SERIES 1500 Conveyor

Installation and Maintenance Manual

Document Structure

Due to the size and amount of content in this document, it has been organized such that each section can be printed as a “stand-alone” document.

Important Message

Trew places an emphasizes on the user’s safety. It is strongly encouraged that the user thoroughly reads and understands the contents of Chapter 2.

ABBREVIATIONS AND ACRONYMS

AMPS	Amperes
ANSI	The American National Standard Institute
ASME	The American Society of Mechanical Engineers
AUX	Auxiliary
BF	Between Frame
CEMA	Conveyor Equipment and Manufacturers Association
CFR	Code of Federal Regulations
DC	Direct Current
DWG	Drawing
F	Fahrenheit
FPM	Feet Per Minute
HCAT	High-Speed Cam Actuated Transfer
I/O	Input/Output
IM	Installation and Maintenance Manual
lbs.	Pounds
LED	Light Emitting Diode
LLC	Limited Liability Company
MDR	Motorized Driven Roller
Min.	Minute
OAL	Overall Length
OSHA	Occupation Safety and Health Agency
PH	Phase
PLC	Programmable Logic Controller
PM	Preventative Maintenance
PSE	Power Supply Enclosue
PSI	Pounds per Square Inch
RSH	Roller Set High
RSL	Roller Set Low
VAC	Volts Alternating Current
VDC	Volts Direct Current
ZPA	Zero Pressure Accumulation

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Chapter 1

Conveyor Introduction

(Section Page Range: 9-47)

1.1 Series 1500 Introduction

The Series 1500 Conveyor is primarily used in distribution facilities where tote and case handling applications are sought. This product line consists of pre-assembled, pre-wired modules that are easily configurable for ease of installation. The product line operates on Motorized Driven Roller (MDR) technology and is controlled by local and remote Input/Output (I/O) controls network for the system's peripheral photoeye devices. Trew's Series 1500 technology can be seen in Figure 1 and has the following advantages:

- Less Power – uses 30-50% less energy than a typical belt conveyor.
- Quiet – runs on demand with low noise.
- Modular – flexible solutions and layouts.

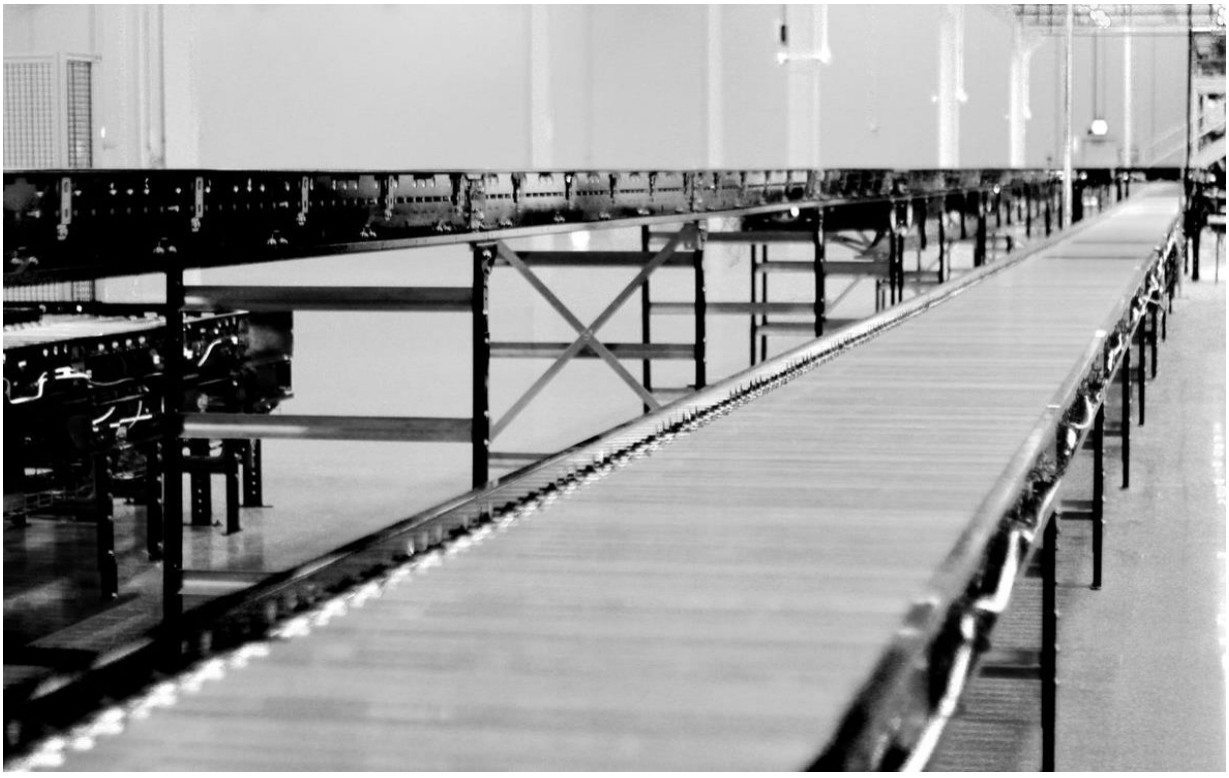


Figure 1: Series 1500 MDR Conveyor

The Series 1500 Conveyor modules, in general, consist of independent roller "zones" where non-powered rollers are connected via transmission couplings (i.e., O-Bands) to a single MDR roller which powers the given zone. Photoeyes are used in each zone and send signals back to the Motor Control Card when a product is

detected. For reference purposes, a straight intermediate section with 4 zones, along with its primary components can be seen in Figure 2:

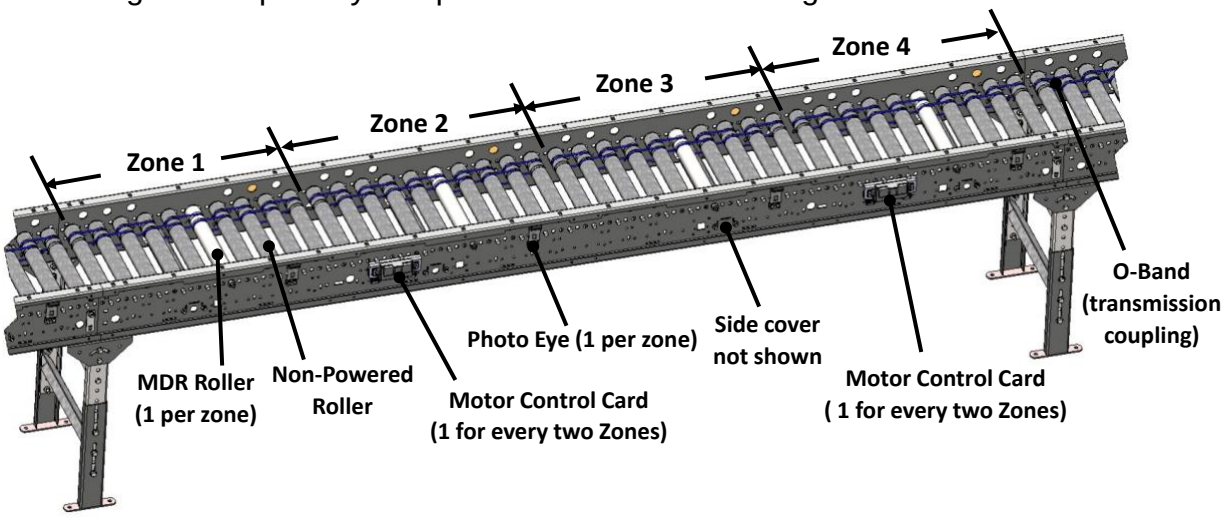


Figure 2: MDR Intermediate Configuration

The control algorithm for the network of modules is comparable to a busy road intersection where a stop light is needed to manage the flow of traffic. In this manner, the control network allows for the products to travel in either a "Transportation Mode (i.e., traveling non-stop in the given zone), or in an "Accumulation Mode" (i.e., traveling into a zone, stopping for a given amount of time, and then exiting the zone at the proper time). For most applications, where there are multiple products being transported, the Accumulation Mode is in effect and will function in the following two ways:

Singulation Release: comparable to a stop sign, one product travels through the zone).

Slug Release: (comparable to a green traffic light, multiple products travel through the zone without stopping). Slug release is typically used in Palletizing or Machine Loading conditions.

The Series 1500 module assemblies are pre-wired for ease of installation purposes and can be networked with a variety of technologies for multiple applications. The electric MDR usage and its control system ensures that the conveyor runs consistently and is noticeably quiet.

The general specifications for the MDR and Belted Zones can be found in Tables 1 and 2. Details of each module can be found in subsequent sections of this document and in Trew's marketing module Cut Sheets.

Table 1: Series 1500 MDR Zone Specifications

Width (BF, inches)	15, 21, 27, 33, 36
Zone Length (inches)	24, 30, 36
Nominal Speed (FPM)	Up to 180
Nominal Capacity (lbs. per zone)	Up to 75
Operating Temperature (degrees F)	40-104
Motorized Drive Roller Type	24VDC
Minimum Product Size	6"x6" for 2" CC 8"x8" for 3" CC 9"x9" for HCAT90

Note: The above specifications are for general use and are subject to change for different applications.

Table 2: Series 1500 Belted Zone Specifications

Width (BF, inches)	15, 21, 27, 33, 36
Zone Length (inches)	24, 30, 36
Nominal Speed (FPM)	Up to 150
Nominal Capacity (lbs. per zone)	Up to 50
Operating Temperature (degrees F)	40-104
Motorized Drive Roller Type	24VDC
Minimum Product Size	4"x4"

Note: The above specifications are for general use and are subject to change for different applications.

1.2 Component Module Summary

The Series 1500 Product Line consists of various modules which can be seen in Figure 3 and described in Table 3.

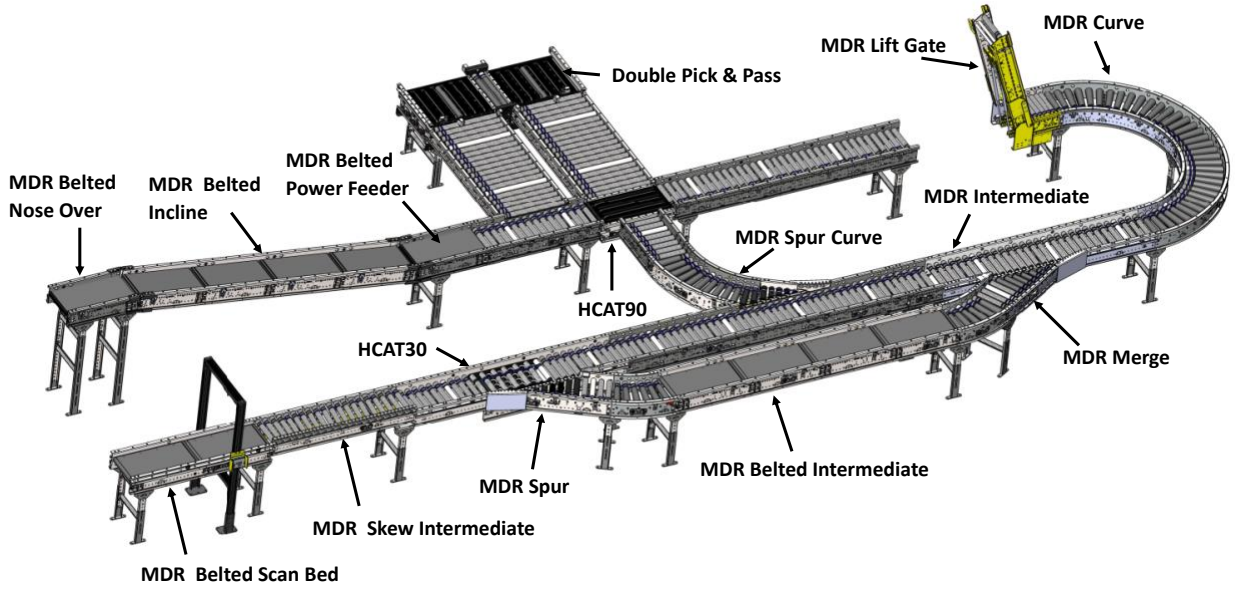


Figure 3: Series 1500 Component Modules

Table 3: Series 1500 Component Module Descriptions

MODULE NAME	MODULE DESCRIPTION
MDR Intermediate	Transports product in a linear direction.
MDR Belted Intermediate	Transports product, using belted roller segments, in a linear direction.
MDR Curve	Transports product along a curve (30, 45, 60, 90 degrees sections).
MDR Spur	A sub-assembly for use in the MDR Merge Module.
MDR Spur Curve	A sub-assembly for use in the MDR Merge Module.
HCAT 30 (Pop-up 30° Divert)	Transports (diverts) product to another conveyor line at a 30 angle.
MDR Merge	Transports (merges) product onto another conveyor line at a 30 angle.
HCAT90 (Pop-Up 90° Transfer)	Transfers (diverts) product to a perpendicular conveyor line. Double Pick & Pass and Triple Pick& Pass Configurations available.
MDR Skew Intermediate	Transports product in a linear direction and aligns that product to one side of the conveyor rail.
MDR Lift Gate	Allows access for personnel or equipment from one side to the other.
MDR Belted Nose Over/ Power Feeder	A sub-assembly module for use in MDR Belted Incline/ Decline lines.
MDR Belted Incline/ Decline	Transports product on a belted zone in an Incline/ Decline manner.
MDR Belted Scan Bed	Transports product on a belted zone to allow for the barcodes to be read.

1.3 Engineered-To-Order Component Module Summary

The Series 1500 Engineered-To-Order Product Line consists of various modules which can be seen in Figure 4 and described in Table 4.

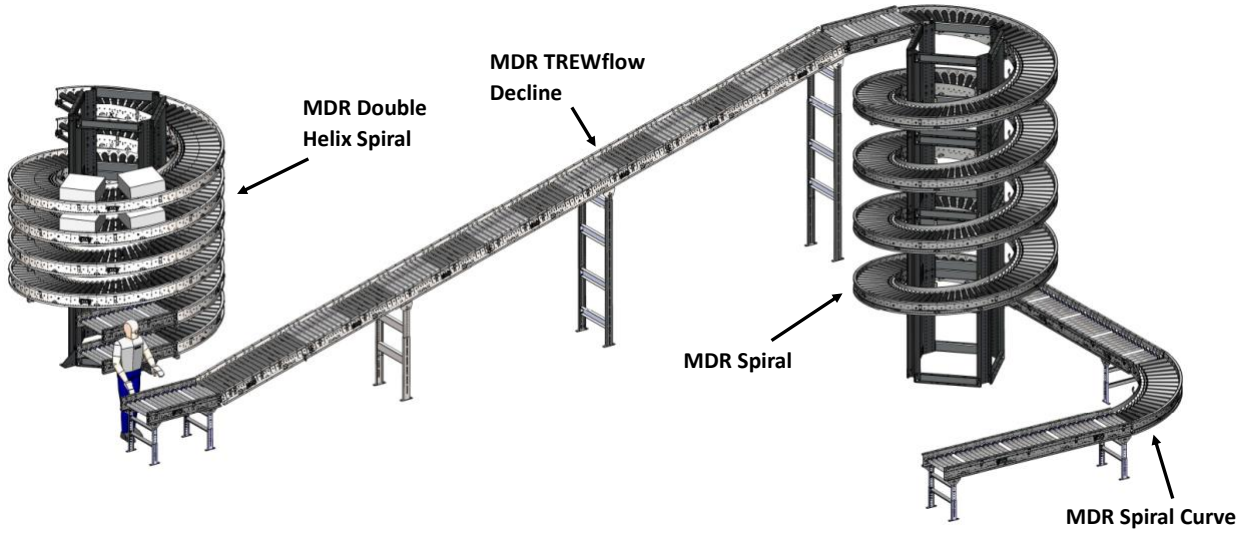


Figure 4: Series 1500 Engineered-To-Order Component Modules

Table 4: Series 1500 Engineered-To-Order Component Module Descriptions

MODULE NAME	MODULE DESCRIPTION
MDR Spiral Curve	Used for elevation changes or in Spiral or Helix Modules.
MDR Spiral	Transports product to different elevations using a small footprint.
MDR Double Helix	Transports product to different elevations using a small footprint.
MDR TREWflow Decline	An intermediate MDR decline with alternating powered & gravity roller zones. Used to relieve product back pressure so that the product can be easily removed.

