Installation and Maintenance Manual

Model: RLVDCG

Effective August 2021

Rev.B

Bastian SOLUTIONS

a TOYOTA ADVANCED LOGISTICS company

Contributions

ROLE	NAME	TITLE
Author	Sam Osterhout	Design Team Lead
Checker	Brad Paris	Senior Design Engineer
Approver	Chris Perry	Engineering Manager

Revisions

DATE	REVISION	DESCRIPTION	AUTHOR
10/21/2019	A1	Initial Document Creation	Josh Foiles
08/30/2021	B	Remove “ZiPline” from manual, and correct manual lifting specifications. Updated Figures 10 and 11 to show hardware and install dimensions in greater detail.	Sam Osterhout

Term and Acronym Definitions

TERM/ACRONYM	DEFINITION
2 Groove	Roller format which uses O-Rings to transfer rotational motion from one roller to another in DC conveyor.
Accumulation	The collection or staging of multiple cartons, cases, or totes of product on conveyor.
BF	Between frame; this refers to the distance between conveyor bed side frames.
Carton or Case	Term for conveyable items generally contained in cardboard boxes.
DC	Direct current
DC Card	A control card used to power and control the logic used when operating a MDR in DC conveyor applications.
Live	A zone of conveyor runs "live" when it runs whenever energized. It is for this reason that live zones of conveyor do not have or need any photoeyes or reflectors.
MDR	Motorized drive roller; DC powered conveyor roller with an internally mounted motor which may be controlled via internal or external commutation.
OAW	Overall width of any given conveyor bed.
OD	Outer diameter of a circular, cylindrical, or arced body.
OSHA	Occupational Safety and Health Administration
Poly-V	A band or roller hub format with longitudinal ribs used for power transmission in DC conveyor applications.
PPE	Personal protective equipment
Reflector	A reflective component needed for retroreflective photoeyes to receive transmitted light or radiation when no object is in front of the photoeye.
Retroreflective	Of or relating to a surface or device that reflects light or other radiation back to its source.
Roller	Powered or unpowered cylindrically-shaped material handling component used for mechanical power transmission, a conveying surface, and/or support for a belted conveying surface.
RLVDCG	RLVDC conveyor configured as a gate for personnel to travel through lanes of conveyor without climbing under or over the conveyor.
Side Cover	A PVC cover used to conceal and protect electrical components and wiring from foreign debris and moving obstacles.
Side Frame	Structural member used to support rotating components needed for conveyor beds.
Wiz Nut	A serrated flange nut used to cut into the surface of the component it is tightened against.
Zone	Any section of DC conveyor driven by a single MDR.

Table of Contents

List of Figures

List of Tables

Reference Documents

Manufacturer	Manual
Interroll	9006 Hybrid Control for RollerDrive Manual
Interroll	ZoneControl User Manual
Interroll	DriveControl User Manual
Interroll	EC100/110 User Manual
Interroll	EC310 User Manual
Itoh Denki	HBM604 User Manual
Itoh Denki	IBE User Manual
Itoh Denki	HB510 User Manual
Itoh Denki	CBM105 User Manual
Itoh Denki	Product Catalog
Bastian Conveyor	Side Cover and Guiderail Installation Manual
Bastian Conveyor	Support Installation Manual

1 Introduction

Thank you for choosing Bastian Solutions' Conveyor. The following manual serves as a guide for installation, part replacement, and general maintenance for your material handling equipment. It is important to read the manual and follow any instructions as it provides important safety information for personnel and will maximize the longevity of the conveyor.

The information contained in this manual applies only to the products described. Uses, activities, or processes related to installing or maintaining the equipment that are not explicitly described in this manual are considered out of scope. Please contact Bastian Solutions' Conveyor for any questions or support that is not clearly addressed in this document. Bastian Solutions is not responsible for misuse of the equipment described in this manual or misuse of information in this manual. If you have any questions, contact Bastian Solutions' Conveyor Customer Service or Support at ConveyorSupport@BastianSolutions.com.

2 OSHA and Safety

Bastian Solutions' Conveyor is not responsible for ensuring that conveyors used in a system abide by OSHA standards. Safety is of primary importance to our company, but as a product distributor we ask that system integrators and end users conform with all applicable OSHA standards. We encourage that all warnings in this manual are followed to avoid unnecessary risk.

3 Model: RLVDCG

The Roller Live DC Gate (RLVDCG) is a conveyor section configured as a gate to allow personnel to travel through lanes of conveyor without having to go over or under the conveyor line. The RLVDCG utilize brushless 24V DC motor roller. These rollers are referred to as motor driven rollers (MDRs). RLVDCG is mainly used in general transport applications. The rollers are “live” meaning they run continuously. RLVDCG is optimal for light to medium product and works great with a variety of product sizes.

The model shown in Figure 1 serves as a reference to become familiar with the components and terminology used in this manual. These terms will be used throughout the manual and are common among many of the other Bastian Solutions’ Conveyor product lines.

