TSplus Flat-Top Chain Conveyor

Basic Equipment Manual
Installation and Maintenance
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Drive module, return module, leg sets, conveyor sections, cross links, connection links, foundation brackets, floor anchors, chain
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Introduction

Like all Bosch flexible assembly systems, TS plus is constructed solely from standardized modules that are precisely matched to each other. One important benefit of this modular design is that you can interlink manual and automatic work stations freely, making TS plus suitable for virtually any assembly task. Another is that you can easily expand a TS plus installation: Use TS plus alone as a closed system, or as a sub-installation in a higher-order materials-handling, manufacturing or assembly system.

About this manual

The manual is divided into the following sections to make it easier to use:

Application and Function
Gives general information about the TS plus conveyor.

Technical Data
Provides the most important technical specifications.

Design and Detailed Description
Supplies an overview of the modules that make up the basic TS plus conveyor. This section will familiarize you with the conveyor’s individual components.

Assembly
Lists step-by-step instructions for setting up the conveyor.

Initial Start-up
Describes the final procedures for getting the conveyor up and running.

Maintenance
Provides information on preventive maintenance.

Repair
Gives step-by-step procedures for replacing any parts subjected to wear.

This manual describes the basic equipment for a TS plus flat-top chain conveyor arranged in an in-line configuration:

- Drive
- Return
- Chain sections
- Leg sets
- Cross links
- Foundation brackets
- Chain

Modules for pallet control are also required and vary according to the configuration of the system. These modules are described in separate manuals and include the following:

- Cushioned and Standard Stop Gates, Rockers
- Proximity Switch Mounting Kits
- Accumulation Control Kits
- Code Programmers, Code Memory Blocks, Code Readers
- Transverse Conveyors
- Lift-Transverse Units
- Lift-Position Units
- Lift-Rotate Units
- Curve Modules

Contact Bosch for information on these and any other modules for flexible assembly.
**Application and Function**

The flat-top chain version of the Bosch TS plus conveyor uses dual strands of side-flexing flat-top chain as its transport medium. The low coefficient of friction with the workpiece pallets allows pallets to be stopped on the conveyor while the chain continues to move beneath them. It is thus possible to queue workpiece pallets as work processes are performed either manually or automatically.

The dual chain (open center) conveyor design provides access to the fixtured workpiece from all sides. The chains themselves are tracked along the chain-guide profiles and are driven at constant speed by means of drive sprockets.

The system is designed for a maximum supported load of 300 kg per standard drive, and 500 kg for heavy-duty drives.

**Technical Data**

Functional dimensions for the TS plus conveyor are shown in Fig. 1 below.

**Important information about curves**

One significant advantage of the side-flexing flat top chain is the ability to install curved sections in the conveyor line, creating carousel style or serpentine systems. However, the capacity of each drive is reduced when curved chain sections are used. As a result, additional drives and returns may be needed when building a system with curves.

To calculate the drive capacity lost when using curves, a reduction factor of 50% per 90° curve is used. For example, a heavy duty drive has a capacity of 500 kg on straight sections. The addition of one 90° curve reduces the drive capacity to 250 kg (500 x 0.5). A 180° curve or a second 90° curve reduces the drive capacity to 125 kg ([500 x 0.5] x 0.5).
Design and Detailed Description

Basic Equipment

The TS plus basic in-line configuration consists of the following modules (Fig. 2):

1. Drive module (AS2C)
2. Return module (UM2C)
3. conveyor chain sections, complete with inner and outer chain guide profiles, and internal return profile.
4. Leg set SZ2
5. Connection links
6. Cross links
7. Foundation brackets and floor anchors
8. Chain

NOTE: The customer assumes responsibility for the control equipment and must provide an EMERGENCY-OFF switch in the TS plus conveyor.
Drive Module AS2C

The TS plus Drive Module (Fig. 3) is delivered completely assembled and ready to be mounted to chain section profiles.

The powered drive module consists of the following main components:

1. Motor
2. Gearbox
3. Drive Sprocket
4. Drive Shaft
5. Guide Key
6. Guide Block
7. Chain Tensioner
8. Guide Profile
9. Parallel Key
10. Side Housing
11. Cover/Side Plate

In the TS plus drive module, the motor (1) and gearbox (2) turns the drive shaft (4), rotating the drive sprockets (3) on both sides of the drive module. The drive sprockets pull the chain the length of the conveyor and into the drive module, where it is routed via the guide key (5) and guide block (6) around a chain tensioning device (7) back up into the return profile on the inside of the chain section strut profile. The spring loaded chain tensioner maintains the proper chain tension. A proximity switch may be added to sense a “maximum chain stretch” condition, indicating it is time to physically remove links from the chain.

