

## STAR – Ball Transfer Units

# STAR – Linear Motion Technology

## Ball Rail Systems

Standard Ball Rail Systems  
Ball Rail Systems with Aluminum Runner Blocks  
Super Ball Rail Systems  
Wide Ball Rail Systems  
Miniature Ball Rail Systems  
Cam Roller Guides  
Accessories

## Roller Rail Systems

## Linear Bushings and Shafts

Linear Bushings  
Linear Sets  
Shafts  
Shaft Support Rails  
Shaft Support Blocks

## Ball Transfer Units

## Screw Drives

## Linear Motion Systems


Linear Motion Slides  
Linear Modules  
Compact Modules  
Ball Rail Tables  
ALU-STAR Profile System  
Controllers, Motors, Electrical Accessories  
Linear Actuators

Rexroth Star GmbH  
D-97419 Schweinfurt



REG. No.  
1617 - 03



STAR, Ball Rail and  are trademarks registered for Rexroth Star GmbH, Germany.

Roller Rail is a trademark of Rexroth Star GmbH, Germany.



# Ball Transfer Units

<b>Product Overview</b>		<b>4</b>
<b>Technical Data</b>		<b>8</b>
<b>Tables</b>		<b>10</b>
- Ball Transfer Units with sheet steel housing	0530-...	10
- Ball Transfer Units with plastic load ball	0531-...	10
- Ball Transfer Units, spring-loaded	0532-...	11
- Ball Transfer Units with solid steel housing – without rim –	0533-...	11/12
- Ball Transfer Units with solid steel housing	0533-...	12
- Ball Transfer Units without housing	0534-...	13
- Ball Transfer Units with reinforced sheet steel housing	0535-...	13
- Ball Transfer Units with spring clip	0536-...	14
<b>Tolerance Ring/Mounting Tools</b>		<b>15</b>

# STAR – Ball Transfer Units

## Product Overview

Star Ball Transfer Units make light work of shifting, rotating and directing unit loads. They have proven extremely valuable as integral parts of conveyor systems, feed devices, and machining and packaging equipment.

### Applications

#### General-Purpose Machines

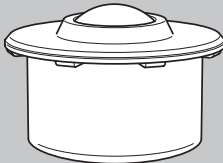
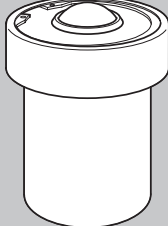

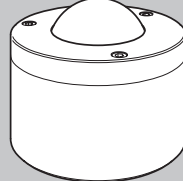
- Feed tables for sheet-metal working machines
- Fixtures for press brakes
- Feed devices for machining centers
- Drilling machine tables and motor-driven supporting tables
- Assembly aids in the manufacture of large engines and motors

#### Materials-Handling Systems

- Transfer ball tables, turntables and switches for sorting and distribution systems
- Crossover sections of continuous conveyors
- Baggage sorting systems at airports
- Transport of steel tubes and pipes
- Lifting platforms

#### Other Fields

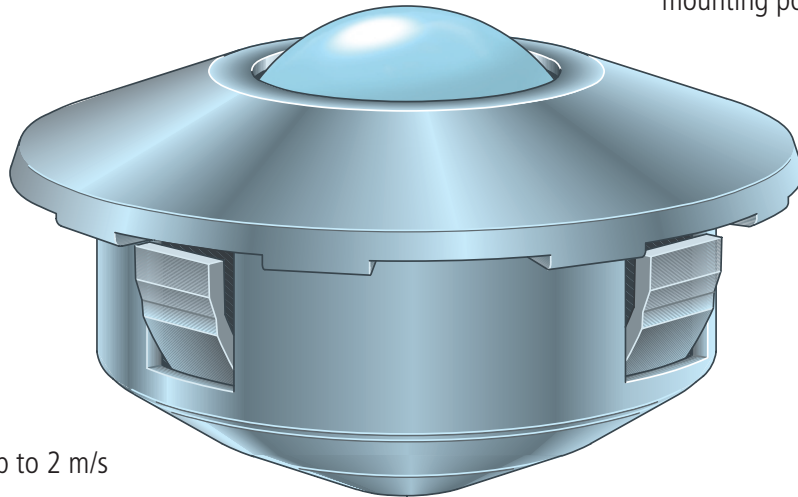
- Construction of special-purpose machines
- Aerospace industry
- Nuclear reactors
- Beverage and stone-processing industries

Ball Transfer Units			
			
<p><b>with sheet steel housing 0530-...</b></p> <ul style="list-style-type: none"> <li>• for general applications</li> </ul> <p><b>plastic load ball 0531-...</b></p> <ul style="list-style-type: none"> <li>• suitable particularly for transporting sensitive materials such as glass, polished aluminum, brass and steel sheets</li> </ul>	<p><b>spring-loaded 0532-...</b></p> <ul style="list-style-type: none"> <li>• are supported on springs and mounted under preload in a housing</li> <li>• Ball Transfer Unit recedes into its housing when overloaded</li> </ul>	<p><b>with solid steel housing - without rim 0533-...</b></p> <ul style="list-style-type: none"> <li>• solid steel housing</li> <li>• very small Ball Transfer Unit</li> <li>• without felt seal</li> <li>• very smooth movement</li> </ul>	<p><b>with solid steel housing - without rim 0533-...</b></p> <ul style="list-style-type: none"> <li>• solid steel housing and cover</li> <li>• for very high loads</li> </ul>

