

TS4*plus* Modular Conveyors for Flexible Manufacturing

Version **3.0**

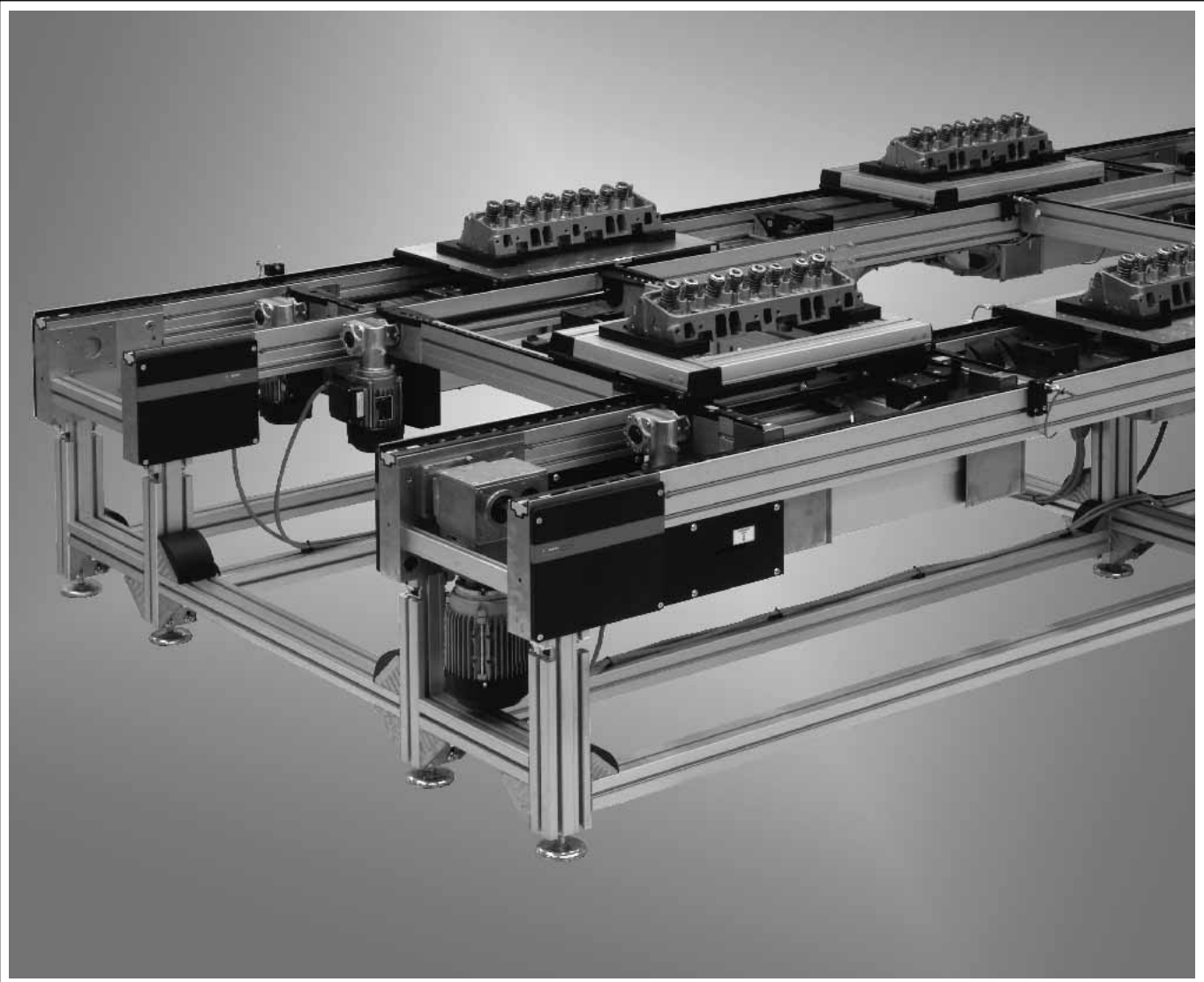
Handle Pallet Payloads up to 250 kg (550 lbs.)



Introduction

TS4plus Modular Conveyors

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**Liability:**

In no event can the manufacturer accept warranty claims or liability claims for damages resulting from improper use or misuse of the equipment or as a result of changes made to the equipment other than those authorized by the manufacturer. The manufacturer will accept no claim in which non-original spare parts have been used.

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Introduction

TS4plus—Flexible assembly solutions for heavy loads

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The TS4plus assembly conveyor, along with TS 1 and TSplus, is part of the new generation of TS modular conveyors for flexible assembly. Like all TS products, TS4plus is a workpiece-pallet based conveyor system designed to improve manufacturing productivity and product quality while allowing for maximum assembly flexibility.

TS4plus lets you respond quickly to changing assembly requirements

All components of the TS4plus system are pre-engineered and modular. The system can be easily expanded, reconfigured, or relocated as your production needs change. You can phase in your investment as time and budget permit. Start with a simple conveyor for basic assembly, and grow into a fully automated, progressive assembly system. As production requirements change, TS4plus gives you the flexibility to add manual or automatic workstations.

The workpiece pallet—heart of the TS4plus system

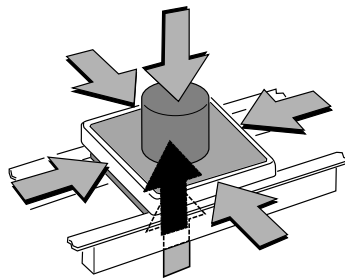
TS4plus conveyors transport parts and assemblies on workpiece pallets. The workpiece pallets, up to 1243 x 1243 mm (49" x 49") are not attached to the conveying medium that transports them. This method offers many benefits for product assembly applications.

Positioning. A Rexroth Lift Position Unit can position pallets at workstations with a repeatable accuracy of ± 0.125 mm, making precision assembly operations possible.

Tooling. Pallets can be equipped with fixtures to secure parts and assemblies for manual or automated operations.

Sensing. Conveyor mounted proximity switches work with exciter plates on the pallet corner bumpers to detect pallet presence.

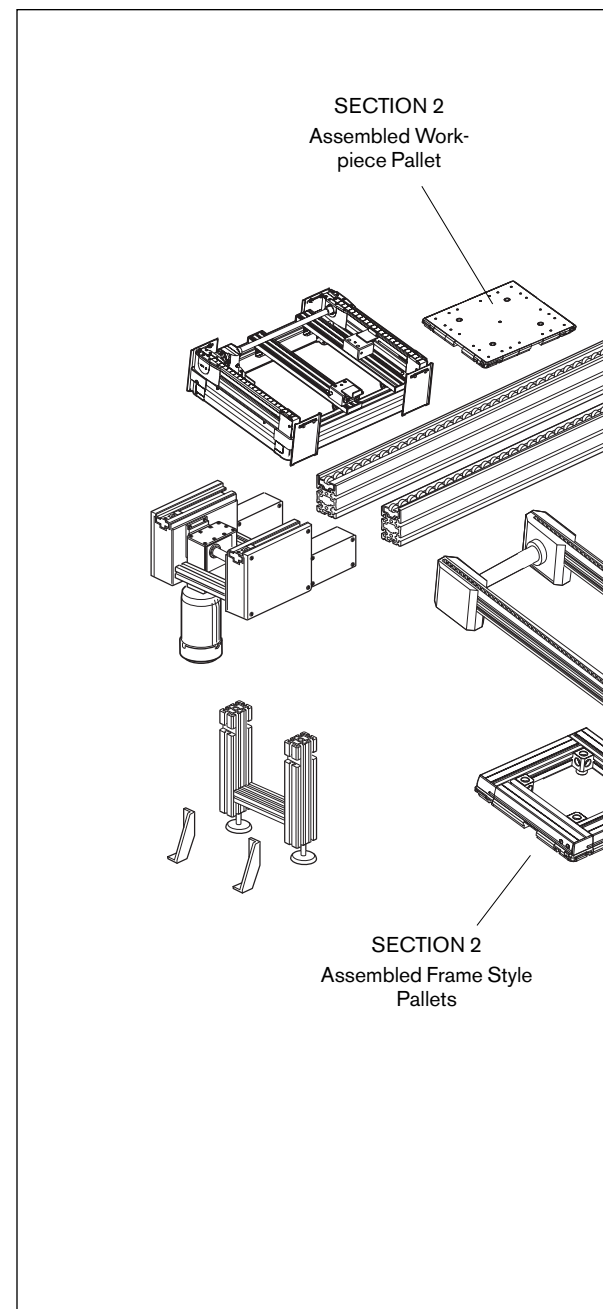
Stopping. Pallets can be stopped on the leading or trailing edge—regardless of pallet orientation on the conveyor. Pallets can also be accumulated in queue and released one at a time.



The workpiece pallet can be accessed from all sides—allowing maximum flexibility in automated or manual workstation placement around the conveyor.

Durable low-friction roller chain

The workpiece pallets are transported by a durable low-friction roller chain, allowing the accumulation of even heavily loaded pallets.



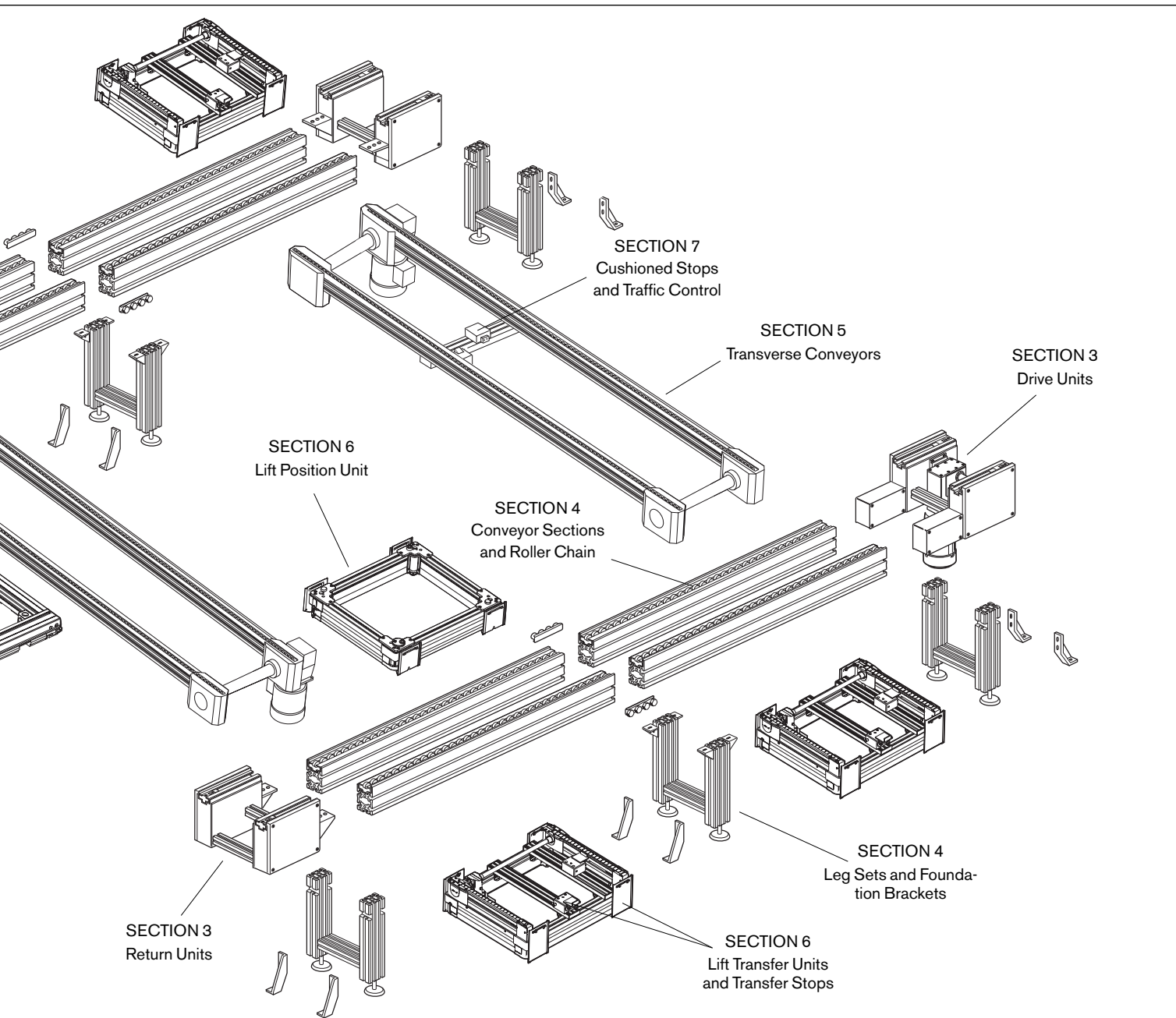
Introduction

Planning the System Layout

When planning a system layout it is very important to consider the individual requirements of the assembly operation.

Pallet payload and size, cycle time, process flow, product changes, pallet fixturing and floor space are a few of the parameters that determine the best configuration for your assembly system.

TS4plus is widely used in the appliance and automotive industries because of its ability to handle large and heavy products like automotive drivetrain components, ranges or even refrigerators.

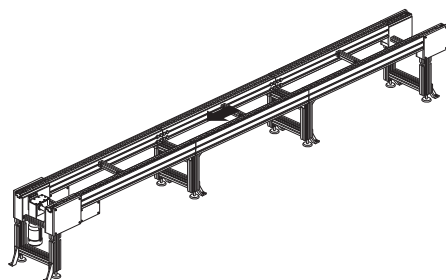


Introduction

Choose the TS4plus configuration that best suits your application

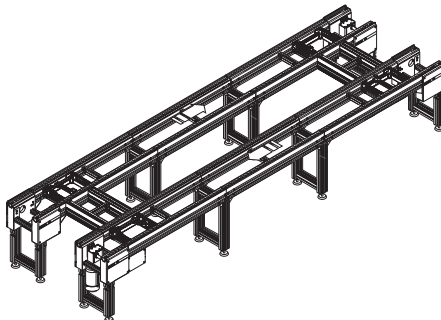
Numerous configuration possibilities

With TS4plus, you have the freedom to select the configuration best suited to your layout and production requirements. Construct and combine four basic configurations: in-line, parallel, rectangular, and over/under. Space constraints and process complexity are often key factors in deciding which configuration(s) will work best for your application.

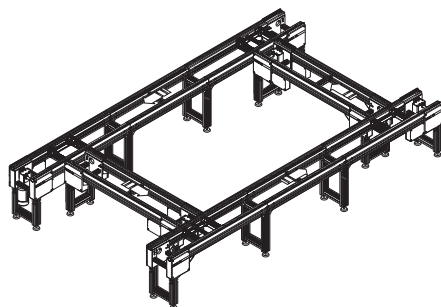
In-line

In-line systems are the simplest configuration and form the basis for all other TS4plus configurations.

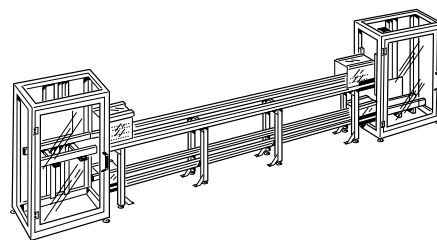
In-line systems can be used for point-to-point transport, or to create spur-lines for inspection or assembly operations. They can also be used to interconnect or extend other TS4plus systems and configurations. Each in-line system consists of a drive and a return, with the pallets transported along roller chain conveyor

Parallel

Parallel systems are formed by linking two in-line systems, running in opposite directions, together side-by-side, with track rollers bridging the gap between the lines. Lift Transfer Units move the pallets on and off the main line. This allows continuous circulation of pallets, and can be used where the capacity of a rectangular system is not needed, or where space is

Rectangular

Rectangular systems use in-line conveyors, with Lift Transfer Units at the "corners" to move the pallets on and off the main lines. This layout offers the advantage of continuous pallet circulation without the spacing limitations created by track rollers. In addition, the use of standard conveyor sections for the transverse sections means that there is no loss in load capacity or accumulation capabilities. Process stations can be set up all the way around the conveyor, if needed.

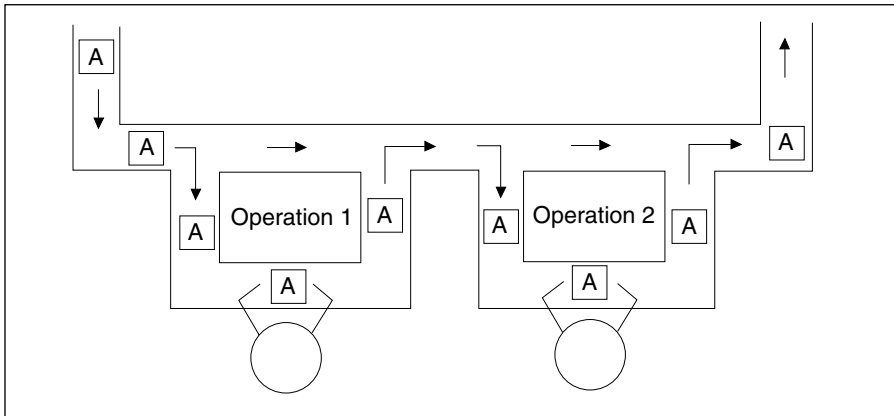
Over/Under

Over/under systems consist of two conveyor sections mounted one above the other. One conveyor section transports the workpiece pallet through the assembly process. The other conveyor section then returns the workpiece pallet to the beginning of the line. The upper and lower sections are connected together by vertical transfer units on each end. Over/under configurations provide a significant savings in floor space requirements, making them ideal for applications where space is at a premium.

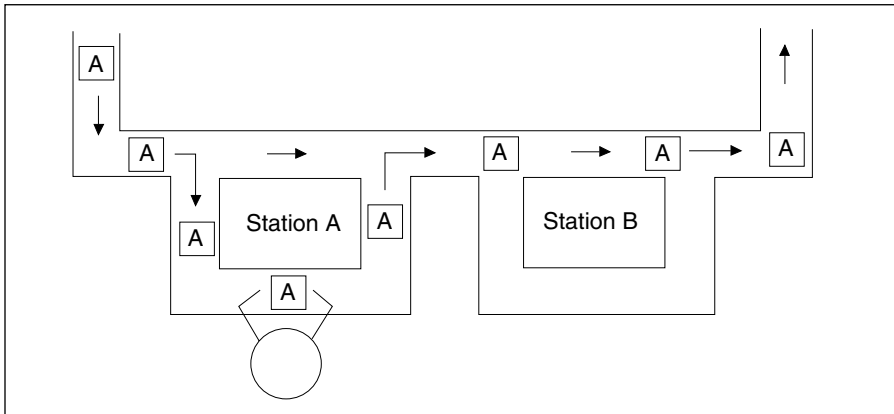
These are just some of the possibilities with TS4plus pre-engineered conveyors. No matter what the assembly requirement, Rexroth modular components make manufacturing truly flexible.

Introduction

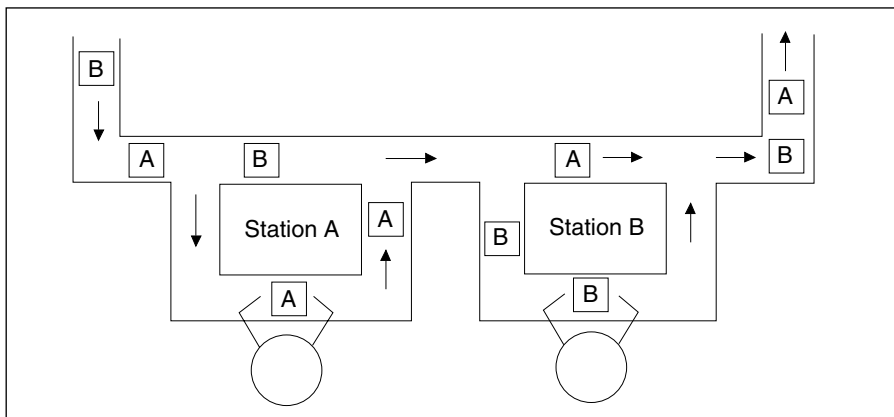
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"Cycle-independent stations" can be used to balance assembly operations with differing cycle times.



Fluctuations in production quantity can be easily accommodated by bypassing assembly workstations.



Different products can also be processed simultaneously.

Further tailor your system to match specific assembly requirements

With TS4plus assembly conveyors, workpiece pallets can be selectively routed to off-line manual or automated stations. These "cycle-independent stations" allow you to accommodate fluctuating production quantities and to balance cycle times between work-stations. This, in turn, permits manual and automated workstations to be combined on the same line.

Cycle-independent stations are constructed using standardized modules and therefore are easily added to the main conveyor.

Applications for TS4plus

The TS4plus system can be used in precision assembly and testing applications with a total pallet payload up to 250 kg (550 lbs). This makes it an excellent solution for the automotive, and appliance industries.

Typical types of products that can be assembled using TS4plus include:

- Automotive assemblies
- Drivetrain components
- Home appliances
- Televisions
- Electronics

Introduction

Complete support: before, during and after installation

1

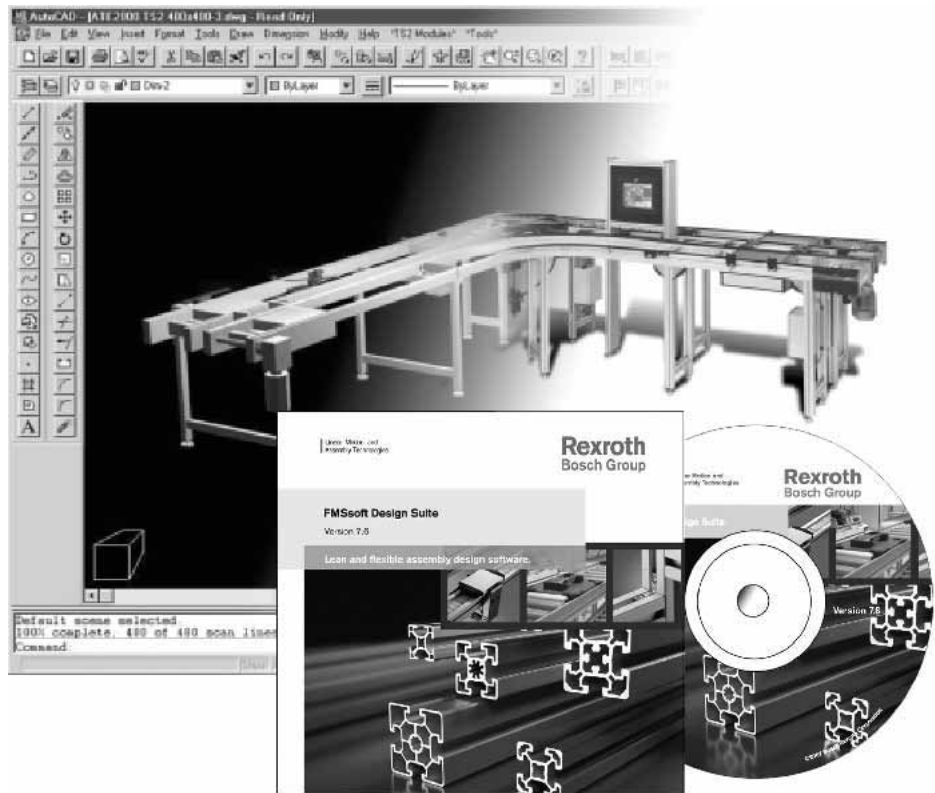
Every assembly project has its challenges. But you don't have to meet them alone. Bosch Rexroth offers the most comprehensive program of customer support available anywhere, from do-it-yourself projects to turnkey installations. Now that you've taken the first step by requesting this catalog, we'll help you with all the rest—from the initial quote and installation, to servicing your line years from now.

Application engineering from experts, or via CAD

Whatever your application, our application engineers have probably worked on it. They'll carefully review your requirements — cycle time, payload, floor space, process flow — and devise the best conveyor layout to meet them.

If you'd rather design the system yourself, our FMSsoft™ program makes it easy. It not only creates a 3-D layout based on your parameters, but generates a bill of materials to simplify ordering. This user-friendly program works on any CAD system using AutoCAD® Release 2000 or later.

Whichever you prefer, we'll respond quickly with a detailed quotation and answer any questions you may have. And we'll work with you directly, or through your local Bosch Rexroth systems integrator, to schedule delivery and installation when you need it.



Systems integrators make Rexroth expertise their business

For large projects, Bosch Rexroth integrators provide total support on a local basis, putting years of expertise with Rexroth products to work for you. They offer complete project management of automated assembly systems, including engineering, manufacturing, installation, and debugging. We work closely with our network of integrator partners, providing them with the latest in product information, as well as software and service training.

After-sale service assures your continued success

The Bosch Rexroth commitment continues long after your system is up and running. Our highly qualified, experienced staff of service experts is always available for maintenance questions, spare parts orders, field service, and more. We're also happy to provide training in the installation or maintenance of any Rexroth products, either in your facility or at our headquarters in Buchanan, Michigan.

Introduction

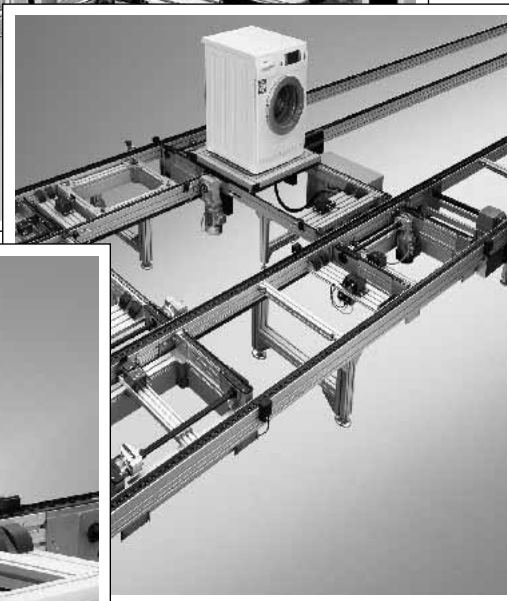
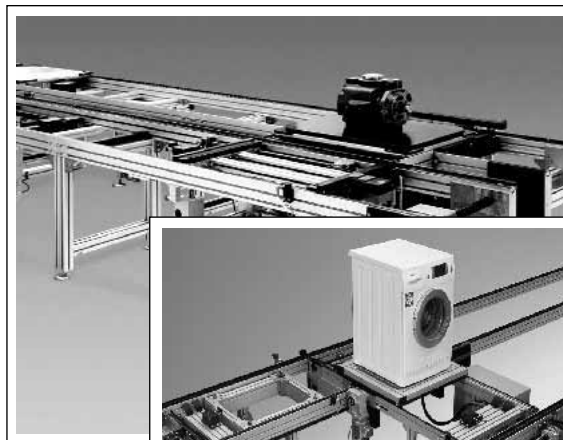
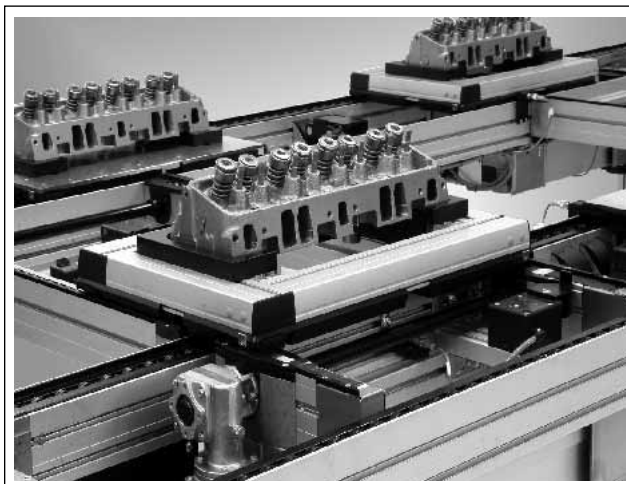
**Documentation that answers
(and anticipates) your questions**

Of course, you don't want to call Rexroth every time you have a question. Fortunately, our approach to documentation ensures that you won't have to. Product catalogs (like this one) make planning and ordering easy, with detailed specifications and dimensions, 3-D illustrations and part numbers.

When your system arrives, everything you need to know for set-up and operation comes with it. And if you'd like to know which spare parts to keep on hand, we'll send you an exploded-view spare parts catalog or a customized spare parts list just for your system.

More available on-line

In a hurry? The latest news, products, application ideas and more are all just a click away, on the Bosch Rexroth Corporation website. You'll find your local authorized integrator there, too, at: **www.boschrexroth-us.com**. Visit today, and see why it pays to specify Rexroth.

1**Application Photos**

Introduction

Getting started using this catalog

1

This catalog describes every module needed to construct a TS4plus assembly conveyor. The modules are organized in the order you would most likely need to specify your system. The chart below lists some common Bosch terms and their definitions that are used in this catalog.

What your order should include

In order for us to process your order as quickly and accurately as possible, please make sure you specify:

- 10-digit part number
- Name of the module
- Quantity
- Other ordering parameters as needed

For example, to order 10 assembled workpiece pallets (page 2-2) measuring 643 mm square with 12.7 mm pallet plates, your purchase order would include:

Module name: **Workpiece Pallet**

Quantity: **10**

Part number: **8981 021 895**

Additional info: **(None required)**

Modules such as drive units, lift transfer units, or positioning modules require you to specify the base 10-digit part number as listed, and then select from a list of options when ordering. These options include such things as voltage/frequency, conveyor speed, motor location, and conveyor width.

As you specify your options, a 15-digit part number will be created, unique to

those options that you have specified.

This part number provides customer service with the exact information they need to build and service your module. Always use this number when ordering parts for your module.

If you need application assistance, or have any questions about ordering, feel free to contact us or your nearest Bosch Rexroth representative.

1-800-322-6724

In Canada:

1-905-335-5511

Rexroth Terms and Definitions**Nominal Height:**

Distance from floor to top of transport media.

Transport Level:

WT = Workpiece pallet

B = Nominal width

L = Nominal length


B_{WT} = Workpiece pallet width

L_{WT} = Workpiece pallet length

B_Q = Lift transfer unit width

B_L = Lift transfer unit length

 = Load Carrying capacity in Kg

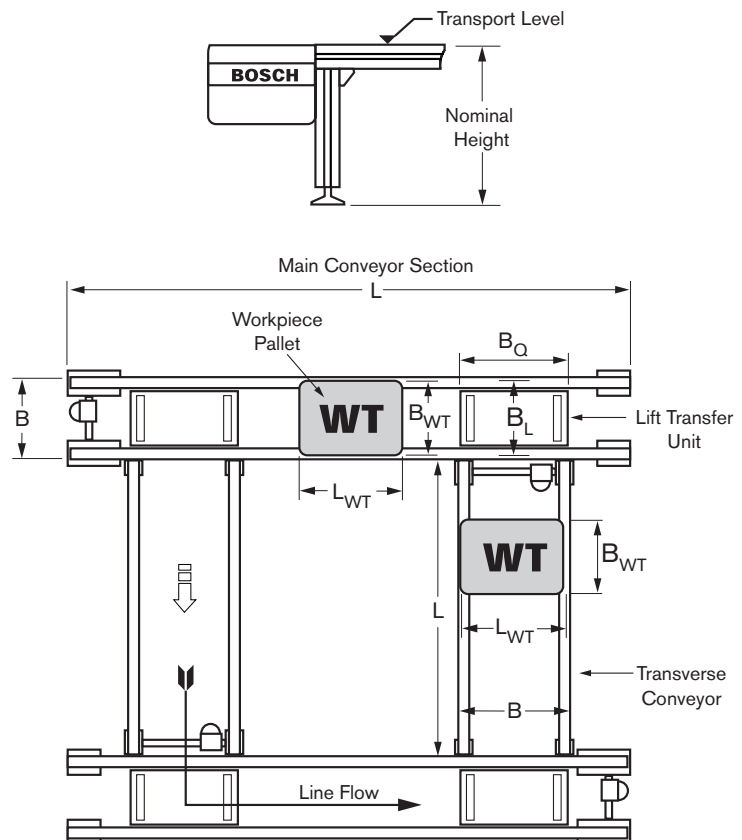
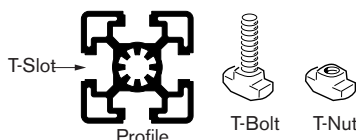
 = Pallet Flow

T-Slot:

The longitudinal slot in the extruded aluminum profiles of the conveyor

T-Bolt and T-Nut:

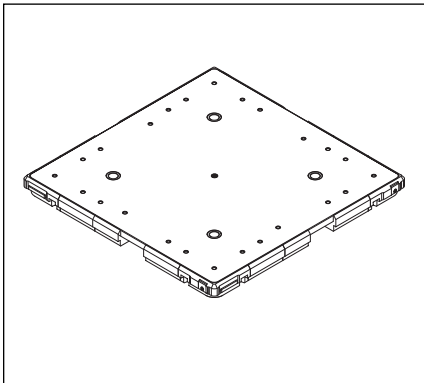
Hardware used to secure components and accessories to the T-slots of a profile



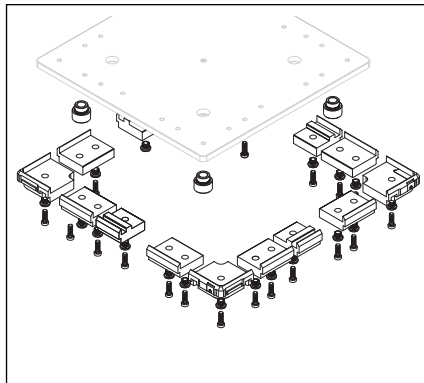
Workpiece Pallets

Section 2—Workpiece Pallets

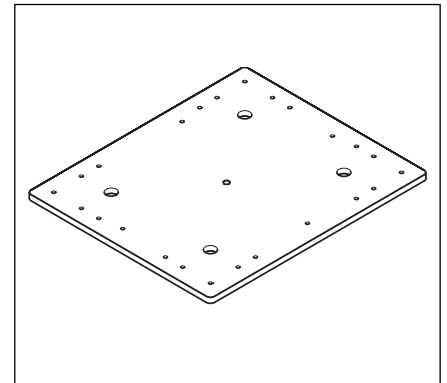
The WT4-S workpiece pallet forms the heart of the TS4plus system. The edge-guided pallets are available in a wide range of sizes and with two different aluminum pallet plate thicknesses to fit your production needs. They can be ordered fully assembled, or purchased in kits of individual components for on-site assembly, with or without the pallet plate. A very lightweight, open center (frame) style pallet is also available.

