

# INSTALLATION, OPERATION, MAINTENANCE MANUAL



## XP43

XenoPRESSURE® Accumulation Conveyor

P/N: E0038176

Revision Date: March 19, 2019



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# Chapter 1: IOM INTRODUCTION

## IOM Purpose

It is the intent of MHS Conveyor, through this manual, to provide information that acts as a guide in the installation, operation, and maintenance of MHS Conveyor conveyors.

This manual describes basic installation practices, assembly arrangements, preventive maintenance, and assists in replacement parts identification.

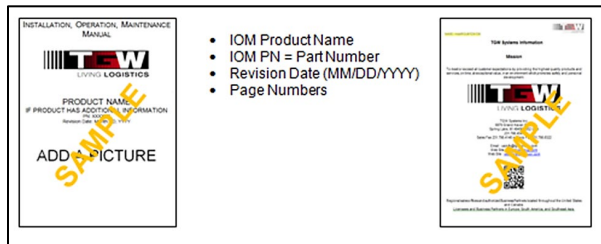
This service manual is intended for use by personnel who are knowledgeable of installation and safe working practices on conveyor systems.

Not all applications and conditions can be covered; therefore, this manual is to be used **ONLY** as a guide.

If additional copies of this manual are needed or if you have any question concerning the conveyor please contact your MHS Conveyor Distributor or MHS Conveyor Lifetime Services at 231-798-4547 or visit MHS Conveyor at [mhs-conveyor.com](http://mhs-conveyor.com) for maintenance videos and other application information.

## Manual Structure

You should receive a separate documentation for each product line of MHS Conveyor implemented in your installation. You can identify the respective product line on the back of the folder or on the cover sheet of the IOM (Installation



Operation Maintenance Manual)

## WARNING



- Pay attention to the safety instructions!
- Prior to working at or in the immediate vicinity of the system it is recommended that you make yourself familiar with the safety instructions included in the present document!

## Chapter 2: MHS Conveyor POLICIES

### MHS Conveyor Equipment Warranty

MHS Conveyor warrants that the material and workmanship entering into its equipment is merchantable and will be furnished in accordance with the specifications stated.

MHS Conveyor agrees to furnish the purchaser without charge any part proved defective within 2 years from date of shipment provided the purchaser gives MHS Conveyor immediate notice in writing and examination proves the claim that such materials or parts were defective when furnished. For drive components specific to XenoROL® (i.e. Xeno belts, slave Xeno belts, drive spools, standard and speed-up, and spacers), this warranty shall be extended to five years of running use, provided the conveyors are applied, installed and maintained in accordance with MHS Conveyor published standards. Other than the above, there are no warranties which extend beyond the description on the face hereof. Consequential damages of any sort are wholly excluded.

The liability of MHS Conveyor will be limited to the replacement cost of any defective part. All freight and installation costs relative to any warranted part will be at the expense of the purchaser. Any liability of MHS Conveyor under the warranties specified above is conditioned upon the equipment being installed, handled, operated, and maintained in accordance with the written instructions provided or approved in writing by MHS Conveyor.

The warranties specified above do not cover, and MHS Conveyor makes no warranties which extend to, damage to the equipment due to deterioration or wear occasioned by chemicals, abrasion, corrosion or erosion; Purchaser's misapplication, abuse, alteration, operation or maintenance; abnormal conditions of temperature or dirt; or operation of the equipment above rated capacities or in an otherwise improper manner.

THERE ARE NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, EXTENDING BEYOND THOSE SET FORTH IN THIS STATEMENT OF WARRANTY.

Rev 03/01/2019

### MHS Conveyor Environment Standards

MHS Conveyor equipment is designed to be installed in a clean, dry warehouse environment. Exposure to extreme humidity, direct sunlight, blowing dirt or rain can permanently damage some components of MHS Conveyor. In particular, the curing agents in concrete are known to attack and degrade the urethane conveyor components.

When installing conveyor on a new construction site, be sure that the concrete is properly cured before setting conveyor on it. In addition, if conveyors are stored in the proximity of curing concrete, proper ventilation must be used to direct the curing agent fumes away from the conveyor.

Failure to comply with these guidelines will void the MHS Conveyor warranty on any failed components that result from these environment issues.

03/01/2019

## Chapter 3: SAFETY RECOMMENDATIONS

### MHS Conveyor Safety Recommendation For additional safety information:

MHS Conveyor agrees to the following safety instruction or guidelines listed within this manual. This is not to conflict with your state or legal requirements.

MHS Conveyor Recommends for maintenance or repair purposes, to incorporate a lock out or tag procedure. To ensure all starting devices, prime movers, or powered accessories are off before attempting to maintenance or repair.

The procedures below are designed to protect everyone involved with the conveyor against an unexpected restart. To include understanding of potential hazard of stored energy, which can exist after the power source is locked out.

For additional information, refer to the latest issue of ANSI Z244.1, American National Standard for Personnel Protection – Lockout/Tagout of Energy Sources– Minimum Safety Requirements.

<http://www.ansi.org/>

**OSHA 29CFR Part 1910.147 “Control of Hazardous Energy Sources (Lockout/Tagout)”**, which includes requirements for release of stored energy and OSHA Safety and Health Regulations for Construction 1926.555 Conveyors

<https://www.osha.gov/>

### Conveyor Design and Safety Guidelines

A safety risk evaluation is required for all of our standard equipment. The safety risk evaluation considers every potential hazard on the conveyor, weighs the probability and the severity of the potential injury, and addresses methods of mitigation to make the risk of injury either low or negligible. We use the ANSI B11 TR3 standards for all of our risk evaluation.

In addition, all of our equipment is designed to comply with the following national and industry standards:

- **ANSI Z535.1** – Safety Color Code
- **ANSI Z244.1** – Lockout/Tagout of Energy Sources
- **ASME B15.1** – Safety standard for Mechanical Power Transmission Apparatus
- **ASME B20.1** – Safety standard for Conveyors and Related Equipment
- **CEMA** – Safety Standards and Labels
- **OSHA 1910.147** – The Control of Hazardous Energy
- **OSHA 1910.212** - General Requirements for all Machines
- **OSHA 1910.95** – Occupational Noise Exposure

#### Definitions:

- **ANSI** = American National Standard Institute
- **ASME** = American Society of Mechanical Engineers
- **CEMA** = Conveyor Equipment Manufacturers Association
- **OSHA** = Occupational Safety and Health Administration



## WARNING



- Safety: Always lock out power source and follow recommended safety procedures.

### 3.1: MHS Conveyor RECOMMENDED STANDARDS FOR CONVEYORS

#### ANSI Standards for Conveyors

It is essential for safe and efficient system operation that safety information and guidelines presented here are properly understood and implemented.

MHS Conveyor recognizes American National Standard Institute (ANSI) booklet entitled ***Safety Standards for Conveyors and Related Equipment B20.1***. For more information go to: <http://webstore.ansi.org/default.aspx>

With any piece of industrial equipment, conditions exist that might cause injury to you or your co-workers. Because it is not possible to describe each potentially hazardous situation that might develop, you must be alert at all times for unsafe conditions. To avoid injury, use maximum possible care and common sense and adhere to all safety standards. Take special care while maintaining and inspecting electrical equipment and devices. All personnel working on or around the system should be aware of, and adhere to, all **CAUTION**, **DANGER**, and **WARNING** signs.

Labels or signs are posted to reduce the risk of injury to all personnel. Never assume that the signs and notices are applicable only to inexperienced personnel. Maintain signs in a legible condition. Contact your supervisor to post additional safety signs if you feel they are necessary. <http://www.ansi.org/>



#### ANSI Conveyor Safety Rules

- Conveyor safety rules, as well as specific regulations and guidelines listed in this publication:
- DO NOT touch moving Conveyor parts.
- DO NOT walk, ride, or climb on the Conveyor.
- DO NOT operate the Conveyor with chain guards or other protective guards removed.
- Keep jewelry, clothing, hair, etc., away from the Conveyor.
- Know the location and function of all start/stop devices and keep those devices free from obstruction.
- Clear all personnel from the equipment before starting the Conveyor.
- DO NOT attempt to clear product jams while the Conveyor is running.
- Allow only trained and authorized personnel to maintain or repair Conveyor equipment.
- DO NOT load the Conveyor beyond specified design limits.
- DO NOT attempt to make repairs to the Conveyor while it is running.
- DO NOT modify equipment without checking with the manufacturer.
- DO NOT operate or perform maintenance on equipment when taking any type of drug, sedative, when under the influence of alcohol, or when over fatigued.
- Report any unsafe condition to your supervisor or maintenance staff.

#### CEMA Standards for Conveyors

The Conveyor Equipment Manufacturers Association (CEMA) provides safety information related to conveyor systems. There are Conveyor Safety Video and Conveyor Safety Poster produced by CEMA.

MHS Conveyor recommends these videos for training and education purposes as part of a safe working environment around conveyor equipment. The videos introduce awareness of operations, personnel, maintenance technicians, and management to safety hazards commonly associated with the automated material handling conveyor equipment.

The safety posters review important safety labels and are intended to be posted in public places as a day-to-day reinforcement of good safety practices. These posters can be downloaded from the CEMA Website at <http://www.cemanet.org/safety-label-posters> or for more information for both the safety poster and the videos can be purchased from CEMA. Visit their website – [www.cemanet.org](http://www.cemanet.org)

For additional information or contact them at:



#### CONVEYOR EQUIPMENT MANUFACTURERS ASSOCIATION

5672 Strand Ct., Suite 2  
Naples, Florida 34110  
239.514.3441

#### CEMA Safety Label Meanings

##### ANSI Z535.4 – Product Safety Signs and Labels

The word or words that designate a degree or level of hazard seriousness. The signal words for product safety signs are: **DANGER**, **WARNING**, and **CAUTION**.

**DANGER** - Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.

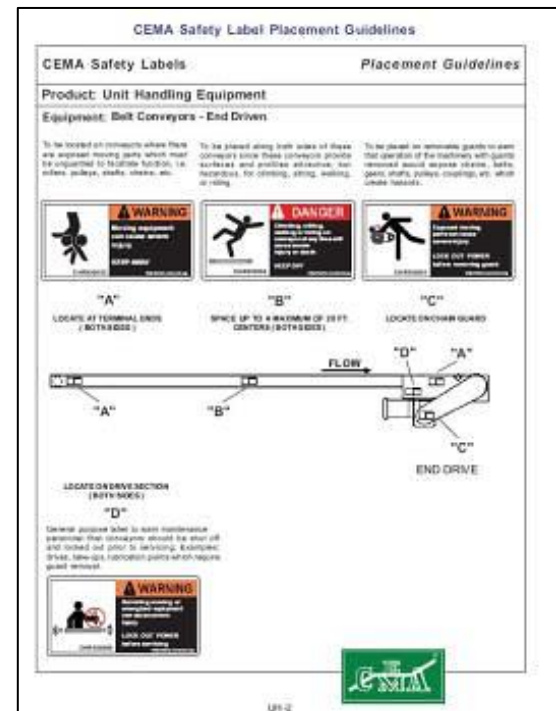
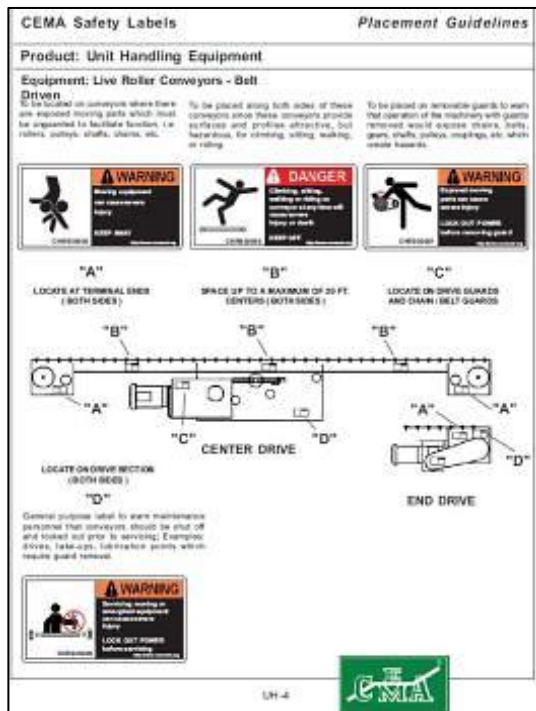
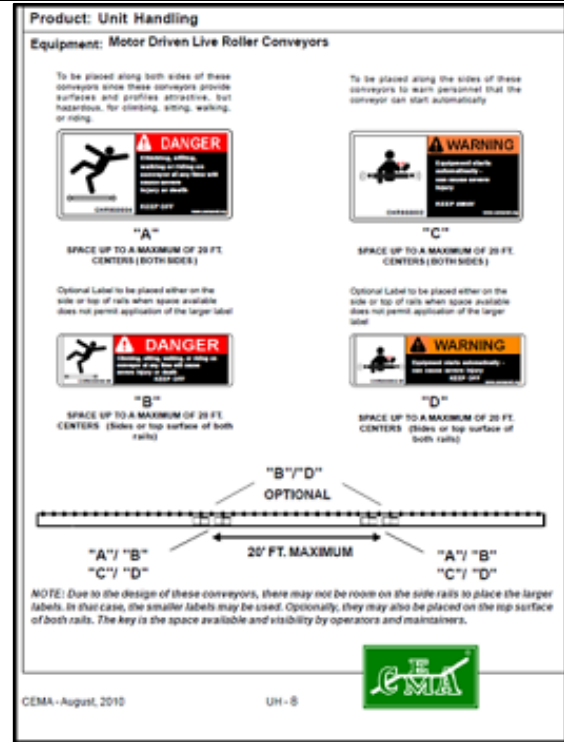
**WARNING** – Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It may also be used to alert against unsafe practices.

**CAUTION** – Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

<http://www.cemanet.org/cema-safety-label-meanings/>

## 3.2: MHS Conveyor RECOMMENDS PROPER LABELS FOR CONVEYOR TYPES

Shown below are some samples of labels applicable to conveyor standards.





### 3.3: WARNINGS AND SAFETY INSTRUCTIONS

Failure to follow the instructions and cautions throughout this manual and warning label on the conveyor may result in injury to personnel or damage to the equipment.

Your MHS Conveyor is powered by a motor and can be stopped only by turning off electrical power to the motor. As with all powered machinery, the drive-related components – including sprockets, chains, shafts, universal joints, and pneumatic devices – can be dangerous. We have installed or provided guards to prevent accidental contact with these parts, along with warning labels to identify the hazards.

Special attention must be paid to the following areas of this manual:



#### WARNING





- Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.

#### CAUTION

- Indicates a situation, which, if not avoided, could result in property damage.

### 3.3.1: Warnings and Safety Instructions

|  <b>WARNING</b> |  |
|--|--|
|                 | <ul style="list-style-type: none"> <li>• After maintenance, REPLACE guards immediately.</li> <li>• Keep ALL warning labels clean and clear of any obstructions.</li> <li>• Never remove, deface, or paint over WARNING or CAUTION labels. Any damaged label will be replaced by MHS Conveyor at no cost by contacting Lifetime Services.</li> <li>• It is very important to instruct personnel in proper conveyor use including the location and function of all controls.</li> <li>• Special emphasis must be given to emergency stop procedures.</li> <li>• It is important to establish work procedures and access areas, which do not require any part of a person to be under the conveyor.</li> <li>• It should be required that long hair is covered by caps or hairnets.</li> <li>• Loose clothing, long hair, and jewelry must be kept away from moving equipment.</li> <li>• Maintain enough clearance on each side of all conveyor units for safe adjustment and maintenance of all components.</li> <li>• Provide crossovers or gates at sufficient intervals where needed to eliminate the temptation for personnel to climb over or under any conveyor.</li> <li>• Walking or riding on a moving conveyor must be prohibited.</li> <li>• Before performing maintenance on the conveyor, make sure the start-up controls are locked out and cannot be turned on by any person other than the one performing the maintenance.</li> <li>• If more than, one crewmember is working on the conveyor, EACH CREW MEMBER MUST HAVE A LOCK ON THE POWER LOCKOUT.</li> <li>• All pneumatic devices must be de-energized and air removed to prevent accidental cycling of the device while performing general maintenance.</li> <li>• Make sure all personnel are clear of all conveyor equipment before restarting the system.</li> <li>• Before restarting a conveyor which has been stopped because of an emergency, an inspection of the conveyor must be made and the cause of the stoppage determined. The starting device must be locked out before any attempt is made to correct the cause of stoppage.</li> </ul> |



## WARNING



- Before servicing or performing any work in the motor control panel, disconnect and lock out air and the main incoming service. If only the panel disconnect is off, the incoming side will still be hot.



### 3.4: MHS Conveyor CONTROLS SAFETY GUIDELINES

The following basic conveyor control safety guidelines are recommended by MHS Conveyor even though Business Partner may or may not purchase conveyor controls from MHS Conveyor. The items listed deal with applications of controls equipment. **The actual installation of the equipment must always follow the National Electric Code and all other local codes.**

#### Start-up Warning Horn

Ideally, all conveyors should be within sight of the conveyor start pushbutton. This allows the operator to verify that no one is touching the conveyor or would be in danger if the conveyor were to start up.

If it is not possible to see the entire conveyor being started from the start pushbutton location, then some form of audible warning device is required. It could be a horn, buzzer, bell, or anything unique to that conveyor for that location. It should be loud enough to be heard at any point on the conveyor system. It should sound for approximately five seconds after the start pushbutton is pushed, prior to the actual running of conveyor. Any auxiliary equipment such as vertical lifts, turntables, etc., should also be included in the warning circuitry.

Conveyors that stop and restart under automatic control could also require a horn warning prior to restarting. If it is not easy to distinguish the difference between a fully stopped conveyor system and a momentarily stopped conveyor section, then it is advisable to add a warning horn. All conveyor sections that stop and restart automatically should be marked with appropriate signs or labels.

#### Start Pushbuttons

Start pushbuttons should be the flush type or guarded such that inadvertently leaning against them will not actuate the conveyor. They should be provided with a legend plate clearly defining which conveyors will be started.

#### Stop Pushbuttons

Stop pushbuttons should be the extended type such that any contact with it is sufficient to stop the conveyor. They would also be provided with a legend plate clearly defining which conveyors will be stopped.

#### Operator Controls

Additional operator controls should be designed into the system with the same guidelines that go into start and stop pushbuttons, depending upon their function. Devices which are repeated on multiple control stations, such as emergency stops, should be located at the same relative location on each station (such as lower right corner).

#### Emergency Stops

All locations where an operator must work directly at the conveyor should be protected by an emergency stop. An operator should not have to move from where he is to actuate the emergency stop.

Conveyors in areas of high pedestrian traffic should also be protected by emergency stop devices.

For all other instances, emergency stops should be located throughout a system such that it is possible to shut down the system without having to walk too far. In these instances the emergency stop is used more to protect the equipment from damage than to protect personnel.

Emergency stops can be of the pushbutton or cable operated switch type. The pushbutton type should be a red, mushroom head maintained pushbutton which requires resetting after it is actuated. Cable operated switches should trip by pulling the cable, and require resetting at the switch.

Actuating an emergency stop must drop-out the start circuit, requiring restarting the system using the start pushbuttons provided.

An emergency stop should normally stop all conveyors in the system. Very large systems may involve dividing a system into zones of control based on proximity of personnel, safety hazards, walls obstacles, etc.

### **Controls Logic**

Solid state controls logic devices, such as programmable controllers are used extensively for conveyor control. They are very reliable, but a hardware failure or software bug would cause an output to function erratically. For this reason, start circuits, warning horn circuits, and emergency stops should usually be configured using conventional relay logic.

### **Safety Switches**

All conveyor control cabinets and motors should be provided with safety (or disconnect) switches. These switches must have provisions for padlocking. As required for maintenance, equipment should be locked in the off position.

### **Special Devices**

Special devices and equipment such as vertical lifts, turntables, high speed conveyors, etc., all have unique design and safety requirements. These should be looked at in each case to determine what the requirements might be.

Rev 03/01/2019

## Chapter 4: XP43 INTRODUCTION

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XP43 uses standard MHS Conveyor CRUZcontrol® to accumulate and release product. Pneumatic brakes are employed to stop the line-shaft zones as the products accumulate. It is critical that the accumulation zones are always longer than the longest product.

XP43 is non-contact accumulator when used in the basic release logic module mode. If the conveyor is switched to the progressive release mode, the product may bump and touch, but will not coast. This feature makes these conveyors ideal for work in process applications where sensitive products are being handled. In distribution warehousing applications, it is important to remember that XP43 will not dense pack mixed size product.

## 4.1: DEFINITION OF TERMS

**Accumulation:** Act of queuing, holding, or backing up of product on a conveyor.

**Basic Logic** (singulation): A method of release that senses gaps between products and then releases the next upstream zone. This logic singulates product in and singulates product out. Products index forward one zone at a time when released.

**Progressive Logic:** A method of release so that no zones are set to accumulate unless ALL the downstream electronic sensors are blocked, meaning that all downstream zones hold accumulated product. A singulation release signal will cause all accumulated zones to release immediately.

**CRUZcontrol:** MHS Conveyor' electronic sensing design featuring a logic module including integral photoeye, solenoid valve, control module, and all pneumatic lines with connections all totally pre-piped and tested at our factory in the CRUZ frame.

**Function Module:** The MHS Conveyor function module that is used at a discharge zone to control release function, plus other functions. Reference the IOM for CRUZcontrol GEN II for NBC and XP43CZ GEN II for complete definition and application.

**GEN II Logic Module Assembly:** The integral electronic sensor, solenoid valve, and control module used within a zone. Manually activated toggle switch can be switched between basic and progressive mode of operation.

**RFP:** Request for Proposal. Form submitted to MHS Conveyor with application information for pricing of optional solutions.

**XenoBRAKE** – Pneumatically operated brake mounted below the conveyor rollers. Used to stop the carrying rollers by applying pressure directly against the bottom of the rollers in a zone.

**XP43CZ GEN II Non-contact Accumulation:** "Pure" zero pressure accumulation, which guarantees that one product, will not touch any other during accumulation, release, or any time.

**XP43CZ GEN II Contact-Allowed Accumulation:** Where the zone length, product weight and conveyor speed may cause some contact between products.

**Zone:** A portion of conveyor activated by a sensor to stop and hold one product in queue.

**Zone Length:** Distance between sensing devices.



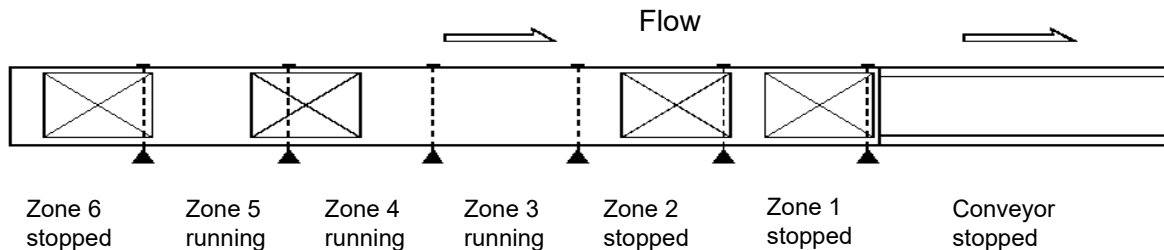
## 4.2: PRODUCT DESCRIPTION EXAMPLES

|  |   |       |       |          |       |                |             |                |        |
|--|---|-------|-------|----------|-------|----------------|-------------|----------------|--------|
| XenoPRESSURE<br>XP43CZ<br>Intermediate Bed<br>EXAMPLE:<br>PRODUCT DESCRIPTION: | TYPE  | MODEL | WIDTH | BED TYPE | FRAME | ROLLER CENTERS | ZONE LENGTH | FLOW DIRECTION | LENGTH |
|  | BED   | XP43  | 28BF  | I        | CZ    | 3RC            | 18Z         | RH             | 9'0"   |
|  | BED,XP43-28BF-I-CZ-3RC-18Z-RH<br>9'0"   |       |       |          |       |                |             |                |        |
|  | Bed, XP43 Conveyor, 28" Width Between Frame, Intermediate Bed, CRUZ Frame (Channel), 3" Roller Centers, 18" Zone Length, Right Hand Flow<br>9'0" Overall Length |       |       |          |       |                |             |                |        |

For the most current list of **Product Description** or **Terms and Abbreviations** please log into <http://mhs-conveyor.com/support/engineering-support-documents> and select Support/Engineering Support Documents

## Chapter 5: LOGIC FUNCTIONS

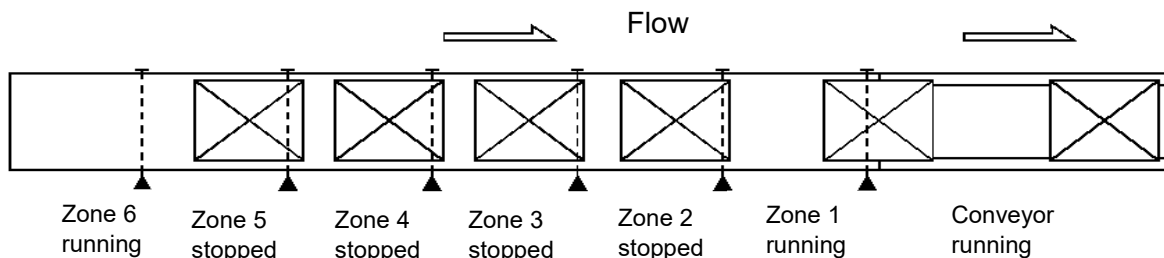
### 5.1: BASIC LOGIC



Basic Logic functions such that when any two successive photoelectric sensors are blocked, the second zone upstream is set to accumulate. In the above example, the discharge zone, Zone 1, is shown stopped, signifying that release from the zone is being inhibited and the Zone 1 sensor is blocked. Zone 1 sensor blocked and Zone 2 sensor blocked results in Zone 2 being stopped. Zone 3 and Zone 4 sensors are not blocked, and the zones are running. Zone 5 sensor is blocked, but the zone is running because the Zone 4 sensor is not blocked. Zone 6 is stopped because both Zone 5 and Zone 6 sensors are blocked.

Note that with Basic Logic products being transported on the conveyor are separated by a gap of at least one zone length. This will reduce the transportation throughput capacity of the conveyor. The rate at which product is introduced onto an accumulation conveyor of this type must not exceed the transportation capacity of the conveyor.

### 5.2: DISCHARGE FROM BASIC LOGIC



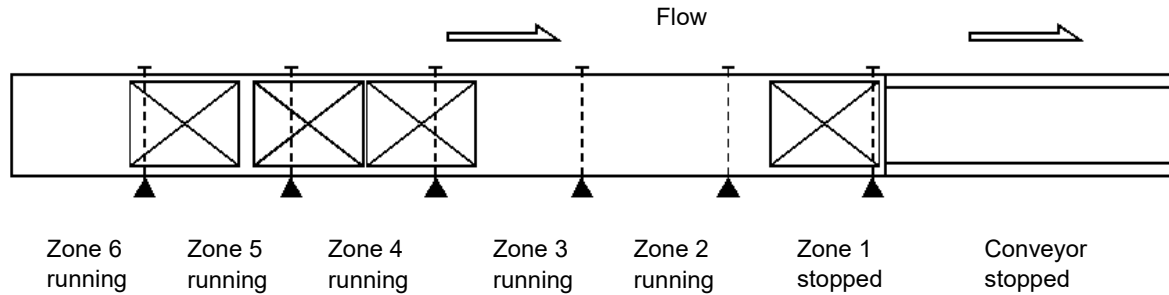
A Singulation Release signal given to the Zone 1 Logic Assembly releases product from that zone. As released product clears a photoelectric sensor, the product stopped at the next upstream zone is released. This will create a one-zone length gap between all released products assuming conveyor speeds (accumulation conveyor and downstream conveyor) are identical.

If the line is set to Slug Release (Train Release), all affected zones will run, resulting in the release of product with little or no gaps. This overrides the normal Basic Logic function.

All product movement as described for transportation, accumulation, and discharge is based on zone lengths, meaning only one product is in each zone. If more than one product should occupy a single zone, which could occur with small products, they will usually move together

or stop together, or they could eventually become separated into different zones. This is true for both Basic Logic and Progressive Logic.

### 5.3: PROGRESSIVE LOGIC

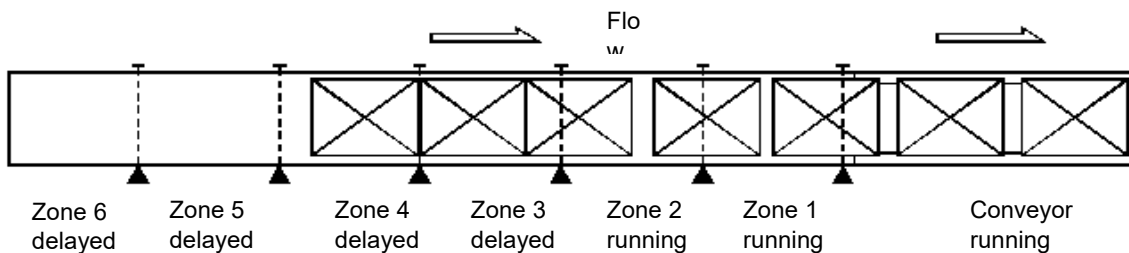


#### 5.3.1: Progressive

Logic functions such that no zones are set to accumulate unless all downstream zones hold accumulated product and the photoelectric sensors are blocked. In the above example, the discharge zone, Zone 1, is shown stopped which is a result of the release from the zone being inhibited and the Zone 1 sensor being blocked. Zone 2 sensor not being blocked results in all upstream zones, Zone 2 through Zone 6, running.

**Note:** Progressive Logic products being transported on the conveyor can remain tightly packed, without any gaps being created.

#### 5.3.2: Discharge from Progressive Logic



A Singulation Release signal given to the Zone 1 Logic Assembly releases product from that zone. Each successive upstream zone will also begin releasing product.

If the line is set to Slug Release (Train Release), all affected zones will run, resulting in the release of product with little or no gaps. This overrides the normal Progressive Logic function.

### **5.3.3: Cautions**

CRUZcontrol Logic Assemblies are designed to be fail-safe. A loss of module power, a disconnected or severed cable, or a dirty or failed photoelectric sensor will all result in the stopping of a zone, initiating accumulation beginning from the affected zone.

With Progressive Logic, failure of a Logic Assembly to function properly could possibly result in product accumulating with zones not stopping as required. While this should be unlikely due to the fail-safe nature of the Logic Assembly, a product jam preventing product from blocking a zone sensor would also result in a zone not functioning. The effects of such a failure should be considered. This type of failure could result in excessive line pressure, eventually causing product to push through the discharge zone of the conveyor. If needed, jam detection sensors could be used to minimize the effects of such a failure.

CRUZcontrol provides the ability for slug release. If the controlled conveyor is set to slug release, all affected zones will run immediately, regardless of downstream conditions, resulting in the immediate release of product with little or no gaps. Both the Basic and Progressive Logic mode release at the maximum possible discharge rate when slug release is enabled. Slug release does create a situation where a product jam will result in excessive line pressure buildup. If the slug release feature is used, it should be used with caution, and for a limited number of successive accumulation zones.

### **5.3.4: Configuration Options**

Basic Logic and Progressive Logic can be intermixed. An example of where this would be advantageous would be the placing of one Basic Logic conveyor bed at the end of a long length of Progressive Logic conveyor. The Progressive Logic would allow the conveyor to receive and transport product at higher throughput rates, while the Basic Logic discharge section would singulate product being released.

## Chapter 6: RECEIVING & SITE PREPARATION

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### General

XP43 zero-pressure conveyor is shipped in subassemblies. These subassemblies are packaged to guard against damage in shipment when handled properly.

Examination immediately following unloading will show if any damage was caused during shipment. If damage is evident, claims for recovery of expenses to repair damage or replace components must be made against the carrier immediately. While unloading, a check must be made against the Bill of Lading, or other packing lists provided, to confirm full receipt of listed items.

### CAUTION

**TAKE CARE DURING THE REMOVAL OF EQUIPMENT FROM THE CARRIER.** Remove small items and boxes first. Pull and lift only on the skid, not on the frame, crossmember or any part of the equipment. Be sure the skid is free of other materials which may be on top of or against the side of the skid to be removed.

### Preparation of Site

After the conveyor is received, move it to the installation site or designated dry storage area as soon as possible. Clean up all packing material immediately before parts get lost in it. Loose parts should remain in the shipping boxes until needed.

Prior to starting assembly of the conveyor, carefully check the installation path to be sure there are no obstructions that will cause interference. Check for access along the path needed to bring in bed sections and components closest to the point where they are needed. It is often necessary to give the area along the system path a general cleanup to improve installation efficiency, access and accuracy.



## 6.1: PARTS INVENTORY AND IDENTIFICATION

Each subassembly is shipped completely assembled except typical loose parts, which are in boxes with the subassemblies. Drive assemblies are shipped mounted to the drive bed frame. Segregate the conveyor subassemblies by types for inventory and ease of locating during installation.

An identification label is attached to the outside of one side channel, close to one end of each conveyor bed and on all drive packages.



An identification label is attached to the charged end of the center bed of each CRUZbelt Module unit.



### Labels may contain the following information:



- Item number
- Description
- Job Number
- Mfg. Number
- Tag number (if specified)
- Assembler's clock number
- Date of manufacture
- QR (Quick Response) bar code
  - Scan Code For IOM Manual



Scan the QR code to retrieve the IOM Manual, if nothing happens; check your scanner settings and make sure the QR Label setting is enabled.