▶ Easy mounting and extraction

▶ Types for all standard applications and for many special solutions

▶ Precise rolling and full load-bearing capability in any mounting position


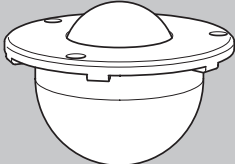

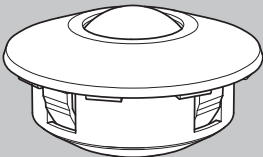


▶ Smooth running

▶ Conveying speed up to 2 m/s in all types

▶ High rationalization effect

▶ Consistently high quality

Ball Transfer Units			
			
<p><b>with solid steel housing</b> 0533-...</p> <ul style="list-style-type: none"> <li>• solid steel housing</li> <li>• for heavy loads</li> </ul>	<p><b>without housing</b> 0534-...</p> <ul style="list-style-type: none"> <li>• low space requirement</li> <li>• simple mounting</li> <li>• mounting via holes in the rim</li> </ul>	<p><b>with sheet steel housing</b> 0535-...</p> <ul style="list-style-type: none"> <li>• reinforced housing and cover</li> <li>• for heavy impact loads</li> </ul>	<p><b>with spring clip</b> 0536-...</p> <ul style="list-style-type: none"> <li>• easily mountable and extractable from the load side. Fixing is by means of spring clips, which permit generous tolerances in the mounting hole</li> <li>• reinforced cover to withstand heavy impact loads</li> </ul>

# STAR – Ball Transfer Units

## Technical Data

### Structural design of the Ball Transfer Units

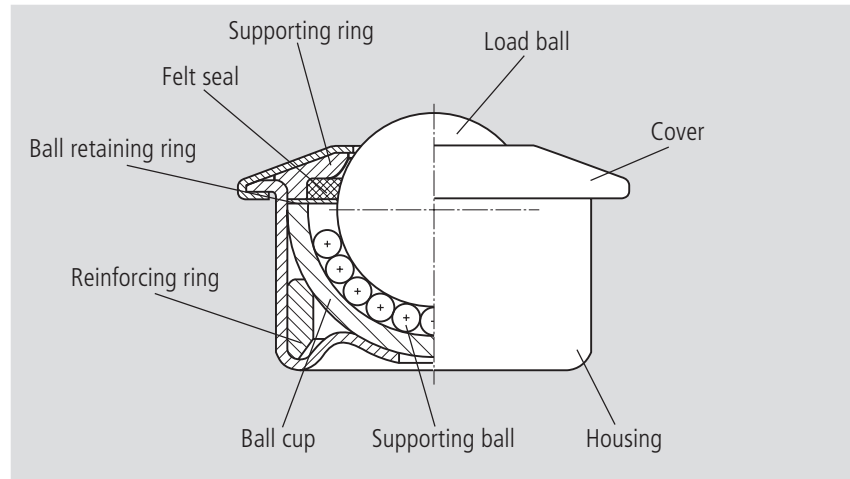
Star Ball Transfer Units have a steel housing incorporating a hardened ball cup.

The latter serves as a raceway for a multitude of small supporting balls.

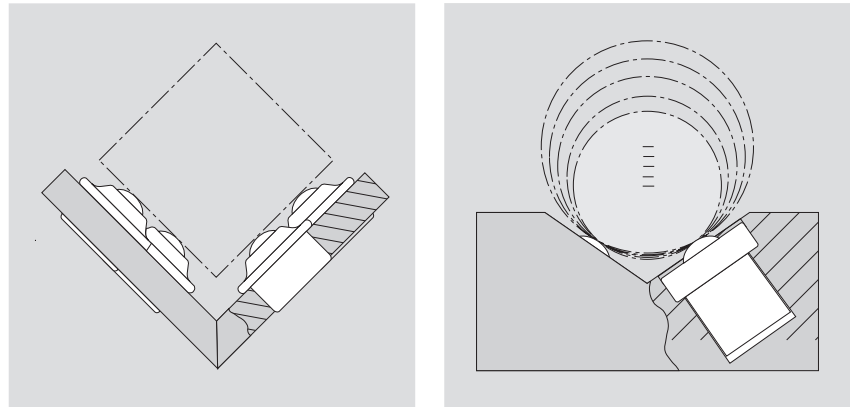
The supporting balls roll against the ball cup when the load ball turns.

Star Ball Transfer Units are designed so that precise rolling and full load-bearing capability are ensured in any mounting position.

Star Ball Transfer Units require little maintenance, and almost every type is protected against dirt by an oil-soaked felt seal.



### Mounting possibilities



### Application example

STAR Ball Transfer Units used for assembling STAR Ball Rail Systems



**Ball Transfer Units in corrosion-preventive design**

Corrosion, caused by moisture or chemical attack, can lead to impaired functioning or even failure of the Ball Transfer Units.

Coated (galvanized + chromated) surfaces and/or higher-grade materials offer enhanced anticorrosion protection.