1.4 Series 1500 Module Details

1.4.1 MDR Intermediate

The MDR Straight Intermediate modules can convey products in a linear direction. Its bed of rollers can either be spaced 2 or 3 inches apart. These models come in the following two configurations:

A Roller Set High (RSH) configuration positions its bed of rollers up high on the side rails in case products need to be pulled laterally off the conveyor. This configuration

uses a diffused Photoeye sensor to detect product. This module and its Photoeye can be seen in Figures 5 and 6.

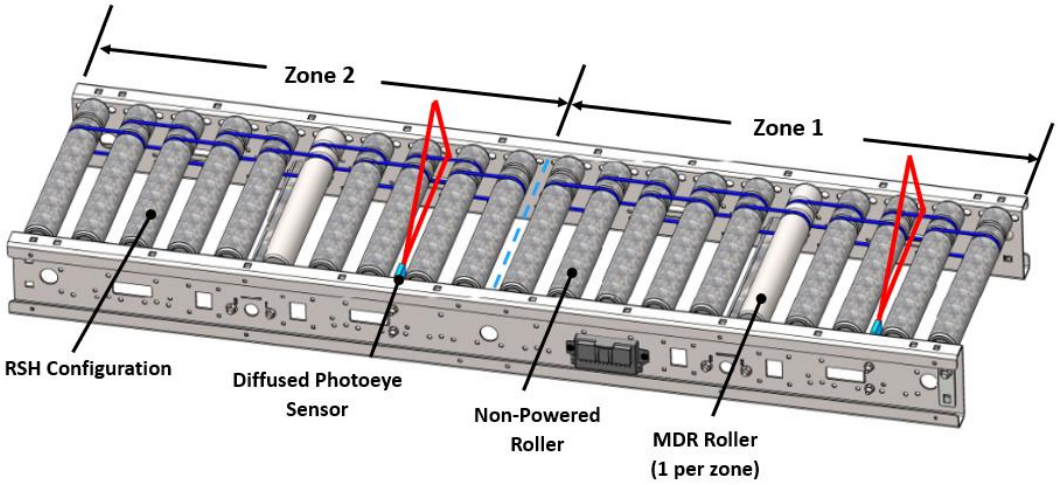


Figure 5: MDR Intermediate Module (RSH)

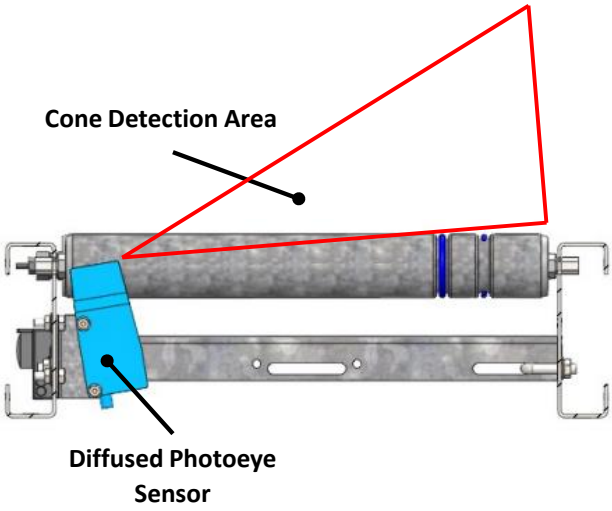


Figure 6: Diffused Photoeye

A Roller Set Low (RSL) configuration positions its bed of rollers in the middle of its side rails. This configuration uses a retro-reflective photoeye. This module and its photoeye can be seen in Figures 7 and 8.

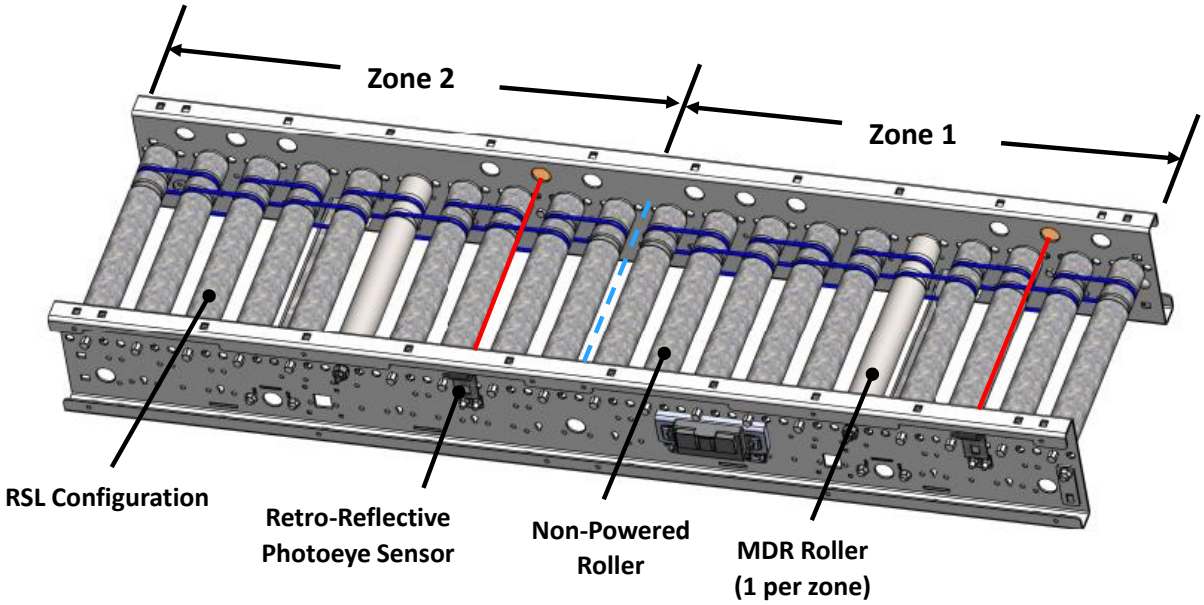


Figure 7: MDR Intermediate Module (RSL)

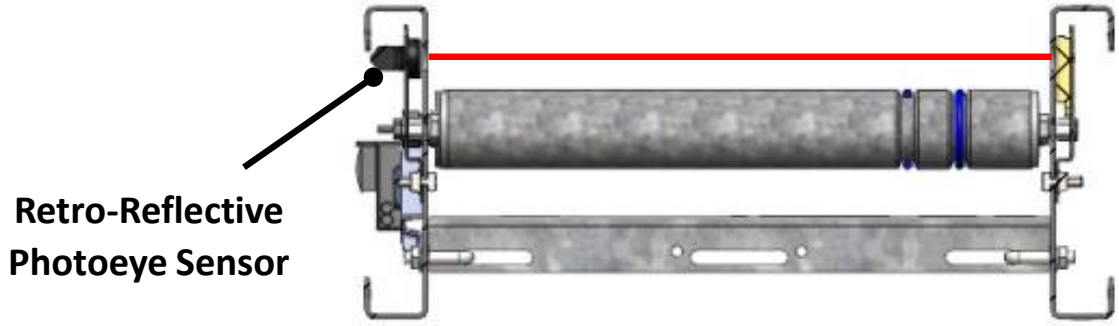


Figure 8: Retro-Reflective Photoeye

1.4.2 MDR Belted Intermediate

The MDR Belted (Zone) Intermediate Module utilizes a seamless belt to convey small products. The belt is commonly referred to as an inverted diamond or negative pyramid and provides a surface that can “grab” product. Belted MDR is used when the system needs to convey smaller products or requires smoother conveyance. This module can be seen in Figure 9 .

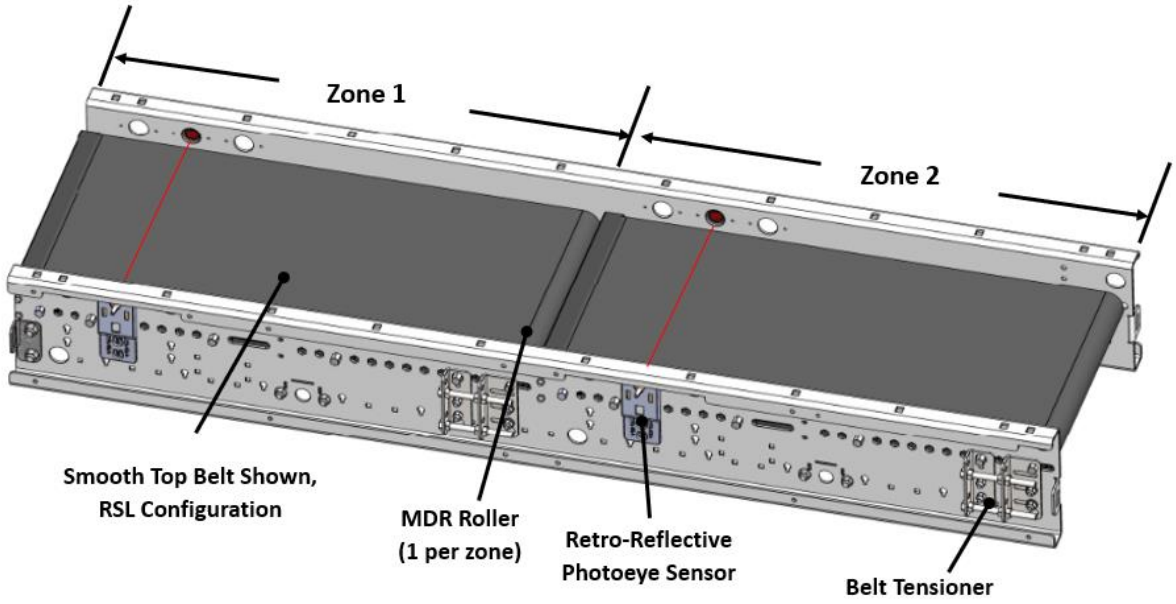


Figure 9. MDR Belted Intermediate Module

In Figure 10, a cross sectional view of the seamless belt can be seen.

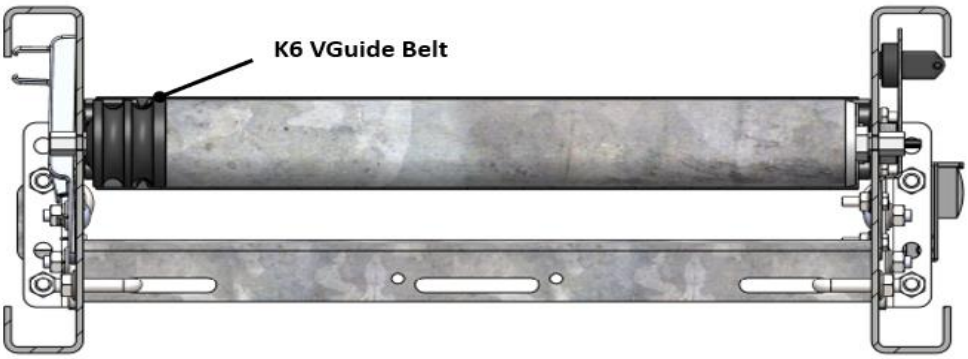


Figure 10: End View of the Belted Zone Module

1.4.3 MDR Curve

The MDR Curve module is available in RSH and RSL, 2 or 3” center configurations and its corresponding photoeye type (See Intermediate section for photoeye details). In Figure 11, the Curve Module can be seen.

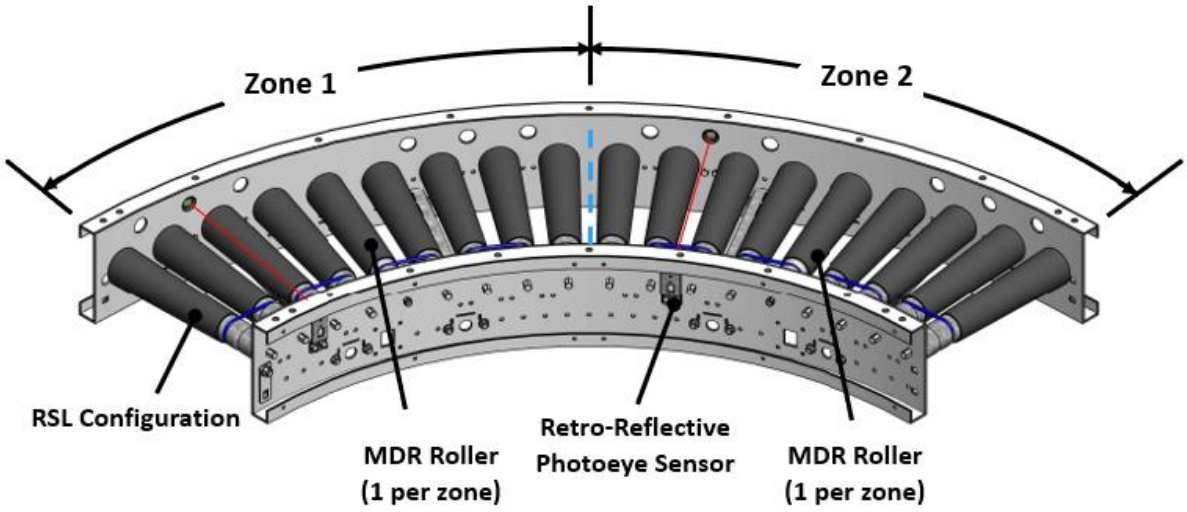


Figure 11: MDR Curve Module

The MDR Curve module requires the use of true tapered rollers to maintain product orientation as it travels around the curve. Here, due to the increasing radius of the roller, the velocity of the roller is greater on the outside relative to the inside since the angular velocity does not change. In Figure 12, the true tapered roller can be seen.