The drive module mounts to the chain section profile by means of a parallel key (9), which is bolted to the side housing (10). The cover and side plate (11) ensure safety during conveyor operation, and also protect against premature wear that may otherwise result from dirt and other contaminants.
Return Module UM2C

The TS plus return module (Fig. 4) is delivered ready to be mounted to the conveyor. It is constructed from the following components:

1. Guide block
2. Idler sprocket
3. Guide key
4. Guide profile
5. Return profile
6. Side housing
7. Parallel key
8. Cover

The TS plus return module conducts the chain arriving in the return profile back up to transport level. The guide block (1) ensures that the chain is transferred smoothly onto the idler sprocket (2), which tracks the chain onto the guide profile (4) via the guide key (3). The idler sprocket/bearing assembly is mounted directly to the return module casting and held in place by a snap ring in order to maintain proper chain alignment.

The return module mounts to the T-slot in the conveyor chain section by means of the parallel key (7) which is bolted to the side housing (6). The cover ensures safety during conveyor operation, and also protects against premature wear that may otherwise result from dirt and other contaminants.

⚠️ WARNING! DO NOT operate the conveyor with the guards or side covers removed! Serious injury may result if the conveyor is operated without guards!
The leg sets are the functional supports of the conveyor system. They ensure the correct line spacing, support the applied loads, and accommodate uneven floors through the use of leveling feet.

Leg sets are available in various configurations, four of which are shown in Fig. 5. Consult the TS plus catalog for available sizes and height ranges. The height specified for the leg set is from the floor to the top of the conveying media. The actual leg height (h_{sz}) will be 80 mm or 100 mm shorter, depending on the type of conveyor sections being used.

Leg sets are installed adjacent to drives and returns, and at intervals of no more than 2 meters along the length of the conveyor. For leg sets adjacent to the drive and return unit, the gussets should be removed from one side of the leg so that the vertical leg post can be installed immediately adjacent to the drive or return, as shown in Fig. 5.
Generally, the leg sets are delivered pre-assembled and ready for attachment to the conveyor section. If the conveyor support system is broken down into its component parts, however, it consists of (see Fig. 6):

1. Strut profiles (2)
2. Cross links (2)
3. Aluminum gussets
4. T-bolts and flange nuts
5. Cross connector kit (4)
6. Leveling feet (2)

Foundation brackets and foundation anchor kits are ordered separately as needed.

The anodized aluminum vertical posts (1 in Fig. 6) form the upright supports of the TS plus conveyor leg set and have 10 mm T-slots for T-bolts, T-nuts and other T-slot fasteners. The cross links (2) connect the leg set vertical posts to each other and are made of 45 x 60 strut profile. Each cross link has two milled slots for the cross connector kit (5). Leveling feet (6) screw into the vertical posts and permit continuously variable adjustment of the leg set height. Aluminum gussets (3) fasten the leg sets to the conveyor by means of T-bolts and flange nuts (4).

**NOTE:** Some leg sets will use gussets in place of cross connectors to attach the cross links. In this case, the cross links will not have milled slots, and the gussets attach to the vertical posts and cross links using T-bolts and flange nuts.
**TSplus Flat-Top Chain Conveyor Section**

The chain conveyor section acts as the bearing surface for the chain, as well as a guide for the workpiece pallets from station to station. Additionally, the chain section as a whole functions as a frame to which other modules and components are mounted, such as stop gates and proximity switches, as well as support and connection elements.

All TSplus chain sections consist essentially of four different components, with matched rails shipped together (Fig. 7):

1. Aluminum conveyor profile
2. Inner chain guide profile
3. Outer chain guide profile
4. Return profile (2x)

The TSplus aluminum conveyor profile is anodized and has 10 mm T-slots for inserting M8 T-bolts, T-nuts and other fasteners. Dimensions are shown in Fig. 9.

