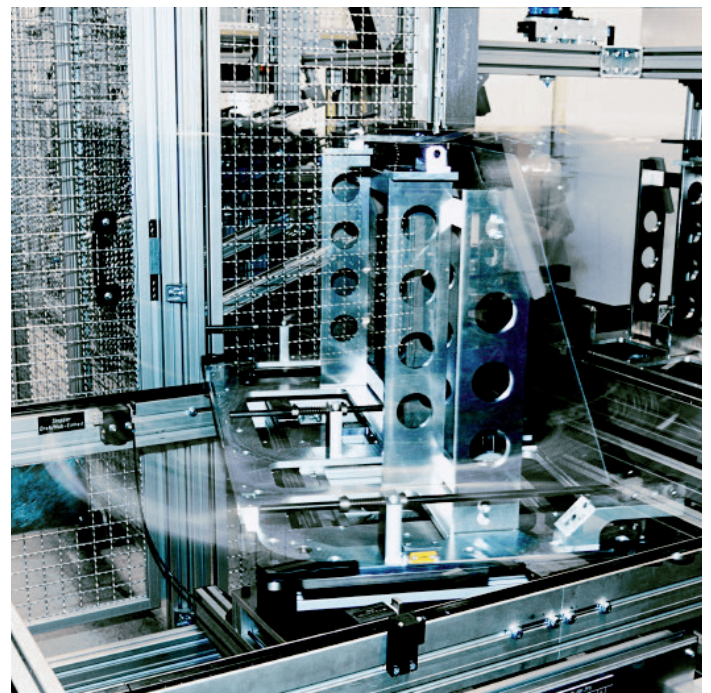
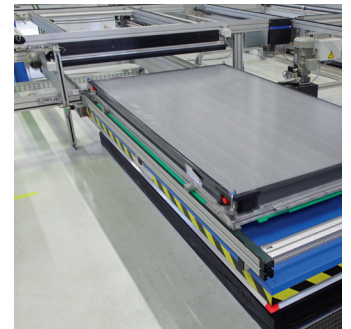
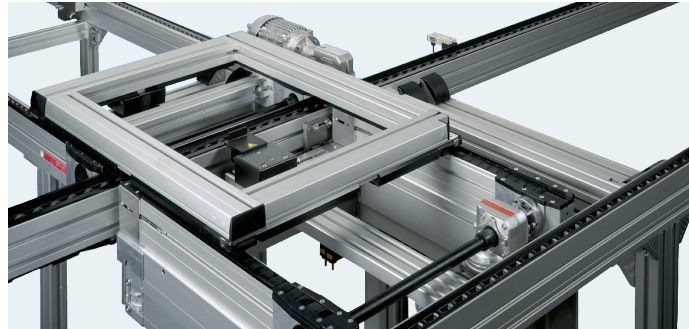


# TS 2plus features

The Rexroth TS 2plus transfer system is designed for the transportation of workpiece pallets weighing up to 240 kg and is a good all-rounder in economical production. It is a diverse modular system that meets the requirements of a wide range of different products.

TS 2plus features standardized modular units, that can be combined in many ways to create a single system. This permits a wide range of variants to be constructed and tailor made for individual requirements. The modular design permits the cost-effective use of ratio potentials in production. All components are of robust design and can therefore be reused for mounting future product generations.



### Diverse, sturdy, adaptable

Due to the large number of modular components incorporated in the system, it can be adapted to suit specific production conditions and individual layouts without requiring any extra parts:

- ▶ Four types of conveyor media (polyamide belts, toothed belts, flat top chains and accumulation roller chains) which can be combined together to meet the needs of the assembly process
- ▶ Workpiece pallets dimensions (from 160 x 160 mm up to 1200 x 1200 mm) specifically designed for the product sizes
- ▶ A high maximum load of up to 240 kg per workpiece pallet

### Special TS 2plus units

Apart from the different types of conveyor media, the TS 2plus also provides an abundance of specific components for curves, transverse conveyors, positioning units and drive units. The time and effort spent on planning and designing can be reduced to a minimum using predefined macro modules.

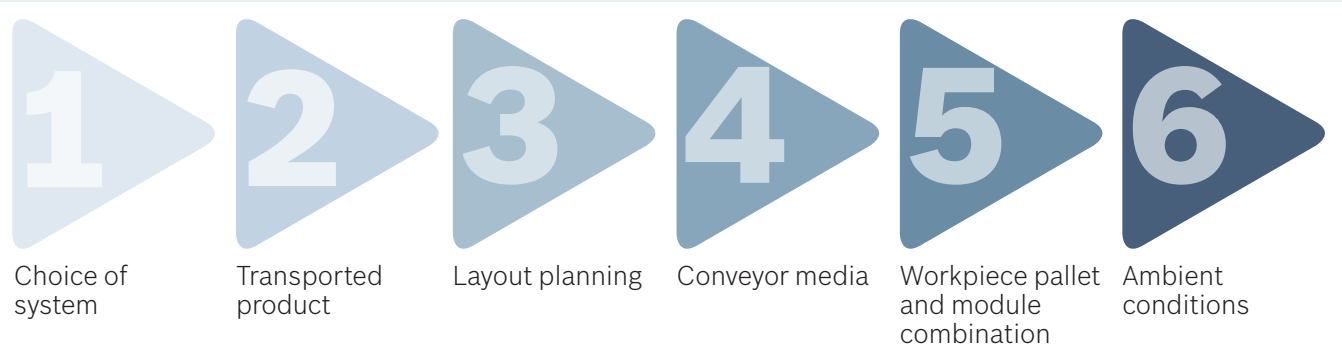
Material combinations that can be ordered from the catalog have been optimized for standard operation with TS 2plus. For special applications, additional material combinations are available. Your Rexroth representative will be pleased to support you in choosing an appropriate solution where required.

