The Drive & Control Company

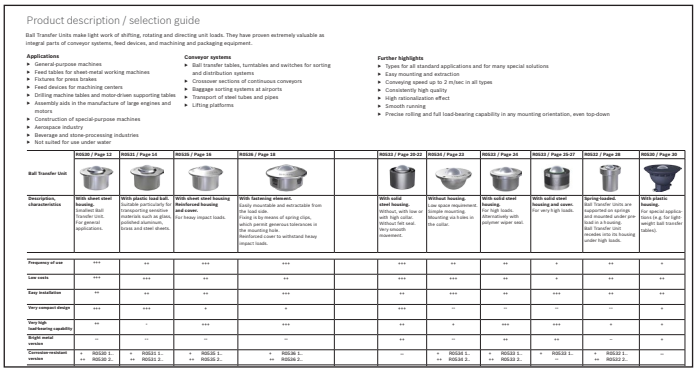
Rexroth
Bosch Group

Ball Transfer Units

Changes/amendments at a glance

- Notes on: Intended use, general safety instructions, directives and standards; page 4
- Revised product description with selection guide; page 6/7
- Revision of the technical data
- Installation suggestions, notes for mounting, installation examples added;
- New Ball Transfer Unit versions with the following types:
  R0530 131 10 and R0530 231 10 with bottom hole Ø 30
  R0530: Size 15 to 45 with bottom hole
  R0532 125 10: Helical spring with amended spring characteristic curve
  R0533 .61 10: with bottom hole and lube port;
  R0533: Size 76 and 90 galvanized; with bottom hole and lube port
  R0533 111 10: galvanized
  R0534 223 10: with bottom hole
  R0535 737 00: with 7 bottom holes, felt seal up to 150 °C
- New short product names; page 34

Product description with selection guide



Product description / selection guide

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.

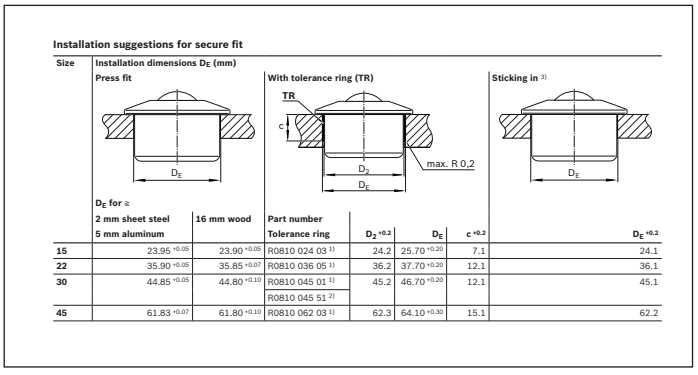
Applications
- General-purpose machines
- Feed tables for sheet-metal working machines
- Fixtures for press brakes
- Feed devices for machining centers
- Drilling machine tables and motor-driven supporting tables
- Assembly aids in the manufacture of large engines and motors
- Construction of special-purpose machines
- Aerospace industry
- Beverage and stone-processing industries
- Not suited for use under water

Conveyor systems
- Ball transfer 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

Further highlights
- Types for all standard applications and for many special solutions
- Easy mounting and extraction
- Conveying speed up to 2 m/sec in all types
- Consistently high quality
- High rationalization effect
- Smooth running
- Precise rolling and full load-bearing capability in any mounting orientation, even top-down

Ball Transfer Unit	R0530 / Page 12	R0531 / Page 14	R0535 / Page 16	R0536 / Page 18		R0532 / Page 20-22	R0534 / Page 22	R0533 / Page 24	R0533 / Page 26-27	R0532 / Page 28	R0530 / Page 30
Description, characteristics	**With sheet steel housing.** Smallest Ball Transfer Unit. For general applications.	**With plastic load ball.** Suitable particularly for transporting sensitive materials such as glass, polished aluminum, brass and steel sheets.	**With sheet steel housing Reinforced housing and cover.** For heavy impact loads.	**With fastening element.** Easily mountable and extractable from the load side. Fixing is by means of spring clips, which permit generous tolerances in the mounting hole. Reinforced cover to withstand heavy impact loads.		**With solid steel housing.** Without, with low or with high collar. Without felt seal. Very smooth movement.	**Without housing.** Low space requirement. Simple mounting. Mounting via holes in the collar.	**With solid steel housing.** For high loads. Alternatively with polymer wiper seal.	**With solid steel housing and cover.** For very high loads.	**Spring-loaded.** Ball Transfer Units are supported on springs and mounted under pre-load in a housing. Ball Transfer Unit recedes into its housing under high loads.	**With plastic housing.** For special applications (e.g. for light-weight ball transfer tables).
Frequency of use	***	**	***	***		***	**	**	*	**	*
Low costs	***	***	**	**		***	***	**	*	**	**
Easy installation	**	**	**	***		**	***	**	***	**	**
Very compact design	***	***	*	*		***	–	–	–	–	*
Very high load-bearing capability	**	-	***	***		**	*	***	***	*	*
Bright metal version	–	–	–	–		**	–	**	**	–	*
Corrosion-resistant version	* R0530 1. ** R0530 2.	* R0531 1. ** R0531 2.	* R0535 1. ** R0535 2.	* R0536 1. ** R0536 2.		–	* R0534 1. ** R0534 2.	* R0533 1. ** R0533 2.	* R0533 1. –	* R0532 1. ** R0532 2.	–