The inner and outer chain guide profiles, as well as the return profile, are pre-attached to the chain section profile. Note that the guide and return profiles are pinned in place at opposite ends of the strut profile. The double pins for the inner and outer chain guide profiles are located at the end of the conveyor profile farthest from the drive (Fig. 8). The guide profiles serve as wear strips and protect the TSplus flat-top chain. Each conveyor section also includes a label indicating pallet flow to insure correct installation.
Three basic types of TS plus conveyor sections are available (Fig. 10), depending on the configuration of your system:

- Straight sections
- 90° curve sections
- 180° curve sections

Straight sections can be ordered in lengths from 200 mm to 2500 mm. Curve sections come pre-assembled and their dimensions vary according to the dimensions of the workpiece pallet used in the system.
**Connection Links (Fig. 11)**

The conveyor section is extended with the help of connection links, with one per conveyor rail for each conveyor-section joint. The connection link consists of the following parts (Fig. 11):

1. Connecting link with four M8 threaded holes
2. M8 hex bolts with lockwashers and backing washers (Qty. 4)

**Cross Links (Fig. 12)**

The 45x60 strut profile cross links provide extra structural support and ensure that the TS plus conveyor section has a uniform guiding width. Cross links must be fastened to the conveyor section profiles at a maximum of 2-meter intervals along the conveyor. The length of the cross links is determined by the width of the workpiece pallet or line width.

**Foundation Bracket/Foundation Anchor Kit (Fig. 13)**

The leg sets are secured to the floor with the foundation bracket kit (1 and 2) and the anchor bolt (3). The foundation bracket (1) is fastened to the leg set with two T-bolt mounting kits. The foundation bracket itself is fastened to the floor with the foundation anchor (3), which is suitable for stone and concrete floors.

**NOTE:** Fit foundation brackets to the equipment only after the conveyor equipment has been completely leveled and aligned.
Chain

The flat-top chain conveys the workpiece pallet from station to station.

The TS plus flat-top chain (Fig. 14) is a wear-resistant, side-flexing #40 chain which has a low-friction, plastic-capped conveying surface. The lack of significant friction allows pallets to be stopped anywhere along the conveyor for processing or assembling operations while the conveyor chain continues to move.

NOTE: To cut down on the time required for master link installation, the chain is delivered in 12-meter rolls, with any amount 6 meters or less delivered as a 6-meter roll. If, for example, your system requires 39 meters of chain, you will receive three 12-meter rolls of chain and one 6-meter roll. Each package also includes one (1) carbon steel master link and one (1) white wear-resistant cap to be used as a master link marker.
Assembly

**NOTE:** The assembly instructions that follow describe the installation of a basic, single-level TS plus transport system. The assembly of other configurations is similar.

### Recommended Tools

The following tools are recommended for assembling the basic system:

- 1 metric hex wrench set (preferably torque wrenches)
- 1 metric Allen wrench set
- 1 pair spring-washer pliers A2
- 1 caliper gauge
- 1 90° square
- 1 soft-faced hammer
- 1 spirit level (2 - 3 ft.)
- 1 alignment cord
- 1 chainbreaker
- 1 chain assembly tool (supplied with your kit)
- Fishtape or other thin plastic-coated wire for feeding the chain.
Leg Set Assembly

Leg sets are shipped pre-assembled from the factory. Assembly instructions are included for adjustment and reference purposes.

**NOTE:** Careful pre-assembly of the leg set will save time during leveling and alignment. It is particularly important to make sure that the leveling feet are all screwed in to the same depth.

Pre-assemble the vertical posts

1. Set the M16 (A/F 24) hex nut on the leveling foot to 45 mm (Fig. 15).

2. Grease the first 50 mm of the threaded shaft so that screw-in and subsequent adjustment are easier.

3. Screw the leveling foot in by hand until the hex nut touches the end of the strut profile.

**NOTE:** Do not tighten the hex nut completely until the entire conveyor has been set up and aligned.
Assemble the leg sets (Fig. 16)

**NOTE:** Some leg sets will use gussets in place of cross connectors to attach the cross links. In this case, the cross links will not have milled slots, and the gussets attach to the vertical posts and cross links using T-bolts and flange nuts.

1. Use cross links (2) to join the pre-assembled vertical posts (1). Position the cross links so that the milled slots are on the underside of the cross links, as shown.

2. Align the cross link T-slots with the T-slots on the vertical posts and fasten the cross links to the vertical posts using the cross connector kits (3). The upper cross link must be flush with the top ends of the strut profiles; the lower cross link must be mounted at a specific distance (S in Fig. 16) from the lower ends (See Fig. 5 on page 8).

**CAUTION:** Overtightening the screws may cause damage to the aluminum profiles. To avoid damage, tighten all threaded fasteners to 18 lb-ft. (25 Nm) using a torque wrench.

3. Check for corner squareness with a 90° square and then firmly tighten all screws and bolts.
Attach the gussets (Fig. 17)

Mount the gussets so that they are flush with the top end face of the leg sets, using a 13 mm hex wrench.

- Use 4 gussets for each intermediate leg set (A).