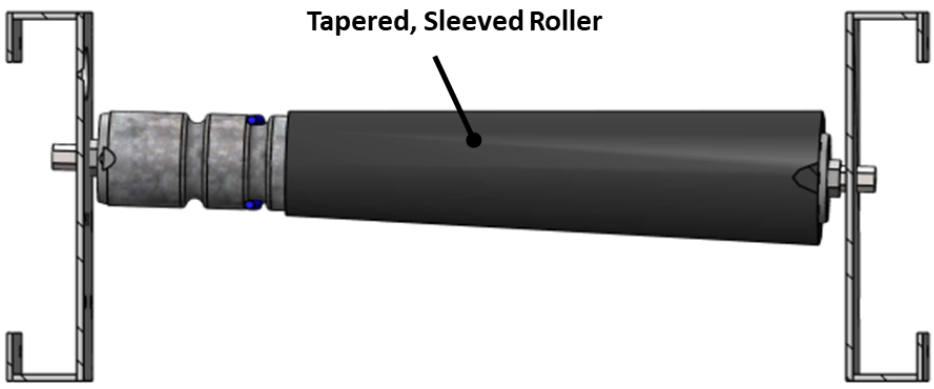


Figure 12: MDR Curve Tapered Roller

1.4.4 MDR Spur

The MDR Spur module is an add-on module for product merge needs. It is available in RSH and RSL, 2 or 3” centers and uses either a Retro-Reflective or Diffused photoeye sensor. This spur model can be seen in Figure 13.

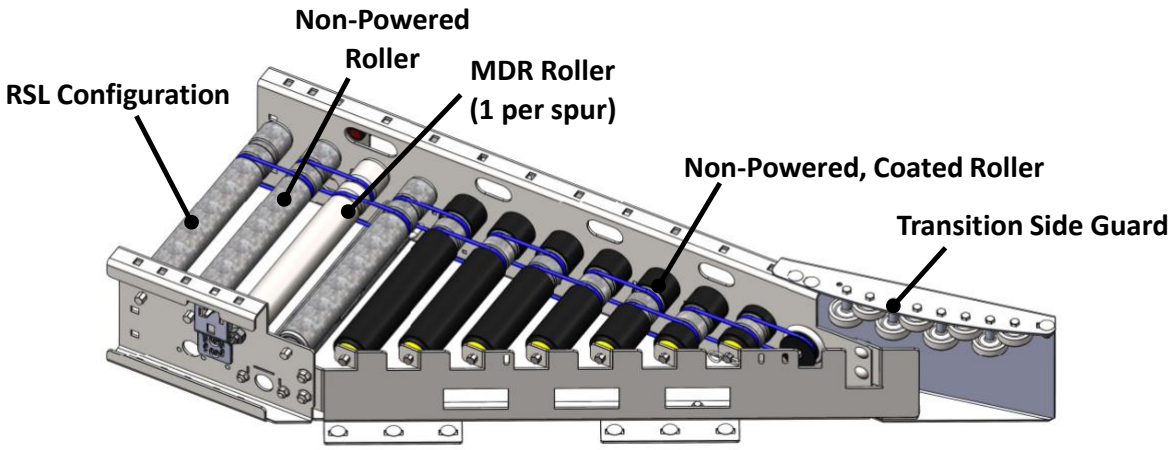


Figure 13: MDR Spur Module

1.4.5 MDR Spur Curve

The MDR Spur Curve module is an add-on module for product merge or divert needs. It is available in RSL, 3” center and uses the Retro-Reflective photoeye sensor. This module can be seen in Figure 14.

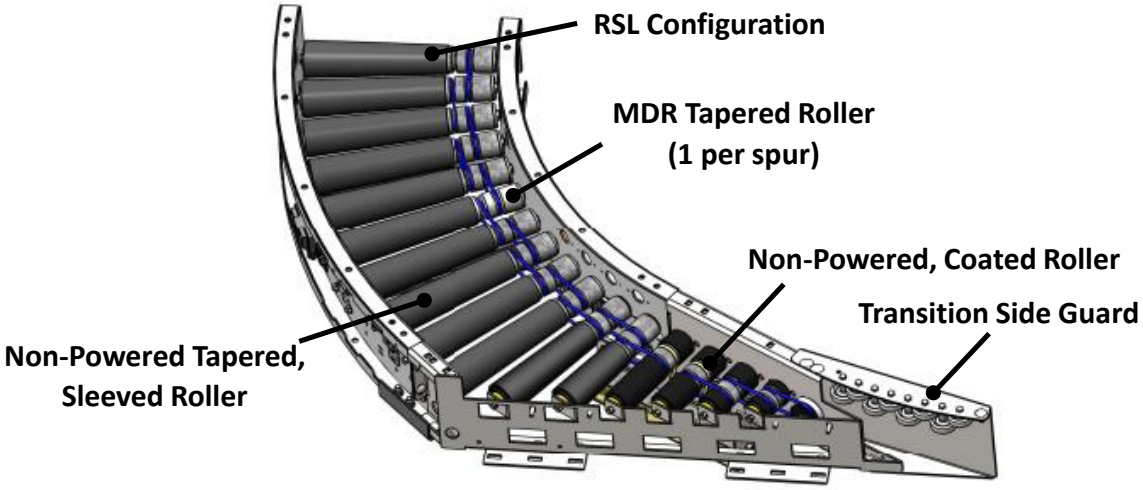


Figure 14: MDR Spur Curve Module

1.4.6 HCAT 30 (Pop-Up 30° Divert)

The High-Speed Cam Actuated Transfer (HCAT30) divert modules provide a 30° angle divert capability to move packages and totes to a separate line. It uses MDR technology to drive the rollers, a cam that converts rotational motion to a reciprocating motion to lift the Pop-Up divert wheels. It is powered by 24-volt DC electricity (not pneumatic), and can divert products at a rate of 35 products/min. This type of module can be seen in Figure 15.

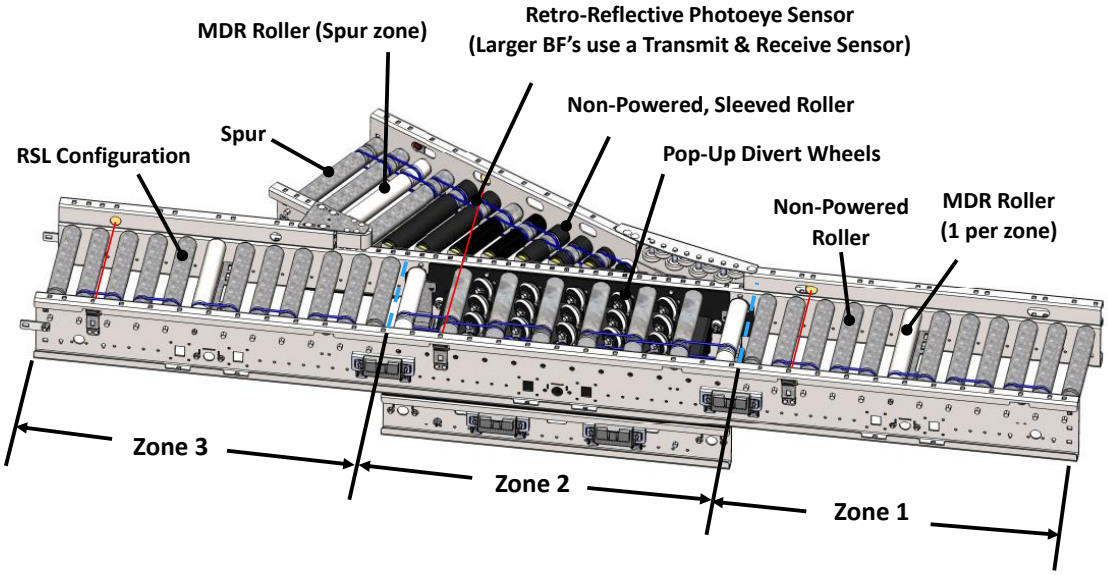


Figure 15: HCAT30 Pop Up Divert Module

This device is pre-wired for ease of installation and is controlled by the G20 Control card. When this module is not diverting product, the Pop-Up Wheels are positioned below the plane of rollers and will not divert any products. Rollers in between the Pop-Up Divert wheels will transport product during non-diverting events. This can be seen in Figure 16.

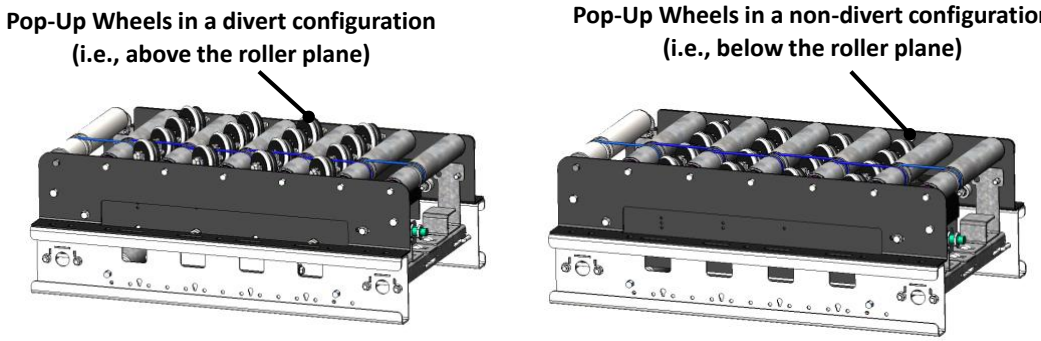


Figure 16: HCAT30 Pop Up Divert Wheel Configuration

1.4.7 MDR Merge

The MDR Merge module is used to integrate (i.e., merge) two different conveyor lines into a single line. This merger can be accomplished by integrating a tapered, straight 30 degree “spur” unto a straight intermediate bed and adjusting its zone control behavior. This module is only available in RSL configuration, 2 and 3” roller centers, and it uses the retro-reflective photoeye sensor. This module can achieve a 40 products/min throughput rate. This type of module can be seen in Figure 17.

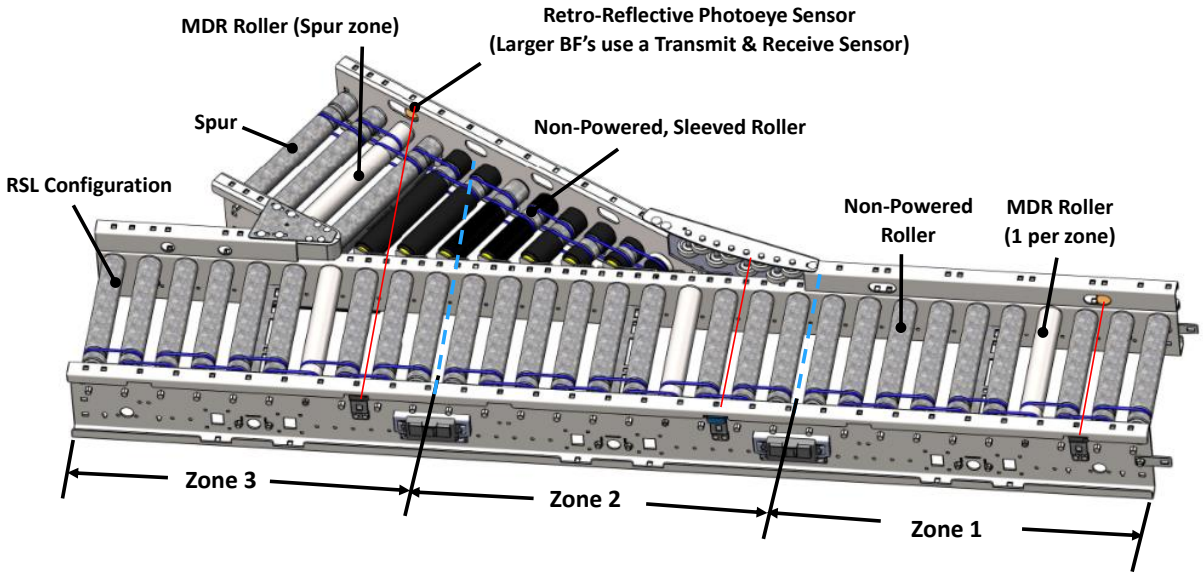


Figure 17: MDR Merge Module

This module’s zones are configured such that there are three zones in the mainline (straight) segment and one zone in the spur subassembly. Zone Control options are typically determined during the design of the layout. Details on zone control can be found in the Operation Chapter of this manual. In general, during operation, products will be able to accumulate on either the spur segment or the intermediate section but will not be able accumulate simultaneously on both segments.

The control logic for this module will allow a package to enter a zone from either path, then it would hold the next box upstream at the respective upstream zone location. The photoeye is mounted to shoot across both the mainline and spur sections.

The MDR Merge module is also available using the MDR Curve. In Figure 18, the MDR Merge Curve can be seen.

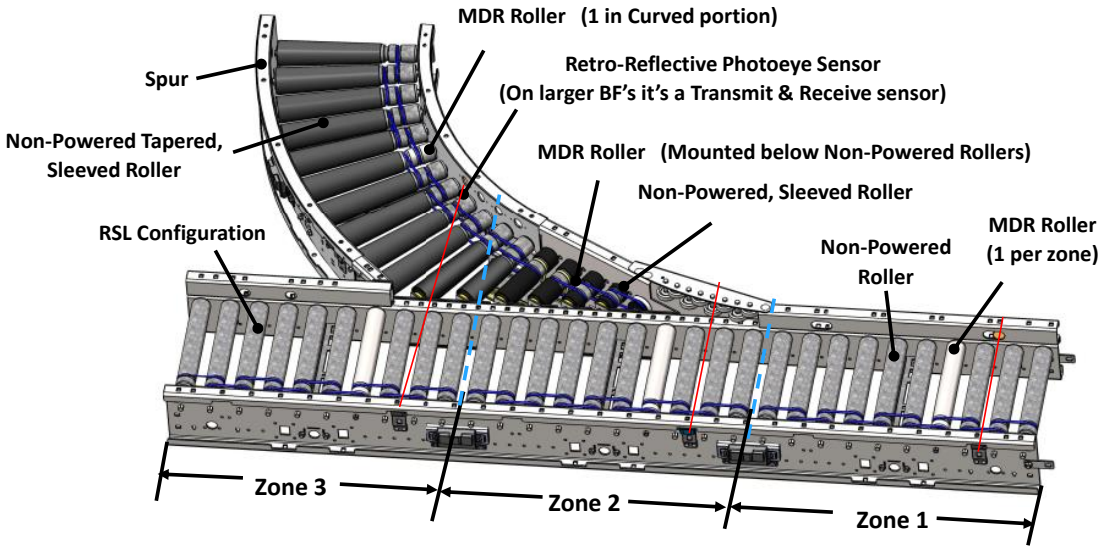


Figure 18: MDR Curve Merge Module

1.4.8 HCAT 90 (Pop-Up 90 Degree Transfer)

The High-Speed Cam Actuated Transfer (HCAT90) divert modules provide a 90° right angle divert capability to divert product for user purposes. In general, the HCAT90 module is used when a small real estate footprint is required or for special user operations. This module can achieve a 30 products/min throughput rate. This module, along with basic nomenclature can be seen in Figure 19.