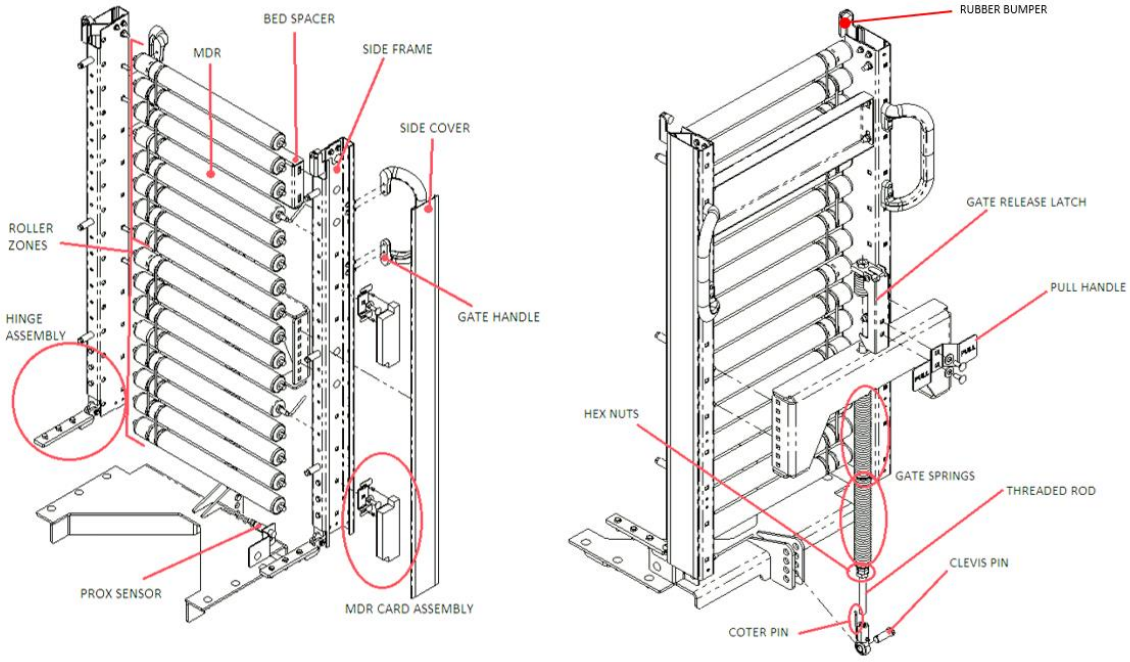

Figure 1: RLVDCG General Arrangement

The model in Figure 1 shows a 4’ RLVDCG. The RLVDCG has 3” roller centers and has (2) 24” zones. Each zone is made up of (7) rollers and (1) MDR. The rollers and MDRs each have two grooves that allow them to be banded together with O-rings. Each gate utilizes springs to make opening and closing the gate lightweight and easy to use.

4 Receiving

Upon delivery of any Bastian Solutions' Conveyor, please review and check the following:

- The quantity of items received against the Bill of Lading.
- Complete a visual inspection of equipment to determine any damage that may have occurred during shipping. If damage is present, document with pictures.
- Review Mark Number information and layout locations. More information can be found in subsection 4.1.

If there are any missing or damaged components contact your Bastian Solutions' Conveyor representative with as much detail as possible. If you are unsure of your Bastian Solutions' Conveyor representative, please contact Customer Service at ConveyorSupport@BastianSolutions.com.

4.1 Mark Numbers

A mark number is a specific number given to a piece of equipment. A mark number is usually made up of a single product line (RZPDC, RLVDC, BZPDC, etc.) but can contain many bed section lengths. They can range from two inches to hundreds of feet. The mark number is used to help identify where the piece of equipment will go within the system layout.

Every bed section of conveyor will have (2) stickers. One sticker on the infeed end of the bed, and one sticker on the discharge end of the bed. Each sticker will contain the following information:

- Bastian Project Number and Name
- Model Type
- Mark Number
- Match
- Piece
- Flow

Figure 2 shows stickers that would appear on an RZPDC that has two bed sections. The Match field on

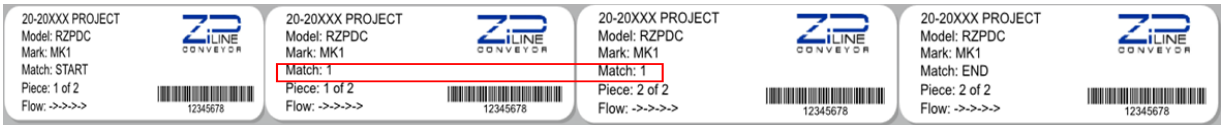

Figure 2: Mark Number Stickers

the stickers is used to indicate if two bed sections are to be spliced to one another. As shown in Figure 2, the stickers where the two beds splice together both contain "Match: 1". The piece field defines the bed section number within the mark. The flow refers to the direction of product flow along the conveyor system.

4.2 Skid Contents

Skids will contain varying combinations of conveyor sections, support structures, accessories, and pertinent hardware. For protection of product integrity during shipping, accessories and supports may be delivered on separate but labeled skids. The RLVDCG will come as two parts. One being the frame/spring assembly, and the other being the ship loose parts as shown in Figure 3. Refer to appendix 9.1 for the list of items within the ship loose kit.

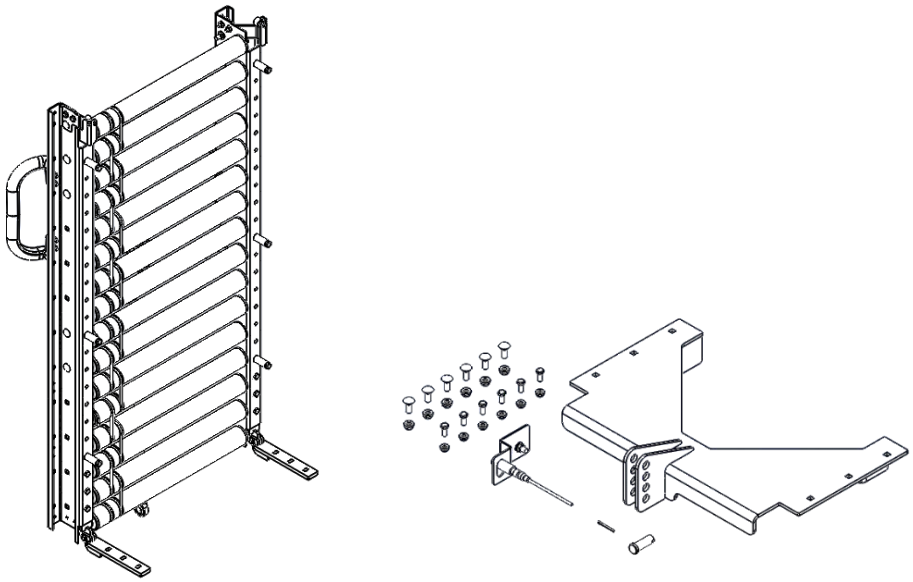

Figure 3: RLVDCG Skid Contents

4.3 Skid Documentation

All shipments will contain a Bill of Lading for the delivery company, a skid label, and a skid manifest. Skid labels have the contents of each shipped item located on the skid. Figure 4 shows a sample of a skid label. These stickers are placed on the surface of each skid.