- Use 2 gussets (on one side only) for leg sets to be used at the drive or return end of the conveyor (B).
Start assembly from the return end of the conveyor (Fig. 18)

**NOTE:** The leveling feet can be screwed in 30 mm, or out 60 mm. Therefore, it is imperative to identify the high point in the floor and make sure you will have enough adjustment remaining to level the conveyor. A transit is recommended to establish a conveyor height and make the process easier.

1. Set the return unit on the floor with the parallel keys pointing straight up. Loosen the four bolts holding the parallel key on the return.

**NOTE:** Make sure that the double pinned end of the transport level guide profile is located at the end closest to the return (see detail above). Correct orientation of the chain profiles is imperative!

2. Carefully slide the first conveyor rail onto the parallel key until it rests squarely against the return’s side housing. Verify that the guide profile lines up correctly with the guides on the return unit.

   Tighten the bolts on the parallel key to 18 lb-ft. (25 Nm). Repeat for the second conveyor rail. Make sure both rails are tight and square against the return’s side housings.

3. Remove the gussets from one side of the leg set and place the vertical posts directly adjacent to the return’s side housings. Fasten the gussets to the conveyor section with T-bolts, tightening the flange nuts to 18 lb-ft. (25 Nm).

4. Position the conveyor assembly in the upright position. Be sure to support the free end with a suitable support or a leg set.
Extend the conveyor (Fig. 19)

1 Pre-install the mounting hardware into the 4-hole connection links. Slide the connection links into the T-slots of each conveyor section, spanning the joint evenly.

2 Slide the next conveyor section onto the leg set and connection links and support the other end with an additional leg set.

3 Use the transit to raise the new section to the proper height and verify that the line is level end-to-end and side-to-side.

4 Tighten the flange nuts on the gussets and the bolts on the connection links to 18 lb-ft. (25 Nm).

5 Repeat this process for each conveyor section.

6 The last leg set will be flush with the end of the conveyor section, with no gussets on the outer side, a mirror image of the leg set at the return unit end.
**Curved chain sections (Fig. 20)**

If curved chain sections are required in your layout, attach them using the same procedure as that used for straight chain sections. Remember that the drive module must be attached at the end of the conveyor’s longest continuous straight section.

**IMPORTANT:** Curved chain sections are delivered pre-assembled, complete with cross links for proper spacing, as well as guide blocks and guide rails for smooth pallet transfer around curves. The cross links on the pre-assembled curved chain sections should not be removed or loosened. The specific application will determine whether 90° or 180° curved chain sections are required.
Attach the drive module leg set (Fig. 21)

1 Prepare a drive leg set by removing the gussets from one side of the leg set.

2 Lay the last pair of conveyor section profiles onto the drive leg set and make sure that the end face of the conveyor section profile is exactly even with the back of the leg set, as shown.

3 Tighten the gusset fasteners on both sides of the conveyor to 18 lb.ft. (25 Nm).

**CAUTION:** Overtightening the bolts may cause damage to the aluminum profiles. To avoid damage, tighten all threaded fasteners in the TSplus conveyor frame to 18 lb.ft. (25 Nm).
Attach the drive module (Fig. 22)

1. Loosen the four bolts (1) holding the parallel key on the drive unit. Carefully slide the drive unit into the ends of the conveyor section until the rails rest squarely against the side housings of the drive unit. Tighten the four parallel key bolts to 18 lb-ft (25 Nm).

2. Remove the drive cover and insert T-bolts with flange nuts (2) into the T-slots on the leg set profiles. Tighten the flange nuts to 18 lb-ft (25 Nm).
Fit the cross links (Fig. 23)

To ensure proper spacing where there are no leg sets, fit cross links at 2 meter intervals along the conveyor section. Do not fit cross links where leg sets are already present.
NOTE: Always re-check the crosswise alignment after making adjustments to the leveling feet for lengthwise alignment, and vice versa.

Align the conveyor (Fig. 24)

Check to see whether the leg sets supporting the straight sections of the conveyor are exactly in line.

1. First check visually for straightness; then attach a T-bolt to the leg sets at each end of the conveyor's straight sections and run an alignment cord from end to end, as shown in Figs. 24 and 24A.

2. Make sure that the cord is taut and that the space between the cord and each leg set is identical. If the leg sets are not exactly in line, push them into place. Repeat the procedure for all of the conveyor's contiguous straight sections.

IMPORTANT! Failure to ensure straightness will result in premature wear and flat-top chain failure.

Level the conveyor

The conveyor should be checked from side to side and end to end to make sure that it is level along its entire length. Adjust the leveling feet as needed to make sure it is level.

NOTE: Large conveyor systems and conveyors with curved sections can be leveled more easily with a transit.
Fasten the conveyor to the floor (Fig. 25)

This should be done only after the conveyor has been leveled and aligned.