2

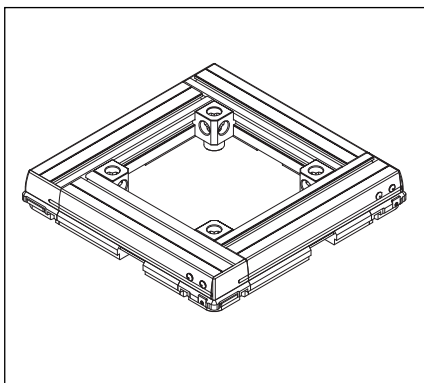
WT4-S, WT4-S-H
Assembled Workpiece Pallets
2-2 to 2-3



WT4-S
Workpiece Pallet Frame Kits
2-4 to 2-5



WT4-S, WT4-S-H
Aluminum Pallet Plates
2-6 to 2-9



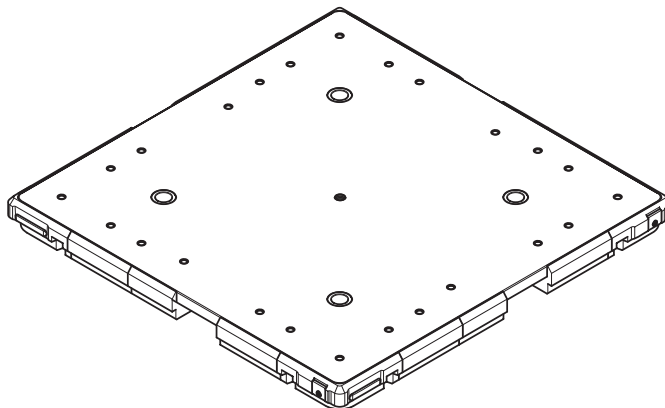
WT4-S/F
Assembled Open Center Pallets
2-10 to 2-11

Workpiece Pallets

Assembled Workpiece Pallets

Model WT4-S, WT4-S-H

Fully assembled TS4plus workpiece pallets are available in 15 standard sizes ranging from 443 x 443mm to 1243 x 1243mm.



The workpiece pallets consist of frame modules (corners and extensions) and a support plate. The frame modules are made from electrically conductive UHMW-PE and include horizontal exciter plates to indicate relative positioning when used in conjunction with proximity switches. The frame modules also include integrated bumpers, which dampen the impact of pallet-to-pallet contact. The support plate is made of aluminum (12.7mm or 19.1mm thick).

Assembled workpiece pallets also have four pressed-in hardened steel positioning bushings which provide precise location of the workpiece pallet for automated assembly operations when used with Rexroth positioning modules. M8x25 screws (quantities vary according to pallet size) are used to secure the frame modules to the support plates.

Workpiece Pallet Payloads (in kg)

Workpiece Pallet load-bearing edge L_{WT} or B_{WT} in mm	Maximum Load in kg*
443	85
643	125
843	165
1043	210
1243	250

* Maximum load is the combined weight of all pallet components, fixture, and parts. Please refer to Section 8 for application notes on pallet payloads as they relate to load application points.

Ordering Information for Assembled Workpiece Pallets WT4-S with 12.7 mm pallet plates

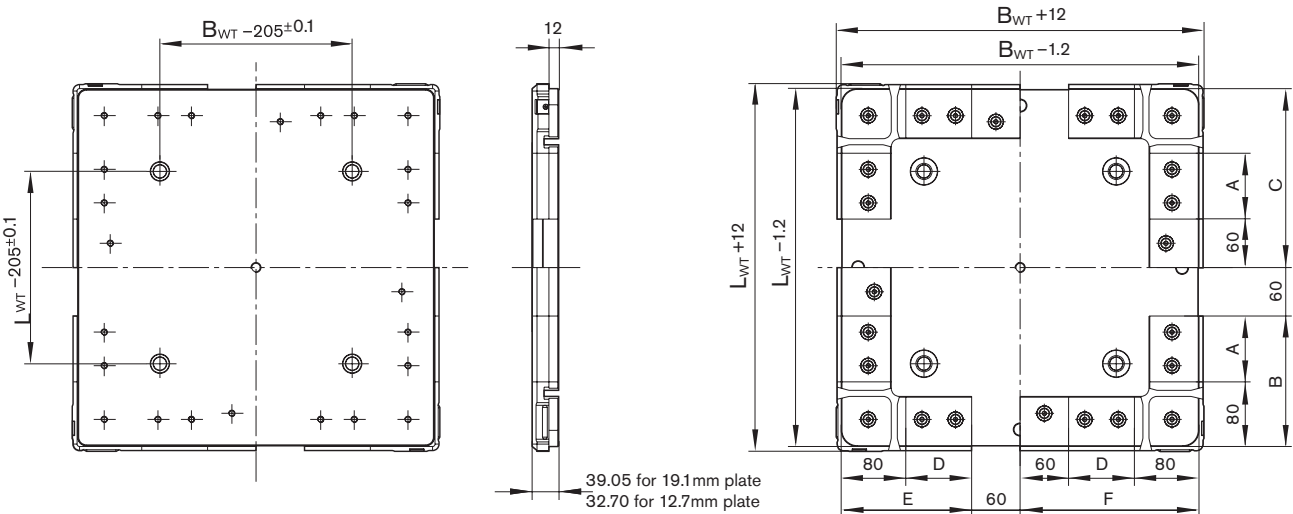
		Width (B_{WT})				
		443	643	843	1043	1243
Length (L_{WT})	443	8981 021 890	•	•	•	•
	643	8981 021 891	8981 021 895	•	•	•
	843	8981 021 892	8981 021 896	8981 021 899	•	•
	1043	8981 021 893	8981 021 897	8981 021 900	8981 021 902	•
	1243	8981 021 894	8981 021 898	8981 021 901	8981 021 903	8981 021 904

Ordering Information for Assembled Workpiece Pallets WT4-S-H with 19.1 mm pallet plates

		Width (B_{WT})				
		443	643	843	1043	1243
Length (L_{WT})	443	8981 021 905	•	•	•	•
	643	8981 021 906	8981 021 910	•	•	•
	843	8981 021 907	8981 021 911	8981 021 914	•	•
	1043	8981 021 908	8981 021 912	8981 021 915	8981 021 917	•
	1243	8981 021 909	8981 021 913	8981 021 916	8981 021 918	8981 021 919

Workpiece Pallets

Dimensional Data for WT4-S, WT4-S-H



B _{WT}	L _{WT}		A	B	C	D	E	F
443	443		81.5	161.5	221.5	81.5	161.5	221.5
443	643		181.5	261.5	321.5	81.5	161.5	221.5
443	843		281.5	361.5	421.5	81.5	161.5	221.5
443	1043		381.5	461.5	521.5	81.5	161.5	221.5
443	1243		481.5	561.5	621.5	81.5	161.5	221.5
643	643		181.5	261.5	321.5	181.5	261.5	321.5
643	843		281.5	361.5	421.5	181.5	261.5	321.5
643	1043		381.5	461.5	521.5	181.5	261.5	321.5
643	1243		481.5	561.5	621.5	181.5	261.5	321.5
843	843		281.5	361.5	421.5	281.5	361.5	421.5
843	1043		381.5	461.5	521.5	281.5	361.5	421.5
843	1243		481.5	561.5	621.5	281.5	361.5	421.5
1043	1043		381.5	461.5	521.5	381.5	461.5	521.5
1043	1243		481.5	561.5	621.5	381.5	461.5	521.5
1243	1243		481.5	561.5	621.5	481.5	561.5	621.5

WT4-S Workpiece Pallet Weights (in kg)

12.7 mm fixture plates		Width (B _{WT})				
		443	643	843	1043	1243
		weight	weight	weight	weight	weight
Length (L _{WT})	443	8.6	•	•	•	•
	643	12.1	17.0	•	•	•
	843	15.7	22.0	28.3	•	•
	1043	19.2	26.9	34.6	42.2	•
	1243	22.8	31.8	40.9	50.0	59.0

WT4-S-H Workpiece Pallet Weights (in kg)

19.1 mm fixture plates		Width (B _{WT})				
		443	643	843	1043	1243
		weight	weight	weight	weight	weight
Length (L _{WT})	443	11.8	•	•	•	•
	643	16.9	24.0	•	•	•
	843	22.0	31.2	40.4	•	•
	1043	27.0	38.3	49.5	60.8	•
	1243	32.2	45.4	58.8	72.0	85.4

NOTE: Dimensions are for reference only. Contact Rexroth for a detailed machining drawing.

Workpiece Pallet Frame Kits

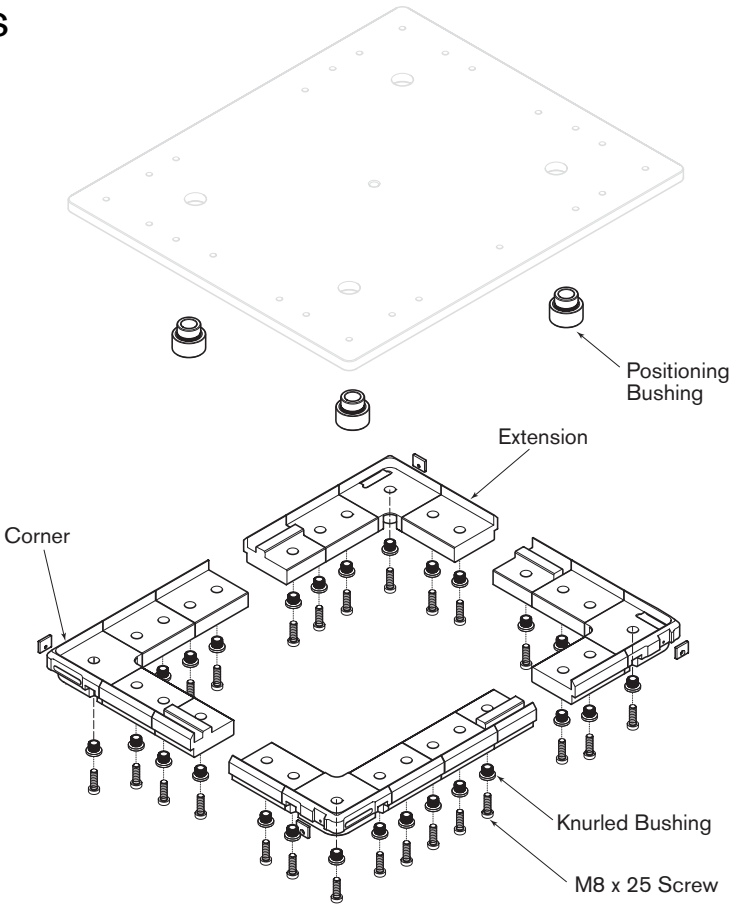
WT4-S

Workpiece pallet frames can also be purchased as kits for on-site assembly. Ordering pallet frame kits make it possible to perform any machining necessary to the pallet plate for fixturing prior to assembling the pallet. 12.7mm thick aluminum pallet plates are available separately on page 2-6 to 2-7. See page 2-8 to 2-9 for 19.1mm thick aluminum pallet plates

In cases where substantial fixture tooling is being used, it may be possible to eliminate the pallet plate entirely, as well as the cost and weight associated with it.

Each workpiece pallet frame kit includes frame extension modules, corner modules, four positioning knurled bushings, and M8x25 screws that are used to secure a pallet plate (12.7mm or 19.1mm) to the frame extensions and corners.

NOTE: Pallet frame kits **DO NOT** include pallet plates.

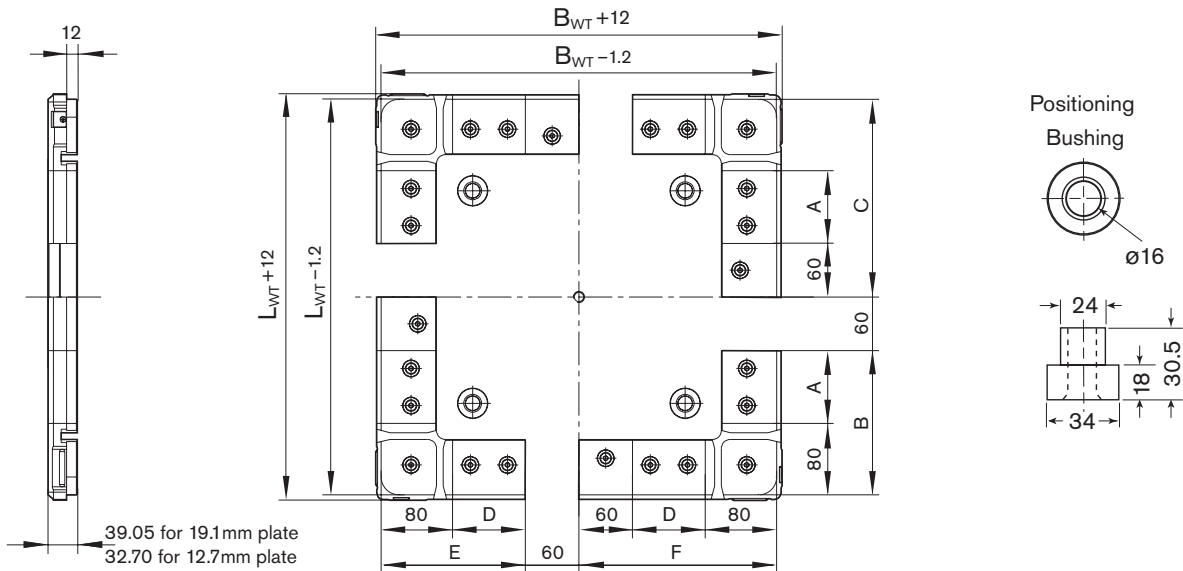


Ordering Information for Workpiece Pallet Frame Kits

		Width (B _{WT})				
		443	643	843	1043	1243
Length (L _{WT})	443	8981 021 920	•	•	•	•
	643	8981 021 921	8981 021 925	•	•	•
	843	8981 021 922	8981 021 926	8981 021 929	•	•
	1043	8981 021 923	8981 021 927	8981 021 930	8981 021 932	•
	1243	8981 021 924	8981 021 928	8981 021 931	8981 021 933	8981 021 934

Workpiece Pallets

Dimensional Data for Pallet Frames



B _{WT}	L _{WT}		A	B	C	D	E	F
443	443		81.5	161.5	221.5	81.5	161.5	221.5
443	643		181.5	261.5	321.5	81.5	161.5	221.5
443	843		281.5	361.5	421.5	81.5	161.5	221.5
443	1043		381.5	461.5	521.5	81.5	161.5	221.5
443	1243		481.5	561.5	621.5	81.5	161.5	221.5
643	643		181.5	261.5	321.5	181.5	261.5	321.5
643	843		281.5	361.5	421.5	181.5	261.5	321.5
643	1043		381.5	461.5	521.5	181.5	261.5	321.5
643	1243		481.5	561.5	621.5	181.5	261.5	321.5
843	843		281.5	361.5	421.5	281.5	361.5	421.5
843	1043		381.5	461.5	521.5	281.5	361.5	421.5
843	1243		481.5	561.5	621.5	281.5	361.5	421.5
1043	1043		381.5	461.5	521.5	381.5	461.5	521.5
1043	1243		481.5	561.5	621.5	381.5	461.5	521.5
1243	1243		481.5	561.5	621.5	481.5	561.5	621.5

NOTE: Dimensions are for reference only. Contact Rexroth for a detailed machining drawing.

Workpiece Pallets

Aluminum Workpiece Pallet Plates (12.7 mm)

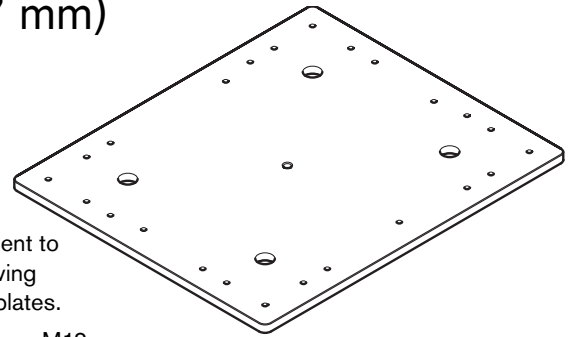
Model WT4-S

When pallet plate machining is required for additional fixturing, Rexroth conveniently offers 12.7 mm aluminum pallet plates.

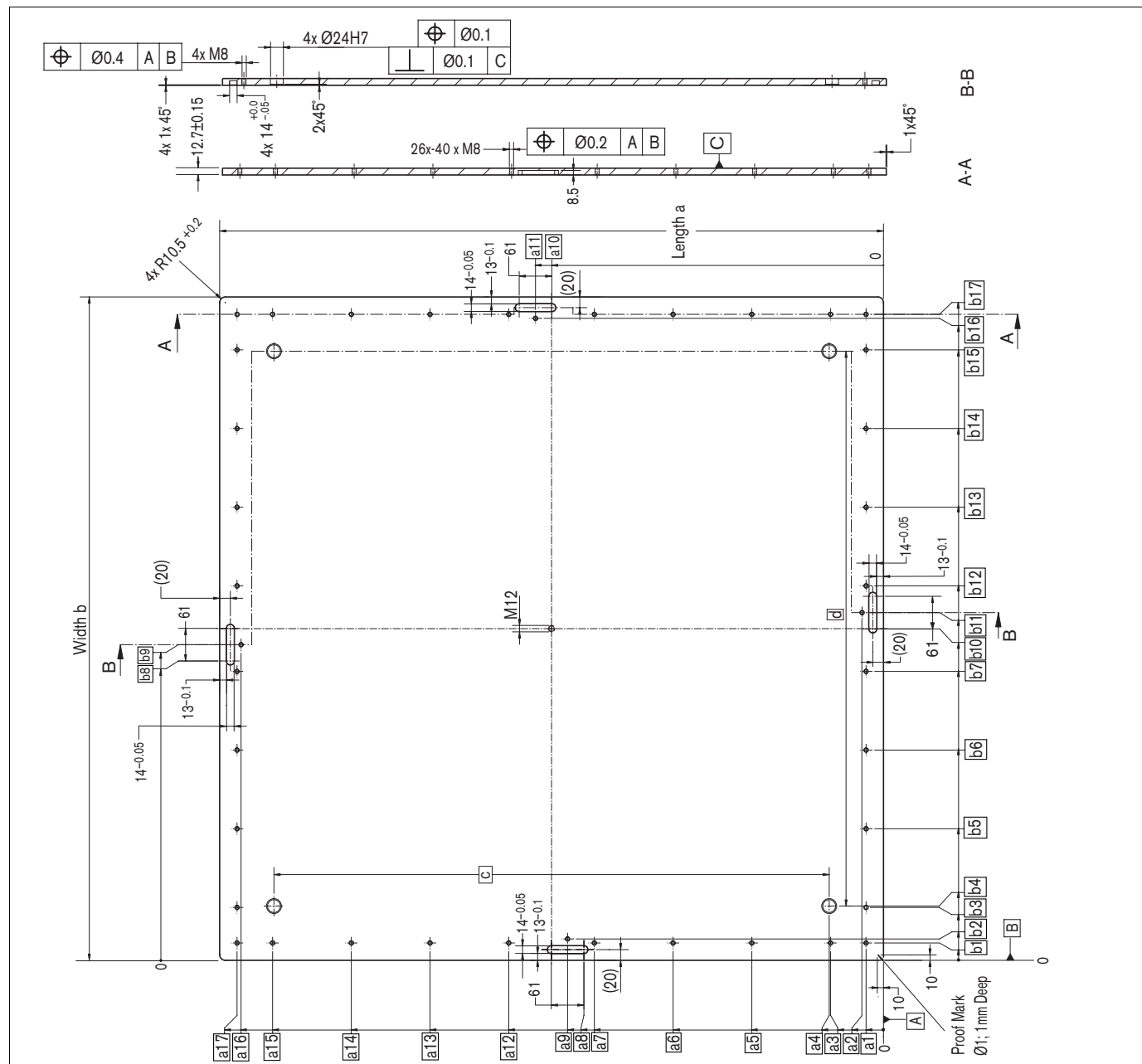
For best pallet accuracy, the fixture mounting holes and positioning bushing location should be machined at the same time. Please contact the Bosch Rexroth

applications engineering department to obtain a detailed pallet plate drawing when machining your own pallet plates.

Each pallet plate is equipped with an M12 tapped hole to accommodate a lifting eye in the center of the plate.



Dimensional Data for 12.7mm Pallet Plates



NOTE: Dimensions are for reference only. Contact Rexroth for a detailed machining drawing.

Workpiece Pallets

Ordering Information for 12.7 mm Aluminum Workpiece Pallet Plates

BWT	LWT	Part Number	Flatness	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	a12	a13	a14	a15	a16	a17
443	443	3842 531 236	0.6	32.5	40	99	101.5			140.5	160	190.5	220	250.5	300.5			342	401	408.5
443	643	3842 531 237	0.8	32.5	40	99	101.5			240.5	260	290.5	320	350.5	400.5			542	601	608.5
443	843	3842 531 239	1	32.5	40	99	101.5	219.75		340.5	360	390.5	420	450.5	500.5	621.5		742	801	808.5
443	1043	3842 531 242	1.2	32.5	40	99	101.5	219.75		440.5	460	490.5	520	550.5	600.5	721.5		942	1001	1008.5
443	1243	3842 531 246	1.2	32.5	40	99	101.5	219.75	393.35	540.5	560	590.5	620	650.5	700.5	847.65	944.85	1142	1201	1208.5
643	643	3842 531 238	0.8	32.5	40	99	101.5			240.5	260	290.5	320	350.5	400.5			542	601	608.5
643	843	3842 531 240	1	32.5	40	99	101.5	219.75		340.5	360	390.5	420	450.5	500.5	621.5		742	801	808.5
643	1043	3842 531 243	1.2	32.5	40	99	101.5	219.75		440.5	460	490.5	520	550.5	600.5	721.5		942	1001	1008.5
643	1243	3842 531 247	1.2	32.5	40	99	101.5	219.75	393.35	540.5	560	590.5	620	650.5	700.5	847.65	944.85	1142	1201	1208.5
843	843	3842 531 241	1	32.5	40	99	101.5	219.75		340.5	360	390.5	420	450.5	500.5	621.5		742	801	808.5
843	1043	3842 531 244	1.2	32.5	40	99	101.5	219.75		440.5	460	490.5	520	550.5	600.5	721.5		942	1001	1008.5
843	1243	3842 531 248	1.2	32.5	40	99	101.5	219.75	393.35	540.5	560	590.5	620	650.5	700.5	847.65	944.85	1142	1201	1208.5
1043	1043	3842 531 245	1.2	32.5	40	99	101.5	219.75		440.5	460	490.5	520	550.5	600.5	721.5		942	1001	1008.5
1043	1243	3842 531 249	1.2	32.5	40	99	101.5	219.75	393.35	540.5	560	590.5	620	650.5	700.5	847.65	944.85	1142	1201	1208.5
1243	1243	3842 531 250	1.2	32.5	40	99	101.5	219.75	393.35	540.5	560	590.5	620	650.5	700.5	847.65	944.85	1142	1201	1208.5

BWT	LWT	b1	b2	b3	b4	b5	b6	b7	b8	b9	b10	b11	b12	b13	b14	b15	b16	b17	c	d
443	443	32.5	40	99	101.5			140.5	160	190.5	220	250.5	300.5			342	401	408.5	238	238
443	643	32.5	40	99	101.5			140.5	160	190.5	220	250.5	300.5			342	401	408.5	438	238
443	843	32.5	40	99	101.5			140.5	160	190.5	220	250.5	300.5			342	401	408.5	638	238
443	1043	32.5	40	99	101.5			140.5	160	190.5	220	250.5	300.5			342	401	408.5	838	238
443	1243	32.5	40	99	101.5			140.5	160	190.5	220	250.5	300.5			342	401	408.5	1038	238
643	643	32.5	40	99	101.5			240.5	260	290.5	320	350.5	400.5			542	601	608.5	438	438
643	843	32.5	40	99	101.5			240.5	260	290.5	320	350.5	400.5			542	601	608.5	638	438
643	1043	32.5	40	99	101.5			240.5	260	290.5	320	350.5	400.5			542	601	608.5	838	438
643	1243	32.5	40	99	101.5			240.5	260	290.5	320	350.5	400.5			542	601	608.5	1038	438
843	843	32.5	40	99	101.5	219.75		340.5	360	390.5	420	450.5	500.5	621.5		742	801	808.5	638	638
843	1043	32.5	40	99	101.5	219.75		340.5	360	390.5	420	450.5	500.5	621.5		742	801	808.5	838	638
843	1243	32.5	40	99	101.5	219.78		340.5	360	390.5	420	450.5	500.5	621.25		742	801	808.5	1038	638
1043	1043	32.5	40	99	101.5	269.75		440.5	460	490.5	520	550.5	600.5	771.25		942	1001	1008.5	838	838
1043	1243	32.5	40	99	101.5	269.75		440.5	460	490.5	520	550.5	600.5	771.25		942	1001	1008.5	1038	838
1243	1243	32.5	40	99	101.5	246.15	393.35	540.5	560	590.5	620	650.5	700.5	847.65	994.85	1142	1201	1208.5	1038	1038

Workpiece Pallets

Heavy Duty Aluminum Pallet Plates (19.1 mm)

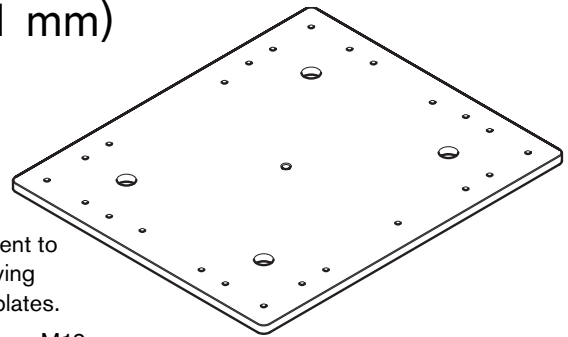
Model WT4-S-H

When pallet plate machining is required for additional fixturing, Rexroth conveniently offers 19.1mm aluminum pallet plates.

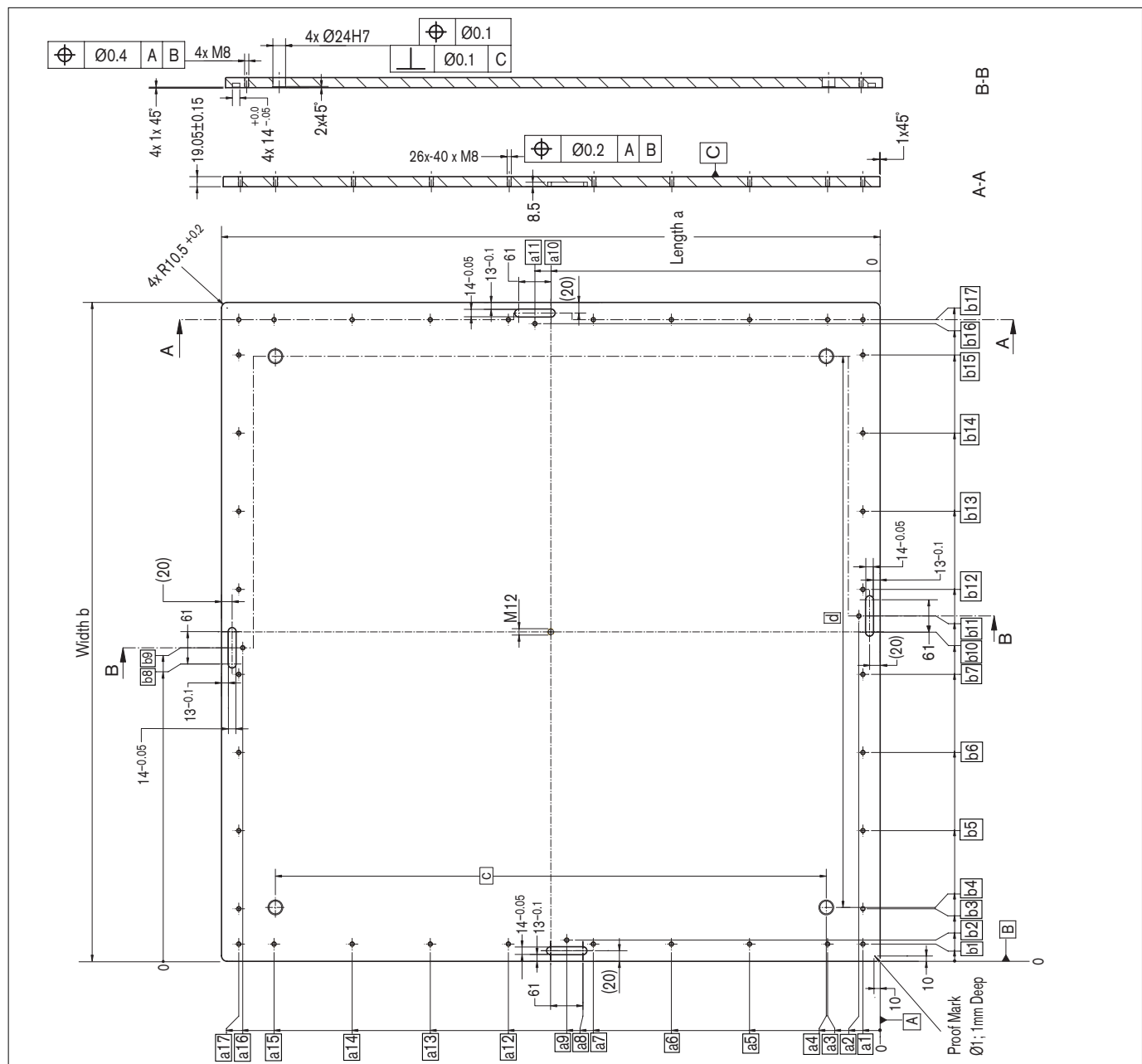
For best pallet accuracy, the fixture mounting holes and positioning bushing location should be machined at the same time. Please contact the Bosch Rexroth

applications engineering department to obtain a detailed pallet plate drawing when machining your own pallet plates.

Each pallet plate is equipped with an M12 tapped hole to accommodate a lifting eye in the center of the plate.