**Galvanized covers and housings**

offer simple protection against corrosion. The supporting balls and load balls are made from standard antifriction bearing steel and are protected by lubricating oil.

**All parts galvanized**

but with corrosion-resistant steel balls. This affords significantly greater protection against corrosion.

**All parts made from corrosion-resistant steels**

(Antifriction bearing steel to DIN 17230 / EN 10 088)

This type is selected if conveyed articles abrade the galvanized/chromated surface and there is exposure to moisture or chemicals. This type is unsuitable for underwater use. Reason: The hardened (carbon-bearing) corrosion-resistant steel of the ball cups and balls.

# STAR – Ball Transfer Units

## Technical Data

### Arrangement of the Ball Transfer Units

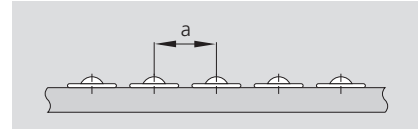
How the Ball Transfer Units should be arranged depends on the undersurface of the conveyed article. For articles with a uniform, smooth undersurface, such as boxes and cases, the distance between the Ball Transfer Units is calculated simply by dividing the smallest edge length by 2.5.

Example:

Undersurface of the conveyed article  
= 500 x 1,000 mm

Distance between Ball Transfer Units

$$a = \frac{500 \text{ mm}}{2.5} = 200 \text{ mm}$$



### Determining the load for Ball Transfer Units

To determine the load for a Ball Transfer Unit, the mass of the conveyed article is divided by 3.

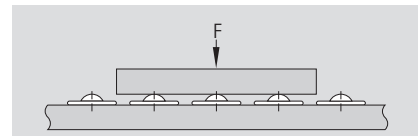
If the load ball height tolerances are well-correlated, it is possible, depending on the nature of the conveyed article, to also perform the calculation based on the number of load-bearing Ball Transfer Units.

Example:

Mass = 3,000 N

Ball Transfer Unit load

$$F = \frac{3,000 \text{ N}}{3} = 1,000 \text{ N}$$



### Spring-loaded Ball Transfer Units

The figures in the column headed "Preload" are most important when choosing the size for these types.

The mass of the conveyed article is divided in this case by the number of load-bearing Ball Transfer Units.

### Conveying speed

$$V_{\max} = 2 \text{ m/s}$$

### Load capacity

The stated load capacities apply to all mounting positions and relate to  $10^6$  rotations of the load ball.

In case of prolonged periods of use at speeds above 1 m/s, an increase in temperature and reduced nominal life must be expected, especially for sizes 60 to 90, as a function of the load.



### Calculation of the nominal life

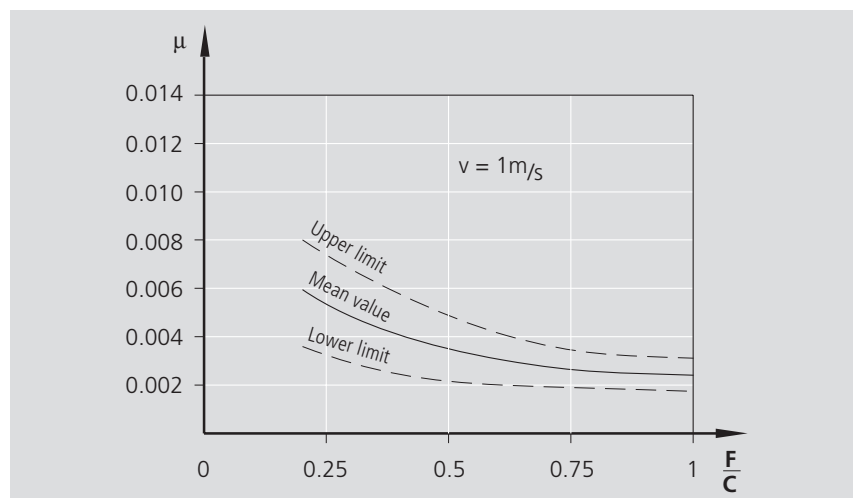
$$L = \left(\frac{C}{F}\right)^3 \cdot 10^6$$

L = Nominal life (rotations)  
 C = Load capacity (N)  
 F = Load (N)

### Friction coefficients

The diagram shows the friction coefficients of STAR Ball Transfer Units as a function of load and speed.

These guideline values apply to any mounting position for rolling contact on a hardened steel plate.



### Operating temperature

Ball Transfer Unit with steel load ball:

up to 100 °C.

At temperatures above 100 °C, only non-galvanized load balls without a felt seal should be used. Make allowance for reduction in load capacity.

Use high-temperature lubricant! Observe the manufacturer's instructions! The existing lube oil may have to be washed out.

Ball Transfer Unit with plastic load ball:

up to 30 °C.

At temperatures above 30 °C, make allowance for reduction in load capacity.

### Temperature factor

for steel load ball:

Temperature °C	Temperature factor $f_T$
125	0.9
150	0.8
175	0.7
200	0.5

for plastic load ball:

Temperature °C	Temperature factor $f_T$
40	0.9
50	0.8
60	0.7
80	0.5

The load capacity must be multiplied by the temperature factor.