1 Attach the foundation brackets to the leg sets according to the pattern shown in Fig. 25: On both sides of each drive and return leg set; then on alternate sides at each leg set along the length of the conveyor.

2 Mount the foundation brackets (1) to the leg sets with T-bolts (2). Bore a 5/16” dia. hole for each bracket into the floor. Finally, insert and tighten the floor anchors (3).
Initial Start-up

Before starting up the conveyor for the first time, re-check all mounting hardware for tightness.

**NOTE:** The customer assumes responsibility for the control system, and must provide an **EMERGENCY-OFF SWITCH** in the TS plus conveyor.

Connect the motor wiring (Figs. 26 and 26A)

The motor and gearbox are delivered already mounted in the conveyor drive module. Replacement procedures for both the motor and gearbox are shown in the “Repair” section of the manual.

Make the motor electrical connections according to the connection schematic shown in Fig. 26 or 26A. An additional copy is attached to the motor nameplate.

**NOTE:** All electrical wiring must be connected by a qualified electrician.

**IMPORTANT!** Verify correct motor rotation before installing the chain. Reverse operation will cause severe damage to the conveyor!
**Special installation notes for curves**

When installing curved sections in an in-line conveyor, the procedures are generally the same as those used for straight section. However, the following key points should be noted:

- The length of chain needed for curved sections will be somewhat higher than the length needed for a straight section.
- The effort required to pull the chain through the curve will be greater than for straight sections due to increased resistance. Keep this in mind when installing and replacing chain.
- The cross link spacing for curves is preset at the factory to maintain proper pallet movement and alignment. DO NOT change the cross link positioning or spacing.
Fit the chain (Figs. 27-29)

Fit the chain only after leveling the conveyor and securing it to the floor with the foundation brackets and foundation kits.

**IMPORTANT!** Support the roll of chain on a rod or pole suspended between two sawhorses or mounted to an adjacent conveyor section (Fig. 27). Avoid contact with the floor which will contaminate the chain with dirt and cause premature pallet frame wear.

**NOTE:** The chain is delivered in 12-meter rolls, with any amount 6 meters or less delivered as a 6-meter roll. If, for example, your system requires 39 meters of chain, you will receive three 12-meter rolls of chain and one 6-meter roll. Each package also includes one (1) carbon steel master link and a white marker cap.
1-3 Remove the drive module guards. First remove the lower guard cover (1 in Fig. 27) and the lower guard (2), as shown. Note that the lower guard is not only screwed to the bottom of the drive module casting but also bolted to the drive module leg set with T-bolts and hex nuts. Then remove the drive module cover (3).

4 Check the motor rotation.

Supply power to the motor to make sure that the chain will be pulled in the proper direction after it has been fitted. The drive sprocket (4) must rotate in the direction indicated so that the transport chain travels toward the drive module. **When you have confirmed proper motor rotation, immediately lock out power before proceeding!**

5 Remove the snap ring (5) from the drive shaft and push the drive shaft far enough through so that the drive sprocket turns freely.

**TIP:** The chamfering on the very end of the hex shaft makes it a little difficult to orient the shaft upon re-insertion. For easier locating, mark the position of one hex shaft corner on one shaft end face (Fig. 28).

6 Remove the return module cover (6).

7-8 Using an electrician’s snake, feed the fishtape (7) or other wire through the return channel of the chain section profile, feeding the tape from the return module end all the way to the drive module. Once the wire (8) emerges at the drive module end of the conveyor, attach it to the free end of the chain, making sure that the chain is oriented properly (see Fig. 29).

**IMPORTANT!** Carefully support the chain roll to avoid contact with the floor and to prevent kinking the chain.

**IMPORTANT!** Make sure that you feed the chain in the proper direction! At transport level, this means that the rear lip on each plastic chain cap must overlap the cap following it as the chain travels toward the drive module. The directional arrow stamped on the side of each chain cap will help you feed the chain correctly. Fig. 29 shows the proper transport level orientation.
Begin feeding the chain (Fig. 30)

1 Feed the chain upside down onto the internal return profile (1) as shown. Have one person feed the chain while another pulls it through with the fishtape from the return end. Join additional segments of chain as necessary, using the provided master links and press-fit tool (Fig. 34 on page 32). Make sure that the tab on each master link faces down, as shown (Figs. 33 and 34).

2 Pull the chain along the conveyor. Bring the chain up around the return module sprocket (2) and onto the transport level guide profile, then use a screwdriver to pull the chain the length of the conveyor, all the way back to the drive module.