Dimensional Data for 19.1mm Pallet Plates



NOTE: Dimensions are for reference only. Contact Rexroth for a detailed machining drawing.

Workpiece Pallets

Ordering Information for 19.1 mm Aluminum Workpiece Pallet Plates

BWT	LWT	Part Number	Flatness	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	a12	a13	a14	a15	a16	a17
443	443	3842 531 251	0.6	32.5	40	99	101.5			140.5	160	190.5	220	250.5	300.5			342	401	408.5
443	643	3842 531 252	0.8	32.5	40	99	101.5			240.5	260	290.5	320	350.5	400.5			542	601	608.5
443	843	3842 531 254	1	32.5	40	99	101.5	219.75		340.5	360	390.5	420	450.5	500.5	621.5		742	801	808.5
443	1043	3842 531 257	1.2	32.5	40	99	101.5	219.75		440.5	460	490.5	520	550.5	600.5	721.5		942	1001	1008.5
443	1243	3842 531 261	1.2	32.5	40	99	101.5	219.75	393.35	540.5	560	590.5	620	650.5	700.5	847.65	944.85	1142	1201	1208.5
643	643	3842 531 253	0.8	32.5	40	99	101.5			240.5	260	290.5	320	350.5	400.5			542	601	608.5
643	843	3842 531 255	1	32.5	40	99	101.5	219.75		340.5	360	390.5	420	450.5	500.5	621.5		742	801	808.5
643	1043	3842 531 258	1.2	32.5	40	99	101.5	219.75		440.5	460	490.5	520	550.5	600.5	721.5		942	1001	1008.5
643	1243	3842 531 262	1.2	32.5	40	99	101.5	219.75	393.35	540.5	560	590.5	620	650.5	700.5	847.65	944.85	1142	1201	1208.5
843	843	3842 531 256	1	32.5	40	99	101.5	219.75		340.5	360	390.5	420	450.5	500.5	621.5		742	801	808.5
843	1043	3842 531 259	1.2	32.5	40	99	101.5	219.75		440.5	460	490.5	520	550.5	600.5	721.5		942	1001	1008.5
843	1243	3842 531 263	1.2	32.5	40	99	101.5	219.75	393.35	540.5	560	590.5	620	650.5	700.5	847.65	944.85	1142	1201	1208.5
1043	1043	3842 531 260	1.2	32.5	40	99	101.5	219.75		440.5	460	490.5	520	550.5	600.5	721.5		942	1001	1008.5
1043	1243	3842 531 264	1.2	32.5	40	99	101.5	219.75	393.35	540.5	560	590.5	620	650.5	700.5	847.65	944.85	1142	1201	1208.5
1243	1243	3842 531 265	1.2	32.5	40	99	101.5	219.75	393.35	540.5	560	590.5	620	650.5	700.5	847.65	944.85	1142	1201	1208.5

BWT	LWT	b1	b2	b3	b4	b5	b6	b7	b8	b9	b10	b11	b12	b13	b14	b15	b16	b17	c	d
443	443	32.5	40	99	101.5			140.5	160	190.5	220	250.5	300.5			342	401	408.5	238	238
443	643	32.5	40	99	101.5			140.5	160	190.5	220	250.5	300.5			342	401	408.5	438	238
443	843	32.5	40	99	101.5			140.5	160	190.5	220	250.5	300.5			342	401	408.5	638	238
443	1043	32.5	40	99	101.5			140.5	160	190.5	220	250.5	300.5			342	401	408.5	838	238
443	1243	32.5	40	99	101.5			140.5	160	190.5	220	250.5	300.5			342	401	408.5	1038	238
643	643	32.5	40	99	101.5			240.5	260	290.5	320	350.5	400.5			542	601	608.5	438	438
643	843	32.5	40	99	101.5			240.5	260	290.5	320	350.5	400.5			542	601	608.5	638	438
643	1043	32.5	40	99	101.5			240.5	260	290.5	320	350.5	400.5			542	601	608.5	838	438
643	1243	32.5	40	99	101.5			240.5	260	290.5	320	350.5	400.5			542	601	608.5	1038	438
843	843	32.5	40	99	101.5	219.75		340.5	360	390.5	420	450.5	500.5	621.5		742	801	808.5	638	638
843	1043	32.5	40	99	101.5	219.75		340.5	360	390.5	420	450.5	500.5	621.5		742	801	808.5	838	638
843	1243	32.5	40	99	101.5	219.78		340.5	360	390.5	420	450.5	500.5	621.25		742	801	808.5	1038	638
1043	1043	32.5	40	99	101.5	269.75		440.5	460	490.5	520	550.5	600.5	771.25		942	1001	1008.5	838	838
1043	1243	32.5	40	99	101.5	269.75		440.5	460	490.5	520	550.5	600.5	771.25		942	1001	1008.5	1038	838
1243	1243	32.5	40	99	101.5	246.15	393.35	540.5	560	590.5	620	650.5	700.5	847.65	994.85	1142	1201	1208.5	1038	1038

Workpiece Pallets

Assembled Open Center Pallets

Model WT4-S/F

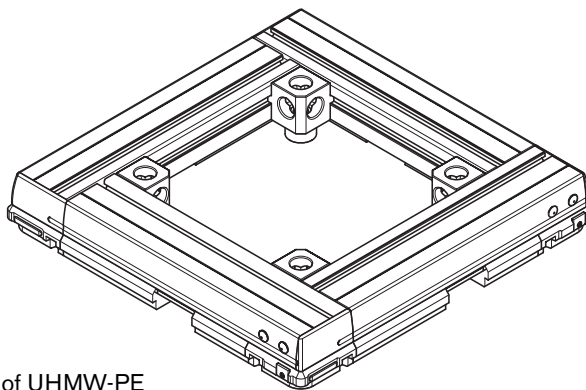
An alternative to the assembled workpiece pallet is the assembled open center pallet. This pallet includes an aluminum profile frame, frame extension modules, corner modules and end caps.

The open center pallet is very lightweight in design and allows a greater portion of total pallet payload (pallet, fixture and product) to be applied to the fixturing and product.

The aluminum profile frame includes a 10mm T-slot, which allows for simple fastening of product supports or fixturing.

The wear strips are made of UHMW-PE and include an integrated dampening element to absorb the shock when two pallets come into contact with each other.

NOTE: Positioning bushings are not included and are only required when the pallet is used in conjunction with a lift position unit. Four positioning bushings are required per pallet and they are sold in kits of two.



Ordering Information for Assembled Frame Style Pallets WT4-S/F

		Width (B _{WT})				
		443	643	843	1043	1243
Length (L _{WT})	443	8981 021 935	•	•	•	•
	643	8981 021 936	8981 021 940	•	•	•
	843	8981 021 937	8981 021 941	8981 021 944	•	•
	1043	8981 021 938	8981 021 942	8981 021 945	8981 021 947	•
	1243	8981 021 939	8981 021 943	8981 021 946	8981 021 948	8981 021 949

Assembled Frame Style Weights (in kg)

		Width (B _{WT})				
		443	643	843	1043	1243
Length (L _{WT})	443	8.3	•	•	•	•
	643	10.6	12.8	•	•	•
	843	12.8	15.1	17.4	•	•
	1043	15.1	17.4	19.7	22.0	•
	1243	17.4	19.7	22.0	24.3	26.6

NOTE: 4 positioning bushings increase the total pallet weight by 2.6 kg.

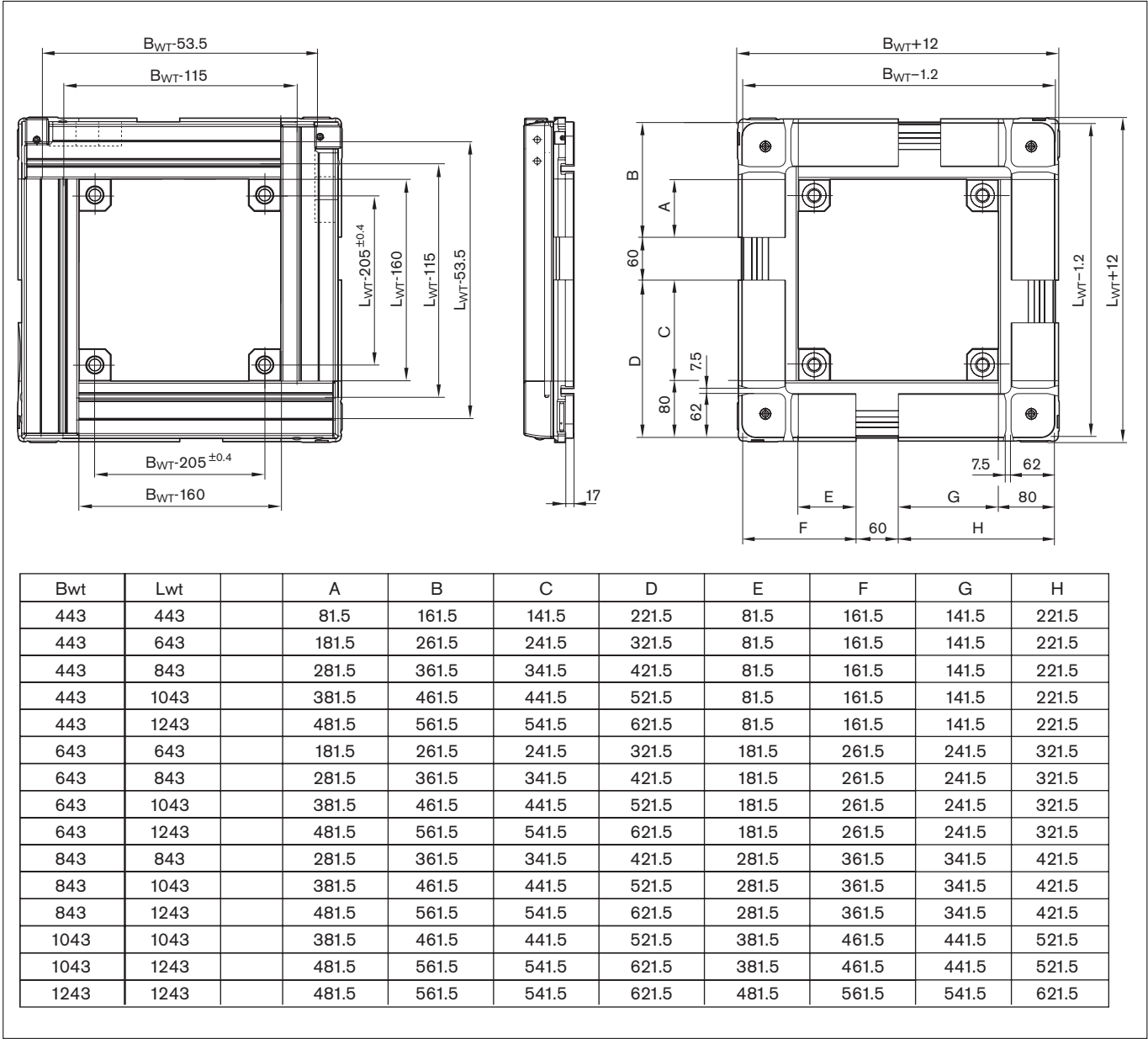
Ordering Information-Positioning Bushings

Description		Part Number
Positioning Bushing Kit (Qty. 2)		3842 530 529

NOTE: 4 bushings are required per pallet. Order 2 kits per pallet.

Workpiece Pallets

Dimensional Data for WT4-S/F



NOTE: Dimensions are for reference only. Contact Rexroth for a detailed machining drawing.

Drive and Return Units

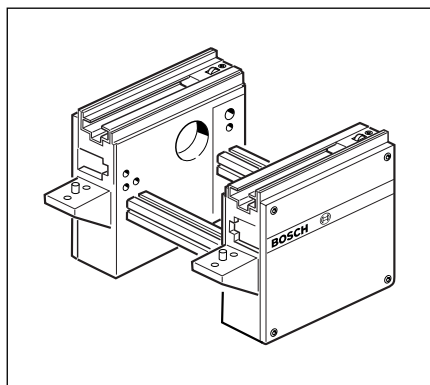
Section 3—Drive and Return Units

TS4plus drive units power the roller chain along the conveyor sections and help maintain proper chain tension. The return units route the roller chain back through the return channel of the chain profile. Drives and returns can also be linked together end-to-end to create extended conveyor lines of almost any length without loss of capacity.

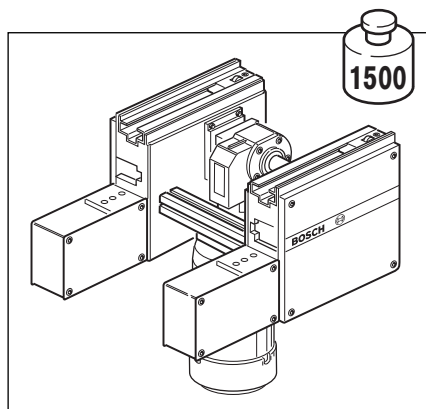
Two types of drive units are available, depending on load requirements for the system.

Different motor electrical options, motor mounting positions, chain tensioners, and transport speeds allow you to configure the drive to suit your needs.

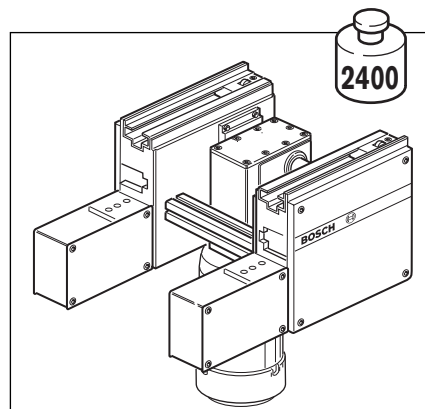
3



UM4S
Return Unit
3-1



AS4S/S
Standard Drive Unit
3-2 to 3-3

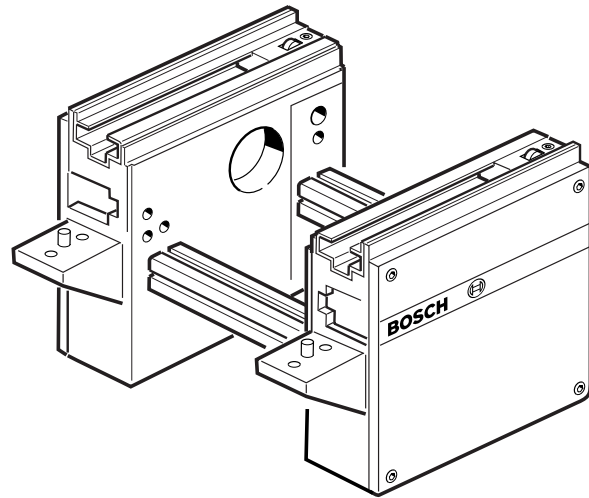


AS4S/H
Heavy-Duty Drive Unit
3-4 to 3-5

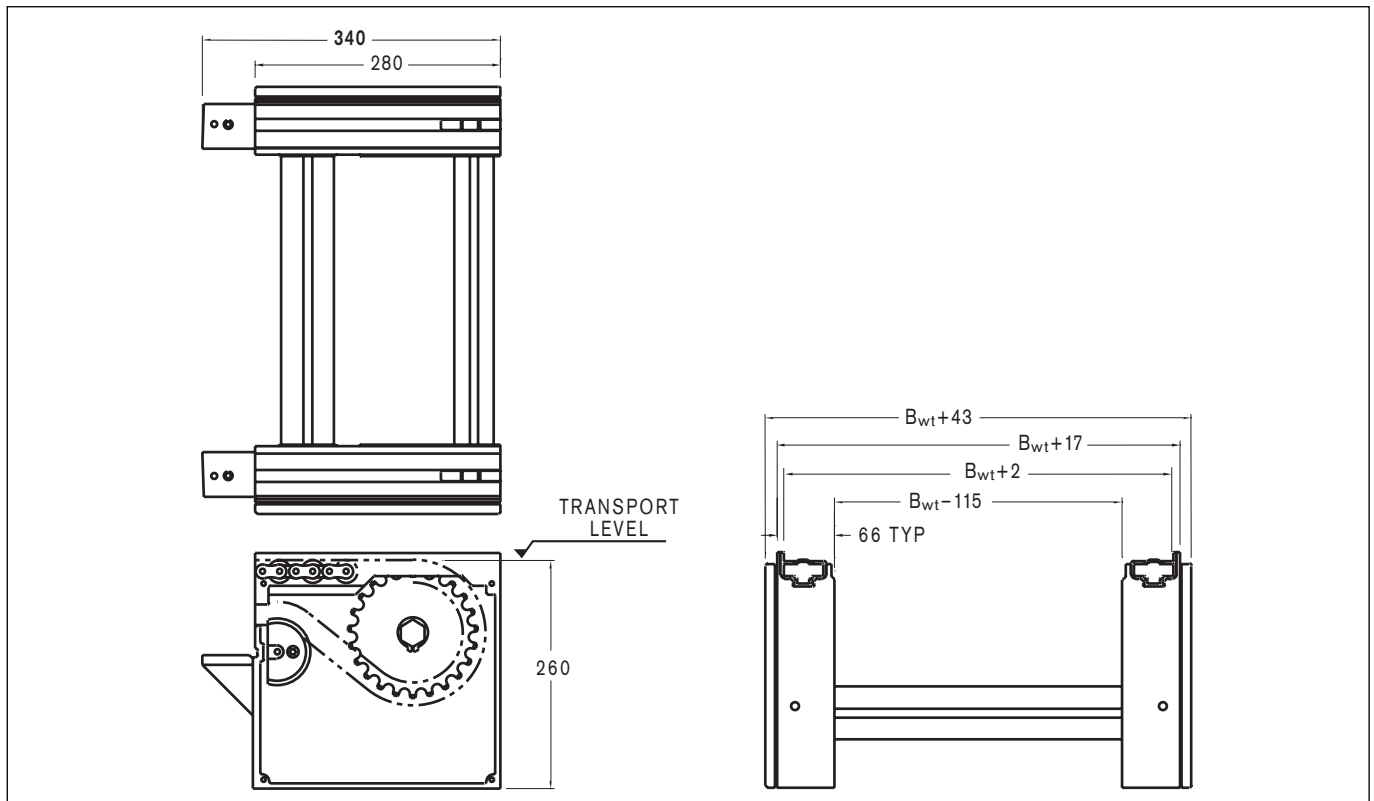
Drive and Return Units

Return Unit UM4S

The TS4plus return unit routes the roller chain from the transport level to the return channel inside the chain section profile, where it is fed back to the drive module. Return units are available in standard widths to match the drive module, and can be used with either standard or heavy-duty drives.

**Ordering Information for Return Unit UM4S**

Width in mm (B _{WT})	Part Number
443	8981 019 495
643	8981 019 496
843	8981 019 497
1043	8981 019 498
1243	8981 019 499

Dimensional Data for UM4S

Standard Drive Unit



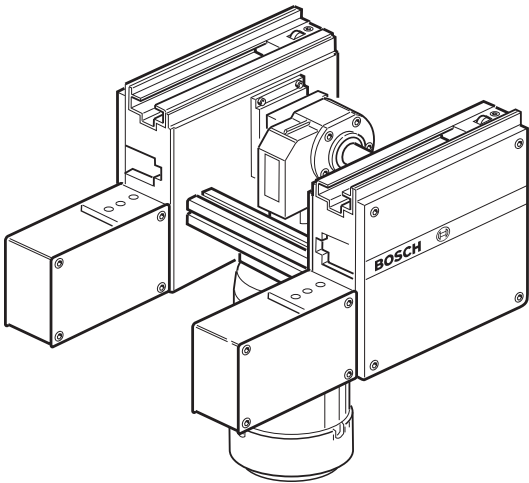
AS4S/S

The TS4plus standard drive module is used to pull the roller chain along the chain section at a constant speed. Drives are available with the motor/gearbox mounted between the conveyor rails (mid-mount) or outside the rails on the left or right side. Standard speed and voltage combinations are listed in Table 3-1.

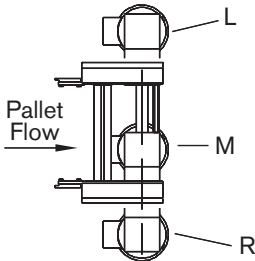
3

Each drive module includes a chain tensioner. Normally, a spring tensioner with 80 mm of travel is used to provide automatic tensioning of the chain during operation. However, fixed tensioners are also available for conveyors under 4000 mm in length and reversing applications. Chain tensioners include a bracket which can be used to mount a 12 mm proximity switch (ordered separately) to sense the end of tensioner travel.

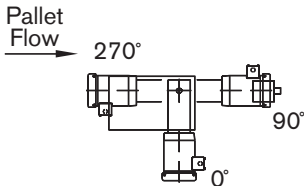
Standard drives are rated for a maximum total payload of 1,500 kg per drive. For heavier loads, a heavy-duty drive module is available (page 3-4), or shorter conveyor sections with additional drive and return modules can be added. Hardware for connecting drive and return modules end-to-end is included.



Motor Position



Motor Orientation



Ordering Information for Standard Drive Unit AS4S/S

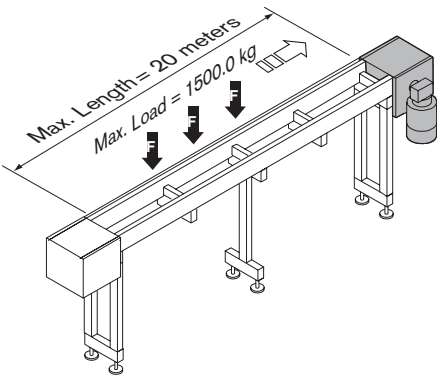
In addition to part number, please specify: ↓	AS4S/S Standard Drive Unit 8981 999 219	
	Your choices are:	Your selection:
Drive Unit width (B)	443, 643, 843, 1043, 1243	_____mm
Nominal speed*	12, 15	_____m/min.
Motor voltage/frequency [†]	See Table 3-1	_____V ____Hz
Tensioner Type	S= Spring F= Fixed**	_____
Motor Orientation	0°, 90°, 270°	_____
Motor Position	L, M, R	_____

*Full load conveyor speeds vary depending on motor frequency. See Table 3-1
**Fixed tensioner required for reverse operation
[†]To omit motor, specify 000V 00Hz

Drive and Return Units

Technical data for AS4S/S

Nominal conveyor speed	=	See Table 3-1
Permissible loading weight	=	1500 kg
Maximum conveyor unit length	=	20 m (65 ft.)
Motor RPM at 50 Hz	=	1400
Motor RPM at 60 Hz	=	1700
Motor, electrical specifications	=	See Table 3-1



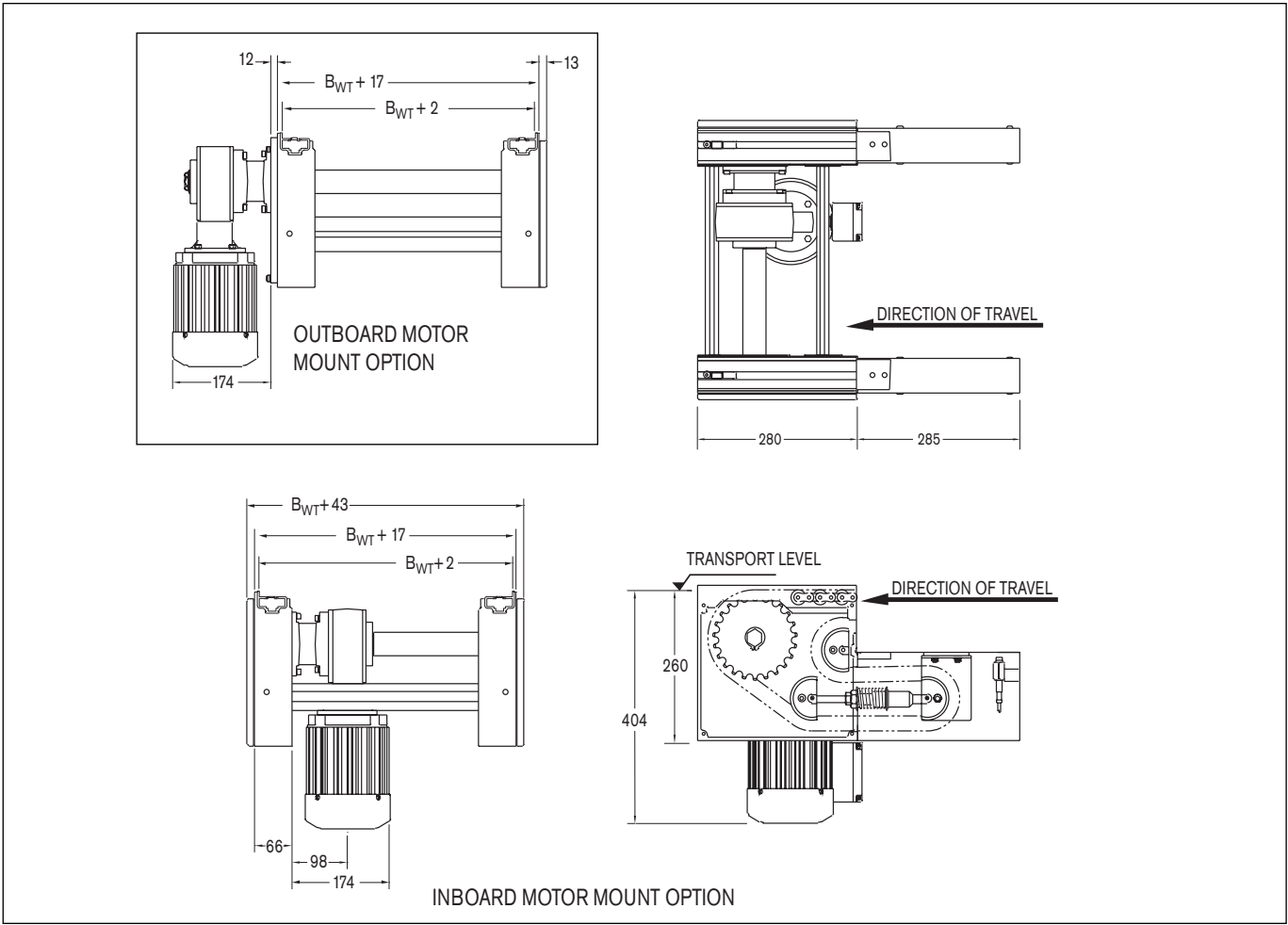
Electrical data for AS4S/S

Nom. M/min	Actual Speed		HP	Full Load Amps @					
	50 Hz	60 Hz		208/60	240/60	380/50	415/50	480/60	575/60
12	9.8	11.9	0.50	1.8	1.9	0.78	0.72	0.84	0.71
15	12.8	15.6	0.50	1.8	1.9	0.78	0.72	0.84	0.71

Table 3-1

Note: Electrical Data for reference only. Refer to motor data plate for actual ratings.

Dimensional data for AS4S/S



Drive and Return Units

Heavy-Duty Drive Unit

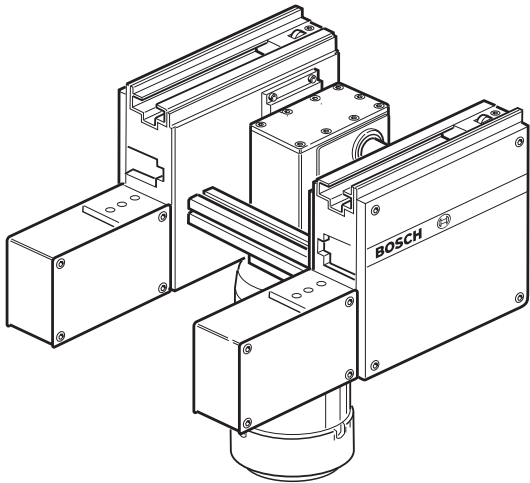
AS4S/H

The TS4plus heavy-duty drive module is used to pull the roller chain along the chain section at a constant speed. Drives are available with the motor/gearbox mounted between the conveyor rails (mid-mount) or outside the rails on the left or right side. Standard speed and voltage combinations are listed in Table 3-2.

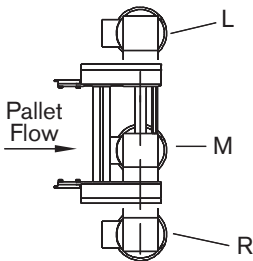
3 Each drive module includes a chain tensioner. Normally, a spring tensioner with 80 mm of travel is used to provide automatic tensioning of the chain during operation. However, fixed tensioners are also available for conveyors under 4000 mm in length and reversing applications.

Chain tensioners include a bracket which can be used to mount a 12 mm proximity switch (ordered separately) to sense the end of tensioner travel.

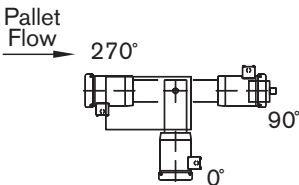
Heavy-duty drives are rated for a maximum total payload of 2,400 kg per drive. For heavier loads, shorter conveyor sections with additional drive and return modules can be added. Hardware for connecting drive and return modules end-to-end is included.



Motor Position



Motor Orientation



Ordering Information for Heavy-Duty Drive Unit AS4S/H

In addition to part number, please specify: ↓	AS4S/H Heavy Duty Drive Unit 8981 999 197	
	Your choices are:	Your selection:
Drive Unit width (B)	443, 643, 843, 1043, 1243	_____mm
Nominal speed*	6, 9, 12, 15, 18	_____m/min.
Motor voltage/frequency [†]	See Table 3-2	_____V _____Hz
Tensioner Type	S= Spring F= Fixed**	_____
Motor Orientation	0°, 90°, 270°	_____
Motor Position	L, M, R	_____
Flange Mounting [‡]	I= IEC 105/IEC120 N= NEMA 56C	_____

*Full load conveyor speeds vary depending on motor frequency. See Table 3-2

**Fixed tensioner required for reverse operation

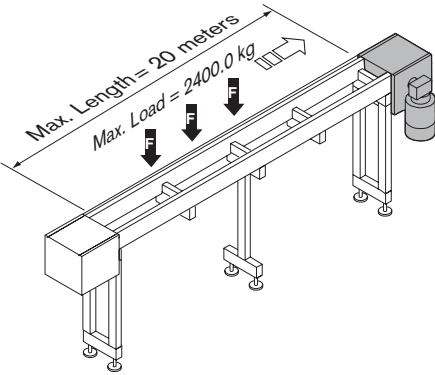
[†]To omit motor, specify 000V 00Hz

[‡]Required for no motor option

Drive and Return Units

Technical data for AS4S/H

Nominal conveyor speed	=	See Table 3-2
Permissible loading weight	=	2400 kg
Maximum conveyor unit length	=	20 m (65 ft.)
Motor RPM at 50 Hz	=	1400
Motor RPM at 60 Hz	=	1700
Motor, electrical specifications	=	See Table 3-2



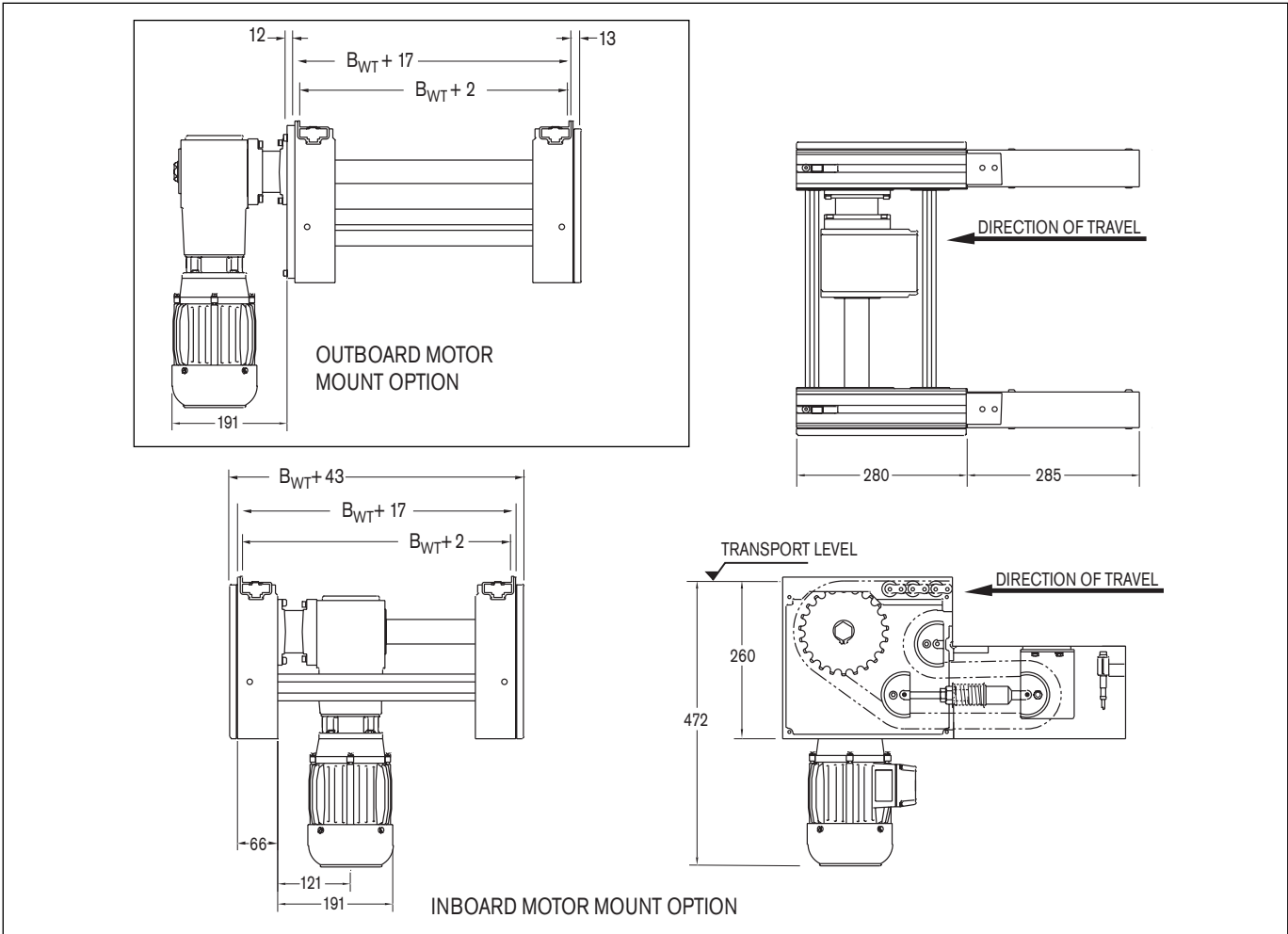
Electrical data for AS4S/H

Nom. M/min	Actual Speed		HP	Full Load Amps @					
	50 Hz	60 Hz		208/60	240/60	380/50	415/50	480/60	575/60
6	6.8	8.3	0.5	1.8	1.9	0.78	0.72	0.84	0.71
9	8.5	10.4	0.5	1.8	1.9	0.78	0.72	0.84	0.71
12	10.6	12.9	0.75	2.9	2.9	1.6	1.6	1.6	1.1
15	12.5	15.2	0.75	2.9	2.9	1.6	1.6	1.6	1.1
18	17.7	18.8	0.75	2.9	2.9	1.6	1.6	1.6	1.1

Table 3-2

Note: Electrical Data for reference only. Refer to motor data plate for actual ratings.