On the supports, the tag is located on the bottom side of the foot. On special devices, it is located on a convenient flat surface that is not offensive to the appearance of the equipment but is still accessible for viewing. These numbers can be cross-referenced against the packing list. Loose parts are boxed and shipped separately. You should have all conveyor sections and supports for a particular conveyor prior to installation. It is cost-effective to identify and procure any missing parts before they are needed for assembly. Small items like nuts and bolts are weigh-counted and packaged by size and type.

|  |   |
|--|---|
|  <b>WARNING</b> |   |
|                 | <p>The Installation Supervisor must be experienced with conveyor and qualified in the mechanics of the equipment and enforce safe working procedures for the protection of the crew, customer, and customer's property.</p> |

|  |  |
|--|--|
|  <b>WARNING</b> |  |
|                 | <p>Before restarting a conveyor which has been stopped because of an emergency, an inspection of the conveyor must be made and the cause of the stoppage determined. The starting device must be locked out before any attempt is made to correct the cause of stoppage.</p> |



# Chapter 7: CRUZBELT APPLICATION & INSTALLATION DETAILS

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## General Procedures

The following procedures are to be used as guidelines only. Specific installation methods will vary somewhat depending on available equipment on site and each installer's preferences based on experience.

## 7.1: SUPPORTS & CONNECTIONS

**Roll Formed (RF) supports replace all existing MHS Conveyor floor supports.**

For details on Supports & Connections, see Support & Connections IOM (#1200485) at <https://mhs-conveyor.com/support/iom-manuals/supports-and-connections>

## 7.2: ENVIRONMENT

### Temperature range (ambient):

+35° to +100°F. For applications that exceed this temperature range, please consult Applications Engineering.

### Ultraviolet Rays:

Avoid exposure of polyurethane O-rings to sunlight.

### Oily or Wet Conditions:

Will impair frictional drive characteristics.

### Corrosive or Abrasive Substances:

Will adversely affect various components.

### Cleaning O-Rings

Manufacturer suggested for cleaning O-rings is to use a cloth with a de-natured alcohol when cleaning the O-ring. This cleaning product would also work for cleaning the rollers.

### Note:

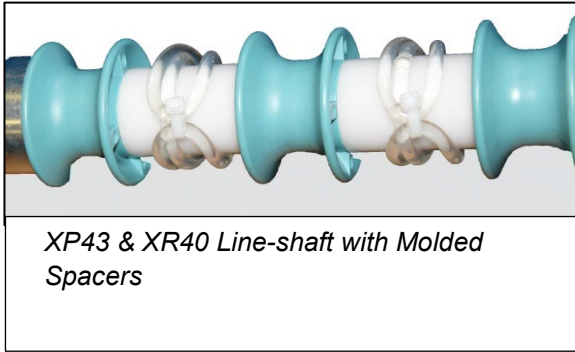
Do NOT immerse the O-rings or any component in a container of this cleaning product.

Accumulation with Application Engineering approval.

## 7.3: LINE-SHAFT EXTRA O-RINGS

### O-rings on Line-shaft

XP43 & XR40 Line-shaft with Molded Spacers



*XP43 & XR40 Line-shaft with Molded Spacers*

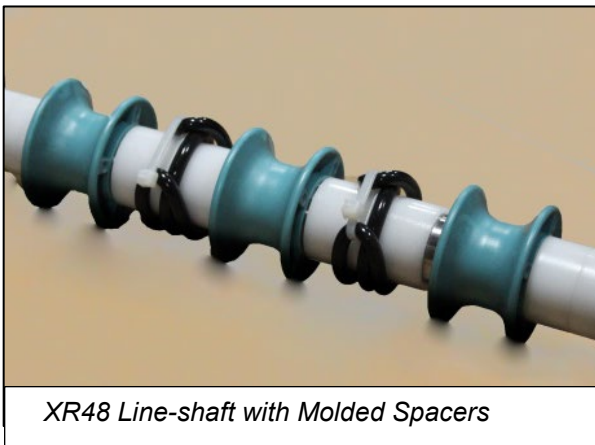
#### Spare Drive Belts:

Provided as full-compliment only. Full complement is: (1) O-ring provided on line-shaft spacers at least 1.74" long. For 3" centers only! (MHS Conveyor O-ring Part Number: **90530009**)

**Note: Extra belts cannot be provided with speedup pulleys.**

### O-rings on Line-shaft

XR48 Line-shaft with Molded Spacers



*XR48 Line-shaft with Molded Spacers*

#### Spare Drive Belts:

Provided as full-compliment only. Full complement is: (1) O-ring provided on line-shaft spacers at least 1.74" long. For 3" centers only!

(MHS Conveyor O-ring Part Number: **90560018**)

**Note: Extra belts cannot be provided with speedup pulleys.**

## 7.4: DIMENSIONAL REFERENCE POINTS

The path of each conveyor in the system is determined by establishing a reference point at each end. The centerline of the conveyor is established and a chalk line is snapped between these points.

Conveyors should be installed with the centerline of the bed matching the centerline of the conveyor path within 1/8" of true center. Locate and mark the center of the crossmembers at each end of the conveyor. Use a plumb line or other acceptable means to ensure accuracy to the chalk line.

Always carry out a thorough check for any obstructions such as building columns, manholes, etc. It may be necessary to reroute the conveyor to avoid the obstruction. In this case it would be advisable to begin installation at this point, using the obstruction as a reference point (Datum), and install the sections in either direction as required.

All conveyor sections must be checked for squareness prior to installation as "racking" or being knocked out of square may have occurred during shipping and handling. All conveyor sections must be checked for squareness prior to installation as "racking" or being knocked out of square may have occurred during shipping and handling.

## 7.5: ELEVATIONS

All conveyor sections should be installed in accordance with the elevations shown on the drawings. In addition, they must be level across the frame width and length (if horizontal). Leveling of the frames is best done using a rotating laser level or builder's level.

After the first elevation is established at a critical point, the elevation of all other points shall be relative to this first point. Normal practice is to dimension the layout and measure elevations from the floor at each point of support.

As the conveyor system proceeds onto another floor or into another building or room, a new elevation will be measured from the floor at that point. The new elevation will then become the reference from subsequent elevations.

When installing an overhead system, the first elevation is measured from the floor and becomes the reference elevation point until a change in the elevation is shown on the layout. Any new elevation is also measured from the floor and becomes the new reference point. The process is repeated each time an elevation change occurs.

### CAUTION

- Consult the building architect or a structural engineer regarding ceiling loading or structural limitations of the building if any conveyor is ceiling-hung.

## Component Orientation

Using your conveyor system layout drawing and the numbers on the I.D. tags of each component, position, and orient the conveyor section.

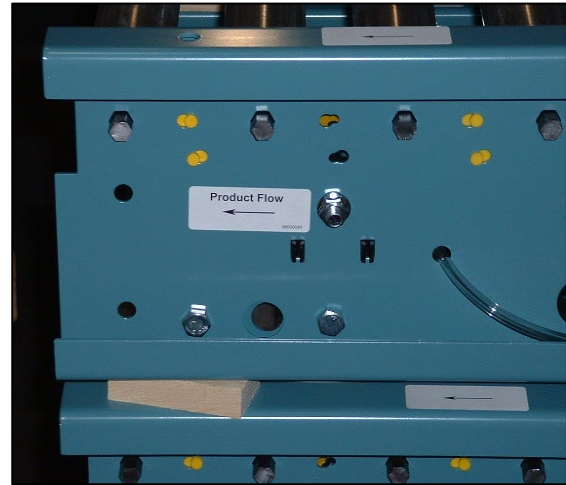
### You must know:

- The direction of product flow
- The elevation height
- How the drive is positioned
- Charge and discharge end beds

### Note:

**Line-shaft away from you. Product moving RIGHT – RH flow. Product moving LEFT – LH flow.**

**IMPORTANT!** Do not make alterations to the equipment without consulting with user's representative and MHS Conveyor. Unauthorized modifications to the equipment may impair its functions, create a hazardous condition, affect its useful life, and /or void the warranty.



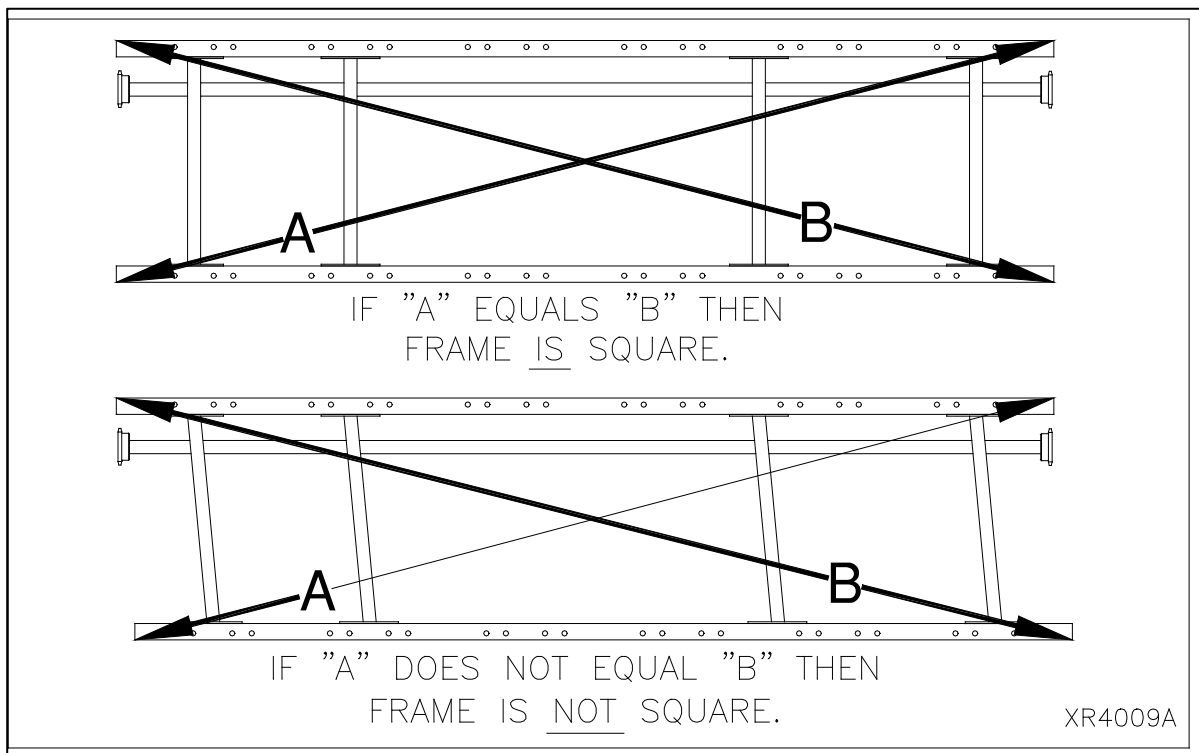
*Bed with product flow direction label.*

## 7.6: BASICS OF XP43 INSTALLATION

### General

XP43 conveyor may be installed using any of the supporting arrangements described under Support Arrangements in this manual. As each bed is installed in the system, level the conveyor from side to side using a bubble level on the roller at each support. The bubble location should be within the level indicator lines of the level. The center line of the conveyor should not bow to the right or left more than 1/8" in either direction from a center line drawn between the centers of the conveyor end assemblies.

A simple way to check this is to tie a nylon string around the center of the end roller, pull it taut, and tie it to the center of the roller at the opposite end. Put a wood spacer under the string at each end so it does not rest on the rollers. With the taut string centered on each end and suspended above the rollers, check the center of the rollers at each support relative to the string and adjust accordingly. (Note that this must be done after side-to-side leveling of the conveyor at each support.)



When joining bed frames it is important to align the rollers and line-shaft. Care must be taken to make sure the rollers are level (carrying surfaces) from bed to bed.

All bed frames should be checked for squareness. To check, measure diagonally from corner to corner. Measure the opposite corners in the same manner. If the bed is square, the two measurements will be the same within 1/16".

### NOTE:

Conveyor frames must always be installed in a straight line from end to end. After a number of sections have been installed to the chalk line and leveled, check the alignment of each line-

shaft assembly. As the conveyor sections are bolted together, the coupler sprocket alignment may require adjusting. The edge of the 1" diameter line-shaft must be 2" from the frame channel as an initial reference point (a business card can be used for measuring this 2").

## 7.7: COUPLER ALIGNMENT

### Check the alignment of each pair of coupler sprockets.

Loosen one coupler sprocket and slide it against the other.

If the coupler sprockets do not align vertically, adjust the following: Loosen the crossmember mounting bolts of two crossmembers in each bed and adjust the height of the crossmember within the limits of the mounting holes.

Retighten all 3/8-16 bearing bolts to 23 ft-lbs and 5/16-18 set screws to 13 ft-lbs.

Wrap Delrin coupling chain around both coupler sprockets.

Install pin and tighten all set screws to 13 ft-lbs.

Adjust the line-shaft for zero gap between sprocket faces and exact mating of teeth.

To align horizontally, loosen the bearings on two crossmembers on each bed.

Align the coupler sprockets with a gap of 9/32" between sprockets after loosening both set screws in one sprocket.

Coupler misalignment outside these specifications may cause the connecting pins to loosen and/or cracks will appear in the chain links.

**NEVER REPLACE A BROKEN COUPLER CHAIN WITHOUT ALIGNING THE SPROCKETS.**

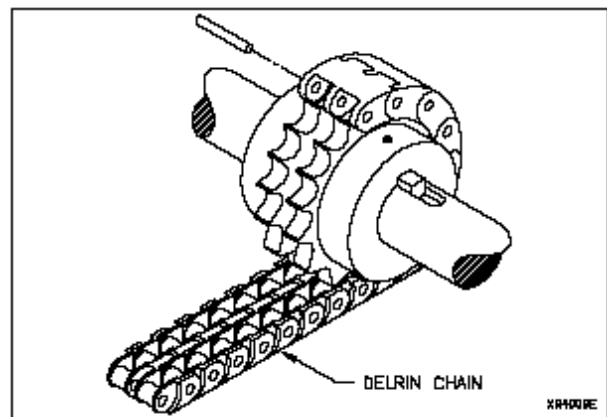
### Coupler Chains

When the line-shafts and coupler sprockets are properly aligned, the coupler chain will easily wrap around the sprockets to complete the coupling. If the chain does not wrap easily, stop and recheck alignment and spacing. The more accurate the coupler alignment, the longer the service life of the Delrin chain.

Connecting the coupler chain is accomplished by inserting the serrated pin through the side of the double wide Delrin coupler chain. Care must be exercised when installing the press fit pin to ensure the side link opposite the insertion side is not damaged. Support the chain link by using a channel lock pliers or similar tool. Start the coupler chain wrap in a position providing the greatest access to the connecting point.

**TIP!** The chain link can be supported by using a channel lock adjustable pliers and squeezing the pin in. This also requires less clearance than using a small hammer and tapping the pin in.

Carefully note from the system layout drawings, any bed joint locations which are not to be coupled due to the ending of that conveyor drive. Those coupler sprockets must be removed







**BEFORE** the beds are installed. This will also prevent the mistake of putting on all coupler chains before realizing which joints are not to be coupled.

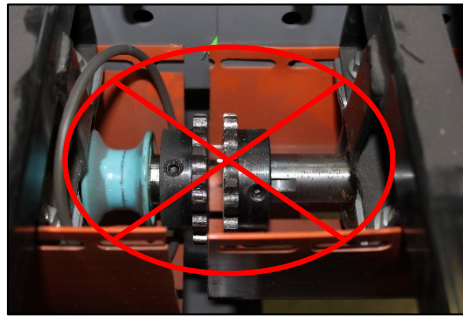
Coupler chains transmit the torque load of that portion of the conveyor located between the coupler and the termination of that conveyor. The highest coupler load will be those located at each end of the drive bed. Excess load will cause premature failure. The maximum load is based on horsepower required torque at a given speed, i.e. 1 HP maximum at 60 FPM or 1.9 at 90 FPM. Horsepower allowed is directly proportional to the speed up or down.

A rule of thumb would be to locate the drive bed as close to the center of the conveyor as possible to center the torque load on the Delrin coupling chains. This is more important at slow speeds than at high speeds. At 90 FPM and above the drive location is not as critical.



The substitution of steel coupler chain is not recommended on the standard coupler sprocket. The use of steel chain on standard coupler sprockets will void the warranty. Steel coupler chain also requires periodic lubrication.

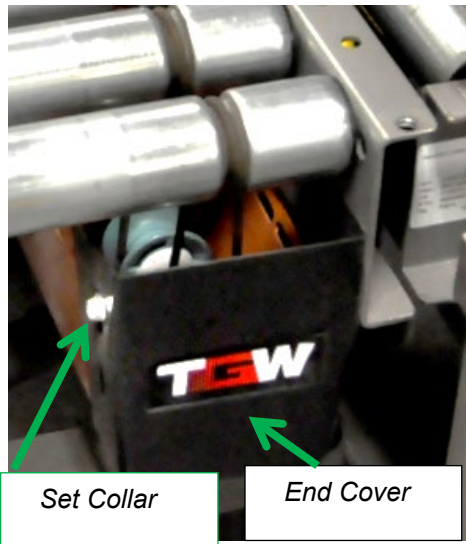
## 7.8: LAYOUT DIMENSIONS CONTINUED



|  <b>WARNING</b> |   |
|--|---|
|                 | <p>Remove any coupler sprocket which is not coupled to an adjacent sprocket. These sprockets must be removed <b>BEFORE</b> the bed is installed. The white line-shaft safety caps must be installed in place of the sprockets to cover the end of the keyway.</p> |

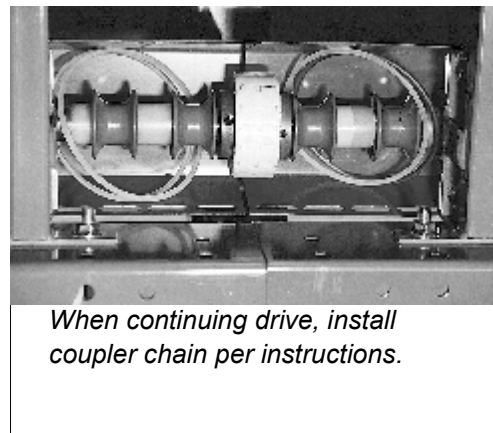
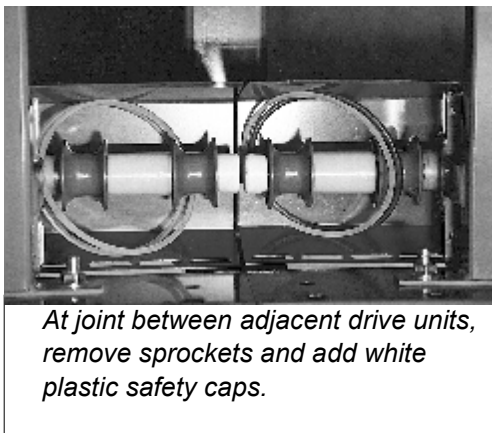


*Never leave unused sprockets on line-shaft.*

|  <b>WARNING</b> |   |
|--|---|
|                 | <p>At the termination of the XenoROL® line-shaft-driven conveyor(s), the open end of the line-shaft guard must be covered with the end cover kit provided with each drive bed or in the loose parts. This kit includes instructions, mounting hardware and 1" bore set collar. The set collar replaces the unused coupler sprocket. This end cover must be used at all exposed ends including XenoROL terminations abutting other types of conveyor or machinery.</p> |





|  |  |
|--|--|
|  <b>WARNING</b> |  |
|               | <ul style="list-style-type: none"> <li>• Safety caps are required on ends of all adjoining line-shaft conveyor beds not coupled together.</li> </ul> |



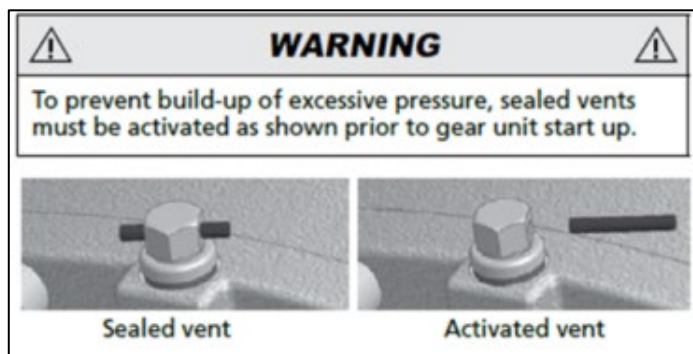
## 7.9: GEAR MOTOR ACTIVATION

PRIOR to systems activation - Please inspect the gear unit for a vent and if applicable to the product remove the rubber sealing plug to activate. The vent is designed to allow excessive pressure to escape. Each gear unit should have a yellow instruction tag as shown below. The tag can be removed after the plug is removed.

**Note:** The rubber sealing plug is in place for shipping and storage purpose only.

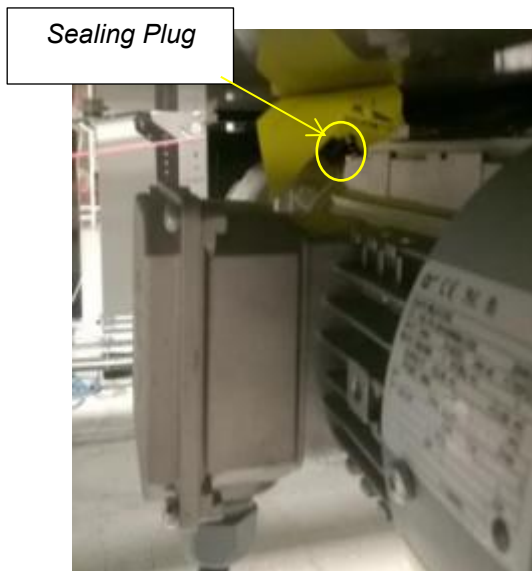
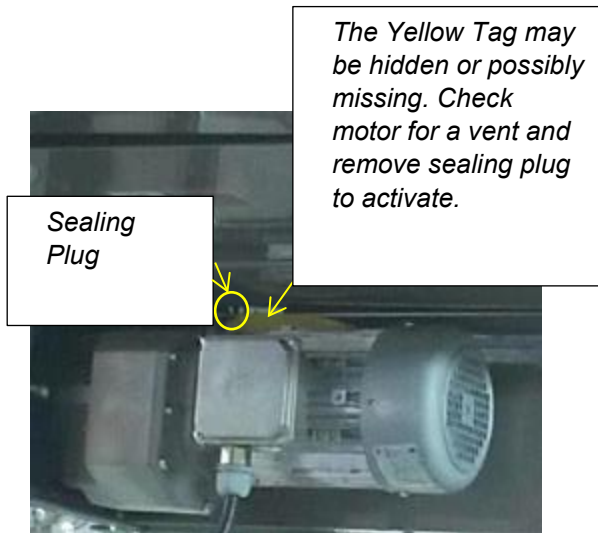
|  |   |
|--|---|
|  <b>WARNING</b> |   |
|                 | <p>In order for the gear motor to release pressure, the vent must be activated by removing the rubber sealing plug PRIOR to gear unit start up.</p> |

Please check you gear unit for a vent and if applicable to your product, remove the sealing plug to activate. "<https://www5.nord.com>" Operation Manual for Gear Units (B1000).

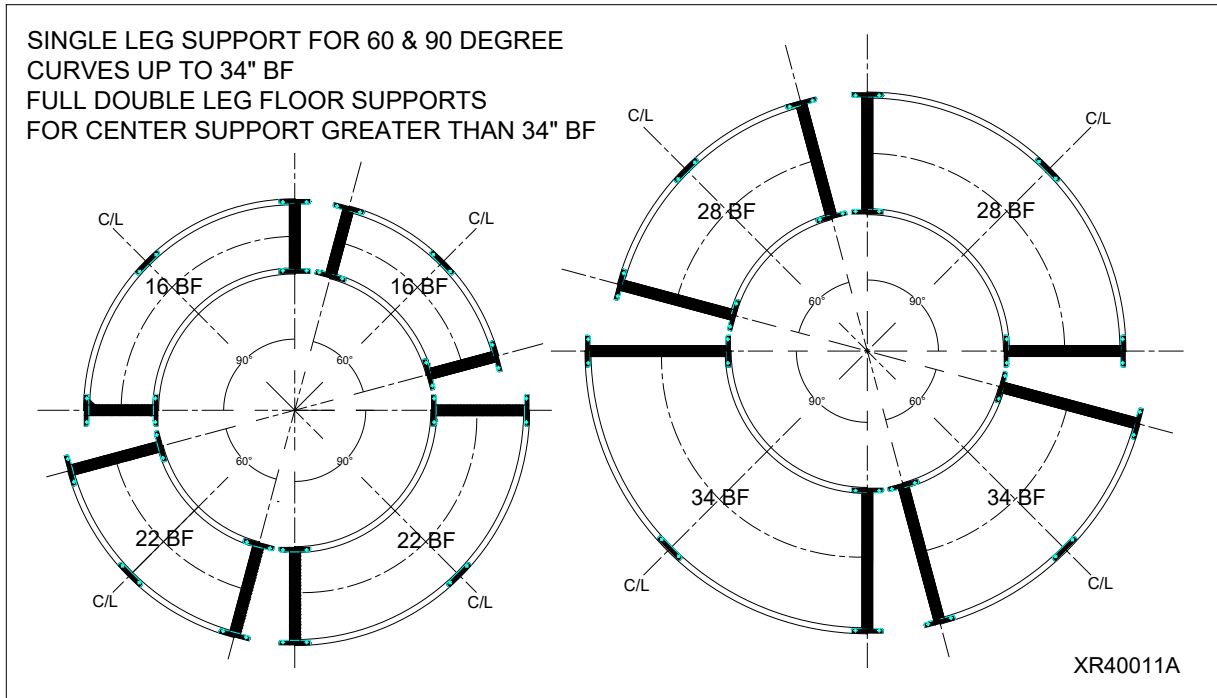


**Note:** Yellow tags may be tucked out of sight. Please inspect all motors for a vent and remove sealing plug, if present, to activate.

The following pictures are examples showing where vent plugs may be located depending on the product line and motor position.



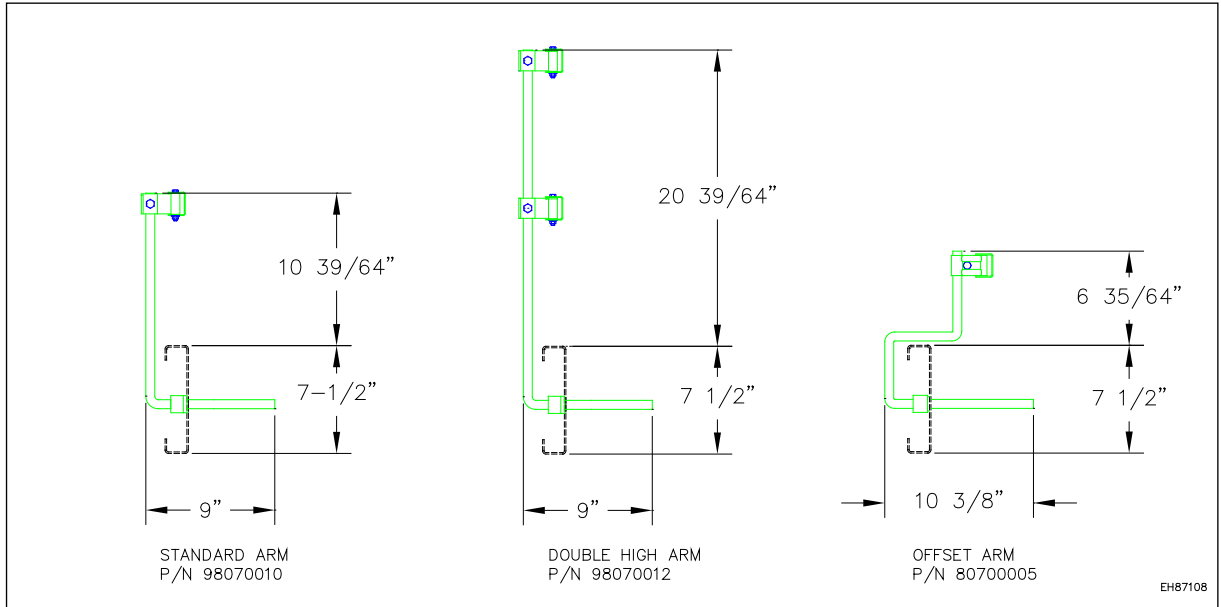
## 7.10: CURVE SUPPORT POINTS



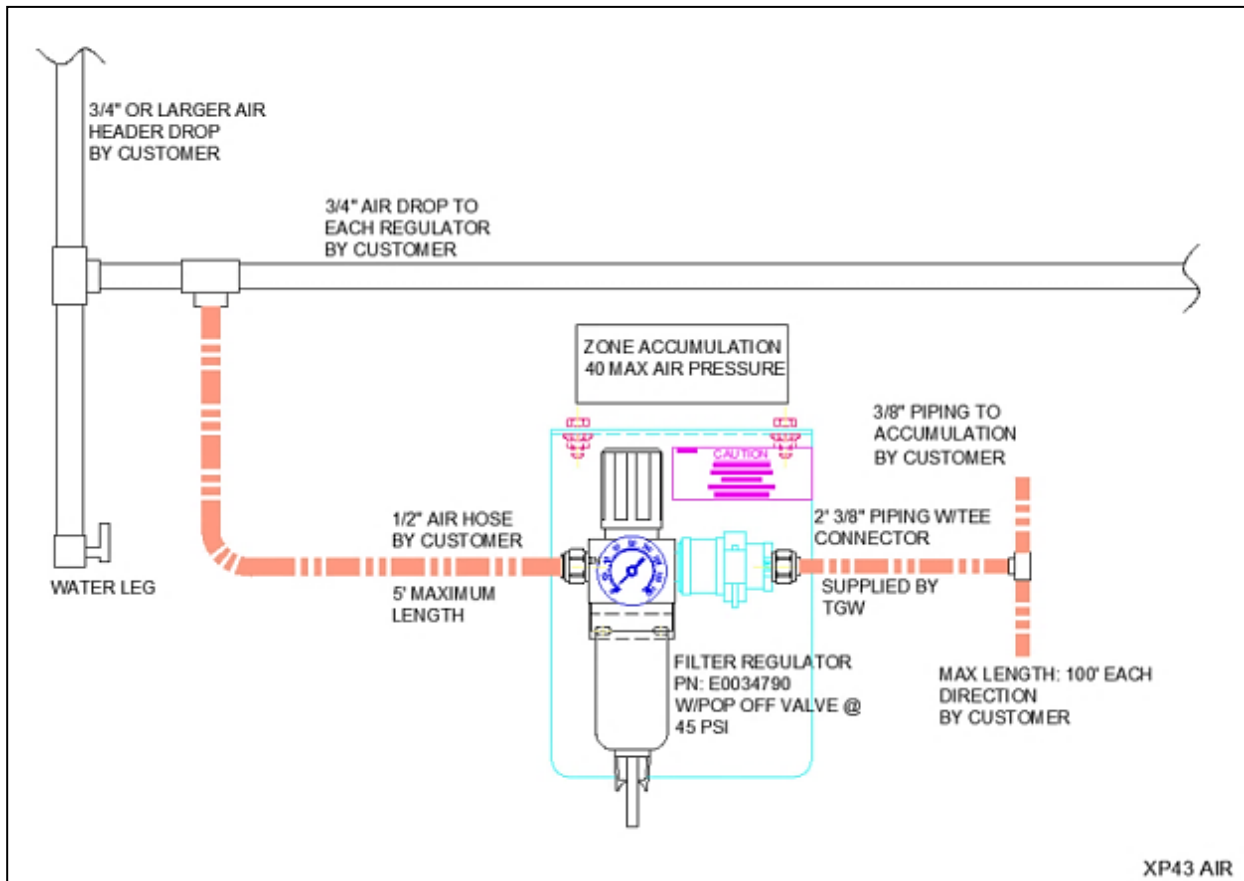
This curve illustration indicates proper support locations for curves of various degrees and widths. The dark lines indicate a full width support. A single dark line on the outside center of the curve indicates only the outer curve rail is supported with either a ceiling hanger drop at that point or a single leg floor support.

If a full width support with crossmember is supplied where only a dark line is indicated, use the full support.

## 7.11: ADJUSTABLE CHANNEL GUARDRAIL TO CRUZCHANNEL OPTIONS



## 7.13: AIR SUPPLY REQUIREMENTS



### General

Every conveyor system is unique, with its own specific requirements. Therefore, the following are a general guidelines.

### Main Feeder

Air velocity through the main feeder piping can be kept smooth with lower losses using large diameter pipe with minimum bends and restrictions. Standard weight black pipe or copper is suitable for plumbing the compressed air overhead to all points of use. PVC and aluminum piping are also commonly being used.

### Air Drops

MHS Conveyor recommends using 3/4" pipe on air drops for high flow and low pressure loss. The drop is terminated with a drain at the bottom. A tee located prior to the drain branches off to the conveyor. This branch line must contain a lockout/shutoff. A shutoff must also be located in the drop before the branch tee. OSHA Rule 29, CFR1910.147 requires energy sources (air drops) be turned off and capable of being locked or labeled with a warning tag.