3 Feed the chain onto the drive sprocket (3) and down into the drive, removing slack as you go.

**NOTE:** Before joining the chain, push up on the bottom of the chain tensioner guide block and insert the pin (4) to hold the tensioner in the compressed position.

4 Determine the break point in the chain (see “Tensioning the chain (initial)”). Then use a chainbreaker (Fig. 32) to break the chain. The chain should be just long enough to join the two ends of the chain with a press-fit master link below the chain tensioner (4), as shown in Fig. 30.
Tensioning the chain (initial) (Fig. 31)

1. Place a flat washer (6) on each end of the tensioning spring (7) and position them on the adjustment nut as shown on the Inset.

2. Slide the tensioner subassembly with the spring and washers up into the collar (4) and compress the spring as shown in inset B.

3. While holding the tensioner subassembly in position, insert the pin (1) through the back side of the cover and into the groove at the top of the adjustment nut (Fig. 31).

4. Set the initial tensioner adjustment to 28 mm from the bottom of the lower flat washer to the chain guide cutout of the tensioner guide (5) as shown in the Inset. To adjust, loosen the locking nut (3) and turn the adjustment nut (2) to achieve the required spacing, then tighten the locking nut.

5. Now wrap the free ends of the chain around the tensioner guide, allowing room for the tensioner to extend slightly, and determine where to break the chain.
To break the chain (Fig. 34):

1 Snap off several plastic chain caps to provide room for the tool.

2 Place the chain you wish to break in the chainbreaker (Fig. 32).

3 Press out both pins (1) on the link by cranking the chainbreaker handle. Remove both outer plates and pins. You will replace these with the master link.

To join the master link (Fig. 34):

Use the chain assembly tool to join the chain with the master link as shown in Fig. 34, making sure that the tab on the master link is on the chain's non-transport side, as shown in Fig. 33.

**IMPORTANT!** Each master link must be installed so that its tab is on the chain's non-transport side. If installed otherwise, the plastic cap and/or master link may fall off during operation and cause damage to the equipment. See Fig. 33 for proper master link orientation.

Replace the plastic caps, using a white cap over the master link.

Repeat for the conveyor's other side.

Repeat the entire procedure for the second chain, then reinstall the hexagonal drive shaft into the housing and secure it with the snap ring.

**NOTE:** Remember to replace the drive shaft cover tubes!
Tensioning the chain (final) (Fig. 35)

1. Remove the pin (1) in the chain tensioner collar (4). Check the length of the spring; it should have an operating length of 30 to 50 mm. If it is greater than 50 mm, loosen the locking nut (3) and turn the adjustment nut to compress the spring to approximately 30 mm. Tighten the locking nut.

NOTE: The chain will stretch slowly with use, and should be readjusted each time the length of the tensioning spring exceeds 50 mm. As the chain tensioner is readjusted, the extended part of the threaded rod of the chain guide will increase. The maximum thread extension is 80 mm, measured the notch in the chain tensioner guide to the flat washer (Inset, Fig. 35). The maximum operating length of the chain tensioner and guide is 178 mm, which is reached when the thread is extended 80 mm and the spring length is 50 mm. When the tensioner reaches the maximum operating length, you will have to remove approximately 5 links from the chain and rejoin it, with the tensioner at its initial setting as described on page 31.

Proximity sensor for sensing tensioner travel

1. An 8 mm proximity sensor can be used to sense when the tensioner subassembly has traveled 20 mm (the spring is at its maximum length).

2. A proximity switch exciter (8) is clamped between the adjustment nut (2) and the lock nut (3).

3. An 8 mm barrel type proximity switch is mounted through the back of drive tensioner cover using two jam nuts.
Maintenance

⚠️ **CAUTION:** LOCK OUT all power supplies before beginning maintenance work of any type.

The gearbox and motor used in the TS plus conveyor are maintenance-free. The following cleaning and adjustment procedures, however, will help keep your conveyor in almost new condition if performed on a regular basis.

1 **Remove all dirt & grease**
   Wipe the conveyor clean of any excess grease, dirt or any foreign substances every month, and at the same time check the conveyor unit for wear. Replace any parts showing signs of excess wear (see section titled “Repair.”)

2 **Re-tighten all fasteners**
   Check all fastening elements for tightness, and re-tighten to 25 Nm (18 lb.ft.), if necessary.

3 **Check the chain tensioner**
   If you have installed a proximity sensor in the drive housing to monitor the tensioner position, there is no need to check chain stretch frequently. Do check it periodically, however, to make sure that everything is functioning properly.