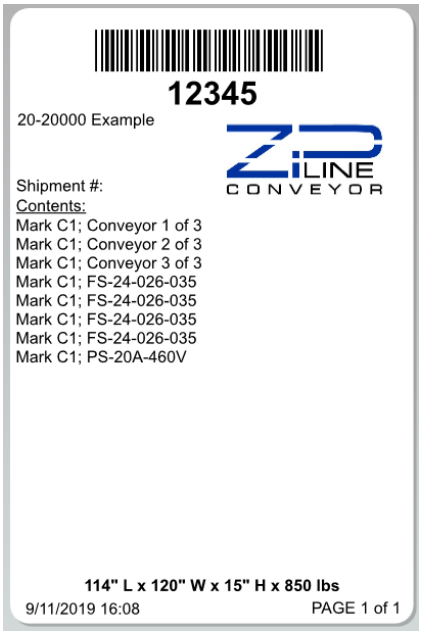

Figure 4: Skid Sticker

5 Installation

The installation supervisor should have elevation and layout prints with detailed information regarding the placement of conveyor sections and support structures. This information is not the responsibility of Bastian Solutions' Conveyor to provide unless otherwise specified. The installation instructions provided in this section are written with the assumption that the conveyor the RLVDCG mounts on has already been installed. It is critical that the floor supports on the infeed and discharge beds are fully anchored to the floor using all mounting hole locations before the gate is installed. If this is not the case, reference the layout drawings provided and the "Installation and Maintenance Manual" for that specific product line.

1. Bring the frame/spring assembly to the same top of roller height of the conveyor the gate is mounting to.
2. Slide the gate hinges into the conveyor the gate is mounting to. (Refer to Figure 5)

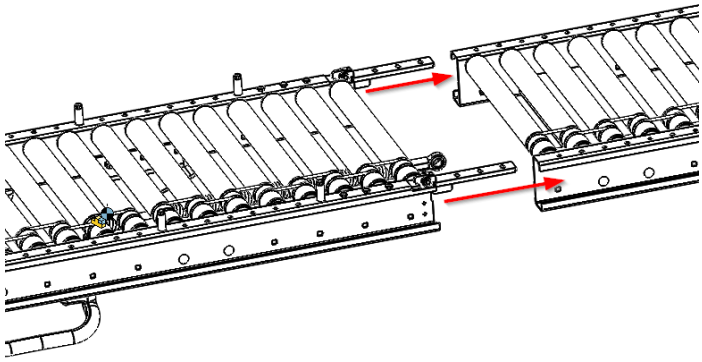

Figure 5: RLVDCG Installation-1

3. Fasten the hinges to the conveyor using the 5/16"-18 hardware that came with the ship loose kit. The three slots in the hinges will line up with the holes in the top of the side frames. (See Figure 6)

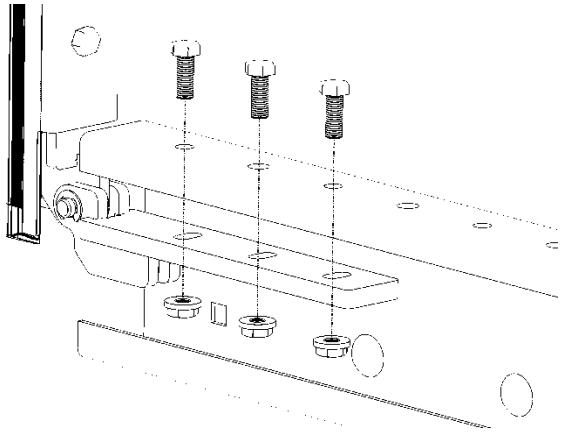

Figure 6: RLVDCG Installation-2

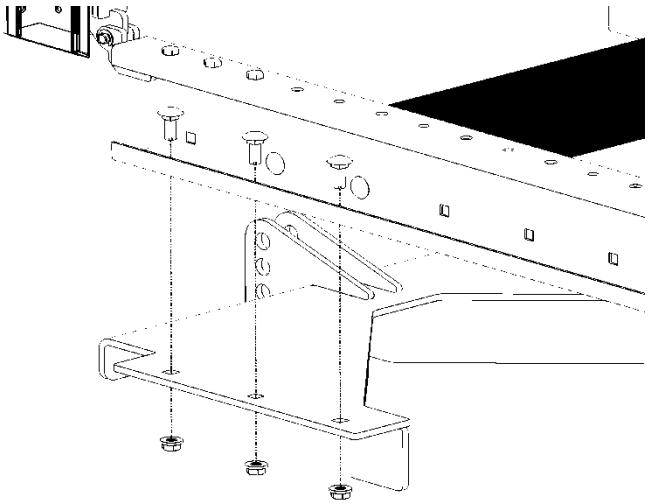

Figure 7: RLVDCG Installation-3

4. Raise and hold the gate vertically so that the spring and ball joint are pointed towards the ground.
5. This step will require two people. While the gate is still being held vertically, fasten the bottom plate using the 3/8”-16 hardware that came with the ship loose kit to the bottom of the conveyor. (See Figure 7)
6. Once the bottom plate is installed the clevis pin can then be installed. Refer to Figure 8, Figure 9, and Table 1 to ensure the clevis pin is in the right location. This will require the gate being lowered to about 45 degrees.

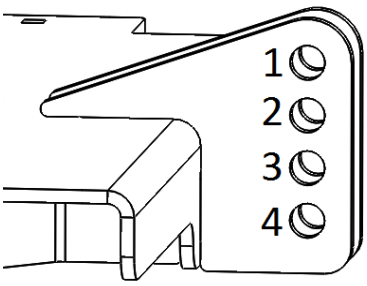

Figure 8: Clevis Hole Callout

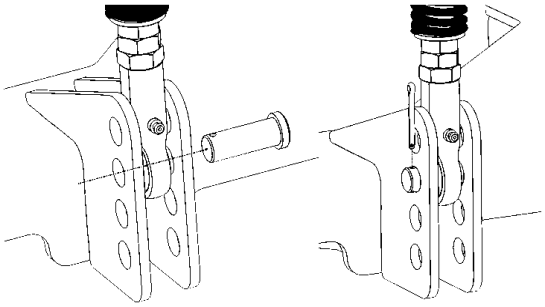

Figure 9: Clevis Pin Insertion

Table 1: Clevis Pin Hole Location

Gate Width	Gate Length	Roller Spacing	Clevis Hole
18	48	2	2
18	48	3	1
18	60	2	2
18	60	3	1
24	48	2	2
24	48	3	2
24	60	2	2
24	60	3	1
30	48	2	1
30	48	3	2
30	60	3	2

7. After installing the clevis pin, the springs need to be tensioned. (The gate needs to be upright during this step.) Tension the springs by moving the hex nut, labeled 3 in Figure 10, down the threaded rod. This will compress the spring. When the hex nut labeled 3 seems to be in the desired position, move the hex nut labeled 2 in Figure 10 until it is firm against hex nut 3. Ensure the flat washer labeled 4 in Figure 10 is installed between hex nut and spring.