# Operating principle

On an assembly line, a transfer system transports workpieces from one station to another. Two constantly moving belts, toothed belts, flat top chains, accumulation roller chains or round belts convey the workpiece pallets (WT) by means of friction. The workpiece pallets hold the workpieces. All workpiece finishing takes place on the workpiece pallets. Information about destination and processing stage are carried in the workpiece pallet memory. The stop gate (VE) stops the workpiece pallet at the stations (areas for

manual work or automatic stations), while the conveyor medium continues moving. Several workpiece pallets can build up in front of individual stations to form small buffers. Once a processing stage is completed at the station, the workpiece pallet is released to travel on to the next work station. The pneumatic stop gate is opened, either manually or with a station control. At the end of the assembly process the workpiece is removed from the workpiece pallet.

## In a few steps for the best solution

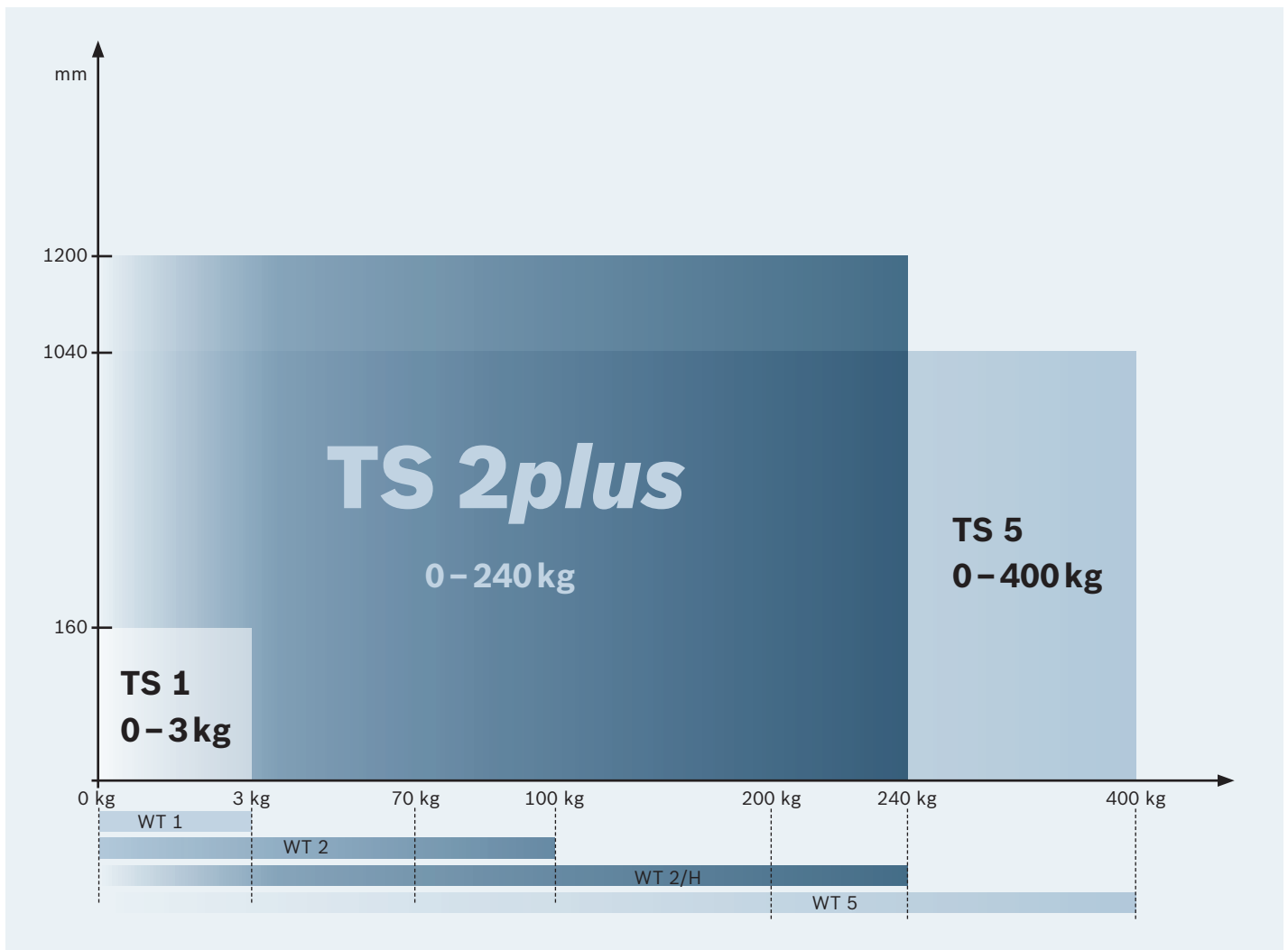


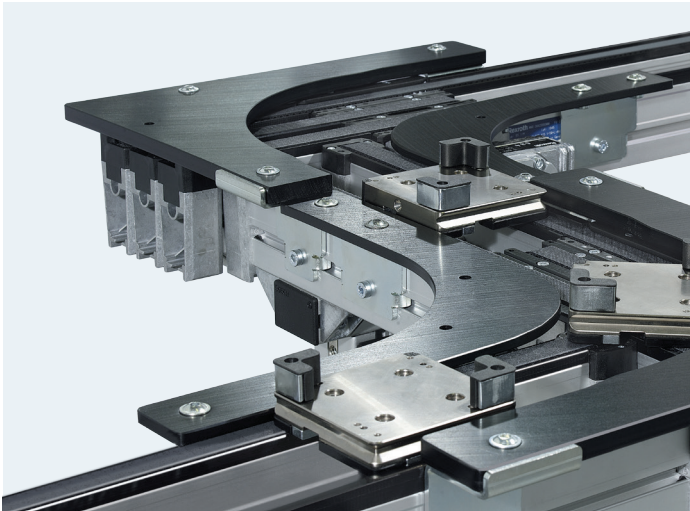
# Operating principle

## 1. Choice of system

To ensure the most economical operation possible, an assembly line requires precise forward planning. Later conversions must be as simple and cost-effective to execute as possible in order to be able to respond to future market requirements. The key factors when selecting a suitable transfer system are the weight and quality of the workpieces to be conveyed as well as the particular production environment.

The flexible modular TS 2plus transfer system from Rexroth covers a very wide range of requirements: With the wide range of mutually compatible units and macro modules permit a large variety of layouts with manual and automatic processing stations to be created. Solutions for maximum positioning accuracy or for especially heavy workpieces can be implemented easily using standard components. The future-proof TS 2plus transfer systems are designed for high availability, even under the harshest conditions.