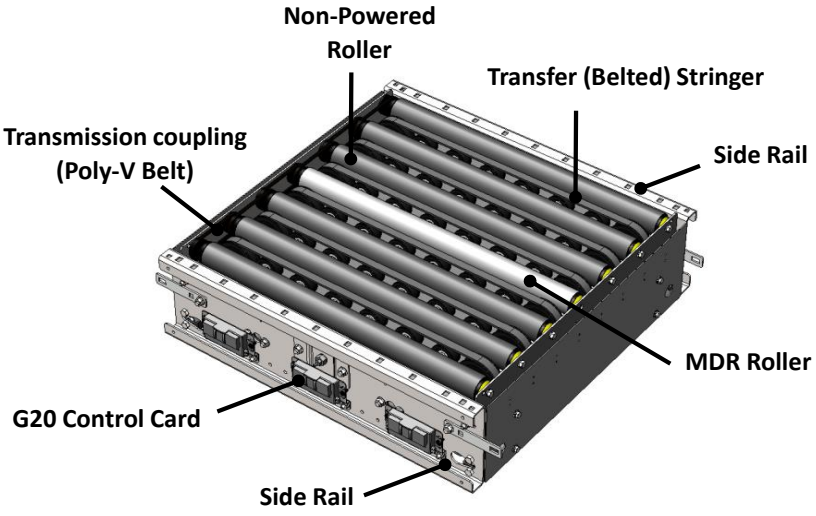


Figure 19: HCAT90 Module

The HCAT90 module utilizes a single MDR roller to power a bed of non-Powered rollers when side-to-side (lateral) product transfer is required. When straight (longitudinal) product transfer is required, a Pop-Up bed of Transfer (Belted) Stringers will rise above the roller plane to engage and transfer the product. This lifting mode of operation is accomplished by activating an internal MDR roller where it turns a cam that converts rotational motion to a reciprocating motion to lift Stringer. A third MDR roller powers the Transfer Stringer's longitudinal belt. The motion directions of this module can be seen in Figure 20.

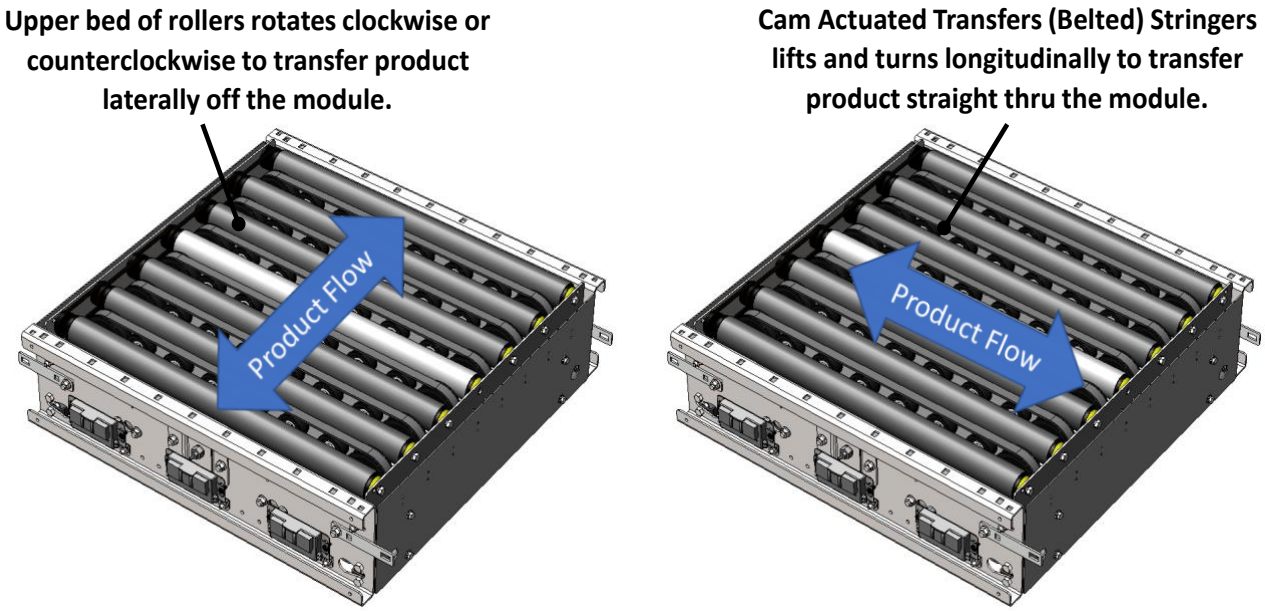


Figure 20: HCAT90 Product Transfer Directions

The HCAT90 module is commonly used in product transfer flow applications as seen in Figure 21. Here, a product can be transferred from one product line to another where it can travel to various points in the facility.

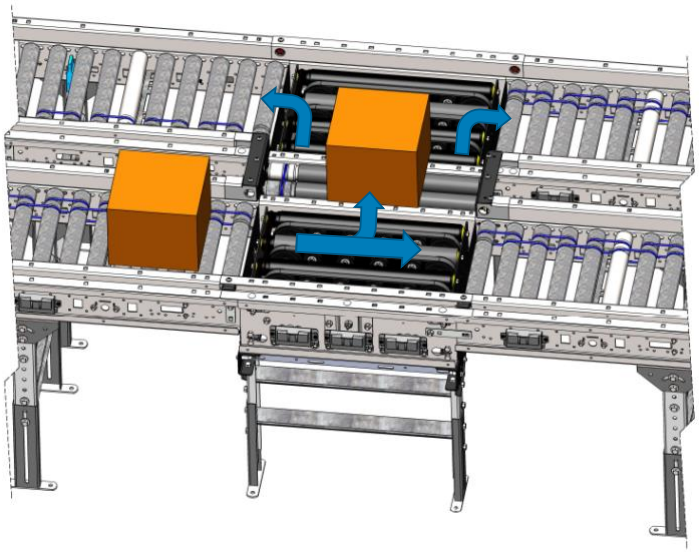


Figure 21: HCAT90 Multiple Product Transfer Flow

Another useful application of the HCAT90 is to use it in a “Pick and Pass” operation. Here, the product will stop at an operator’s station for that operator to either remove (Pick) the product, or to add or remove items in that box or tote. In Figure 22, the product is making a “U-turn” after the user performs his intended function. This type of configuration is very suitable for “Pick-to-light” or “Voice-Pick” systems.

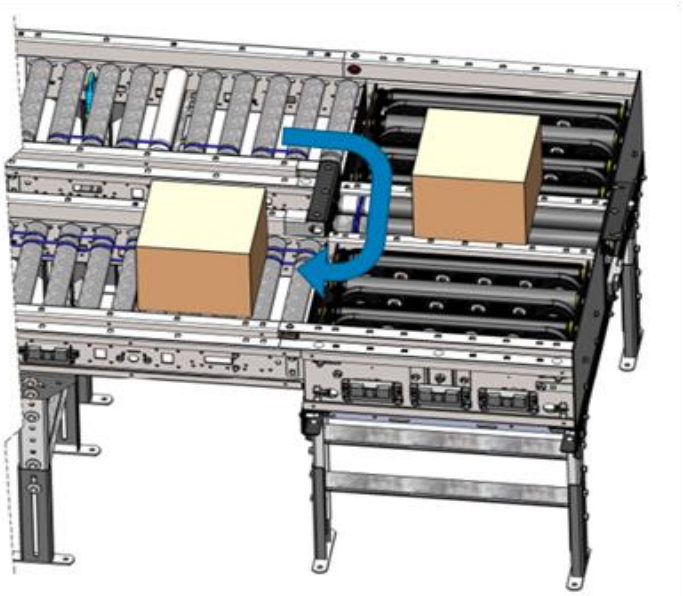


Figure 22: Double Pick and Pass Module

Lastly, the HCAT90 can be configurable to a Triple Pick and Pass Module configuration. Here, either one or two conveying lines transports a product to the operator station and then, after its operation, will leave the station via one or two conveying lines, respectively. The Triple Pick and Pass module configuration can be seen in Figure 23.

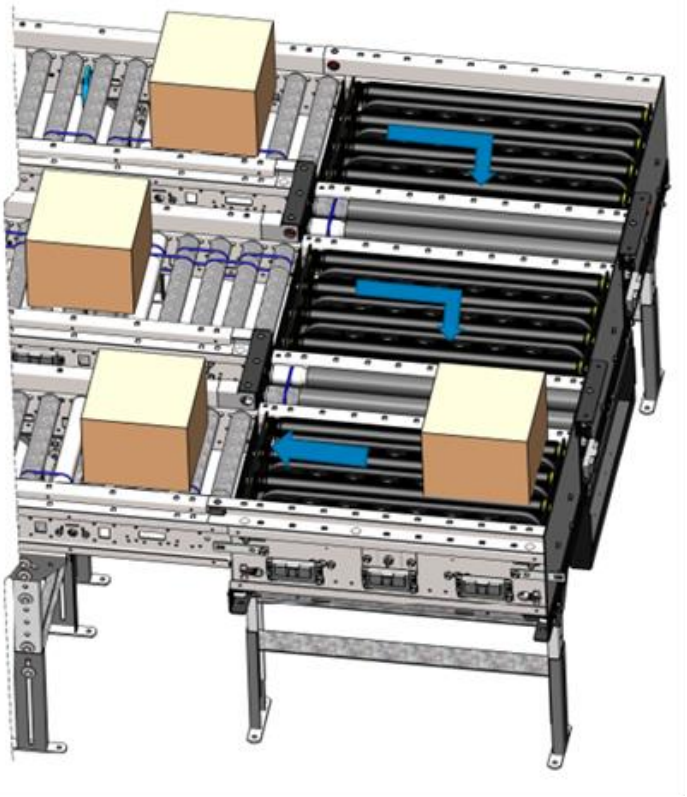


Figure 23: Triple Pick & Pass Module

1.4.9 MDR Skew Intermediate

The MDR Skew Intermediate Module is used to move products from the centerline of the conveyor to one side or the other. This lateral repositioning of products along the length of the conveyor is accomplished by skewing the bed of rollers such that the vectored component of lateral forces will drive the product into the rail.

Moving products to one side, at times, may be desirable when some downstream operation requires the box to be in a specific location. (I.e., Pop-Up Diverts). This module is available in 2” and 3” centers, RSH and RSL configurations along with its corresponding photoeye type (See Intermediate section for photoeye details).

In Figure 24, the Skew Intermediate Module can be seen.

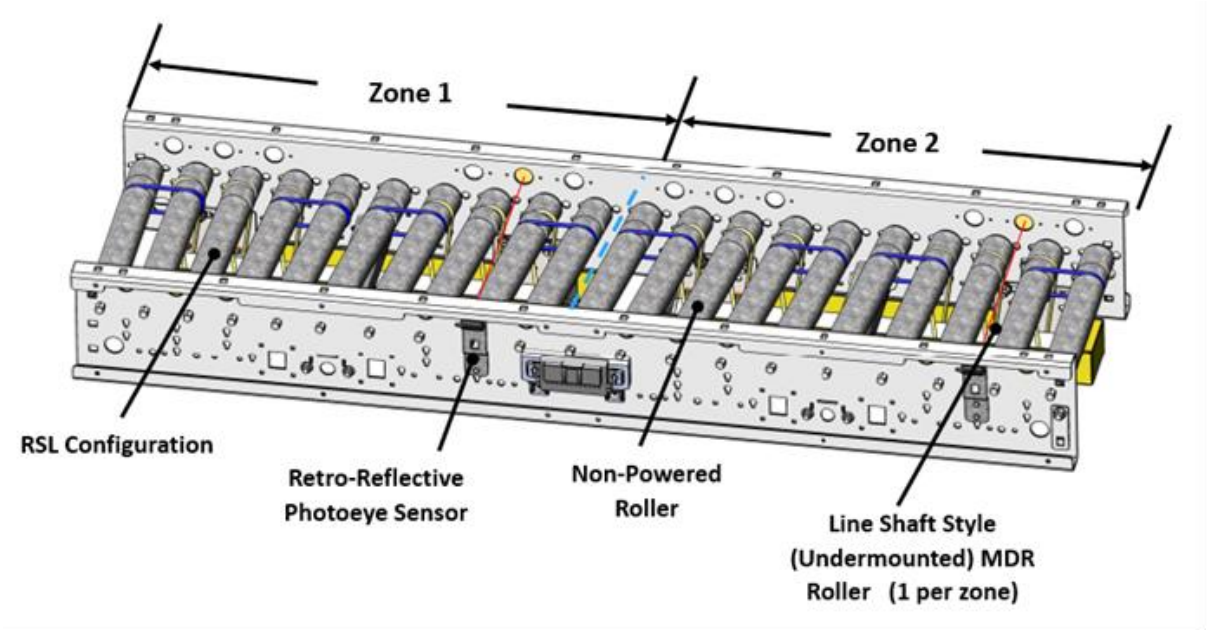


Figure 24: Series 1500 Skew Intermediate Module

In Figure 25, a top-down view of the skew can be seen for reviewing purposes.

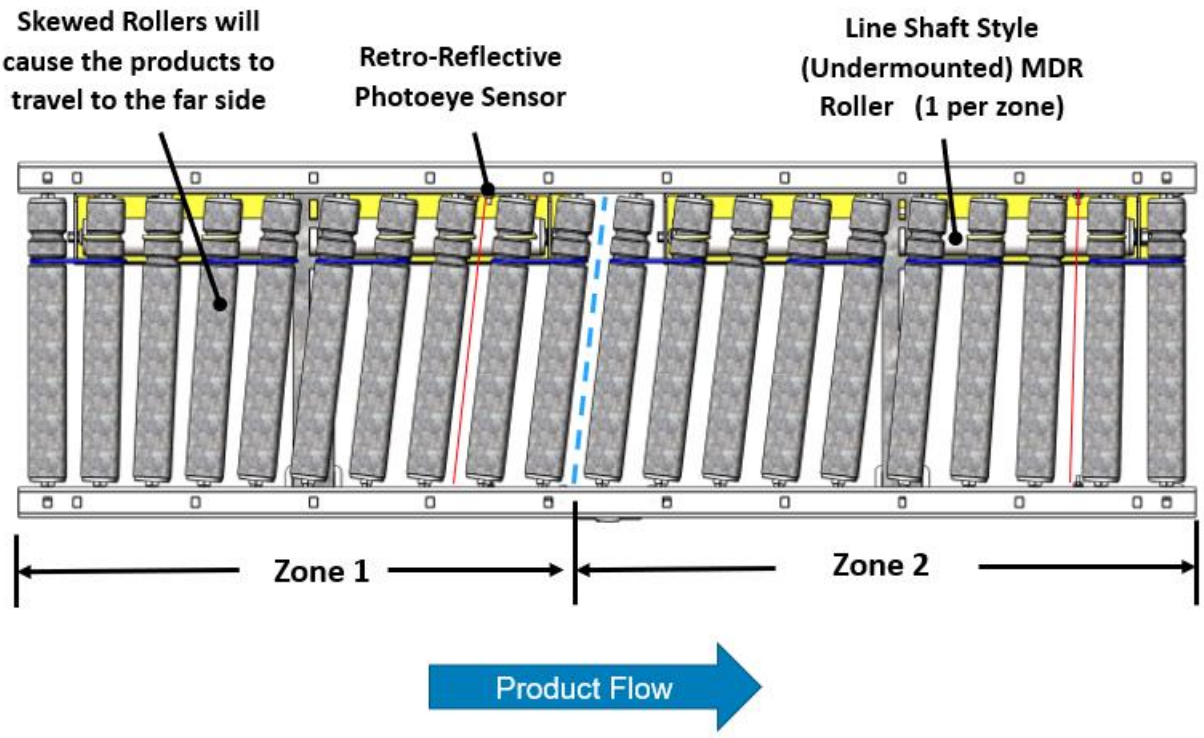


Figure 25: Top-down view of MDR Skew Module

1.4.10 MDR Lift Gate

MDR Lift Gate modules (See Figure 26) provide pedestrian and pushcart access to the other side of the conveyor line. Typical gates consist of a 36” pivot bed with 12” tangents, adding a clear distance for a walkway. Other sizes and swing gates are available upon request. All lift gates come with gas springs to assist the user in moving the gate up or down. Pre-wired conveyor sections are networked with a variety of technologies and are easily configured for multiple applications.