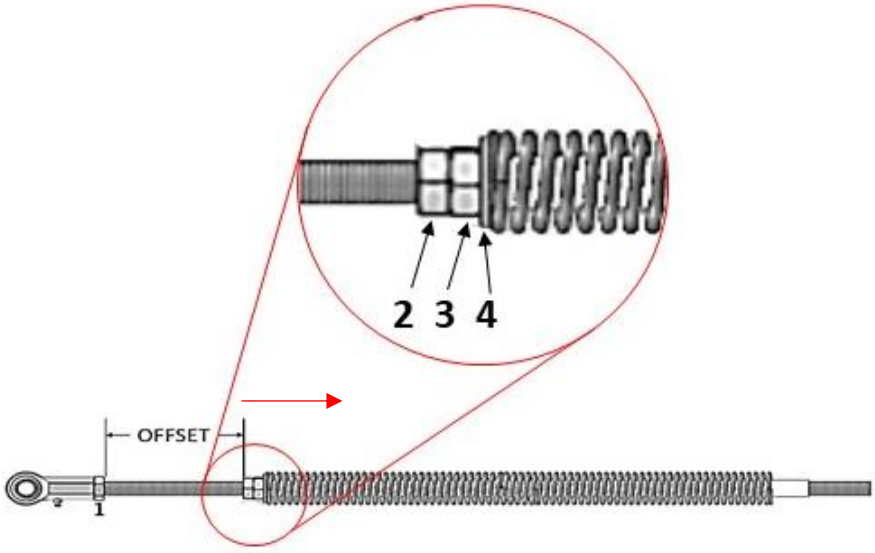

Figure 10: Hex Nut Offset

Refer to

8. *Table 2* for a suggested hex nut offset. This table serves as a guideline, but each gate may require a unique offset. If the gate is heavy to lift using one hand increase the hex nut offset. If the gate does not want to stay down and begins to rise, decrease the offset. When tensioned correctly the gate should be liftable by hand.

Table 2: Hex Nut Offset Guide

Gate Width	Gate Length	Roller Spacing	Hex Nut Offset ± 1”
18	48	2	5
18	48	3	4.5
18	60	2	4
18	60	3	3.5
24	48	2	5.5
24	48	3	5
24	60	2	5.5
24	60	3	7.25
30	48	2	3
30	48	3	5.5
30	60	3	5

9. After the springs have been tensioned, adjust the hex nut at the top of the threaded rod to compress the small spring. With the gate opened vertically, the compressed height of spring should be 2” as shown in Figure 11. If the spring is compressed correctly the gate latch assembly

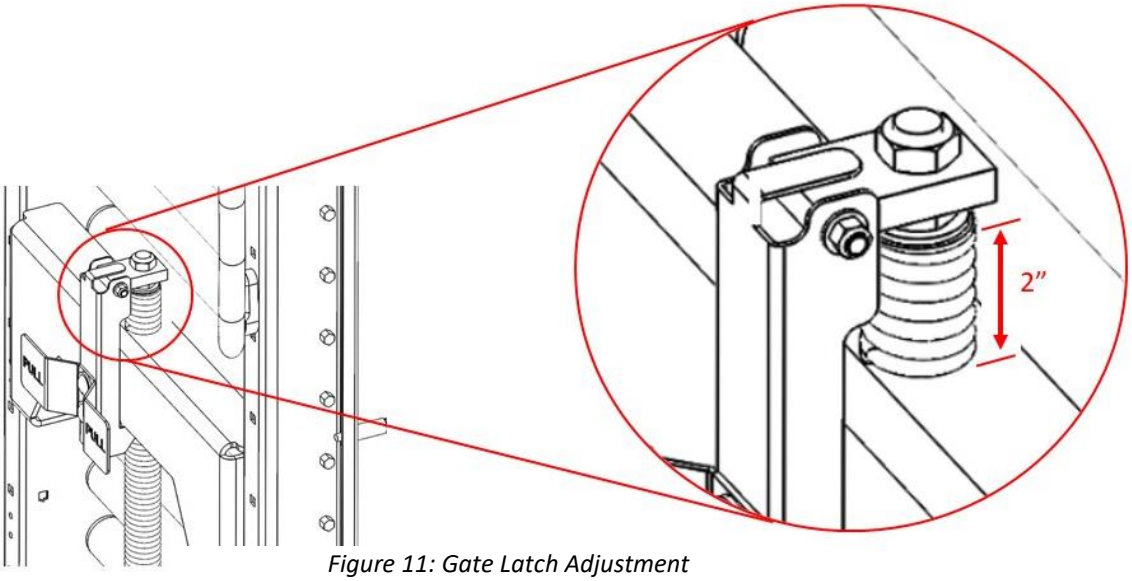

Figure 11: Gate Latch Adjustment

should “latch” to the bed spacer when the gate is opened vertically. To close the gate, pull the latch handle while applying pressure to the gate horizontally. (See Figure 11)

10. To finish the install of the gate, mount the proximity sensor. The proximity sensor and the mounting bracket will be included in the ship loose kit that comes with the gate. Figure 12 shows how to correctly mount the sensor.