   If you have **NOT** installed a sensor, check the chain frequently, especially upon initial start-up of the line. If the chain has stretched more than 20 mm (approx. 3/4”), adjust the chain tension. The procedure is described on page 33.

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**NOTE:** To re-tension the chain, turn the brass adjustment nut counterclockwise until it just touches the collar on the tensioning device (Fig. 35). When the adjustment nut is in the proper position lock it in place by tightening the lock nut up against the adjustment nut.

After approximately 3 adjustments (when the threaded shaft is extended approximately 55 mm from its position for a new chain; see Fig. 35), you will need to remove 5 links of chain and re-adjust the tension as if you were joining the chain for the first time. See page 32 for instructions on breaking and re-joining the chain.

4 **Inspect all sprockets for wear**
   Inspect the sprockets on both the drive and return modules for wear regularly and replace as necessary. The severity of the operating conditions will vary from application to application, making regular inspection of the sprockets imperative. Careful monitoring of conveyor operation will help you determine when sprockets need replacing.
Repair

⚠️ CAUTION: LOCK OUT all power supplies before beginning maintenance work of any type.

Replacing the guide profile (Fig. 36)

All guide profiles should be checked for wear regularly and replaced, if needed, including the internal return profile.

NOTE: Before replacing the guide profiles you must first disconnect the transport chain in the drive module. Refer to page 36 steps 1-2 for the correct procedure.

1. Remove the disconnected transport chain to just beyond the section you are replacing.

2. Then, remove the guide profile retention pins and snap off the old guide profiles by hand.

3. Finally, replace and re-pin the guide profiles.

Cut chain guide profiles slightly shorter than the aluminum conveyor chain sections to allow for thermal expansion (see dimensions in Fig. 36).

Snap the new guide profiles into place, locating them flush with the aluminum chain section on the ends that are pinned.

Find the existing holes in the chain section strut profile and drill holes for the pins in the new guide profiles with a 1.95 mm (5/64") drill bit.

Insert the new pins and replace the conveyor's transport chain.

Guide profile length = L−2 mm for 0-1000 mm sections
Guide profile length = L−3 mm for 1001-2000 mm sections
Guide profile length = L−4 mm for 2001-and longer sections

Fig. 36
Replacing the drive module sprockets
(Fig. 37)

**NOTE:** Before replacing the drive module sprockets, you must first disconnect the transport chain.

1. Remove covers (1) and (2) on both sides of the drive. Push up on the bottom of the chain tensioner guide block and insert the pin to hold the tensioner in the compressed position.

2. Disconnect the transport chain at the master link nearest the drive module and pull the chain back out of the way.

3. Using snap ring pliers, remove the snap ring (3), and use a gear puller to remove the worn sprocket and bearing assembly.

4. Press the new bearing into the new sprocket. Press the new sprocket assembly (4) onto the stub shaft (5) on the drive unit housing.

5. Re-attach the snap ring, reconnect the chain and remove the pin from the chain tensioner. Make sure that the master link is installed with the tab facing down (see Fig. 33).

6. Finally, replace the covers.
Area of detail

Fig. 37
Replacing the return module sprockets
(Fig. 38)

NOTE: Before replacing the return module sprockets, you must first disconnect the transport chain in the drive module. Refer to page 38 steps 1-2 for the correct procedure.

1 Remove the return module cover (1) and pull the disconnected transport chain through the upper guide profile, away from the return module sprockets.

2-3 Remove the snap ring (2) using snap ring pliers, and use a gear puller to remove the worn sprocket and bearing assembly (3).

4 Press the new bearing into the new sprocket. Press the new sprocket assembly onto the stub shaft (4) on the return module casting.

5 Re-attach the snap ring, re-connect the chain, and replace the return module cover.

The procedure is the same for both sprockets in the return.
Standard Duty Drives

Replacing the motor (Fig. 39)

**CAUTION: LOCK OUT** all power supplies before beginning maintenance work of any type.

1. **LOCK OUT POWER SUPPLY** and disconnect electrical wiring to the motor.

2. Loosen the four hex screws connecting the motor to the gearbox. Lower the motor from the gearbox.

3. Lift the new motor into the gearbox mounting flange, carefully aligning the motor shaft with the gearbox input.

4. Rotate the motor to obtain the proper junction box orientation and secure it to the mounting flange with four hex bolts. For Nema motors, use 3/8-16x1” bolts; for IEC motors use M6x25 DIN933 bolts.

5. Reconnect the electrical wiring.

6. Apply power and carefully check for proper motor rotation.
Replacing the side-mounted gearbox:
standard-duty drives (Fig. 40)

1. Remove the four screws from the gearbox mounting flange on the side of the drive unit.

2. Remove the two screws attaching the gearbox to the mounting flange. Access to the screws is on the inside of the flange.