Dimensional Data for AS4S/H



Chain Sections and Leg Sets

Section 4—Chain Sections and Leg Sets

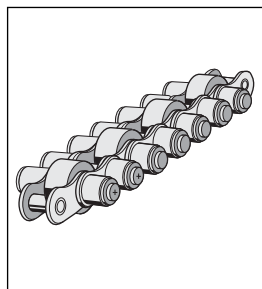
A key factor in the flexibility of the TS4plus system is the modular, T-slotted design of the conveyor sections, leg sets, and cross links.

By using aluminum conveyor section profiles, it is possible to build a system to meet whatever length requirements you may have. In addition, the profiles

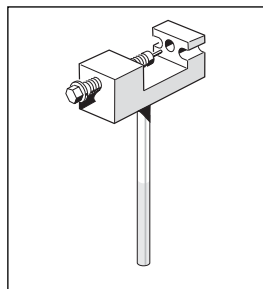
have 10mm T-slots that provide a mounting location for stops, control systems, proximity sensors, and other conveyor modules, as well as a wide variety of other components and accessories.

The roller chain provides a low friction transport medium with the ability to handle heavy loads and pallet accumulation.

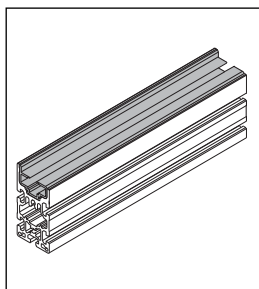
4



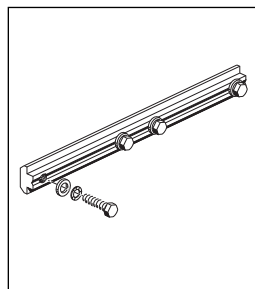
GT4/R
Roller Chain
4-1



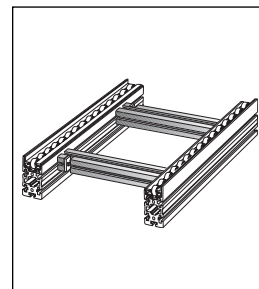
*Roller Chain
Disassembly Tool*
4-1



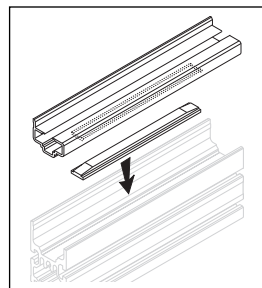
ST4-S/R
Chain Conveyor Sections
4-2 to 4-3



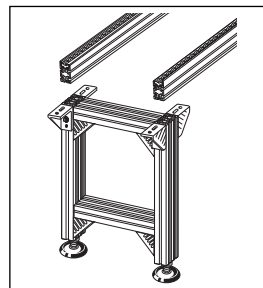
Connection Links
4-4



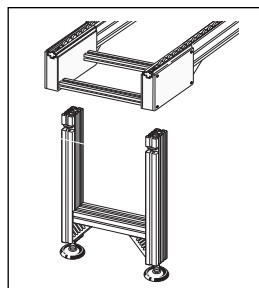
Cross Links
4-4



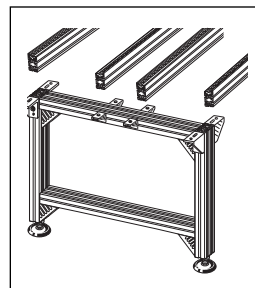
ST4/R
Pallet Accelerator Kit
4-5



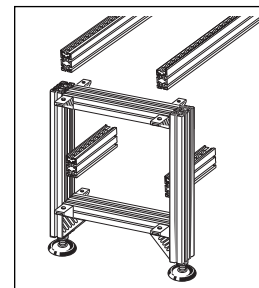
SZ4S/E
Single Leg Sets
4-6



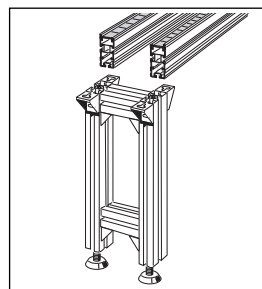
SZ4S/D
Drive/Return Leg Sets
4-6



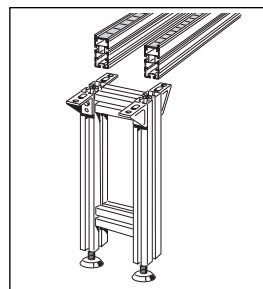
SZ4S/T
Parallel Leg Sets
4-7



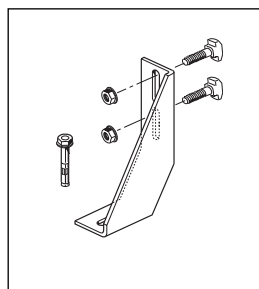
SZ4S/U
Over/Under Leg Sets
4-7



SZ2
BS4 Leg Sets
4-8



SZ2/H
BS4 Heavy Duty Leg
Sets 4-8



Foundation Brackets
4-8

Chain Sections and Leg Sets

Roller Chain

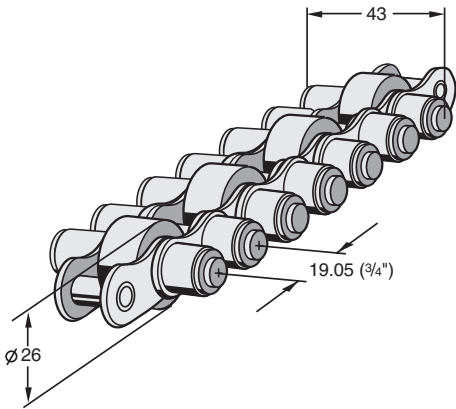
GT4/R

The TS4plus roller chain provides a low friction transport medium with the ability to handle heavy loads and pallet accumulation.

Roller chain is available in 5 meter rolls; each 5 meter roll includes one master link. The chain is installed by connecting one roll to the next with master links until one side of the conveyor is complete. Any remaining chain can then be used for installation on the other side of the conveyor. Additional master links can be ordered as needed.

To calculate the length of chain needed per side, use the formula in the box at right. When ordering chain, always round up to the next complete 5 meter roll.

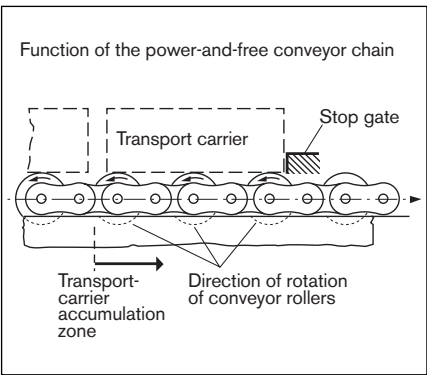
The chain will stretch over a period of time. Chain tensioners in the drive units compensate for this stretch. When the tensioner is extended to its maximum stroke, the chain must be serviced and the tensioner reset.



Roller chain required per side:

$D + R + (2 \times L)$

L = conveyor section length
R = chain in return unit = 609 mm
D = chain in drive unit = 1090 mm



Ordering Information for Roller Chain GT4/R

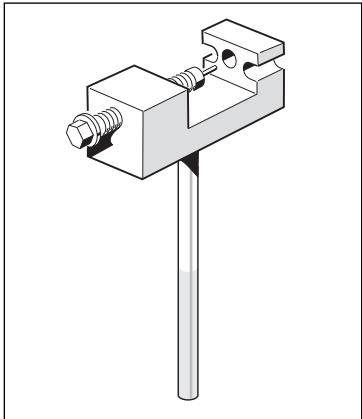
	Part Number
Roller Chain, 5 meter roll	8981 021 173
Master Link	8981 021 175

Roller Chain Disassembly Tool

This tool is used to simplify disassembly of the roller chain by pushing out the link pins, and can be used on any segment. Reconnecting the chain after removal of unnecessary links requires the use of a master link (see the "Roller Chain" section above).

Ordering Information for Roller Chain Disassembly Tool

	Part Number
Roller Chain disassembly tool	8981 020 124

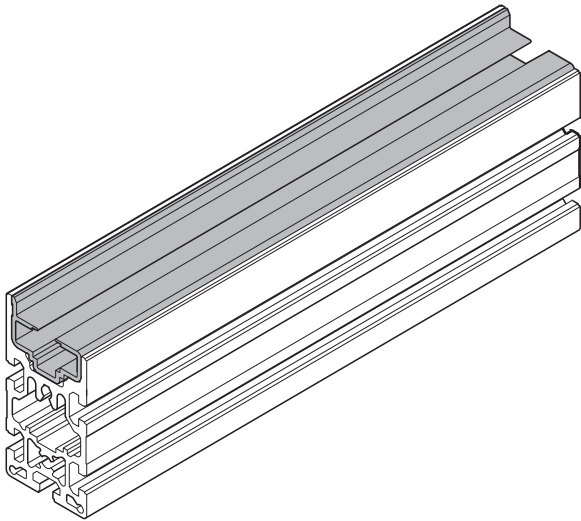


Chain Conveyor Sections

ST4/R

The TS4plus conveyor section is the structural element that supports and guides the workpiece pallet. Each section consists of two anodized aluminum chain section profiles and two polyamide guide profiles. The guide profiles serve as both wear strips and a support surface for the chain.

Chain conveyor sections are available in lengths between 200 mm and 6000 mm, and can be joined at the ends using connection links (see page 4-4) to create extended lengths. Cross-links and leg sets are required at intervals no greater than 2000 mm.



Ordering Information for Chain Conveyor Section, Specify Length in mm: 200 ≤ L ≤

Description	Part Number/Length
Chain Conveyor Section ST4/R	3842 994 839/....

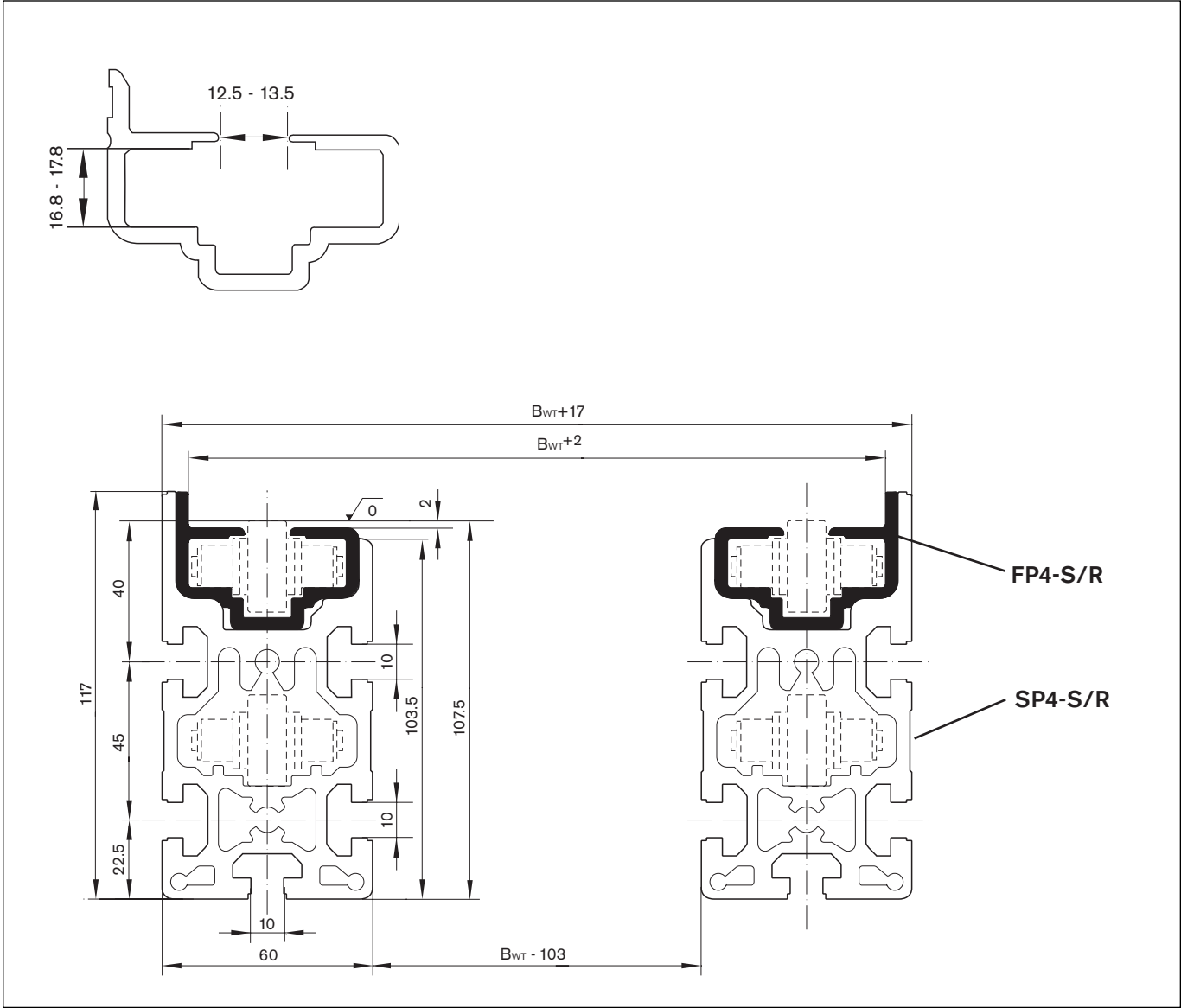
** To order conveyor sections 200-6000mm long, please specify desired length at the end of the part number.
For example, to order a 3560mm conveyor section, your part number should look like this: 3842 994

Ordering Information for Chain Profiles, uncut

Description	Part Number
Aluminum Chain Profile SP4-S/R, L=6000 mm	3842 532 703
Polyamide Chain Guide Profile FP4-S/R, L=6000mm	3842 532 704

Chain Sections and Leg Sets

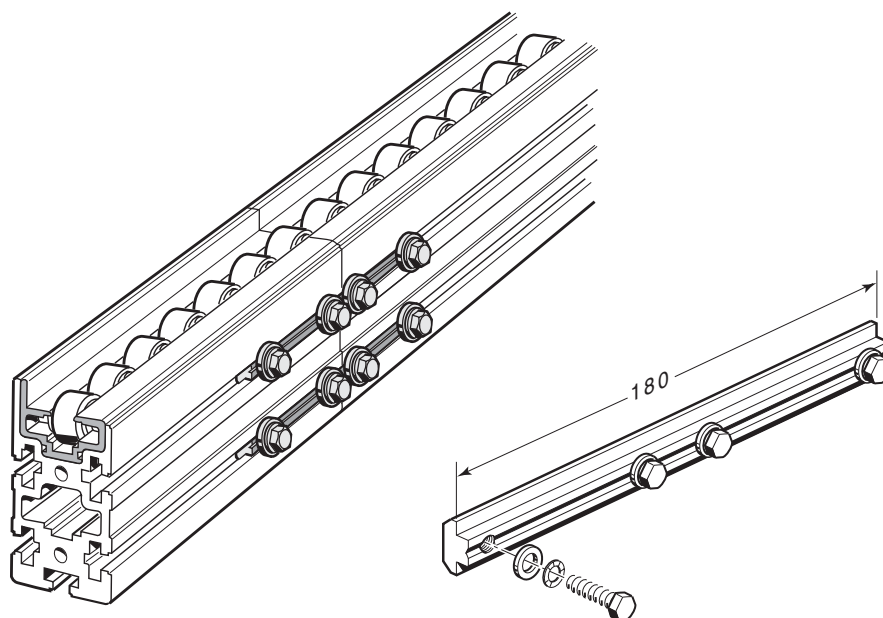
Dimensional Data for ST4/R



Chain Sections and Leg Sets

Connection Links

Connection links join conveyor sections end-to-end. Four connection links are required to join conveyor sections, two on each rail. They can be mounted either between the rails or on the outside of the rails, as the application permits. Connection links are made of steel for maximum strength and include all required fastening hardware.



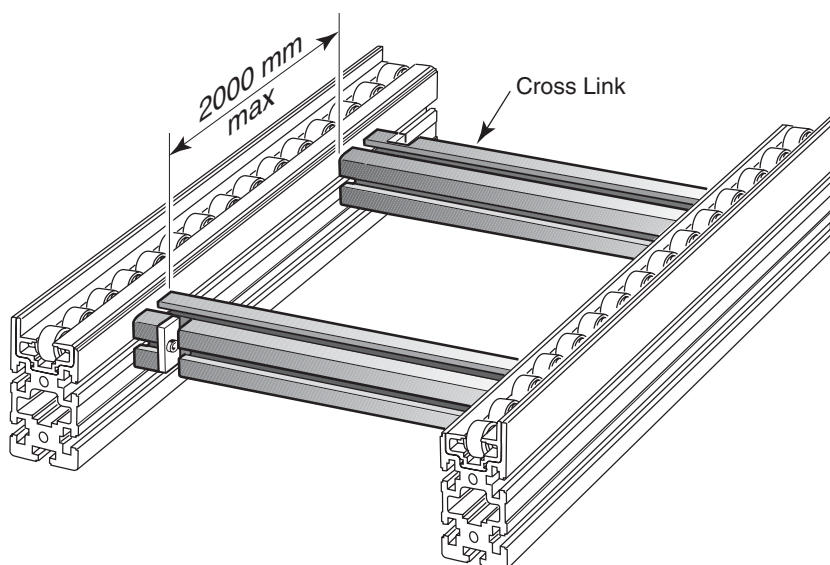
4

Ordering Information for Connection Links

Description	Part Number
Connection link with hardware, one	3842 528 746

Cross Links

Cross links are used to maintain the proper width and alignment between conveyor section rails, and are made from aluminum profile. Cross-links must be installed along conveyor sections between leg sets at a maximum interval of 2000 mm. They are available for the five standard line widths and include all required mounting hardware.



Ordering Information for Cross Links

Description	Part Number
Cross link with mounting hardware, B = 443 mm	8981 020 055
Cross link with mounting hardware, B = 643 mm	8981 020 056
Cross link with mounting hardware, B = 843 mm	8981 020 057
Cross link with mounting hardware, B = 1043 mm	8981 020 058
Cross link with mounting hardware, B = 1243 mm	8981 020 059

Pallet Accelerator Kit

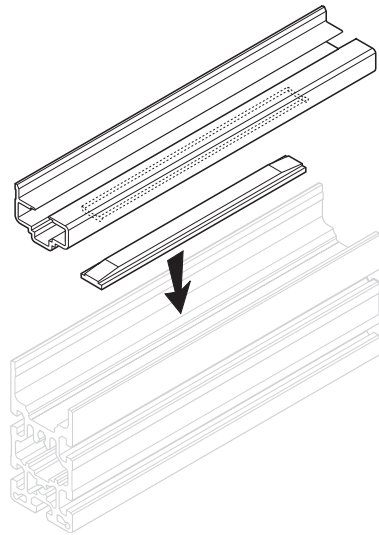
Model ST4/R

Due to roller chain's low coefficient of friction, workpiece pallets have a slight delay before reaching full speed once they have been stopped. The pallet accelerator, used in conjunction with accumulation roller chain and an ST4/R conveyor section, can shorten the time required for the workpiece pallet to reach drive speed.

How it works: In normal usage, a workpiece pallet rides on the 3/4" carry rollers, while the chain is driven by two smaller outboard rollers. The accelerator strip lifts the carry rollers so they are frictionally engaged between the accelerator element and the workpiece pallet, briefly accelerating the workpiece pallet to approximately twice the speed of the drive module depending on payload.

The accelerator strip is mounted in the upper guide profile section as shown in either of the two applications below. It is designed only for use with the ST4/R conveyor section and is not compatible with BS4 transverse conveyor sections. The kit includes two 500mm long guide profiles and two accelerator strips which are inserted into the notch inside the guide profile.

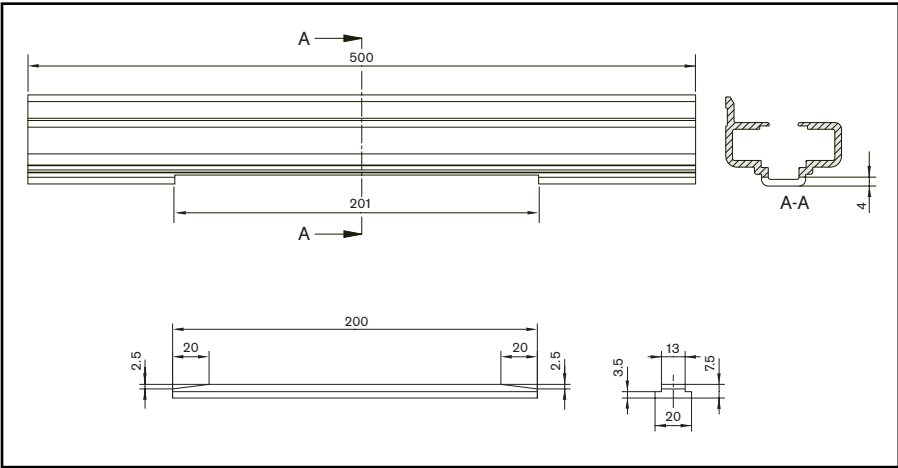
APPLICATION NOTE: Acceleration speed can be adversely affected by contaminants on the roller chain such as grease, dirt or foreign substances.



Ordering Information for Pallet Accelerator Element

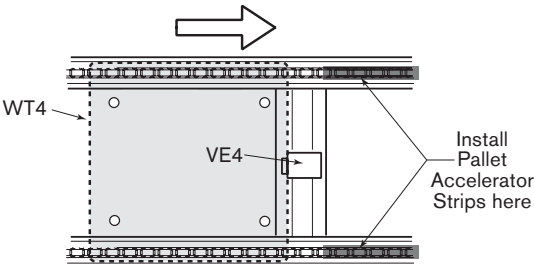
Description	Part Number
Pallet Accelerator Element	3842 531 115

Dimensional Data for ST4/R

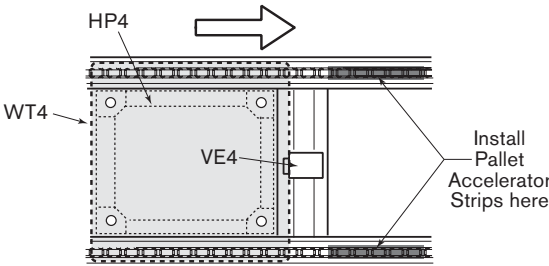


Pallet Accelerator application examples

Example 1: Downstream from a stop gate.



Example 2: Downstream from a lift-position unit and stop



- NOTE:**
- Allow line spacing to permit the pallet to decelerate to drive speed before it comes into contact with the next station in above applications.
 - The stopping or queueing of pallets is NOT allowed behind the accelerator element.

Leg Sets (ST4 and BS4 mounting)

Model SZ4S/..., SZ2

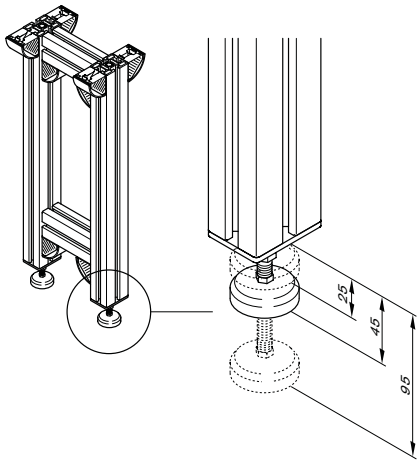
TS4plus leg sets are manufactured from extruded aluminum profiles and are specifically designed to be mounted to ST4 or BS4 conveyor sections. Six leg set types are available:

- SZ4S/E, Single
- SZ4S/D, Drive/Return
- SZ4S/T, Parallel
- SZ4S/U, Over/Under
- SZ2, BS4 Mounting
- SZ2/H, BS4 Heavy Duty Mounting

Each leg set is equipped with leveling feet and the connection hardware required to connect the leg set to the conveyor section or drive/return. Leveling feet are preset at the factory and allow line height to be adjusted down 15mm and up 45mm.

Foundation brackets and anchor bolts are required to secure leg sets to the floor and must be ordered separately (see page 4-8).

Leg set height is specified from the floor to the top of the conveyor chain. Leg set width is determined by line width.



Leg sets must be placed below chain section joints, at maximum conveyor spans of 2000mm and where additional support is needed.

NOTE: Remember to consider clearance for modules such as lift transfer units and lift position units when determining the minimum line height.

SZ4S/E Single Leg Sets

Ordering Information for SZ4S/E Leg Set

Specify part number, then select from the options below	Your Choices are:	Part Number 8981 999 240
		Your selection:
Line Width (B)	443, 643, 843, 1043, 1243	_____ mm
Transport Height (H)	300 - 1500 in 1 mm increments	_____ mm

Specify height to top of chain (H)

SZ4S/D Drive/Return Leg Sets

Ordering Information for SZ4S/D Leg Set

Specify part number, then select from the options below	Your Choices are:	Part Number 8981 999 241
		Your selection:
Line Width (B)	443, 643, 843, 1043, 1243	_____ mm
Transport Height (H)	300 - 1500 in 1 mm increments	_____ mm

Specify height to top of chain (H)

Chain Sections and Leg Sets

SZ4S/T Parallel Leg Sets

Specify height to top of chain (H)
Specify gap "a" in mm

Parallel leg sets are similar to single leg sets, but are used to support two adjacent conveyor sections on a single leg set. To help prevent overloading, each section width (B_{WT}) is limited to 843mm.

The gap between lanes, "a", is set at 90 or 290mm. For other gaps, contact your Bosch representative.

Ordering Information for SZ4S/T Leg Set

Specify part number, then select from the options below	Your Choices are:	Part Number 8981 999 242
		Your selection:
Line Width (B)	443, 643, 843,	_____ mm
Transport Height (H)	300 - 1500 in 1 mm increments	_____ mm
Gap "a"	90 or 290	_____ mm

* for 443 mm line width, use a=90 mm maximum gap.

SZ4S/U Over/Under Leg Sets

Specify height to top of upper chain (H)
Specify height to top of lower chain (h)

Over/Under leg sets are similar in design to single leg sets, but allow a second line to be installed below the main line, typically as a return line for empty pallets. The height to the top of the lower chain must be at least 300 mm, to allow clearance for drives and returns. Sufficient space must be left between the top and bottom heights to allow for pallet and fixture clearance.

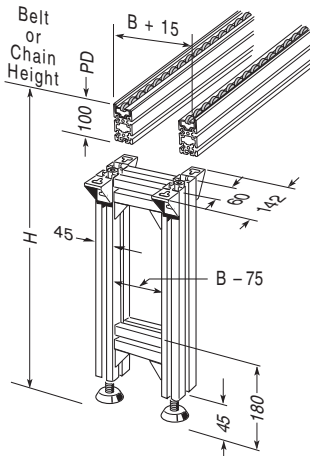
NOTE: When attaching a Drive or Return unit to an over/under leg set please call our Applications Engineering Department.

Ordering Information for SZ4S/U Leg Set

Specify part number, then select from the options below	Your Choices are:	Part Number 8981 999 243
		Your selection:
Line Width (B)	443, 643, 843, 1043, 1243	_____ mm
Transport Height (H)	800 - 2000 in 1 mm increments	_____ mm
Lower Height (h)	300 - 1500 in 1 mm increments	_____ mm

Chain Sections and Leg Sets

SZ2 Single Leg Sets (for mounting to BS4 Transverse Conveyors)



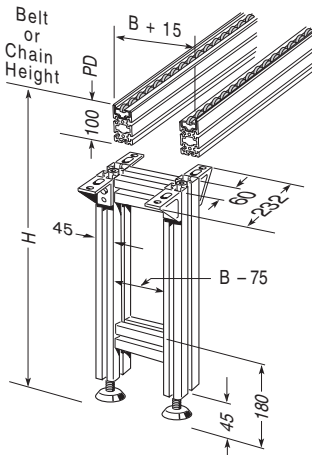
Ordering Information for SZ2 Leg Set

Specify part number, then select from the options below	Your Choices are:	Part Number 3842 999 816
		Your selection:
Line Width (B)	443, 643, 843, 1043, 1243	_____ mm
Profile Depth	100 mm	_____ 100 _____ mm
Transport Height (H)	350 - 1500 in 1 mm increments	_____ mm

Specify height to top of chain (H)

4

SZ2/H Heavy Duty Single Leg Sets (for mounting to BS4 Transverse Conveyors)



Ordering Information for SZ2/H Leg Set

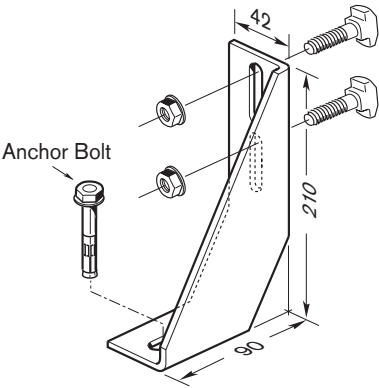
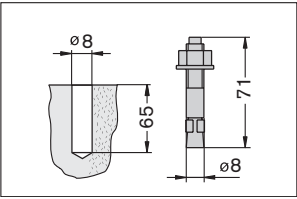
Specify part number, then select from the options below	Your Choices are:	Part Number 3842 999 705
		Your selection:
Line Width (B)	443, 643, 843, 1043, 1243	_____ mm
Profile Depth	100 mm	_____ 100 _____ mm
Transport Height (H)	350 - 1500 in 1 mm increments	_____ mm

Specify height to top of chain (H)

Foundation Brackets and Anchor Bolts

The steel foundation bracket secures the leg set to the floor after the conveyor has been leveled and aligned. Two foundation brackets should be used for each leg set. Two T-bolt kits for fastening the foundation bracket to the leg set are included. Anchor bolts for securing the bracket to concrete floors are ordered separately.