Installation suggestions



Installation suggestions for secure fit

Size	Installation dimensions D_E (mm) Press fit: D_E for ≥ 2 mm sheet steel / 5 mm aluminum	16 mm wood	With tolerance ring (TR): Part number	Tolerance ring	D_2 +0.2	D_E	c +0.2	Sticking in [3]: D_E +0.2
15	23.95 +0.05	23.90 +0.05	R0810 024 03 [1]		24.2	25.70 +0.20	7.1	24.1
22	35.90 +0.05	35.85 +0.07	R0810 036 05 [1]		36.2	37.70 +0.30	12.1	36.1
30	44.85 +0.05	44.80 +0.10	R0810 045 01 [1]		45.2	46.70 +0.20	12.1	45.1
			R0810 045 51 [2]					
45	61.83 +0.07	61.80 +0.10	R0810 062 03 [1]		62.3	64.10 +0.30	15.1	62.2

Notes for mounting

Assembling the Ball Transfer Units with tolerance rings

Installation examples

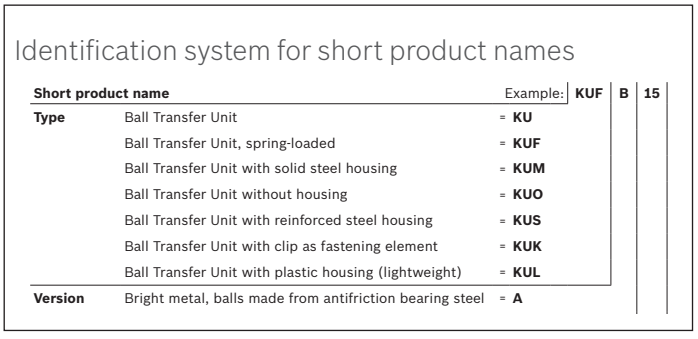
Ball Transfer Unit installation exa

with arrangement and determination of the Ball Transfer U

Scenario A
Arrangement as an equilateral triangle.

The square item to be transported (375 x 375 mm) has a central center of gravity and is supported by 5 Ball Transfer Units.
The distance of the Ball Transfer Units should not be larger than 150 mm (375 / 2.5 = 150 mm).
The mass[1] (3500 N) is distributed over three Ball Transfer Units and is 1166.7 N per Ball Transfer Unit (3500 N / 3 = 1166.7 N).
Selected Ball Transfer Unit, e.g.: R0530 122 10.

Short product names



Identification system for short product names

Short product name		Example:	**KUF**	**B**	**15**
Type	Ball Transfer Unit	= **KU**			
	Ball Transfer Unit, spring-loaded	= **KUF**			
	Ball Transfer Unit with solid steel housing	= **KUM**			
	Ball Transfer Unit without housing	= **KUO**			
	Ball Transfer Unit with reinforced steel housing	= **KUS**			
	Ball Transfer Unit with clip as fastening element	= **KUK**			
	Ball Transfer Unit with plastic housing (lightweight)	= **KUL**			
Version	Bright metal, balls made from antifriction bearing steel	= **A**			

Contents

Notes

Intended use

The product may be used in accordance with the technical documentation (product catalog) for the following purposes:

- For moving loads, in bottom installation (load ball to the top) or top installation (load ball to the bottom) or side installation.
- The type-specific load data from the relevant catalogs and the supplementary technical calculations provided by our company must be considered in all cases.
- The product is intended exclusively for professional use and not for private use.
- Use for the intended purpose also includes the requirement that you must have read and understood the product documentation completely, in particular these “Safety instructions”.

Misuse

Use of the product in any other way than as described under “Intended Use” is considered to be misuse and is therefore not permitted. If unsuitable products are installed or used in safety-relevant applications, this may lead to uncontrolled operating statuses in the application which can cause personal injury and/or damage to property.

