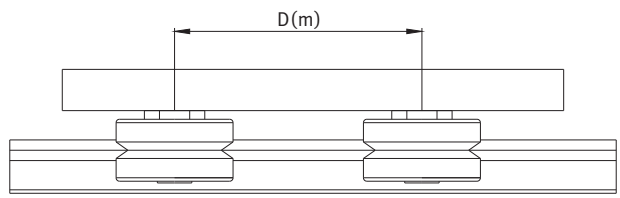
Mx max - Max moment capacity in X direction. (N·m)

My max - Max moment capacity in Y direction. (N·m)

Mz max - Max moment capacity in Z direction. (N·m)

Straight rail carrige's load capacity

Carriage Type	Dry system Double Row Bearings and Twin Bearings					Lubricated system/Twin Bearings					Lubricated system/Double Row Bearings				
	Fy	Fz	Mx	My	Mz	Fy	Fz	Mx	My	Mz	Fy	Fz	Mx	My	Mz
	N	N	Nm	Nm	Nm	N	N	Nm	Nm	Nm	N	N	Nm	Nm	Nm
SLC25	410	410	4.6	200xD	200xD	1300	1225	14	600xD	640xD	1610	3020	18.2	1500xD	800xD
SLC44	790	790	16	400xD	400xD	3250	2830	65	1400xD	1600xD	3620	6050	74	3000xD	1800xD
SLC76	1850	1850	65	900xD	900xD	7250	6380	255	3200xD	3600xD	10050	10050	365	5000xD	5000xD

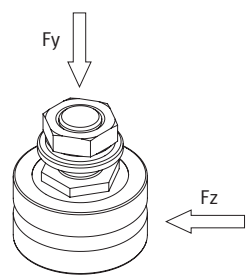


Ring rail carriage's load capacity

Carriage Type	Dry system Double Row Bearings and Twin Bearings					Lubricated system/Twin Bearings					Lubricated system/Double Row Bearings				
	Fy	Fz	Mx	My	Mz	Fy	Fz	Mx	My	Mz	Fy	Fz	Mx	My	Mz
	N	N	Nm	Nm	Nm	N	N	Nm	Nm	Nm	N	N	Nm	Nm	Nm
SRC25 159	410	410	4.6	8.7	8.7	1300	1225	14	25.5	27.5	1610	3020	18.2	65	33.5
SRC25 255	410	410	4.6	8.2	8.2	1300	1225	14	23.5	25.5	1610	3020	18.2	60	31.5
SRC25 351	410	410	4.6	8.7	8.7	1300	1225	14	24.5	27.5	1610	3020	18.2	64	33.5
SRC44 468	790	790	16	28.2	28.2	3250	2830	65	97	112	3620	6050	74	215	120
SRC44 612	790	790	16	28	28	3250	2830	65	100	110	3620	6050	74	225	130
SRC76 799	1850	1850	65	87	87	7250	6380	255	305	345	10050	10050	365	480	480
SRC76 1033	1850	1850	65	105	105	7250	6380	255	365	415	10050	10050	365	580	580
SRC76 1267	1850	1850	65	122	122	7250	6380	255	425	480	10050	10050	365	680	680
SRC76 1501	1850	1850	65	138	138	7250	6380	255	490	550	10050	10050	365	780	780

Roller load factor

If the system does not use SAIBO standard 4 roller carriage, It is necessary to calculate each roller's loading factor. Biggest loaded roller's load determines the system's life.



$$LF = \frac{Fy}{Fymax} + \frac{Fz}{Fzmax}$$

LF - Loading factor

LF should be less than 1.0 for any combination of load

Fy - Actual axial capacity. (N)

Fz - Actual radial capacity. (N)

Below parameters can be taken from below table.

Fy max - Max axial load. (N)

Fz max - Max radial load. (N)

Roller's load capacity

Please refer to page 11.

Life calculation

After getting Loading Factor LF, the life in km can be calculated by selecting one of below two formulas. The basic life can be taken from table below.

Dry system

$$Life(km) = \frac{Basic\_life}{(0.03+0.97LF*f)^2}$$

Lubricated system

$$Life(km) = \frac{Basic\_life}{(0.03+0.97LF*f)^3}$$

Basic life

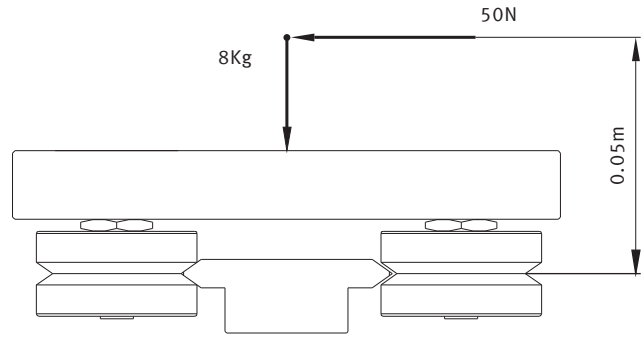
Bearing type	Dry system	Lubricated system
SVR-25	100	150
SVR-34	100	150
SVR-54	150	250

f - Reduction coefficient of the application and environment.

None vibration or shock, Low speed (＜1m/s), Low frequency shift direction, clean environment.	1-1.5
Light vibration or shock, medium speed (1-2.5m/s) medium frequency shift direction, some dirtiness	1.5-2
Heavy vibration or shock, high speed (＞2.5m/s) high frequency shift direction, heavy dirty	2-3.5

Calculation example

A machine use SB-LGV25 spacer railway and standard carriage. The carriage and work-piece total weight 8 kg. When the carriage moving, there is an external load of 50 N exerted as below drawing. Working environment is clean. There is none vibration or shock.



The load factor LF is calculated use formula

$$LF = \frac{Fy}{Fymax} + \frac{Fz}{Fzmax} + \frac{Mx}{Mxmax} + \frac{My}{Mymax} + \frac{Mz}{Mzmax}$$

Fy = 8kg x 9.8 (gravity) = 78.40 N

Fz = 50 N

Mx = 50 x 0.05 = 2.5 N·m

My = 0

Mz = 0

Take parameters Fy max, Fz max, Mx max, My max, Mz max from table and then fill in the formula

$$\mathbf{LF} = \frac{78.4}{1280} + \frac{50}{1200} + \frac{2.5}{14} + \frac{0}{\text{Mymax}} + \frac{0}{\text{Mzmax}} = 0.2816$$

Then life (km) calculation can use formula as below:

Dry system

$$\mathbf{Life(km)} = \frac{\text{Basic\_life}}{(0.03+0.97LF*f)^2}$$

Basic life is 100km.

According to the description of working condition, take f=1.3.

$$\mathbf{Life(km)} = \frac{100}{(0.03+0.97*0.2816*1.3)^2} = 674\text{km}$$

Lubricated system

Basic life is 150 km, take f=1.1

$$\mathbf{Life(km)} = \frac{\text{Basic\_life}}{(0.03+0.97LF*f)^3}$$

$$\mathbf{Life(km)} = \frac{150}{(0.03+0.97*0.2816*1.1)^3} = 4155\text{km}$$

From this example, it shows clearly that lubrication is so important for the life. Please pay attention to install the lubrication system for your system.

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