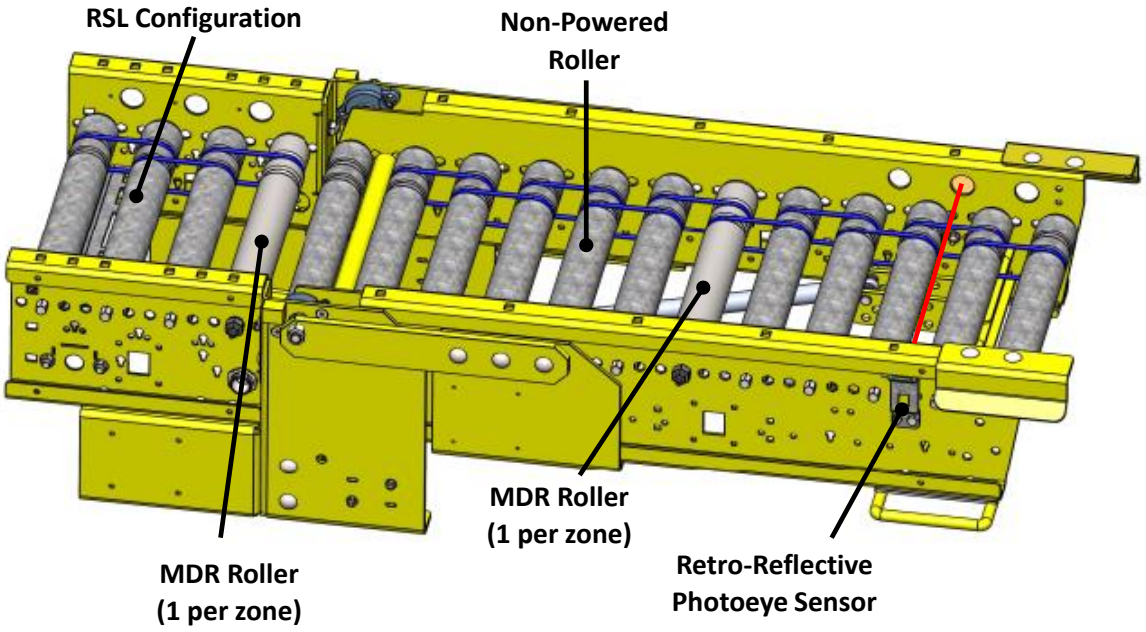


Figure 26: MDR Lift Gate Module

Figure 27 shows a typical assembly for a standard gate. Each zone has one MDR, photoeye sensor, reflector, motor control card, and carrier rollers. The gate can be configured for 1, 2, or 3 zones depending on overall length (OAL) of the gate and zone size. Standard lengths for a gate are 36” or 48”. You should refer to your electrical schematic to see the wiring setup for your gate.

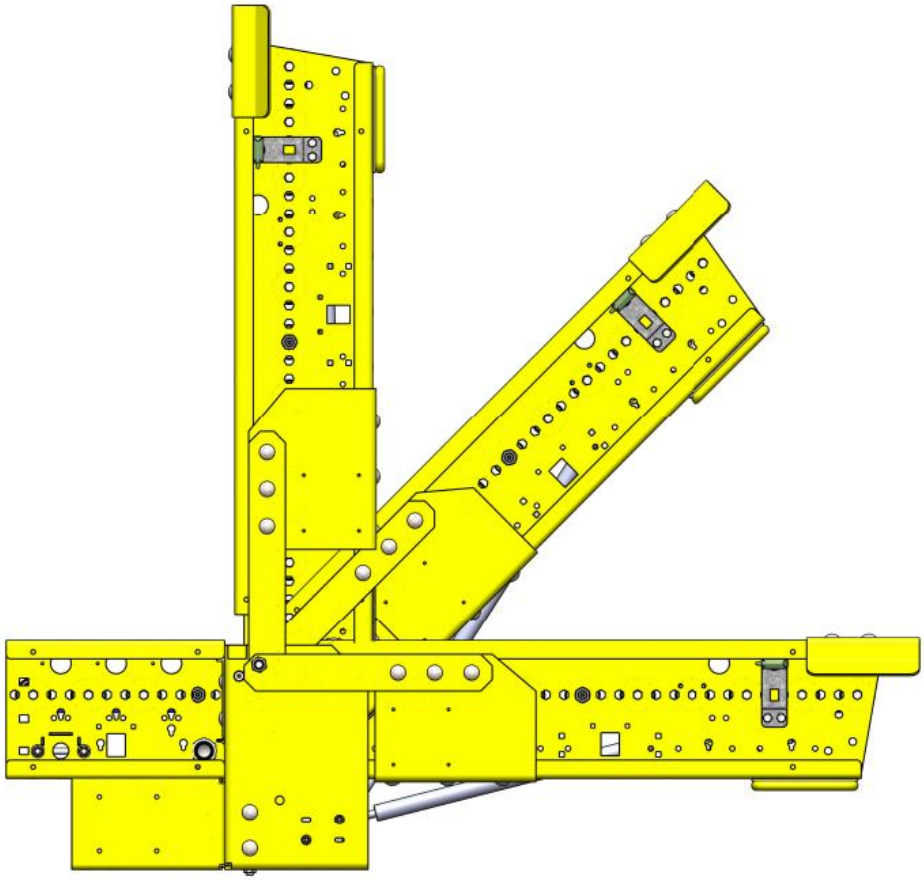


Figure 27: MDR Lift Gate Module Orientations

1.4.11 MDR Nose Over / Power Feeder

The Nose Over/ Power Feeder module is used in MDR Belted Incline and Decline conveyor modules where the use of a high friction belt is employed to reduce the risk of product sliding down the incline. Conventional naming terminology of this module depends on the location of this module and is as follows:

This module is called a Nose over when it is located at the top of the MDR Belted Incline or Decline conveyor.

This module is called a “Power Feeder” when it is located at the bottom of the MDR Belted Incline or Decline Conveyor.

This module can be seen in Figure 28:

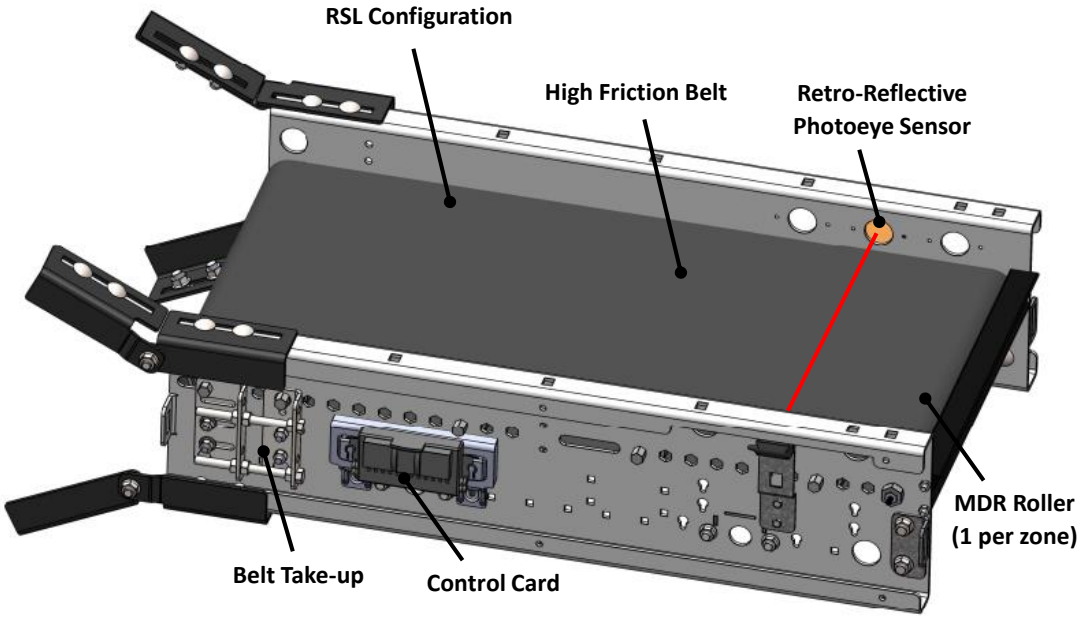


Figure 28: MDR Nose Over/ Power Feeder Module

This module is available in RSL configurations only and can use either the G20 or H20 Control Cards. These modules are intended for light to medium weight applications up to 50lbs per zone.

1.4.12 MDR Belted Incline/Decline

The MDR Belted Incline and Decline assemblies can handle product zone loads up to 50lbs at a speed of 150 fpm. These modules can be configured up to a 15-degree slope as seen in Figure 29. This angle, depending on the product size, weight and center of gravity characteristics may go beyond the 15-degree limit if proper validation testing is performed.

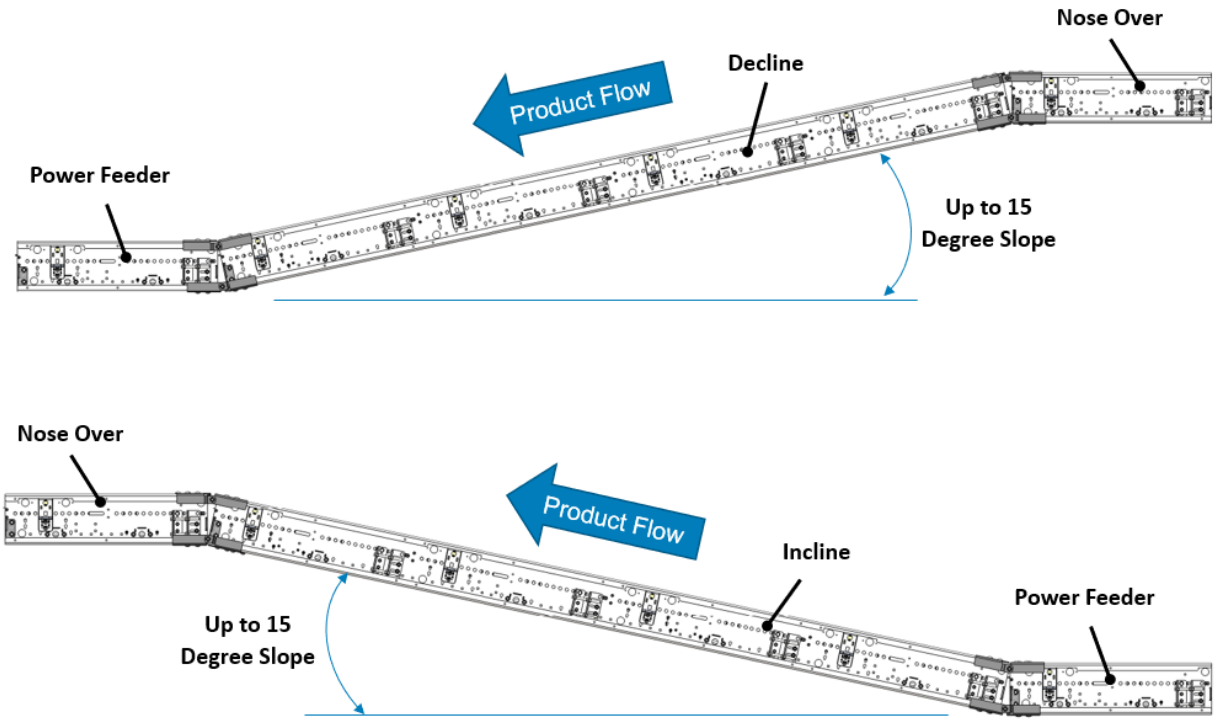


Figure 29: MDR Belted Incline and Decline Conveyor

Belted incline sections contain one-way rollers to prevent product from moving when rollers are unpowered. Belted decline sections do not come with any type of brake, and function as gravity rollers when system power is lost. Like the Nose Over and Power Feeder modules, the incline and decline portion also uses the same high friction belt to prevent products from slipping down the incline.

These modules come pre-wired and can be supported from ceiling or the floor.

1.4.13 MDR Belted Scan Bed

The MDR Belted Scan Bed modules have easily removable guide rails to allow for easy external mounting of scanners. This module, along with a typical scanner can be seen in Figure 30:

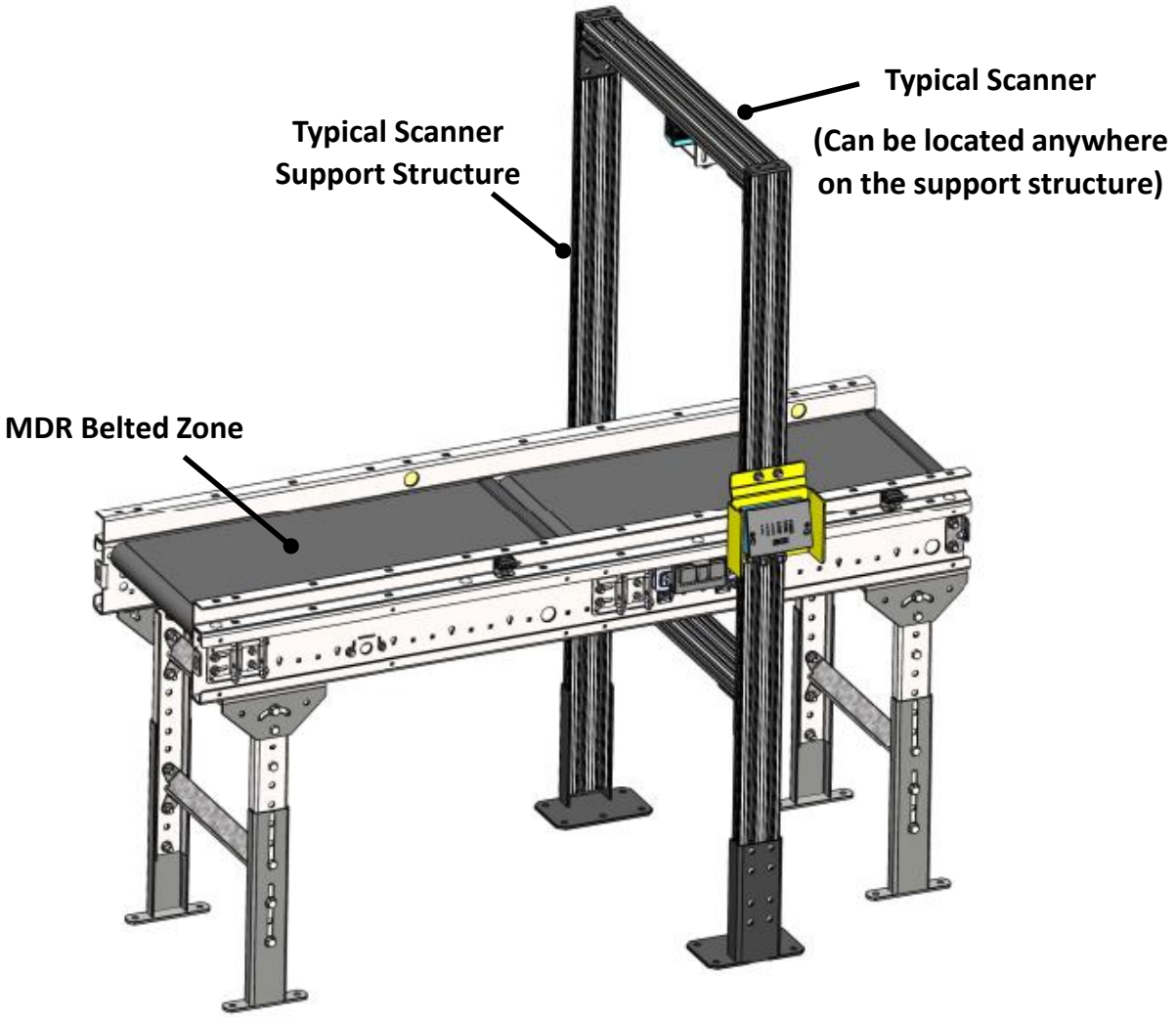


Figure 30: MDR Belted Scan Bed Module

1.4.14 Series 1500 Engineered to Order Module Details

Engineered To Order modules are available upon request.