The product may only be used in safety-relevant applications if this use has been expressly specified and permitted in the product documentation.

Bosch Rexroth AG will not accept any liability for injury or damage caused by misuse of the product. The risks associated with any misuse of the product shall be borne by the user alone.

Misuse of the product includes:

– the transport of persons

General safety instructions

- The safety rules and regulations of the country in which the product is used must be complied with.
- All current and applicable accident prevention and environmental regulations must be adhered to.
- The product may only be used when it is in technically perfect condition.
- The technical data and environmental conditions stated in the product documentation must be complied with.
- The product must not be put into service until it has been verified that the final product (for example a machine or system) into which the product has been installed complies with the country-specific requirements, safety regulations and standards for the application.
- Rexroth Ball Transfer Units may not be used in zones with potentially explosive atmospheres as defined in the ATEX directive 94/9/EC.
- Rexroth Ball Transfer Units must never be altered or modified.
- The product must never be disassembled.
- Special safety requirements for specific sectors (e.g. cranes, theaters, foodstuffs) as provided for in laws, directives and standards must be complied with.

Directives and standards:
Rexroth Ball Transfer Units are suitable for dynamic and static applications. All users must comply with a series of standards and guidelines. The standards can vary significantly worldwide. It is therefore essential to understand the legislation and standards that apply in each particular region.

EN ISO 12100

This standard is entitled Safety of machinery – General principles for design – Risk assessment and risk reduction. It gives a general overview and contains a guide to the major developments governing machines and their intended use.

Directive 2006/42/EC

The European Machinery Directive describes the basic safety and health requirements for the design and manufacture of machinery. The manufacturer of a machine or his authorized representative has a duty to ensure that a risk assessment has been performed in order to determine the health and safety requirements which have to be fulfilled for that machine. The machine must be designed and built with the results of the risk assessment in mind.

Directive 2001/95/EC

This directive covers general safety requirements for any product placed on the market and intended for consumers, or likely to be used by consumers under reasonably foreseeable conditions, including products that are made available to consumers in the context of service provision for use by them.

Directive 1999/34/EC

This directive concerns liability for defective products and applies to industrially manufactured movables, irrespective of whether they have been incorporated into another movable or into an immovable or not.

ORDINANCE (EC) no. 1907/2006 (REACH)

This regulation relates to restrictions on the marketing and use of certain dangerous substances and preparations. “Substances” means chemical elements and their compounds as they occur in the natural state or as produced by industry. “Preparations” are mixtures, compounds or solutions consisting of two or more substances.

Product description / selection guide

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Applications

- General-purpose machines
- Feed tables for sheet-metal working machines
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Ball Transfer Unit					
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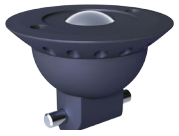
Frequency of use	+++	++	+++	+++	
Low costs	+++	+++	++	++	
Easy installation	++	++	++	+++	
Very compact design	+++	+++	+	+	
Very high load-bearing capability	++	-	+++	+++	
Bright metal version	--	--	--	--	
Corrosion-resistant version	+ R0530 1.. ++ R0530 2..	+ R0531 1.. ++ R0531 2..	+ R0535 1.. ++ R0535 2..	+ R0536 1.. ++ R0536 2..	
Stainless version	+++ R0530 6..	+++ R0531 6..	--	--	
Suitable for coarse dirt	+	-	+	+	
Designed for vacuum[1)2)]	+	+	+	+	

[1)] In "dry version" only (all part oil- and grease-free), without felt seal (R053x xxx 60)
[2)] In "dry version" only (all part oil- and grease-free), with felt seal (R053x xxx 90)

+++ Very good
++ Good
+ Fair
- Adequate, not recommended
-- Version not available

Further highlights

- Types for all standard applications and for many special solutions
- Easy mounting and extraction
- Conveying speed up to 2 m/sec in all types
- Consistently high quality
- High rationalization effect
- Smooth running
- Precise rolling and full load-bearing capability in any mounting orientation, even top-down

	R0533 / Page 20-22	R0534 / Page 23	R0533 / Page 24	R0533 / Page 25-27	R0532 / Page 28	R0530 / Page 30
						