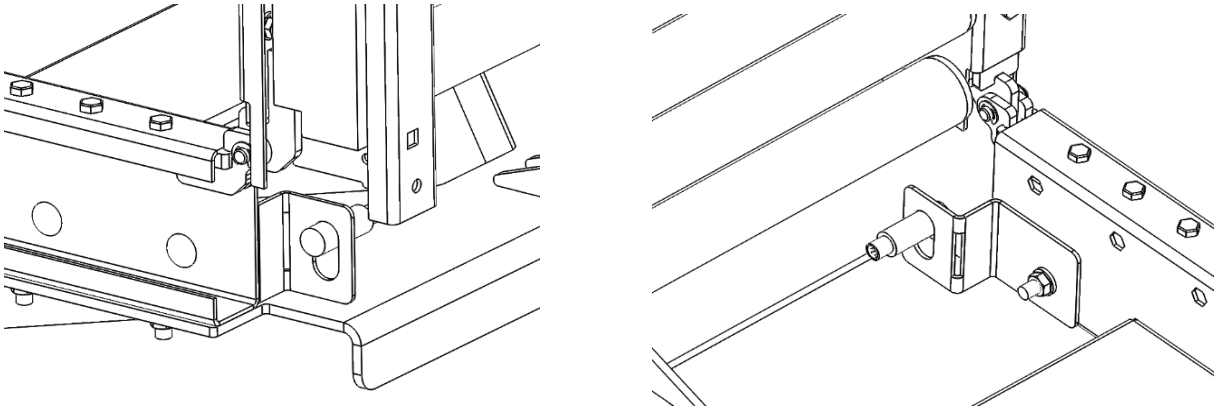

Figure 12: Proximity Sensor Mounting

6 Maintenance and Operation

The longevity and proper functionality of Bastian Solutions' Conveyor is based upon standard operating practices and general maintenance of equipment. Setting up a regular maintenance schedule will help to ensure that products comply with the equipment's warranty. **Lockout/Tagout** procedures should be implemented before performing any maintenance.

6.1 Safety During Operation

The list below explains a series of recommended precautions that should be taken when personnel are near the equipment. This list is not intended to be the only precautions taken, but it serves as a guide of important steps to follow.

- Only fully trained employees should operate or perform maintenance on the conveyors. Proper training should include the detailed description of fail-safes, stopping devices, or other emergency regulations put in place.
- WARNING stickers should be replaced if worn or damaged.
- All personnel in the area should be alerted prior to starting any conveyor at all times. This process may vary depending on the conditions and layout of the site, but it should use audible and visual cues and all personnel should be made aware of the protocol.
- Operators should inspect the conveyor for damage, foreign objects, and verify all personnel is clear of the equipment prior to engaging drive.
- Ensure that all areas are clear of objects prior to loading and unloading.
- No personnel should ever ride, climb, step, sit on, or otherwise put body weight on the conveyor. Doing so puts both personnel and equipment at risk.
- Maintenance should be performed at regular intervals to assure the safety of operators and the longest life of components. Should a component break during operation or prior to operation, then lockout/tagout instructions should be performed immediately to prevent exposure to hazards.

6.2 Maintenance Schedule

To prolong the life of the material handling equipment and reduce the risk of potential safety hazards, it is vital that a preventative maintenance program be set in place and followed. The following instructions will help identify key areas requiring maintenance.

6.2.1 Mechanical Service

- An auditory inspection of the equipment should be performed to identify any unusual noise that may indicate that there is a problem with the equipment.
- Check all nuts and bolts to ensure bolts remain tight. MDR nuts should be torqued using a torque wrench to each MDR's torque specs. Please reference Table 3 for a list of common MDRs and their torque requirements.
- O-rings/bands should be inspected for excessive wear, stretching or slip and replaced as necessary.
- The recommended interval for maintenance is at least once every 6 months.

Table 3: MDR Nut Torque Specifications

MDR	MDR Nut Torque Specs
Interroll EC100/110	30 ft-lbs
Interroll EC310	50 ft-lbs
Itoh PM486FE/FP	23 ft-lbs

6.2.2 Electrical Service

- All Bastian Solutions' Conveyor DC products operate at either 24V or 48V, nominally.
- If adjustment of control card settings is required, refer to the respective technical manual listed in Reference Documents, or contact Bastian Solutions' Support at ConveyorSupport@BastianSolutions.com.
- If there is a need to replace a DC control card, perform the following:
    - De-energize associated power supply and remove respective side cover (if applicable)
    - Adjust settings of replacement control card to match those of the existing control card.
    - Remove the existing control card from the side frame for ease of cable disconnection:
        - If the existing control card has a mounting plate, remove wiz nut securing control card mounting plate to side frame.
        - If the existing control card is secured to the conveyor side frame with anything other than a mounting plate, install new securing material on the new control card and re-use the securing material on the side frame.
    - One at a time, remove all cables and connectors and plug them into the same respective connection port on the new control card.
    - If the control card in question has a mounting plate, remove the mounting plate secured to the existing control card, and install it on the new control card (if the new control card does not already have a mounting plate installed on it).
    - Install the new control card on the conveyor side frame
    - Re-energize associated power supply, check the lane for proper system functionality, and reinstall respective side cover (if applicable).

Never "hot swap" control cards (i.e. disconnect and reconnect power connector on control cards without de-energizing respective power supply). When doing this, there is an increased risk of damaging the new control card.

There is always a possibility that control card errors are being caused by faulty communication cables (RJ45, CAT5, or CAT6), or problems with adjacent cards connected via the communication cables.

- If cards or card fuses are blowing:
    - Ensure there are no shorts in system power wiring
    - Ensure all conveyor side frames are electrically bonded and provided a direct connection to earth ground
    - Ensure control card DIP switch settings match those needed for zone MDR (if applicable)

- If associated conveyor zone has powered brake roller, ensure it is electrically connected
- If problems persist, refer to the respective technical manual listed in the Reference Documents section of this document.

- If experiencing any other electrical problems with Bastian Solutions' DC conveyor, contact Support at ConveyorSupport@BastianSolutions.com.

6.2.3 Replacing Rollers

If polyvee bands or 2" roller spacing is being used, it will often be easier to remove a roller/band by disassembling the zone roller-by-roller until reaching the roller/ band that is being replaced. The directions in this segment refer to replacement of rollers within a 3" roller center conveyor.