Anchor Bolt Dimensions



Ordering Information for Foundation Brackets

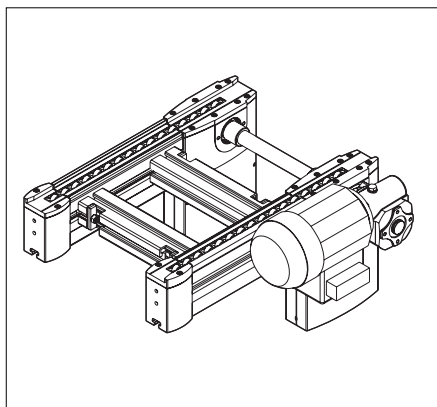
Description	Part Number
Steel Foundation Bracket with two T-Bolt Kits	8981 003 224
Anchor Bolt, one (1)	3842 526 560

Transverse conveyors

Section 5—Transverse Conveyors

BS4 Transverse conveyors are designed to transfer pallets for short transport distances (e.g. between two rectangular lines) or as cycle-independent work-stations. They are equipped with both a drive and return and steel roller chain. BS4 transverse conveyors are reversible and are available in a standard and heavy duty version.

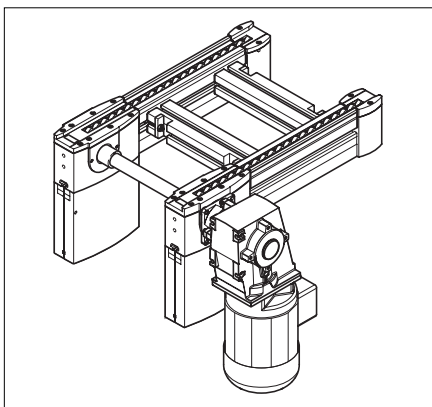
Various motor electrical options, motor mounting positions, transport speeds, and conveyor section length and width configurations allow you to order transverse conveyors to suit any assembly requirement.



BS4-S/R

Transverse Conveyor

5-2 to 5-3



BS4-S/R-H

Heavy Duty Transverse Conveyor

5-4 to 5-5

Transverse conveyors

Transverse Conveyors

Model BS4-S/R

Roller chain transverse conveyors are used to transfer heavy workpiece pallet payloads between parallel conveyor sections. They are also used to construct cycle-independent workstations and are especially suitable for modular system layouts with short conveyor sections at high loads. The unit itself is modular and comes with its own drive, return, and preinstalled roller chain.

In normal operation, the maximum load capacity for the BS4-S/R is 200kg and 100kg in reverse. The unit uses steel roller chain as the conveying medium and is delivered with a spring chain tensioning device.

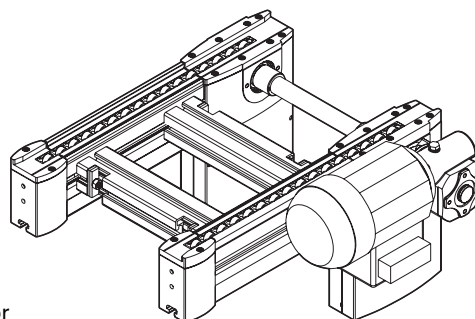
NOTE: When reverse operation is specified, a fixed chain tensioner is used instead of the spring tensioner.

The roller chain transverse conveyor is available in lengths from 400mm to 6000mm in 5mm increments. Specify conveyor width, length, conveyor speed, motor voltage/frequency, motor position, reverse option, and motor orientation when ordering.

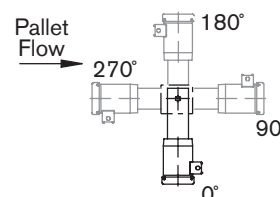
Motor voltage and frequency selections are described in Table 5-1. All motors include CE compliant wiring terminals.

The unit comes fully assembled. **Mounting hardware is not included.** Three different connection kits are available depending on the module the BS4-S is being mounted to.

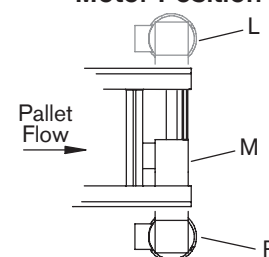
Please contact our applications engineering department for nonstandard length, width, speed, or voltage.



Outboard Mounted Motor Orientation



Motor Position



Ordering Information for BS4-S/R

Specify part number, then select from the options below	Your Choices are:	Part Number 3842 998 097
		Your selection:
Width (B) in mm	443, 643, 843, 1043, 1243	_____ mm
Motor Position	R, M, L	_____
Motor Orientation (outboard mount only)	0°, 90°, 180°, 270°	_____
Reverse Operation	YES with fixed tensioner NO with spring tensioner	_____
Transverse Conveyor length (L) [†]	400mm to 6000mm [†] (in 5 mm increments)	_____ mm
Nominal Conveyor Speed (m/min)*	9, 12, 15, 18	_____ m/min
Motor Voltage/Frequency	See Table 5-1	_____ V _____ Hz

* Full load conveyor speeds vary depending on motor frequency. See table 5-1

[†] Transverse conveyors ≥2000mm long must be supported by a leg set. See page 4-8

Ordering Information for BS4-S Connection Kits

Description	Part Number
BS4-S to AS4-S/UM4-S Connection Kit	3842 530 871
BS4-S to ST4-S Connection Kit	3842 530 868
BS4-S to BS4-S Connection Kit	3842 528 192

Transverse conveyors

Technical Data for BS4-S/R

Nominal conveyor speed	= See Table 5-1
Load capacity forward	= 200 kg
Load capacity reverse	= 100 kg
Motor RPM @ 50 Hz	= 1400
Motor RPM @ 60Hz	= 1700
Motor electrical specifications	= See Table 5-1

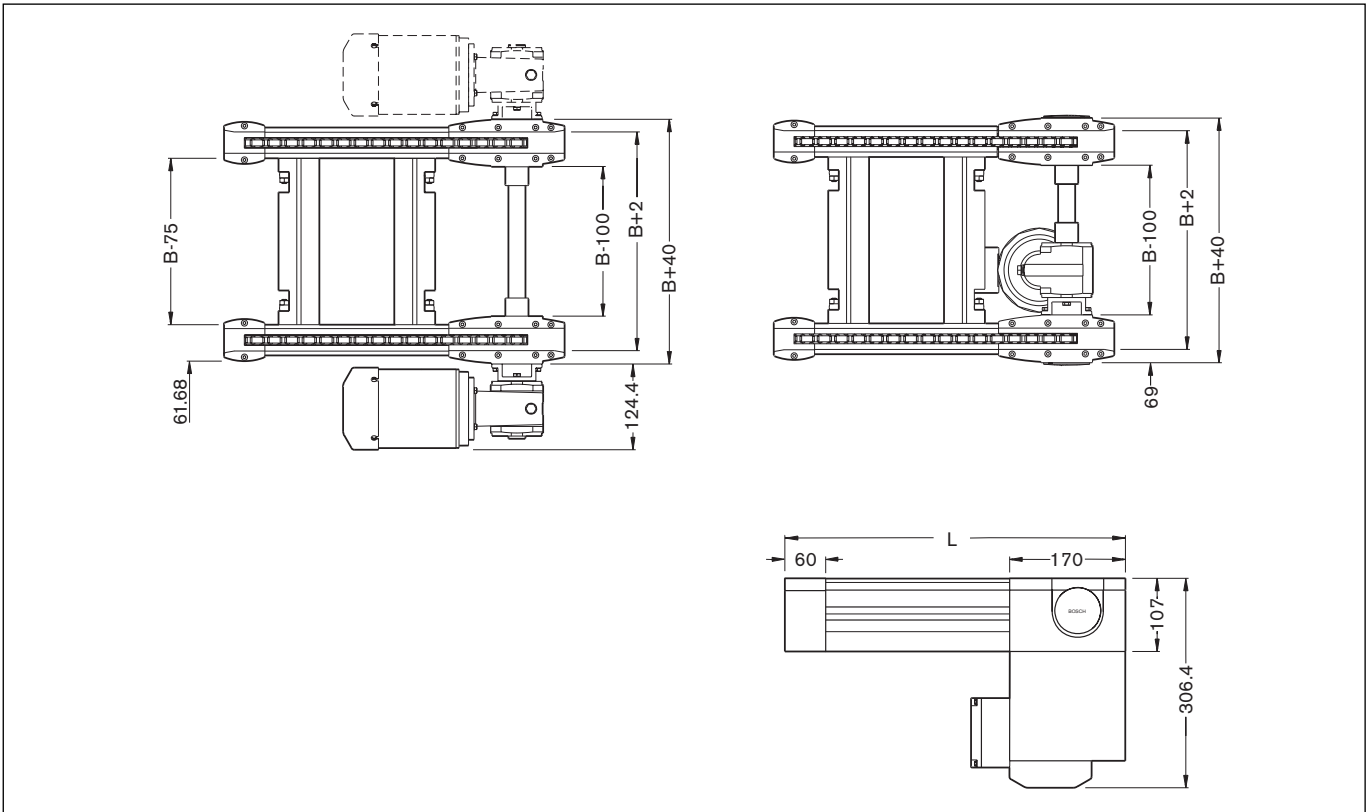
Electrical Data for BS4-S/R

Nom. M/min	Actual Speed		HP	Full Load Amps @					
	50 Hz	60 Hz		208/60	240/60	380/50	415/50	480/60	575/60
9	9.5	8.7	.25	1.6	1.3	0.86	0.72	0.67	0.55
12	11.5	11.6	.25	1.6	1.3	0.86	0.72	0.67	0.55
15	14.3	13.9	.25	1.6	1.3	0.86	0.72	0.67	0.55
18	19.1	17.4	.25	1.6	1.3	0.86	0.72	0.67	0.55

Table 5-1

Note: Electrical Data for reference only. Refer to motor name plate for actual amperage ratings.

Dimensional Data for BS4-S/R



Transverse conveyor width (B) must match pallet length (L_{WT}) or width (B_{WT}), depending on orientation.

Transverse conveyors

Heavy Duty Transverse Conveyors

Model BS4-S/R-H

Heavy Duty Roller chain transverse conveyors utilize a gearmotor and are used to transfer heavy workpiece pallet payloads between parallel conveyor sections. They are also used to construct cycle-independent workstations and are especially suitable for modular system layouts with short conveyor sections at high loads. The unit itself is modular and comes with its own drive, return, and preinstalled roller chain.

In normal operation, the maximum load capacity for the BS4-S/R-H is 450kg and 225kg in reverse. The unit uses steel roller chain as the conveying medium and is delivered with a spring chain tensioning device.

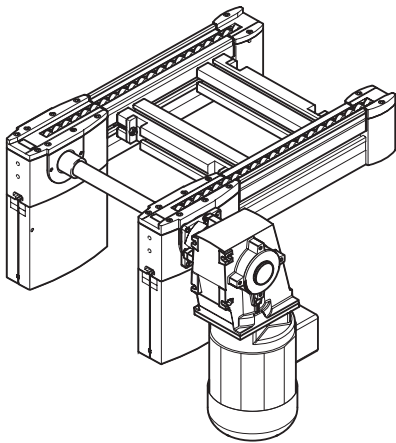
NOTE: When reverse operation is specified, a fixed chain tensioner is used instead of the spring tensioner.

The roller chain transverse conveyor is available in lengths from 400mm to 6000mm in 5mm increments. Specify conveyor width, length, conveyor speed, motor voltage/frequency, motor position, reverse option, and motor orientation when ordering.

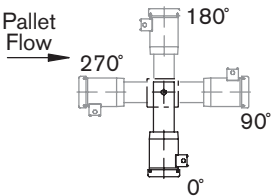
Motor voltage and frequency selections are described in Table 5-2. All gearmotors include CE compliant wiring terminals.

The unit comes fully assembled. **Mounting hardware is not included.** Three different connection kits are available depending on the module the BS4-S is being mounted to.

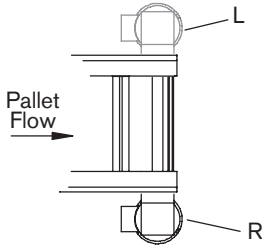
Please contact our applications engineering department for nonstandard length, width, speed, or voltage.



Outboard Mounted Motor Orientation



Motor Position



Ordering Information for BS4-S/R-H

Specify part number, then select from the options below	Your Choices are:	Part Number 3842 999 901
		Your selection:
Width (B) in mm	443, 643, 843, 1043, 1243	_____ mm
Motor Position*	R, L	_____
Motor Orientation	0°, 90°, 180°, 270°	_____
Reverse Operation	YES with fixed tensioner NO with spring tensioner	_____
Transverse Conveyor length (L) †	400mm to 6000mm † (in 5 mm increments)	_____ mm
Nominal Conveyor Speed (m/min)**	9, 12, 15, 18	_____ m/mm
Motor Voltage/Frequency	See Table 5-2	_____ V _____ Hz

* Mid-mounted motor not available with BS4-S/R-H transverse conveyors.
** Full load conveyor speeds vary depending on motor frequency. See Table 5-2
† Transverse conveyors ≥2000mm long must be supported by a leg set. See page 4-8

Ordering Information for BS4-S Connection Kits

Description	Part Number
BS4-S to AS4-S/UM4-S Connection Kit	3842 530 871
BS4-S to ST4-S Connection Kit	3842 530 868
BS4-S to BS4-S Connection Kit	3842 528 192

Transverse conveyors

Technical Data for BS4-S/R-H

Nominal conveyor speed	= See Table 5-2
Load capacity forward	= 450 kg
Load capacity reverse	= 225 kg
Motor RPM @ 50 Hz	= 1380-1410
Motor RPM @ 60Hz	= 1656-1728
Motor electrical specifications	= See Table 5-2

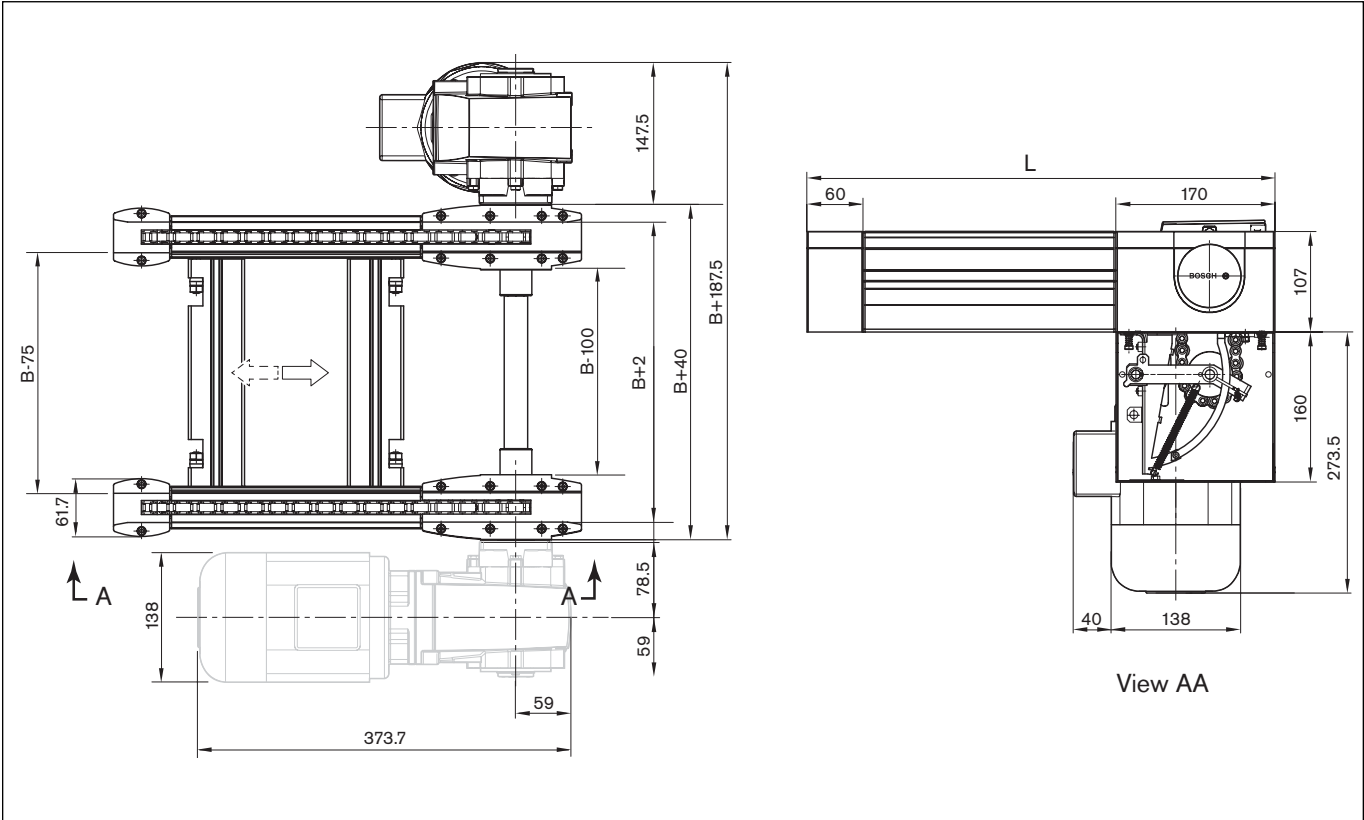
Electrical Data for BS4-S/R-H

Nom. M/min	Actual Speed		Full Load Amps/HP@											
	50 Hz	60 Hz	208/60		240/60		380/60		415/50		480/60		575/60	
			AMPS	HP	AMPS	HP	AMPS	HP	AMPS	HP	AMPS	HP	AMPS	HP
9	9.8	9.1	2.4	1/2	2.4	1/2	1.6	3/4	1.7	3/4	1.2	5/8	1.0	5/8
12	12.3	11.7	2.4	1/2	2.4	1/2	1.6	3/4	1.7	3/4	1.2	5/8	1.0	5/8
15	14.9	14.7	2.4	1/2	2.4	1/2	1.2	1/2	1.2	1/2	1.2	5/8	1.0	5/8
18	18.3	17.9	2.4	1/2	2.4	1/2	1.2	1/2	1.2	1/2	1.2	5/8	1.0	5/8

Table 5-2

Note: Electrical Data for reference only. Refer to motor name plate for actual amperage ratings.

Dimensional Data for BS4-S/R-H



Transverse conveyor width (B) must match pallet length (L_{WT}) or width (B_{WT}), depending on orientation.

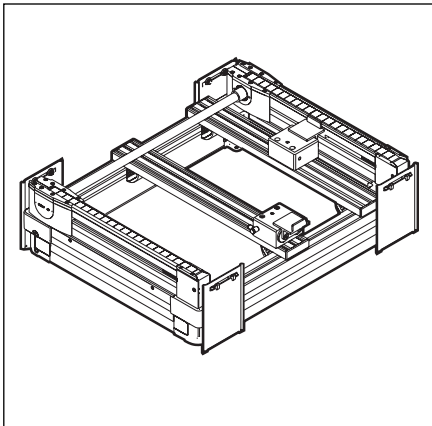
Section 6—Lift-Transfer Modules

TS4plus lift-transfer units permit the transfer of pallets between parallel conveyor lines. They lift the pallet above the roller chain surface and transfer it perpendicular to the main line with a flat-top chain conveyor segment.

Depending on the application, the pallet is transferred either across track rollers

(for transfer between two closely spaced parallel lines) or to another conveyor chain section (for greater distances or shunt lines).

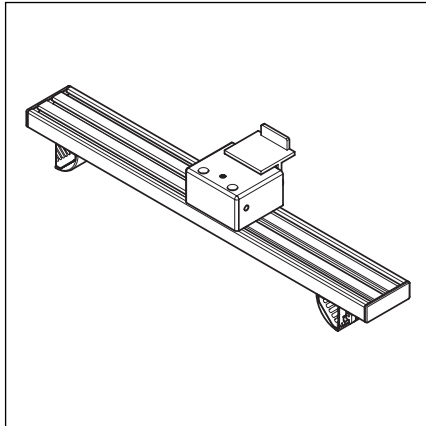
Two common line layouts are shown on the next page to demonstrate common HQ4 applications.



HQ4

Lift-Transfer Unit

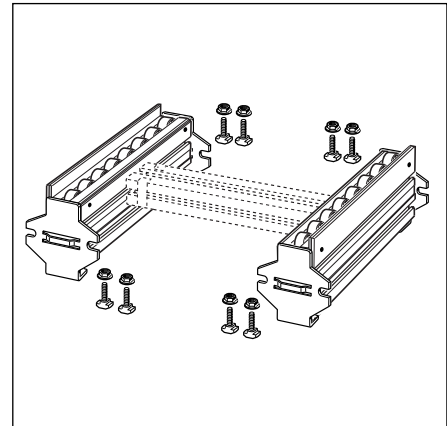
6-2 to 6-4



WI4-S/100, WI4-S/250

Cushioned Transfer Stop for HQ4

6-5 to 6-8



TR4-S

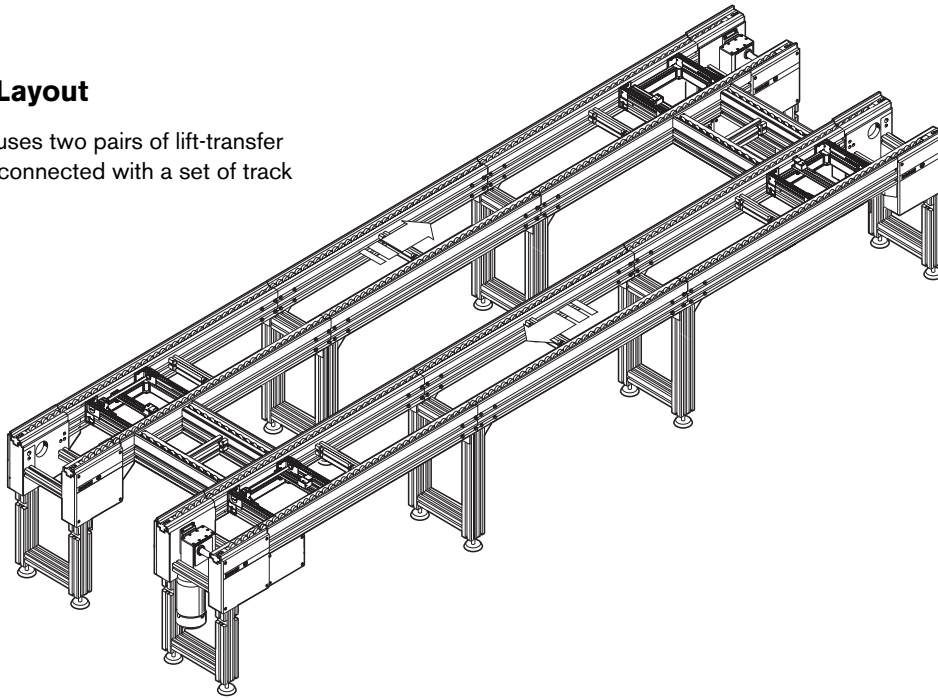
Track Rollers

6-9 to 6-11

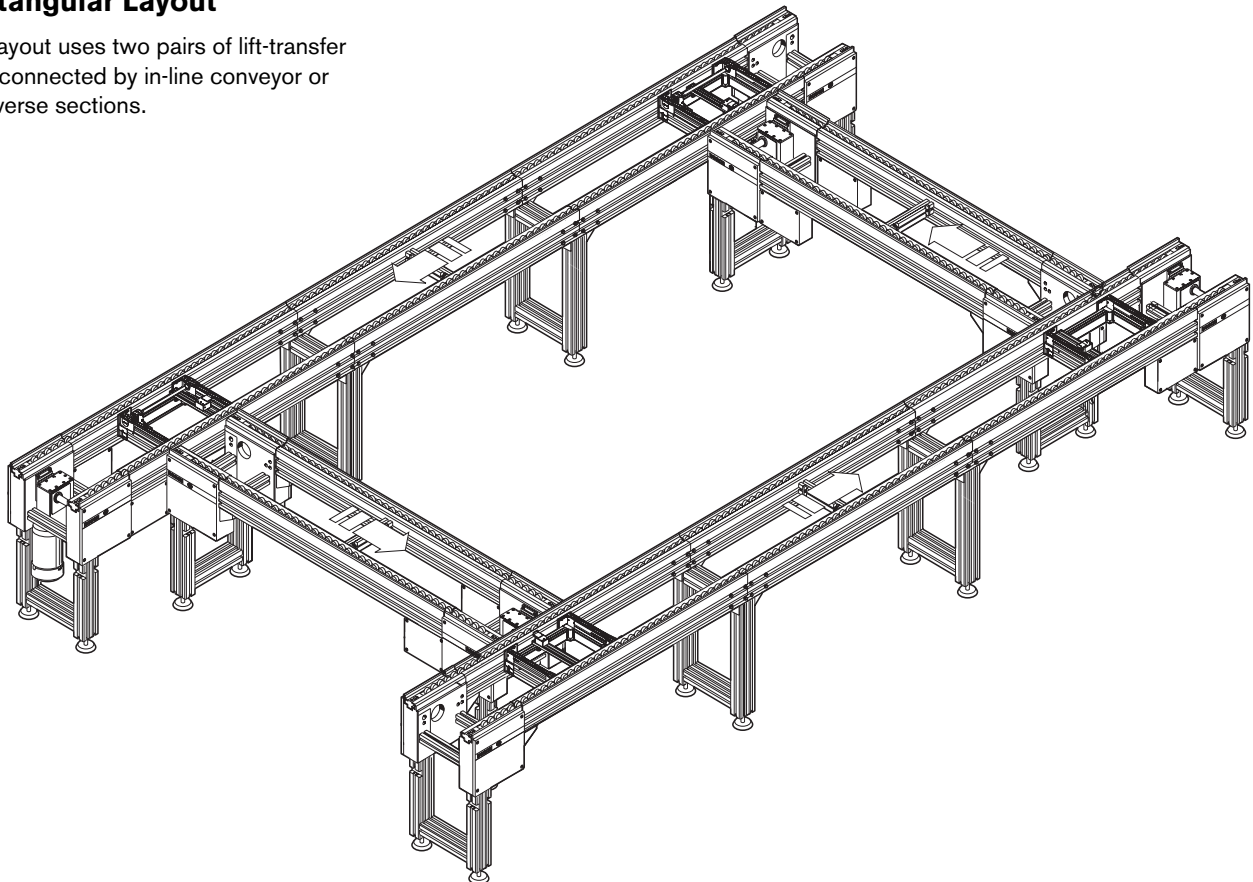
Lift-Transfer Modules

Parallel Layout

This layout uses two pairs of lift-transfer units, each connected with a set of track rollers.

**Rectangular Layout**

This layout uses two pairs of lift-transfer units connected by in-line conveyor or transverse sections.



Lift-Transfer Unit

Model HQ4

The HQ4 Lift-Transfer Unit is used to stop, lift, and transfer pallets at 90° angles in relation to the main conveyor direction. They are used at corners and along the line any time a pallet must be directed off the main conveyor. The lift transfer unit is securely mounted to the conveyor rails. The unit does not require leg posts, which allows it to be used with multi-level layouts.

The HQ4 uses flat-top chain to transfer the pallet and is bi-directional. The lift transfer unit utilizes three-position, spring-centered pneumatic lift cylinders. In the center, or “stop” position, the flat-top chains are 10 mm below the transport level. In this position, pallets are stopped on their trailing edge by a cushioned transfer stop. To allow stopped pallets to pass through, the cylinders are energized and the HQ4 lowers 10 mm, allowing pallets to pass over the stop.

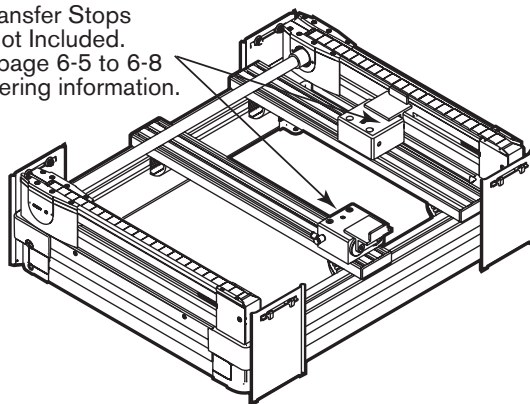
To receive or send a pallet onto a perpendicular line, the cylinders lift the pallet 23 mm. As the unit rises, the flat-top chains engage the pallet and transfer it on or off the main conveyor.

Proximity switches can be used to detect the upper and lower positions of the HQ4. Two proximity switch brackets and exciter elements are included. Proximity switches are ordered separately. For sending or receiving of pallets, a cushioned transfer stop (ordered separately on page 6-5) must be used to stop the pallet on the HQ4.

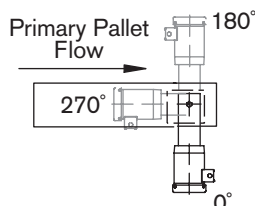
The lift mechanism is synchronized to provide precise movement and a flow control is included for smooth lifting of the pallet. The HQ4 uses standard pushlock pneumatic connections and requires a minimum pressure of 4 bar (58 psi) of filtered, oiled or unoled, compressed air. All required mounting hardware is included.

NOTE: Please consult our application engineering department for mid-mounted motor options.

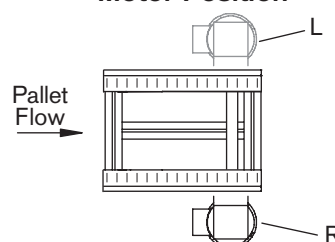
Transfer Stops
Not Included.
See page 6-5 to 6-8
for ordering information.