1.4.15 MDR Spiral Curve

Spiral curve modules can be used to accomplish small elevation changes in the conveying system. These module assemblies are also used in the MDR Spiral and MDR double helix spiral. In Figure 31, the Spiral curve module can be seen.

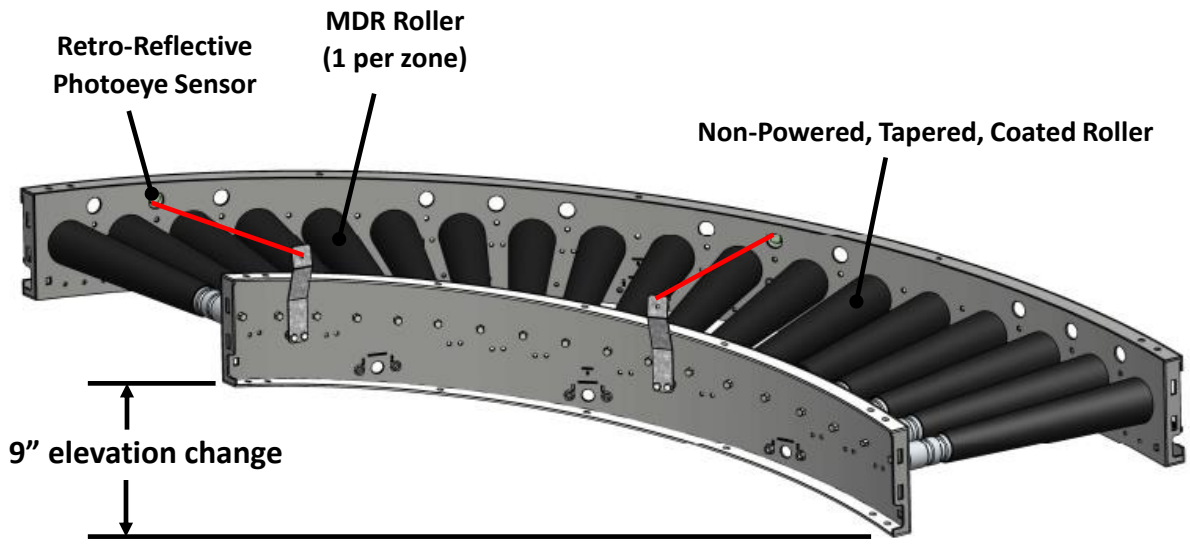


Figure 31: MDR Spiral Curve Module

1.4.16 MDR Spiral

The MDR Spiral curve module can be used as a stand-alone elevation change or it can be used to create an inclining or declining MDR Spiral Module. The module can have built in Zero Pressure Accumulator (ZPA) logic, or it can be programmed via Programmable Logic Controller (PLC) and can be networked with bus technology. The height of the superstructure (typically < 23 ft) and whether additional bracing is required is determined upon order. This type of module can be seen in Figure 32.

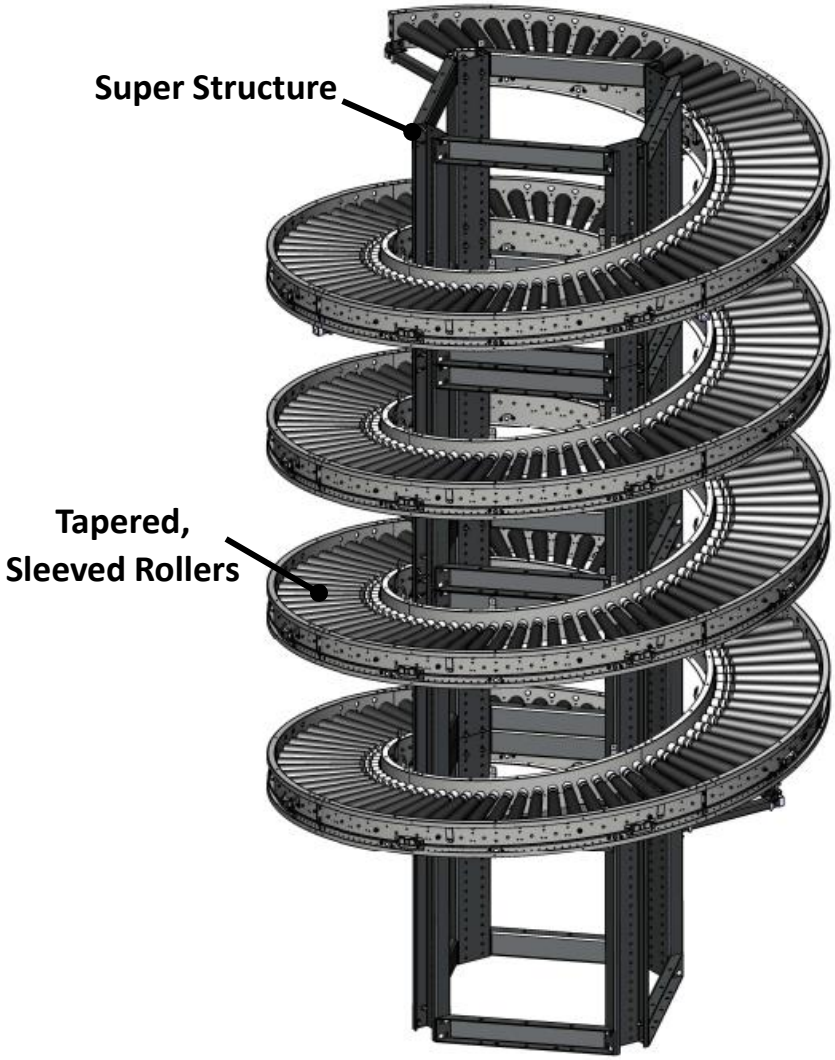


Figure 32: MDR Spiral Module

1.4.17 MDR Double Helix Spiral

The MDR Spiral curve module can be used as a stand-alone elevation change or it can be used to create an inclining or declining MDR Double Helix Spiral Module. The module can have built in ZPA logic, or it can be programmed via PLC and can be networked with bus technology. The height of the superstructure (typically < 23 ft) and whether additional bracing is required is determined upon order. This type of module can be seen in Figure 33.

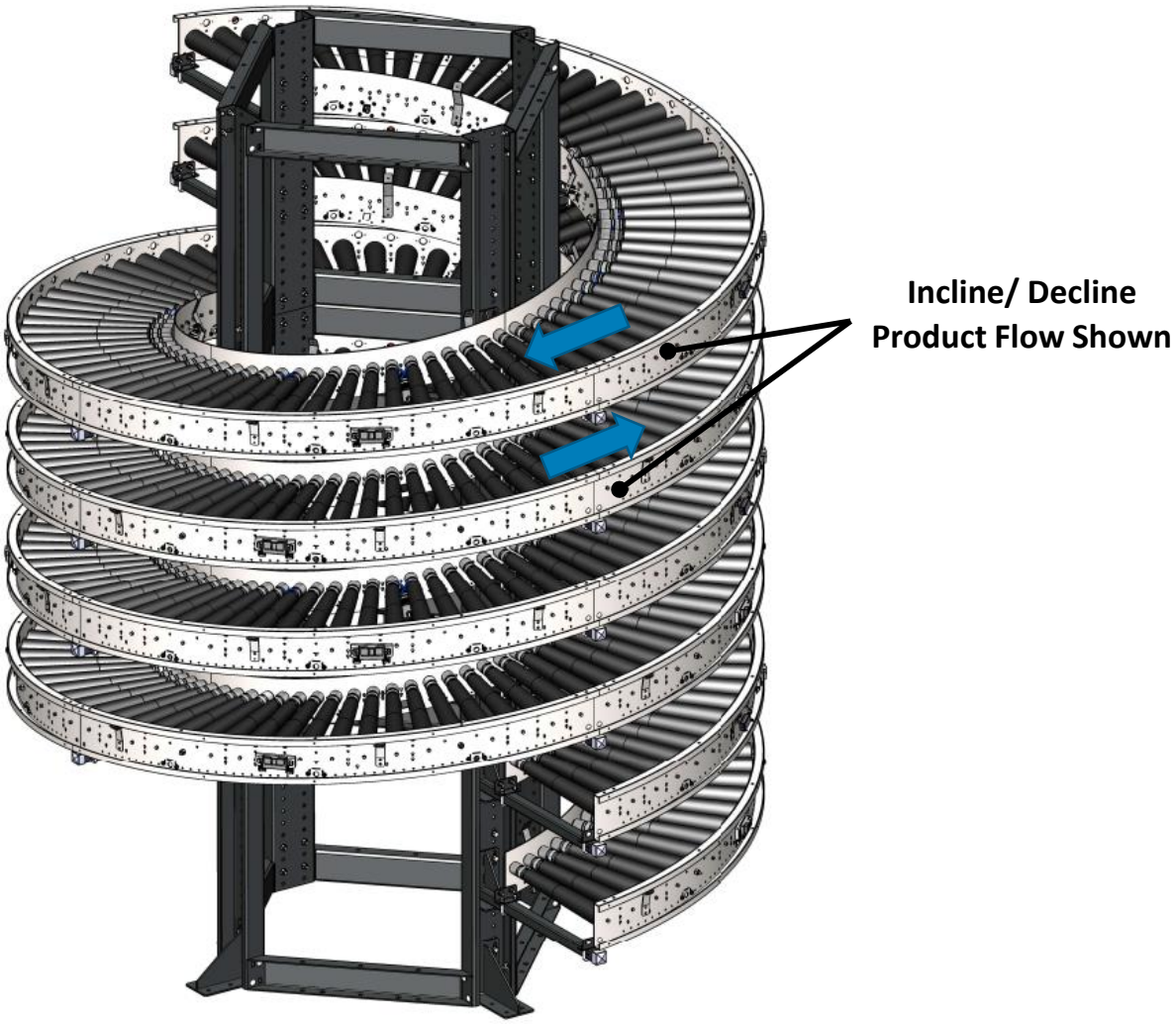


Figure 33: MDR Double Helix Spiral Module

This module can also be configured to run in Incline Only or Decline Only modes of operation. Due to height real estate limitations, the max product height for this module is 8”.

1.4.18 MDR TREWflow Decline

In conventional Gravity Roller Decline conveyors, products can accumulate at the end of the line when it is awaiting an operator to unload it. In this event, backpressure can build up to the point where the operator may have difficulties removing the last product from the system. If the built up back pressure gets too high, it may also damage the product's packaging. A conventional gravity decline conveyor with accumulated products (i.e., built-up back pressure) can be seen in Figure 34.

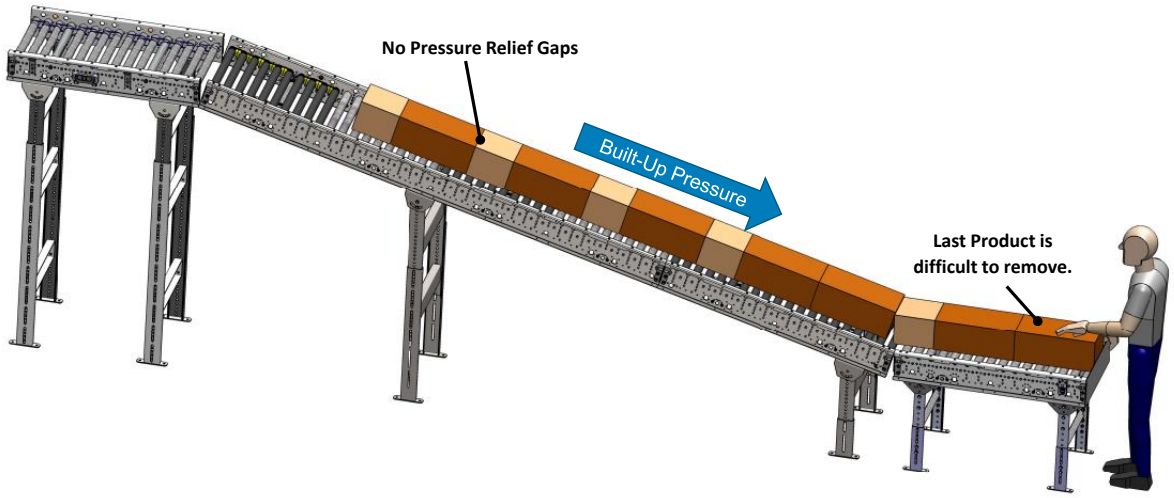


Figure 34: Conventional Decline Conveyor with Built-Up Back Pressure

To alleviate the difficulties of removing the last product in the discharge end of the conveyor, the TREWflow Module uses alternating powered and unpowered MDR zones, in conjunction with specialized software to reverse the direction of the powered zone, thereby causing accumulated product to travel (slightly) back up the incline.

In Figure 35, the Powered/ Unpowered zones configuration of this module can be seen. In Figure 36, Trewflow's resulting pressure relief gaps can be visualized. Here, once the back pressure is removed from the first product, the user can easily remove it from the conveyor.

TREWFlow is designed for 3–15-degree declines and can handle up to 60lbs per zone.