For motor driven rollers (MDRs):

1. Follow the lockout/tagout procedure in place to ensure safety.
2. Remove the side cover from the intended work area.
3. Loosen the MDR nut located on the cable side of the roller.
4. Pull the MDR bracket away from the frame. (Refer to Figure 13)

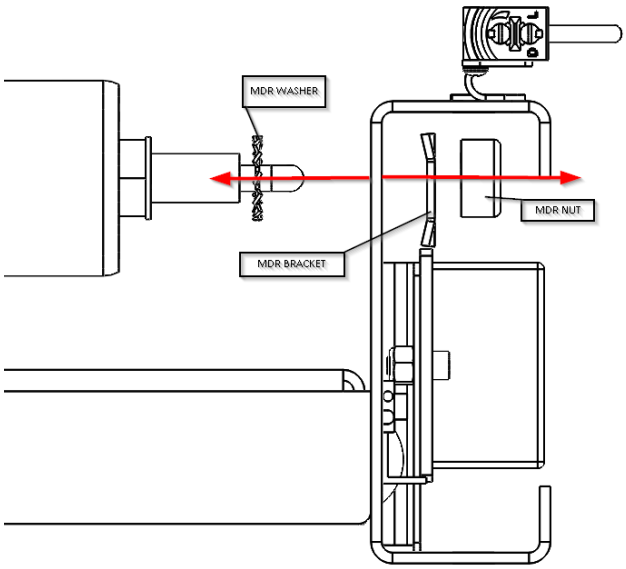

Figure 13: MDR Removal-1

5. Apply pressure on the end of the hex shaft opposite the cable using a small diameter punch or similar tool until the shaft clears the frame. Be careful NOT to apply a side load to the hex shaft. (Refer to Figure 14)

6. Provide upward force on the roller body until the hex is sitting above the sideframe. Refer to Figure 15. (A putty knife or other flat surface tool is recommended to be placed between the hex shaft and the inside of the frame. This will help protect the paint on the sideframe.)

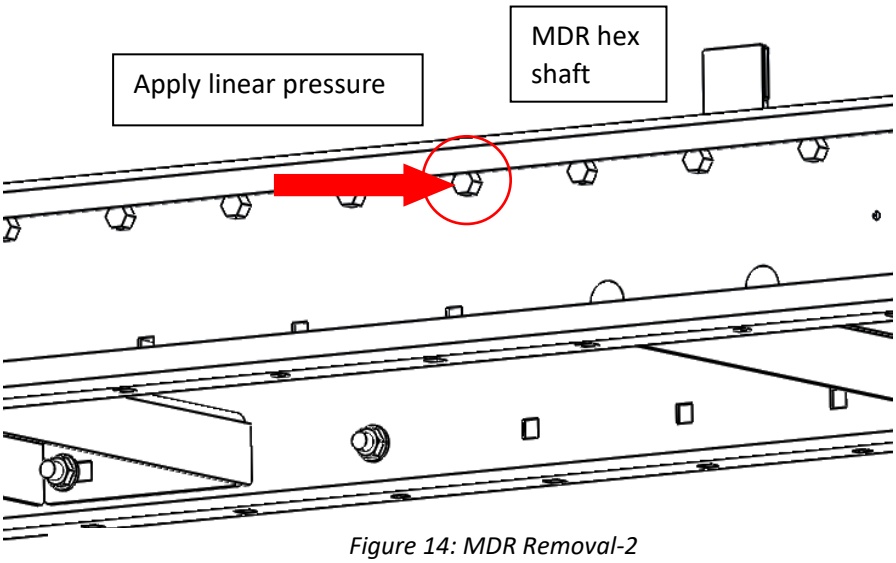

Figure 14: MDR Removal-2

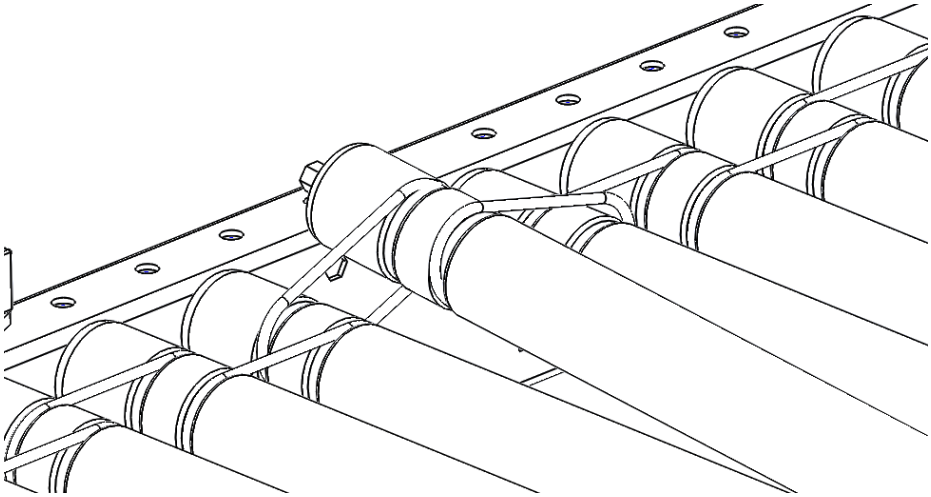

Figure 15: MDR Removal-3

7. Pull the threaded shaft out of the sideframe.
8. Pull the MDR away from the bands until the MDR is completely free of the side frames and bands.
9. Slide the new MDR cable through the MDR washer and guide it through the hex hole.
10. Place the MDR bracket back onto the threaded shaft.
11. Guide the MDR back through the existing bands.
12. Use a putty knife or other flat surface tool to guide the hex shaft into the hex hole.
13. Fasten the MDR nut using a torque wrench to the appropriate value given in Table 3.
14. Plug the MDR into the card.