### Note:

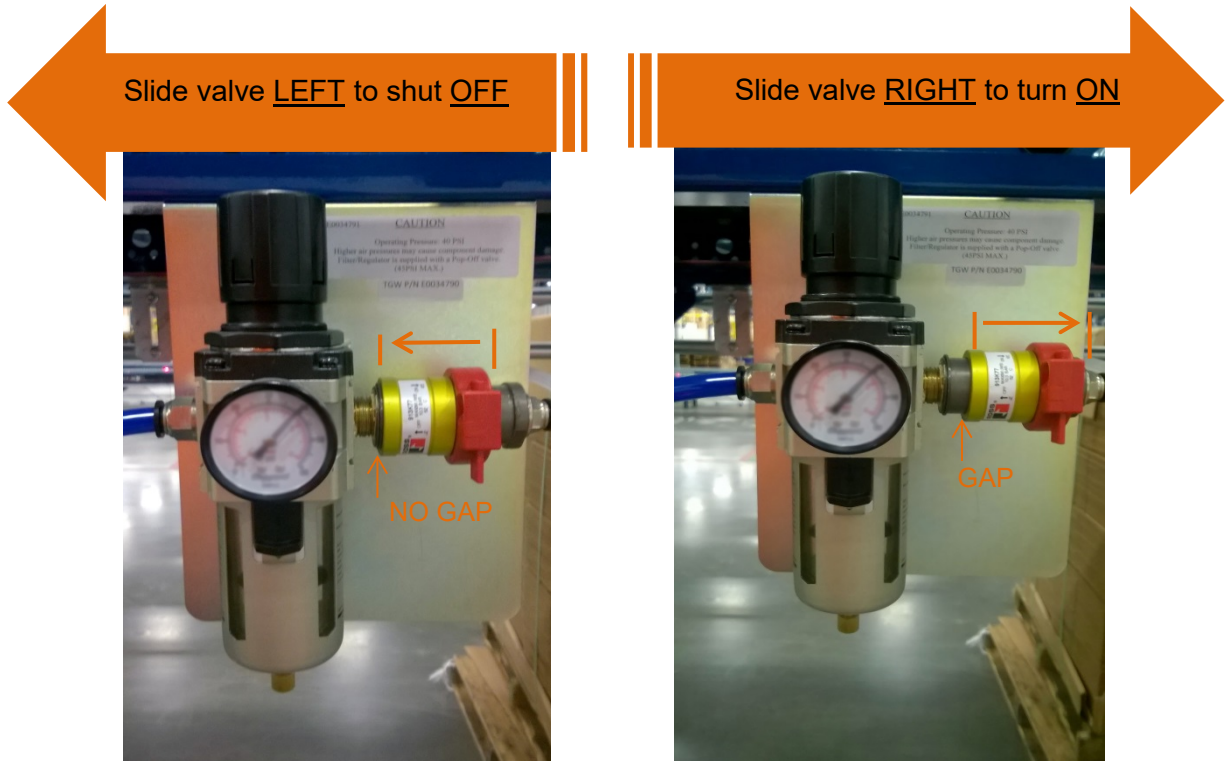


The pneumatic system for product installations does not require lubrication. Lubrication may affect the valving operation and cause sluggish or erratic operation.

## CAUTION

- All factory air lines must be thoroughly blown out to clear all debris. The regulator must be set at 40 PSI prior to connecting air to XP43.
- If your air compressor uses synthetic oil, a coalescing filter plus a regular filter of 5 micron is required.
- Synthetic oils will shrink the seals in pneumatic devices and valving.

## 7.14: AIR REGULATOR LOCK OUT VALVE ON AND OFF POSITION



### Note:

- The air regulator valve label details the on and off positions.
- For air pressure regulations please see detailed instruction in this manual.

|  |  |
|--|--|
|  <b>WARNING</b> |  |
|                 | <p>Do not remove and install sleeve valve to infeed side of regulator. Back feeding through the regulator will cause damage and void the warranty.</p> |

## 7.15: LOW PRESSURE SWITCH

An air pressure switch is recommended to be installed into the pneumatic circuit to detect a drop in air pressure below required levels. If pressure drops below approximately 35 PSI, the conveyor system will shut off.

### Pneumatic Requirements

- Regulator pressure set at 40 PSI.
- Maximum conveyor length each way from regulator is 100'.
- Locate regulator in center of conveyor for efficient air pressure distribution.
- MHS Conveyor supplied low pressure regulator is required.
- Customer supplied low pressure switch to be set at 35 PSI.
- In high humidity or low temperature, use air dryer.
- Use 5 micron filter.
- Lockout/shutoff valve to be provided by air system installer on high pressure side of regulator.

### CAUTION

Never operate the XP43 over 45 PSI. Conveyor will be damaged at pressures over 45 PSI.

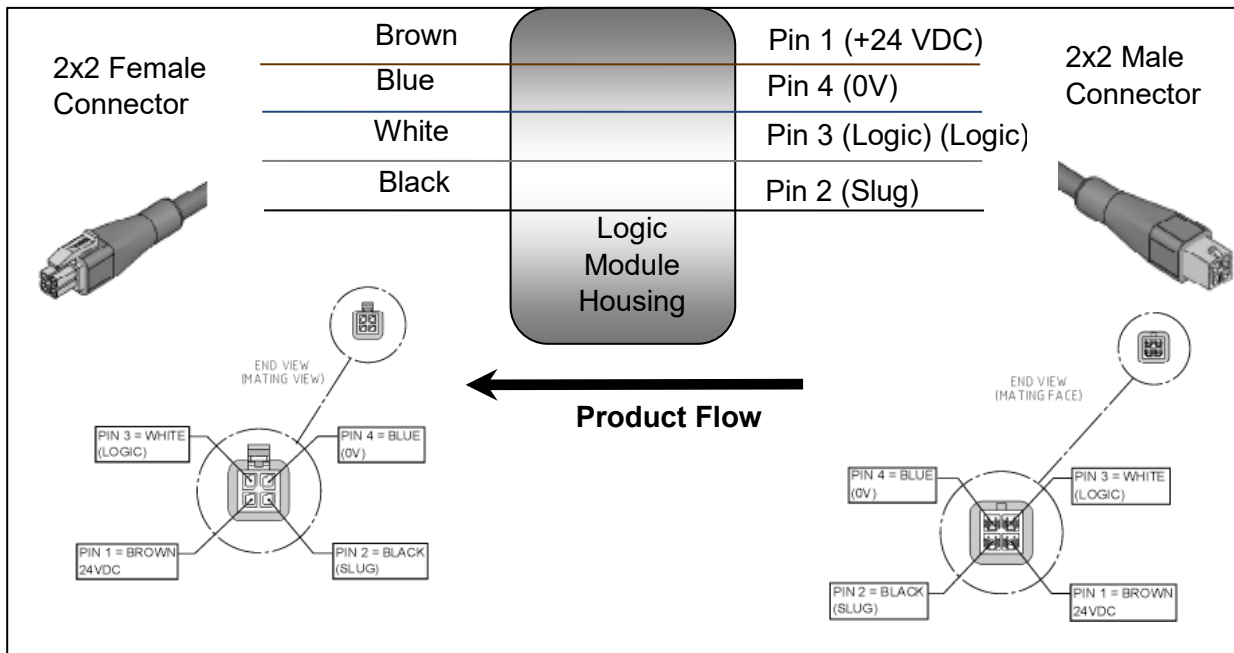
## 7.16: CRUZCONTROL ON SITE INSTALLATION

Installation of CRUZcontrol on site will consist of the following:

- Connection of Air Supply air tubing between conveyor beds, closing and terminating the ends of the Air Supply tubing, and providing the air supply to the conveyor.
- Connection of the Logic Assembly interconnection cables from the last zone of a conveyor bed to the first zone in the next upstream conveyor bed.
- Providing a suitable 24 VDC power supply and connecting it into the string of Logic Assemblies.
- Providing a Singulation Release signal for the discharge zone (using Function Module).
- Providing a Slug Release signal for the discharge zone, if required (using Function Module).
- Obtaining Zone Status indications as required for system control.
- Terminating unconnected cable ends with Termination Plugs. This is suggested to protect the cable ends from damage.
- Adding auxiliary photoelectric sensors as required for discharge and full line condition sensing.

| MHS Conveyor part number | Description   |
|--------------------------|---|
| 90139992                 | Male Termination Plug (use for terminating male cable ends)     |
| 90139994                 | Female Termination Plug (use for terminating female cable ends) |


## 7.17: LOGIC MODULE WIRING





**CRUZcontrol will come pre-installed on the conveyor with the following:**

- The CRUZcontrol Logic Assemblies are installed on the same conveyor side channel that zone brakes are located.
- The air supply for the conveyor is plumbed the length of the conveyor bed, passing through each Logic Assembly. To connect the next bed's first module, enough tubing is provided at the ends of the conveyor bed.
- The zone control air is plumbed from the Logic Assembly to the zone air pucks or cylinders by  $\frac{1}{4}$ " of dia. clear tubing.
- The photoelectric sensors are mounted for each zone, along with the reflector across the conveyor bed. The photoelectric sensors are tested to insure proper alignment with the reflectors, as well as proper functioning of the Logic Assemblies.



## 7.18: ELECTRICAL / GEARMOTOR

|  <b>WARNING</b> |  |
|--|--|
|                 | <p>All electrical controls must be installed, wired, and connected by a licensed electrician.</p> <p>Do not connect the motor to any other voltage than stamped on its metal name plate.</p> |

All motor controls and wiring must conform to the National Electrical Code as published by the National Fire Protection Association and approved by the American National Standards Institute, Inc. In addition, since specific electrical codes vary from one area to another, be sure to check with the proper authorities before starting the electrical wiring.

|  <b>WARNING</b> |  |
|--|--|
|               | <p>All Standard Gearmotor with brake Coil Rectifiers are Half-Wave and are suitable only for 480VAC.</p> <p>Using standard Gearmotor with Brake at 240VAC will void the Gearmotor with brake warranty.</p> <p>Contact Distributor Services for the correct rectifier for your intended voltage if other than 400-480VAC.</p> |

The voltage of the motor will be stamped on the name plate. This voltage must match available voltage. Consult the wiring diagram on the motor for proper connections. If a single direction conveyor with a 3 phase motor runs the wrong direction, two leads must be switched to reverse rotation.

|  <b>WARNING</b> |  |
|--|--|
|                 | <p>VFD s (variable frequency drive) motor controllers may not be directly connected to any Gearmotor with brake. Brake Coil Rectifier as they are not compatible and the motor/brake will not completely release.</p> <p>VFD connection to Brake Coil Rectifier will void Gearmotor with brake warranty.</p> |

Consult the wiring diagram of the inside cover of the starter and pushbutton for the proper electrical connections. Three phase drives require transformers to reduce the pushbutton and

control circuit to 115 volts. If primary voltage is changed, the transformer must be changed, according to the wiring diagram found on the transformer.

**NEMA enclosure ratings are as follows:**

NEMA 1- Indoor use, provides protection against contact with internal components. Suitable for use in warehouse and distribution environments.

**Gasket**

NEMA 1- Same use as NEMA 1, but with additional protection against dirt and dust.

NEMA 3- Outdoor use, designed to keep out rain and dust.

NEMA 4- Indoor and outdoor use, designed to keep out rain and dust.

NEMA 12- Indoor use, provides protection against dust, dirt, oil seepage, and dripping of non-corrosive liquids. Suitable for use in industrial environments.

NEMA 13- Indoor use, provides protection against dust, dirt, sprayed oil and non-corrosive liquids.

**NOTE: All the controls logic, safety switches, and some special devices are covered by the original manufacturer's warranty.**



Conveyor in areas of high pedestrian traffic should also be protected by emergency stop devices.

Emergency stops should be located throughout a system. Their location will depend on likely observation points and areas with special devices or interfaces between equipment.

Emergency stops can be a pushbutton or cable operated switch. The pushbutton should be mushroom-style and red. The pushbutton must require resetting after actuation. Cable operated switches should trip by pulling the cable and require resetting at the switch.

An emergency stop should normally stop all conveyors in the system. Very large systems may involve dividing the system into zones of control.

Actuating an emergency stop must drop out the start circuit and require restarting the system using the start pushbutton.

|  |   |
|--|---|
|  <b>WARNING</b> |   |
|                 | <p>Before restarting a conveyor, which has been stopped because of an emergency, an inspection of the conveyor shall be made and the cause of the stoppage determined. The starting device shall be locked out before any attempt is made to correct the cause of the stoppage.</p> |

## 7.19: CONTROLS LOGIC

Solid state controls logic devices, such as programmable controllers, are used extensively for conveyor control. They are very reliable, but a hardware failure or software bug could cause an output to malfunction. For this reason, start circuits, warning horn circuits, and emergency stops should usually be configured using conventional relay logic.



### Safety Switches

All conveyor control cabinets and motors should be provided with safety (or disconnect) switches. These switches must have provisions for padlocking. As required for maintenance, equipment should be locked in the OFF position.

### Special Devices

Special devices and equipment such as vertical lifts, turntables, high speed conveyors etc. all have unique design and safety requirements and should be evaluated individually.

## 7.20: ELECTRICAL WARNINGS AND CAUTIONS

|  |  |
|--|--|
|  <b>WARNING</b> |  |
|               | <p>Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.</p> |

|   |  |
|---|--|
| <b>CAUTION</b>  |  |
| <p>To ensure safe operation of this product, a qualified electrician must perform installation and servicing. Check with local codes before installation.</p> <p>For maximum protection, follow UL listing requirements. The input line cable and line fuses must be sized in accordance with the rated input current of the unit.</p> <p>Do not make any connections when the Function Module is connected to the AC/DC utility/supply line.</p> <p>Before applying power to the module, make sure that the cover of the Function Module is closed.</p> <p>Any motor cables should cross CRUZcontrol cables at an angle of 90 degrees.</p> <p>If conduit is being used for wiring, use separate conduits for the input power wiring, the output power wiring, the signal wiring and the control wiring.</p> <p>Serviceability / Field Repair: Device is not serviceable.</p> |  |



## CAUTION

CRUZcontrol Logic Assemblies are designed to be fail-safe. A loss of module power, a disconnected or severed cable, or a dirty or failed photoelectric sensor will all result in the stopping of a zone, initiating accumulation beginning from the affected zone.

In Progressive Logic mode, failure of a Logic Assembly to function properly could possibly result in product accumulating with zones not stopping as required. While this should be unlikely due to the fail-safe nature of the Logic Assembly, a product jam preventing product from blocking a zone sensor would also result in a zone not functioning. The effects of such a failure should be considered. This type of failure could result in excessive line pressure, eventually causing product to push through the discharge zone of the conveyor. If needed, jam detection sensors should be used to minimize the effects of such a failure.

Conveyors should not be operated with 100% of the logic modules switched to the progressive mode in the contact accumulation mode. This could cause line pressure issues if there is a jam since in the release mode, progressive ignores the photo sensors and dumps all the zones at once, in the same way slug discharge operates. **In the progressive release mode for contact accumulation, it is extremely important to set every 5th logic module to basic. Do not set all logic modules to progressive unless your line is under 20' long.** This limits a product jam condition line pressure to 16' of conveyor. Failure to set every fifth logic module to basic can result in extreme line pressures that can damage your conveyor, product and could cause injury.

CRUZcontrol provides the ability to slug release. If the line is set to Slug Release, all affected zones will run immediately, regardless of downstream conditions, resulting in the immediate release of product with little or no gaps. Both the Basic and Progressive Logic modes will release at the maximum possible discharge rate when slug release is enabled. Slug release does create a situation where a product jam will result in excessive line pressure buildup. If the slug release feature is used, it should be used with caution, and for a limited number of successive accumulation zones.

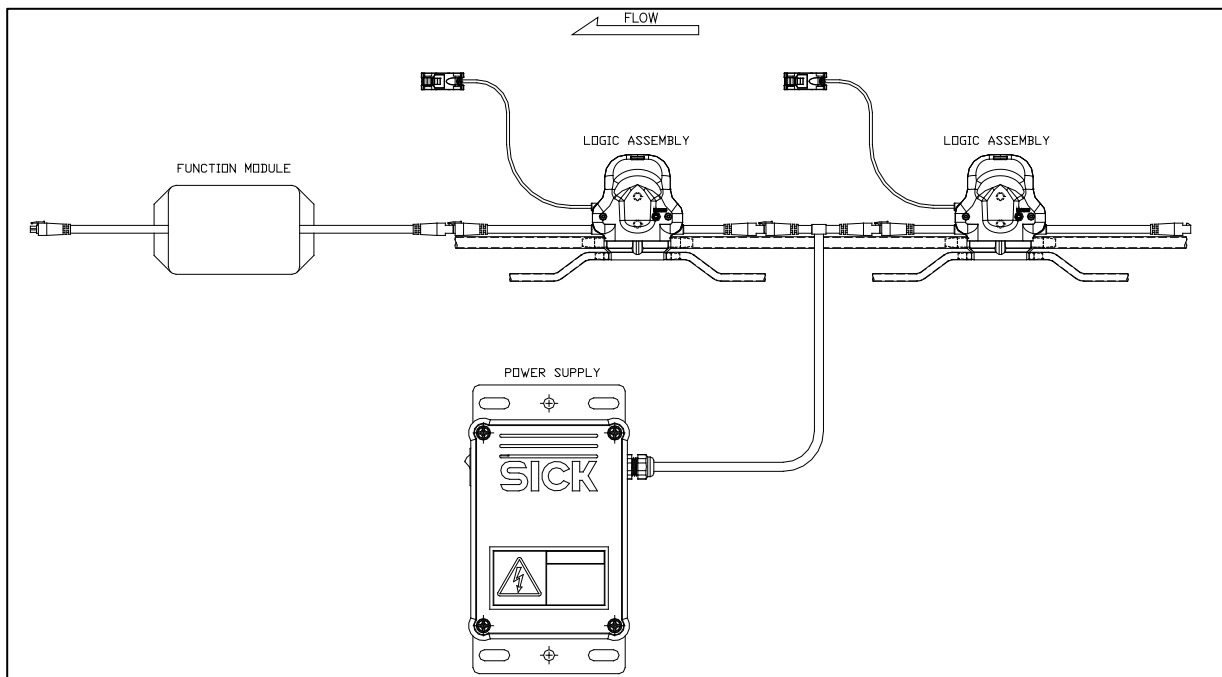
The "Air to Brake" operation requires a consistent supply of air to operate safely and predictably. The system air supply should be monitored by a customer supplied air pressure switch to insure that adequate air pressure is available before operating conveyors.

## 7.21: CRUZCONTROL CONCEPTS

The CRUZcontrol product line is a set of off the shelf components used to setup accumulation and discharge on XP43 conveyor. It consists of logic modules that detect product and control accumulation, function modules that release product, and 24VDC power supplies. There are also accessories such as sensors and cables to ease installation and interfacing.

*CRUZcontrol is a 24VDC system that will automatically start accumulation when product reaches the end of an accumulation line. When a release signal is applied to a function module that is installed at the discharge end of an accumulation line, the product will begin to release. Product will continue to release until the signal is removed. The type of accumulation that occurs is based on the mode that the logic assembly has been configured for. The type of product release is based on logic assembly mode and function module setup.*

Figure 1: Basic Concept Layout



## 7.22: CRUZCONTROL LOGIC TYPES

XP43 uses standard MHS Conveyor CRUZcontrol to accumulate and release product. Pneumatic brakes are employed to stop the line-shaft driven roller zones as the products accumulate. It is critical that the accumulation zones are longer than the longest product.

XP43 is a non-contact accumulator. This feature makes this conveyor ideal for “work in process” applications where sensitive products are being handled. In distribution warehousing applications, it is important to remember that XP43 will not dense pack mixed size product.

All product movement as described for transportation, accumulation, and discharge is based on zone length meaning only one product is in each zone. If more than one product should occupy a single zone, which could occur with small products, they will usually move together and stop together, but they could eventually become separated into different zones. This is true for both Basic Logic and Progressive Logic.

## 7.23: BASIC LOGIC

### Accumulation in Basic Logic Mode

Basic Logic functions such that when any two successive photoelectric sensors are blocked, the third zone’s logic module upstream is set to accumulate. Once a zone is in accumulation mode any product sensed in that zone will be accumulated (stop carrier roller) until product is not sensed in the downstream zone.

Products being transported on a Basic Logic conveyor are separated by a gap of one zone length minus the product length. This will reduce the transportation throughput capacity of the conveyor. The speed at which product is introduced onto an accumulation conveyor of this type must not exceed the speed of this accumulation conveyor.

### Single Discharge from Basic Logic

A Singulation Release signal given to the function module will release product from the discharge zone. As released product clears the discharge photoelectric sensor, product stopped at the next upstream zone is released. This will create a one-zone length gap between all released products; assuming conveyor speeds (accumulation conveyor and downstream conveyor) are the same.

### Slug Discharge from Basic Logic

A slug release signal given to the function module will release product in all connected zones simultaneously, resulting in the release of product with existing gaps.

### Configuration Options

The Progressive Logic mode would allow the conveyor to receive and transport product at higher throughput rates, while the Basic Logic mode would provide a Singulation of product from the discharge zone.

## 7.24: PROGRESSIVE LOGIC

### Accumulation in Progressive Logic Mode

A zone is not set to accumulate product until all downstream zones hold accumulated product.

### Discharge from XP43 Controlled Zones

A Singulation Release signal releases product from all accumulated zones at the same time. The gap between released products will be dependent on the product size, the number of products occupying each accumulation zone, and the conveyor speed.

Progressive mode only allows slug release. All zones connected together will be activated simultaneously. A Release signal given to the function module will release product in all zones, resulting in the release of product with existing gaps. A release signal can be given to the function module on TB1- single release or TB2- slug release, with no difference in operation.

### Caution

CRUZcontrol Logic Assemblies are designed to be fail-safe. A loss of module power, a disconnected or severed cable, or a dirty or failed photoelectric sensor will all result in the stopping of a zone, initiating accumulation beginning from the affected zone.

With Progressive Logic, failure of a Logic Assembly to function properly could possibly result in product accumulating with zones not stopping as required. While this should be unlikely due to the fail-safe nature of the Logic Module Assembly, a product jam preventing product from blocking a zone sensor would also result in a zone not functioning. The effects of such a failure should be considered. This type of failure could result in excessive line pressure, eventually causing product to push through the discharge zone of the conveyor. If needed, jam detection sensors could be used to minimize the effects of such a failure.

CRUZcontrol provides the ability for slug release. If the line is set to Slug Release, all affected zones will run immediately, regardless of downstream conditions, resulting in the immediate release of product with existing gaps. Both the Basic and Progressive Logic Assemblies release at the maximum possible discharge rate when slug release is enabled. Slug release does create a situation where a product jam will result in excessive line pressure buildup. If the slug release feature is used, it should be used with caution, and for a limited number of successive accumulation zones.

## 7.25: CRUZCONTROL LOGIC COMPONENTS

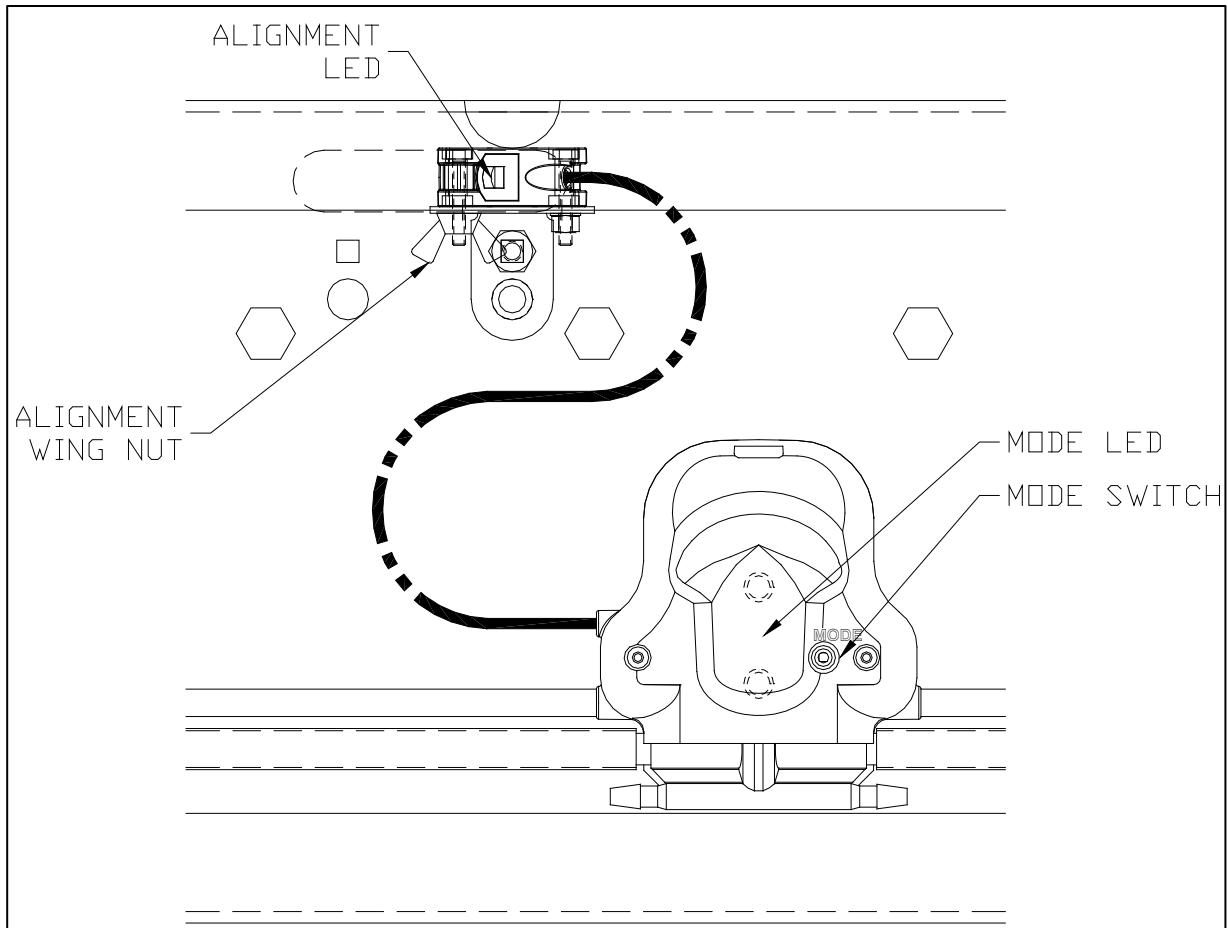
### CRUZcontrol Logic Assembly

The CRUZcontrol Logic Assembly consists of a polarized retro-reflective type photoelectric sensor, pneumatic valve and logic module integrated into one assembly.

The photoelectric sensor will function reliably on conveyor widths up to 34 inches between frames. The sensor is polarized, and is not affected by shiny surfaces.

*The sensor bracket as provided allows for easy adjustment of the sensor. An amber LED output indicator on the back of the sensor aids in the adjustment of the sensor. The LED is off if the sensor is not aligned, flashes if functional but marginally aligned, and is on steady if properly aligned. A green LED indicates power on status.*

Figure 2: Logic Assembly Mode & Alignment



## Logic Module Assembly

The CRUZcontrol Logic Module Assembly P/N: 1115898 or 1114947 provide an “air to brake” logic output (a “normally open” solenoid condition). When the logic module has power and the photoeye sees its reflector, its air valve will be in the closed position and brakes down.

## Logic Assembly Functions

The CRUZcontrol Logic Module Assembly comes with a momentary button on the front of the housing allowing for selection of either Basic Logic or Progressive Logic mode. A Mode LED indicates either Basic (green) or Progressive (amber) has been selected. Pressing and then releasing the button toggles between the two modes.

*Table 1: Logic Assemblies Functions*

| Function          | Basic Logic | Progressive Logic |
|-------------------|-------------|-------------------|
| Single Accumulate | Yes         | No                |
| Slug Accumulate   | No          | Yes               |
| Single Release    | Yes         | No                |
| Slug Release      | Yes         | Yes               |

*Table 2: Logic Assemblies Part Numbers*

| Part Number | Description   | Used with                              |
|-------------|---|--|
| 1115898     | Basic/Progressive Logic Module, Air to Brake. LM, PE, Mounting Bracket, & Hardware, | XP43 straight conveyor and XP43 curves |
| 1114947     | Basic/Progressive Logic Module, Air to Brake. Logic Module and PE Only!             | XP43 straight conveyor and XP43 curves |

## 7.26: FUNCTION MODULES

The Function Module provides electrical isolation for external controls and creates controllable zones to facilitate CRUZcontrol applications.

### Function Module Types

There are three different Function Modules, each providing certain functions.

*Table 3: Function Module Functions*

| Part Number |                         | Single RLS | Slug RLS | Pulsed RLS | Zone Stop | Zone Delay | Logic INT | Slug INT | Zone Status |
|-------------|-------------------------|------------|----------|------------|-----------|------------|-----------|----------|-------------|
| 1138074     | Full Function Module    | x          | x        | x          | x         | x          | x         | x        | x           |
| 1138075     | Release Function Module | x          | x        |            | x         |            | x         | x        |             |
| 1138078     | Zone Status             |            |          |            |           |            |           |          | x           |

### Function Module Functions

| Single Release |   |
|----------------|---|
| Definition     | Only the discharge zone releases, when the discharge photoeye is clear the next zone releases. The discharge zone will continue to release until the release signal is removed.     |
| Configuration  | The logic assemblies must be in basic mode (mode LED is green).<br><br>When releasing from the discharge end of the conveyor line all jumper terminals should be on pins 1-2.       |
| User Action    | Apply a high (24Vdc/120Vac) release signal to TB1, 1-2 if using isolated inputs,<br><br><b>Or</b><br><br>Apply a high (24Vdc) release signal to TB4, 3 if using non-isolated input. |

| <b>Slug Release</b> |  |
|---------------------|--|
| Definition          | All zones that are connected in one continuous string release at the same time regardless of zone status. All zones will continue to release until the release signal is removed.  |
| Configuration       | The logic assemblies can be in basic or progressive mode.<br><br>When releasing from the discharge end of the conveyor line all jumper terminals should be on pins 1-2.  |
| User Action         | Apply a high (24Vdc/120Vac) release signal to TB2, 1-2 if using isolated inputs, the logic assemblies can be in basic or progressive mode.<br><br><b>Or</b><br><br>Apply a high (24Vdc) release signal to TB4, 3 if using non-isolated inputs, the logic assemblies must be in progressive mode. |

| <b>Pulse Release</b> |   |
|----------------------|---|
| Definition           | Upstream Logic Assembly releases for a length of time set by ZS ON (0-20s) and then accumulates for length of time set by ZS OFF (0-20s). |
| Configuration        | When releasing from the discharge end of the conveyor line jumper terminal JP3, NC - all other jumper terminals should be on pins 1-2.    |
| User Action          | Apply a high (24Vdc/120Vac) release signal to TB1, 1-2.   |

| <b>Logic Interrupt</b> |   |
|------------------------|---|
| Definition             | Breaks release signal from downstream Logic Assembly. Upstream zones are forced to accumulate despite downstream zone status. |
| Configuration          | When using TB1 to release set jumper terminal JP3, 2-3<br><br>When using TB4 to release set jumper terminal JP4, 2-3.         |
| User Action            | Apply a high signal to TB1 (24Vdc/120Vac) or TB4 (24Vdc). No action required for interrupt for release.                       |



| <b>Zone Delay</b> |  |
|-------------------|--|
| Definition        | After the downstream zone clears, the upstream zone releases only after the time set by the Logic Delay potentiometer has expired. |
| Configuration     | Adjust Logic Delay potentiometer from 0 to 20 seconds.   |
| User Action       | No action required   |

| <b>Slug Interrupt Downstream</b> |  |
|----------------------------------|--|
| Definition                       | Logic Assemblies downstream of the Function Module will not slug release when the Slug Release signal goes high. |
| Configuration                    | JP1, 2-3 all other jumper terminals should be on pins 1-2.   |
| User Action                      | No action required   |

| <b>Slug Interrupt Upstream</b> |  |
|--------------------------------|--|
| Definition                     | Logic Assemblies upstream of the Function Module will not slug release when the Slug Release signal goes high. |
| Configuration                  | JP2, 2-3 all other jumper terminals should be on pins 1-2.   |
| User Action                    | No action required   |

| <b>Zone Status Indication</b> |  |
|-------------------------------|--|
| Definition                    | Indicates full or empty status of the downstream zone on TB3.  |
| Configuration                 | JP4, 1-2 and JP5, 1-2 for logic status or 2-3 for sensor status, all other jumper terminals should be on pins 1-2.   |
| User Action                   | <p>Connect to TB3 for zone status.</p> <p>The output transition of the Zone Status from OFF to ON or ON to OFF can be delayed by the Zone Status ON and Zone Status OFF Delay potentiometers. This is typically used to indicate a zone is full only after a product is detected for period of time.</p> |

## 7.27: TERMINAL AND JUMPER DESCRIPTIONS

| Terminal Descriptions |  |
|-----------------------|--|
| <b>TB1</b>            | <b>Single release, Logic interrupt, Pulse release.</b>   |
|                       | <p>This terminal is an isolated input; it must be used when signal voltage is from a supply that is different than the supply powering CRUZcontrol logic assemblies.</p> <p>It can be used when signal voltage is from same power supply that is powering CRUZcontrol logic assemblies.</p>  |
| <b>TB2</b>            | <b>Slug release.</b>   |
|                       | <p>This terminal is an isolated input; it must be used when signal voltage is from a supply that is different than the supply powering CRUZcontrol logic assemblies.</p> <p>It can be used when signal voltage is from same power supply that is powering CRUZcontrol logic assemblies.</p>  |
| <b>TB3</b>            | <b>Zone Status (TB3 only available on full function module)</b>  |
|                       | <p>This terminal is an isolated output; it must be used when signal voltage is from a supply that is different than the supply powering CRUZcontrol logic assemblies.</p> <p>It can be used when signal voltage is from same power supply that is powering CRUZcontrol logic assemblies.</p> |
| <b>TB4</b>            | <b>Inputs</b>  |
|                       | This terminal is a non-isolated input; it must be used when signal voltage is from same power supply that is powering CRUZcontrol logic assemblies.  |
| <b>TB5</b>            | <b>Outputs</b>   |
|                       | This terminal is a non-isolated outputs; output signal voltage is from same power supply that is powering CRUZcontrol logic assemblies.  |

| <b>Jumper Descriptions</b> |  |
|----------------------------|--|
| <b>JP1</b>                 | <b>Downstream slug control</b>   |
|                            | Pins 1-2 = slug pass through<br>Pins 2-3 = slug interrupt<br>Pins 3-4 = slug interrupt<br>Pins 4-5 = singulation to slug crossover<br>Pins NC = slug interrupt |
| <b>JP2</b>                 | <b>Upstream slug control</b>   |
|                            | Pins 1-2 = slug pass through<br>Pins 2-3 = slug interrupt<br>Pins NC = slug interrupt  |
| <b>JP3</b>                 | <b>Release control at TB1</b>  |
|                            | Pins 1-2 = single release<br>Pins 2-3 = logic interrupt<br>Pins NC = pulsed released   |
| <b>JP4</b>                 | <b>Release control at TB4</b>  |
|                            | Pins 1-2 = single release<br>Pins 2-3 = logic interrupt<br>Pins NC = zone status input (determined by JP5)   |
| <b>JP5</b>                 | <b>Zone Status control (JP5 only available on full function module)</b>  |
|                            | Pins 1-2 or NC = downstream logic status<br>Pins 2-3 = downstream sensor status  |

## 7.28: USE OF 115 VAC CONTROLS

Important information regarding the use of 115 VAC controls:

These Function Modules will accept 115 VAC control inputs. There are some cautions that must be observed to avoid Function Module hardware failure.