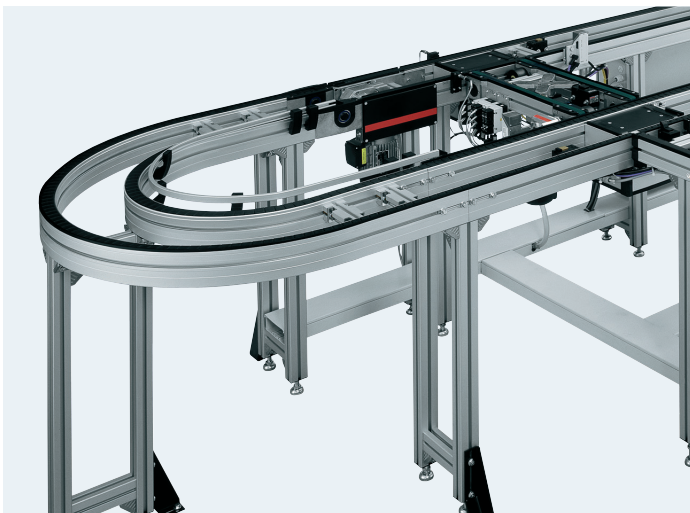




## TS 1

### **TS 1** **0–3kg**

The TS 1 transfer system is specifically tailored to small, lightweight products and assemblies, which require high positioning accuracy and repeatability.



## TS 2plus

### **TS 2plus** **0–240kg**

In the automotive industry and the electronics industry, household appliances and electronics manufacturing: With their diverse system components, TS 2plus assembly lines are suitable for use in a wide range of industries.



## TS 5

### **TS 5** **0–400kg**

The roller conveyor of the TS 5 transfer system conveys loads of up to 400 kg, over long distances where necessary, while its robust construction make it especially suitable for harsh environments.

# Operating principle

## 2. Transported product

### Workpiece pallet (WT)

The workpiece pallet (WT) transports the workpiece from one processing station to the next on the transfer system. Rexroth workpiece pallets are available in several versions for different applications: The complete plastic WT 2/E handles the transportation and positioning of lighter workpieces. The more robust WT 2 and WT 2/H models, with their steel or aluminum carrying plates, are also suitable for medium and heavy loads.

The WT 2 series workpiece pallets can be configured from components for the individual workpieces. A selection of various frame modules and carrying plates is available for this purpose.

Because the workpiece pallets must be loaded as centrally as possible for optimal transportation, it is advisable to choose larger sized carrying plates for heavier workpieces or for those with uneven weight distribution.

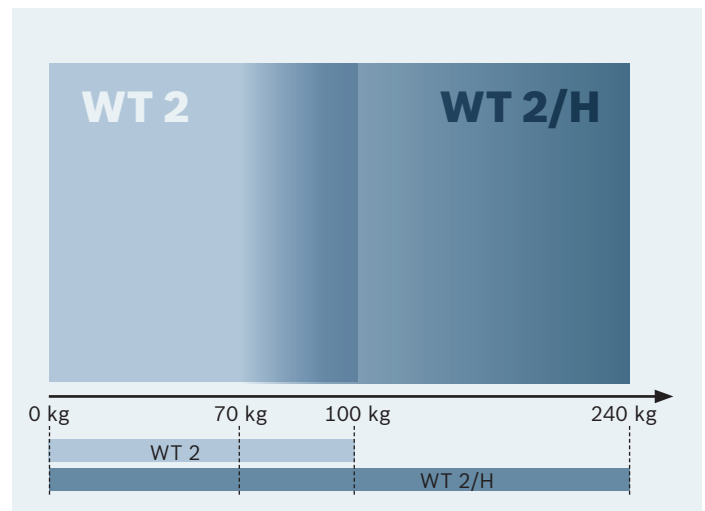
### Permitted weights

The WT total weight is limited for each WT size so that the permitted surface pressure is not exceeded.

The WT total weight results from the following:

- ▶ Workpiece pallet mass
- ▶ Workpiece pallet load (workpiece, pick-up, etc.)
- ▶ Weight of the special equipment (data storage, etc.)

For workpiece pallets that are not square, please note that the permissible WT total weight ( $m_G$ ) may be different for longitudinal conveyors and transverse conveyors and the shorter side is the determining factor for the maximum WT load.



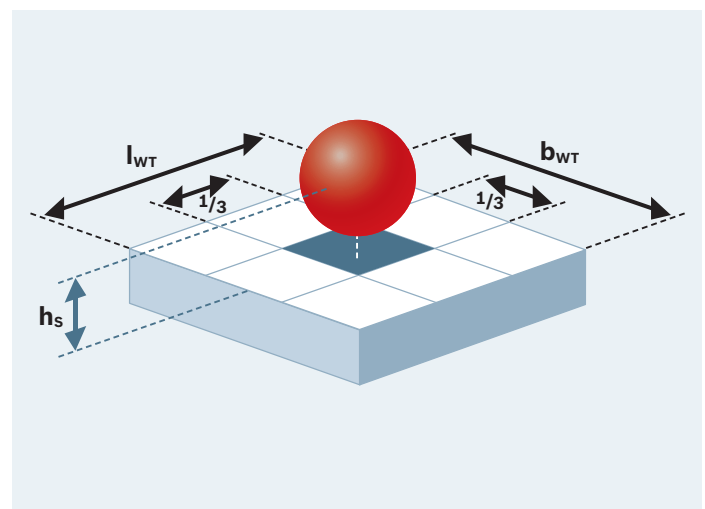
### Permissible gravity center position

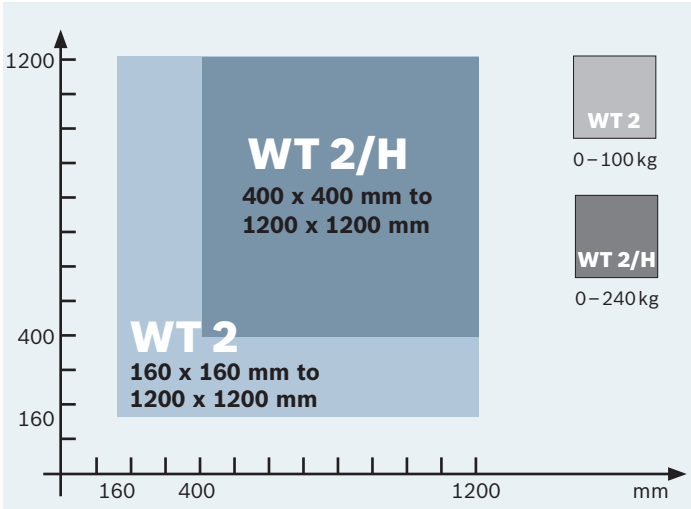
When separating pallets or changing directions, it is important to observe the position of the gravity center load on the workpiece pallet to ensure that the acceleration forces can be absorbed without any interferences.

Generally we recommend that:

- ▶ the load should be positioned in the center of the workpiece pallet
- ▶ the center of gravity should not exceed a height  $h_s$  of  $1/2 b_{WT}$  (with  $b_{WT} \leq l_{WT}$ ).

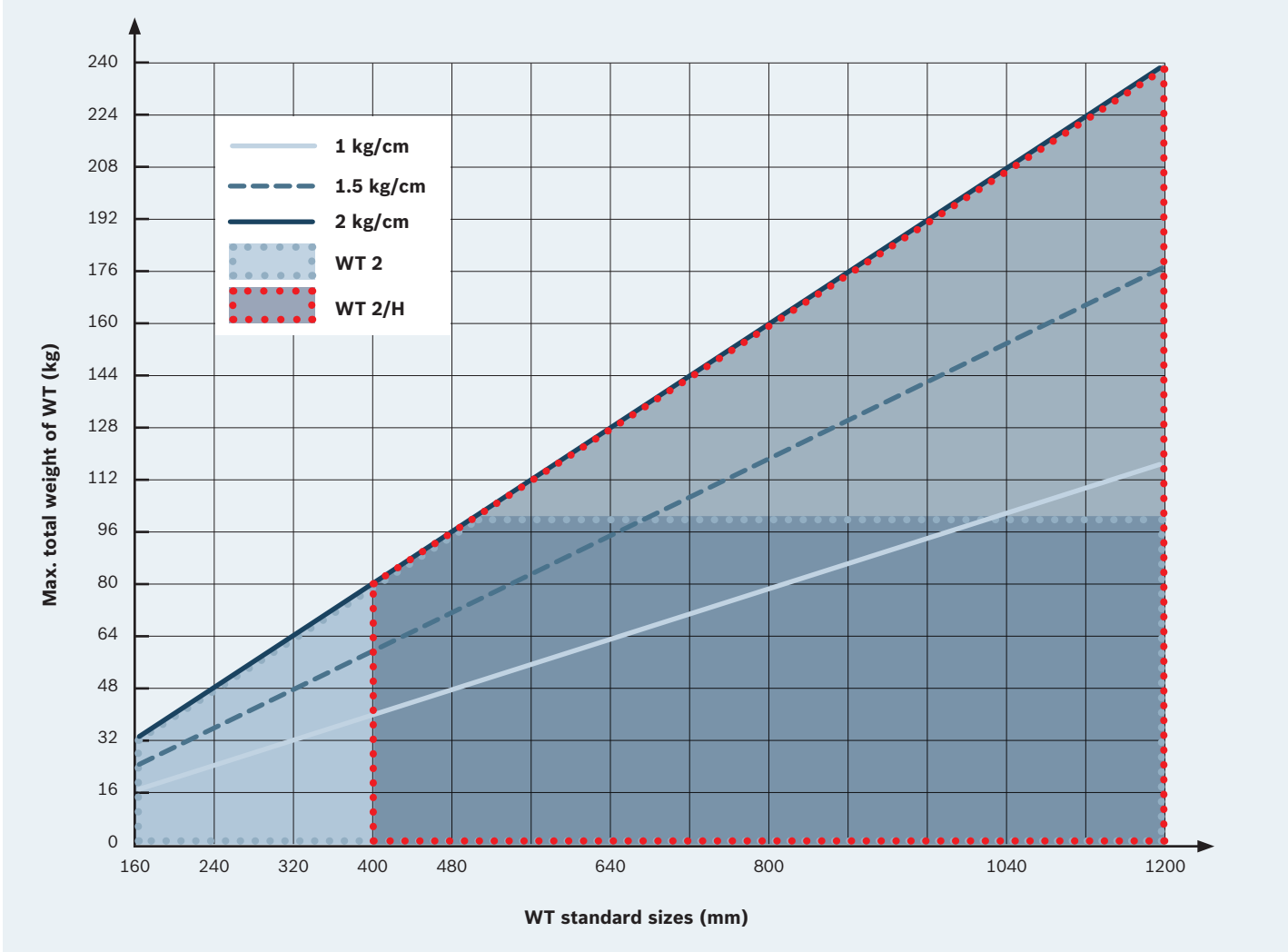
The specified performance data relate to the illustrated gravity center position.





**Available workpiece pallet (WT) dimensions**

Workpiece pallets with a surface from 160 x 160 mm up to 1200 x 1200 mm (WT 2) or with a surface from 400 x 400 mm up to 1200 x 1200 mm (WT 2/H) allow for correct adaptation to the particular workpiece geometry. If necessary, a number of workpieces can be accommodated on a single workpiece pallet (WT).



# Operating principle

## 3. Layout planning

When planning the system layout, it is very important to take into account the individual requirements, targets and priorities of the company. A very flexible system is often required for complex assembly procedures. This may be due to:

- ▶ frequent product alterations
- ▶ cycle problems due to different models
- ▶ differences in the work involved at each station
- ▶ frequent product alterations
- ▶ great fluctuation in number of workpieces

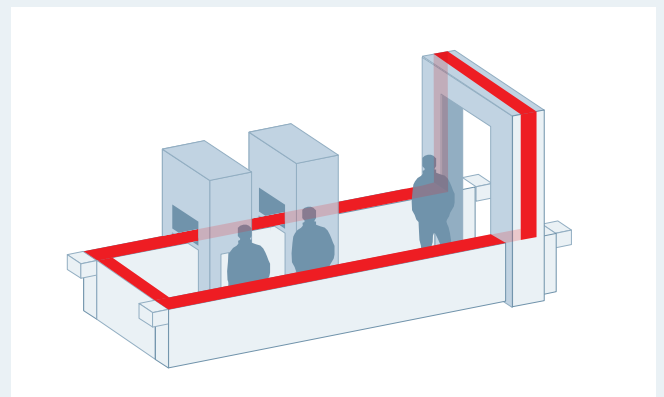
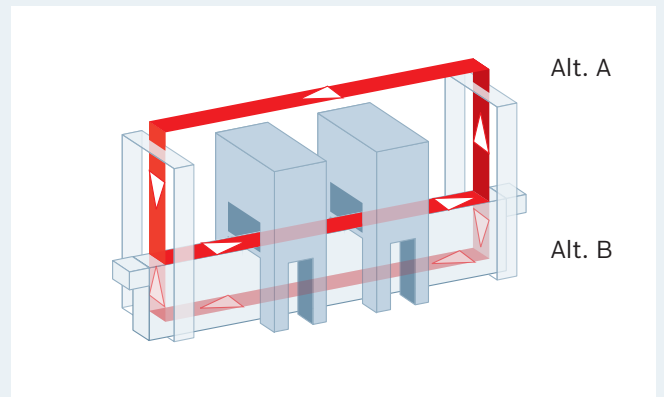
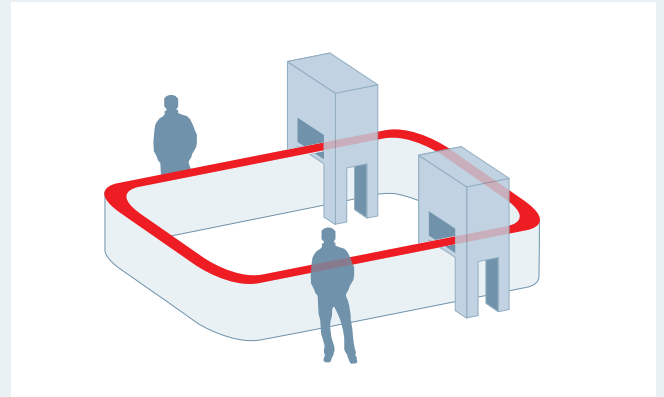
In cases like this, it is practical to transfer the workpiece pallet off the main conveyor (main circuit) into a shunt system which is independent of the main cycle. The term main circuit is used to describe workplaces or stations arranged in series.

A shunt is when workpiece pallets are directed out of the main circuit for processing independently of the main cycle, and then reintegrated in the main circuit.

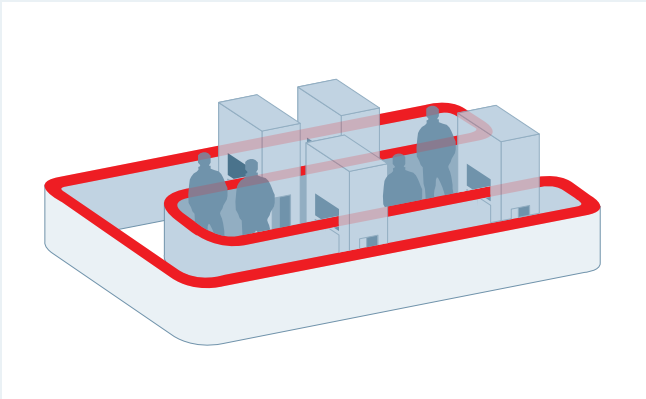


### System layouts

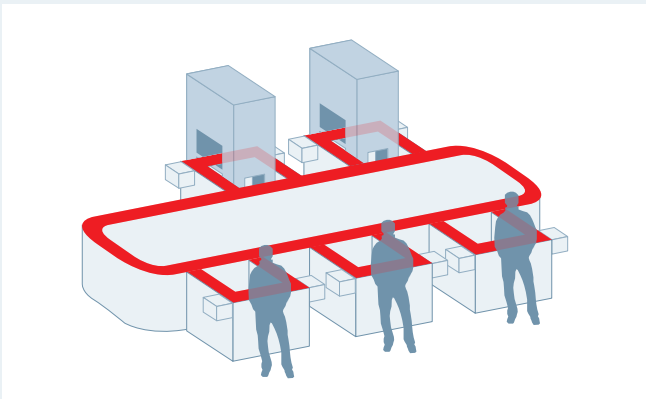
#### Main circuit



◀ Rectangular circuit

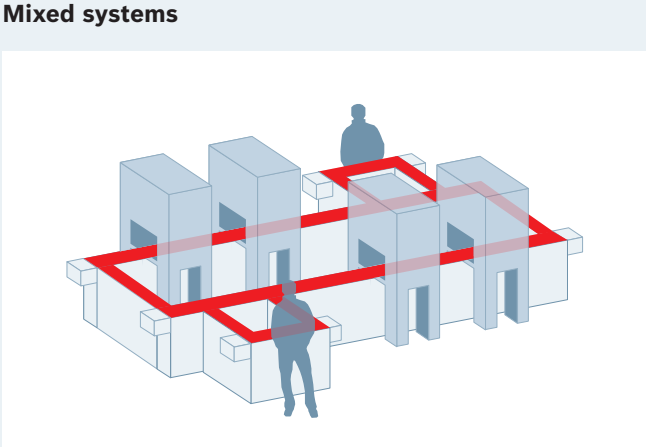


◀ U-shape



◀ Production line construction (with lift\*)  
\* Our partners can advise you about lifts.

◀ Parallel workplaces



◀ U-shape (with lift)  
\*Our partners can advise you about lifts.