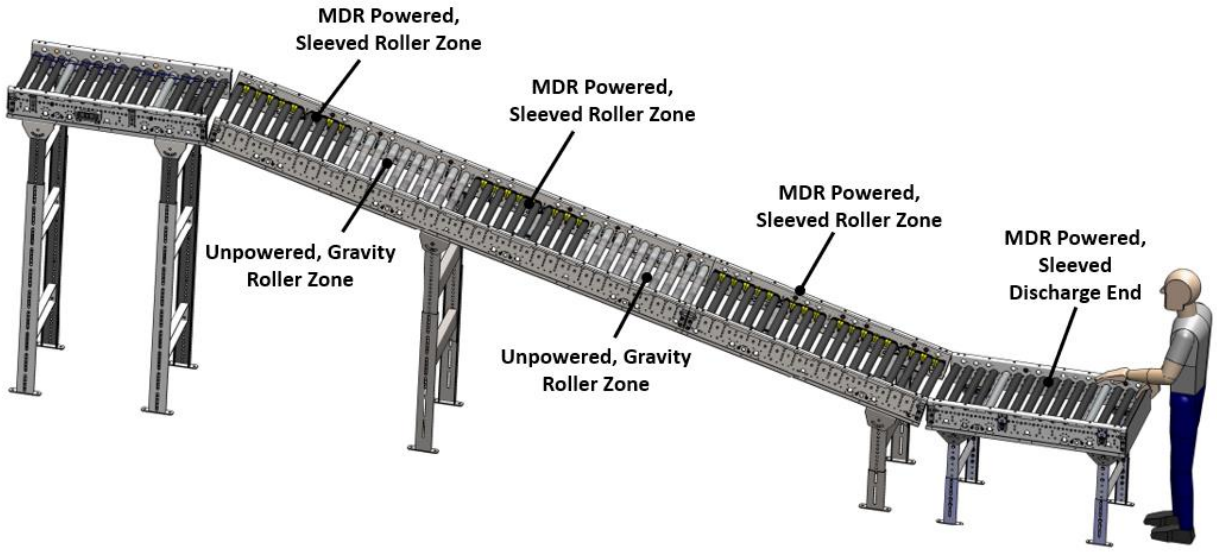


Figure 35: MDR TREWflow Decline Module

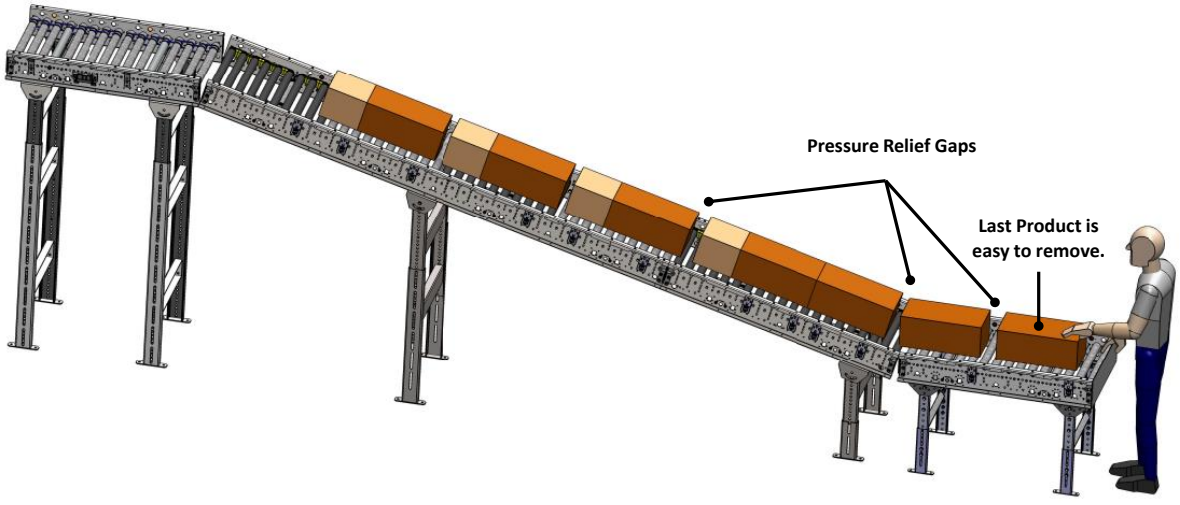


Figure 36: TREWflow Conveyor with Pressure Relief Gaps

1.5 Accessories and Other Components

1.5.1 Photoeyes

The Series 1500 Product Line uses three distinct types of photoeyes which can be seen in Figure 37 and described in Table 5.

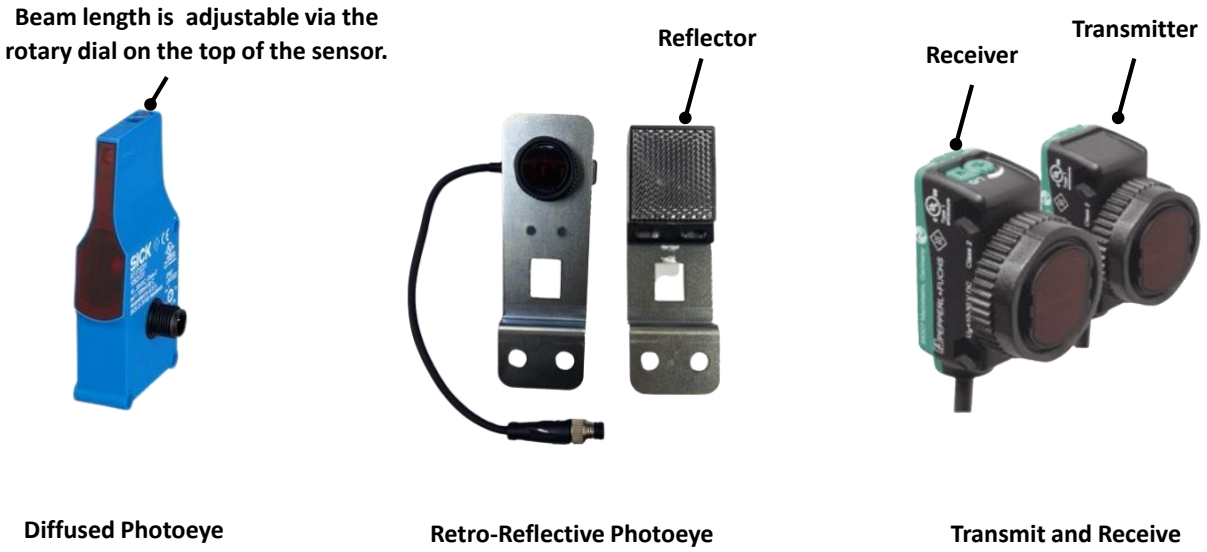


Figure 37: Photoeyes Types

Table 5: Photoeye Description Summary

Sensor Type	Usage	Description	Connector
Diffused Photoeye	RSH, Skatewheel Gravity Sections, Difficult Areas	Background Suppression: User sets the conical detection region. Light Operated (i.e., The beam is not reflected to the device)	M8 - 4 Pin
Retro-Reflective Photoeye	RSL, Above Frame (Special Cases)	Polarized Retro Reflective Sensor. Dark Operated (i.e., If blocked a signal is sent to the control card.)	M8 - 4 Pin
Transit and Receive Photoeye	RSL/ RSH	Used when shiny, reflective products are present. Used in larger BFs due to range limitations in the above Photoeye devices.	M8 - 4 Pin

The Dark Operated Polarized Retro-Reflective Photoeye has two lights that are on the top of the sensor. If the sensor is working properly, then the yellow and green lights will be both on. If only the green light is on, then the photoeye is not aligned properly with its mating reflector. If the yellow light is blinking, then the photoeye is only partially detecting the mating reflector. If an adjustment needs to be made in the photoeye-reflector alignment, then simply bend the metal photoeye bracket forward or backwards until both the lights are on.

The Background Suppression Diffused Photoeye can be used in conjunction with a Timing Relay component if the user requires a time delay in its PLC controls. The Timing relay can be seen in Figure 38.

Figure 38: Timing Relay Component

1.5.2 Power Supply Enclosure

The 1500 Series Conveyor uses Power Module components through the conveying system to supply power to the MDR rollers and other electronic equipment. These Power Supply Enclosure convert the buildings incoming Alternating Current (AC) power to DC power and can be seen in Figure 39. Other relevant details of various module components can be seen in Table 6.

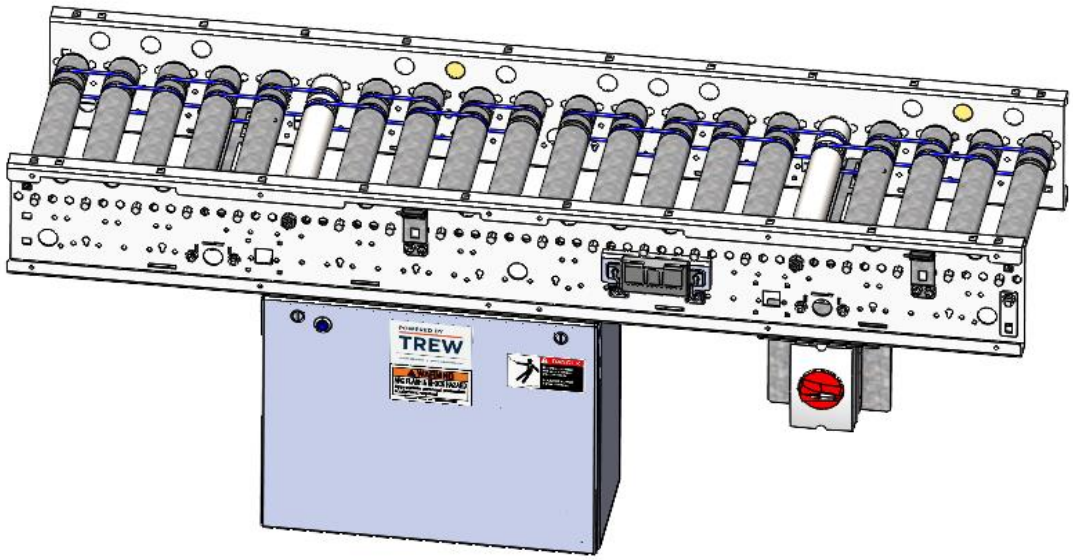


Figure 39: Power Module

Table 6: Power Module Component Summary

Module (Dwg #)	Input Voltage (VAC)	Input Phase (PH)	Input Current (amps)	Output Voltage (VDC)	Output Current (amps)	Output Circuits (#)	Output Circuit Size (amps)	Number of MDRs (#)
10801-042319	480	3	2.8	24	80	6	15	36

1.5.3 Extension Cables

Trew offers extension cables that allow the photo eye cable to extend further distances. The Dark Operated Polarized Retro-Reflective sensor has a cable attached to the photo eye that is 6 inches long. The standard cable that Trew offers is a 2 Meter M8 4-Pin Male to Female extension cable. If a customer requires a greater distance to plug into the H20 Auto or G20 Full Control Card, please contact a sales representative.

1.5.4 Drive Belts (O-Bands)

Series 1500 conveyor utilizes two types of O-band transmission drive belts:

- To connect individual zone rollers together
- In the HCAT30 Module Pop-Up Subassembly
- In the MDR Intermediate Skew Module.

In Figure 40, Two of the above O-Band usages can be seen.

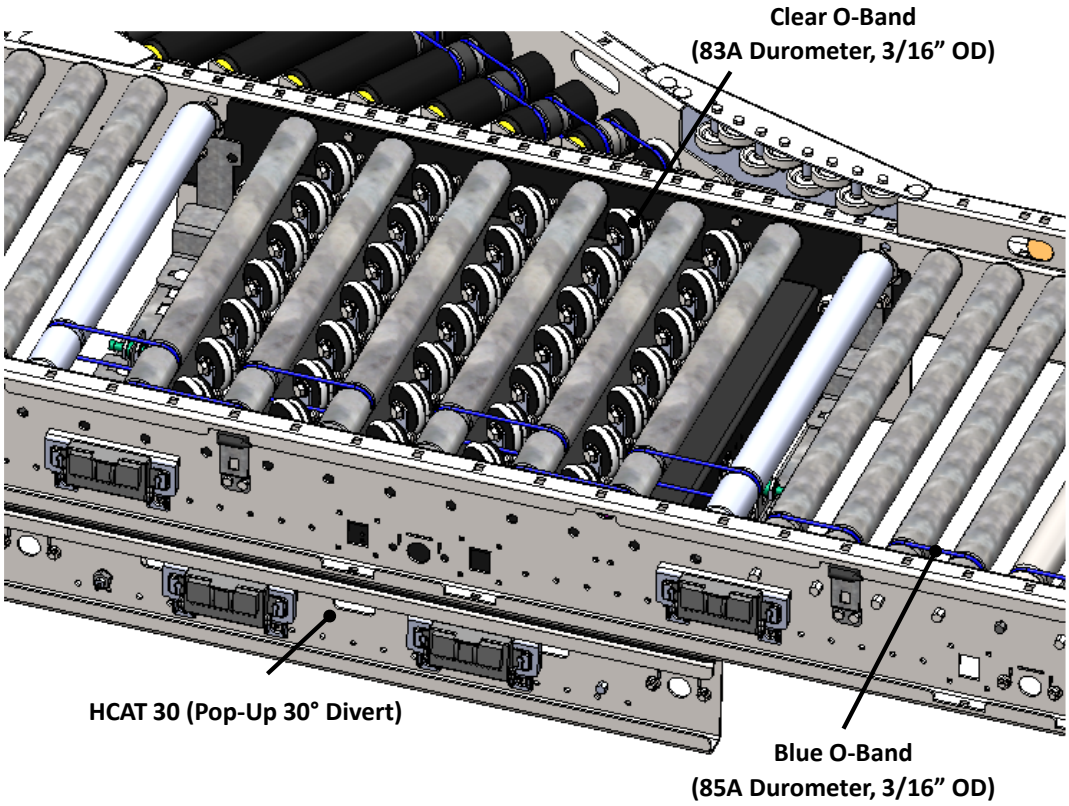


Figure 40: O-Band Usage: HCAT30, Roller Zones

The third type of O-Band usage can be seen in the MDR Intermediate Skew module which can be seen in Figure 41.

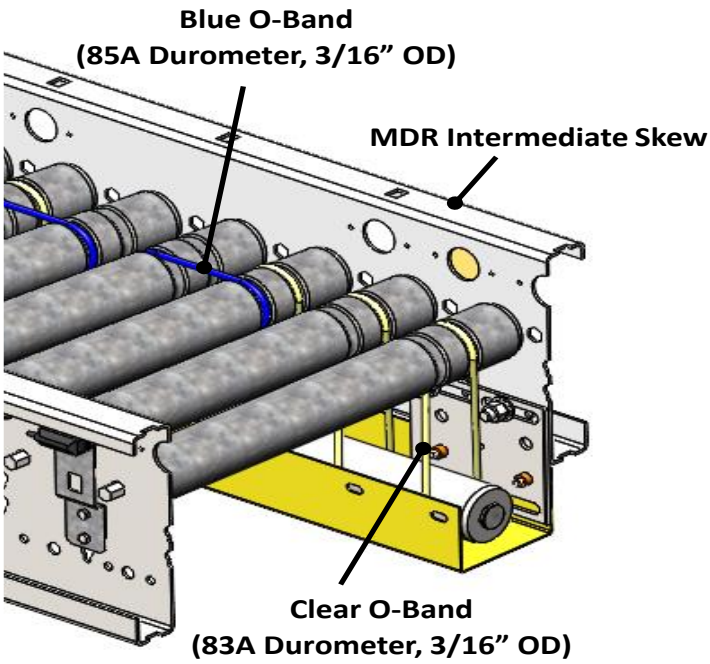


Figure 41: O-Band Usage: MDR Intermediate Skew

Over time, the drive belts will exhibit wear and stretch. The belts may either break or experience a slowdown in the zone speed. At this point, the O-Bands will need replacing. Generally, O-Bands in MDR Curve modules will need to be inspected every 6 months, and 1 year for all other modules.

1.5.5 Guide Rail

Guide Rails are used to ensure that the product will stay on the conveyor. These components are typically installed on the top flange of a given conveyor side rail and may or may not need an additional support bracket. Overlapping Guide Rail segments need to be oriented such that no snag or catch points could interfere with the product flow. A Guide Rail example can be seen in Figure 42.