15. Replace the side cover.

For standard rollers:

1. Follow the lockout/tagout procedure in place to ensure safety.
2. Remove the side cover from the intended work area.
3. Apply pressure on the end of the hex shaft opposite the wiring using a small diameter punch or similar tool until the shaft clears the frame. Be careful NOT to apply a side load to the hex shaft. (Refer to Figure 14)
4. Provide upward force on the roller body until the hex is sitting above the sideframe. Refer to Figure 15. (A putty knife or other flat surface tool is recommended to be placed between the hex shaft and the inside of the frame. This will help protect the paint on the sideframe.)
5. Remove the hex shaft from the opposite hex hole
6. Pull the roller away from the bands until the roller is completely free of the side frames and bands.
7. Slide the new roller through the bands.
8. Once the new roller is through both bands, guide the hex shaft into the hex hole.
9. After the hex shaft is in the hex hole, the opposite side shaft can be inserted into the appropriate hex hole. Use the roller's length as leverage to aid in this step.
10. Use a putty knife or other flat surface tool to guide the hex shaft into the opposite hex hole.
11. Replace the side cover.

6.2.4 Replacing Bands

1. Follow the lockout/tagout procedure in place to ensure safety
2. Remove the side cover from the intended work area.
3. If the band being replaced is on the outside groove/hub of the roller as shown in circle 2 of Figure 16, the two rollers within the brackets will need to be removed. Follow the roller removal steps in the roller replacement procedure.
4. After the rollers have been removed, slide one of the rollers that was removed through the band in circle 1 of Figure 16.
5. After the roller is within circle 1, slide the new band onto the same roller on the groove side of the roller. (Left side in Figure 16)
6. Use the new band to help guide the hex shaft into the hex hole.

This method is effective but requires a large amount of tension in the bands. Because of this tension fingers can be pinched if not done carefully.)

7. Once the groove side hex shaft (Left side in Figure 16) is within the hex hole, insert the opposite side hex shaft into the appropriate hex hole. Use the roller's length as leverage to aid in this step. As called out in the roller replacement procedure, use a putty knife or other flat surface tool to protect the paint on the sideframe.
8. After the first roller has successfully been re-installed, install the second roller.
9. Slide the roller through the old band in circle 3 of Figure 16. Then slide the roller through the new band. (This step can be difficult as the bands are tight.)
10. Once the roller has both bands around it, guide the hex shaft into the hex hole.

11. Once the groove side hex shaft (Left side in Figure 16) is within the hex hole, insert the opposite side hex shaft into the appropriate hex hole. Use the roller's length as leverage to aid in this step. As called out in the roller replacement procedure, use a putty knife or other flat surface tool to protect the paint on the sideframe.
12. If the band being replaced is on the inside groove/hub of the roller as shown in the blue circle of Figure 16, then remove the hex shafts opposite the groove/hub.
13. Roll the band being replaced down the length of the two rollers.
14. Roll the new band up the length of the two rollers.
15. Re-insert the hex shafts into the appropriate hex holes.
16. Replace side covers.

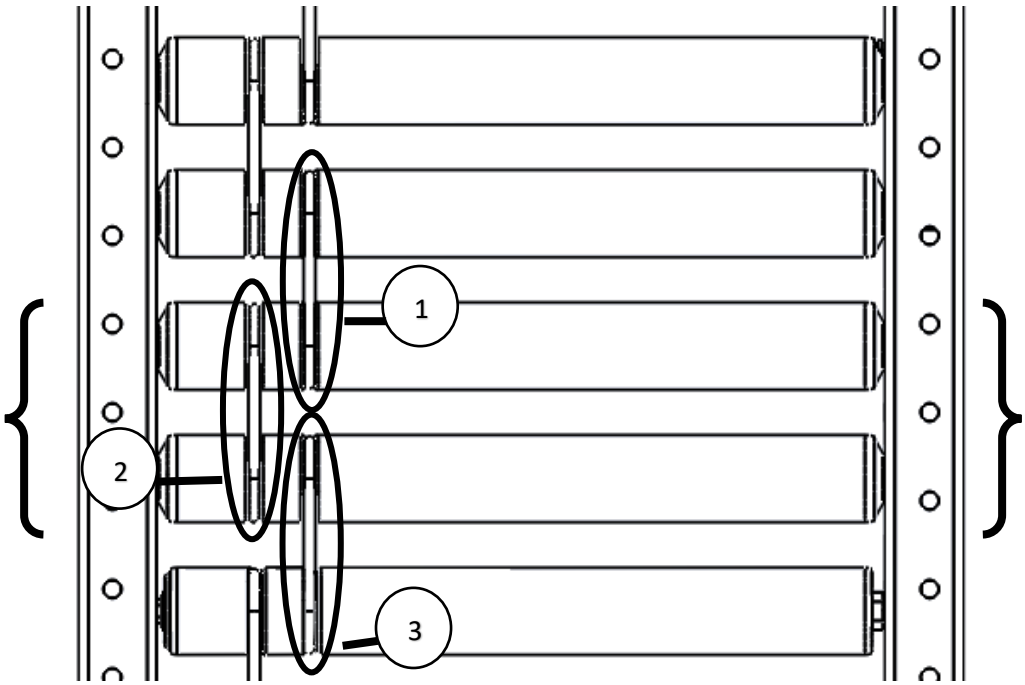

Figure 16: Band Replacement

7 Troubleshooting and Repair

Many issues that may arise with Bastian Solutions' Conveyor can be corrected with minimal field repairs. Bastian Solutions encourages using the following troubleshooting techniques before contacting a Bastian representative as these are the same techniques used by our field service engineers. To assist in data collection, Bastian Solutions asks that any issues that arise be recorded in a log, with the mark number, a description of the issue, and the steps taken to resolve the issue. Table 4 gives direction for retroreflective photoeyes. If a diffuse photoeye is being used, verify that the sensor is set to Light Mode(L) (Arrow pointed at L on photoeye).

Table 4: Troubleshooting Card Issues

ERROR	CAUSE	ACTION
Conveyor flow direction, speed, or acceleration is incorrect	Incorrect DIP switch settings	Check card manufacturer's literature to verify proper switch configuration.
Zone not operating	No power supply	Check that the power supply is on and wired to the card.
	Fuse is blown	Check LED lights and replace the fuse if confirmed short
	Incorrect DIP switch setting	Check card manufacturer's literature to verify proper switch configuration.
System reverses or jogs without prompting	Fuse is blown	Check the fuses of all cards in the immediate system.
	Incorrect DIP switch setting	Check card manufacturer's literature to verify proper switch configuration.
	Communication cable incorrectly connected or faults	Check com cables and replace if faulty.
System turns off when several zones are in use at the same time	Power supply insufficient	Check the number of zones per power supply.
		Check that the power supply and AC voltage source are working properly and installed correctly.