Function Module signal inputs are protected against 500 volt spikes. 115 VAC control signal wiring run in conduit along with higher voltage motor wiring could experience voltage spikes that exceed the 500 volt limit. This can be prevented by running control wiring in separate conduit from motor wiring. Additional protection for the Function Module inputs can be achieved by using an MOV (metal oxide varistor) placed across the input terminals within the Function Module. Suggestions of suitable MOV's would include Panasonic ERZV07D241 or Littlefuse V250LA2.

Long conduit runs with motor wiring for multiple motors, and the use of variable frequency drives, all contribute to electrical noise, with a good potential for high voltage spikes. If there is any doubt, the control signals to the Function Modules should be run in conduits separate from motor wiring.

The Function Module signal inputs have high impedance. When connected to some output devices, such as some PLC triac outputs, the inputs could sense an "ON" state even if the output connected to it is not on. This can be corrected by adding additional loading to the PLC output. This can be done by adding a loading resistor, placed across the PLC output terminals. Do not put this resistor inside of the Function Module. The size and wattage rating of the resistor would depend on the output characteristics of the PLC card. A typical value would be 10,000 ohms (10K ohms) and 2 watts. The resistor would dissipate 1.32 watts at 115 VAC, so it will get warm.

## 7.29: FUNCTION MODULE PARTS

Table 4: Function Module Part Numbers

| Part Number | Description             |
|-------------|-------------------------|
| 1116731     | Full Function Module    |
| 1116732     | Release Function Module |

Figure 3: Function Modules



Figure 4: Full Function Module Board Layout

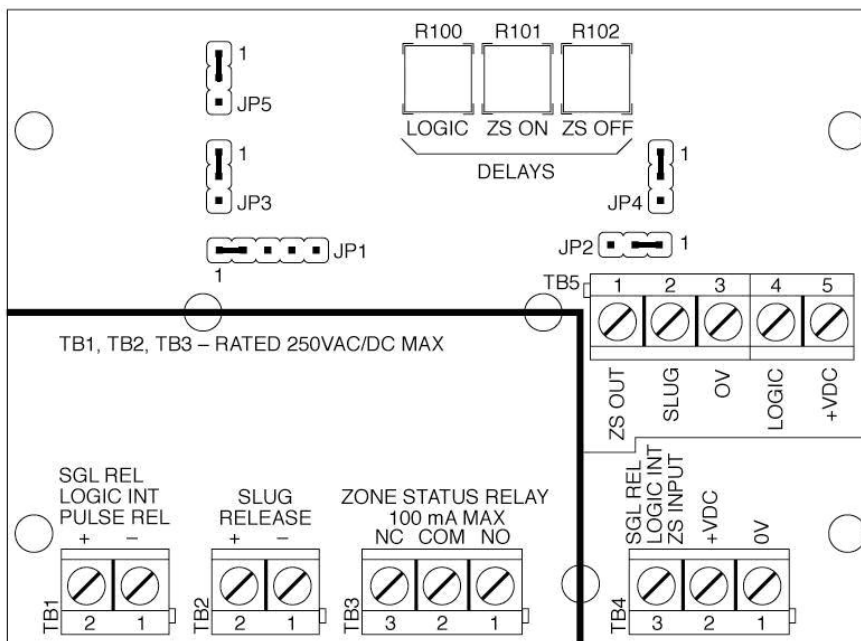


Figure 5: Full Function Module Circuit

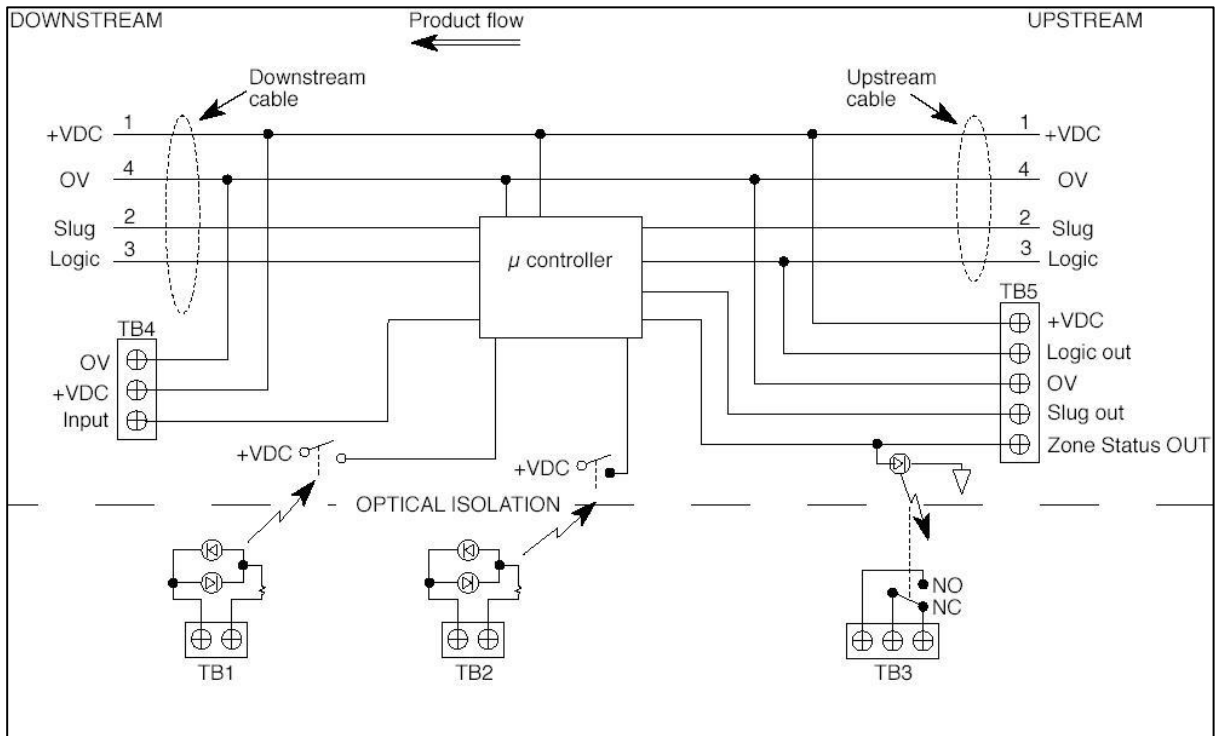


Figure 6: Release Function Board Layout

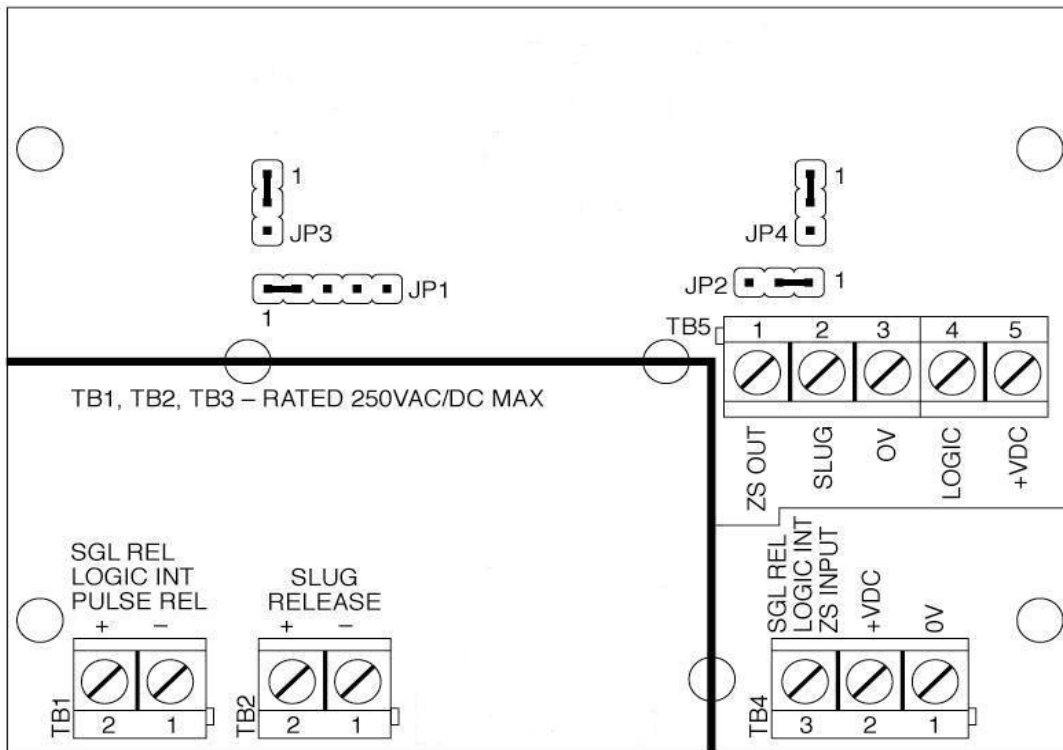
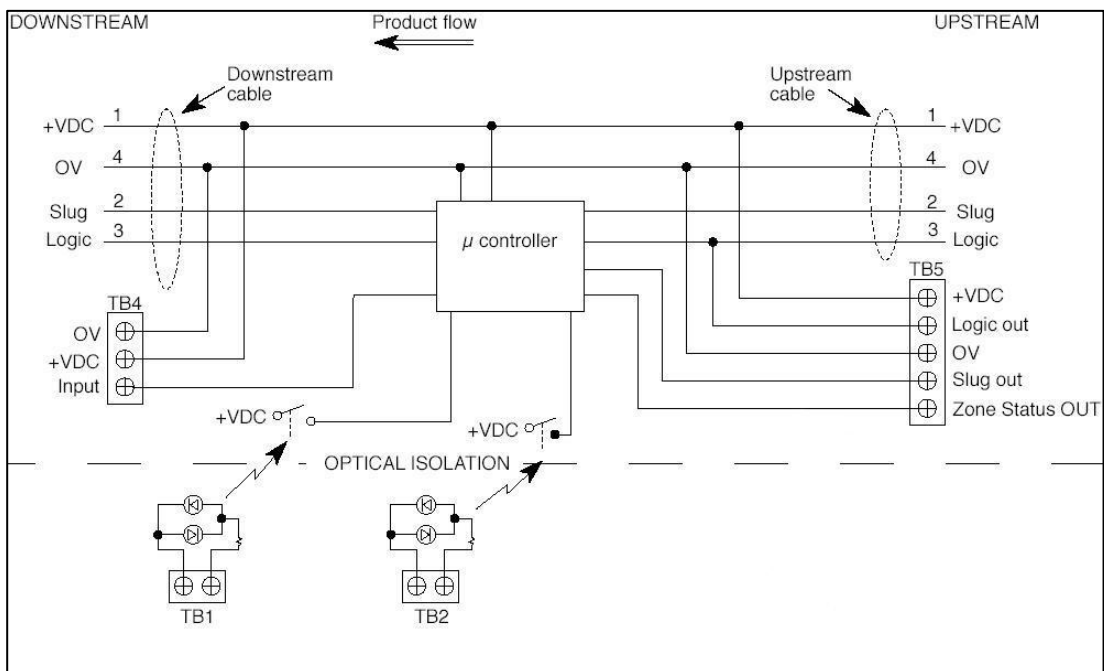


Figure 7: Release Function Module Circuit



## 7.30: POWER SUPPLIES

A 24 VDC power supply is needed to power the logic assemblies and the function modules. One power T cable is prewired to the power supply. The power supply is available in 120VAC or 480 VAC versions.

### Power Supply Requirements

CRUZcontrol operates from a Class 2 power supply voltage of 24-28 VDC. This limits the total number of CRUZcontrol Logic Assemblies that can be connected to one power supply. There is also a limit on the maximum number of Logic Assemblies that can be in one continuous string, based on the cable length and power requirement of Logic Assemblies. More than one string of Logic Assemblies can be connected to a power supply, as long as the power supply output rating isn't exceeded.

The Function Modules require 10mA of current at 24 VDC. This needs to be considered, as it will reduce the total number of Logic Modules that can be connected to one Class 2 power supply to a quantity less than stated in table 5.

*Table 5: Maximum Number of Logic Modules per String*

| Number of Zones         | Number of Zones |
|-------------------------|-----------------|
| End Tap (95W, 24VDC)    | 27              |
| End Tap (95W, 28VDC)    | 35              |
| Center Tap (95W, 24VDC) | 54              |
| Center Tap (95W, 28VDC) | 46              |



## 7.31: POWER SUPPLY WIRING

### Connection made between two Logic Assemblies using a T Cable

This drawing illustrates a power connection made between two intermediate accumulation zones making use of a T Cable. Note that all power and control signals, including the Slug and Logic Signals, pass through the T Cable uninterrupted.

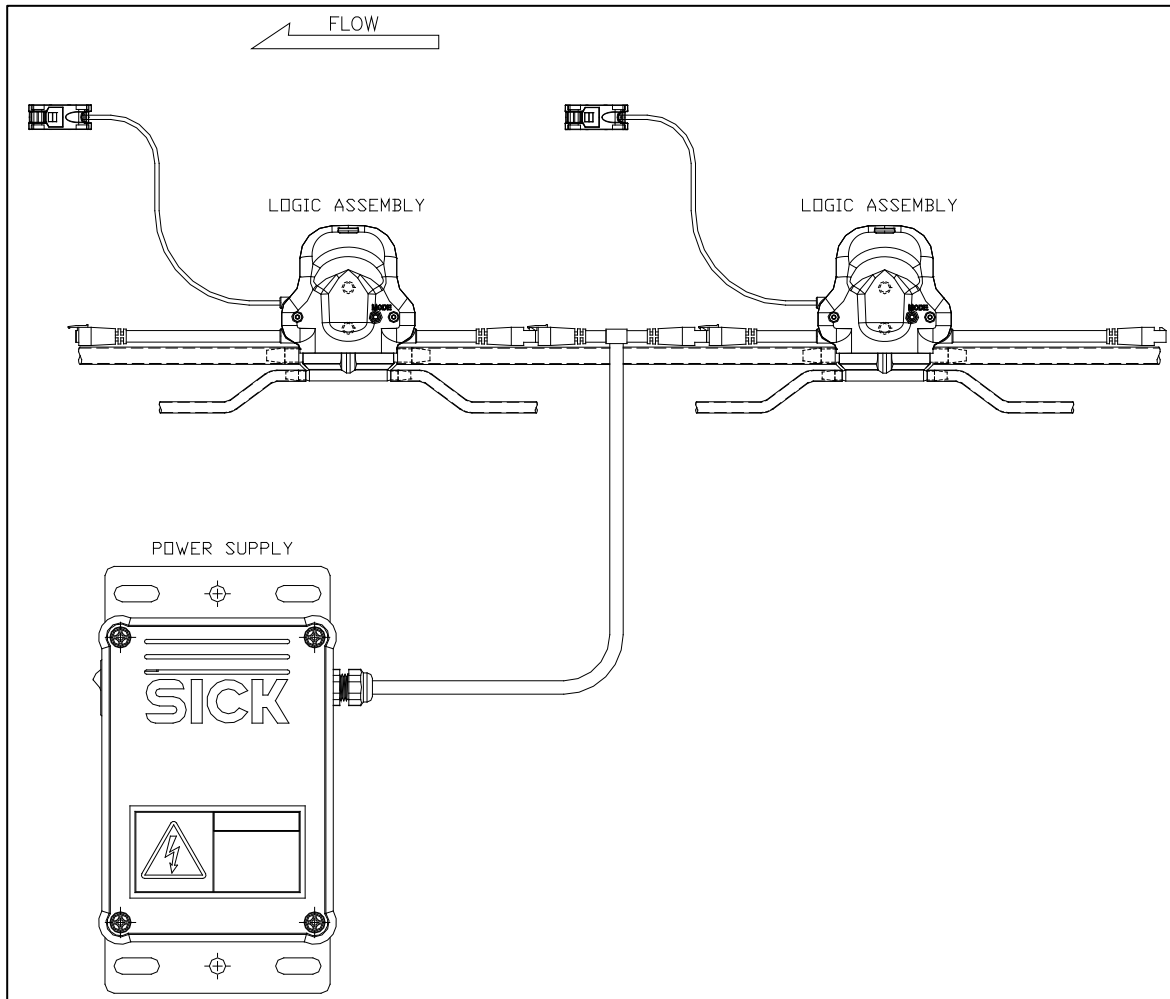


Figure 8: Two Logic Assemblies using a T Cable

### One Power Supply used to power two separate CRUZcontrol sections

This drawing illustrates the use of one power supply to power two separate, short CRUZcontrol sections on two different conveyors. This can be done to make better use of the full capacity of a power supply.

It could be necessary to extend the T Cable leads to reach the power supply location. This should be done with a wire gauge large enough to prevent noticeable voltage drop. The number of CRUZcontrol zones that can be connected per string must also be reduced based on the voltage drop of the wire used.

The brown lead on the T Cable connects to +24 VDC on the power supply. The blue lead on the T Cable connects to 0 VDC on the power supply.

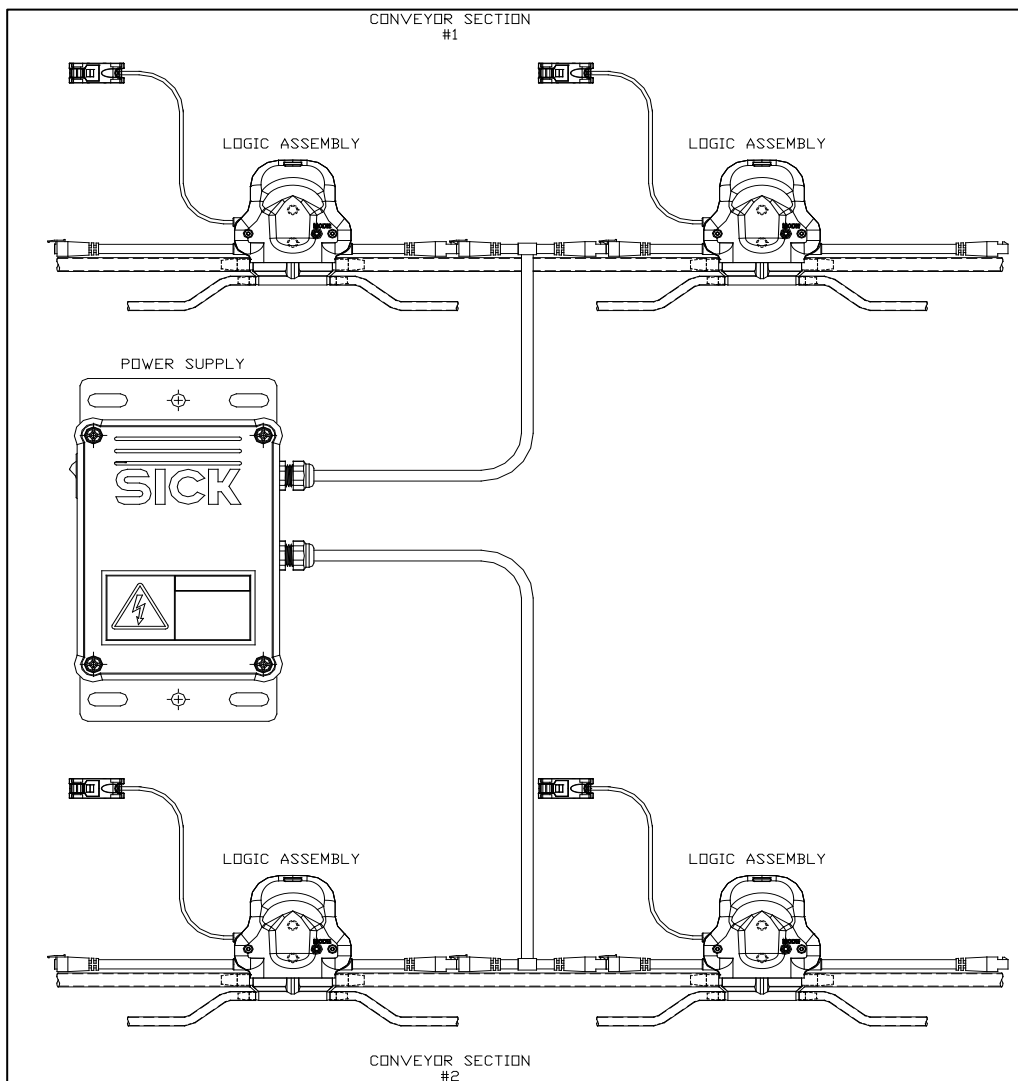


Figure 9: Two Separate CRUZcontrol Sections

### Using two Power Supplies to power one extended CRUZcontrol section

A CRUZcontrol string with more than 54 Logic Assemblies would require the use of more than one power supply. This can be done, but it requires that the power supplies be isolated from each other at the +24 volt line. This drawing illustrates how to isolate the two strings making use of a Power Interrupt Cable. The + VDC line is not passed through, while the Slug Release and Singulation Release Signals as well as 0 VDC are connected to pass the signals through uninterrupted.

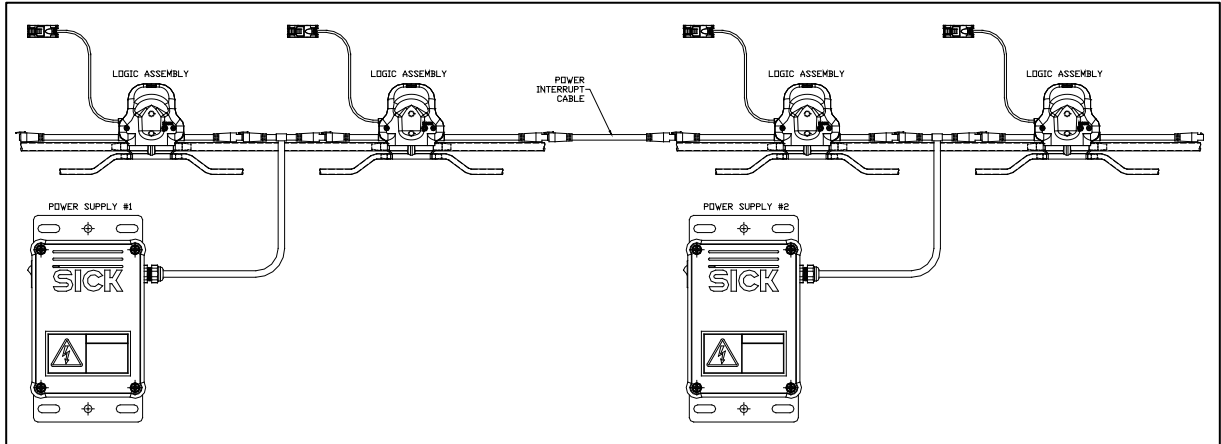


Figure 10: One CRUZcontrol Section with Two Power Supplies

#### 7.31.1: Power Supply Parts

| MHS Conveyor Part Number   |         | Description  |
|----------------------------|---------|--|
| Kit Part Number<br>1117431 | 1117972 | 100-120/220-240 VAC input Power Supply and T cable |
|                            | 1117937 | Mounting Bracket                                   |
|                            | 1117379 | T cable  |
| Kit Part Number<br>1117432 | 1107030 | 380-480 VAC 2 phase input Power Supply and T cable |
|                            | 1117937 | Mounting Bracket                                   |
|                            | 1117379 | T cable  |
|                            | 1117380 | Power Interrupt Cable, 8 inches long               |

Table 6: Power Supply Part Numbers

## Accessories

### Auxiliary Photoelectric Sensor

There is often a need to sense product presence on a CRUZcontrol equipped conveyor, with the sensors connected to a control system other than CRUZcontrol. To allow for this, adequate space has been provided alongside of the CRUZcontrol photoelectric sensors to allow for the mounting of a second independent photoelectric sensor, sharing the same holes through the conveyor side channels and the same reflector. Appropriate holes are provided for the photoelectric sensor mounting bracket. The discharge end of XP43CZ conveyor is also provided with an additional mounting location for a photoelectric sensor and reflector.

The following kits are available, which include the photoelectric sensor and appropriate bracket. Even though not normally needed, an extra reflector and adhesive mounting tape is also included with each kit.

The 10-30 VDC photo sensors are similar to the CRUZcontrol sensors. They are light operate, with a 50 mA maximum output current, and come with a 27 inch cable (no connector).

*Table 7: Photoelectric sensor*

| Part Number | Description   |
|-------------|---|
| 1117727     | Photoelectric sensor with bracket, 10-30 VDC PNP output |

### Reflector

Replacement reflectors can be ordered with the following part number.

*Table 8: Reflector*

| Part Number | Description  |
|-------------|--|
| 400004      | Reflector  |
| 50005427    | Tape, double sided, 1" square (2 needed per reflector) |

### 7.31.2: Sensor Valve Assemblies

A Sensor Valve Assembly is used for applications not requiring accumulation logic, (controlling the zone with a PLC) but the solenoid valve and photoelectric sensor configuration as used in the CRUZcontrol channel is still desired.

Table 9: Sensor Valve Assembly

| Part Number | Description           |
|-------------|-----------------------|
| 1116736     | Sensor Valve Assembly |

### 7.31.3: Extension Cables

The following extension cables are available to meet application requirements where longer zone lengths or skipped zones must be accommodated. Each cable has 4 conductors, with male and female 2X2 connector ends.

Table 10: Extension Cables

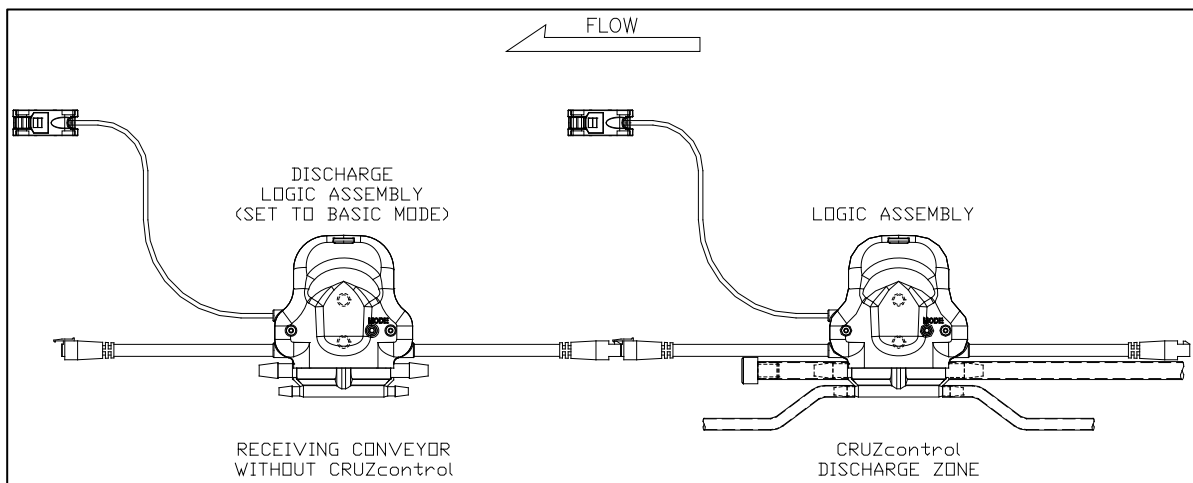
| Part Number | Description                  |
|-------------|------------------------------|
| 1117372     | Extension Cable (39 inches)  |
| 1117373     | Extension Cable (78 inches)  |
| 1117374     | Extension Cable (156 inches) |

## Chapter 8: DISCHARGE LOGIC ASSEMBLY

Discharge Logic Control refers to using a standard Logic Assembly set to Basic Logic mode to control the release from the last discharge zone of a length of CRUZcontrol. This is typically done when CRUZcontrol conveyor (of any kind) feeds non-CRUZcontrol conveyor. There are no air connections made to the valve section of the Logic Assembly. When used this way, the added Logic Assembly is known as the Discharge Logic Assembly (DLA).

The Discharge Logic Assembly is mounted on the charge end of the conveyor immediately downstream of the last (discharge) zone of a length of CRUZcontrol accumulation conveyor. It is connected to the Logic Assembly of the discharge zone as shown. There is no need for a Function Module to be attached to it. The DLA does not need to be given a release signal. Product blocking that photoelectric sensor will stop release from the CRUZcontrol discharge zone, until the photoelectric sensor clears again. This operation can usually be left enabled and ready to function regardless of whether the receiving conveyor is running or off. There would be no need to interface the CRUZcontrol operation with the receiving conveyor operation, since the functioning of it is based solely on product movement.

*Figure 11: Discharge Logic Control*



The following hardware listing is for two Discharge Logic Assembly kits consisting of the Discharge Logic Assembly, a reflector, and mounting brackets. The mounting brackets provide for the mounting of the Discharge Logic Assembly and reflector either ½ inch or 3 inches above a standard CRUZ side channel. Since every application is different, there will usually be a need to drill mounting holes for the brackets.

*Table 11: Discharge Logic Assembly*

| Part Number | Description  |
|-------------|--|
| 1117859     | Discharge Logic Assembly Kit, ½ inch above rollers scan height |
| 1117860     | Discharge Logic Assembly Kit, 3 inch above rollers scan height |

## Chapter 9: CRUZCONTROL ON SITE INSTALLATION

---

### 9.1: PRE-INSTALLED ON THE CONVEYOR

- The CRUZcontrol Logic Assemblies are installed on the side channel of the conveyor bed.
- The air supply tubing for the conveyor is plumbed the length of the conveyor bed, passing through each Logic Assembly.
- The zone control air is plumbed from the Logic Assembly to the zone air pucks or cylinders.
- The photoelectric sensors are mounted for each zone, along with the reflector across the conveyor bed. The photoelectric sensors are tested to insure proper alignment with the reflectors, as well as proper functioning of the Logic Assemblies.