3. Replace the gearbox by reversing steps 1 and 2.

If you wish to replace just the gearbox, it can now be unscrewed easily from the motor. Remember to apply anti-seize lubricant to the motor shaft before attaching the new gearbox.
Replacing the center-mounted gearbox: standard duty drives (Fig. 41)

⚠️ CAUTION: LOCK OUT all power supplies before beginning maintenance work of any type.

1. Remove the motor as described on page 39.
2. Remove the side covers (1) and the guide blocks (2) from both sides of the drive.
3. On the side opposite the gearbox, remove the cap screw holding the hexagon spacer (3) between the two side housings. Slide the spacer (3) out of the way and unscrew the hexagon spacer shaft (3) from the side of the gearbox.
4. On the side with the gearbox, remove the snap ring (4) from the hexagon drive shaft. Slide the shaft (5) through the sprocket and gearbox until the first cover tube section can be removed.
5. Support the gearbox while removing the three hex bolts (6) that secure the gearbox to the mounting flange.
6. Install the new gearbox by reversing the disassembly procedure described above.

**NOTE:** The motor/gearbox can be rotated into the positions shown above (0°, 90°, 180°, or 270°) prior to reassembly. Verify that the motor will not interfere with pallet movement before changing the motor/gearbox position!
**Heavy-Duty Drives**  
**Replacing the motor (Fig. 42)**

⚠️ **CAUTION: LOCK OUT** all power supplies before beginning maintenance work of any type.

1. **LOCK OUT POWER SUPPLY** and disconnect electrical wiring to the motor.

2. Loosen the four hex screws connecting the motor to the gearbox. Lower the motor from the gearbox.

3. Transfer the coupling to the new motor by loosening the set screw and sliding the coupling off the motor shaft. Install on the new motor shaft according to the dimensions in the inset below.

4. Apply a liberal amount of coupling grease to the coupling and gearbox input shaft. Use only Klüber Microlube 261.

5. Lift the motor into the gearbox mounting flange, carefully aligning the coupling and the gearbox input shaft.

6. Rotate the motor to obtain the proper junction box orientation and secure it to the mounting flange with four hex bolts. For Nema motors, use 3/8-16 x 1” bolts; for IEC motors use M6x25 DIN933 bolts.

7. Reconnect the electrical wiring.

8. Apply power and carefully check for proper motor rotation.

⚠️ **CAUTION!** Reverse operation of the conveyor will cause severe damage!
Heavy-Duty Drives
Replacing the side-mounted gearbox (Fig. 43)

**CAUTION:** **LOCK OUT** all power supplies before beginning maintenance work of any type.

1. Remove the motor as described on page 42.
2. Support the gearbox while removing the three hex bolts (1) that secure the gearbox to the mounting flange.
3. To remove the motor mounting flange, remove the four cap screws (2) that secure it to the gearbox.
4. Install the new gearbox by reversing the disassembly procedure described above. The motor mounting angle can also be changed to the positions shown below. Simply rotate the motor/gearbox assembly to the desired angle.

**NOTE:** Bosch gearboxes are factory filled with a specific volume and type of lubricant. Do not drain, fill, or “top-off” the lubricant. Incorrect fluid level and type will cause leakage and gearbox damage.
Heavy-Duty Drives
Replacing the center-mounted gearbox
(Fig. 44)

⚠️ CAUTION: LOCK OUT all power supplies before beginning maintenance work of any type.

1. Remove the motor as described on page 42.
2. Remove the side covers (1) and the guide blocks (2) from both sides of the drive.
3. On the side opposite the gearbox, remove the cap screw holding the hexagon spacer (3) between the two side housings. Slide the spacer (3) out of the way and unscrew the hexagon spacer shaft (3) from the side of the gearbox.
4. On the side with the gearbox, remove the snap ring (4) from the hexagon drive shaft. Slide the shaft (5) through the sprocket (6) and gearbox until the first cover tube section can be removed.
5. Support the gearbox while removing the three hex bolts (7) that secure the gearbox to the mounting flange.
6. To remove the motor mounting flange, remove the four cap screws (8) that secure it to the gearbox.
7. Install the new gearbox (9) by reversing the disassembly procedure described above.

NOTE: Bosch gearboxes are factory filled with a specific volume and type of lubricant. Do not drain, fill, or “top-off” the lubricant. Incorrect fluid level and type will cause leakage and gearbox damage.
Application Notes:
Application Notes: