

AP
TR
MP
MS3
MM3
ML2
MX2
MT2
MR2
MF2
MPP
MM3P
ML2P
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MA
DS3
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DL2
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DA
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IM
MM

MAINTENANCE MANUAL (MM)



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General

This maintenance manual allows the users to maintain the conveyor in a proper manner which will ensure the safe maintenance, smooth operation and maximum life span of the system.

It is important to understand the operation manual before operating and performing maintenance on the system.

This documentation is not to be reproduced without written permission from the manufacturer.

Safety Precautions



DO NOT ATTEMPT MAINTENANCE ON ANY CONVEYOR WHILE IT IS IN OPERATION.

Before Maintenance

- Maintenance works should only be performed after all electricity supply is switched off. All motor switches must be switched off and locked in the off position.
- Pneumatic air must be disconnected and any pressure accumulation must be released.
- Never perform maintenance tasks on a conveyor while it is in operation, unless required. If that is so, allow only trained maintenance personnel to work on the conveyor.
- Remove all products from the conveyor system.

During Maintenance

- Do not wear loose clothing while performing maintenance on operating equipment.
- Be aware of hazardous conditions, such as sharp edges and protruding parts.
- When using hoists, cables or other mechanical equipment to perform maintenance. Use the equipment with care in order not to damage the conveyor components.
- Keep area clean. Clean up lubricants and other materials before starting conveyor.
- Personnel must be equipped with Personal Protective Equipment (PPE) such as safety glass, safety shoe, safety helmet and etc when performing maintenance task.

After Maintenance

- Before starting any conveyor ensure that maintenance equipment and foreign objects are cleared.
- Notify all personnel before starting up the conveyor.
- Only authorized personnel should be permitted to start any conveyor following maintenance or emergency shut-off.

System Maintenance

Introduction

This manual is designed to provide assistance for planned maintenance schedule.

Maintenance of the MODU's conveyor systems shall only be done by trained personnel who are familiar with MODU System products. If in doubt, please consult MODU System's representative.

Non MODU System Product

Products that are not manufactured by MODU System, its maintenance shall be carried out accordance with their respective manufacturer's instructions.

Warning

Do not climb onto any MODU's conveyor systems.

Maintenance Instructions

Introduction

This maintenance manual contains maintenance guide for MODU System standard component as listed in MODU System Product Catalogue. For non MODU System components such as motors, sensors, pneumatic components, control systems etc., the manufacturer maintenance instructions apply. This manual does not include maintenance instruction for equipments which customer has chosen and specified for fitting to the installation.

Recommended Spare Parts List

Recommended spare parts list is shown in Appendix A. User of MODU's conveyor system shall keep at least a complete set of recommended spare parts.

If there is a demand for spare parts, please contact MODU System's representative.

Maintenance Schedule and Inspection Guidelines

A suggested maintenance schedule and inspection guidelines are shown in the next page.

Warranty Claim

MODU System conveyors are covered by warranty as agreed within the trading term and/or Order Acknowledgement.

Maintenance Guides

Maintenance Schedule

MODU System conveyors are designed to run 24 hours a day, 7 days a week, with minimal maintenance. For non MODU System components such as geared motors, sensors, pneumatic components, control systems etc., the manufacturer maintenance instructions apply.

AP

TR

MP

MS3

MM3

ML2

MX2

MT2

MR2

MF2

MPP

MM3P

ML2P

MDP

MG

MB

MA

DS3

DM3

DL2

DX2

DT2

DR2

DF2

DG

DB

DA

SD

SE

TL

IM

Table below shows MODU System conveyor maintenance schedule.

No	Section	General checks	No of operating hours / time interval
1	Drive Unit	Check sprocket, chain return guide, chain guards and lubrication.	First 50, 250 and 500 hours. Then every 500 hours.
2	Idler End	Check chain guides and chain guards.	Every 1000 hours.
3	Chain	Clean.	Every day.
		Check wear or crack.	Every 2000 hours.
		Check tension.	First 40 and 200 hours. Then every 1600 hours.
4	Slide Rails	Check slide rails at horizontal and vertical bends.	Every 200 hours.
		Check and clean slide rails of the conveyor system.	Every 1500 hours.
6	Safety Features	Check for function as required.	At least once a year.

Troubleshooting Guidelines

During conveyor operation, periodic inspection of the conveyor system is required to prevent of any breakdowns and failures. MODU System conveyors should be inspected while the system is running as well as when it is shut down.

Table below shows troubleshooting guidelines.

Symptom	Cause	Solution
Jerky running	Damaged or badly fitted slide rail.	Inspect and replace as necessary.
	Conveyor chain is too tight/loose.	Tension conveyor chain correctly.
	Dirty conveyor.	Clean conveyor chain and slide rail. Lubricate with silicone based lubricant.
Noise	Worn or damaged bearings in drive unit.	Check/replace drive unit.
	Damaged/badly fitted slide rail.	Check the free running of the chain, especially in slide rail joints.
	Excessive conveyor speed.	Lower speed. Check actual load against recommended loading.
	Incorrect conveyor chain tension.	Tension conveyor chain correctly.
Motor overheating on drive unit	Overloaded conveyor.	Remove products from conveyor and test run. Check actual conveyor load against recommended loading.
	Gearbox leaking oil.	Check output shaft seal and area around motor/gearbox interface.
	Dirty conveyor.	Clean the chain and slide rail.

Abnormal wear on plastic parts	Overloaded conveyor.	Remove products from conveyor and test run. Check the free running of the conveyor chain. Check actual conveyor load against recommended loading.
	Ambient temperature too high.	Check against recommended temperature for conveyor.
	Chemicals in the environment are affecting plastic parts.	Check in MODU System catalogue (section TR) for listing of incompatible chemicals.
	Damage due to ingress of contaminant	Clean the system.
	Particles, swarf etc.	Remove source of contamination.
Drive unit is running, conveyor chain is not	Friction disc in slip clutch are worn or contaminated.	Check and replace if necessary.
	Transmission products are not fitted.	Check and fit.

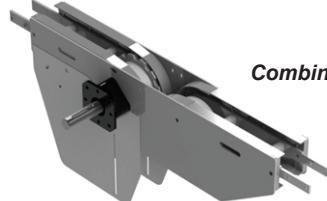
Introduction to Drive Units

There are five different types of drive unit, namely Front Drive Unit, Combined Drive Unit, Suspended Drive Unit, Catenary Drive Unit and Intermediate Drive Unit.



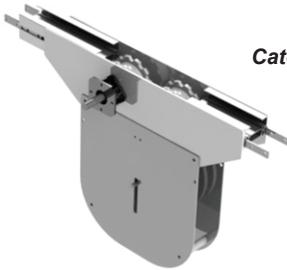
Front Drive Unit

Front Drive Unit with return chain, located at the “pulling” end of the conveyor. This drive unit is applicable for all conveyor series.



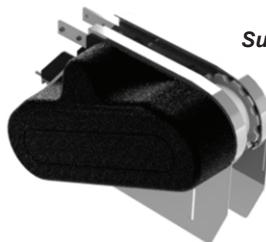
Combined Drive Unit

Combined Drive Unit with return chain, located at an intermediate position along the conveyor. This drive unit is applicable for all conveyor series.



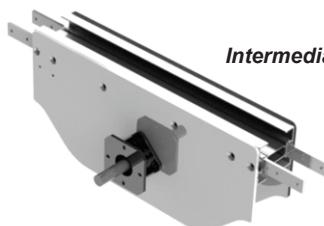
Catenary Drive Unit

Catenary Drive Unit without return chain, located at an intermediate position along the conveyor. This drive unit is applicable for MM3 only.



Suspended Drive Unit

Suspended Drive Unit with return chain, located at the “pulling” end of the conveyor. This drive unit is applicable for MS3, MM3 and ML2 only.



Intermediate Drive Unit

Intermediate Drive Unit with return chain, located at an intermediate position along the conveyor. This drive unit is applicable for MS3, MM3 and ML2 only.

Inspection of Drive Units

Roller Chain or Timing Belt Transmission

The roller chain or timing belt transmission should be checked and lubricated after 50, 250 and 500 hours of operation, and then every 500 hours.

If the roller chain or timing belt transmissions are not fitted with a tensioner it should be checked. The roller chain should be lubricated.

If the transmissions are fitted with a chain tensioner, lubrication of roller chain should only be carried out at the stated interval. The condition of the chains must be checked at the same time.

(Note: The discs in the slip clutch must be kept free from oil and grease.)

Geared Motor

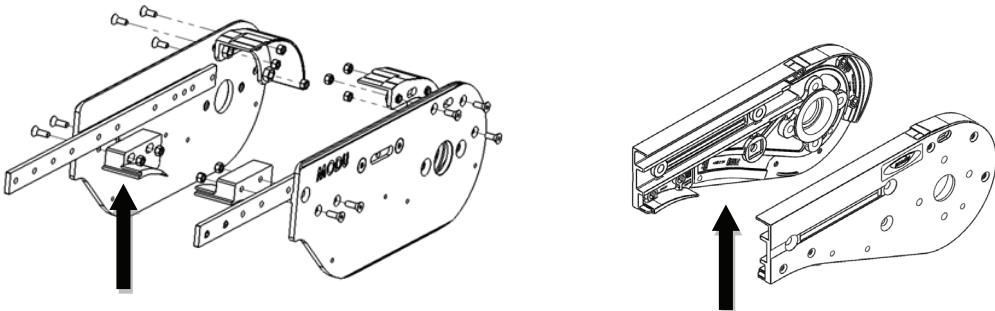
The geared motor should be checked in accordance with the instructions from the relevant supplier. Guides for the Conveyor Chain. The purpose of the guide for the conveyor chain is to guide the return chain correctly into the drive unit.

Fully guided drive unit do not have guides. Hence, no slack is allowed at the drive unit since the conveyor chain is being controlled all the time. Special attention must be given to chain elongation in conveyor of this configuration.

Example : Gripper Conveyor.

The pictures below shows two (2) type of chain guides.

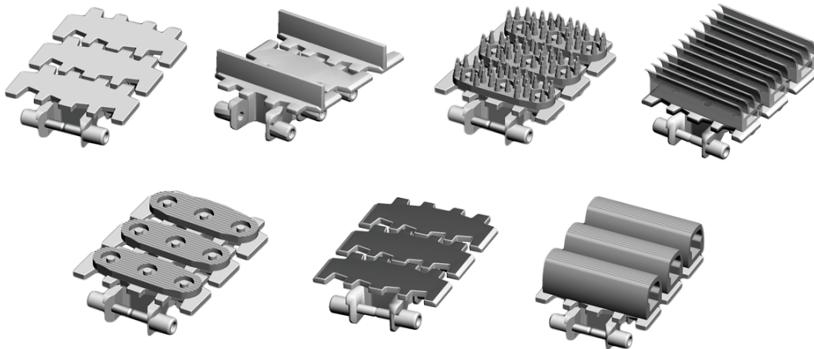
General Check on Drive Unit



Carry out a general inspection of the drive unit:

Inspection of Conveyor Chains

The most common types of conveyor chains are shown below:



Caution!

Only warm water (50°C), with soap if necessary, may be used for cleaning conveyor chain.

Checking the Tension of Conveyor Chain

The chain is made of elastic material. The chain eventually stretches as the material creeps. The extent of the stretch depends on the traction force in the chain. The stretch shows itself as slack on the return side of drive unit.

The tension of the chain should be checked after 40 and 200 hours of operation and every 1600 hours thereafter.

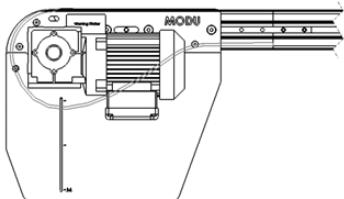
During operation, there will be some slack in the conveyor chain. The amount of slack acceptable depends on the length of the conveyor chain. The slack in chain can be checked at the drive unit.

Important!

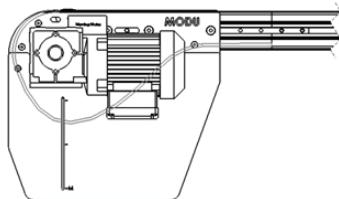
The chain should be pre-tensioned while the conveyor is stationary. However, the chain should not be too tight. There should be a considerable slack on the chain when the conveyor is stationary. This can, however, vary depending on the total length of the chain. If there is too much slack, there will be excessive wear on the chain guides and the chain.

If the slack on the conveyor chain is high, it must be shortened by removing the necessary number of chain links.

If the conveyor is a fully guided drive unit, the elongation of the chain has to be monitored even more carefully, to ensure a trouble free operation.



The conveyor chain does not need to show any slack when the conveyor chain is stationary



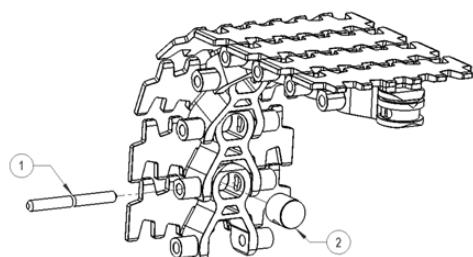
The conveyor chain must show some slack during operation

Shortening Conveyor Chain

The most suitable place to shorten the chain is at the drive unit.

Instructions

- Make the conveyor chain accessible at certain overhead locations.
- Remove the steel pin (1) from the pivot (2). Use the pin insertion tool.
- Remove the necessary number of links.
(Note: With cleated or friction chains, pay attention to the divisions between links.)
- Join the chain together with a new pivot.
(Note: the old pivot should not be re-used. When the chain is divided, a new pivot must always be fitted.)
- Insert the steel pin using the pin insertion tool.
- After inserting the steel pin, check that it is centered and that the chain easily bends in the fitted link.



Chain Joint Components

Inspection of Slide Rails

Checking Slide Rail

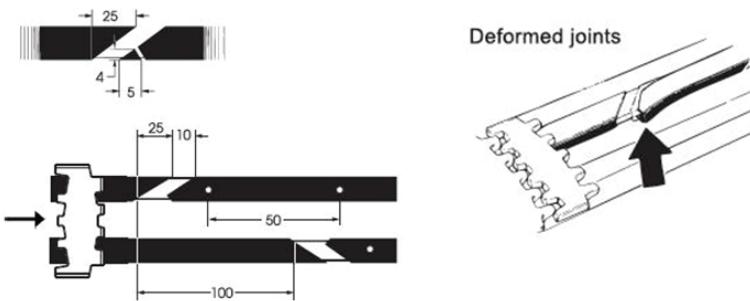
The condition of the slide rails is fundamental to the functioning of the installation. It is therefore essential that these are in good condition.

Checking the Slide Rail with the Conveyor Chain in Place

The slide rail must be checked every 200 hours. Check on the stationary conveyor with the chain in place.

- Check the fastening points on the slide rail.
- Check the joints on the slide rail. Below shows correct configuration of joints.
- Check that there is a gap between the slide rails and that the joints are correctly fitted.
- Check that the joints are not deformed.
- Check that the slide rail has not been broken off.

Replace the slide rail if necessary.



Checking the Slide Rail with the Conveyor Chain Removed

At least once a year or every 2000 hours. The chain should be removed from the beam and the slide rail. Check for wear and fastening.

Plain bend should be checked every 500 hours as they are subjected to higher loads.

- Carry out the same checks as mentioned above.
- Check the slide rail for wear and tear.
- Check in the inner slide rail of the plain bends.
- Check the slide rails for scratches and notches.
- Replace the slide rail and fasteners if necessary.
- Wash the conveyor chain.

Conveyor Beams, Idler Ends and Bends

The conveyor beams themselves does not require regular inspections. Be observant for damage arising from external factors, warping or deformation. Deformation can cause the conveyor chain to jam, resulting in uneven running.

Idler ends and wheel bends does not normally require special inspections, but they should be checked when the slide rails are inspected.

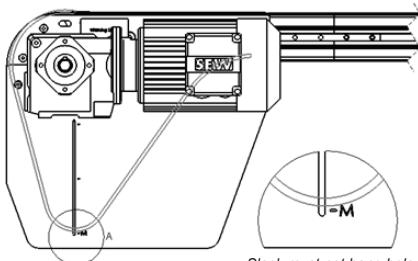
Large radius plain bends may have inner support rails fitted to the beam. Ensure that these rails (if fitted) are not worn, paying attention to the "lead-in" area.

Inspection of Safety Features

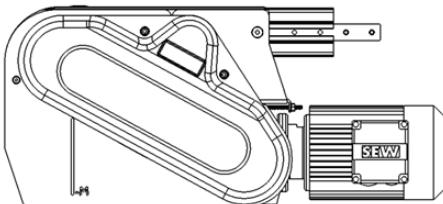
Protective and Safety Features

Safety features should be checked at regular intervals.

- Check the chain guard for roller chain or timing belt transmission. The guard must always be in place when the conveyor is running.
- Check the protective cover on the cleated chain conveyor return chain.
- Drive units have a slack indicator. Check that the chain slack and ensure that it does not hang below the "M" mark on drive safety cover.
- There may be other types of guards which are specific to your installation and these must also be inspected.



Slack must not hang below "M" mark



Chain guard for roller chain or timing belt

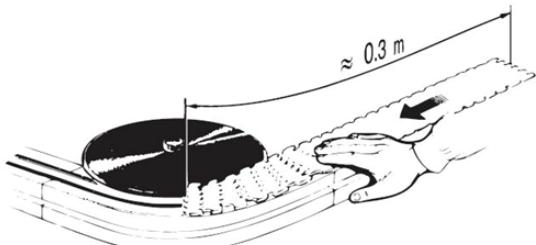
Replacement of Worn Conveyor Chain

Removal of Conveyor Chain

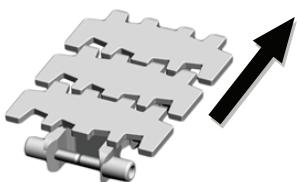
- Ensure that the power to the drive motor is disconnected.
- Disengage the motor; there are various methods depending on the type of drive unit.
- Split the chain by removing the steel pin from the pivot. Use the special tool for insertion or removal (see Shortening Conveyor Chain section).
- Pull out the chain.

Fitting the Conveyor Chain

- Run a sample, approximately 0.3m of conveyor chain through the installation in the direction of the conveyor. Check that the chain moves easily and correctly through the bends and idler ends.
- Put the new conveyor chain in place. Check that the chain direction corresponds to the conveyor direction.



Checking of Conveyor Chain Space



Conveyor Chain Direction

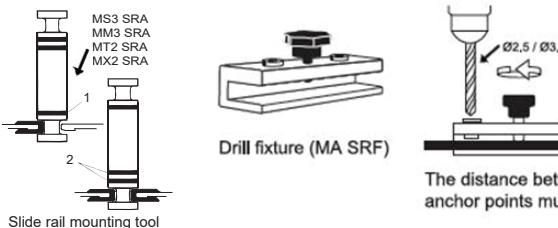
Replacement of Worn Slide Rails

Replacing Slide Rails

It is very important the assemble slide rail correctly to ensure smooth system operation.

Follow the illustrated instruction on the following pages carefully. Observe the following points:

- Slide rail cutter – single cut pliers are suitable tools for cutting the slide rails.
- Use slide rail mounting tools.
- Use drill fixture.
- Use a high quality drill bit to avoid forming a shoulder, preferably one which is intended for drilling aluminium.



When fitting the slide rails with rivets, refer below:

- The joints on the slide rails must have a distance of 100mm between them. The joints should be laid out as in the picture with gap of approximately 10mm between the rails.
- Joints may not be positioned in bends, or in the transition between two sections of beams.
- The slide rails should normally be approximately 5m long on a straight conveyor beam. In a bend, the maximum length of slide rail should be 3m.
- The joints should be positioned a minimum of 500mm before an idler end unit, drive unit or vertical bend. The slide rail must overlap the recess in the idler end and drive unit.

- The inner slide rail after a wheel bend must be cut at a 45° angle.

Note:

Check final slide rails visually, as well as running a section of conveyor chain through the installation.

Another method of installing slide rail is using screw, applicable for ML2 and MX2 series. Please see following pages for fitting instructions.

Slide Rail Fixing Instructions

Fixing Slide Rail to the Conveyor Beam

The beginning of each slide rail section must be fixed to the beam, since the chain will cause the slide rail to be pushed forward. Slide rail which moves into a wheel bend or a drive unit can block the chain completely.

There are two different methods for fixing slide rail to the conveyor beam:

- Using rivets (MA RR 3), this is applicable for MP, MS3 and MM3 series only.
- Using screws (MA RS 6.5), this is applicable for ML2 and MX2 series only.

Method 1 – Using Rivets, Applicable for MP, MS3 & MM3 Series Only



Step 1

Drill through holes on the slide rail.



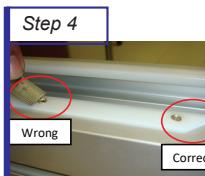
Step 2

Countersunk on slide rail.



Step 3

Insert rivets into the holes, using rivet crimping tool (MA RC)



Step 4

Check that the rivets do not protrude over the surface of slide rail. Check both top and bottom surface of slide rail for protruding metal.

Wrong

Correct



Step 5

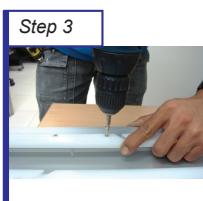
Complete slide rail fitting.

Method 2 – Using Screws, Applicable for ML2 and MX2 Series Only

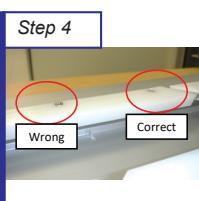
Drill through holes on slide rail.



Countersunk on slide rail.



Apply screws into the holes.



Check the for protruding screws over the surface of slide rail.
Check both top and bottom surface of slide rail for protruding metal.



Complete slide rail fitting.