### 9.2: FIELD INSTALLATION

#### Bed to bed connections

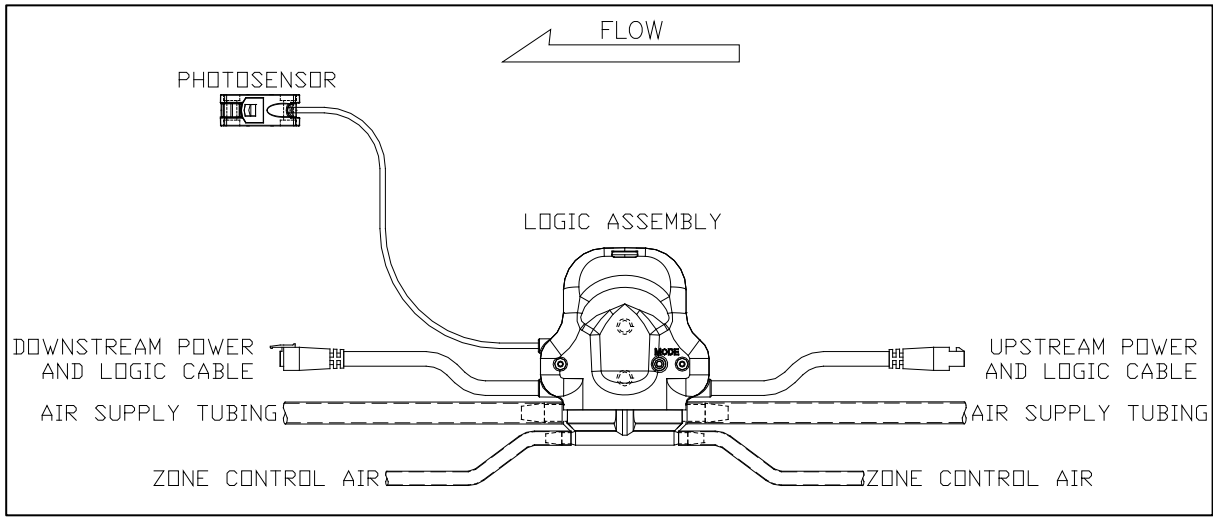
- Connect air supply tubing between conveyor beds. Terminate the ends of the conveyor air supply tubing with supplied tubing plugs.
- Connection of the Logic Assembly upstream or downstream cable from the last zone of a conveyor bed to the first zone in the next upstream conveyor bed

#### System connections

- Connecting the air supply to the conveyor
- Connecting a power supply into the string of Logic Assemblies
- Adding extension, power interrupt, or adapter cables if needed
- Adding auxiliary photoelectric sensors as required for lead zone and line full conditions
- Providing a release signal to the function module at the discharge zone



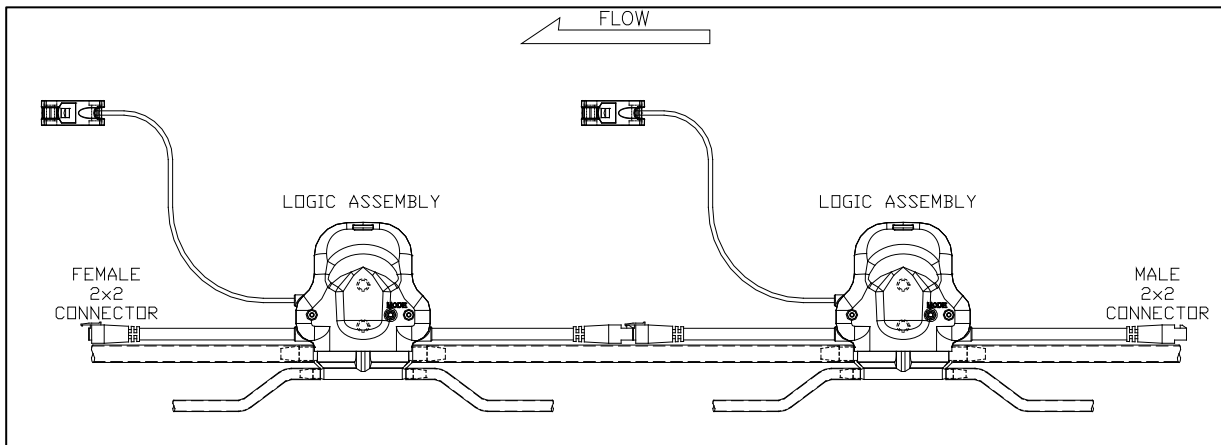
Figure 12: Logic Assembly



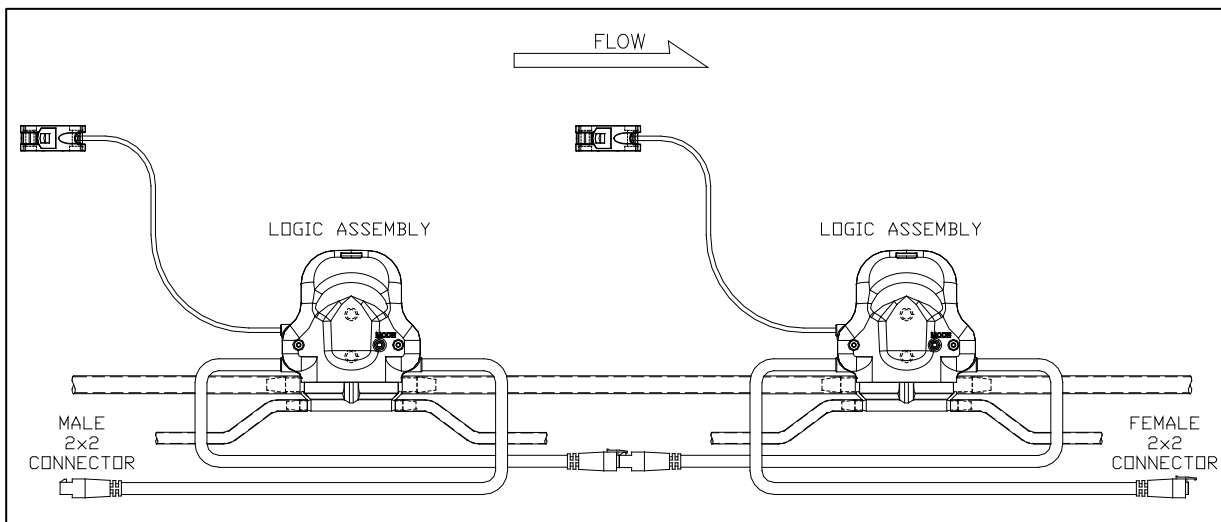
## Chapter 10: CONVEYOR FLOW

The logic assembly wiring is “in-line” for left hand flow conveyors; for right hand flow conveyors the wiring direction will be reversed.

*Figure 13: Left Hand Flow Conveyor Bed*



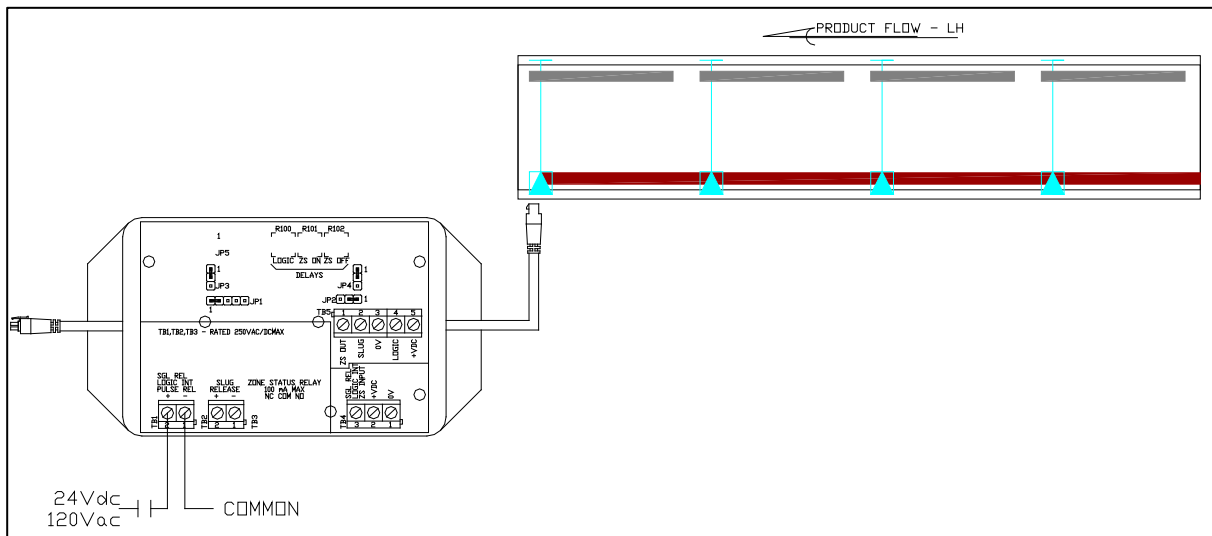
*Figure 14: Right Hand Flow Conveyor Bed*

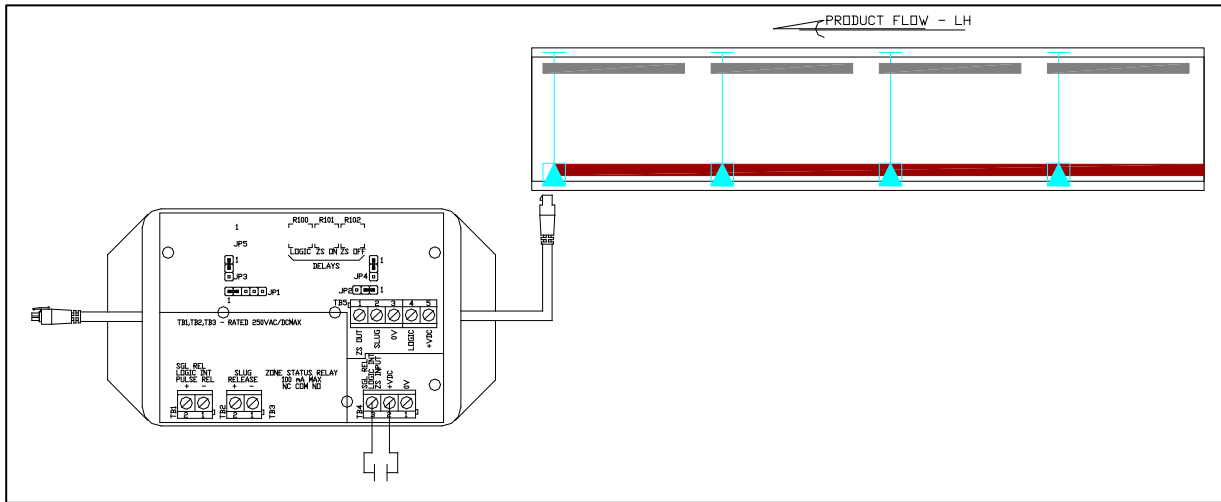


## Example 1: Releasing from CRUZcontrol

| Releasing from CRUZcontrol |  |
|----------------------------|--|
| Problem                    | Releasing Accumulated Product  |
| Solution                   | When using CRUZcontrol the product will automatically accumulate.<br>A signal must be given to the function module to get it to release.   |
| Configuration              | Plug Function module into discharge zone.<br><br>All jumpers are set to pins 1-2.<br><br>Give function module a release signal either through the isolated input as shown in Figure 15 or through the non-isolated inputs as shown in Figure 16. |
| Operation                  | Product will release for as long as the release signal is given.   |

Figure 15: Isolated Input Single Release



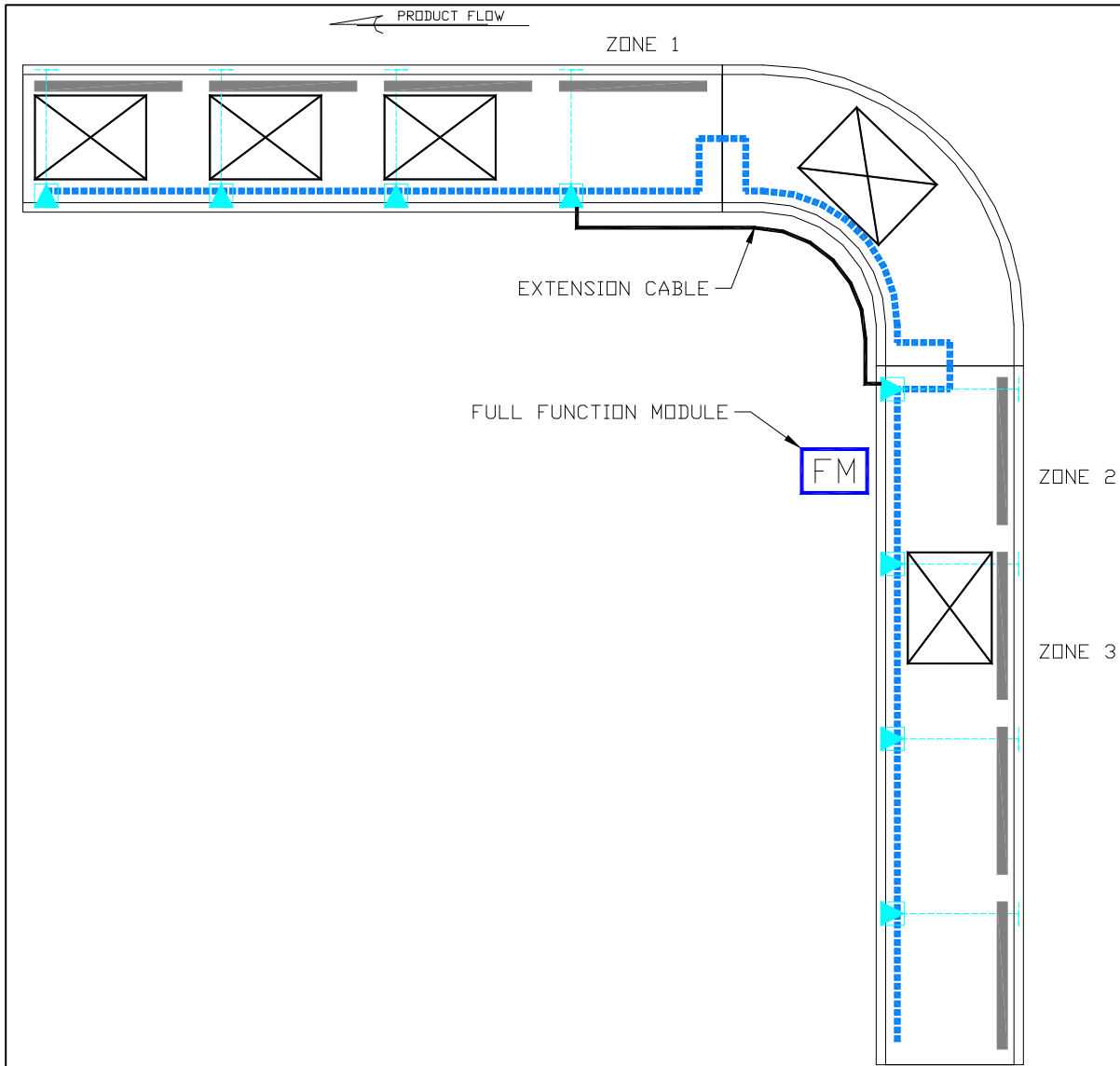
*Figure 16: Non-Isolated Input Single Release*

**Example 2: CRUZcontrol around a curve. (low rate)**

| <b>CRUZcontrol around a curve – Low Rate</b> |   |
|--|---|
| Problem                                      | <p>Product releasing into a curve then not having a zone to occupy.</p> <p>This situation occurs because it takes longer for product to go from zone 2 to zone 1 than it does for product to go from zone 3 to zone 2.</p>  |
| Solution                                     | <p>Delay zone 3 releasing until product has reached zone 1</p> <p>This example will only work if the throughput rate is low.</p>  |
| Configuration                                | <p>Set CRUZcontrol Logic Assemblies to Basic Logic mode.</p> <p>Plug full function module between zones 2 and 3.</p> <p>Set the logic delay R100 potentiometer to delay the release signal from zone 2 to 3 until product has reached zone 1.</p>   |
| Operation                                    | <p>Carton flow from zone 3, to zone 2, to zone 1, occurs as normal. When a carton first clears the zone 2 photoelectric sensor, the release of the next carton from zone 3 is inhibited by the setting of the logic delay relay in the full function module. No external logic signals are require. The release will need to be delayed until the carton released from zone 2 reaches zone 1.</p> |

The release delay is not retained in the event of a system shut down. If a carton is flowing around the curve and the system is shut down, upon start up a second carton could be released from Zone 2 to the curve before the first carton has had the chance to clear the curve. In that event, manual intervention might be required to clear the curve of the extra carton.

Figure 17: CRUZcontrol around a curve (low rate)



*Example 3: Creating a work zone*

| Creating a work zone |  |
|----------------------|--|
| Problem              | Creating a work zone in the middle of a section of CRUZcontrol   |
| Solution             | Use the release function module and interrupt the downstream logic to start accumulation.  |
| Configuration        | When using TB1 to interrupt the logic set jumper terminal JP3, 2-3<br>When using TB4 to interrupt the logic set jumper terminal JP4, 2-3 |
| User Action:         | Apply a high signal to TB1 (24Vdc/120Vac) or TB4 (24Vdc)   |
| Operation            | All product stops at a specific accumulation zone, when the contact is closed and is released when the contact is opened.                |

*Figure 18: Work Zone*

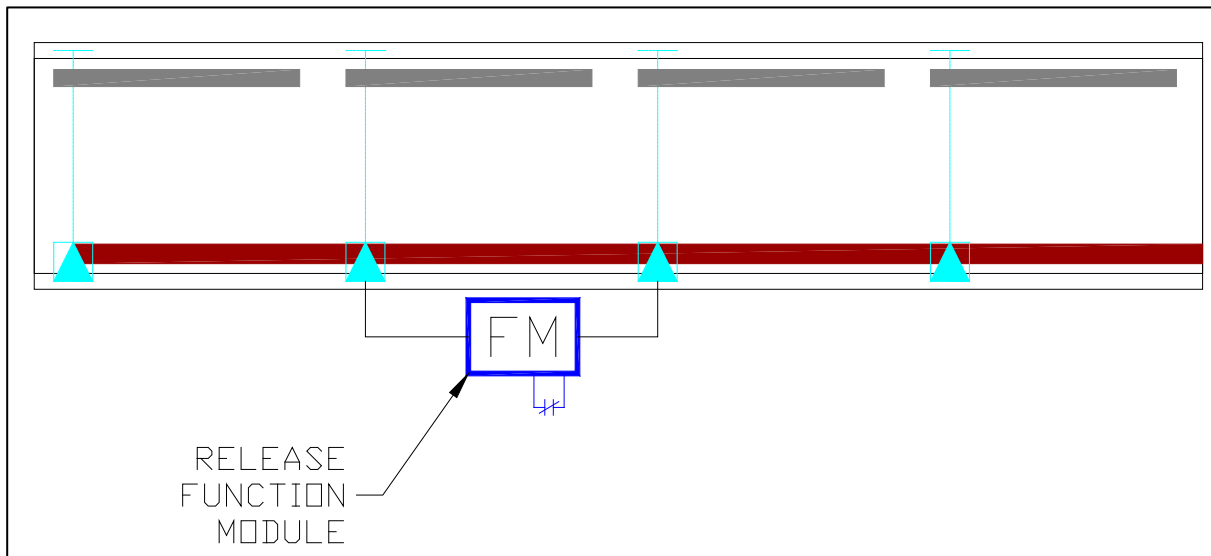


Figure 19: Work Zone Using TB1

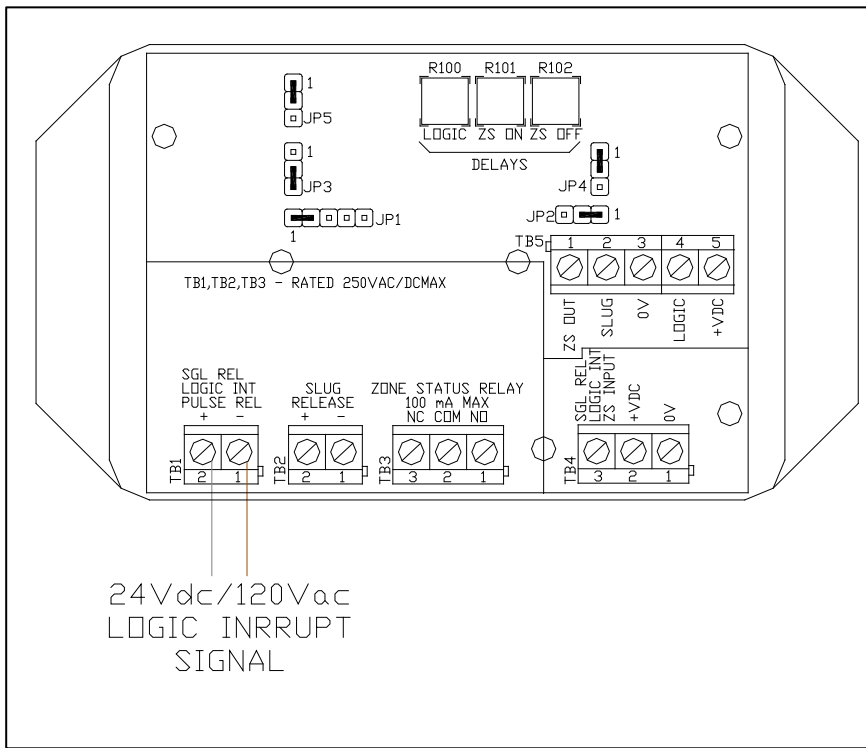
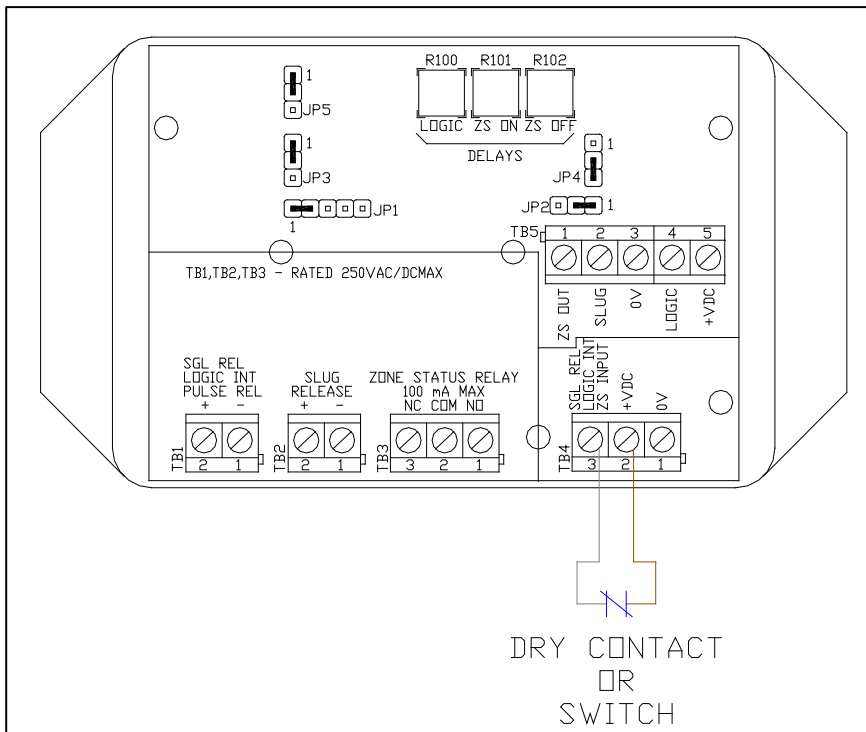


Figure 20: Work Zone Using TB4





## Chapter 11: TECHNICAL SPECIFICATIONS

### 11.1: LOGIC ASSEMBLY SPECIFICATIONS

Figure 21: Logic Module

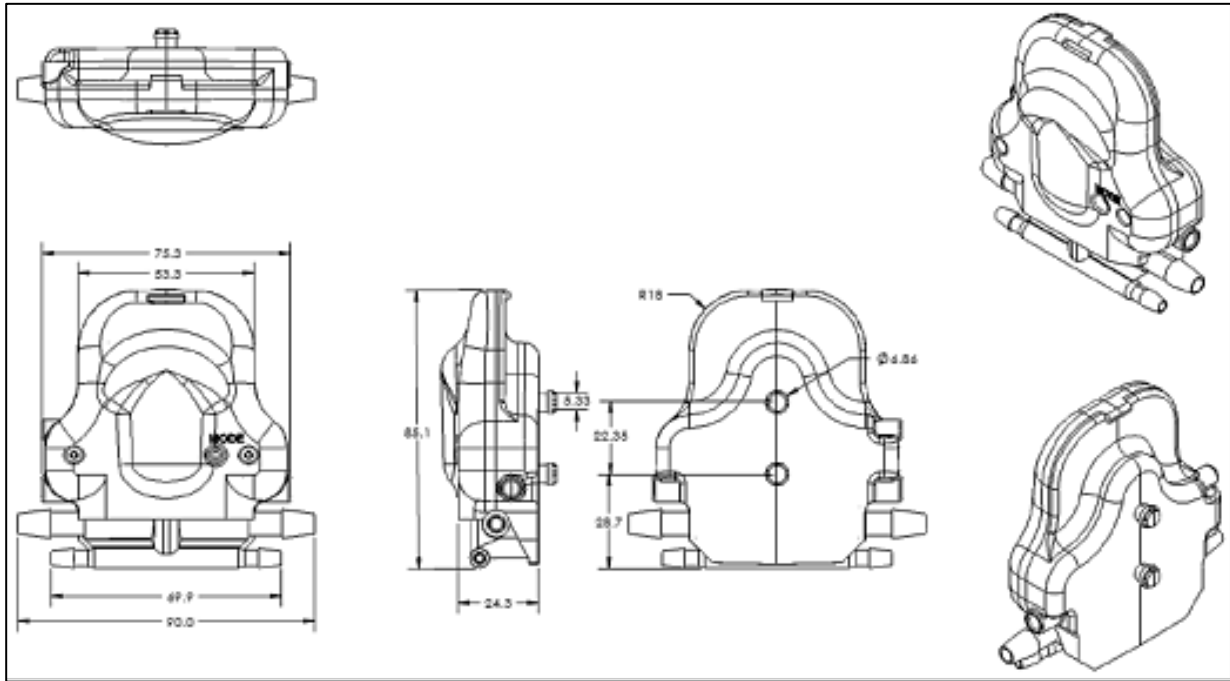


Table 12: Logic Module Mechanical Specification

|                             |  |
|-----------------------------|--|
| Maximum Height              | 3.35 in. (85.1 mm)   |
| Maximum Width               | 2.5 in. (63.5 mm)  |
| Maximum Depth               | 1.25 in. (32 mm)   |
| Daisy Chain Cable Length    | Downstream - 28 in. (711 mm), Upstream - 28 in. (711 mm) $\pm 1$ in. |
| Daisy Chain Wire Gauge      | 22 AWG   |
| Daisy Chain Connection Type | Over molded 2x2; Downstream - Female, Upstream - Male                |
| Sensor Cable Length         | 28 in. (711mm) $\pm 1$ in.   |
| Input Air Connection        | Barbed tube fitting for 3/8 in. O.D., 1/4 in. I.D. tubing            |
| Output Air Connection       | Barbed tube fitting for 1/4 in. O.D., 0.160 in. I.D. tubing          |
| Enclosure Rating            | IP20   |
| Housing Material            | ABS plastic  |

|                                 |  |
|---------------------------------|--|
| Color                           | Back cover and manifold - Black; Front cover - PMS 420 |
| Mounting                        | Twin Keyhole (same as current module)                  |
| Ambient Temperature – Operating | +14...122°F (-10...+50C)                               |
| Ambient Temperature – Storage   | -40...158°F (-40...+70C)                               |

Table 13: Logic Module Electrical Specification

|                                       |  |
|---------------------------------------|--|
| Supply Voltage                        | 24 VDC (-20%/+15%)   |
| Voltage Drop per Module               | TBD  |
| Current Consumption                   | TBD  |
| Maximum Logic Output Current          | 100 mA   |
| Response Time                         | <2.5 ms  |
| Switching Frequency                   | 200 Hz   |
| Maximum # of Logic Modules per String | End Tap (95W, 24Vs) - 4 ft. zones = 25<br>End Tap (95W, 28Vs) - 4 ft. zones = 33<br>Center Tap (95W, 24Vs) - 4 ft. zones = 50<br>Center Tap (95W, 28Vs) - 4 ft. zones = 46 |
| Approvals                             | CE, UL Listed, NFPA 70, NEC  |

Figure 22: Sensor

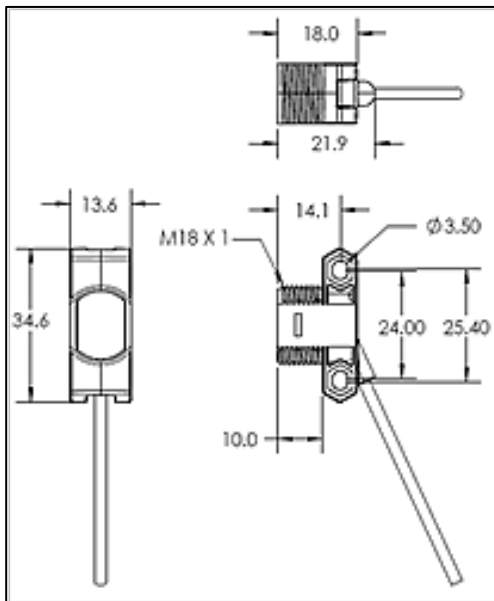


Table 14: Sensor Optical Specification

|                    |                   |
|--------------------|-------------------|
| Sensor Model       | ZL2-P2400S04      |
| Sensor Part Number | 2048176           |
| Sensor Type        | Reflex, Polarized |

|                     |   |
|---------------------|---|
| Switching Logic     | Light operate   |
| Light Source        | Red LED   |
| Output Indicator    | Amber   |
| Power Indicator     | Green   |
| Life Expectancy     | 100,000 hours @ 77°F (25C)                              |
| Light Spot Diameter | 4.9 in. x 4.9 in. at 39.4 in. (125mm x 125mm at 1000mm) |
| Housing Material    | ABS   |
| Enclosure Rating    | IP67  |

*Table 15: Sensor Electrical Specification*

|                                 |                                  |
|---------------------------------|----------------------------------|
| Supply Voltage                  | 10...30 VDC                      |
| Ripple                          | <5 Vss                           |
| Current Consumption             | <20 mA (without load)            |
| Output Current Max.             | 50 mA                            |
| Response Time                   | <1.25 ms                         |
| Switching Frequency             | 400 Hz                           |
| Cable Length                    | 28 in. (711mm), ±1 in.           |
| Connection to Logic Module      | Hard-wire on the Downstream side |
| Ambient Temperature – Operating | -13...122°F (-25...+50C)         |
| Ambient Temperature – Storage   | -40...158°F (-40...+70C)         |

*Table 16: Pneumatic Valve Specification*

|                          |                       |
|--------------------------|-----------------------|
| Operating Pressure Range | 0-40 psi (0-2.75 bar) |
| Flow rate Capacity       | ≥ 0.04 Cv (40 NI/m)   |
| Ventilation Capacity     | ≥ 0.04 Cv (40 NI/m)   |
| Power Consumption        | 1W                    |
| Minimum Supply Voltage   | 19.2 VDC              |
| Maximum Supply Voltage   | 28.8 VDC              |
| Duty Cycle               | 100%                  |

|                       |                                  |
|-----------------------|----------------------------------|
| Life Expectancy       | 100 million cycles               |
| Input Air Connection  | 3/8 in. (9.5mm) barbed fitting   |
| Output Air Connection | 1/4 in. (6mm) barbed fitting     |
| Operating Mode2       | N.O. (Air to Brake)              |
| Air supply            | Non-lubricated, 5 micron or less |

Figure 23: Logic Module Wiring

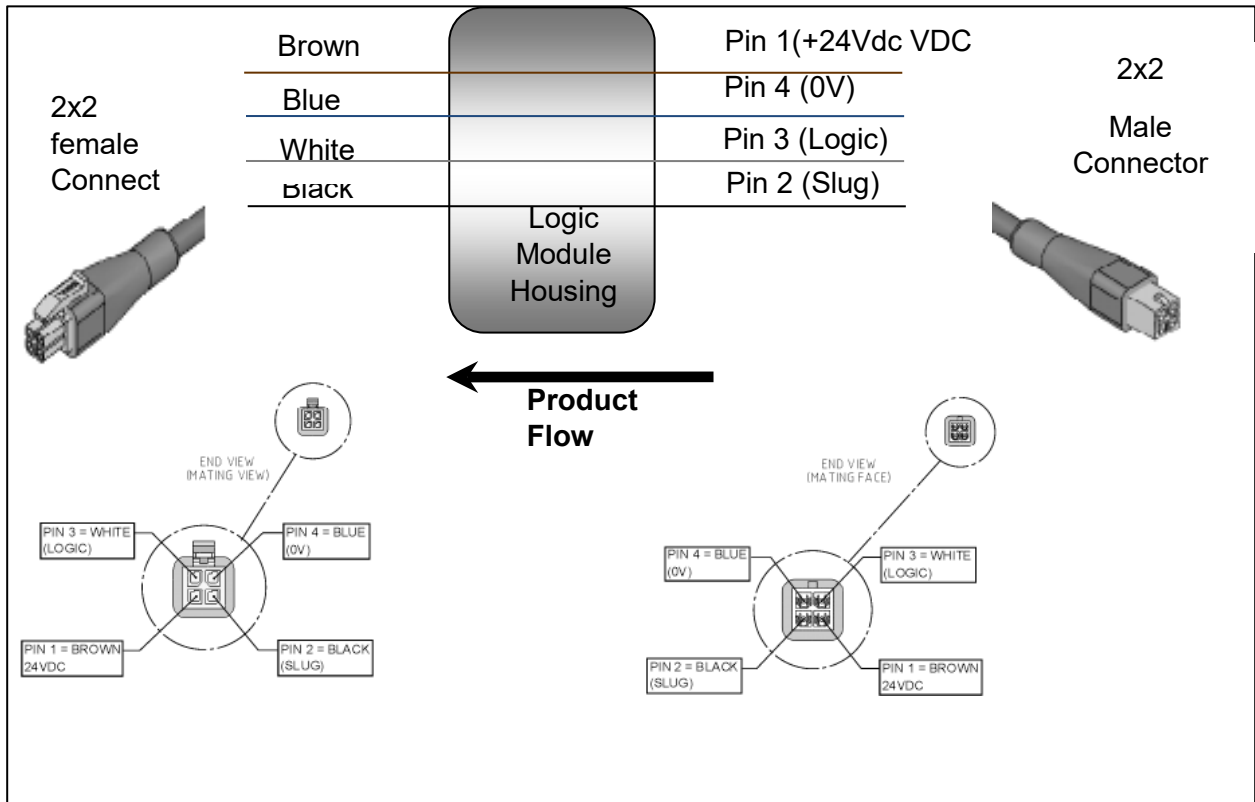
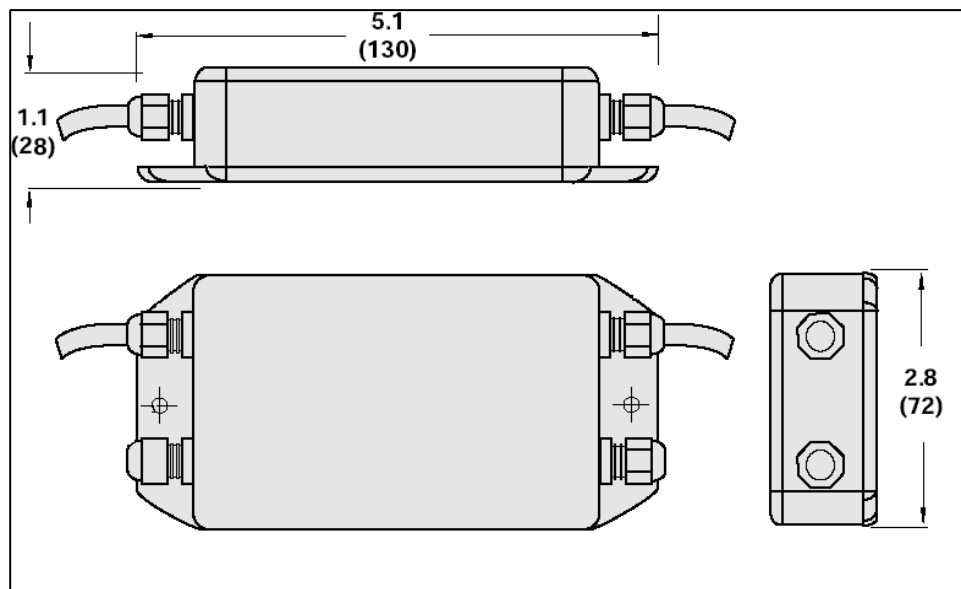