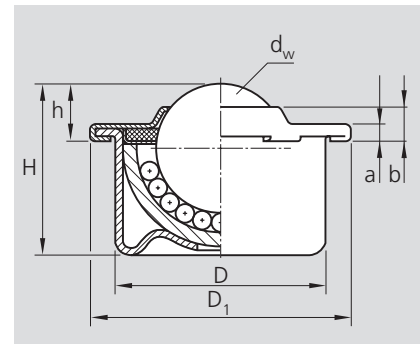
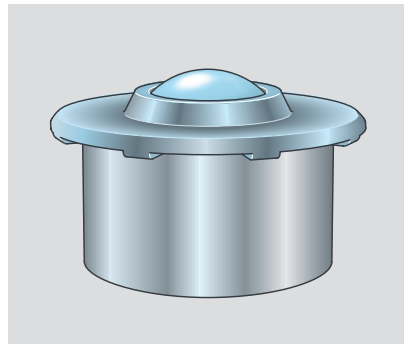
### Lubrication

The lubrication must be adapted to the conveyed article and to the ambient conditions. The lubricant (oil) can be introduced via the load ball.

# STAR – Ball Transfer Units Tables

## Ball Transfer Units with sheet steel housing

0530 – ...



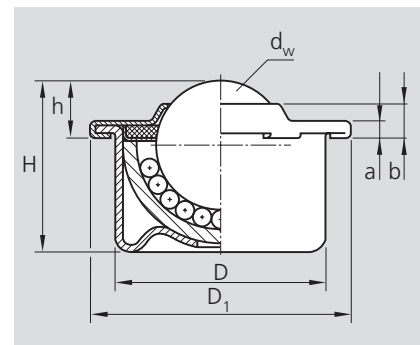
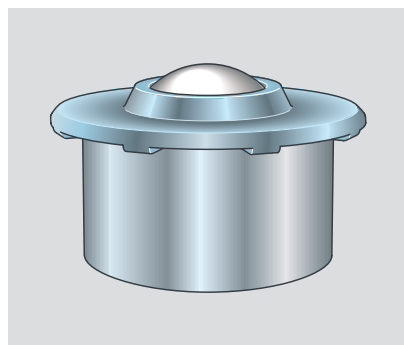
Part numbers	Finish	Dimensions (mm)							Load capacity C (N)	Mass (kg)
		d <sub>w</sub>	D	D <sub>1</sub>	h	H	a	b		
0530-115-10 <sup>1)</sup>	Cover and housing galvanized	15	24 ± 0.065	31	9.5 ± 0.2	21.5	2.5	6.1	500	0.038
0530-122-10		22	36 ± 0.080	45	9.8 ± 0.2	29.5	2.9	5.7	1300	0.132
0530-130-10		30	45 ± 0.080	55	13.8 ± 0.3	37.5	3.7	7.9	2500	0.265
0530-145-10		45	62 ± 0.095	75	19.0 ± 0.4	53.7	4.2	10.3	6000	0.720
0530-215-10 <sup>1)</sup>	All parts galvanized, balls made from corrosion-resistant steel	15	24 ± 0.065	31	9.5 ± 0.2	21.5	2.5	6.1	370	0.038
0530-222-10		22	36 ± 0.080	45	9.8 ± 0.2	29.5	2.9	5.7	970	0.132
0530-230-10		30	45 ± 0.080	55	13.8 ± 0.3	37.5	3.7	7.9	1900	0.265
0530-245-10		45	62 ± 0.095	75	19.0 ± 0.4	53.7	4.2	10.3	4500	0.720
0530-615-00 <sup>1) 2)</sup>	All parts made from corrosion-resistant steel	15	24 ± 0.065	31	9.5 ± 0.2	21.5	2.5	6.1	370	0.038
0530-622-00 <sup>2)</sup>		22	36 ± 0.080	45	9.8 ± 0.2	29.5	2.9	5.7	970	0.132
0530-630-00 <sup>2)</sup>		30	45 ± 0.080	55	13.8 ± 0.3	37.5	3.7	7.9	1900	0.265

<sup>1)</sup> Without felt seal

<sup>2)</sup> Also available with plastic load ball

## Ball Transfer Units with plastic load ball

0531 – ...



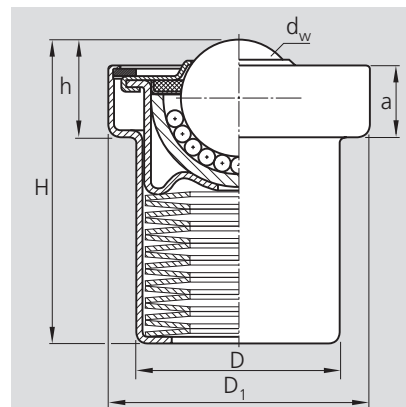
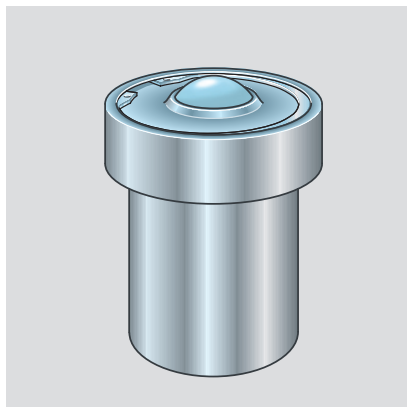
Part numbers	Finish	Dimensions (mm)							Load capacity <sup>3)</sup> C (N)	Mass (kg)
		d <sub>w</sub>	D	D <sub>1</sub>	h	H	a	b		
0531-115-10 <sup>1)</sup>	Cover and housing galvanized	15	24 ± 0.065	31	9.5 ± 0.2	21.5	2.5	6.1	70	0.024
0531-122-10 <sup>2)</sup>		22	36 ± 0.080	45	9.6 ± 0.2	29.3	2.9	5.7	100	0.093
0531-130-10 <sup>2)</sup>		30	45 ± 0.080	55	13.6 ± 0.3	37.3	3.7	7.9	150	0.168
0531-215-10 <sup>1)</sup>	All parts galvanized, load balls made from corrosion-resistant steel	15	24 ± 0.065	31	9.5 ± 0.2	21.5	2.5	6.1	70	0.024
0531-222-10 <sup>2)</sup>		22	36 ± 0.080	45	9.6 ± 0.2	29.3	2.9	5.7	100	0.093
0531-230-10 <sup>2)</sup>		30	45 ± 0.080	55	13.6 ± 0.3	37.3	3.7	7.9	150	0.168