◀ Rectangular circuits with parallel workplaces

**Shunt**

**Mixed systems**

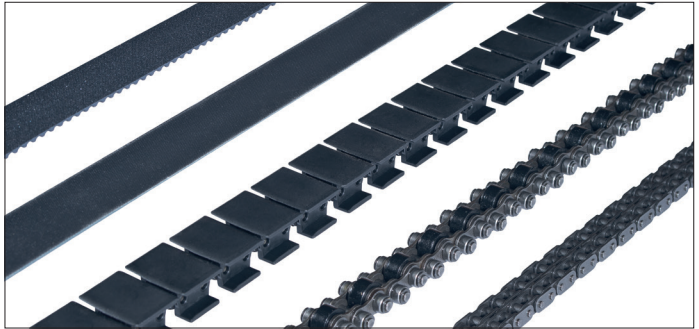


# Operating principle
























## 4. Conveyor media

The load carrying capacity of a workpiece pallet results from the

- ▶ combination of conveyor medium, glide profiles, and workpiece pallet wear pad as well as
- ▶ the surface length on the conveyor medium.



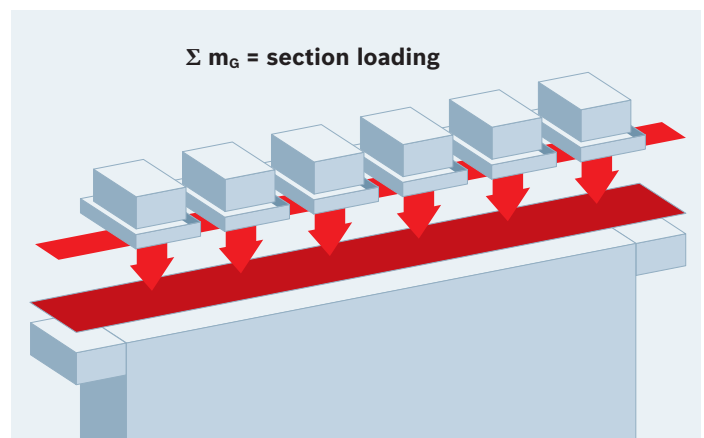
Toothed belts, belts, plastic flat top chains, roller chains, duplex chains (from left to right)

	Standard wear pad 				Special wear pad 			
Conveyor medium								
Steel glide profile								
Plastic glide profile								
	 Specific section load/cm = overall workpiece pallet mass / support surface length							

### Permitted section loading

When designing the conveyor sections, it is important to ensure that the **sum of the total weights of all workpiece pallets**, which re on the conveyor section in accumulation operation at one time, **is less than the permitted load for the conveyor section.**

The permitted section loading in accumulation is specified on individual drive modules and belt sections. If the permitted section loading for the conveyor section is exceeded, the section must be divided into several individual sections.



# Operating principle

## 5. Combination of conveyor media, glide profiles and components

### Assignment of weight classes – products

Workpiece pallet	WT 2 ≤ 400 mm	WT 2	WT 2-H	WT 2-H
Typical total weights of the WT in the application	Load 0 – 30 kg	Load 30 – 100 kg	Load 30 – 100 kg	Load 100 – 240 kg
Lift positioning unit (HP)/ positioning unit (PE)	PE 2 (F ≤ 30 kg)			
		PE 2/X (F ≤ 100 kg)	PE 2/H (F ≤ 240 kg)	PE 2/H (F ≤ 240 kg)
	HP 2/L (F ≤ 40 kg)	HP 2/L (F ≤ 40 kg)		
	HP 2 (F ≤ 110 kg)	HP 2 (F ≤ 110 kg)		
	PE 2/XX (F ≤ bel)	PE 2/XX (F ≤ bel)	PE 2/XX (F ≤ bel)	PE 2/XX (F ≤ bel)
	PE 2/XP (F ≤ 100 kN)			
Stop gate (VE)	VE 2 (F ≤ 200 kg)	VE 2 (F ≤ 200 kg)	VE 2/D100-H	VE 2/D100-H
	VE 2/L (F ≤ 200 kg)	VE 2/L (F ≤ 200 kg)	VE 2/D250-H	VE 2/D250-H
	VE 2/M (F ≤ 200 kg)	VE 2/M (F ≤ 200 kg)		
	VE 2/S (F ≤ 140 kg)	VE 2/S (F ≤ 140 kg)		
	VE 2/X (F ≤ 450 kg)	VE 2/X (F ≤ 450 kg)		
	VE 2/D-60 (F ≤ 60 kg)	VE 2/D-60 (F ≤ 60 kg)		
	VE 2/D-175 (F ≤ 100 kg)	VE 2/D-175 (F ≤ 100 kg)		
	VE 2/D-200 (F ≤ 200 kg)	VE 2/D-200 (F ≤ 200 kg)		
Damper (DA)	DA 2/10 (F ≤ 20 kg)			
	DA 2/30 (F ≤ 60 kg)			
	DA 2/100 (F ≤ 100 kg)	DA 2/100 (F ≤ 100 kg)		
			DA 2/100-H (F ≤ 100 kg)	DA 2/100-H (F ≤ 100 kg)
			DA 2/250-H (F ≤ 240 kg)	DA 2/250-H (F ≤ 240 kg)
		DA 2/150-E	DA 2/150-E	
Switch bracket (SH)	SH 2/S	SH 2/S		
	SH 2/ST	SH 2/ST		
	SH 2/S-H	SH 2/S-H	SH 2/S-H	SH 2/S-H
	SH 2/U	SH 2/U		
	SH 2/UV	SH 2/UV		
	SH 2/U-H	SH 2/U-H		
	SH 2/SF	SH 2/SF		
Rocker (WI)	WI 2	WI 2		

# Operating principle

## 6. Ambient conditions

### **Materials used, resistance to media**

Rexroth transfer systems are manufactured with high-quality materials to ensure continuous use. They are resistant to lubricating and cleansing agents that are common in an industrial environment.

However, we cannot guarantee that the products contained in this catalog are resistant to all combinations of testing liquids, gases, or solvents. Please contact your Rexroth representative if you have any doubts.



## Environmental conditions – climatic

The transfer systems have been designed for stationary use in a location that is protected from the elements.

### Operating temperature

+5 ... +40 °C  
-5 ... +60 °C with 20%  
less load

### Storage temperature

-25 °C ... +70 °C

### Relative humidity

5 ... 85%, non-condensing  
1 ... 2% (dry room) on request

### Air pressure

> 84 kPa as appropriate  
Installation altitude < 1400 m above mean sea level.  
Load values are reduced by 15% when the system is set up at a location that is over 1400 m above sea level.