Outboard Mounted Motor Orientation



Motor Position



Ordering Information for Lift-Transfer Unit HQ4

Specify part number, then select from the options below	Your Choices are:	Part Number 3842 998 035
		Your selection:
Mounting Location	ST4-S: Mainline Conv. BS4-S: Transverse Conv.	_____
Lift Transfer Unit Length (B _L)	See Table 6-1	_____ mm
Lift Transfer Unit Width (B _Q)	See Table 6-1	_____ mm
Motor Position	R, L	_____
Motor Orientation (outboard)*	0°, 180°, 270°	_____ mm
Nominal Speed (m/min)	9, 12, 15, 18	_____ m/mm
Motor Voltage/Frequency**	See Table 6-2	_____ V _____ Hz

* 270° motor orientation are only available when B_Q ≥ 643

** Full load conveyor speeds vary depending on motor frequency. See Table 6-2

HQ4 Available Sizes

		Transfer Width, (B _Q)				
		443	643	843	1043	1243
Transfer Length, (B _L)	643	•	•	•	•	•
	843	•	•	•	•	•
	1043	•	•	•	•	•
	1243	•	•	•	•	•

Table 6-1

Lift-Transfer Modules

Technical Data for HQ4

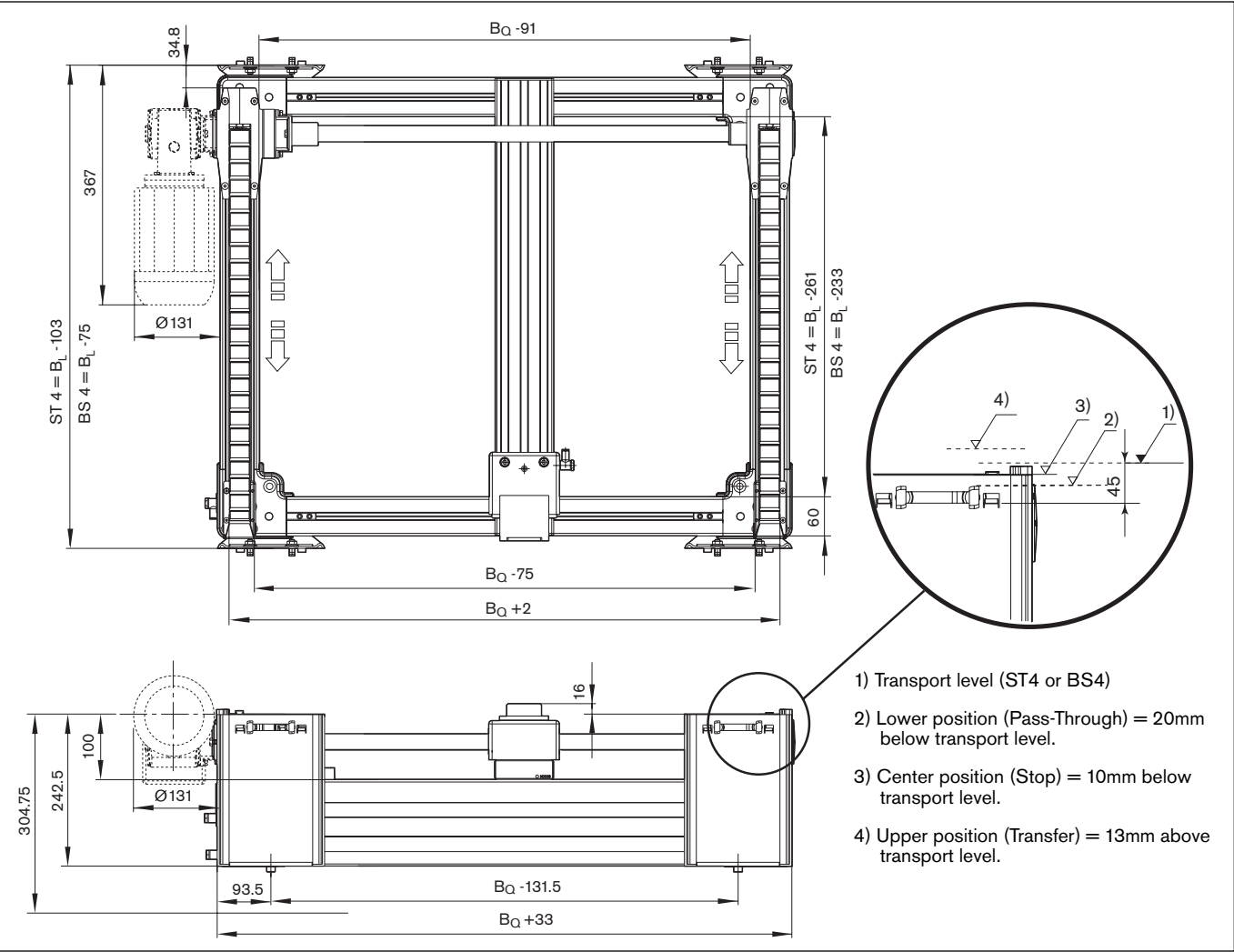
Cylinder Bore	=	63 mm
Cylinder Stroke	=	33 mm
Operating Pressure	=	4–6 bar (58–87psi)
Lift Above Chain:	=	13 mm
Air Fittings	=	8mm Pushlock (5/32")

Electrical Data for HQ4

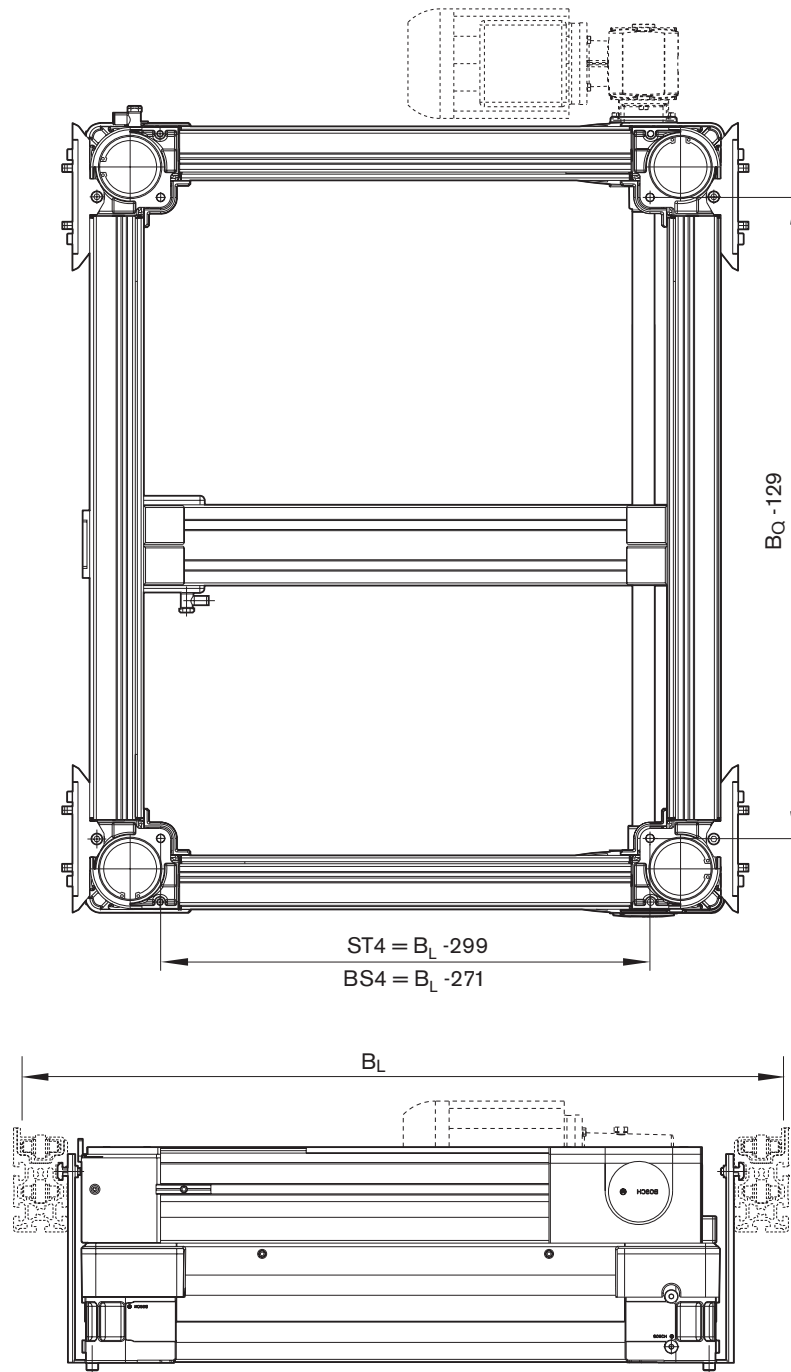
Nom. M/min	Actual Speed		HP	Full Load Amps @					
	50 Hz	60 Hz		208/60	240/60	380/50	415/50	480/60	575/60
9	9.0	8.2	.25	1.6	1.3	0.86	0.72	0.67	0.55
12	10.7	10.9	.25	1.6	1.3	0.86	0.72	0.67	0.55
15	13.4	13.0	.25	1.6	1.3	0.86	0.72	0.67	0.55
18	17.9	16.3	.25	1.6	1.3	0.86	0.72	0.67	0.55

Table 6-2
Note: Electrical Data for reference only. Refer to motor data plate for actual ratings.

Dimensional Data for HQ4



NOTE: See Page 6-4 for additional HQ4 dimension drawings

Dimensional Data for HQ4

Cushioned Transfer Stop for HQ4

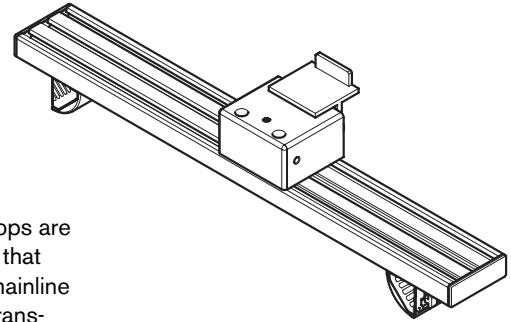
Models WI4-S/100, WI4-S/250

Cushioned transfer stops are used to stop workpiece pallets that are being sent (or received) onto an HQ4 lift-transfer unit. They are designed to be mounted inside a lift-transfer unit and can be used for either sending or receiving, depending on mounting location.

The WI4-S/100 cushioned transfer stop is designed for pallet loads between 5kg and 100kg. The WI4-S/250 heavy duty cushioned transfer stop is designed for payloads between 25kg and 250kg. Damping effect for various payload and speed combinations is set via an adjustment screw.

Two styles of cushioned transfer stops are available for HQ4 lift transfer units that are mounted either inside an ST4 mainline conveyor section or inside a BS4 transverse conveyor module. NOTE: Different part numbers exist for each style and line width.

All required mounting hardware is included. The stop is shipped unassembled. It includes a 8mm pushlock pneumatic fitting and requires 4-6 bar of filtered oiled or unoled, compressed air.



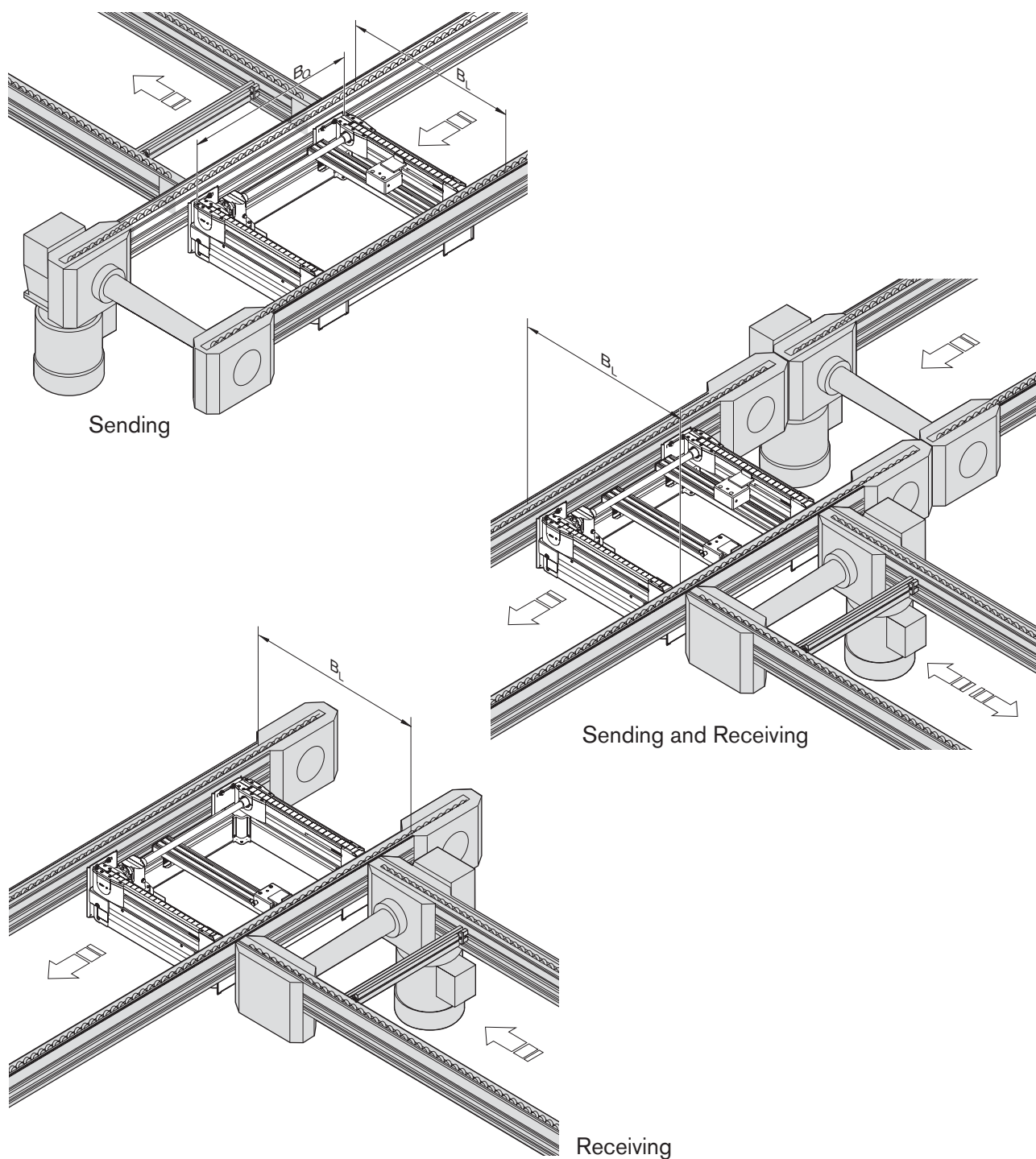
Ordering Information for WI4-S/100

Line Width (B) in mm	Conveyor Section Type	Part Number
443	ST4	8981 022 100
643	ST4	8981 022 101
843	ST4	8981 022 102
1043	ST4	8981 022 103
1243	ST4	8981 022 104
443	BS4	8981 022 105
643	BS4	8981 022 106
843	BS4	8981 022 107
1043	BS4	8981 022 108
1243	BS4	8981 022 109

Ordering Information for WI4-S/250

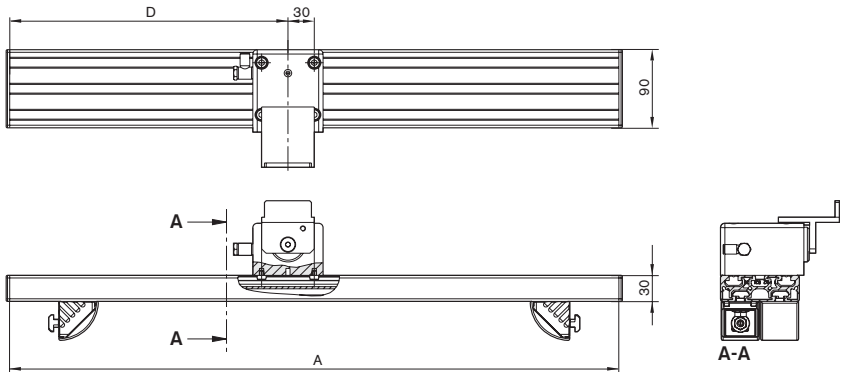
Line Width (B) in mm	Conveyor Section Type	Part Number
443	ST4	8981 022 110
643	ST4	8981 022 111
843	ST4	8981 022 112
1043	ST4	8981 022 113
1243	ST4	8981 022 114
443	BS4	8981 022 115
643	BS4	8981 022 116
843	BS4	8981 022 117
1043	BS4	8981 022 118
1243	BS4	8981 022 119

Application Examples for Cushioned Stops

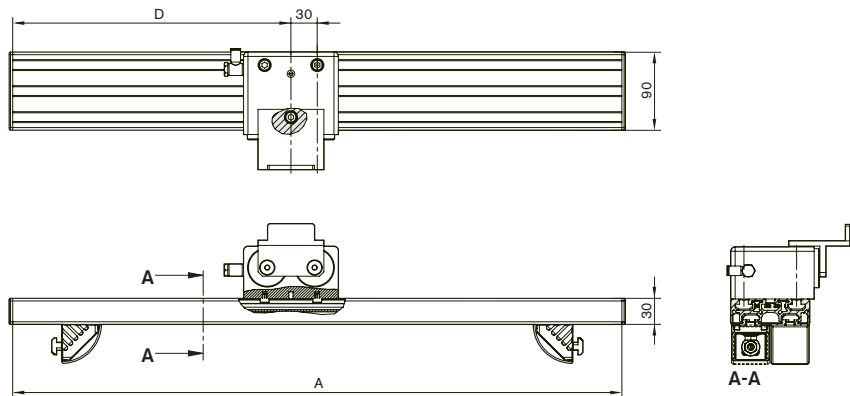


Dimensional Data for Cushioned Stops-Sending

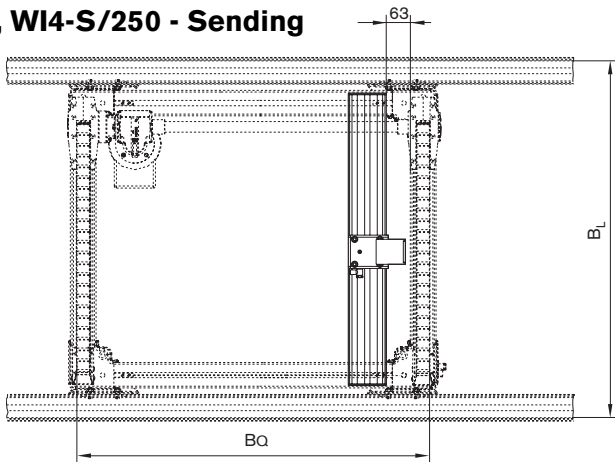
WI4-S/100 - Sending



WI4-S/250 - Sending



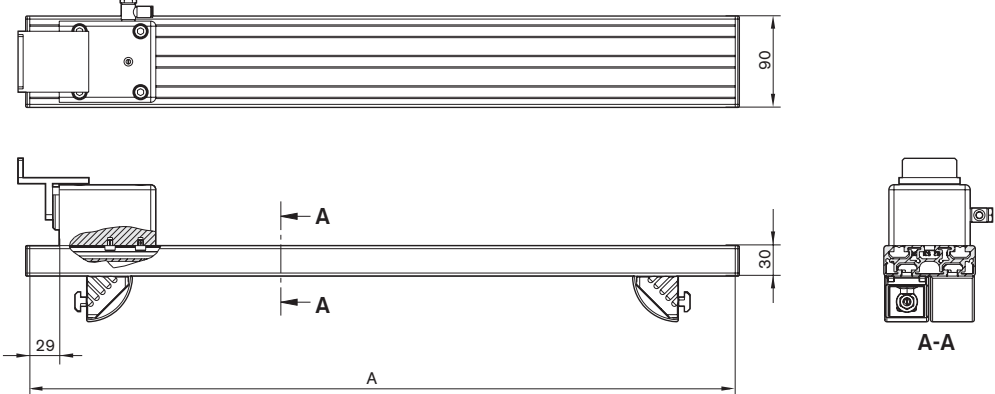
WI4-S/100, WI4-S/250 - Sending



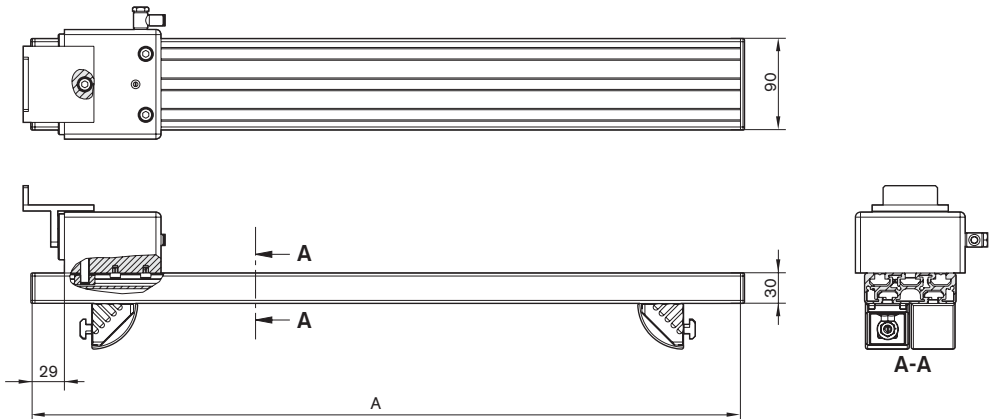
		EQ4 mounted in ST4	EQ4 mounted in BS4
B _L (mm)	D (mm)	A (mm)	A (mm)
443	131	294	322
643	231	494	522
843	331	694	722
1043	431	894	922
1243	531	1094	1122

Dimensional Data for Cushioned Stops-Receiving

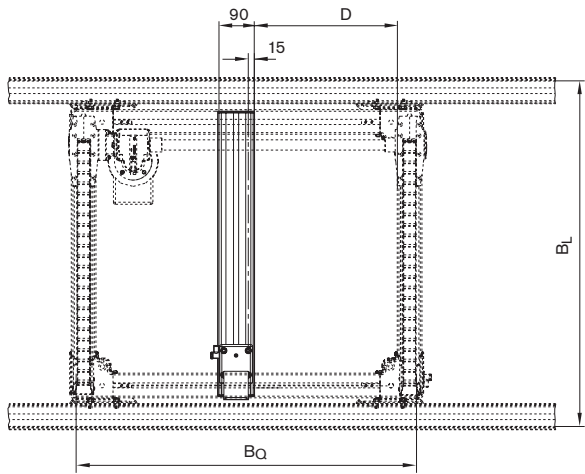
WI4-S/100- Receiving



WI4-S/250 - Receiving



WI4-S/100, WI4-S/250 - Receiving



	EQ4 mounted in ST4	EQ4 mounted in BS4
B _L (mm)	A (mm)	A (mm)
443	294	322
643	494	522
843	694	722
1043	894	922
1243	1094	1122

B _Q (mm)	D (mm)
443	161.5
643	261.5
843	361.5
1043	461.5
1243	561.5

Lift-Transfer Modules

Track Rollers

Model TR4-S

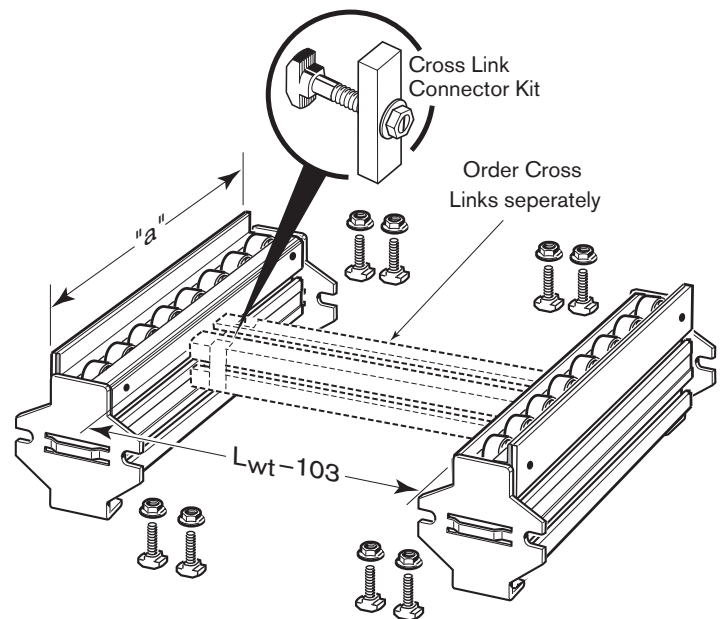
Track

rollers are non-powered and are used in conjunction with lift transfer units to support the pallet as it traverses the gap between parallel conveyor lines. They are available in 4 lengths, depending on pallet width (B_{WT}).

Mounting brackets and T-bolts are included; cross links and cross link connector kits must be ordered separately. Refer to the ordering chart below for the part number, length, and quantity required for each track roller size.

NOTE: To ensure sufficient surface contact between the pallet wear strips and sending/receiving HQ4 lift-transfer units, TR4-S track rollers are only to be used with pallet widths (B_{WT}) ≥ 643. For pallet widths of < 643mm, BS4 transverse conveyors, with a minimum length of 400mm, are required in place of track rollers.

See pages 6-10 and 6-11 for detailed dimensional data.



Ordering Information for Track Rollers TR4-S

Conveyor Gap "a"	Use when B _{WT} is	Part Number
90 mm	≥ 643 mm	8981 021 950
290 mm	≥ 843 mm	8981 021 951
490 mm	≥ 843 mm	8981 021 952
690 mm	≥ 1043 mm	8981 021 953

6

Ordering Information for Track Roller Cross Links

Conveyor Gap "a"	Quantity of Cross Links required	Quantity Connector Kits required	Part Number
90 mm	none	none	N/A
290 mm	1	4	3842 992 491/...mm*
490 mm	2	2	3842 990 584/...mm*
690 mm	2	2	3842 990 584/...mm*

* Specify length of cross link required where ... = (L_{WT} - 103)

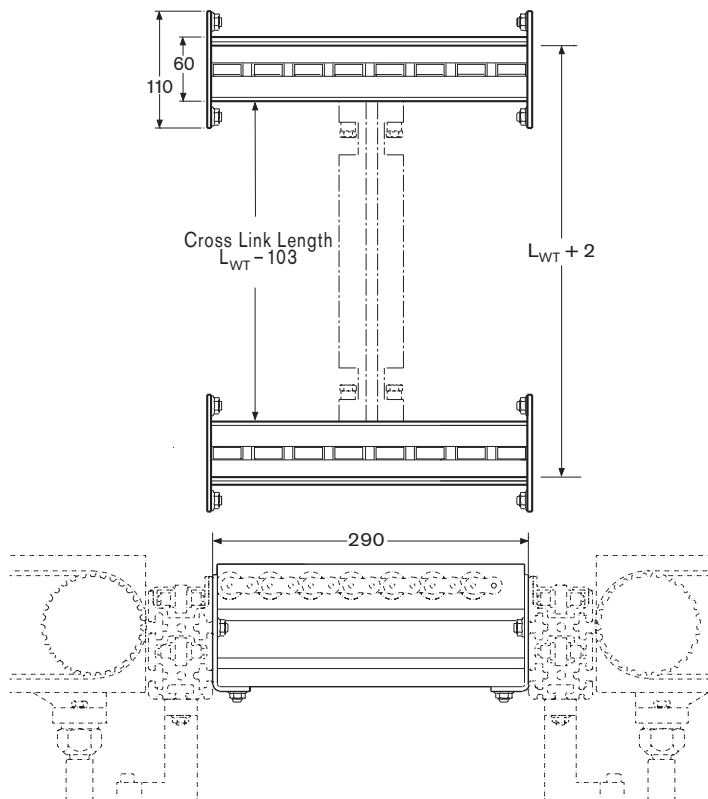
Ordering Cross Link Connector Kits

Description	Qty	Part Number
Cross Link Connector Kit	1	3842 146 972

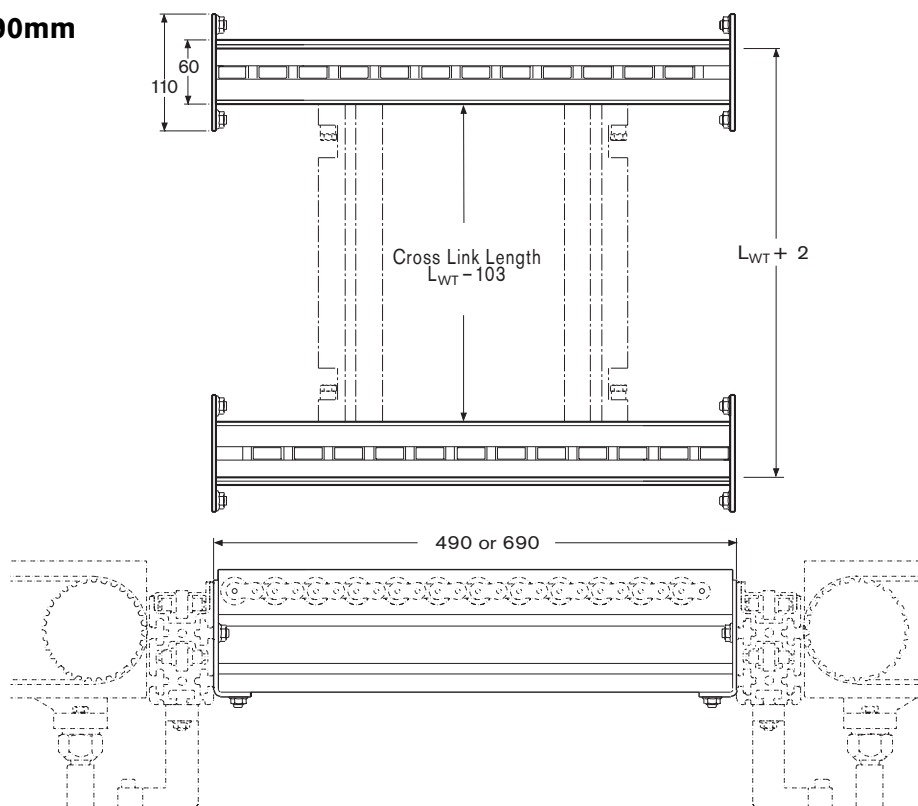
Track Rollers

Dimensional Data for TR4-S

Conveyor gap "a" = 290 mm



Conveyor gap "a" = 490 or 690 mm



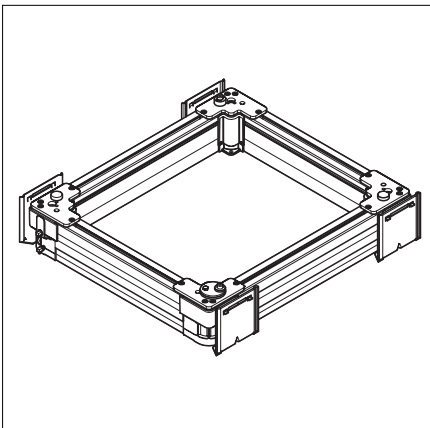
Lift-Position Modules

Section 7–Lift-Position Modules

TS4plus Lift-Position Units precisely position the workpiece pallet for various manufacturing processes.

The PE4 uses pneumatic cylinders to raise the pallet 18mm above the moving roller chain surface.

Positioning pins and synchronization shafts provide positioning accuracy of up to $\pm 0.125\text{mm}$.

**PE4**

Lift-Position Units

7-2 to 7-3

Lift-Position Units

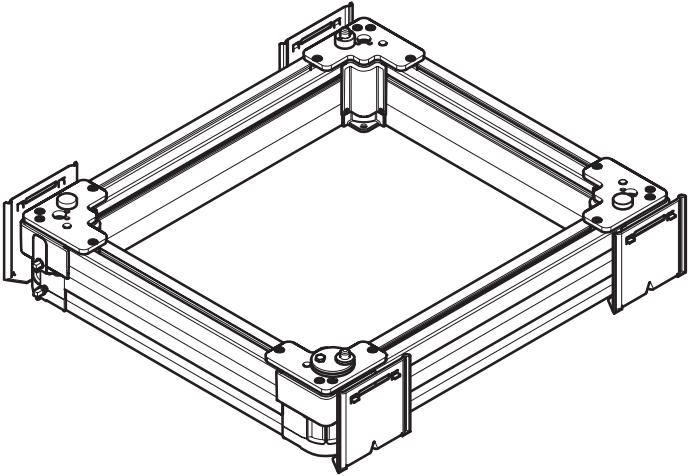
Model PE4

The PE4 Lift-Position Unit accurately positions a workpiece pallet by lifting it vertically off a conveyor, isolating it from the moving roller chain. Pallet positioning repeatability is up to ± 0.125 mm when station mounted (attached to separate leg posts or a machine base) and anchored to the floor. The PE4 mounts directly to ST4 conveyor sections or a BS4 transverse conveyor module.

The PE4 raises and lowers pallets with four double acting lift cylinders. Uniform lift is maintained through a series of rack and pinion gears between the lift cylinders. The PE4 lifts the pallet 18 mm above the roller chain. This reduces operator risk by minimizing potential pinch points between the pallet and the conveyor line.

Two 12 mm proximity switches can be used to sense the upper and lower positions of the PE4. Two proximity switch mounting brackets and exciter elements are included. VE4-S cushioned stop gates must be used at all PE4 locations to stop pallets on the leading edge. Stop gates and proximity switches are not included but are available separately (see Section 7).

The PE4 uses standard 8mm pushlock pneumatic connections and requires a minimum pressure of 4 bar (58 psi) of filtered, oiled or unoled, compressed air. All required mounting hardware is included.