8 Standard Spare Parts

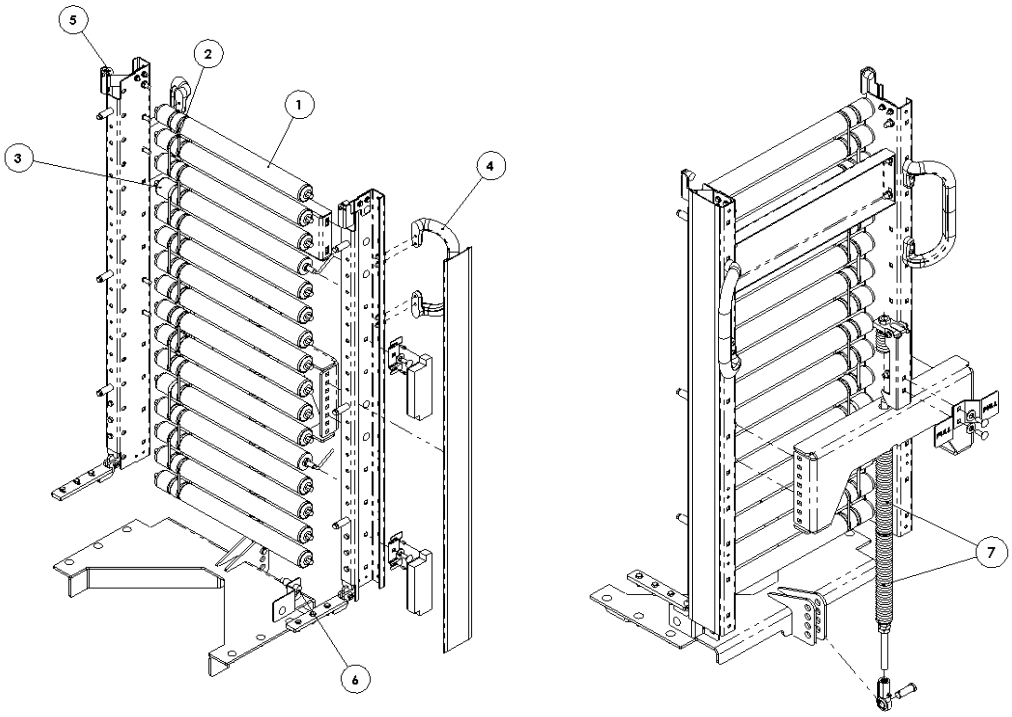

Figure 17: RLVDCG Spares Exploded View

Table 5: RLVDCG Standard Spare Parts Table

REF. NO.	DESCRIPTION	COMMON CONFIGURATIONS
1	ROLLERS	2 GROOVE
		POLYVEE
2	BANDS	O-RING- 2IN ROLLER SPACING
		O-RING – 3IN ROLLER SPACING
		POLYVEE- 2IN ROLLER SPACING
		POLYVEE- 3IN ROLLER SPACING
3	MOTOR DRIVEN ROLLERS (MDRS)	2 GROOVE/POLYVEE – INTERROLL EC100
		2 GROOVE/POLYVEE – INTERROLL EC110
		2 GROOVE/POLYVEE – INTERROLL EC310
		2 GROOVE/POLYVEE – ITOH PM486FE
		2 GROOVE/POLYVEE – ITOH PM486FP
4	GATE HANDLE	GATE HANDLE
5	RUBBER BUMPER	RUBBER BUMPER (NOT INCLUDED ON DISCHARGE MOUNTED GATES
6	PROX SENSOR	PROX SENSOR
7	DIE SPRINGS	DEPENDANT ON GATE CONFIGURATION

9 Appendix

9.1 Ship Loose Items

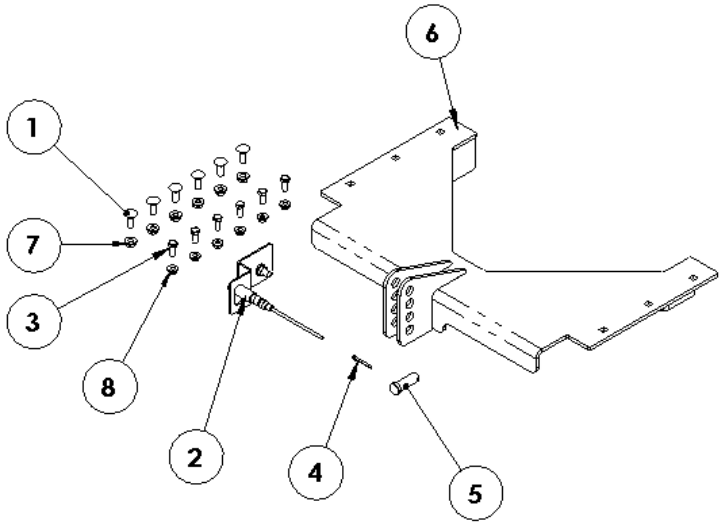

Figure 18: Standard Ship Loose Kit

Table 6: RLVDCG Standard Ship Loose Items

REF. NO.	DESCRIPTION
1	CARRIAGE BOLT, 3/8"-16 UNC X 1"L, GR5, ZINC PLATED, FULL THD
2	ASM, GATE DOWN PROX
3	HHCS, 5/16"-18 UNC X "L, GR5, ZINC PLATED, FULL THD
4	COTTER PIN, 0.156in DIA, 1.25in L, ZINC PLATED
5	CLEVIS PIN, 0.625in DIA, 1.5in USABLE LENGTH
6	WELD, SPRING LOWER MOUNT, XX” OAW
7	WIZ NUT, 3/8"-16 UNC, GR2, ZINC PLATED
8	WIZ NUT, 5/16"-18 UNC, GR2, ZINC PLATED

Bastian Solutions' Conveyor Installation and Maintenance Manual

Model: RLVDCG

Bastian Solutions, LLC

1821 Bastian Court

Westfield, IN 46074

Customer Support: ConveyorSupport@BastianSolutions.com