## Environmental conditions – biological

Avoid molds, fungi, rodents, and other vermin.

## Environmental conditions – chemical

Do not set up near industrial systems with chemical emissions.

## Environmental conditions – physical

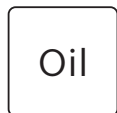
Do not set up near sources of shavings, sand or dust.  
Do not set up in areas that are regularly jarred by high forces caused by, e.g., presses, heavy machinery, etc.





### **Suitability for electrostatically sensitive areas**

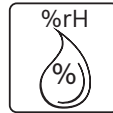
Almost all of the components and parts in Rexroth transfer systems are ESD-compatible or available in ESD-compatible design. They can thus principally be used in EPA (ESD-protected areas). We do, however, recommend that you contact your Rexroth representative.



### **Use in oily environments**

For applications where process-related oil can enter the transfer system, we recommend using chains as the conveyor medium (accumulation roller chains, *Vplus* chains or flat top chains). We do, however, recommend that you contact your Rexroth representative.





### Use in dry rooms

TS 2plus has been tested and approved with all conveyor media for use in dry rooms with a relative humidity of 1 ... 2%, e.g., for the production of Li-Ion battery cells. Your Rexroth representative will be pleased to advise you about this.



### Use in cleanrooms

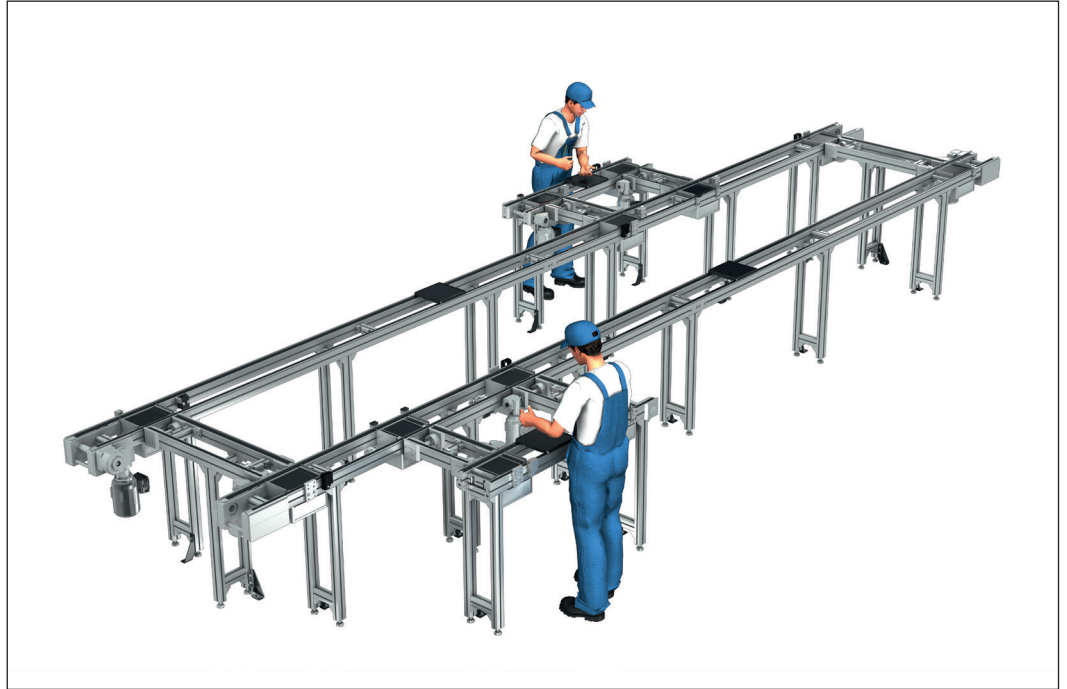
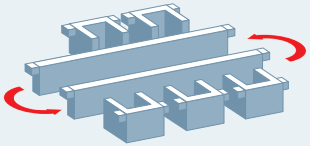
Almost all the components have been approved by the IPA<sup>\*)</sup> for use in clean rooms and for clean room class 7 according to DIN EN ISO 14644-1. Please note that some clean room-compatible components have been specially modified. Please contact your Rexroth representative if you require clean room components.

<sup>\*)</sup> Fraunhofer Institute for Manufacturing Engineering and Automation, Stuttgart, Germany

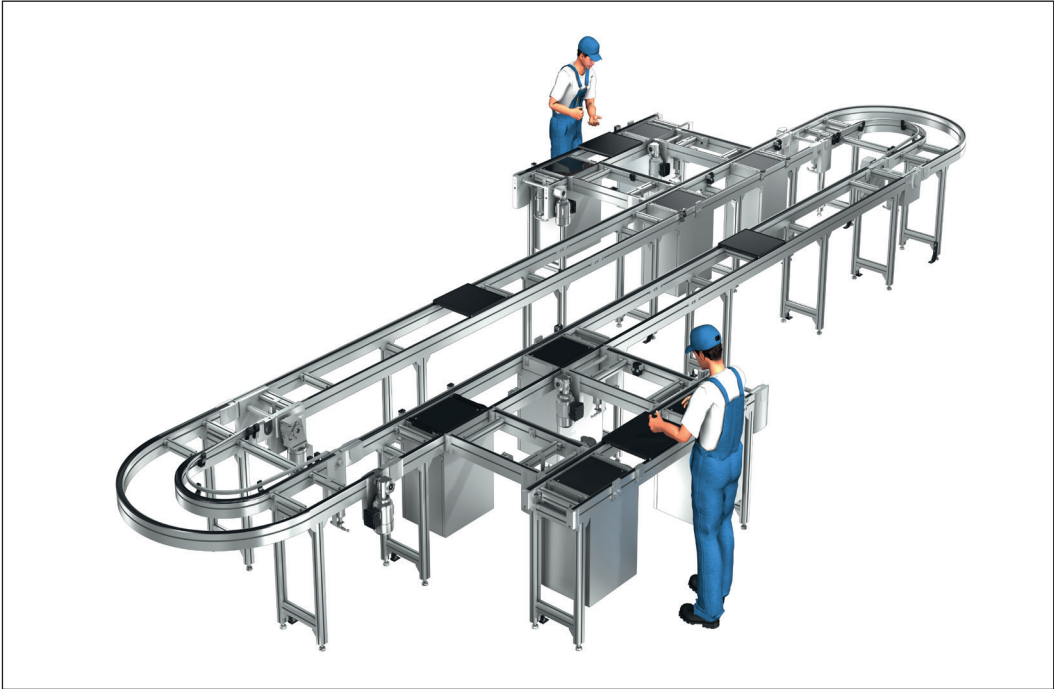
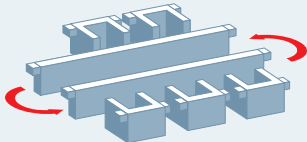
# Design ideas