<sup>1)</sup> Without felt seal

<sup>2)</sup> Felt seal not oil-soaked

<sup>3)</sup> At 20 °C

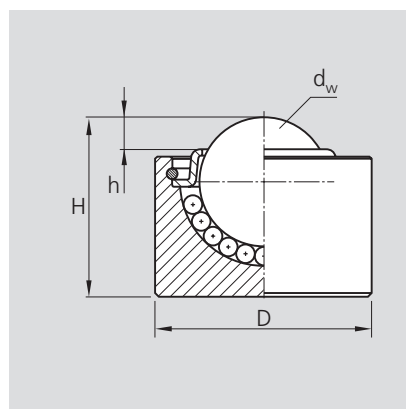
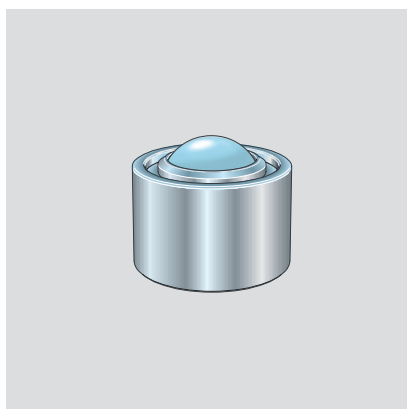
**Ball Transfer Units, spring-loaded**  
0532 – ...



Part numbers	Finish	Dimensions (mm)						Pre-load (N)	Ultimate load <sup>1)</sup> (N)	Tol. for preload and ult. load (%)	Mass (kg)
		d <sub>w</sub>	D	D <sub>1</sub>	h	H	a				
0532-122-10	Cover and housing galvanized	22	38.8	50 ± 0.100	18.6	58.1	13.6	730	860	+25/-7.5	0.30
0532-130-10		30	48.2	62 ± 0.125	24.4	70.0	17	1350	1600	+15/-7.5	0.60
0532-145-10		45	66.4	85 ± 0.150	35.6	100.5	24.2	2280	2770	+15/-7.5	1.60
0532-222-10	All parts galvanized. balls made from corrosion-resistant steel	22	38.8	50 ± 0.100	18.6	58.1	13.6	730	860	+25/-7.5	0.30
0532-230-10		30	48.2	62 ± 0.125	24.4	70.0	17	1350	1600	+15/-7.5	0.60
0532-245-10		45	66.4	85 ± 0.150	35.6	100.5	24.2	2280	2770	+15/-7.5	1.60

<sup>1)</sup> Under ultimate load the Ball Transfer Unit recedes completely.

**Ball Transfer Units with solid steel housing – without rim –**  
0533 – ...

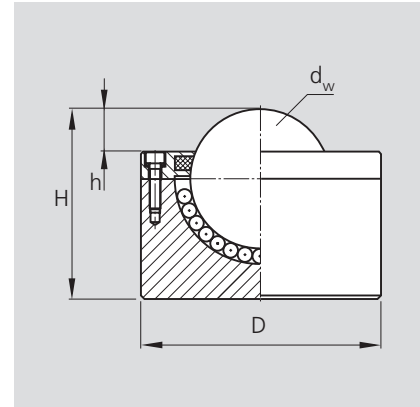
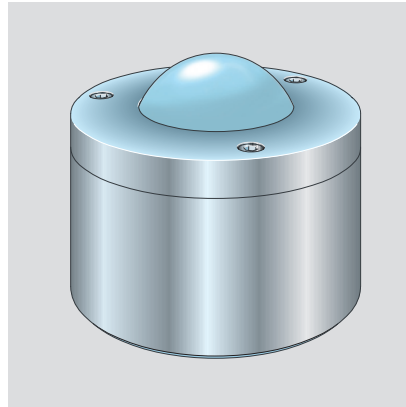


Part numbers	Finish	Dimensions (mm)				Load capacity C (N)	Mass (kg)
		d <sub>w</sub>	D	h	H		
0533-712-00 <sup>1)</sup>	Bright metal	12	20 ± 0.065	3	16.5 ± 0.2	250	0.027

<sup>1)</sup> Without felt seal

# STAR – Ball Transfer Units Tables

**Ball Transfer Units with solid steel housing – without rim – 0533 – ...**

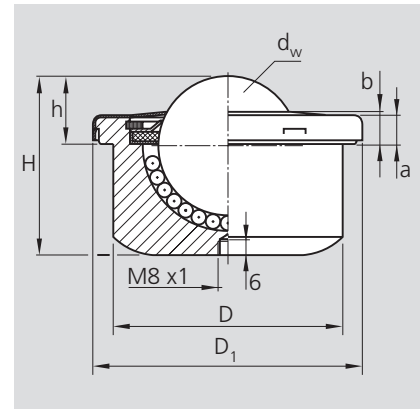
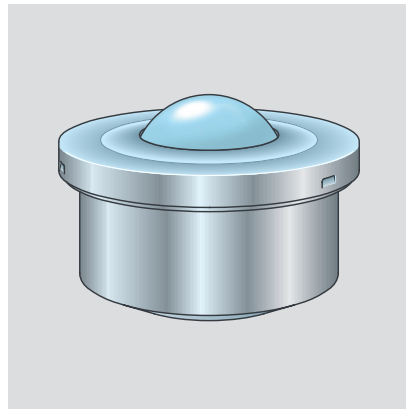


Part numbers	Finish	Dimensions (mm)				Load capacity C (N)	Mass (kg)
		d <sub>w</sub>	D	h	H		
0533-076-00 <sup>1)</sup>	Bright metal	76	130 ± 0.080	23	103 ± 0.2	20000	8.6
0533-090-00 <sup>2)</sup>		90	145 ± 0.080	25	115 ± 0.2	25000	11.0

<sup>1)</sup> Upon request, available with lube hole

<sup>2)</sup> Lube hole R1/8" (at center of base) closed by screw plug

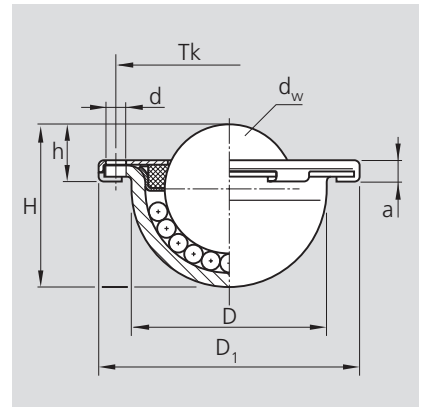
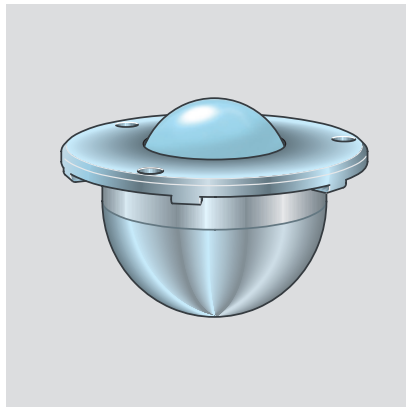
**Ball Transfer Units with solid steel housing 0533 – ...**



Part numbers	Finish	Dimensions (mm)							Load capacity C (N)	Mass (kg)
		d <sub>w</sub>	D	D <sub>1</sub>	h	H	a	b		
0533-060-00	Bright metal	60	100 ± 0.110	117	29.5 ± 0.2	77.5	13	14.5	13000	3.5
0533-160-10	Cover and housing galvanized	60	100 ± 0.110	117	29.5 ± 0.2	77.5	13	14.5	13000	3.5
0533-260-10	All parts galvanized, balls made from corrosion-resistant steel	60	100 ± 0.110	117	29.5 ± 0.2	77.5	13	14.5	9700	3.5

<sup>1)</sup> Upon request, available with lube hole

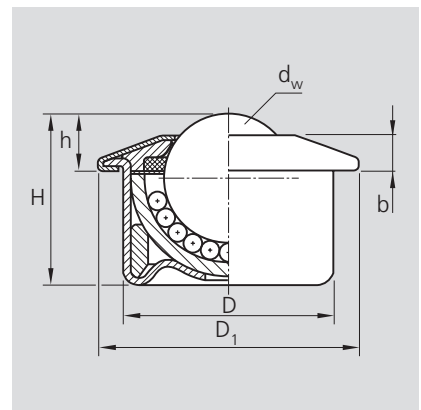
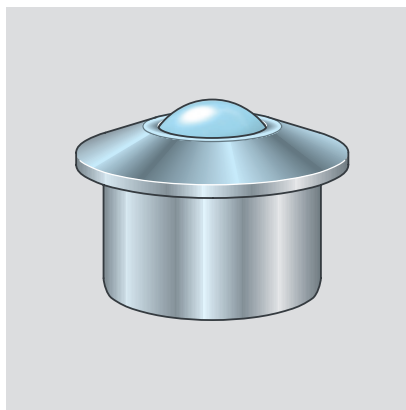
**Ball Transfer Units without housing**  
0534 – ...



Part numbers	Finish	Dimensions (mm)						Mounting holes			Load capacity C (N)	Mass (kg)
		d <sub>w</sub>	D	D <sub>1</sub>	h	H	a	d	Tk	Number		
0534-122-10	Cover and ball cup galvanized	22	33 -0.2	45	9.8 ± 0.2	27.7	3.6	3.5	39	3	1200	0.1
0534-222-10	All parts galvanized, balls made from corrosion-resistant steel	22	33 -0.2	45	9.8 ± 0.2	27.7	3.6	3.5	39	3	900	0.1

**Ball Transfer Units with reinforced sheet steel housing**  
0535 – ...

- For applications entailing extreme impact loads on the housing
- The special shape of the cover requires the use of a mounting tool, particularly for tight fits – see Mounting Tools



Part numbers	Finish	Dimensions (mm)						Load capacity C (N)	Mass (kg)
		d <sub>w</sub>	D	D <sub>1</sub>	h	H	b		
0535-115-10	Cover and housing galvanized	15	24 ± 0.065	31	9.5 ± 0.2	21.5	5.5	500	0.045
0535-122-10		22	36 ± 0.080	45	9.8 ± 0.2	29.5	6.0	1300	0.150
0535-130-10		30	45 ± 0.080	55	13.8 ± 0.3	37.5	8.0	2500	0.300
0535-145-10		45	62 ± 0.095	75	19.0 ± 0.4	53.7	10.0	6000	0.820
0535-215-10	All parts galvanized, balls made from hardened corrosion-resistant steel	15	24 ± 0.065	31	9.5 ± 0.2	21.5	5.5	370	0.045
0535-222-10		22	36 ± 0.080	45	9.8 ± 0.2	29.5	6.0	970	0.150
0535-230-10		30	45 ± 0.080	55	13.8 ± 0.3	37.5	8.0	1900	0.300
0535-245-10		45	62 ± 0.095	75	19.0 ± 0.4	53.7	10.0	4500	0.820
0535-331-10 <sup>1)</sup> <sup>2)</sup>		30	45 ± 0.080	55	13.8 ± 0.3	37.5	8.0	1900	0.300

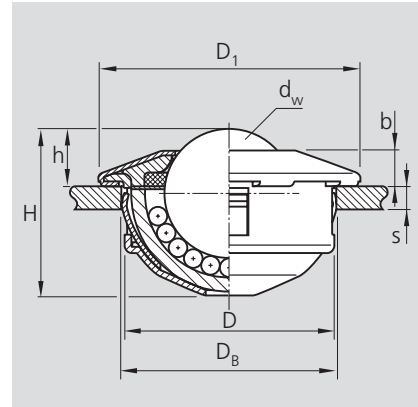
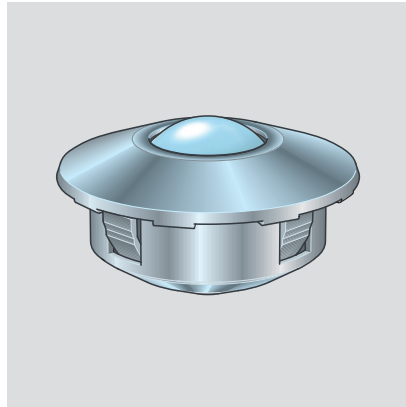
<sup>1)</sup> With holes in base

<sup>2)</sup> Ball cup, balls and ball retaining ring made from corrosion-resistant steel. Other parts galvanized.

# STAR – Ball Transfer Units Tables

## Ball Transfer Units with spring clip 0536 – ...

- Types with plastic load ball upon request. Load capacities same as for 0531 – ...
- Special cover shape requires use of mounting tool – see Mounting Tools



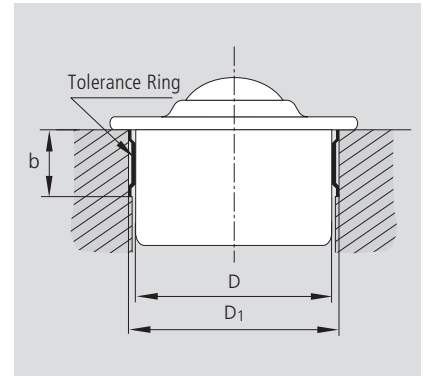
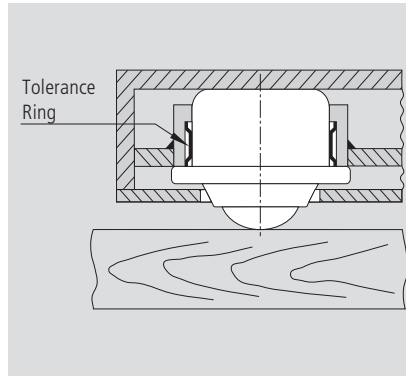
Part numbers	Finish	Dimensions (mm)							Mounting cutout dia. D <sub>B</sub>	S <sup>1)</sup> min	Load capacity C (N)	Mass (kg)
		d <sub>w</sub>	D	D <sub>1</sub>	h	H	b	D				
0536-115-10	Cover and housing galvanized	15	24 -0.13	31	9.5 ± 0.2	20.5	5.5	24 + 0.5	1.5	500	0.044	
0536-122-10		22	36 -0.16	45	9.8 ± 0.2	28.6	6.0	36 + 0.8	2.0	1300	0.146	
0536-130-10		30	45 -0.16	55	13.8 ± 0.3	37.5	8.0	45 + 1.0	2.5	2500	0.290	
0536-215-10	All parts galvanized, balls made from corrosion-resistant steel	15	24 -0.13	31	9.5 ± 0.2	20.5	5.5	24 + 0.5	1.5	370	0.044	
0536-222-10		22	36 -0.16	45	9.8 ± 0.2	28.6	6.0	36 + 0.8	2.0	970	0.146	
0536-230-10		30	45 -0.16	55	13.8 ± 0.3	37.5	8.0	45 + 1.0	2.5	1900	0.290	

<sup>1)</sup> Minimum nominal thickness of mounting base

# Tolerance Ring / Mounting Tools

## Tolerance Ring

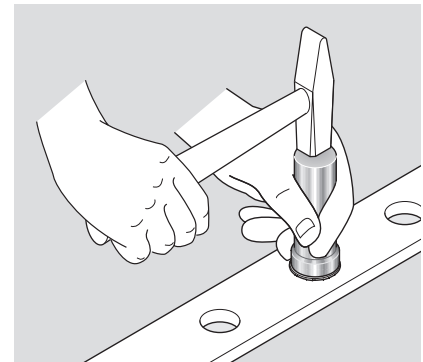
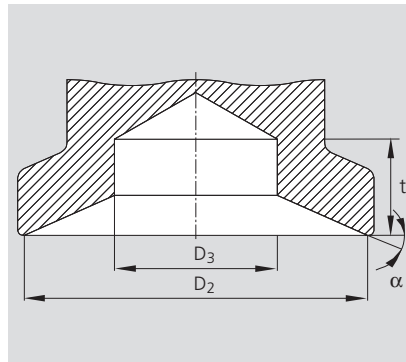
0810 – ...



Ball Transfer Units				Dimensions (mm) D	Tolerance Ring Part numbers	Mounting dimensions (mm)	
Part numbers						D <sub>1</sub>	b
0530-.15-..	0531-.15-..	—	0535-.15-..	24	0810-024-03	25.67 + 0.08	7.1+0.2
0530-.22-..	0531-.22-..	—	0535-.22-..	36	0810-036-05	37.67 + 0.08	12.1+0.2
0530-.30-..	0531-.30-..	—	0535-.30-..	45	0810-045-01	46.67 + 0.08	12.1+0.2
0530-.45-..	—	—	0535-.45-..	62	0810-062-03	64.03 + 0.12	15.1+0.2
—	—	0533-.60-..	—	100	0810-100-02	102.42 + 0.14	19.1+0.3

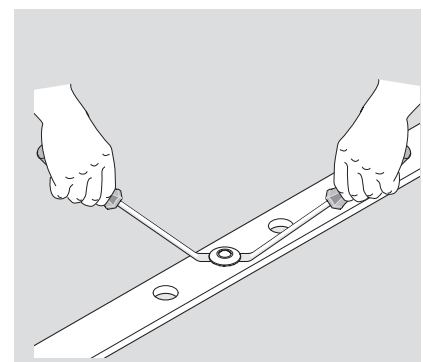
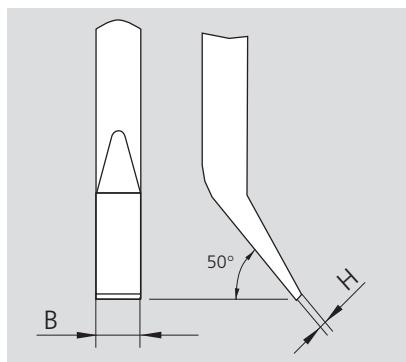
## Mounting tool 0536- for Ball Transfer Units 0535- and 0536-

for d <sub>w</sub>	Part numbers	Dimensions (mm)			
		D <sub>2</sub>	D <sub>3</sub>	t <sub>min</sub>	a (°)
15	0536-015-30	29	17	10	30
22	0536-022-30	43	24	10	20
30	0536-030-30	53	30	10	24
45	0536-045-30	73	45	15	26



## Extraction tool recommended for Ball Transfer Units 0536-

for d <sub>w</sub>	Dimensions (mm)	
	H <sup>1)</sup> max	B <sup>1)</sup> max
15	0.6	6
22	0.6	8
30	0.8	10




<sup>1)</sup> Suitable for the recesses in the rim of Ball Transfer Unit 0536-

Great care has been taken during the compilation of this publication to ensure all the information contained is accurate. We accept no responsibility however for any damage resulting from incorrect or incomplete information contained.

For deliveries and other services in the course of commercial business, the general terms and conditions for supplies and services contained in the valid price lists and the confirmations of order apply.

As our products are constantly in the process of further development, they are subject to alteration without notice.

STAR, Ball Rail and  are trademarks registered for Rexroth Star GmbH, Germany.

Roller Rail is a trademark of Rexroth Star GmbH, Germany.

Reproduction of this document, even in extract form, is only permitted with our approval.

**Rexroth Star GmbH**

D-97419 Schweinfurt  
Germany

Telephone +49-9721-937-0

Telefax +49-9721-937-275  
(general)

Telefax +49-9721-937-350  
(direct)

[www.rexroth-star.com](http://www.rexroth-star.com)

Ball Transfer Units  
RE 82 910/09.99