Figure 24: Function Module Specifications



## 11.2: TECHNICAL DATA

Table 17: Full Function Module Specification

| Technical Data                                  |  |
|---|--|
|   |  |
| <b>Interface to CRUZcontrol</b>                 |  |
| Upstream connection                             | Male, 2X2, 4-PIN, 300 mm cable   |
| Downstream connection                           | Female, 2X2, 4-PIN, 300 mm cable   |
| <b>Power</b>                                    |  |
| Supply voltage from daisy chain                 | 18...30 VDC  |
| Power consumption of ZIM                        | 10 mA, no load   |
| ZoneControl system power TB4 input              | 24...28 VDC typical. Limit values: 18...30 VDC                           |
|   |  |
| <b>Input ratings</b>                            |  |
| TB4 Power inputs +VDC, Common                   | 24 VDC typical, 30 VDC max.  |
| TB4 Release/Interrupt input                     | 18...30 VDC  |
|   | Guaranteed OFF Voltage: $\leq 4.0$ VDC                                   |
|   | Guaranteed ON Voltage: $\geq 15.0$ VDC                                   |
|   | Typical ON state current draw @24V: 4mA                                  |
|   |  |
| TB1 Single Release/Logic Interrupt <sup>1</sup> | 18...250 UC <sup>1</sup>   |
|   | Guaranteed OFF Voltage: $\leq 4$ UC                                      |
|   | Guaranteed ON Voltage: $\geq 15.0$ UC                                    |
|   | Typical ON state current draw 2.5 mA                                     |
|   |  |
| TB2 Slug Release input <sup>1</sup>             | 18...250 UC <sup>1</sup>   |
|   | Guaranteed OFF Voltage: $\leq 4$ UC                                      |
|   | Guaranteed ON Voltage: $\geq 15.0$ UC                                    |
|   | Typical ON state current draw 2.5 mA                                     |
|   |  |
| <b>Output ratings</b>                           |  |
| TB5 Logic output                                | PNP; 2.21 kohm impedance typical   |
| TB5 Zone Status output                          | PNP; 2.21 kohm impedance typical   |
|   |  |
| <b>Physical properties</b>                      |  |
| <b>Terminal block</b>                           |  |
| Terminal block wire                             | 30 to 12 AWG (2.5 ... 0.2mm <sup>2</sup> , strip length ¼" (6.0 mm))     |
| Screw terminal torque                           | 5 in-lbs. (0.56 Nm)  |
| <b>Housing</b>                                  |  |
| Dimensions                                      | 5.125" x 3.75" x 1.125" (130mm x 95mm x 29mm)                            |
| Mounting  | 3/16" holes in mounting flange or double sided adhesive, any orientation |
| Enclosure rating                                | IP 42, NEMA 1  |

| Technical Data        |   |
|-----------------------|---|
| Sock and vibration    | IEC 68 2-27, IEC 68 2-29, and EC 68 2-6 |
| Operating temperature | -13...131°F (-25...55°C)                |
| Storage temperature   | -40...185°F (-40...85°C)                |
| Approximate weight    | 0.9 lb. (400 g)                         |



## Chapter 12: POWER SUPPLY FEATURES

- Adjustable output voltage up to 24...28 VDC
- 115/230 VAC or 480 2 phase VAC input
- State-of-the-art design
- Type 1 enclosure, IP 20
- Bolt on mounting

Figure 25: MHS Conveyor P/N 1117432 Dimensional Diagrams

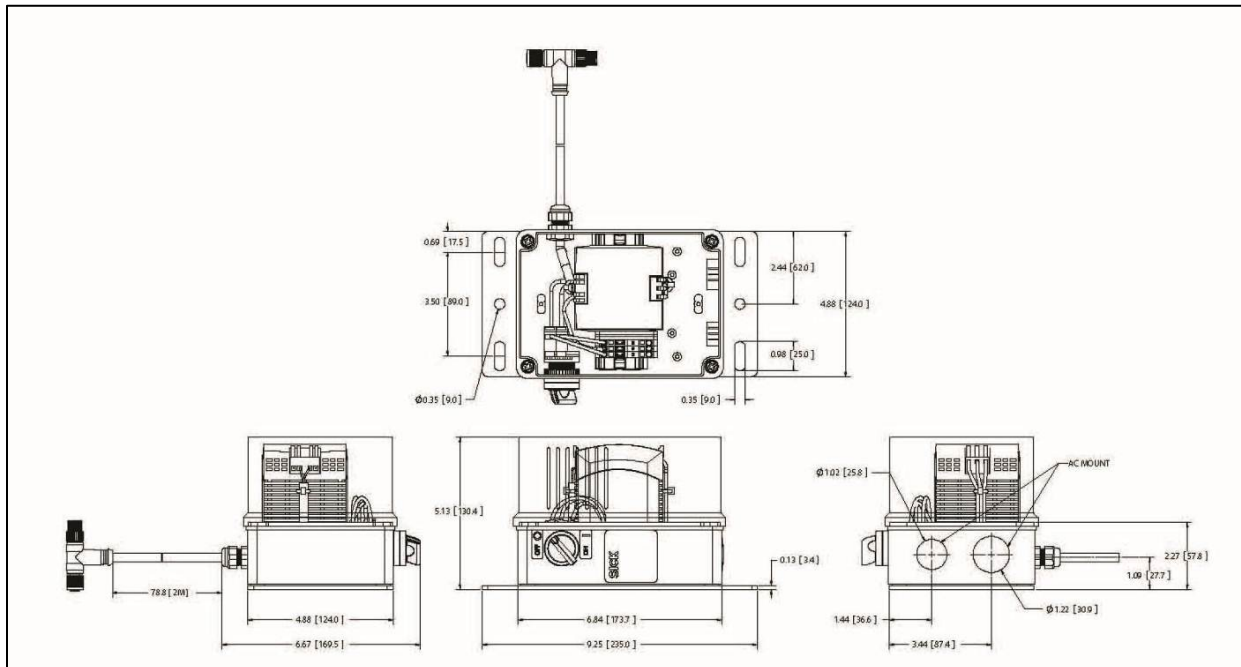


Figure 26: MHS Conveyor P/N 1117432 Connection Diagrams

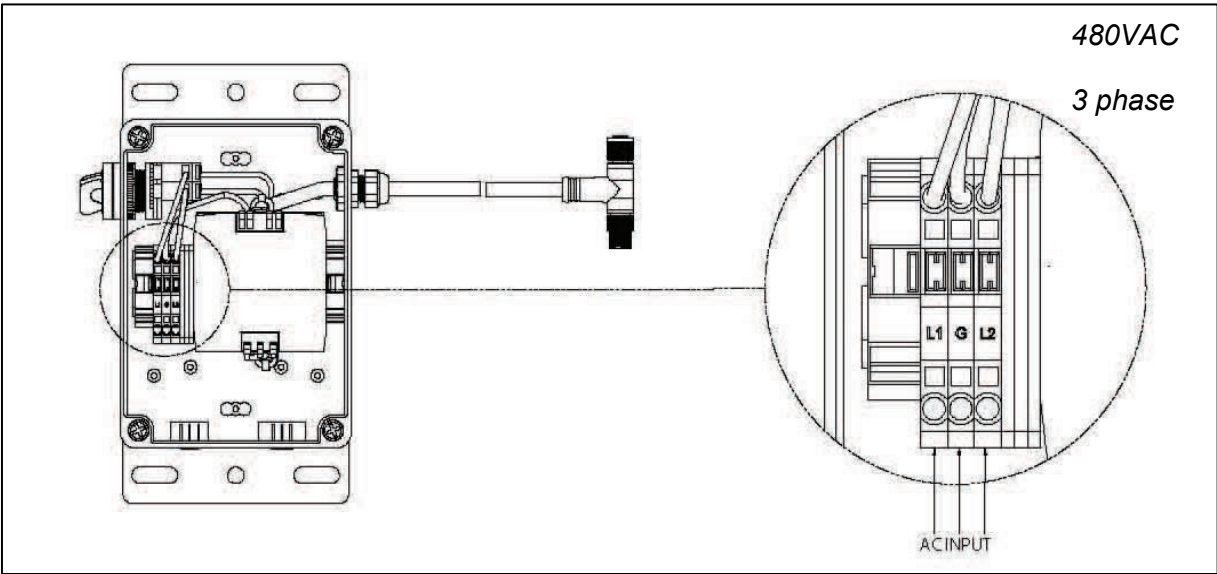


Figure 27: MHS Conveyor P/N 1117431 Dimensional Diagram

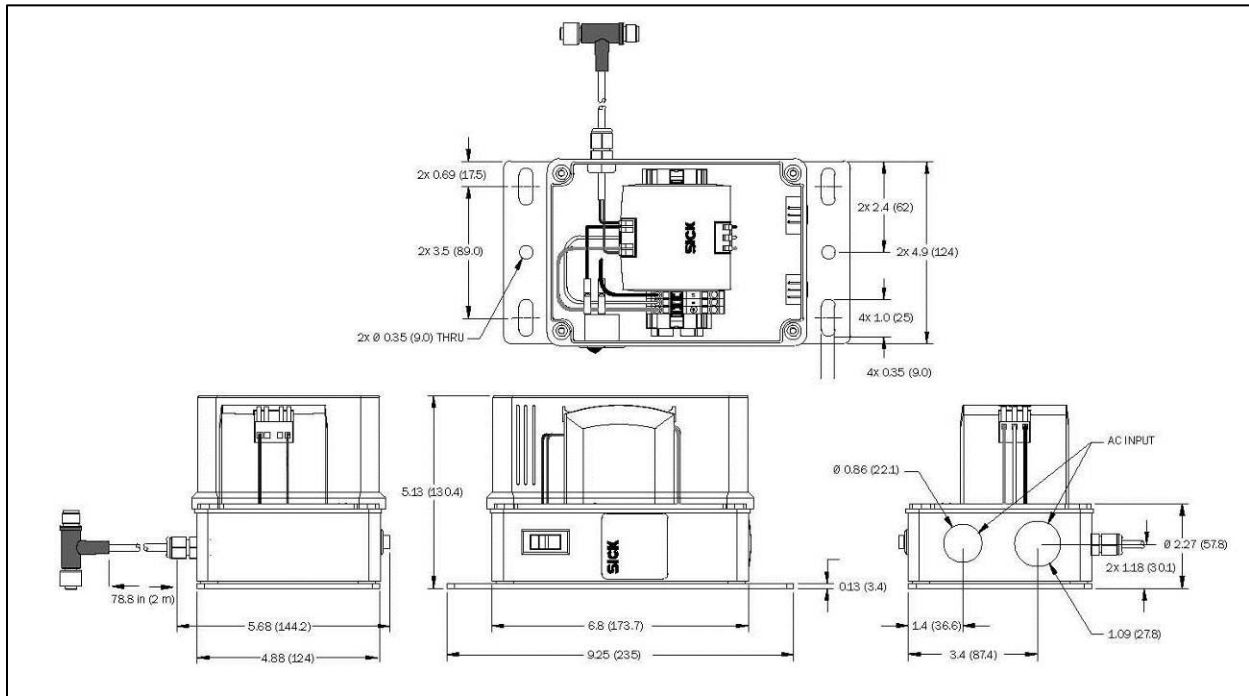
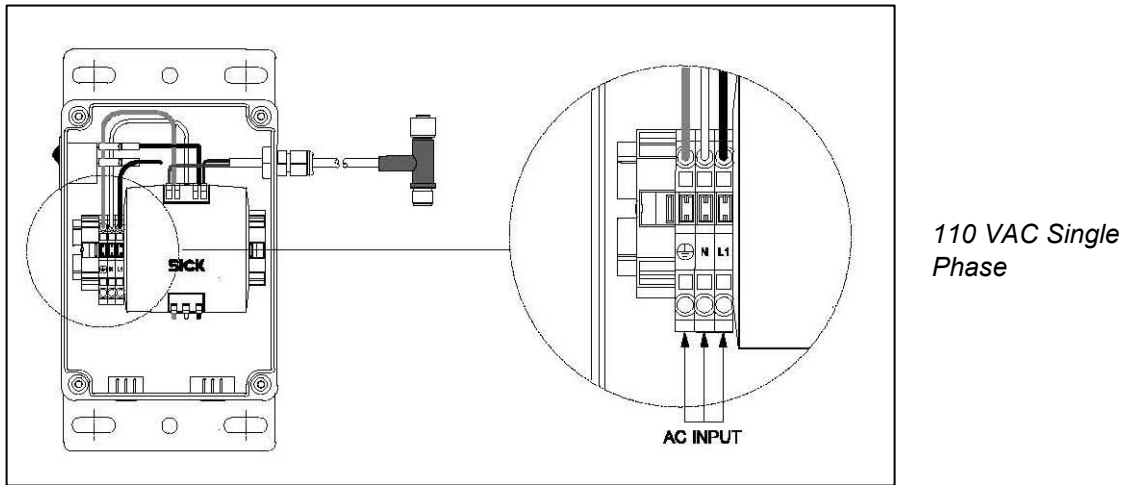


Figure 28: MHS Conveyor P/N 1117431 Connection Diagram





## 12.1: POWER SUPPLY TECHNICAL DATA



| Technical Data  | PN 1117431  | PN 1117432               |
|---|---|--------------------------|
| <b>Input Parameters</b>                                 |   |                          |
| Input Voltage Range V AC (nominal)                      | 100...120/220...240 V                                   | 380...480 V (2 phase)    |
| Input Voltage Range V AC (continuous)                   | 85...132/1184...264 V                                   | 323...552 V (2 phase)    |
| Input Frequency   | 47...63 Hz  | 47...63 Hz               |
| Phase   | 1   | 2                        |
| Input Voltage Range V DC (see derating requirements)    | 220...375 V   | consult factory          |
| Input Rated Current                                     | < 2.0 A (100 V AC)                                      | < 0.42 A (400 V AC)      |
|   | < 0.95 A (196 V AC)                                     | < 0.36 A (480 V AC)      |
| Transient Immunity Over Entire Load Range               |   | Consult factory          |
| <b>Output Parameters</b>                                |   |                          |
| Output Voltage  | 24...28 V DC  | 24...28 V DC             |
| Output Voltage Preset                                   | 24.5 V DC ±0.5%   | 24.5 V DC ± 0.5%         |
| Ripple/Noise @ 20 MHz, 50 Ohm                           | < 50 mVpp   | < 50 mVpp                |
| Output Voltage Regulation Accuracy                      | 0.5% Vout static  | ± 200 mV static          |
|   | ±1.5% Vout dynamic                                      | Dynamic not available    |
| Output Rated Current                                    | 3.9 A (at 24 V)   | 3.75 A (at 24 V)         |
|   | 3.2 A (at 28 V)   | 3.2 A (at 28 V)          |
| Hold Up Time  | > 20 ms (196 V AC, 24.5V/3.9 A)                         | Typ. 52 ms (at 400 V)    |
|   | > 20 ms (100 V AC, 24.5 V/3.9A)                         | Typ. 93 ms (at 480 V)    |
| <b>General Device Parameters</b>                        |   |                          |
| Operating Temperature Range (Tamb) - Full Load          | 14...140°F (-10...60 C)                                 | 14...140°F (-10...60 C)  |
| Operating Temperature Range (Tamb) - Derated            | 122...140°F (50...60 C)                                 | 122...140°F (50...60 C)  |
| Storage Temperature                                     | -13...185°F (-25...85 C)                                | -13...185°F (-25...85 C) |
| Humidity (Do not energize when condensation is present) | < 93%   | < 95%                    |
| Input Cable Access                                      | 3/4 or 1/2 in. hole for conduit                         |                          |
| AC Connection Wires                                     |   |                          |
| Stranded cable  | 0.3...2.5 mm2 / AWG 28-12                               | ≥ 2,5 mm2 , AWG 26-12    |
| Solid cable   | 0.3...4 mm2 / AWG 28-12                                 | ≥ 2,5 mm2 , AWG 26-12    |
| Stripping at wire end                                   | 6 mm  | 6 mm                     |
| <i>Note: secure wires from strain</i>                   |   |                          |
| AC External Protection/Fusing                           | 20A Max   | 30A Max                  |
| Output Connector Cables                                 | M12 4-pin "T" cable                                     | M12 4-pin "T" cable      |
| Efficiency  | 90% (typical at 230 V AC, 3.9A)                         | 89.5% (at 400 V)         |
|   |   | 89.0% (at 480 V)         |
| Protection Class - Type 1 Enclosure                     | IP 20 (DIN/IEC 60 529)                                  | IP 20 (DIN/IEC 60 529)   |
| MTBF  | 500,000 h @ 40C SN 29500                                | 1.5 Mio h @ 40C SN 29500 |
|   | Not tested at MIL 217 GP40                              | 482,000 h @ MIL 217 GP40 |
| Dimensions  | 9.25 x 5.67 x 5.13                                      | 9.25 x 5.67 x 5.13       |
|   | (235 x 144 x 130.4 mm)                                  | (235 x 144 x 130.4 mm)   |
| Weight  | 3.9 lbs (1.8 kg)  | 4.4 lbs (2.0 kg)         |
| Cover Screw Torque Rating (in-lb)                       | 4±1   | 4±1                      |
| Mounting  | Vertical mounting only. AC input enters from the bottom |                          |
| Clearance   | Keep 4 in. clearance from ventilating slots in cover    |                          |
| <b>Applicable Standards</b>                             |   |                          |
| EN 60 950-1, IEC 60 950                                 | Yes   | Yes                      |
| EN 60 204-1, EN 50 178                                  | Yes   | Yes                      |
| <b>Third Party Approvals</b>                            |   |                          |
| UL 508 Listing (US and Canada)                          | Multiple Listing  | Multiple Listing         |
| UL 60 950-1 Recognition (US and Canada)                 | Multiple Listing  | Multiple Listing         |
| NEC Class 2 According to UL 1310                        | Multiple Listing  | Multiple Listing         |

## Chapter 13: PREVENTIVE MAINTENANCE

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Do not perform maintenance on the conveyor until the startup controls are locked out and cannot be turned on by any person other than the one performing the maintenance. If more than one member of a crew is working on the conveyor, EACH CREW MEMBER MUST HAVE A LOCK ON THE POWER LOCKOUT. The air pressure must be turned off to the work area. All pneumatic devices must be de-energized to prevent accidental cycling of the device. Make sure all personnel are clear of all conveyor equipment before restarting the system.

|  <b>WARNING</b> |  |
|--|--|
|                 | Do not perform maintenance on the conveyor until the startup controls are locked out and cannot be turned on by any person other than the one performing the maintenance. If more than, one member of a crew is working on the conveyor, EACH CREW MEMBER MUST HAVE A LOCK ON THE POWER LOCKOUT. The air pressure must be turned off to the work area. All pneumatic devices must be de-energized to prevent accidental cycling of the device. Make sure all personnel are clear of all conveyor equipment before restarting the system. |

|  <b>WARNING</b> |  |
|--|--|
|                 | Before servicing or performing any work in the motor control panel, disconnect and lock out the main incoming service. If only the panel disconnect is off, the incoming side will still be hot. |



## General

The key to ensuring the expected return on investment is to protect against premature failure with a well-planned, follow-up program of preventive maintenance.

Preventive maintenance programs examine what may fail and then formulate action plans which will prevent failure or downtime. This kind of maintenance includes lubrication and replacement or repair of parts before failure but after expected life has been attained.

Preventive maintenance will save expensive downtime and wasted energy. It will increase the life of components. Along with preventive maintenance should be a record-keeping system. You must know what problems you have had in the past and when different components were serviced.

A visual and audible inspection should be taken every day. Visually you can see if a chain is loose, oil leaking, sprocket worn; or you can hear a faulty bearing, noisy chain or any other noise that might indicate a problem. When something major goes wrong with some component, a note should be made to see if a pattern to the problem occurs. All personnel working in close proximity to the conveyor should inform maintenance or their supervisor of any unusual noise.



|   |  |
|---|--|
|  <b>WARNING</b> |  |
|                | <p>Do not perform maintenance on the conveyor until the startup controls are locked out and cannot be turned on by any person other than the one performing the maintenance. If more than one member of a crew is working on the conveyor, <b>EACH CREW MEMBER MUST HAVE A LOCK ON THE POWER LOCK OUT</b>. The air pressure must be turned off to the work area. All pneumatic devices must be de-energized to prevent accidental cycling of the device. Make sure personnel are clear of all conveyor equipment before restarting the system.</p> |

## 13.1: MOTOR AND GEARCASE

The drive unit should be checked monthly. Check the motor gearcase for leaking seals. If reducer is other than Reliance Relialube, check the gearcase for proper oil level and add the approved oil for your particular unit. Check for overheating, vibrations and dirt buildup. With Reliance Relialube reducers, change oil only when performing maintenance that requires gearbox disassembly using Mobil SHC-634. When replacing the motor, re-lubricate using Fel-Pro C5A Anti-Seize or Mobiltemp 78 grease in the reducer bore and on the motor shaft.

## 13.2: CHAINS AND SPROCKETS



Chains and sprockets should be checked monthly. Look for correct alignment. In time, set screws may loosen and allow the sprockets to become misaligned. Use a straight edge held parallel to both sprockets to check alignment. Shift one of the sprockets if the straight edge shows it is necessary.

|  <b>WARNING</b> |   |
|--|---|
|                | <p>REPLACE ANY CHAIN GUARD REMOVED in order to adjust, check or lubricate chain and sprockets. Guards are furnished and installed to prevent personal injury during operation; maintain them on the unit.</p> |

Keep the chain clean and lubricated. Chains may be cleaned by wiping with a rag soaked in nonflammable cleaning solvent.

Lubrication of roller chains is essential to effectively minimize metal-to-metal bearing contact of pin-bushing joints of the chain. Oil should be applied to outside plate and inside plate edges, since access to pin-bushing area is possible only through clearances between the outside plates and the inside plates. Oil applied on the center line of the rollers cannot reach pin-bushing joints.

A good grade of SAE30 non-detergent petroleum base oil is recommended. Heavy oils and greases are generally too stiff to enter and fill the chain joints.

|  <b>WARNING</b> |   |
|--|---|
|                 | <p>Do not use gasoline or kerosene for cleaning. Use nonflammable solvent only.</p> |

During the monthly check, look for damaged or worn links in the chain and wear spots on sprockets. If either the chain or sprockets are worn, then both must be replaced and the cause of wear corrected.

If chains have stretched so that above adjustments cannot be made, remove a link and reconnect. If removal of one link makes the chain too short, add an offset half link and reconnect. Chains should be tightened until there is 1/2" total movement at center of span (1/4" each way of center).

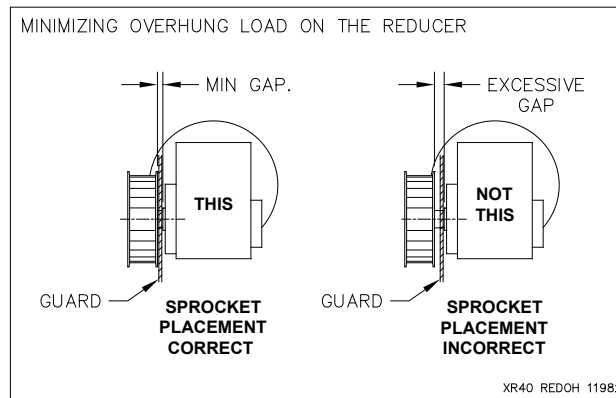
New chains should be installed under slight tension, as they will elongate a small amount due to seating of pins and bushings during the first 250 hours of operation. Chains on drives having near vertical centers should be kept reasonably tight with idler sprockets.



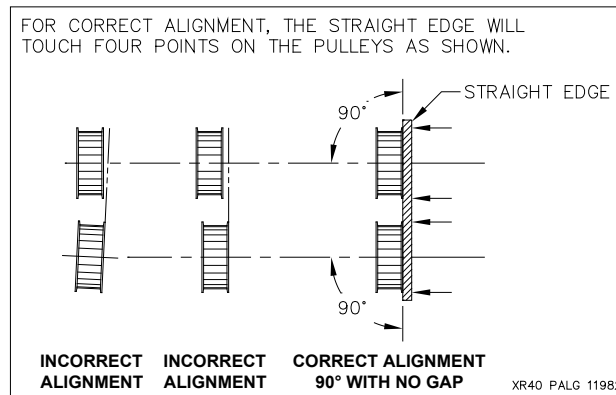
### 13.3: TIMING BELTS & PULLEYS – PULLEY ALIGNMENT

Pulley alignment is critical to reducing wear and extending belt life.

First to minimize the overhung load on the reducer, place the pulley on the reducer shaft as close to the reducer as possible.



Then align the pulley on the line-shaft with the reducer pulley by placing a straightedge across face of pulleys as shown below. The straightedge should cross pulleys as near their center as possible.



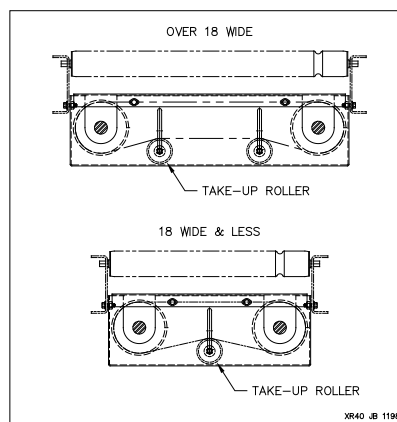
For jumps follow the above procedure starting out by placing the pulleys as close to the line-shaft bearings as possible and aligning the pulleys as shown above.

## 13.4: TIMING BELT TAKE-UP

In general, belt take-up is accomplished either by moving the pulley or by take-up rollers.

For dives the belt take-up is done by moving the reducer-motor assembly which moves the drive pulley. Remember to check the pulley alignment after moving the reducer.

For jumps, the belt take-up is done by the use of take-up roller(s). For 18 wide and narrower, there is only a single take-up roller. On wider widths, two take-up rollers are used. The take-up rollers must be placed under the return side of the belt as shown below. The belt is tensioned by moving the roller(s) up into the belt. When two take-up rollers are used, try to move them up evenly.



## 13.5: TIMING BELT TENSION

You must use one of the two following methods of tensioning the timing belt. Following these methods will properly tension the belt. If after tensioning you have problems with the timing belt jumping teeth, you need to look for problems that can cause excessive drive and correct them. Higher tensions than those recommended can lead to component failure and void the warranty!

### CAUTION

Excessive belt tension may cause component failure.

**13.5.1: Method 1**

The preferred method of measuring belt strand tension is by using a Sonic Meter. Use either the Gates 505C or 507C Sonic Meter which will measure the belt strand tension directly in pounds.

For our standard HPR or HTD, 8 mm pitch, 30 mm wide Belt, use the following information to program the meter.

- HPR Belt weight = 5.8 g/m
- Belt width = 30.0 mm
- Belt span = Center Distance in millimeters

**NOTE**

To covert inches to millimeters, multiply by 25.4. For example, if your center distance measures 7 7/8" multiply 7.875 by 25.4 to get 200 millimeters.

The measured belt strand tension should be as follows:

- For drives the belt strand tension should be 50-80 lbs.
- For jumps the belt strand tension should be 30-50 lbs.

**NOTE**

You must use either the Gates 505C or the Gates 507C Sonic Meter for measuring the belt tension.



### 13.5.2: Method 2

If you do not have a Sonic Meter, the belt tension can be measured by applying a set amount of force and measuring the resulting belt deflection. The following table gives you the information you need for this.

| Timing Belt Tensioning Specifications                         |            |      |            |      |            |      |            |
|---|------------|------|------------|------|------------|------|------------|
| For Standard HPR or HTD, 8 mm Pitch, 30 mm Width Belts,       |            |      |            |      |            |      |            |
| Using the Tension Force as noted below.                       |            |      |            |      |            |      |            |
| Round all fractional span distances to the nearest inch.      |            |      |            |      |            |      |            |
| Deflection tolerance: $\pm 1/64$ "                            |            |      |            |      |            |      |            |
| Span  | Deflection | Span | Deflection | Span | Deflection | Span | Deflection |
| 6"  | 3/32"      | 20"  | 5/16"      | 34"  | 17/32"     | 48"  | 3/4"       |
| 7"  | 7/64"      | 21"  | 21/64"     | 35"  | 35/64"     | 49"  | 49/64"     |
| 8"  | 1/8"       | 22"  | 11/32"     | 36"  | 9/16"      | 50"  | 25/32"     |
| 9"  | 9/64"      | 23"  | 23/64"     | 37"  | 37/64"     | 51"  | 51/64"     |
| 10"   | 5/32"      | 24"  | 3/8"       | 38"  | 19/32"     | 52"  | 13/16"     |
| 11"   | 11/64"     | 25"  | 25/64"     | 39"  | 39/64"     | 53"  | 53/64"     |
| 12"   | 3/16"      | 26"  | 13/32"     | 40"  | 5/8"       | 54"  | 27/64"     |
| 13"   | 13/64"     | 27"  | 27/64"     | 41"  | 41/64"     | 55"  | 55/64"     |
| 14"   | 7/32"      | 28"  | 7/16"      | 42"  | 21/32"     | 56"  | 7/8"       |
| 15"   | 15/64"     | 29"  | 29/64"     | 43"  | 43/64"     | 57"  | 57/64"     |
| 16"   | 1/4"       | 30"  | 15/32"     | 44"  | 11/16"     | 58"  | 29/32"     |
| 17"   | 17/64"     | 31"  | 31/64"     | 45"  | 45/64"     | 59"  | 59/64"     |
| 18"   | 9/32"      | 32"  | 1/2"       | 46"  | 23/32"     | 60"  | 15/16"     |
| 19"   | 19/64"     | 33"  | 33/64"     | 47"  | 47/64"     | 61"  | 61/64"     |
| For Drives use a Tension Force of 4 lb. $\pm 1/2$ lb.         |            |      |            |      |            |      |            |
| For Jumps use a Tension Force of 2 lb. $\pm 1/2$ lb.          |            |      |            |      |            |      |            |
| For MOVIMOT drives use a Tension Force of 1 lb. $\pm 1/2$ lb. |            |      |            |      |            |      |            |

## 13.6: ROLLERS

Precision bearings require no maintenance. For severe or dirty conditions, non-precision bearings may require periodic lubrication (approximately every six months) if they sound dry. If the rollers have unsealed bearings, lubricate them by removing them from the bed and place several drops of a good grade machine oil in the small opening around the inner race hub and spin the axle. Repeat for each end of the roller. Standard rollers are greased for life and normally do not require maintenance. However, if the conveyor operates over 120 FPM more than a single shift, it is under severe duty conditions. Periodically removing the rollers has an added benefit of distributing the wear on the bearing inner race by rotating the axle to a new position. If a defective roller bearing is found, replace the roller.

|  |   |
|--|---|
|  <b>WARNING</b> |   |
|                 | <p>Use a blunt object to remove rollers from frame.</p> <p>A screwdriver or similar pointed object could slip and cause injury.</p> |

Do not allow tape, banding, shrink-wrap, etc. to build up on roller or pulleys. This can cause rollers to jam and the belt to mistrack. If this is a common occurrence due to the product packaging, clean up on a regular schedule.

### Drive Belts



Drive belts should require no actual maintenance. Visually check for broken or worn belts. Normally, a few broken belts will not hamper the performance of XP43. Periodically replace any broken belts. If belt shows signs of abrasion, check for belt rub against any object or foreign matter in roller groove.

### Line-shaft Bearings

The line-shaft bearings have a dual set screw collar. After one week of constant operation, check each bearing to see if the set screws are loose. Recheck every six months.

### Motor Controls

#### Inspection (semi-yearly)

|  |  |
|--|--|
|  <b>WARNING</b> |  |
|                 | <p>Before servicing or performing any work in the motor control panel, disconnect and lockout the main incoming service. If only the panel disconnect is off, the incoming side will still be hot.</p> |

Excessive overheating is indicated by discoloration of components. Most often, these symptoms are a sign of loose connections. If left uncorrected, this can eventually cause arcing between components, leading to destruction of the controls. It is normal to find the interior of the control cabinet very warm when it is first opened.

The condition of contacts must be checked on all contactors and starters that show signs of overheating. Make sure that they are free of dust and are not excessively pitted or burned. When badly burned or worn, the contacts must be replaced.

In the course of inspecting contact condition, spring pressure should be checked. As contact surface wears down, spring pressure can be lost because of the overheating. Contact spring resiliency can usually be detected by fingertip pressure.

Check for faulty door gaskets especially when there are excessive deposits of foreign materials. Particular attention should be given to conductive deposits because they can cause flashovers and premature component failure when allowed to collect to any great extent. Either reposition or replace defective gaskets and clean the control cabinet.

## CAUTION

- Avoid touching components until they have had time to cool. Some may still be hot.

Check all overload settings on motor controls. Check for loose wiring and tighten as required.

### Cleaning

When cleaning a control cabinet, it is best to use a vacuum cleaner rather than compressed air. A vacuum cleaner removes rather than redistributes dust and dirt. Compressed air can damage and displace relay contacts and springs.

## Chapter 15: COMMISSIONING OF EQUIPMENT

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### 15.1: GENERAL

Commissioning of the equipment can best be defined as the final adjustments and test of the installed equipment required for its proper operation. The need for commissioning is inherent, since the individual components of equipment are brought together at the installation site to operate as a system.

Mechanical and electrical commissioning is most often carried out simultaneously. Commissioning must simulate the actual operation of the system as close as possible to demonstrate the ability to perform reliably at the specified rate in the prescribed operational sequence.

During the Commissioning Phase, it is necessary to load the equipment with product to be conveyed, which provides the means of detecting those areas requiring adjustment. Personnel will be required to support operational functions. This may serve as part of operator training and familiarity with the system. During the commissioning activity, special attention should be directed toward personnel safety. No unnecessary risks should be taken that would endanger the safety of any personnel. All personnel must familiarize themselves with all safety features of the system such as emergency stops and motor disconnects.

#### Common Adjustments

##### 15.1.1: Mechanical

- Check roller direction (belt twist)
- Check guard rail clearance to product
- Eliminate all catch points
- Check conveyor elevations
- All bolts and set screws tight
- Check product clearance to overhead structures
- Simulate all operational functions with actual product
- All necessary lubrication performed
- All chains properly tensioned
- All sprockets aligned
- All guards in place with proper clearance
- All OSHA required guards in place on walkways, catwalks, ladder-ways, floor openings, etc.
- All labels and warning signs in proper place unobstructed
- Any spare parts shipped with conveyors turned over to appropriate personnel
- Proper roller to roller height at bed joints and interfaces
- Check pneumatic connections for leaks
- All jump chains installed per print
- Any pneumatic speed controls adjusted



### 15.1.2: *Electrical*

- Adjust timing functions
  - Adjust limit switches
  - Verify circuitry
  - Verify proper line voltage
  - Verify function of all safety shutoff devices
  - Verify sequence of operation
  - Verify each motor has lockable disconnect switch
  - Check audible system start-up warning signals
  - • Verify all national, state and local codes are met
  - Control stations marked/labeled to indicate the function or motor controlled
  - Verify all devices are labeled and numbered to match documentation (Ex. PE 12, for photoeye No. 12 or SOL43 for solenoid valve No. 43)
1. Determine what size product the photoeye must sense.
  2. Adjust for the worst case, usually smallest item, by loosening photoeye mounting nut and aligning while making sure photoeye has unobstructed view of reflector.
  3. Move the product in and out of the field of detection to ensure that the photoeye energizes and de-energizes.
  4. Readjust as required to achieve maximum performance and tighten mounting nut. If the photoeye cannot be adjusted, replace and adjust as required. When replacing the photoeye, be sure that the correct type is installed.
    - a. Adjust proximity switches as follows:
  5. Loosen proximity switch mounting bolt and adjust sensing switch so that the product passes directly in front of the switch face at a distance of approximately 1/2".
  6. Check that the proximity switch energizes and de-energizes as the product passes in front of the switch face.
  7. Tighten the mounting bolt.

### 15.1.3: *Drive Belt Break-In*

The round drive belts are installed under tension with predetermined initial tension. After a time of static and running conditions, there is an initial tension drop in the belt which levels off to a working point where it will remain the rest of its flex life. Drive capacities and horsepower requirements are based on this working level, not the initial temporary level. After 3 hours run time, 64% of the tension drop has occurred. However, it takes 24 hours to reach 88% and 48 hours to reach 98%.

Run all minimum pressure accumulation conveyors 48 hours empty before applying air or running product. This will ensure motors are not overloaded during accumulation under the higher initial belt tension. This run time is best accomplished during installation as soon as the drive motors are wired and during the commissioning phase.

## Chapter 16: PREVENTIVE MAINTENANCE & TROUBLESHOOTING

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### GENERAL



The key to ensuring the expected return on investment is to protect against premature failure with a well-planned and follow-up program of preventive maintenance.

Preventive maintenance programs examine what may fail and then formulate action plans which will prevent failure or downtime. This kind of maintenance includes lubrication and replacement or repair of parts before failure but after expected life has been attained.

Preventive maintenance will save expensive downtime and wasted energy. It will increase the life of components. Along with preventive maintenance should be a record-keeping system. You must know what problems you have had in the past and when different components were serviced.

A visual and audible inspection should be taken every day. Visually you can see if a chain is loose, oil leaking, sprocket worn; or you can hear a faulty bearing, noisy chain or any other noise that might indicate a problem. When something major goes wrong with some component, a note should be made to see if a pattern to the problem occurs.

All personnel working in close proximity to the conveyor should inform maintenance or their supervisor of any unusual noise

|  |   |
|--|---|
|  <b>WARNING</b> |   |
|                 | <p>Do not perform maintenance on the conveyor until the startup controls are locked out and cannot be turned on by any person other than the one performing the maintenance. If more than one member of a crew is working on the conveyor, <b>EACH CREW MEMBER MUST HAVE A LOCK ON THE POWER LOCK OUT</b>. The air pressure must be turned off to the work area. All pneumatic devices must be de-energized to prevent accidental cycling of the device.</p> <p>Make sure personnel are clear of all conveyor equipment before restarting the system.</p> |



### Motor and Gearcase

The drive unit should be checked monthly. Check the motor gear case for leaking seals. If reducer is other than Reliance Relialube, check the gear case for proper oil level and add the approved oil for your particular unit. Check for overheating, vibrations and dirt buildup.

With Reliance Relialube reducers, change oil only when performing maintenance that requires gearbox disassembly using Mobil SHC-634. When replacing the motor, re-lubricate using Fel-Pro C5A Anti-Seize or Mobiltemp 78 grease in the reducer bore and on the motor shaft.

### Chains and Sprockets



Chains and sprockets should be checked monthly. Look for correct alignment. In time, set screws may loosen and allow the sprockets to become misaligned. Use a straight edge held parallel to both sprockets to check alignment. Shift one of the sprockets if the straight edge shows it is necessary

|  <b>WARNING</b> |  |
|--|--|
|                 | <p>REPLACE ANY CHAIN GUARD REMOVED in order to adjust, check or lubricate chain and sprockets. Guards are furnished and installed to prevent personal injury during operation; maintain them on the unit</p> |

Keep the chain clean and lubricated. Chains may be cleaned by wiping with a rag soaked in nonflammable cleaning solvent.

Lubrication of roller chains is essential to effectively minimize metal-to-metal bearing contact of pin-bushing joints of the chain. Oil should be applied to outside plate and inside plate edges, since access to pin-bushing area is possible only through clearances between the outside plates and the inside plates. Oil applied on the center line of the rollers cannot reach pin-bushing joints.

A good grade of non-detergent petroleum base oil is recommended. Heavy oils and greases are generally too stiff to enter and fill the chain joints. The Lubrication Guide on page 43 indicates the proper lubricant viscosity for various surrounding temperatures.

|  <b>WARNING</b> |   |
|--|---|
|                 | <p>Do not use gasoline or kerosene for cleaning. Use nonflammable solvent only.</p> |

During the monthly check, look for damaged or worn links in the chain and wear spots on sprockets. **If either the chain or sprockets are worn, then both must be replaced and the cause of wear corrected.**

If chains have stretched so that above adjustments cannot be made, remove a link and reconnect. If removal of one link makes the chain too short, add an offset half link and reconnect. Chains should be tightened until there is 1/2" total movement at center of span (1/4" each way of center).

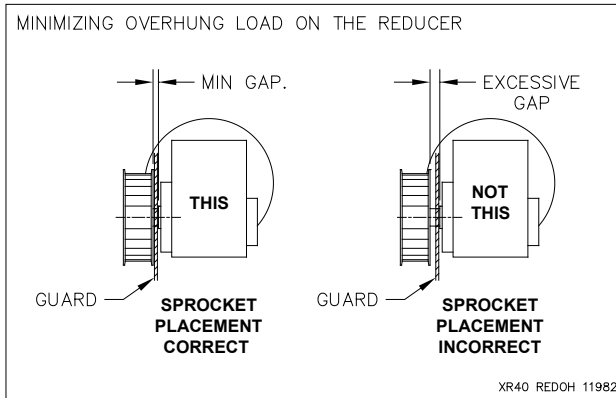
New chains should be installed under slight tension as they will elongate a small amount due to seating of pins and bushings during the first 250 hours of operation. Chains on drives having near vertical centers should be kept reasonably tight with idler sprockets.

## 16.1: TIMING BELTS & PULLEYS

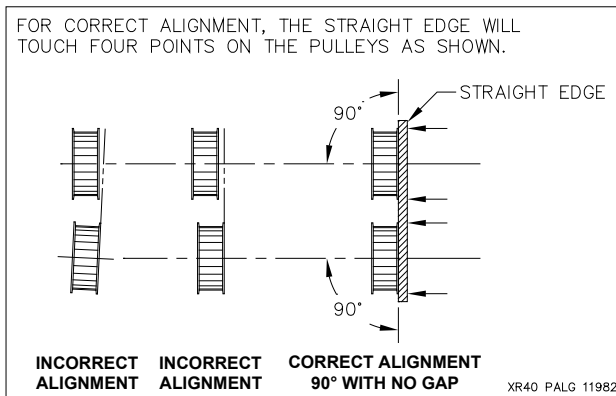
### 16.1.1: Pulley Alignment

Pulley alignment is critical to reducing wear and extending belt life.

First to minimize the overhung load on the reducer, place the pulley on the reducer shaft as close to the reducer as possible.



Then align the pulley on the line-shaft with the reducer pulley by placing a straightedge across face of pulleys as shown below. The straightedge should cross pulleys as near their center as possible.



For jumps follow the above procedure starting out by placing the pulleys as close to the line-shaft bearings as possible and aligning the pulleys as shown above.

### 16.1.2: Timing Belt Take-up

In general, belt take-up is accomplished either by moving the pulley or by take-up rollers.

For dives the belt take-up is done by moving the reducer-motor assembly which moves the drive pulley. Remember to check the pulley alignment after moving the reducer.

For jumps, the belt take-up is done by the use of take-up roller(s). For 18 wide and narrower, there is only a single take-up roller. On wider widths, two take-up rollers are used. The take-up rollers must be placed under the return side of the belt as shown below. The belt is

tensioned by moving the roller(s) up into the belt. When two take-up rollers are used, try to move them up evenly.

### 16.1.3: Timing Belt Tension

You must use one of the two following methods of tensioning the timing belt. Following these methods will properly tension the belt. If after tensioning you have problems with the timing belt jumping teeth, you need to look for problems that can cause excessive drive and correct them. Higher tensions than those recommended can lead to component failure and void the warranty!

|  |   |
|--|---|
|  <b>WARNING</b> |   |
|                 | Excessive belt tension may cause component failure! |

### 16.1.4: Method 1

The preferred method of measuring belt strand tension is by using a Sonic Meter. Use either the Gates 505C or 507C Sonic Meter which will measure the belt strand tension directly in pounds.

For our standard HPR or HTD, 8 mm pitch, 30 mm wide Belt, use the following information to program the meter.

- HPR Belt weight = 5.8 g/m
- Belt width = 30.0 mm
- Belt span = Center Distance in millimeters

Note: To covert inches to millimeters, multiply by 25.4. For example, if your center distance measures 7 7/8" multiply 7.875 by 25.4 to get 200 millimeters.

The measured belt strand tension should be as follows:

- For drives the belt strand tension should be 50-80 lbs.
- For jumps the belt strand tension should be 30-50 lbs.
- For MOVIMOT drives the belt strand tension should be 20-30 lbs.

Note: You must use either the Gates 505C or the Gates 507C Sonic Meter for measuring the belt tension.

### 16.1.5: Method 2

If you do not have a Sonic Meter, the belt tension can be measured by applying a set amount of force and measuring the resulting belt deflection. The following table gives you the information you need for this.

### TIMING BELT TENSIONING SPECIFICATIONS

For Standard HPR or HTD, 8 mm Pitch, 30 mm Width Belts, Using the Tension Force as noted below.

Round all fractional span distances to the nearest inch.

Deflection tolerance:  $\pm 1/64$ "



| Span | Deflection | Span | Deflection | Span | Deflection | Span | Deflection |
|------|------------|------|------------|------|------------|------|------------|
| 6"   | 3/32"      | 20"  | 5/16"      | 34"  | 17/32"     | 48"  | 3/4"       |
| 7"   | 7/64"      | 21"  | 21/64"     | 35"  | 35/64"     | 49"  | 49/64"     |
| 8"   | 1/8"       | 22"  | 11/32"     | 36"  | 9/16"      | 50"  | 25/32"     |
| 9"   | 9/64"      | 23"  | 23/64"     | 37"  | 37/64"     | 51"  | 51/64"     |
| 10"  | 5/32"      | 24"  | 3/8"       | 38"  | 19/32"     | 52"  | 13/16"     |
| 11"  | 11/64"     | 25"  | 25/64"     | 39"  | 39/64"     | 53"  | 53/64"     |
| 12"  | 3/16"      | 26"  | 13/32"     | 40"  | 5/8"       | 54"  | 27/64"     |
| 13"  | 13/64"     | 27"  | 27/64"     | 41"  | 41/64"     | 55"  | 55/64"     |
| 14"  | 7/32"      | 28"  | 7/16"      | 42"  | 21/32"     | 56"  | 7/8"       |
| 15"  | 15/64"     | 29"  | 29/64"     | 43"  | 43/64"     | 57"  | 57/64"     |
| 16"  | 1/4"       | 30"  | 15/32"     | 44"  | 11/16"     | 58"  | 29/32"     |
| 17"  | 17/64"     | 31"  | 31/64"     | 45"  | 45/64"     | 59"  | 59/64"     |
| 18"  | 9/32"      | 32"  | 1/2"       | 46"  | 23/32"     | 60"  | 15/16"     |
| 19"  | 19/64"     | 33"  | 33/64"     | 47"  | 47/64"     | 61"  | 61/64"     |

For Drives, use a Tension Force of 4 lb.  $\pm 1/2$  lb.

For Jumps, use a Tension Force of 2 lb.  $\pm 1/2$  lb.

For MOVIMOT drives use a Tension Force of 1 lb.  $\pm 1/2$  lb.

For severe or dirty conditions, the rollers may require periodic (approx. 6 months) lubrication if they sound dry. If the rollers have unsealed bearings, lubricate them by removing them from the bed and place several drops of a good grade machine oil in the small opening around the inner race hub and spin the axle. Repeat for each end of the roller. Standard rollers are greased for life and normally do not require maintenance. However, if the conveyor operates over 120 FPM more than a single shift, it is under severe duty conditions. Periodically removing the rollers has an added benefit of distributing the wear on the bearing inner race by rotating the axle to a new position. If a defective roller bearing is found, replace the roller.

|  |  |
|--|--|
|  <b>WARNING</b> |  |
|                 | <p>Use a blunt object to remove rollers from frame. A screwdriver or similar pointed object could slip and cause injury.</p> |

Do not allow tape, banding, shrink-wrap, etc. to build up on roller or pulleys. This can cause rollers to jam and the belt to miss-track. If this is a common occurrence due to the product packaging, clean up on a regular schedule.

### Drive Belts

Drive belts should require no actual maintenance. Visually check for broken or worn belts. Normally, a few broken belts will not hamper the performance of XenoROL®. Periodically replace any broken belts. If belt shows signs of abrasion, check for belt rub against any object or foreign matter in roller groove.

### Line-shaft Bearings

The line-shaft bearings have a set collar. After one week of constant operation, check each bearing to see if the collar is tight. If a collar is loose:



Set by using a set screw wrench.

Tighten the set screw.

Recheck every six months.

### Motor Controls

#### INSPECTION (SEMI-YEARLY)



|  |  |
|--|--|
|  <b>WARNING</b> |  |
|                 | <p>Before servicing or performing any work in the motor control panel, disconnect and lockout the main incoming service. If only the panel disconnect is off, the incoming side will still be hot.</p> |

Excessive overheating is indicated by discoloration of components. Most often, these symptoms are a sign of loose connections. If left uncorrected this can eventually cause arcing between components, leading to destruction of the controls. It is normal to find the interior of the control cabinet very warm when it is first opened.

The condition of contacts must be checked on all contactors and starters that show signs of overheating. Make sure that they are free of dust and are not excessively pitted or burned. When badly burned or worn, the contacts must be replaced.

In the course of inspecting contact condition, spring pressure should be checked. As contact surface wears down, spring pressure can be lost because of the overheating. Contact spring resiliency can usually be detected by fingertip pressure.

Check for faulty door gaskets especially when there are excessive deposits of foreign materials. Particular attention should be given to conductive deposits because they can cause flashovers and premature component failure when allowed to collect to any great extent. Either reposition or replace defective gaskets and clean the control cabinet.

|  |   |
|--|---|
|  <b>WARNING</b> |   |
|                 | Avoid touching components until they have had time to cool. Some may still be hot |

Check all overload settings on motor controls. Check for loose wiring and tighten as required.

### Cleaning

When cleaning a control cabinet, it is best to use a vacuum cleaner rather than compressed air. A vacuum cleaner removes rather than redistributes dust and dirt. Compressed air can damage and displace relay contacts and springs.



## 16.2: SUPPORTS/Framework

Preventive maintenance for supports and framework should include the following periodic checks:

- a) Check for plumb and level. Shims have been known to vibrate out from under supports in isolated incidents.
- b) Check and retighten any bolts that may have come loose.
- c) Touch up paint that has been chipped. Unpainted surfaces will rust.
- d) Check for stress cracks or fatigue.

### Universal Joints

Universal joints (U-joints) are primarily used to "bend" the line-shaft in the XenoROL® system, such as in merges, curves, and small incline and decline angles.



To ensure proper lubrication of all four bearing assemblies on U-joints, add lubricant until it appears at all journal cross bearing seals. This assures removal of dirt particles and other contaminants that may find their way into the bearings and indicates that the bearings are fully lubricated.

Do not assume that bearing cavities have been filled with new lubricant unless flow is noticed around all four bearing seals. For universal joint application involving speeds below 500 RPM (approx. 200 FPM), a mineral oil in the SAE 140 to SAE 250 viscosity range should be used.

For universal joint applications involving speeds over 500 RPM, a high quality extreme pressure (EP) grease recommended by lubricant manufacturers for U-joints should be used. Lithium soap base greases meeting National Lubricating Grease Institute (NLG) Grade 1 and Grade 2 specifications are preferred.

The grease should be pumped in slowly until a slight bead forms around the seals. This bead, in addition to acting as an indicator of adequate re-lubrication, provides additional protection against the entry of foreign matter.

Grease in the bearing prevents excessive wear of parts, protects ball races, balls, etc. from corrosion, and aids in heat dissipation within the bearing. Lubricate monthly.

|  |  |
|--|--|
|  <b>WARNING</b> |  |
|                 | <p>As with all rotating machinery, the line-shaft, couplers and U-joints present the possible danger of entangling hair, fingers, jewelry or clothing. Never operate the conveyor without the guards in place.</p> |

### Coupler Sprockets/Chains

Coupler sprockets and chains located at the ends of line-shafts transmit rotational power from the conveyor drive to all connecting intermediate beds. To check or service couplers, shut off and lock out power supply.

To provide access, remove necessary rollers. Visually inspect coupler chain for cracks or broken side links. If a coupler chain needs replacing, the coupler sprockets (line-shaft) probably need realigning.

### Guide Posts

Guide posts are used in location stops, urethane belt transfers and some special devices. Visually inspect for damage (ex. galling) and listen for squeaking. Lubricate with light oil if required.

### Air Systems

The best preventive maintenance for any air operated device is clean air. Always be alert for air leaks anywhere in the system and correct promptly. Check all airline filter bowls for accumulated water and drain if necessary. Check for proper PSI settings on air regulators.



Monitor bowl drain every week. To manually drain the bowl, first remove the hose. Carefully turn knurled drain valve counterclockwise until you hear air escaping. Let all accumulated liquid drain and close by turning clockwise. Reconnect hose.

Remove and replace clogged filter elements as required by filter condition indicator. Indicator is mounted on top of the filter housing.

### Lubrication

Normally a lubricated air system is not required; however, if lubrication is used due to very dry air, it should be a non-detergent, lightweight oil without an ester or ketone base. It must also be anti-foaming, compatible with Buna N rubber and have high film strength.

**Note:** See Lubrication Guide for recommended oils which perform well.

|  |  |
|--|--|
|  <b>WARNING</b> |  |
|                 | <p>If an internal (light oil) lubricator is to be used, EXTREME CARE must be taken to avoid over lubrication</p> |

## Chapter 17: MAINTENANCE & TROUBLESHOOTING



Periodic maintenance intervals shown may vary with load, speed, hours of daily operation, ambient temperature, humidity, etc. Intervals can be established by fairly frequent maintenance at first, then lengthen the intervals as justified by observation of need based on history. The following is based on five days per week, eight hours per day under normal conditions.

### Daily

- Listen to everything for unusual noises or vibration.
- Visually inspect to see that conveyor sections are clear and free of debris.
- Check to see that all safety guards are in place.
- Check any oil leakage.
- Check any unusual noises or vibration.
- Check for loose bolts or parts.
- Check air filter bowls for accumulated water.
- Listen for air leaks.

### Weekly

- Inspect bearings, gear reducers and motors for excessive noise or heat.
- Clean breather cap on gear motor (if used).
- Check operation of all electrical controls.
- Inspect motor mounting bolts.
- Check for proper PSI on air regulators.

|  |   |
|--|---|
|  <b>WARNING</b> |   |
|                 | <p>Prohibit riding on conveyor by anyone.</p> <p>Think before making any adjustments. It may prevent an injury. Remember, all moving components are potentially dangerous.</p> <p>Protect yourself from unexpected starts when working on a stopped unit by locking and tagging the control panel or disconnect switch that supplies power to the unit.</p> |

### Monthly

- Check air filters for cleanliness.
- Check coupler chains for cracks.
- Clean chains and sprockets and lubricate with SAE 30 weight oil or equivalent. (Check chain tension and tightness of all adjusting screws.)
- Check drive unit for leaking seals and oil level in gearcase (if applicable), unusual noises, vibration and stress cracks.
- Check drive belts for wear, cracks or breaks.
- Lubricate U-joints.

**Semi-Yearly**

- If dry sounding, lubricate unsealed bearings in rollers with light oil. Check free spin of rollers.
- Drain and flush gearcase after each 2,500 hours of normal operation or at least every six months (if applicable).
- Grease motor shaft bearings.
- Inspect and clean motor control centers.
- Grease re-greasable bearings. *Recommend NLGI #2 lithium complex grease.*

**Yearly**

- Change oil in gearboxes.
- Inspect tightness of all nuts and bolts on units. Readjust and, if necessary, retighten.
- Check for plumb and level. Shims have been known to vibrate out from under supports in isolated incidents.
- Touch up paint that has been chipped. Unpainted surfaces will rust.
- Inspect for stress/fatigue cracks in frame and supports.

**CAUTION**

Check to confirm tools and foreign objects have not been left on or inside the conveyor.  
Check to confirm all loosened parts have been retightened.  
Check to confirm all guards have been installed.

## Supports/Framework

Preventive maintenance for supports and framework should include the following periodic checks:

- Check for plumb and level. Shims have been known to vibrate out from under supports in isolated incidents.
- Check and retighten any bolts that may have come loose.
- Touch up paint that has been chipped. Unpainted surfaces will rust.
- Check for stress cracks or fatigue.

## Universal Joints



Universal joints (U-joints) are primarily used to "bend" the line-shaft in the XP43/46 system, such as in merges, curves, and small incline and decline angles.

To ensure proper lubrication of all four bearing assemblies on U-joints, add lubricant until it appears at all journal cross bearing seals. This assures removal of dirt particles and other contaminants that may find their way into the bearings and indicates that the bearings are fully lubricated.

Do not assume that bearing cavities have been filled with new lubricant unless flow is noticed around all four bearing seals. For universal joint lubrication use a high quality extreme pressure (EP) grease recommended by lubricant manufacturers for U-joints should be used. Lithium soap base greases meeting National Lubricating Grease Institute (NLG) Grade 1 and Grade 2 specifications are preferred.

The grease should be pumped in slowly until a slight bead forms around the seals. This bead, in addition to acting as an indicator of adequate relubrication, provides additional protection against the entry of foreign matter.

Grease in the bearing prevents excessive wear of parts, protects needle races, needles, etc. from corrosion, and aids in heat dissipation within the bearing. Lubricate yearly.

|  |  |
|--|--|
|  <b>WARNING</b> |  |
|                 | <p>As with all rotating machinery, the line-shaft, couplers and U-joints present the possible danger of entangling hair, fingers, jewelry or clothing. Never operate the conveyor without the guards in place.</p> |

### **Coupler Sprockets/Chains**

Coupler sprockets and chains located at the ends of line-shafts transmit rotational power from the conveyor drive to all connecting intermediate beds. To check or service couplers, shut off and lock out power supply.

To provide access, remove necessary rollers. Visually inspect coupler chain for cracks or broken side links. If a coupler chain needs replacing, the coupler sprockets (line-shaft) probably need realigning.

### **Guide Posts**

Guide posts are used in location stops, urethane belt transfers and some special devices. Visually inspect for damage (such as galling) and listen for squeaking. Lubricate with light oil if required.

### **Air Systems**

The best preventive maintenance for any air operated device is clean air. Always be alert for air leaks anywhere in the system and correct promptly. Check all airline filter bowls for accumulated water and drain if necessary. Check for proper PSI settings on air regulators.

Monitor bowl drain every week. To manually drain the bowl, first remove the hose. Carefully turn knurled drain valve counterclockwise until you hear air escaping. Let all accumulated liquid drain and close by turning clockwise. Reconnect hose.

Remove and replace clogged filter elements as required by filter condition indicator. Indicator is mounted on top of the filter housing.

## Chapter 18: TROUBLESHOOTING GUIDE - MECHANICAL

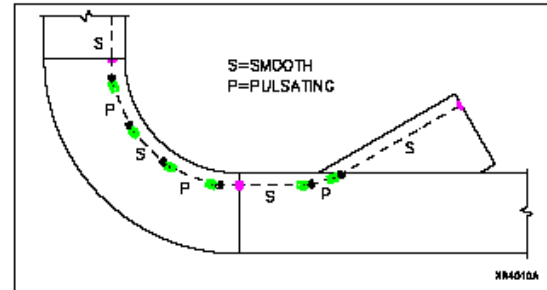
| Mechanical Problem                                | Possible Cause                              | Remedy  |
|---|---|---|
| Insufficient drive                                | Not enough rollers being driven             | Drive more rollers if available   |
|   | Poor bottom on product                      | Improve product conveyability or install drive belts with right tension |
|   | Overloading of product                      | Remove overload   |
|   | Lubricant on belts, rollers or drive spools | Clean belts, rollers and spools. Spray electrical contact cleaner.      |
|   | Weak drive belts                            | Replace belts   |
|   | Drive belt interference with structure      | Locate and correct interference   |
| Rollers not turning/turning slowly                | Weak belts                                  | Replace belts   |
|   | Faulty bearing in rollers                   | Replace rollers affected  |
|   | Interference with roller or belt            | Locate and correct interference   |
|   | Bent roller                                 | Replace roller  |
| Broken belt                                       | Belt rubbing on interference                | Make clearance, then replace belt                                       |
|   | Age (Flex life)                             | Replace belt  |
| Weak belts  | Reaction to chemical                        | Correct cause   |
|   | Excessive temperature                       | Replace with high temperature belt                                      |
|   | Ultraviolet rays (sun)                      | Replace belt with UV blocker type                                       |
| Belt out of groove                                | Drive pulley location                       | Move pulley to reduce belt angle on groove input side                   |
|   | Groove mislocated on roller                 | Replace roller  |
| Vibration in frame (slight side-to-side movement) | Misalignment in bearings                    | Loosen bearing and readjust shaft                                       |

| Mechanical Problem                    | Possible Cause                             | Remedy  |
|---------------------------------------|--|---|
| of frame is normal)                   | Structural frequency                       | Brace conveyor frame.<br><br>Add diagonal sway brace to support.<br><br>Change speed 20 FPM up or down. |
|                                       | Bent shaft                                 | Replace shaft   |
|                                       | Misalignment in coupling                   | Realign coupling  |
|                                       | Universals out of phase                    | See Phasing – Universals  |
| Roller pulsation after curve or merge | Angle or alignment of universals not equal | Readjust universals   |



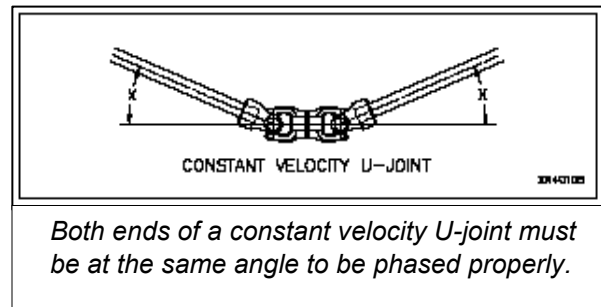
## 18.1: PULSATING EFFECT OF POWERED CURVES

During the operation of the powered curves, a slight pulsating or jerking effect may be noticed in the rollers driven from that portion of the line-shaft connecting each pair of universal joints (U-joints). This is caused by the intermittent speedup and slowdown effect of U-joints. Pulsing is most noticeable as U-joints approach operation at 30 degrees (as in a 60 degree curve) and virtually unnoticeable as the U-joints approach operation at 0 degrees. This pulsating has NO detrimental effect on the performance of the powered curve. The pulsating effect of one universal joint is eliminated by the reverse effect of the other, provided they are in phase. (See Phasing below.)



## 18.2: PHASING – UNIVERSAL JOINTS

When connecting U-joints in XenoROL merges, inclines or declines, be sure that the U-joints are installed in phase. To be in phase, both U-joints must be identically situated in-line (symmetrical) on the connecting shaft, have equal angles and in the same plane.



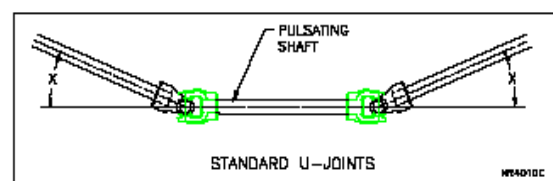
If more than one line-shaft bed separates the U-joints, align the U-joints before installing the last coupler chain. If all line-shaft keyways are aligned, then the universal joints will automatically be in phase.



To be in phase requires:

1. Equal angles
2. Same plane
3. Shaft keyed in-line (symmetrical) with both ends of connecting line-shaft.

Since U-joints are common and basic to the operation of XenoROL, they are taken for granted. However, if they are not applied or installed correctly, they can cause major problems. The effect of improperly installed U-joints can also have detrimental effects on other components besides the U-joint itself.