Ordering Information for Lift Transfer Unit PE4

Specify part number, then select from the options below	Your Choices are:	Part Number 3842 998 067
		Your selection:
Mounting Location	ST4-S: Mainline Conveyor BS4-S: Transverse Conveyor	
Pallet width (B _{WT})	See Table 6-3	_____ mm
Pallet length (L _{WT})	See Table 6-3	_____ mm

PE4 Available Sizes

		Width (B _{WT})				
		443	643	843	1043	1243
Length (L _{WT})	443	•	•	•		
	643	•	•	•	•	
	843	•	•	•	•	•
	1043		•	•	•	•
	1243		•	•	•	•

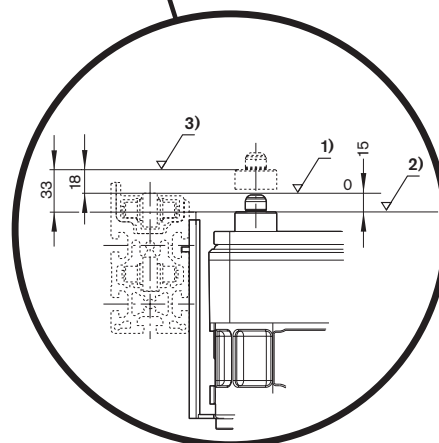
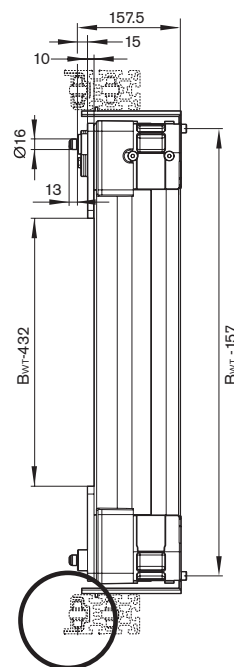
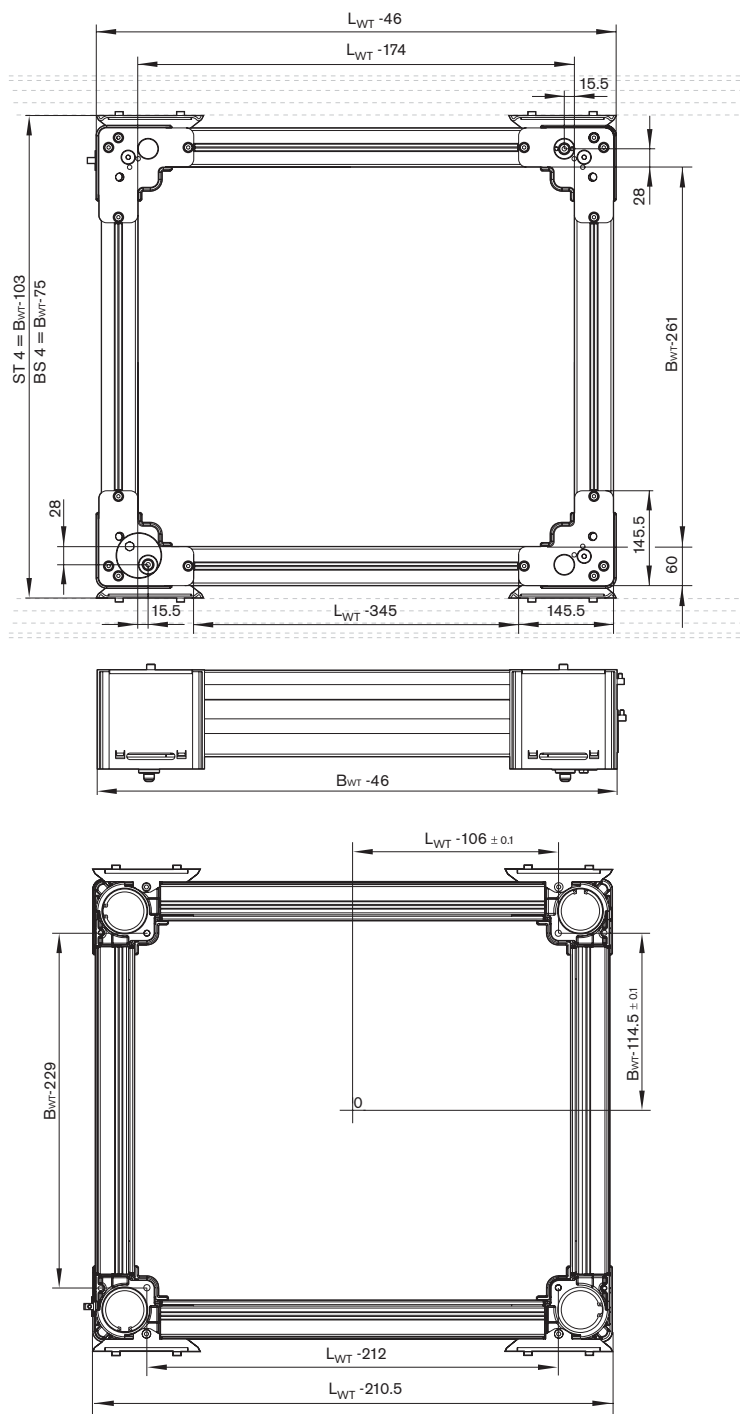
Table 6-3

Lift-Position Modules

Technical Data for PE4

Cylinder Bore	=	63 mm
Cylinder Stroke	=	33 mm
Operating Pressure	=	4–6 bar (58–87 psi)
Lift Above Chain	=	18 mm
Repeatability	=	±0.125 mm
Max. allowable applied force	=	1100N (incl. WT4 payload)
Air Fittings:	=	8mm pushlock (5/32")

Dimensional Data for PE4



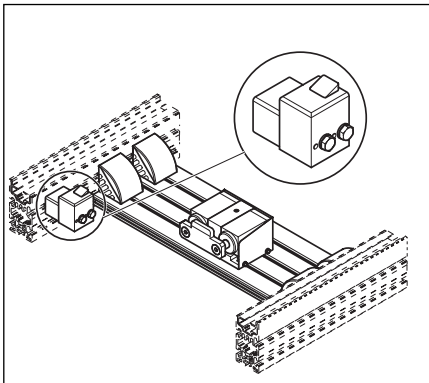
- 1) Transport level (ST4 or BS4)
- 2) Lower position = 15mm below transport level.
- 3) Upper position = 18mm above transport level.

Section 8—Traffic Control

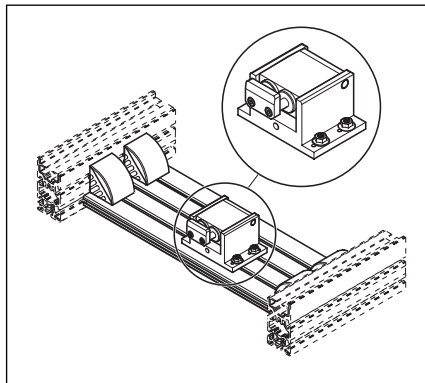
Controlling the flow of pallets to prevent excessive accumulation or maximize manual and automated workstation efficiency takes a variety of approaches. TS4plus offers several types of stop gates, as well as proximity switches and switch mounting kits, to provide the most effective traffic control system for your application.

Cushioned stop gates are used for all applications along a mainline conveyor line or transverse conveyor section.

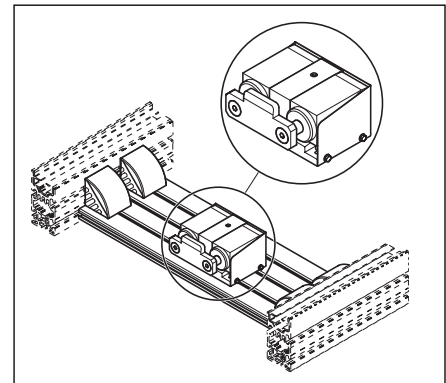
All TS4plus cushioned stops utilize infinitely adjustable, self-compensating pneumatic dampers to gently stop the workpiece pallet.



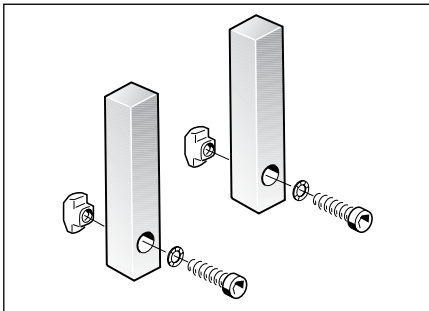
VE4-S/AR
Anti-rebound Stop
8-1



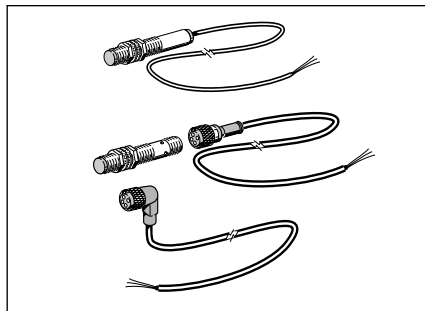
VE4-D100
Cushioned Stop Gates
8-2 to 8-3



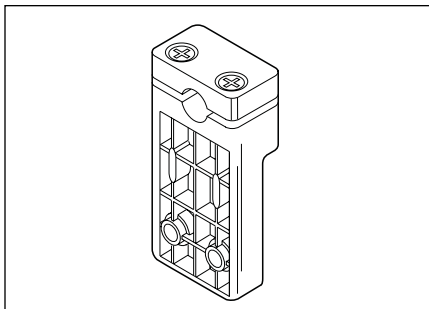
VE4-D250
Heavy Duty Cushioned Stop Gates
8-4 to 8-5



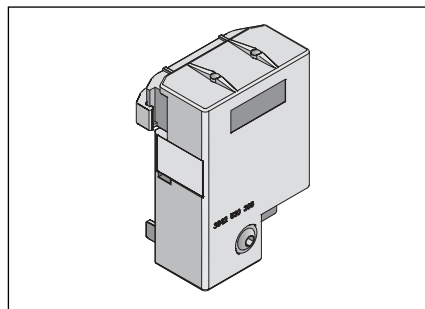
Safety Stop Kit
8-6



Proximity Switches
8-8



Proximity Switch Bracket
8-8



WI/M
Mini Rocker
8-9

Traffic Control

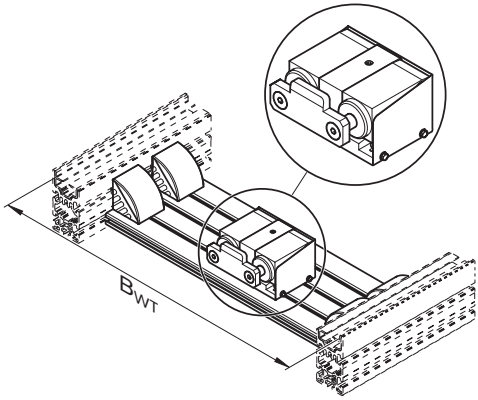
Anti-rebound Stop

Model VE4-S/AR

With the low coefficient of friction on TS4plus roller chain conveyors, workpiece pallets may rebound when pallet travel is halted by a stop gate or the stop rail on a Lift-Transfer Unit. Typically, rebound begins whenever pallet weight with payload exceeds 200kg or when transport speeds are 12m/min and higher. If required by the assembly process, the VE4-S/AR can be used to prevent pallet rebound.

In operation, as the workpiece pallet passes over the rebound stop, the latch lever is pushed down. Just as the pallet frame clears the rebound stop, the latch lever springs back, limiting any reverse movement of the workpiece pallet. The latch lever will engage the inner or outer frame rail of any TS4plus workpiece pallet and is reversible for left or right side mounting. The rebound stop mounts to the inner conveyor rail T-slot and includes all required mounting hardware.

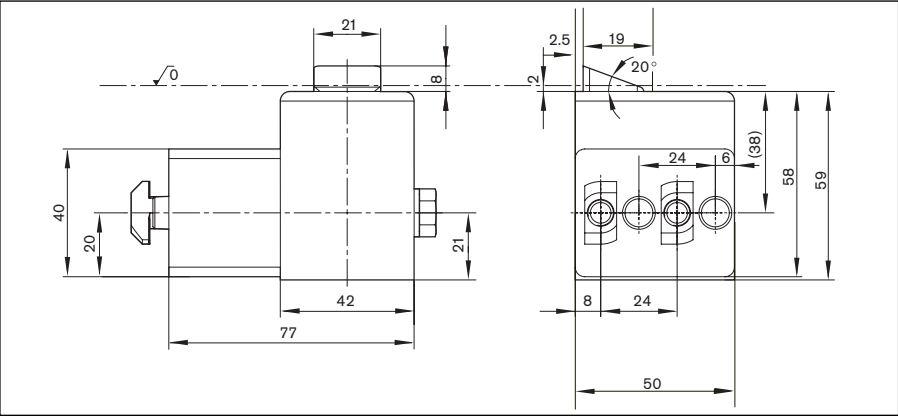
For reverse operation, a pneumatically actuated rebound stop is also available. The pneumatically actuated version is a single acting stop that utilizes a spring to perform the rebound (stopping) motion and a pneumatic actuation to perform the return (retracting) motion.



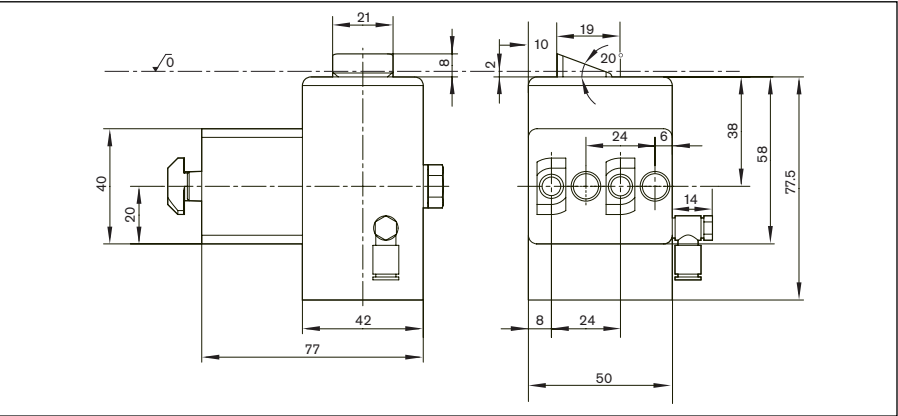
Ordering Information for Anti-rebound Stop VE4-S/AR

Anti-rebound Stop	3842 530 968
Pneumatic Anti-rebound Stop	3842 532 329

Dimensional Data Anti-rebound Stop VE4-S/AR



Dimensional Data for Pneumatic Anti-rebound Stop VE4-S/AR



Cushioned Stop Gates

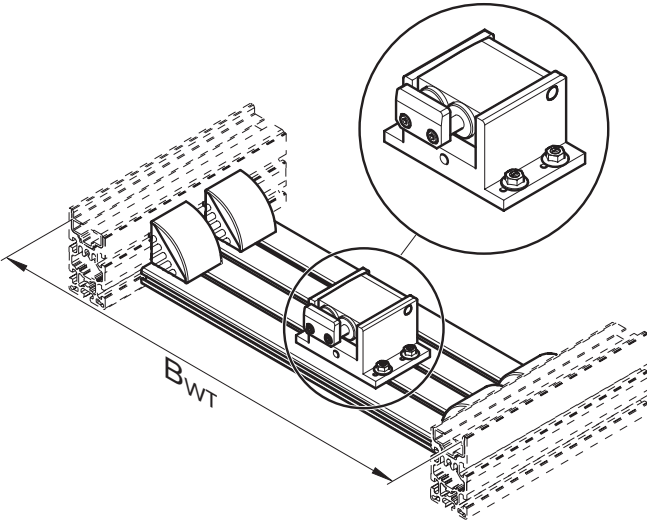
Model VE4/D100

Center-mount cushioned stop gates are used to stop and separate workpiece pallets on the conveyor. They are pneumatically reset and mounted between the conveyor section by attaching the mounting plate with gussets to the inner T-slot of the conveyor rails.

Cushioned stop gates are available for mounting to either ST4 mainline conveyor sections or to BS4 transverse conveyor sections. **NOTE:** Different part numbers exist for each style and line width.

The VE4/D100 cushioned stop gate is designed for pallet loads between 5kg and 100kg. When delivered, cushioned stop gates are configured to stop the pallet on the leading edge. However, they can be converted at any time (with no additional parts needed) to stop the pallet on its trailing edge. Damping effect for various payload and speed combinations is set via an adjustment screw.

All required mounting hardware is included. Cushioned stop gates include 8 mm pushlock pneumatic fittings and require 4–6 bar of filtered, oiled or unoled, compressed air.



Ordering Information for Cushioned Stop Gates, VE4/D100

Line Width (B _{WT}) in mm	Conveyor Section Type	Part Number
443	ST4	8981 022 133
643	ST4	8981 022 134
843	ST4	8981 022 135
1043	ST4	8981 022 136
1243	ST4	8981 022 137
443	BS4	8981 022 138
643	BS4	8981 022 139
843	BS4	8981 022 140
1043	BS4	8981 022 141
1243	BS4	8981 022 142

Traffic Control

Cushioned Stop Gates

Stop Load Ratings for VE4/D100

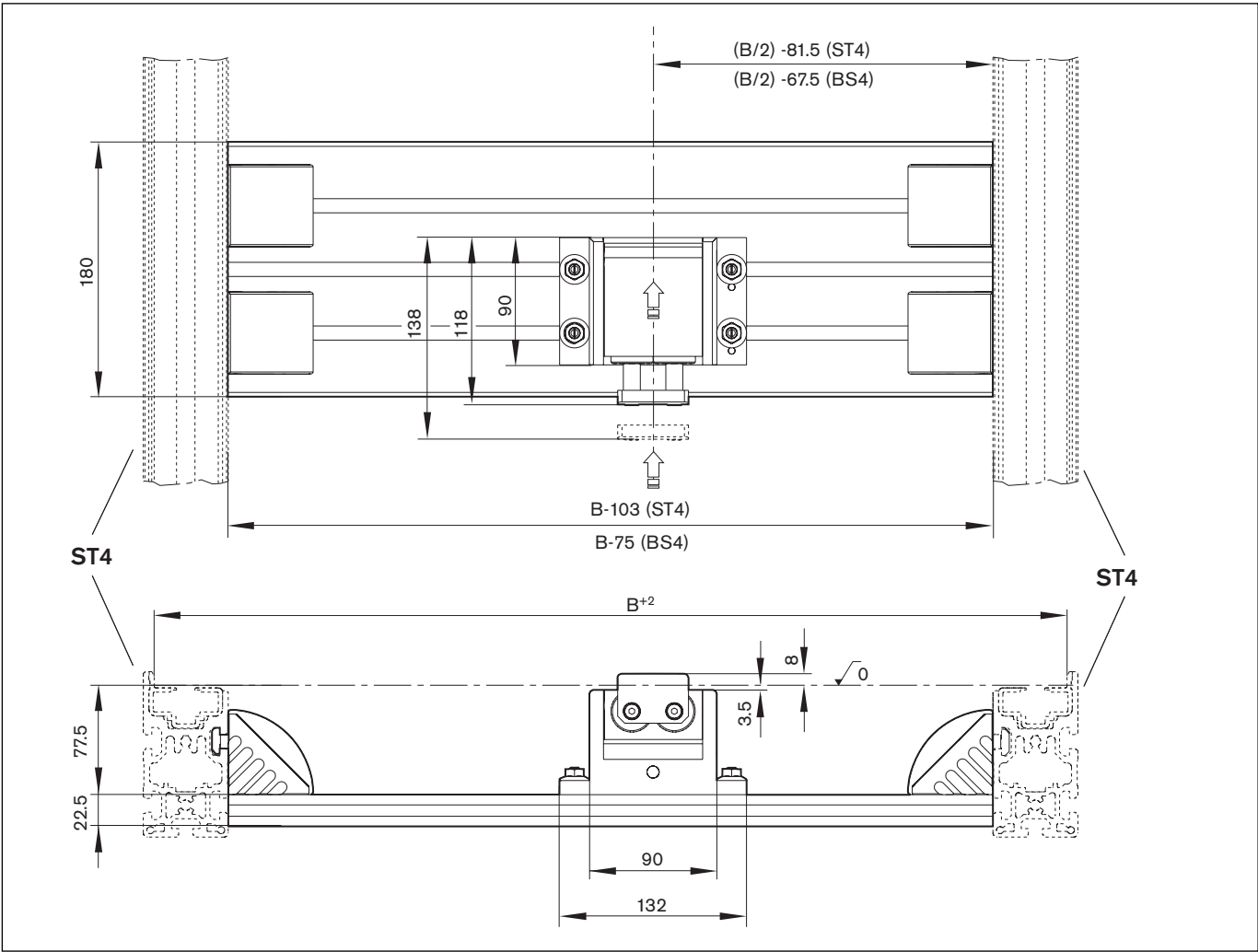
6 m/min	9 m/min	12 m/min	15 m/min	18 m/min
100 Kg	100 Kg	100 Kg	95 Kg	90 Kg

Accumulation Load Ratings for VE4/D100

6 m/min	9 m/min	12 m/min	15 m/min	18 m/min
1000 Kg	800 Kg	500 Kg	300 Kg	200 Kg

NOTE: Once a cushioned stop gate has been compressed by a workpiece pallet, "Accumulation" refers to any subsequent pallets that queue up behind the first pallet.

Dimensional Data for VE4/D100



Heavy Duty Cushioned Stop Gates

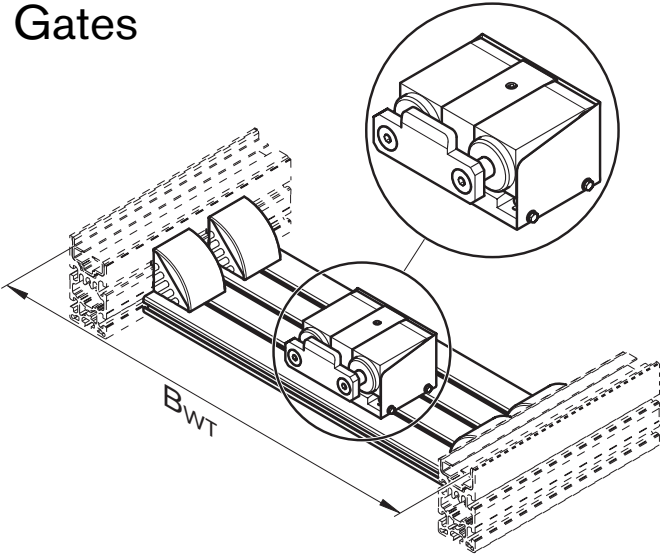
Model VE4/D250

Heavy Duty center-mount cushioned stop gates are used to stop and separate workpiece pallets on the conveyor. They are pneumatically reset and mount between the conveyor section by attaching the mounting plate with gussets to the inner T-slot of the conveyor rails.

Cushioned stop gates are available for mounting to either ST4 mainline conveyor sections or to BS4 transverse conveyor sections. NOTE: Different part numbers exist for each style and line width.

The VE4/D250 cushioned stop gate is designed for pallet loads between 30kg and 250kg. When delivered, cushioned stop gates are configured to stop the pallet on the leading edge. However, they can be converted at any time (with no additional parts needed) to stop the pallet on its trailing edge. Damping effect for various payload and speed combinations is set via an adjustment screw.

All required mounting hardware is included. Cushioned stop gates include 8mm pushlock pneumatic fittings and require 4–6 bar of filtered, oiled or unoled, compressed air.



Ordering Information for Heavy Duty Cushioned Stop Gates, VE4/D250

Line Width (B _{WT})	Conveyor Section	Part Number
443	ST4	8981 022 143
643	ST4	8981 022 144
843	ST4	8981 022 145
1043	ST4	8981 022 146
1243	ST4	8981 022 147
443	BS4	8981 022 148
643	BS4	8981 022 149
843	BS4	8981 022 150
1043	BS4	8981 022 151
1243	BS4	8981 022 152

Traffic Control

Heavy Duty Cushioned Stop Gates

Stop Load Ratings for VE4/D250

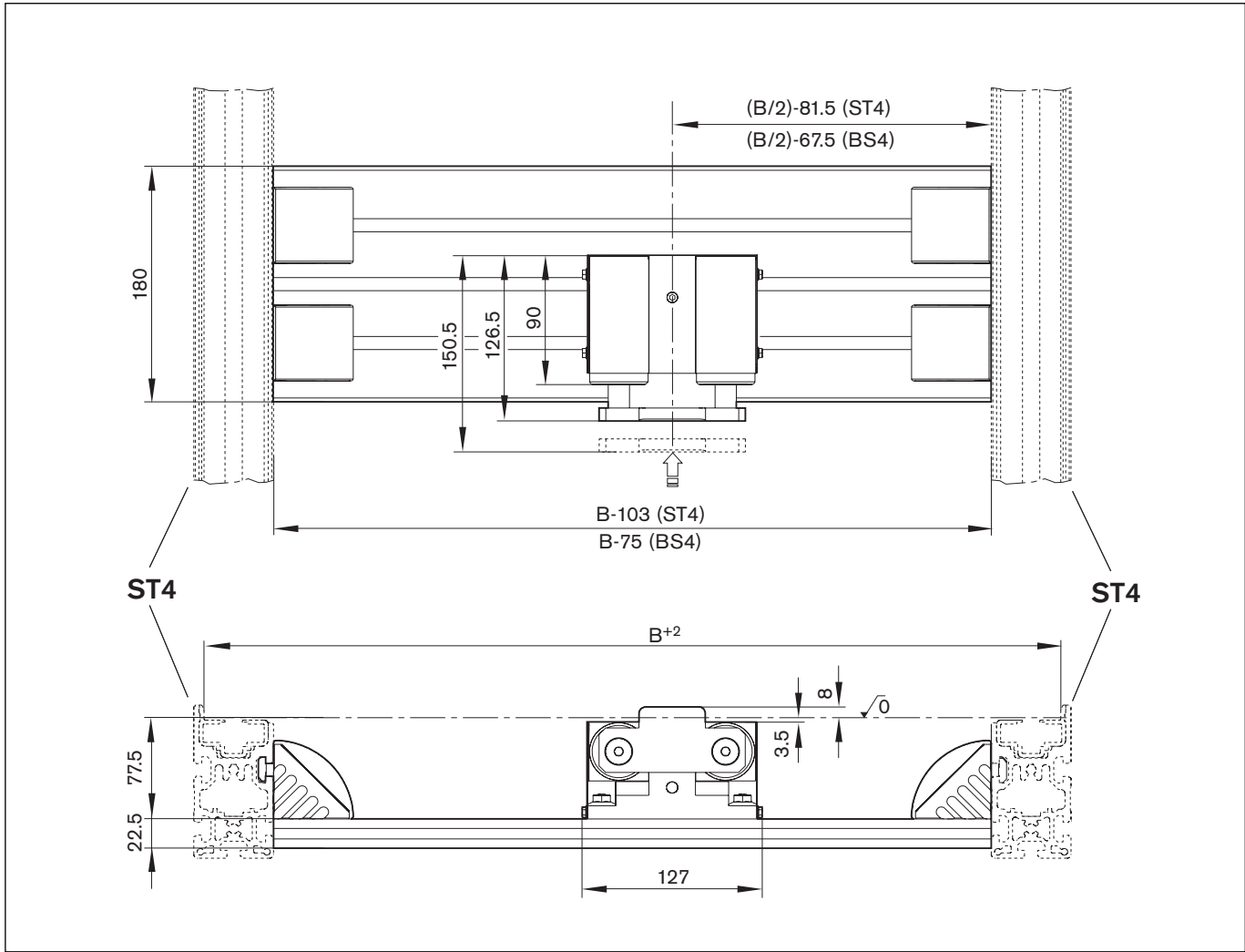
6 m/min	9 m/min	12 m/min	15 m/min	18 m/min
250 Kg	250 Kg	250 Kg	235 Kg	225 Kg

Accumulation Load Ratings for VE4/D250

6 m/min	9 m/min	12 m/min	15 m/min	18 m/min
2300 Kg	2000 Kg	1200 Kg	700 Kg	500 Kg

NOTE: Once a cushioned stop gate has been compressed by a workpiece pallet, "Accumulation" refers to any subsequent pallets that queue up behind the first pallet.

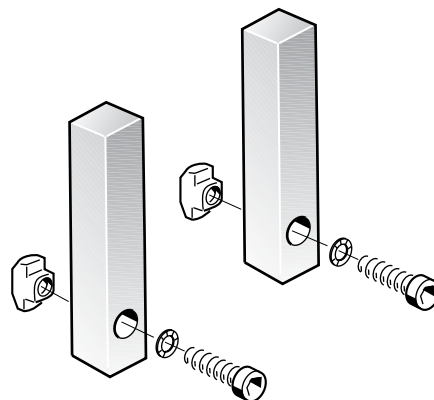
Dimensional Data for VE4/D250



Traffic Control

Safety Stop Kit

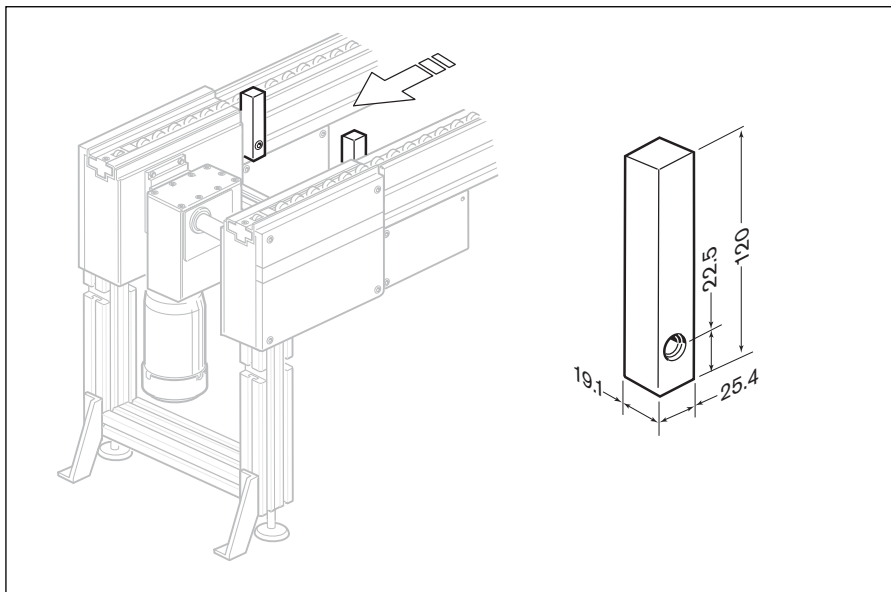
The optional safety stop kit is not required but can be used as a redundant safety feature for the control system. The safety stop will prevent the workpiece pallet from being pushed from the end of the conveyor in the event of a control system failure. The stops attach to the T-slot in the conveyor rail next to the drive unit. The kit includes two stops and the required mounting hardware.



Ordering Information for Safety Stop Kit

	Part Number
Safety Stop Kit (for all pallet sizes)	8981 020 069

Dimensional Data for Safety Stop Kit



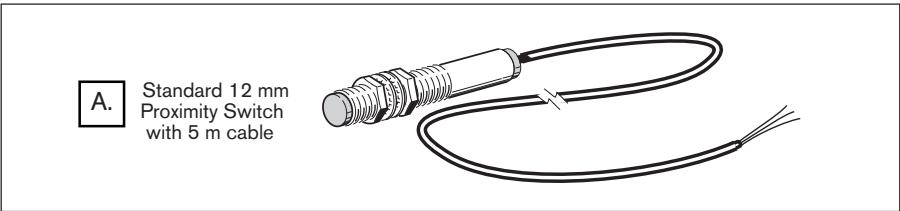
Proximity Switches

Proximity switches indicate workpiece pallet presence by detecting the exciter plates on the sides of workpiece pallets. These normally open, 24 VDC, short-circuit protected switches are PNP (sourcing) and have a 12 mm threaded body. Proximity switches operate at a 4 mm sensing range (unshielded) and have an LED indicator.

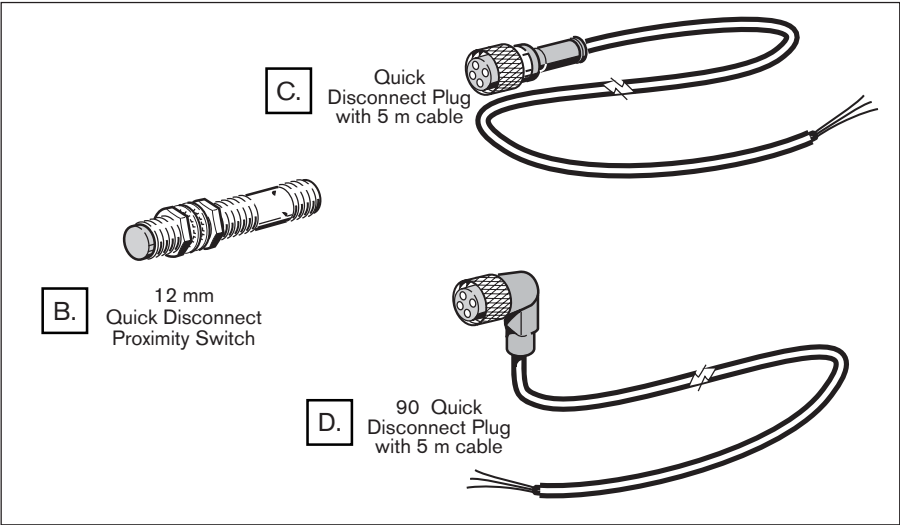
Two versions are available. The standard switch has five meters of three conductor cable attached. The quick disconnect switch provides for faster assembly and service when used with the disconnect plug and cable.