## Systems

Layout example with  
240 x 240 mm workpiece  
pallets, conveyor  
medium: belts,  
toothed belts



Layout example with  
640 x 640 mm workpiece  
pallets, conveyor  
medium: accumulation  
roller chain, flat  
top chain





# Identification and data tag systems

Identification and data storage systems store all product and process-related data directly on the workpiece pallet and enable local or central data processing. Identification and data tag systems are used to control numerous production and transport systems in assembly technology applications.

## Data related to objects is the basis for

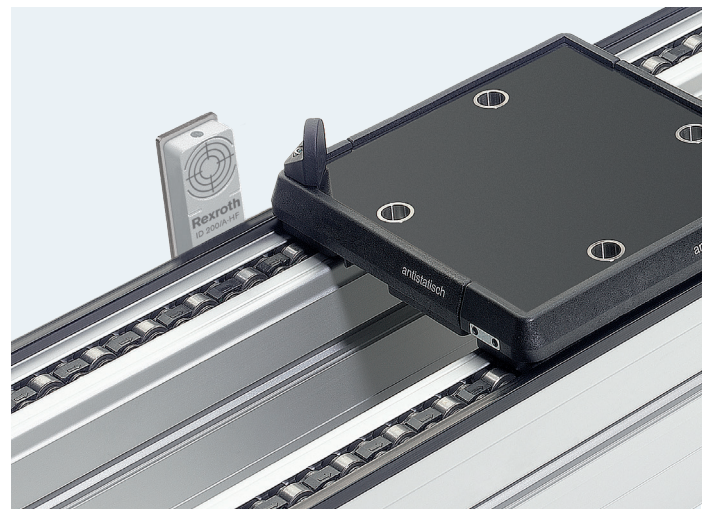
- ▶ for targeted control of processes and processing steps
- ▶ infeeding or outfeeding workpiece pallets according to type or variant when manufacturing product variants on flexible assembly systems.



ID 15



ID 40



ID 200

You can find the current range of Rexroth identification and data tag systems in the RFID systems catalog.

Identification systems catalog

DE no. 3842541003



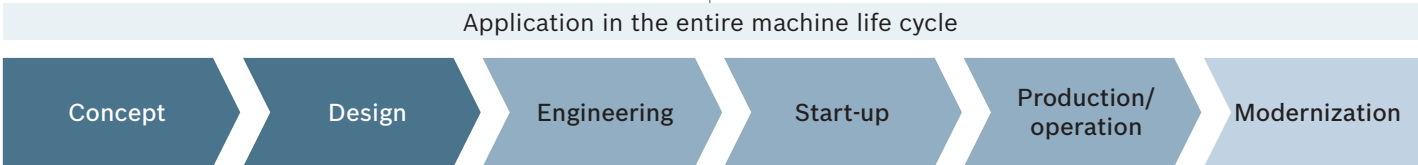
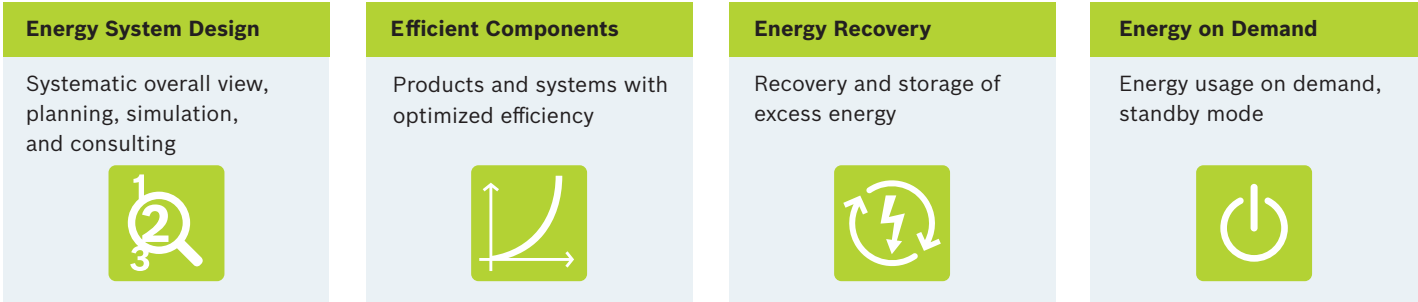
# Energy efficiency – Rexroth 4EE



## Energy efficiency – a key factor for corporate success

From an economic point of view, energy efficiency and reduced emissions lower operating costs and offer a competitive edge in the fiercely competitive global market. In addition, they help support compliance with environmental standards.

All potentials for optimization are used effectively when not only the details of a system but the system as a whole is optimized. The 4EE system features four levers:



**Efficient system layout**  
To achieve high energy efficiency, the system must be examined as a whole as early as in the planning phase. The TS 2plus modular system offers numerous modules, all of which enable you to implement a transfer system tailored precisely to the particular application. This effectively prevents over-dimensioning and high energy losses from the outset.

**Energy-efficient modules**  
The TS 2plus modules are equipped with particularly energy-efficient drives. The efficiency of most of the motors already exceed future requirements. The interplay of friction-optimized materials, e.g., on slide rails, friction-minimizing gear oils and numerous further design details ensures perfect coordination in the overall system.

**Energy use on demand**  
Minimal energy consumption requires the ability to be able to switch off system components on demand. The majority of motors in the TS 2plus system are designed for start-stop operation and frequency converter operation.

**Worldwide approval**  
For international use, most of the motors feature CE, cURus and CCC approvals.