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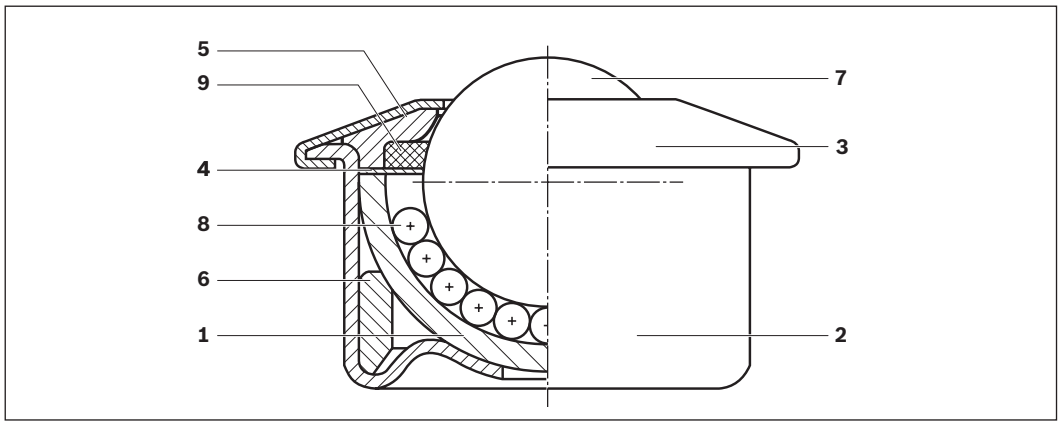
	+++	++	++	+	++	+
	+++	+++	++	+	++	++
	++	+++	++	+++	++	++
	+++	--	--	--	--	+
	++	+	+++	+++	+	+
	++	--	++	++	--	+
	--	+ R0534 1.. ++ R0534 2..	+ R0533 1.. ++ R0533 2..	+ R0533 1.. --	+ R0532 1.. ++ R0532 2..	--
	--	--	--	--	--	--
	+	+	+ R0533 .6. +++ R0533 .05	+++	+	+
	+++	+	-	-	-	-

Technical data

Structural design of the Ball Transfer Units

A hardened ball cup serves as a raceway for a multitude of small supporting balls.
The supporting balls roll against the ball cup when the load ball turns.
Rexroth Ball Transfer Units are designed so that precise rolling and full load-bearing capability are ensured in any mounting orientation. Ball Transfer Units require little maintenance, and almost every type is protected against dirt by an oil-soaked felt seal.

1 Ball cup
2 Housing
3 Cover
4 Ball retaining ring
5 Supporting ring
6 Reinforcing ring
7 Load ball
8 Supporting balls
9 Felt seal



Corrosion protection

Corrosion, caused by moisture or chemical attack, can lead to impaired functioning or even failure of the Ball Transfer Units. Coated (galvanized + chromated) surfaces similar to DIN 50979 specifications and/or higher-grade materials offer enhanced corrosion protection.

Cover and housing galvanized, R053. 1..

Offer simple protection against corrosion. In this type, the supporting balls and load balls are made from standard antifriction bearing steel and are protected from corrosive attack by the lubricant.

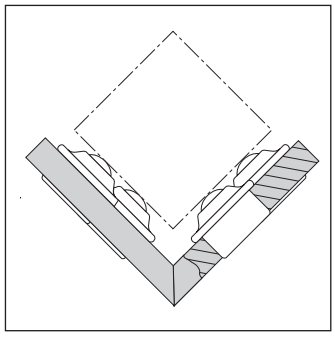
All parts galvanized, balls made from corrosion-resistant steel, R053. 2..

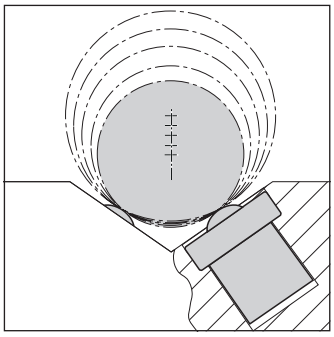
Consistent coating of all internals and the use of corrosion-resistant steels for the antifriction bearing elements, similar to ISO 683-17 specifications, ensures comprehensive corrosion protection such as specified in ASTM B117-03.

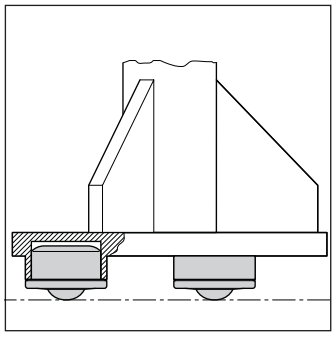
Complete version made from corrosion-resistant steel (in accordance with EN 10 088), R053. 6..

This version should be used for abrasive conveyed articles and/or where there is exposure to aggressive ambient conditions, especially to chemicals.