NOTE: Proximity switches are not included with modules that require them and must be ordered separately. In some cases, proximity switch use is optional, depending on the control system programming.

Standard Proximity Switches



Quick Disconnect Proximity Switches



Ordering Information Proximity Switches

	Description	Part Number
A	12mm, 10-30 VDC, normally open, Proximity Switch with 5m of 3 conductor cable, one	8981 004 462
B	12 mm 10-30 VDC, normally open, Quick Disconnect Proximity Switch, one	8981 533 326
C	Straight, Quick Disconnect Plug with 5m of 3 conductor cable, one	8981 008 498
D	90° Quick Disconnect Plug with 5m of 3 conductor cable, one	8981 013 317

Traffic Control

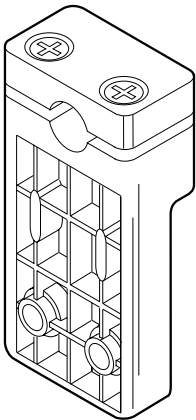
Proximity Switch Bracket

Model SH2/S

Proximity switch mounting kits are used to attach proximity switches to sense the discrete pallet position along the line for control purposes. The switch, sold separately, is typically used to provide a "pallet present" signal at stops, transfers, and positioning modules.

The proximity switch bracket is designed to be used with any 12 mm diameter proximity switch. The bracket is constructed of tough polyamide and includes all mounting hardware.

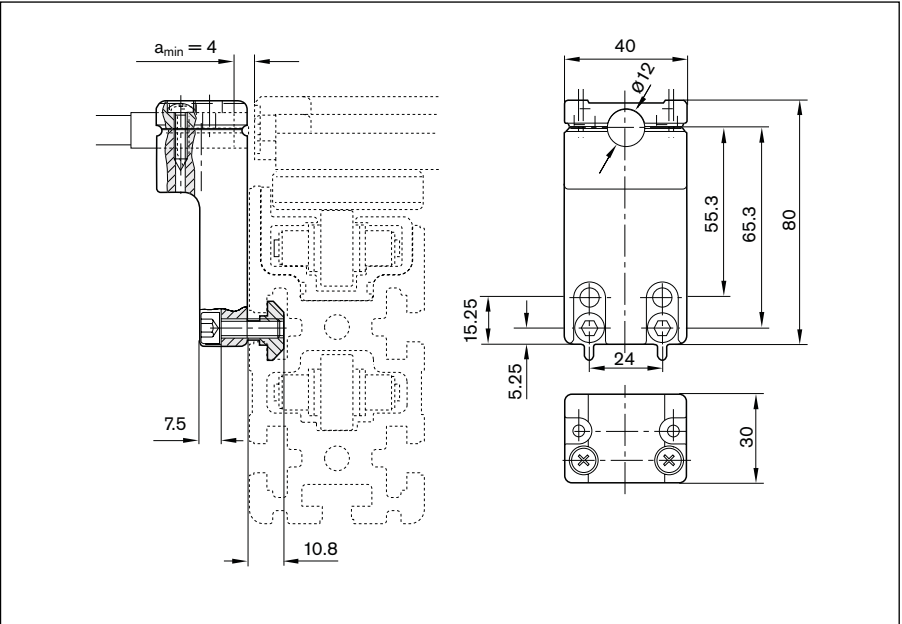
NOTE: Proximity switches must be mounted at a minimum distance of 4mm from the exciter plate, which is located on the corner bumper of the pallet.



Ordering Information for Proximity Switch Bracket SH2/S

Description	Part Number
Horizontal Proximity Switch Bracket with mounting hardware	3842 168 830

Dimensional Data for SH2/S



Traffic Control

Mini Rocker

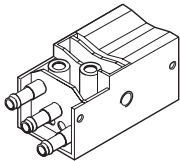
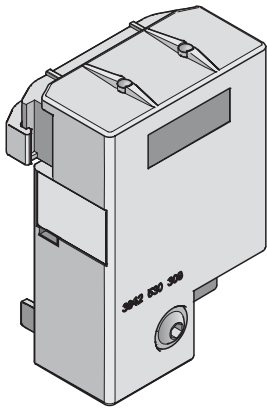
Model WI/M

The WI/M mini rocker stop provides an economical method of workpiece pallet detection. It can also be used (in conjunction with other components) to create an accumulation control kit.

When used for pallet detection, a 12mm threaded body proximity switch is required (ordered separately). The switch is activated when a workpiece pallet passes in front of the rocker. In this configuration, the WI/M has a monitoring area of 44mm.

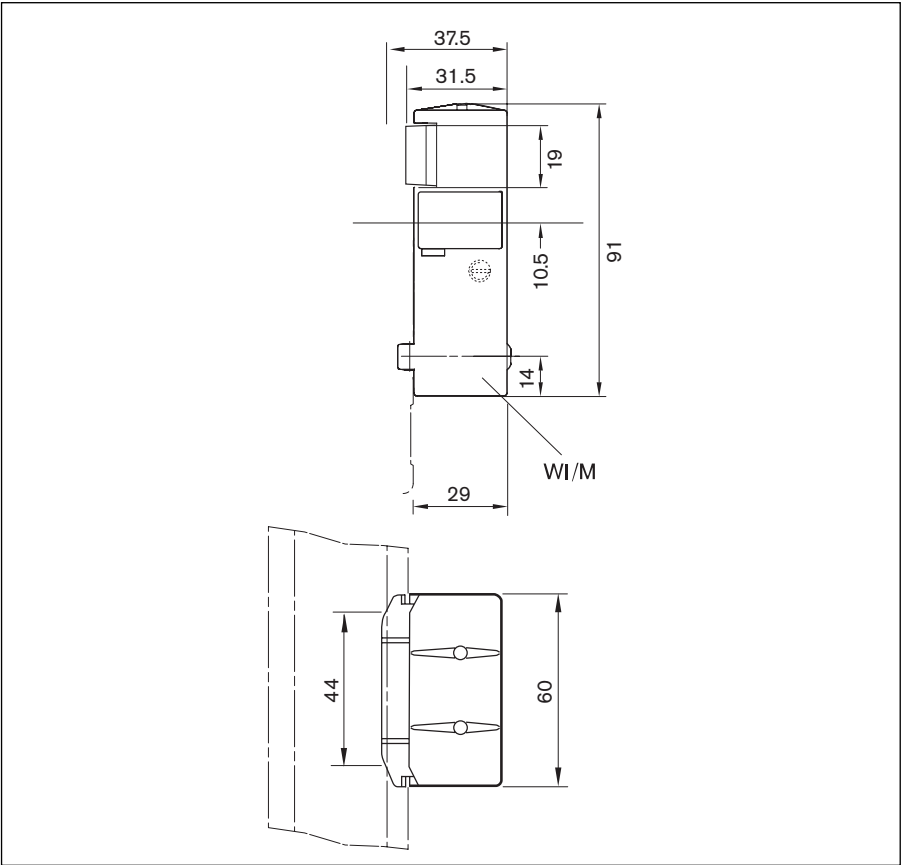
When used for accumulation control, the WI/M is combined with a pneumatic cylinder switch. In this configuration, the slide actuation is directly converted into a pneumatic signal. A pneumatic accumulation control kit can then be constructed with the use of a VE4 stop gate.

How an accumulation control kit works: when the rocker is in the rest position, air is directed to the stop gate and pallets freely pass through. When the rocker is actuated by a pallet, the air is disabled and the stop gate begins queuing pallets.



Pneumatic Cylinder Switch

Dimensional Data for WI/M



Ordering Information for Mini Rocker Stop, WI/M

Description	Part Number
WI/M Rocker Module (Fastening Hardware Included)	3842 530 797
Pneumatic Cylinder Switch	3842 532 151

Section 9–TS4plus Technical Data

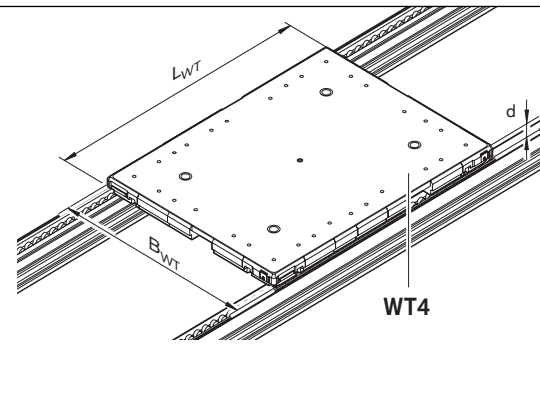
Conveyor width

Conveyor width is determined by the size of the workpiece pallet. Maximum payload depends on the length of the load-bearing edge (L_{wt} or B_{wt}) of the workpiece pallet. Since workpiece pallet orientation changes at junctions in a parallel or rectangular configuration, maximum permissible loading also changes, as shown at right.

Maximum permissible workpiece pallet payload (includes pallet, fixturing, and workpiece) depends on the supported length of the pallet. See the illustration at right.

Never exceed the maximum load per pallet or per drive unit. The load is maximum when pallets are in queue.

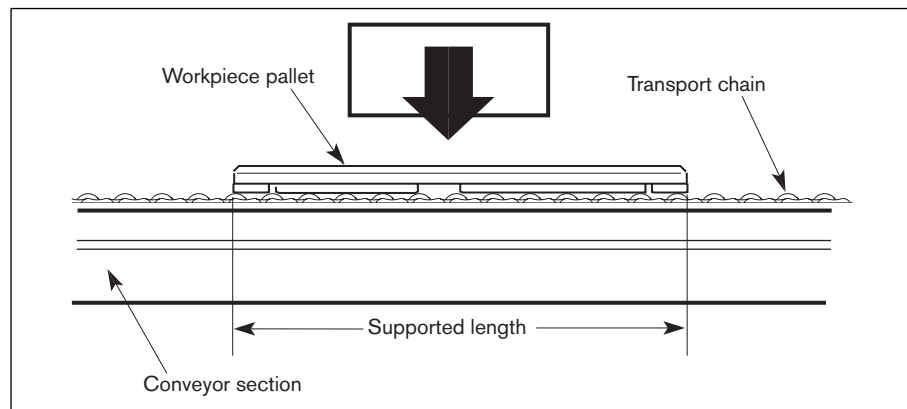
Workpiece Pallet load-bearing edge L_{wt} or B_{wt} in mm	Maximum Load in kg*
443	85
643	125
843	165
1043	210
1243	250



* Maximum load is the combined weight of all pallet components, fixture, and parts. Please refer to page 8-2 for application notes on pallet payloads as they relate to load application points.

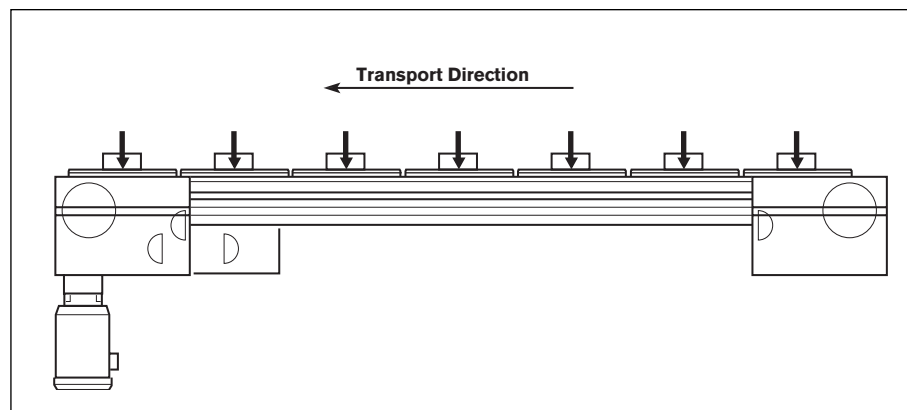
Transportation speed

Preferred speed is 12m/min on conveyor sections and transfers. Performance data for individual modules is based on these speeds, although different speeds can be selected. Transportation speed is selected based on the system cycle time, time required by the workpiece pallet to enter a workstation, total weight of the pallet, and the stability of the workpiece on the pallet.



Conveying direction

Workpiece pallets should be conveyed toward a drive unit. Reversible operation is possible only when explicitly stated.

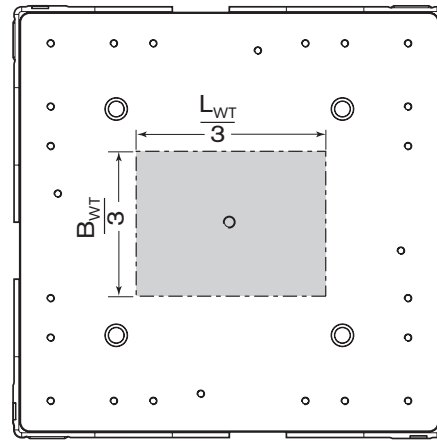


Technical Data

Pallet Plate Loading and Deflection

The maximum payload of certain size pallets is subject to reduction due to excessive deflection of the pallet plate. Deflection must be limited to 2mm maximum as measured at the center point of the pallet plate. This deflection value increases as the payload footprint decreases.

The following information is offered as a guideline for proper application of payload considerations. The calculated values shown below are based on a payload footprint equal to $B_{WT}/3 \times L_{WT}/3$ (see diagram at right).



Payload Footprint for Deflection Values

Application notes:

1. The footprint $B_{WT}/3 \times L_{WT}$ represents the smallest "normal" application, and is indicative of the outermost location of any piece-part tooling.
2. If you have a concentrated load on a small footprint as shown, the payload rating is reduced per the tables below.
3. Pallet sizes not shown in table are capable of carrying their rated maximum payloads with a footprint $\geq B_{WT}/3 \times L_{WT}/3$ (consult the Bosch applications department for payloads with a footprint smaller than $B_{WT}/3 \times L_{WT}/3$).
4. Deflection values are based on a MIC-6 Aluminum tooling plate with a raw material modulus of elasticity of 71000 Mpa minimum.
5. In addition to payload deflection considerations, pallets subject to external forces such as automated assembly operations (i.e. at lift position units) must be supported properly to maintain pallet integrity.
6. Plate and fixture geometry will affect deflection values. Please contact the Bosch applications department to review your particular requirements.

Payload with 1/3 weight distribution on 3/4" (19.1 mm) pallets				
Affected Pallet Sizes	Reduced Allowable Pallet Weight		Deflection (mm)	
			Bwt	Lwt
	kg	lbs.	Center	Center
443x1043	185	407.9	-0.052	-1.968
443x1243	105	231.5	-0.025	-1.933
643x1243	155	341.8	-0.126	-1.963
843x1243	205	452.0	-0.396	-1.979

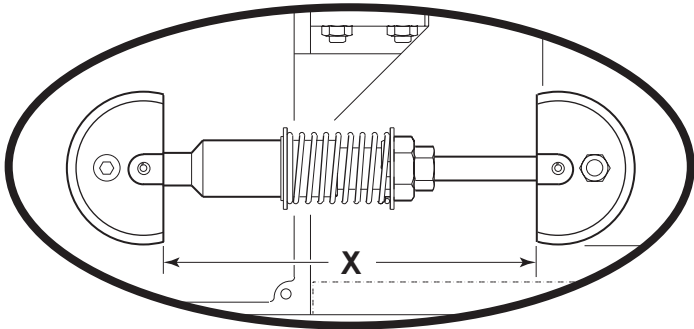
Payload with 1/3 weight distribution on 1/2" (12.7 mm) pallets				
Affected Pallet Sizes	Reduced Allowable Pallet Weight		Deflection (mm)	
			Bwt	Lwt
	kg	lbs.	Center	Center
443x84	105	231.5	-0.124	-1.925
443x1043	55	121.3	-0.053	-1.975
443x1243	(Excessive deflection @ any load)			
643x84	155	341.8	-0.626	-1.955
643x1043	80	176.4	-0.261	-1.976
643x1243	(Excessive deflection @ any load)			
843x1043	105	231.5	-0.815	-1.977
843x1243	60	132.3	-0.281	-1.955
1043x1043	130	286.7	-1.977	-1.977
1043x1243	75	165.4	-0.958	-1.974
1243x1243	90	198.5	-0.987	-1.987

Drive Unit Chain Tensioner Options

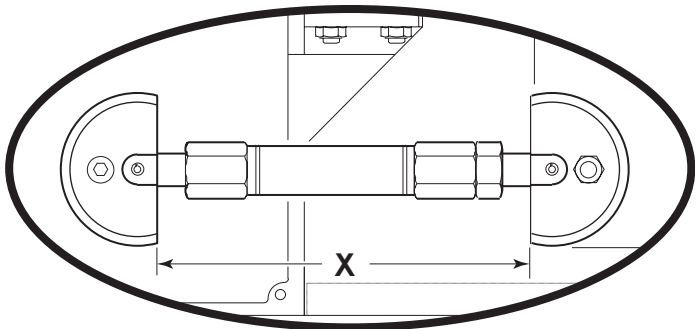
Two types of chain tensioners are available for both standard and heavy-duty drives.

The spring tensioner is recommended for most applications. When properly adjusted, the spring tensioner allows the chain tensioning shoe to float ± 21 mm from the nominal setting. This absorbs fluctuations in chain slack caused by varying loads, and helps protect the chain from damage caused by unusual stresses such as debris in the chain. The overall shoe distance "X" is set at assembly ($X = 178$ mm) and must be adjusted periodically to maintain proper tensioning. When the adjustment range of the tensioner is exhausted ($X = 228$ mm), the chain must be shortened or replaced. A proximity switch can be installed to detect this service condition.

The threaded tensioner does not provide the same degree of protection from chain tension fluctuations as the spring tensioner. However, it must be used in special applications, such as reversing systems or systems with a total length under 4000 mm. Set-up and maintenance are similar, but more frequent adjustment is necessary to avoid excessive slack in the chain. Again, when the adjustment range of the tensioner is exhausted, the chain must be shortened or replaced. A proximity switch can be installed to determine when shortening the chain is necessary.



SPRING TENSIONER OPTION



THREADED TENSIONER OPTION

Dimension "X"
Minimum = 178 (New chain)
Maximum = 228 (Chain to be shortened)

General System Information

CE Identification, responsibility

Components that fall under the EC machinery guideline are provided upon request with the corresponding manufacturer's declaration. Overall responsibility for system safety (declaration of conformity, CE identification) lies with the system builder. The references in the assembly instructions must be followed.

Ambient conditions

Environmental conditions - climatic

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

Operating temperature

+5 to +40°C

-5 to +60° with 20% less load

Storage temperature

-25°C to +70°C

Relative humidity

5 to 85%, non-condensing

Air pressure

> 84 kPa appropriate height

< 1400m above sea level

Load values are reduced by 15% when the system is set-up at a location that is over 1,400m 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 sandy or dusty sources. Do not set up in areas that are regularly jarred by high forces caused by equipment such as presses, heavy machinery etc.

Materials used

The materials used in the components are primarily:

- Non-rusting steel or steel protected against corrosion by a special surface
- Brass
- Cast or malleable aluminum alloy
- Polyurethane, polyamide, some with additives to improve electrical and mechanical characteristics and UHMW polyethylene
- NBR or VITON for elastic seals

Media resistance

Resistant to many common media used in production such as water, mineral oil, grease and detergents. Contact your Rexroth representative if you have any doubts about resistance to specific chemicals such as test oil, doped oils, aggressive detergents, solvents or brake fluids. Avoid long-term contact with acidic or basic reacting materials.

Contamination

Wear may increase dramatically if the system is contaminated due to environmental factors, particularly with abrasive media such as sand and silicates but also due to processes running on the transfer system (e.g. welding beads, pumice dust, glass shards, shavings or lost parts...). In such cases, maintenance intervals must be substantially shortened.

General System Information

Functional Safety

Resistance to media and contamination does not mean that functional safety is guaranteed in every case.

- Liquids that thicken on evaporation and are highly viscous or adhesive (sticky) could lead to a disruption in function.
- Media with lubricating properties may reduce the driving power that is caused by friction if they are transported on systems with belts or round belts.
- The chain lubricant used on conveyor chains can be washed away with solvents or detergents.

Such cases require special attention when planning the system and adjusting the maintenance intervals.

Environmental sustainability, recycling

The materials used are environmentally sustainable and may be recycled or reused (if components are converted or replaced). Recyclability is ensured by the selection of material and the possibility to take the components apart.

Pneumatic connection data

Oiled or non-oiled, filtered, dry compressed air

Operating pressure 4 to 8 bar

Performance data is for an operating pressure of 5 bar.

Maintenance

The TS components require very little maintenance. Maintenance instructions are included in the operating manual.

Wear

Wear is caused by the basic principle of this system and cannot be avoided. Constructive measures and selection of the proper materials will help functional safety last for the lifetime of the system. However, wear depends on the operating, maintenance and ambient conditions of the system and the location (resistance, contamination).

Measures to reduce wear

The following measures reduce wear and the friction caused by it:

- Switch off conveyor sections when the system is not running, e.g. during breaks, overnight, on the weekend.
- Only select speeds that correspond to the particular function.
- Minimize the weight of the workpiece pallet - do not overload with material during pickup.
- Avoid unnecessary accumulation section, e.g. by reducing the number of workpiece pallets.
- Switch off accumulation sections that can carry heavy workpiece pallets if transport is not necessary
- Especially important: Avoid contamination by abrasive media or reduce contamination with regular cleaning.

Load specifications

Permitted loads apply for conveyor sections only under the condition that workpiece pallets with the maximum permitted weight have accumulated. Higher loads are permitted if accumulation can be safely avoided. Accumulation operation is not permitted on lift-transverse units.

Technical Data

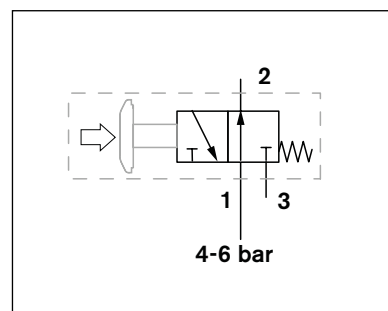
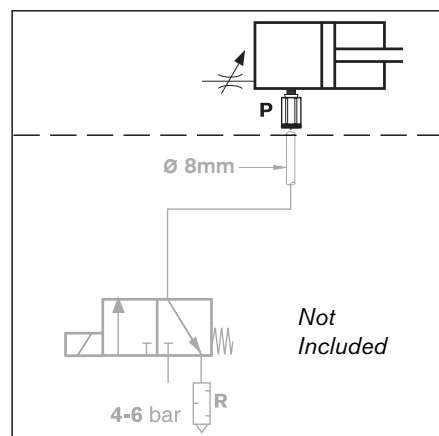
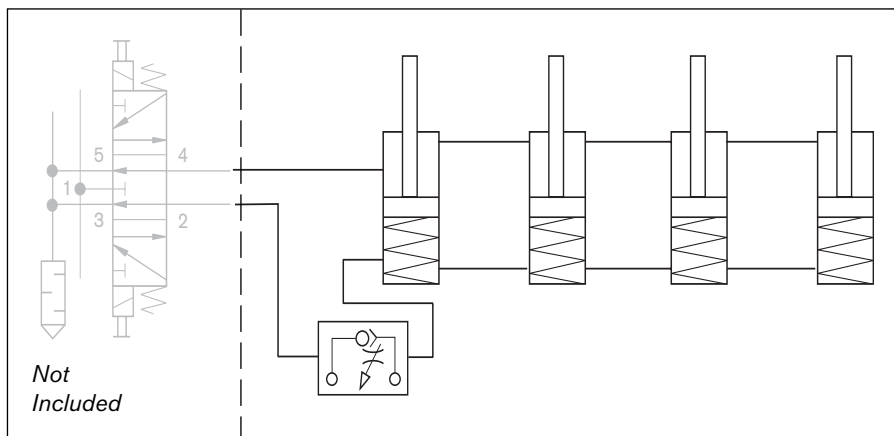
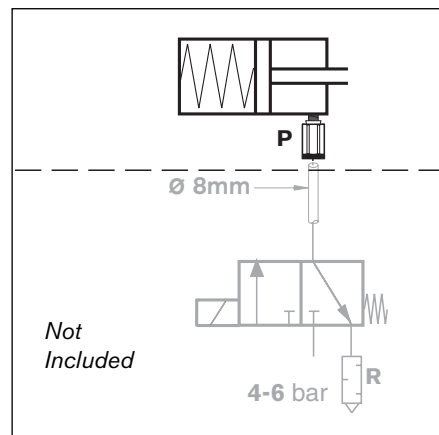
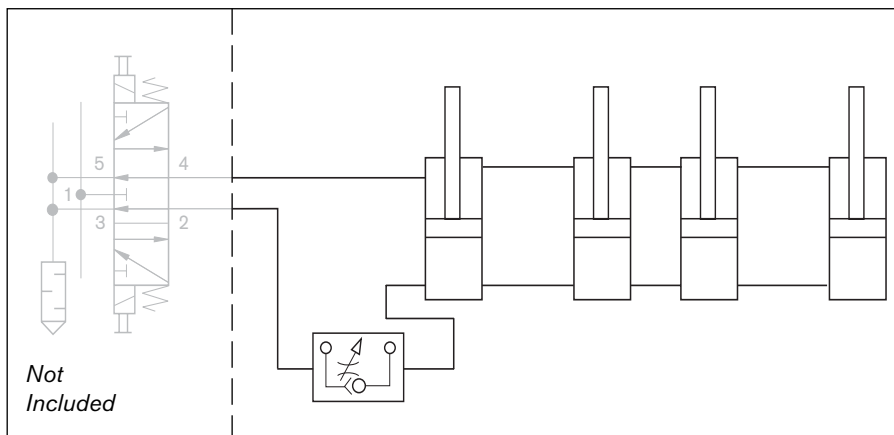
Pneumatic Information

Pneumatic Summary

Module	Bore	Stroke	Volume per Stroke (liters)	Tube Size (mm)	Port
VE4-S/D100	25	20	0.01	8	G ^{1/8}
VE4-S/D250	40	24	0.03	8	G ^{1/8}
WI4-S/D100	35	24	0.02	8	G ^{1/8}
WI4-S/D250	40	24	0.03	8	G ^{1/8}
HP4-S	63	33	0.41	8	G ^{1/8}
EQ4-S	63	33	0.41	8	G ^{1/8}

Module	Tube Size (mm)	Port	Flow Rate
Pneumatic Cylinder Switch	4	barbed hose connector	40l/min

WI/M Pneumatic Cylinder Switch

WI4-S/100, WI4-S/250
Cushioned Transfer StopsHQ4-S
Lift Transfer UnitVE4-S/D100, VE4-S/D250
Cushioned Stop GatesPE4-S
Lift Position Unit

Technical Data

Conversion Chart

Metric/English Conversion Chart

Measurement	Multiply	by	to get:
Linear	millimeters (mm) inches kilometers (km) miles	0.03937 25.4 0.6214 1.6093	inches millimeters (mm) miles kilometers (km)
Area	millimeters ² (mm ²) inches ²	0.00155 645.16	inches ² millimeters ² (mm ²)
Volume	centimeters ³ (cm ³) inches ³ 1 cm ³ = 1 milliliter (mL) , 1000 mL = 1 Liter	0.06102 16.387	inches ³ centimeters ³ (cm ³)
Acceleration	meter/second ² (m/s ²) inch/second ²	39.37 0.0254	inch/second ² meter/second ² (m/s ²)
Velocity	meter/second (m/s) feet/second	3.281 0.3048	feet/second meter/second (m/s)
Mass	kilogram (kg) pounds	2.2046 0.4536	pounds kilogram (kg)
Force	kilograms-f (kgf) Newtons (N) pounds-f	9.807 0.10194 4.448	Newtons (N) kilograms-f (kgf) Newtons (N)
Pressure	Newtons (N) bar PSI	0.2248 14.5 0.069	pounds-f PSI bar
Torque	Newton-Meters (Nm) pound-inches	8.851 0.11298	pound-inches Newton-Meters (Nm)
Moment of Inertia	centimeters ⁴ (cm ⁴) inches ⁴	0.02403 41.623	inches ⁴ centimeters ⁴ (cm ⁴)
Power	kilowatts (Kw) horsepower (HP)	1.34 0.746	horsepower (HP) kilowatts (Kw)
Energy	Joules (J) foot/pounds (ft/lbs)	0.7376 1.3558	foot/pounds (ft/lbs) Joules (J)

Metric Tap/Drill Specifications

Tap	Tap	Drill Size
M4	M4 x .7	3.3 mm
M5	M5 x .8	4.2 mm
M6	M6 x 1	5.0 mm
M8	M8 x 1.25	6.8 mm
M12	M12 x 1.75	10.2 mm
M16	M16 x 2	14.0 mm

Temperature

Degrees Celsius	$\frac{5 \times (\text{degrees F} - 32)}{9}$
Degrees Fahrenheit	$\frac{(9 \times \text{degrees C}) + 32}{5}$

Part Number Index

Part Number	Page	Part Number	Page	Part Number	Page
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Request for TS4*plus* Quote

Bosch Rexroth Corporation Request for TS4*plus* Quote

Contact Name: _____ RFQ Date: _____ Requested Completion: _____

Company Name: _____ Phone #: _____ (ext.) _____

Address: _____ Fax #: _____

Address: _____ E-mail: _____

Definite Project: Potential Project ☐ Budgetary Concept ☐

Product Type / Media: _____ Voltage / Freq. _____

Pallet Size / Type: _____ Line Speed / Cycle Time: _____

Part & Fixture Weight: _____ Number Of Pallets: _____

Line Height (working): _____ Line Height (return): _____

Project Name / Special Notes: _____

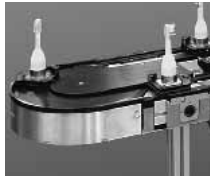
Layout Sketch (include dimensions)

Send or Fax to:

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Attention: Applications Engineering

Bosch Rexroth has a conveyor to fit any application

TS 1 is ideal for assembling or testing small products or subassemblies. This makes it a popular choice for electronic component and automotive parts assembly where plant floor space is a premium. Aluminum, steel and economical plastic pallets are available and all pallets have a vee notch for accurate positioning.



TSplus is used for all medium size products such as computers, automotive components and small appliances. It is the most flexible of all Rexroth conveyors with your choice of configuration, speed, 26 different pallet sizes and three available transport media. Repeatability is up to ± 0.05 mm.



VarioFlow™ is a single strand conveyor system designed for the specific needs of the packaging, material handling and assembly industries in two system widths, 65mm and 90mm. Extremely stable chain design allows VarioFlow to achieve chain tensile forces (pulling strength) of 1250 N in both widths. Transport speeds include nine fixed and two variable speed drives.



Workpiece Pallet Size Range:
80 x 80 mm to 160 x 160 mm

Workpiece Pallet Load Capacity:
Up to 3.0 kg (6.6 lbs)

Transport Media:
Double Belt

Transport Rate:
9, 12, 15 or 18 m/min

Workpiece Pallet Size Range:
160 x 160 mm to 1040 x 1040 mm

Workpiece Pallet Load Capacity:
Up to 70 kg (154 lbs)

Transport Media:
Double Belt, Flat-Top Chain or Roller Chain

Transport Rate:
9, 12, 15 or 18 m/min

VarioFlow™: Model VF65
Product Width: 15-175 mm
Maximum Product Weight: 10kg.

VarioFlow™: Model VF90
Product Width: 35-200 mm
Maximum Product Weight: 20kg.

Transport Rate:
Fixed or variable up to 60 m/min.

Bosch Rexroth integrators solve tough assembly problems



From lean manufacturing cells to fully automated systems, no one helps you get more out of your assembly operation than a Bosch Rexroth Integrator. Our integrators are experts at integrating modular conveyors from Bosch Rexroth into flexible, productive systems, tailored to your needs. Count on them for:

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