When a pulsating shaft is connected by a coupler on an incline/ decline, we have potential phasing problems. The U-joint **MUST** be in line before installing the last coupler chain. No drive may be located between a pair of U-joints, unless they are constant velocity. No jump chain other than 1:1 ratio may be located between a pair of standard U-joints.



|  |   |
|--|---|
|  <b>WARNING</b> |   |
|                 | <p>U-joints used in curves can be dangerous. The curve line-shaft guards and U-joint covers are installed at the factory and must always be in place when operating the conveyor.</p> |

### 18.3: TROUBLESHOOTING – MOTOR/REDUCER

| Motor reducer problem           | Possible cause  | Remedy   |
|---------------------------------|---|--|
| Reducer running excessively hot | Low reducer oil level                                 | Check oil level in gearcase and be sure breather plug is open (non Relialube reducers)   |
|                                 | Drag on conveyor                                      | Check and inspect all bearings on conveyor   |
|                                 |   | Check for excessive product load   |
|                                 |   | Check all rollers for free rotation  |
| Reducer or motor noisy          | Insufficient reducer lubricant on motor shaft bearing | Add recommended oil to gearcase  |
|                                 | Damaged gears   | Replace unit   |
|                                 | Output shaft or chain rubbing chain guard             | Adjust guard   |
|                                 | Bent fan housing                                      | Repair or replace part   |
|                                 | Worn brushes  | Repair or replace part   |
|                                 | Worn bearing  | Repair or replace part   |
| Repeated motor stalling         | Electrical  | Check circuits and panel   |
|                                 | Motor wiring  | Check heater size and amp draw   |
|                                 |   | Check motor wiring   |
|                                 | Drag on conveyor                                      | Check all bearings   |
| Drive slow to start             | Electrical  | Check circuits and panel   |
|                                 |   | Take ampere reading  |
| Motor will not start            | No line voltage                                       | Check fuses and wiring for open circuit; check overload protection device and reset; check limit switches, starter and relays for faulty contacts or mechanical fault; check for voltage at source |

| Motor reducer problem                                 | Possible cause                        | Remedy   |
|---|---------------------------------------|--|
|   | Low line voltage                      | Check control circuit voltage  |
|   |                                       | Check for low resistance short on line   |
|   | Conveyor jammed                       | Check for foreign material in chain and sprockets                                  |
|   | Burned out or shorted stator windings | Replace motor with spare and send defective motor to authorized repair station     |
|   | Failure of photo electric control     | Check photo electric control   |
| Motor will run but reducer output shaft does not turn | Worn worm gear in reducer             | Replace reducer with spare and send defective reducer to authorized repair station |
|   | Input shaft key missing or defective  | Replace key  |
| Reducer oil leakage (non-Reliance Relialube)          | Overfilling                           | Drain lubricant to proper level  |
|   | Vent in wrong location                | Place vent in uppermost position   |
|   |                                       | Extend vent with pipe nipple   |
|   | Defective oil seals on output shaft   | Tighten all bolts and fittings   |
|   |                                       | Install new oil seals  |
| Motor overload protectors kicking out                 | Incorrect size                        | Check overload size and replace if necessary                                       |
|   | Short in motor                        | Replace motor  |
| Motor runs, line-shaft does not turn                  | Drive chain broken or disconnected    | Replace chain (see page 58)  |
|   | Sprocket loose                        | Install key, tighten set screws and check line-shaft for wear                      |
| Starter overloads kicking out                         | Wrong size overloads                  | Check proper size and replace  |
|   | Excessive amps being pulled           | Reset starter and check amp draw   |
|   | Motor too small                       | Replace motor within size limits for conveyor speed                                |

| Motor reducer problem | Possible cause      | Remedy                      |
|-----------------------|---------------------|-----------------------------|
|                       | Defective motor     | Repair or replace motor     |
|                       | Overloaded conveyor | Check for excessive product |

## 18.4: TROUBLESHOOTING GUIDE – MECHANICAL



| Mechanical Problem  | Possible Cause  | Remedy  |
|---|---|---|
| Line-shaft bearing noisy                                  | Misaligned line-shaft                                     | Temporarily loosen noisy bearing plus bearing on each side, start motor, stop and retighten |
| Product over XP43 brake will not hold                     | Inadequate air pressure                                   | Air pressure to 40-45 PSI   |
|   | Blown air diaphragm                                       | Remove brake and replace air diaphragm  |
|   | Major air leak  | Find and repair air leak  |
|   | Tubing not contacting all rollers                         | Loosen brake mount bolts and level the brake  |
|   | Light product   | Use plastisol-coated rollers for additional friction  |
| Bearing housing turning in roller shell                   | Insufficient swedging pressure                            | Tack weld outer bearing flange to shell   |
|   | Press fit not tight                                       | Use industrial strength adhesive (like "Loctite" 609)                                       |
|   |   | Replace roller  |
| Roller will not fit in frame                              | Crossmember too short                                     | Shim crossmember at frame   |
|   | Frame bent  | Straighten frame or replace   |
|   | Roller too long   | Replace roller with shorter one   |
| Excessive sprocket wear                                   | Loose chain   | Tighten chain   |
|   | Misalignment  | Check alignment with straight edge alongside of chain                                       |
|   | Dry chain   | Lubricate on proper intervals   |
| Nonsymmetrical wear on sprockets or rollers               | Connected shafts not parallel                             | Realign shafts  |
| Wear on inside of roller plates or side of sprocket teeth | Sprockets offset on shaft (misaligned) or out of parallel | Realign sprockets   |
| Wear on tips of sprocket teeth                            | Chain elongated excessively                               | Replace chain   |
|   | Loose chain   | Tighten chain   |

| Mechanical Problem                    | Possible Cause                              | Remedy  |
|---------------------------------------|---|---|
| Broken chain parts,<br>sprocket teeth | Drive overloaded                            | Avoid overloading   |
|                                       | Excessive slack causing chain to jump teeth | Periodically adjust tension   |
|                                       | Foreign object caught in chain              | Remove object and prevent entry   |
|                                       | Inadequate lubrication                      | Maintain proper lubrication intervals   |
| Excessive chain noise                 | Chain contacting stationary parts           | Remove interference   |
|                                       | Worn sprockets or chain                     | Replace both  |
|                                       | Inadequate lubrication                      | Maintain proper lubrication intervals   |
|                                       | Broken or missing chain rollers             | Repair or replace chain   |
|                                       | Sprockets misaligned                        | Align and tighten all fasteners   |
|                                       | Check shaft and sprocket alignments         | Realign   |
|                                       | Insufficient chain tension                  | Adjust tension  |
|                                       | Chain jumping sprocket teeth                | Adjust chain tension, check for wear  |
| Excessive vibration                   | Broken or missing chain roller              | Replace chain and sprockets   |
|                                       | Broken sprocket teeth                       | Replace chain and sprockets   |
| Pulsing chain                         | Insufficient chain tension                  | Reposition drive sprocket shaft   |
|                                       | Misalignment of chain guard                 | Align sprockets and chain guard   |
|                                       | Overload                                    | Adjust guard as appropriate<br>Inspect for obstruction to or drag on conveyor |
| Broken chain                          | Drive overload                              | Avoid overloading<br>Reduce unit length                                       |
|                                       | Frozen bearing on                           | Inspect for damaged bearings and  |

| Mechanical Problem                                  | Possible Cause                           | Remedy   |
|---|--|--|
|   | sprocket shaft                           | replace as necessary   |
|   | Worn or damaged chain                    | Replace chain as required  |
|   | Obstruction or jam                       | Remove obstruction to clear jam  |
|   | Very dry chain                           | Use lubrication schedule   |
|   | Rusty chain                              | Remove source of corrosion or use noncorrosive chain; increase lubrication schedule  |
| Sprocket loose on shaft                             | Loose set screws                         | Realign sprockets and tighten set screws   |
|   | Worn or damaged keyway                   | Replace with new key   |
| Excessive slack                                     | Normal wear                              | Expect rapid chain growth in first two weeks of operation – reposition sprocket shaft; align sprockets and tighten down drive  |
| Chain climbs on sprocket                            | Improper chain/sprocket alignment        | Realign sprockets  |
|   | Material build-up in sprocket teeth      | Clean sprocket and readjust chain  |
| Broken coupler chain                                | Improper chain installation              | Replace chain  |
|   | Misalignment of line-shaft and sprockets | Realign shafts and sprocket gap  |
| XP43 brake not dropping completely away from roller | Brake located too high in frame          | Loosen mounting bolts to finger tight. Actuate brake, retighten mounting bolts while actuated. This will align the brake assembly with the bottom surface of the rollers and bottom mounting bolts in the frame holes. |



## Chapter 19: REPAIR PROCEDURES

|  <b>WARNING</b> |  |
|--|--|
|                 | <p>Do not perform maintenance on the conveyor until the start-up controls are locked out and cannot be turned on by any person other than the one performing the maintenance. If more than, one member of a crew is working on the conveyor, <b>EACH CREW MEMBER MUST HAVE A LOCK ON THE POWER LOCK OUT</b>. The air pressure must be turned off to the work areas. Make sure personnel are clear of all conveyor equipment before restarting the system. Do not use gasoline or kerosene for cleaning. Use nonflammable solvent only.</p> |

### Coupler Chains

If the coupler failed from torque fatigue, analyze the amount of conveyor driven from that coupler. Perhaps the drive load can be shared better with adjoining conveyors. If the coupler failed from line-shaft misalignment, this condition must be corrected before the new chain is installed. If corrective steps are not taken to address the cause of breakage, the replacement coupler chain will probably also fail. The set screws in coupler sprockets must be torqued to 13 ft-lbs.

### Chain and Sprockets

Lubrication of roller chains is essential to effectively minimize metal-to-metal bearing contact of pin-bushing joints in the chain. Oil should be applied to outside and inside plate edges, since access to the pin-bushing area is possible only through clearances between the outside plates and the inside plates. Oil applied on the center line of the rollers cannot reach pin-bushing joints.

Chain drives should be protected against dirt and moisture. Oil supply should be kept free of contamination.

A good grade of non-detergent petroleum base oil is recommended. Heavy oils and greases are generally too stiff to enter and fill the chain joints. The following table indicates the proper lubricant viscosity for various surrounding temperatures.

| Temperature<br>Degrees F | Recommended<br>Lubricant |
|--------------------------|--------------------------|
| 20 to 40                 | SAE 20                   |
| 40 to 100                | SAE 30                   |
| 100 to 120               | SAE 40                   |
| 120 to 140               | SAE 50                   |

**Inspection includes:**

1. Lubrication check for dirt, grit, or chips and clean if necessary by soaking chain in nonflammable cleaning solvent.
2. Sprocket alignment (see following text)
3. Wear on the inner surfaces of the roller chain link plates.
4. Sprocket tooth wear.
5. Chain tension (see following text).
6. Set screw tightness (5/16-18 at 13 ft-lbs and 1/4-20 at 6 ft-lbs).

**Sprocket alignment**

1. Loosen sprocket.
2. Align loose sprocket to the other by laying a straight edge across their faces or along the chain.
3. Retighten the loose sprocket.

**Chain tension**

Chain should be checked for excessive slack, if the chain is running close to the tips of the sprocket teeth. This can be checked by lifting the chain away from the large sprocket, making sure the chain is in mesh with the sprocket teeth. Excess clearance is conclusive evidence that the chain has elongated in pitch and no amount of tension adjustment will keep it properly meshed with the sprocket teeth. Continued operation will quickly destroy the sprocket teeth which otherwise may be good. If the sprocket is still serviceable, replace the chain.

**Tension adjustment**

1. Loosen mounting bolts of tension.
2. Increase tension up to 1/2" of total slack (1/4" each way of center).
3. Turn adjusting bolts on gearbox plate or move gearbox in mounting slots until there is 1/2" total chain slack.
4. Retighten all bolts after checking alignment.

If chains have stretched so that above adjustments cannot be made, remove a link and reconnect. (If removal of one link makes the chain too short, add offset link and reconnect.)

If a chain should break or fail due to overload, neglect or accident, those portions of the chain which appear to remain intact are, in all probability, damaged and subject to early failure if continued in service. Replace the entire chain and sprockets.

**Chain/sprocket replacement on line-shaft**

1. Shut off and lock out power supply to area of required maintenance.
2. To provide access, remove necessary rollers.
3. Remove line-shaft guard.
4. Disassemble any components involved with the operation of the line-shaft, slave drive, chains, couplers, etc.
5. Remove chain with roller chain pin extractor.
6. Unbolt the bearing housings from the crossmembers.

**CAUTION**

The line-shaft will fall unless supported or held.

7. With line-shaft removed, loosen the eccentric cam collars and coupler chain on the side closest to the sprocket to be removed.
8. Remove all components up to the sprocket being replaced.
9. Loosen set screws on sprocket and remove.
10. Place new sprocket on shaft with keyway aligned and key installed.
11. Remount line-shaft to conveyor bed and properly align sprockets with straight edge against the face of both sprockets.
12. Tighten set screws to specification.
13. Reassemble all components in reverse of disassembly.
14. Reassemble coupler chain around coupler sprockets.
15. Double check tightness of all fasteners.
16. Properly tension chain.
17. Recheck alignment of sprockets.
18. Reinstall chain guard.
19. Reinstall line-shaft guard.

## Universal Joints

U-joints are primarily used to "bend" the line-shaft in the XP43 system both horizontally and vertically. They are used in curves, diverter spurs, merges and small incline or decline angles.

To ensure proper lubrication of all four bearings, pump lubricant slowly until it appears as a slight bead at all journal cross bearing seals. This assures removal of dirt particles and other contaminants that may find their way into the bearings and indicates that the bearings are fully lubricated. In addition this provides additional protection against the entry of foreign matter.

Grease in the bearing prevents excessive wear of parts, protects ball races, balls, etc. from corrosion, and aids in heat dissipation within the bearing.

### Disassembly/assembly procedure as follows:



1. To provide access to maintenance area, remove necessary rollers.
2. Remove line-shaft guarding in area requiring maintenance.
3. Loosen set screws on the universal joint and remove from shaft.
4. Replace universal.
5. Reverse above procedures for assembly.
6. Torque 3/8-16 set screws to 23 ft-lbs – see Universal Joint "phasing".

### Line-shaft Bearings (standard)

Line-shaft bearings have dual set screws torqued to 95 in-lbs to secure the bearing inner race bore to the line-shaft. After one week of constant operation, check each bearing to see that the set screws are tight. Recheck every six months.

To replace any worn or damaged bearings, the drive shaft must be removed from the conveyor. Follow the same procedures as sprocket replacement. Any burrs caused by locking set screws should be removed before sliding bearings or spools off the drive shaft.

Before reassembly the line-shaft must be cleaned. Be sure the shaft is dry before reinstalling bearings and spools.

|  |  |
|--|--|
|  <b>WARNING</b> |  |
|                 | <b>REINSTALL ALL GUARDS.</b> As with all rotating machinery, the line-shaft, couplers and U-joints present the possible danger of entangling hair, fingers, jewelry or clothing. |

### Line-shaft

During manufacturing processes line-shafts are left with a light coating of lubricant. Excess is wiped off before the assembly of components onto the line-shaft. A certain amount of lubricant is needed to prevent formation of rust before the conveyor is put in use. Under normal conditions this has no detrimental effects. However, on rare occasions some rollers may have reduced drive capacity due to excessive lubricant remaining after assembly or due to a localized spill.

To get access to the line-shaft, a spacer must be cut off. A solvent containing no lubricant, which does not harm plastic or urethane, and dries without leaving film, must be used. Success has been found with some brake cleaners, isopropyl alcohol and certain CRC electrical contact cleaner products.

Use the cleaner liberally while shifting the pulleys back and forth on the line-shaft with the drive belts removed. The solution must run out to properly flush. The removed spacer can be placed back on the shaft. Make sure the belt twist is correct when placing the drive belts back on the rollers.

### **Reducers/Gearmotors**

Units are properly filled at the factory with sufficient lubrication for desired mounting position. With "Relialube," the break-in period and subsequent oil change ordinarily experienced with conventional reducers has been eliminated.

With Reliance Relialube reducers, change oil only when performing maintenance that requires gearbox disassembly. In this case, use only Mobil SHC-634. If possible return to Reliance service center for repairs.



### **Disassembly/assembly procedure as follows:**

1. To provide access to maintenance area, remove necessary rollers.
2. Disconnect drive chain from line-shaft drive sprockets using roller chain extractor tool.
3. Disconnect any electrical connection.
4. Remove reducer or gearmotor.
5. Perform required maintenance.
6. Reverse procedures for assembly.
7. After all fasteners are tight, double check chain tension and sprocket alignment.
8. Replace all guards.

*Regularly inspect all gearbox reducers to guarantee maximum performance: (see **Lubrication Guide**)*

1. Tightness of bolts and screws
2. Correct alignment of shaft and couplings
3. No major oil leaks
4. No excessive heating
5. No unusual vibration or noise

Enclosed gear drives (except those tagged as pre-lubricated) require filling to the proper oil level before operating as indicated. Equivalent lubricants should conform to AGMA Standard Specification No. 250.03 applying to the AGMA Lubricant Number indicated for the required ambient range. Service life and efficiency of gears and bearings will be affected by oxidation or contamination of oil used. Improved performance will be obtained by periodic lubrication at regular intervals of approximately 2,500 hours of operation or six months, whichever comes first. See Lubrication Guide.

|  <b>WARNING</b> |  |
|--|--|
|                 | <p>Do not perform maintenance on the conveyor until the startup controls are locked out and cannot be turned on by any person other than the one performing the maintenance.</p> <p>If more than, one member of a crew is working on the conveyor, <b>EACH CREW MEMBER MUST HAVE A LOCK ON THE POWER LOCK OUT.</b></p> <p>The air pressure must be turned off to the work area. All pneumatic devices must be de-energized to prevent accidental cycling of the device.</p> <p>Make sure personnel are clear of all conveyor equipment before restarting the system.</p> |

## 19.1: DRIVE BELTS

When it becomes necessary to replace a XenoROL drive belt, there are choices depending on the situation. New original manufactured belts are the best and will last the longest.

Replacement belts with hook connections require only the removal of a roller to install. Making belts by heat welding a length of cord stock requires special tools and techniques.

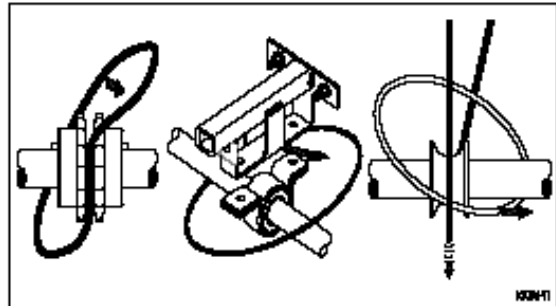
***When replacing all belts, only use original type belts with the following procedure:***

**Disassembly/assembly procedures (original belts):**

1. Remove all rollers.
2. Remove the line-shaft guarding.
3. Remove coupler chains at both ends.
4. Unbolt the line-shaft bearings from the conveyor crossmembers, then lower line-shaft carefully.
5. Place new belts over the line-shaft assembly. If spares are included, they must be secured with tie straps to the spacers. Do not tighten tie to cause belt compression or distortion or it will not be usable in the future.
6. Reassemble the line-shaft by bolting the line-shaft bearings to the crossmembers.
7. Realign adjoining coupler sprockets.
8. Attach coupler chains. (See installation of coupler chains.)
9. Be aware of the drive belt's twist direction for proper conveying direction. Twist belt onto roller's groove and reassemble roller into conveyor bed.



***When replacing a few belts in a specific location, use original type belts with the following procedures:***

1. Remove rollers receiving new belts.
2. Remove the line-shaft guard.
3. Remove the coupler chain closest to the replacement area.
4. Remove the bolts holding line-shaft bearings between the coupler and replacement area.
5. Pass the belt between the coupler sprockets.
6. Pass belts over the line-shaft bearings.
7. Pass the belts through all connected belts by turning the roller while pulling the belt through.
8. With the new belts in their respective pulleys, reassemble bearing and couplings.



***In an emergency the belts may be replaced by cutting and splice welding a new length belt from cord stock using the following procedure:***

1. Preheat the iron with the adjustment knob at approximately the three-fourths setting for a couple of minutes.
2. Feed new length of belt around line-shaft.
3. Holding one end of the belt in each hand, place the ends against each side of the heating surface and thoroughly soften both ends making sure melted material appears around the entire perimeter of the splice.
4. Remove from iron and match cord, end to end.
5. Hold firmly together until the joint solidifies.
6. When belt is cool, trim the flashing from around the welded joint. Twenty minutes cooling time is recommended before reconnecting to the roller.
7. Be aware of the orientation of roller drive belts for conveying direction. Twist belt onto roller groove and reassemble roller into conveyor bed.
8. To reassemble the roller into conveyor frame, lay the roller on the frame with the grooved end over the line-shaft. After placing the belt over the roller with the correct twist, put the axle on the line-shaft side into its hex hole. Align the axle with the hex hole on the opposite side/frame and depress axle with a blunt object. Push the roller downward into frame until axle snaps into hex hole in side channel.

|  |   |
|--|---|
|  <b>WARNING</b> |   |
|                 | Use a blunt object to depress roller axles. If a screwdriver or similar pointed tool is used and slips, it could cause injury to the installer. |



# Chapter 20: XP43 REPLACEMENT PARTS IDENTIFICATION

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## 20.1: REPLACEMENT PARTS IDENTIFICATION

This section is used to identify parts that may require replacement during the life of the conveyor. Parts, which specifically pertain to MHS Conveyor conveyors, are included with illustrations. A "Recommended Spare Parts List" is published for all conveyor orders of \$20,000. This spare parts list is sent to the purchaser approximately (2) weeks after the order is received. It includes part numbers, description, pricing and recommended quantities to be kept on hand for maintenance. If you are unable to locate this document, another may be obtained by contacting the MHS Conveyor Lifetime Services at 231-798-4547.

## SPARE PARTS PRIORITY LEVEL EXPLANATIONS

### Level #1

**Failure of a priority level #1 spare part ("A" level part) may cause major disruption of system performance.**

Priority level 1 spare parts must be on-hand, and available to be replaced in the event of a component failure that could shut down a critical function of a conveyor system.

Priority level 1 spare parts include motors, gear reducers, gearmotor, motorized rollers, air solenoid valves, and related components. The majorities of these parts are purchased from MHS Conveyor vendors and carry their own warranties through these vendors. For more warranty information, see MHS Conveyor Equipment Warranty.

### Level #2

**Failure of a priority level #2 spare parts ("B" level part) usually is gradual and should not cause a major system disruption.**

Priority level 2 spare parts are parts required for smooth system operation and preventative or regular mechanical maintenance.

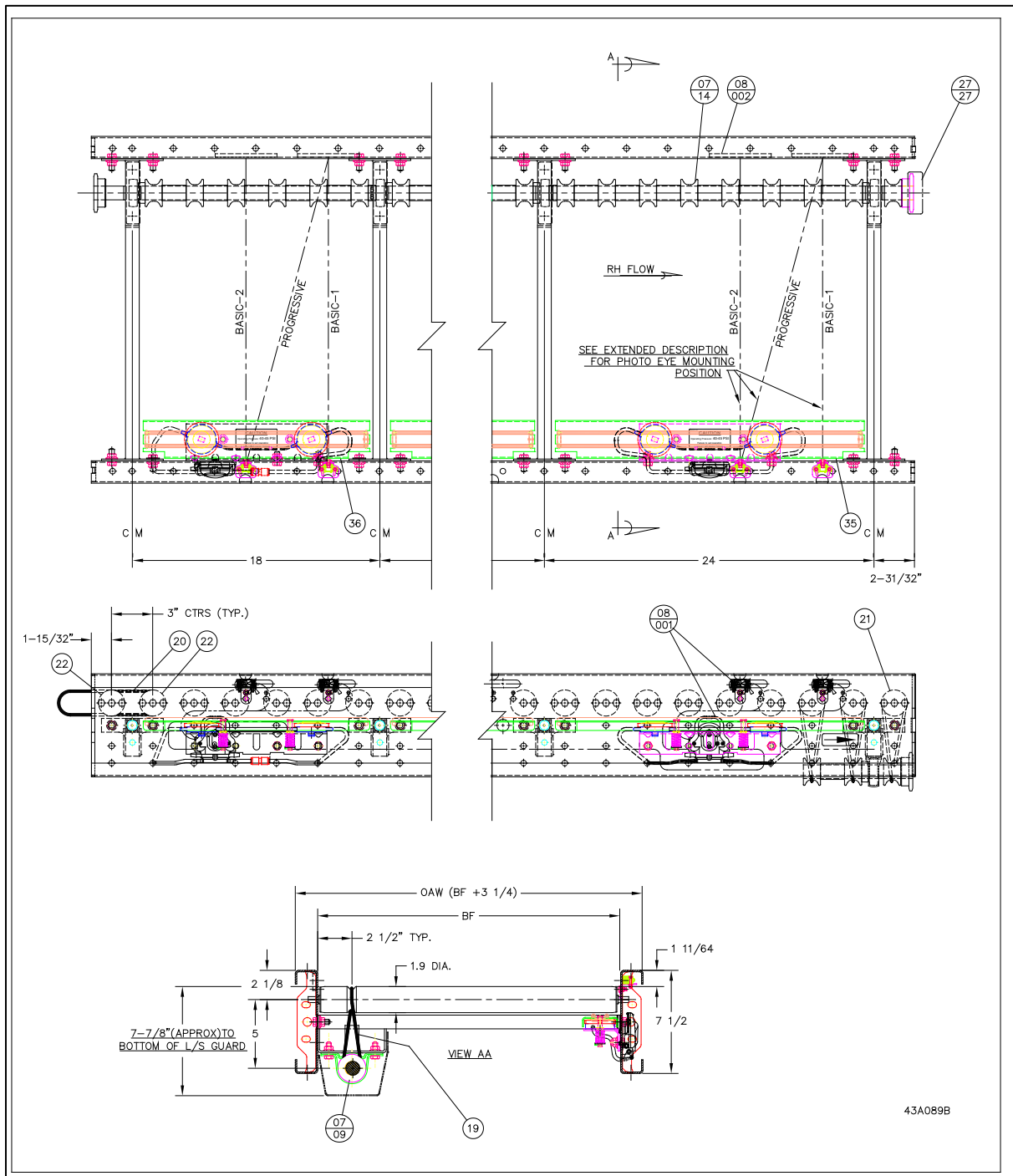
Priority level 2 spare parts include roller chain, sprockets, belt pulleys, rollers, air cylinders, and other related parts whose failure should not stop a conveyor system suddenly. These parts tend to wear out gradually and are not known to fail suddenly.

### Level #3

**Priority level #3 parts ("C" level part) rarely fails and are easily obtainable.**

Priority level 3 spare parts are parts that rarely fail or maybe optionally used by the customer.

## 20.2: XP43 BED



Reference Dwg 43A089B

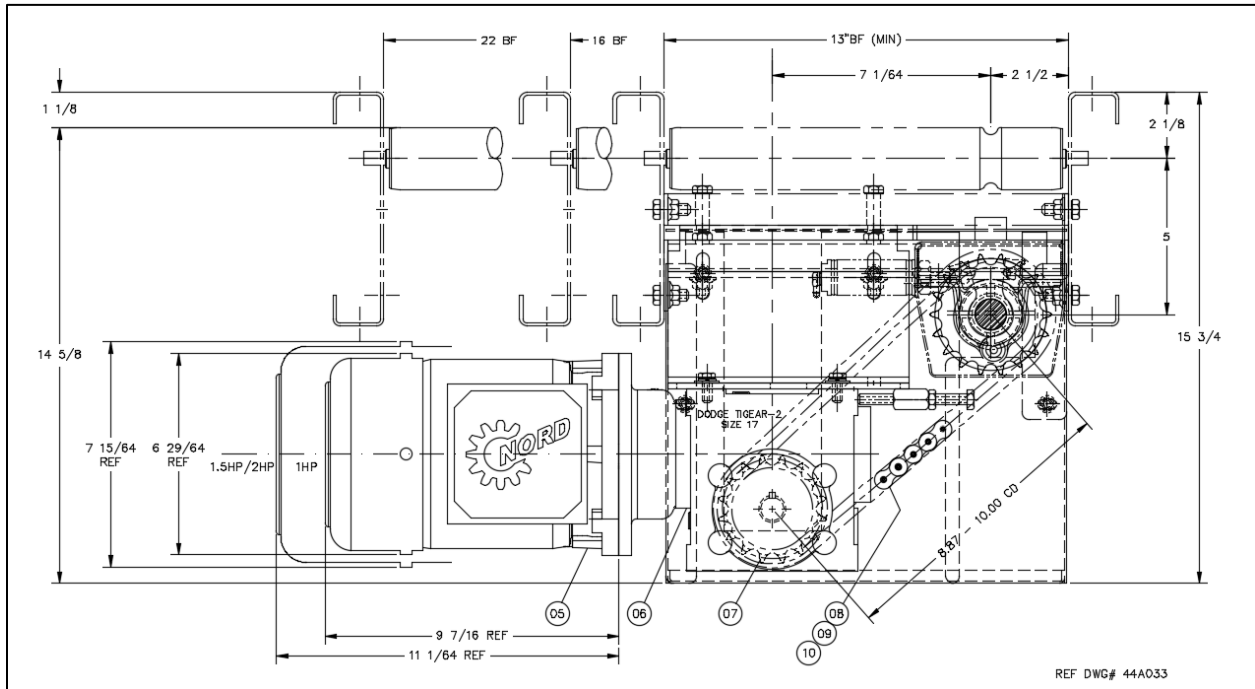
### 20.2.1: Replacement Parts – XP43 Bed

Description: Bed,\_XP43CZ-3I/D\_24 RH/LH-10' GENII

| REPLACEMENT PART NUMBERS FOR RH XP43CZ |  |                      |          |          |          |
|--|--|----------------------|----------|----------|----------|
| Balloon                                | Description  | Width                |          |          |          |
|  |  | 18 XP                | 24 XP    | 30 XP    | 36 XP    |
| 07/009                                 | 1" BORE PRECISION BEARING                              | 90050103             |          |          |          |
| 07/014                                 | 1" BORE DRIVE PULLEY                                   | 90801200             |          |          |          |
| 08/001                                 | PHOTO EYE VALVE (Normally Open – Air-to-Brake)         | 1114947              |          |          |          |
| 08/001                                 | LOGIC MODULE, PHOTOEYEE, MOUNTING BRACKET AND HARDWARE | 1115898              |          |          |          |
| 09/001                                 | PHOTO EYE REFLECTOR                                    | 400004               |          |          |          |
| 19                                     | 3/16" x 13-1/2" O-RING                                 | 90530009             |          |          |          |
| 20                                     | 3/16" x 9-15/16" O-RING                                | 90530005             |          |          |          |
| 21                                     | 1.9" DIA. PLATED ROLLER (PRECISION BEARING)            | 40218029             | 40224029 | 40230029 | 40236029 |
| 22                                     | 1.9" DIA. PLATED ROLLER (PRECISION BEARING)            | 40218129             | 40224129 | 40230129 | 40236129 |
| 27/027                                 | CHAIN COUPLER  | 90140025             |          |          |          |
| 35 & 36                                | BRAKE  | SEE BRAKE ZONE CHART |          |          |          |
| Bed Reference Dwg. #43A089B            |  |                      |          |          |          |

| BRAKE ZONE REPLACEMENT PART NUMBERS |                                |                      |                     |                     |                     |
|-------------------------------------|--------------------------------|----------------------|---------------------|---------------------|---------------------|
| Balloon                             | Description                    | Zone Lengths         |                     |                     |                     |
|                                     |                                | 18                   | 24                  | 30                  | 36                  |
| 35 & 36                             | BRAKE                          | 1129738<br>18" Zone  | 1129740<br>24" Zone | 1129490<br>30" Zone | 1129491<br>36" Zone |
|                                     | BRAKE (RIGHT HAND DOUBLE PUCK) | 1129753<br>12" Brake |                     |                     |                     |
|                                     | BRAKE (LEFT HAND DOUBLE PUCK)  | 1129754<br>12" Brake |                     |                     |                     |

## 20.3: XP43 DRIVE TRAIN



Description: DR,CTR\_CZ-\_-RH/LH

### 20.3.1: Replacement Parts- XP43 LH/RH Bed

| REPLACEMENT PART NUMBERS FOR XP43 CENTER DRIVE, DRIVE TRAINS    |     |         |          |              |                   |                   |                            |                                      |                                |          |             |
|---|-----|---------|----------|--------------|-------------------|-------------------|----------------------------|--------------------------------------|--------------------------------|----------|-------------|
| DRAWING   |     |         |          |              | BELT DRIVEN       |                   |                            | CHAIN DRIVEN                         |                                |          |             |
| BALLOON   |     | 05      | 06       |              | 07                | 07                | 08                         | 07                                   |                                | 08       | 09          |
| FPM   | HP  | MOTOR   | REDUCER  | REDUCER SIZE | DRIVE PULLEY      | DRIVEN PULLEY     | BELT                       | DRIVE SPROCKET                       | DRIVEN SPROCKET                | CHAIN    | MASTER LINK |
| *30   | 1   | 1187036 | 90655016 | 56/17-20     | NOT AVAILABLE     |                   |                            | 90800530 5016<br>7/8"BORE            | 90800542<br>18-TOOTH<br>1"BORE | 90140029 | 90440106    |
|   | 1.5 | 1187038 | 90655174 | 140/26-20    |                   |                   |                            | 90800532 5016<br>1-1/8"BORE          |                                |          |             |
| 45  | 1   | 1188036 | 90655014 | 56/17-15     |                   |                   |                            | 90800541 5018<br>7/8"BORE            |                                |          |             |
|   | 1.5 | 1187038 | 90655069 | 140/26-15    |                   |                   |                            | 90800539 5018<br>1-1/8"BORE          |                                |          |             |
| *60   | 1   | 1188036 | 90655009 | 56/17-10     | 90800831<br>36-8M | 90800836<br>40-8M | 90050800(HPR)<br>800-8M-30 | 90800530 5016<br>7/8" BORE           |                                |          |             |
|   | 1.5 | 1187038 | 90655012 | 140/17-10    | NOT AVAILABLE     |                   |                            | 90800532 16-<br>TOOTH 1-1/8"<br>BORE |                                |          |             |
|   | 2   | 1187039 | 90655011 | 140/26-10    |                   |                   |                            |                                      |                                |          |             |
| *75   | 1   | 1188036 | E0005769 | 56/17-7.5    | 90800839<br>34-8M | 90800836<br>40-8M | 90050800(HPR)<br>800-8M-30 | 90800523 5015<br>7/8" BORE           |                                |          |             |
|   | 1.5 | 1187038 | 1188291  | 140/17-7.5   | NOT AVAILABLE     |                   |                            |                                      |                                |          |             |
|   | 2   | 1187039 | 1188291  | 140/17-7.5   |                   |                   |                            |                                      |                                |          |             |
| 90  | 1   | 1188036 | E0005769 | 56/17-7.5    | 90800845<br>40-8M | 90800836<br>40-8M | 90050800(HPR)<br>800-8M-30 | NOT AVAILABLE                        |                                |          |             |
|   | 1.5 | 1187038 | 1188291  | 140/17-7.5   | NOT AVAILABLE     |                   |                            |                                      |                                |          |             |
|   | 2   | 1187039 | 1188291  | 140/17-7.5   |                   |                   |                            |                                      |                                |          |             |
| *120  | 1   | 1188036 | 90655005 | 56/17-5      | 90800831<br>36-8M | 90800836<br>40-8M | 90050800(HPR)<br>800-8M-30 |                                      |                                |          |             |
|   | 1.5 | 1187038 | 90655004 | 140/17-5     |                   |                   |                            |                                      |                                |          |             |
|   | 2   | 1187039 | 90655004 | 140/17-5     |                   |                   |                            |                                      |                                |          |             |
| *Requires Reducer Spacer Plate, Ref. P/N 40740014               |     |         |          |              |                   |                   |                            |                                      |                                |          |             |
| Pulleys and Sprockets requires two set screws, Ref. P/N 1115210 |     |         |          |              |                   |                   |                            |                                      |                                |          |             |
| Drive-Train Reference Dwg. #44A033E                             |     |         |          |              |                   |                   |                            |                                      |                                |          |             |

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## MHS Conveyor GENERAL INFORMATION

### MHS Conveyor Website Link:

[mhs-conveyor.com](http://mhs-conveyor.com)

## MHS Conveyor INFORMATION

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### Mission

MHS Conveyor, located in Norton Shores, Michigan, is a leading deliverer of “smart” material handling systems, technologies, products, and services, creating solutions for material flow applications. As a global supplier of conveyor systems and equipment since 1964, MHS Conveyor provides sorters, conveyors, and accessories to satisfy a broad spectrum of accumulation, transportation, and sortation applications.



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