Mounting possibilities

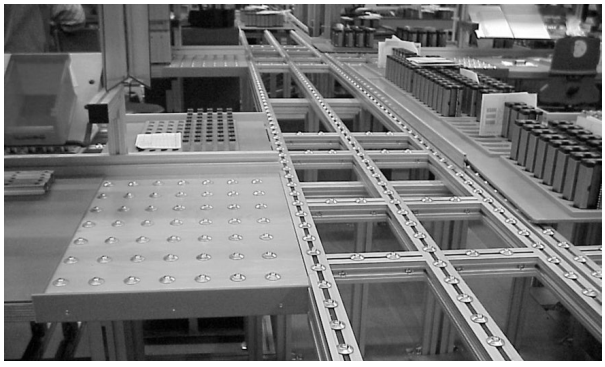


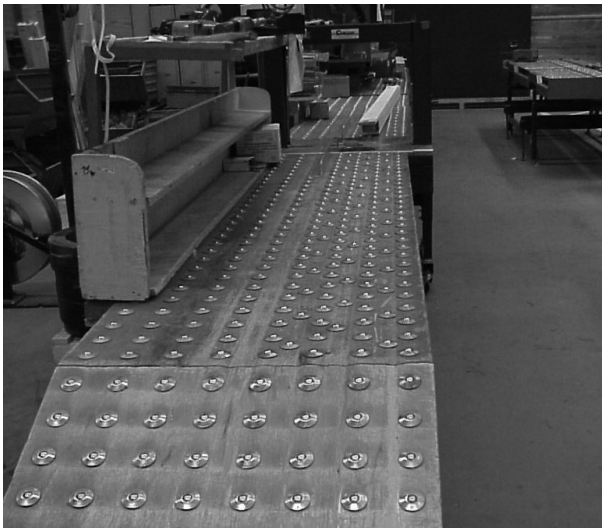




Application examples

- **E.g. Ball Transfer Units used for assembling ball runner blocks, assembly lines, packaging workstations.**





Technical data

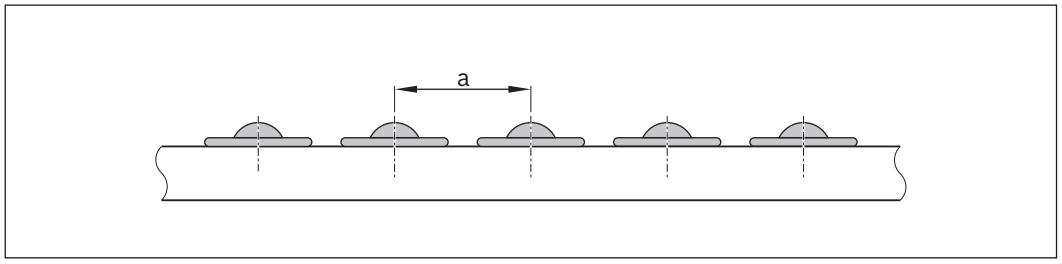
Arrangement of the Ball Transfer Units

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 1000 mm

Distance between Ball Transfer Units $a = \frac{500\ mm}{2.5} = 200\ mm$



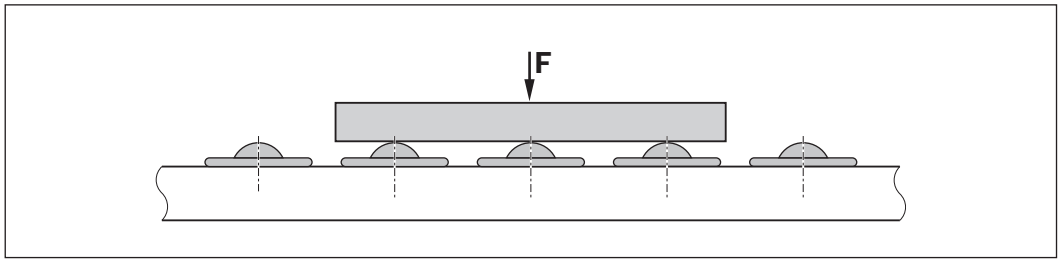
Determining the load for Ball Transfer Units

To determine the load for a Ball Transfer Unit, the weight 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 = 3000 N

Ball Transfer Unit load $F = \frac{3000\ N}{3} = 1000\ N$



Please refer to page 32 for installation examples

Spring-loaded Ball Transfer Units

The figures in the column headed "Preload" are most important when choosing the size for these types. The weight of the conveyed article is divided in this case by the number of load-bearing Ball Transfer Units.

Conveying speed

$V_{max} = 2 m/s$

Load capacity

The stated load capacities apply to all mounting orientations and relate to 10^6 rotations of the load ball.
In case of prolonged periods of use at speeds above 1 m/sec, an increase in temperature and reduction in service life must be expected as a function of the load, especially for sizes 60 to 120.