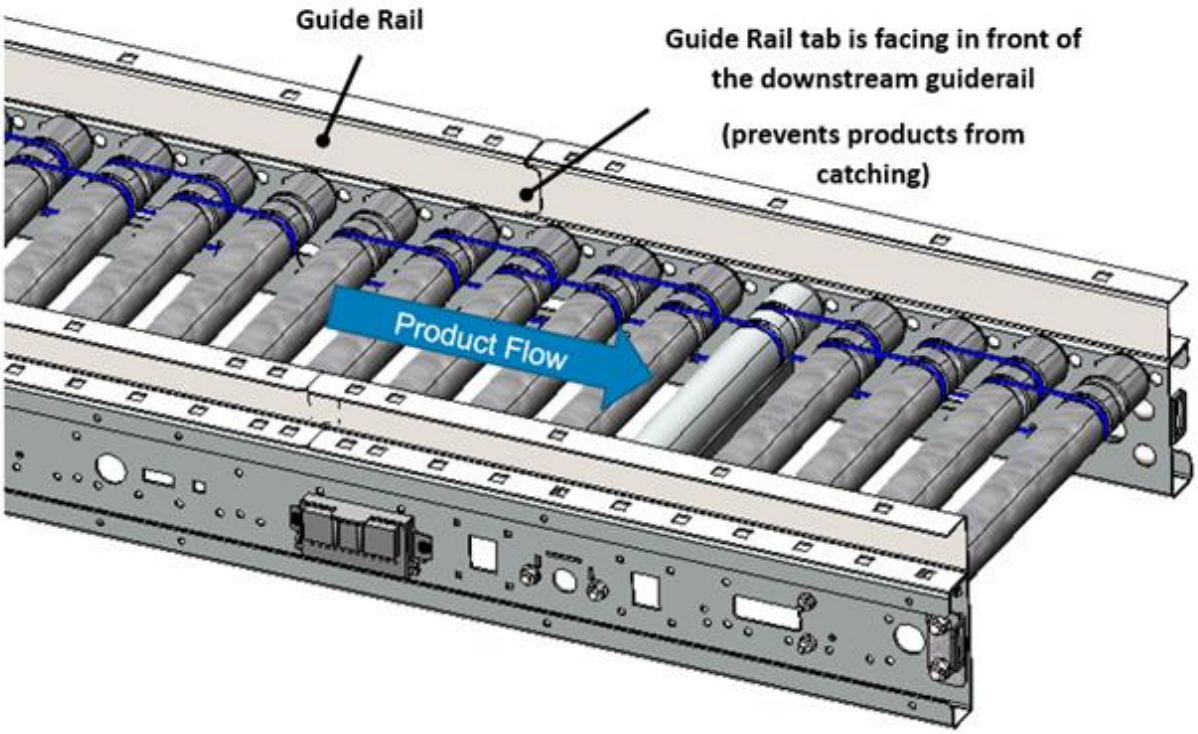


Figure 42: Guide Rail

1.5.6 Angled End Stop

Angled End Stop components are used to prevent products from falling off the end of a conveyor. This add-on component can be seen in Figure 43.

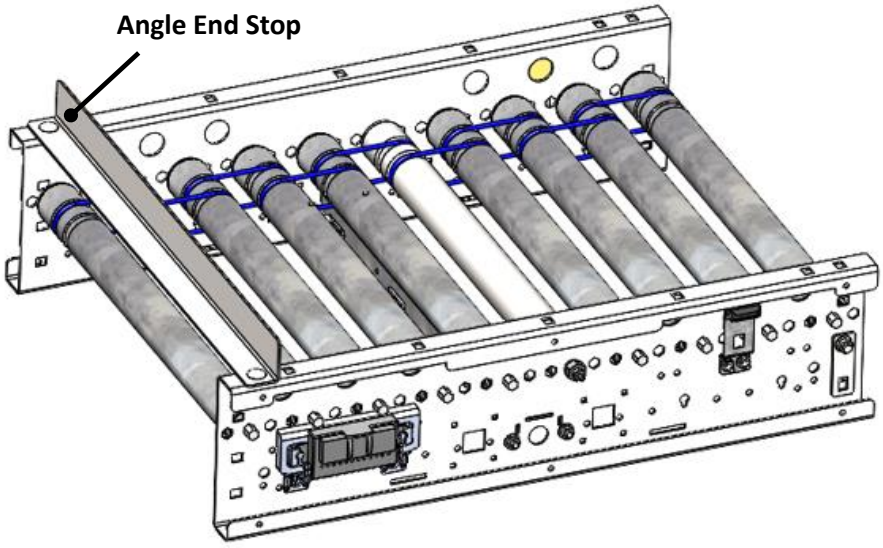


Figure 43: Angled End Stop

1.5.7 Blade Stop

Blade Stop sub-assemblies allow you to start and stop product traffic without stopping and starting conveyor motors. Blade stops are pneumatically or electrically operated. This device is mounted beneath the conveyor surface with a stainless-steel blade which extends above and retracts below the roller surface between roller shafts. This sub-assembly can be seen in Figure 44.

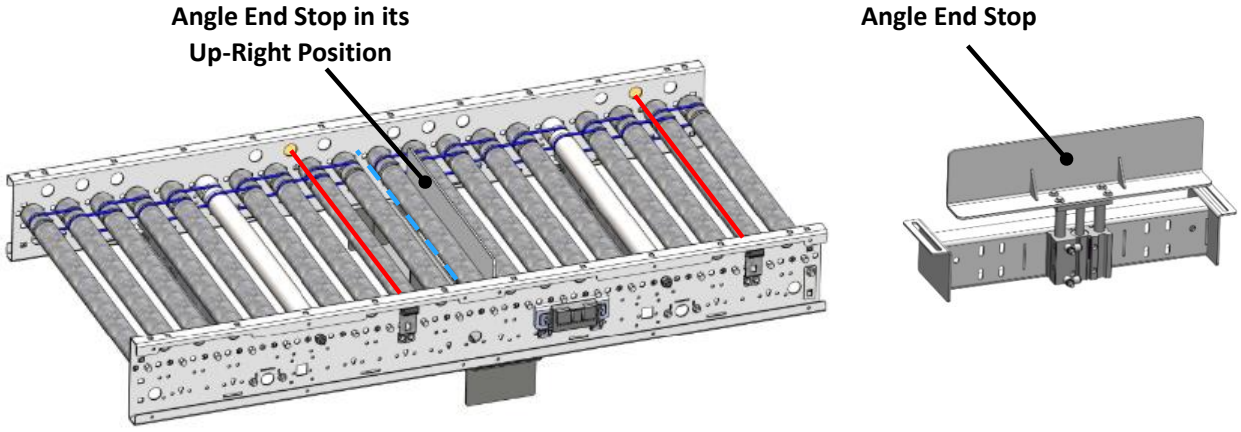


Figure 44: Standard Blade Stop

1.5.8 Standard End Plate

End plates are mounted at the end of a given conveyor line for safety purposes. This component can be seen in Figure 45.

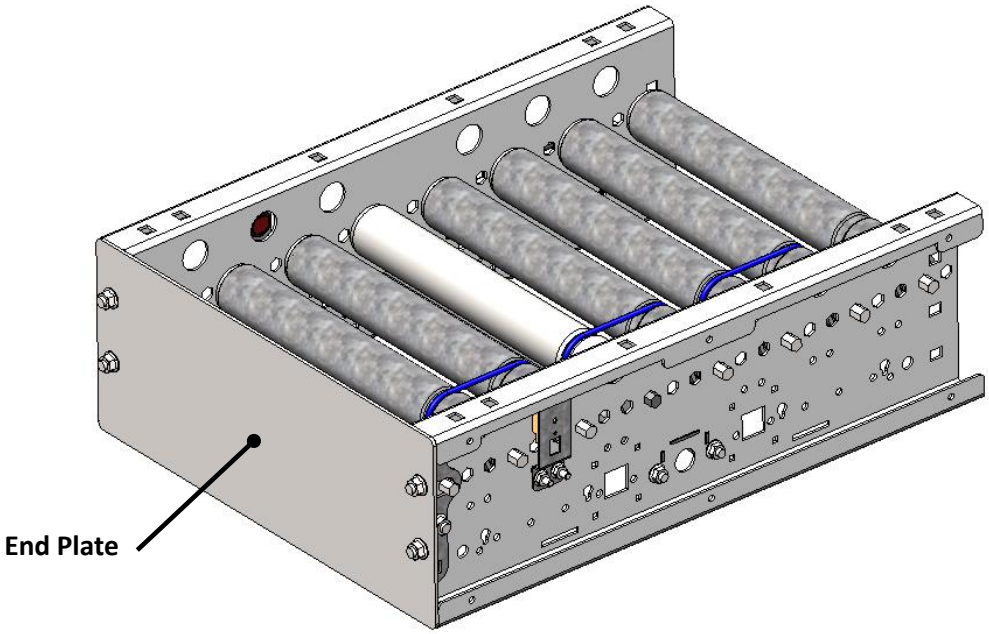


Figure 45: Standard End Plate

1.5.9 Roller Types - Reference

For user reference purposes, the distinct types of rollers in the Series 1500 can be found in Figure 46 through 49.

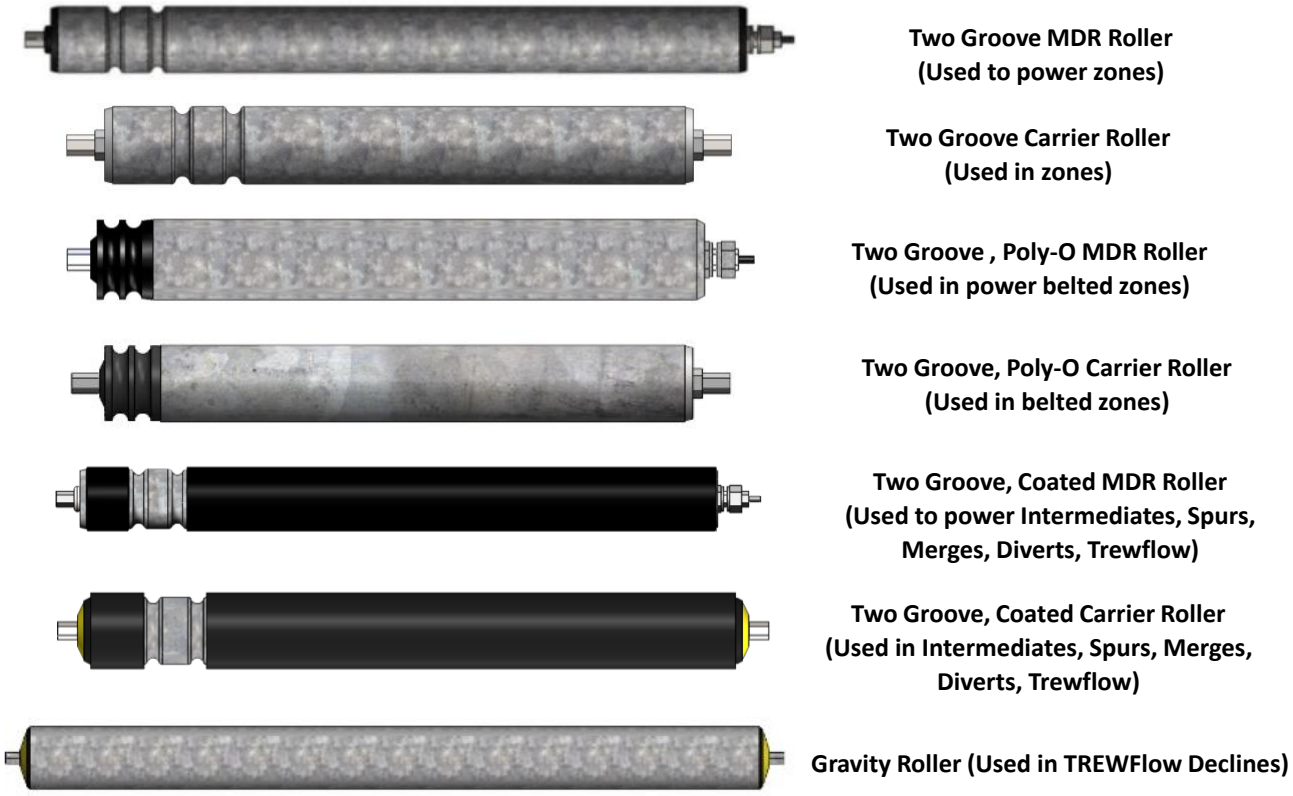


Figure 46: General Use Rollers

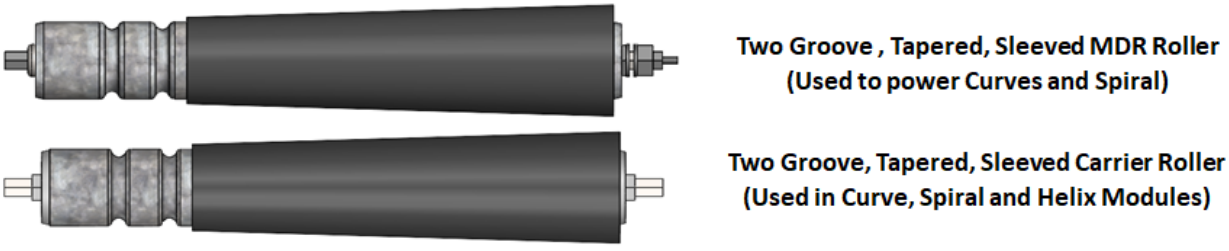


Figure 47: Curve Rollers

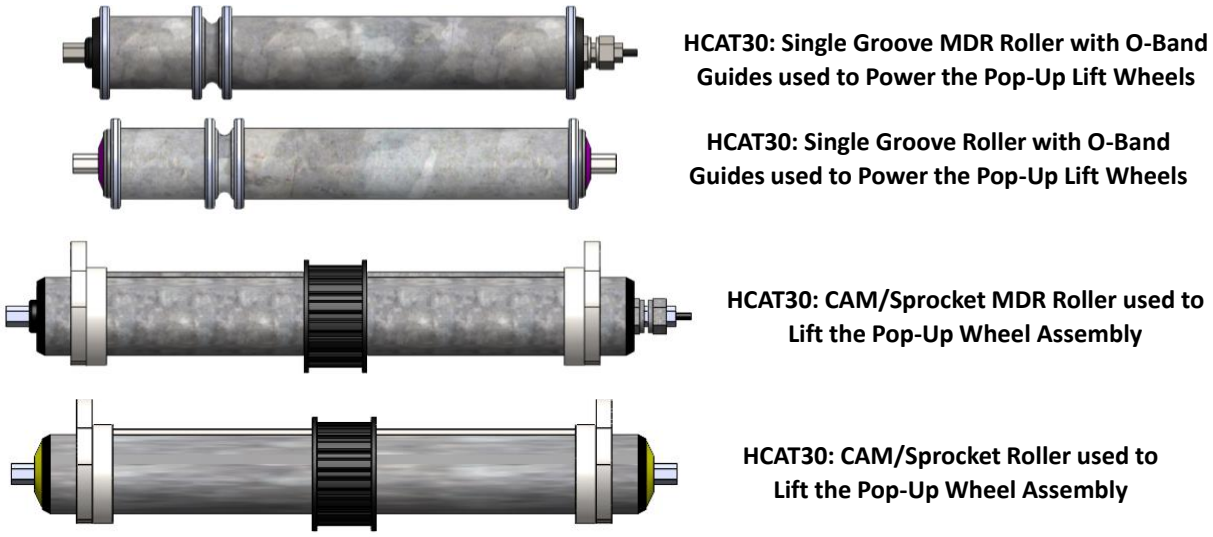


Figure 48: HCAT30 Rollers

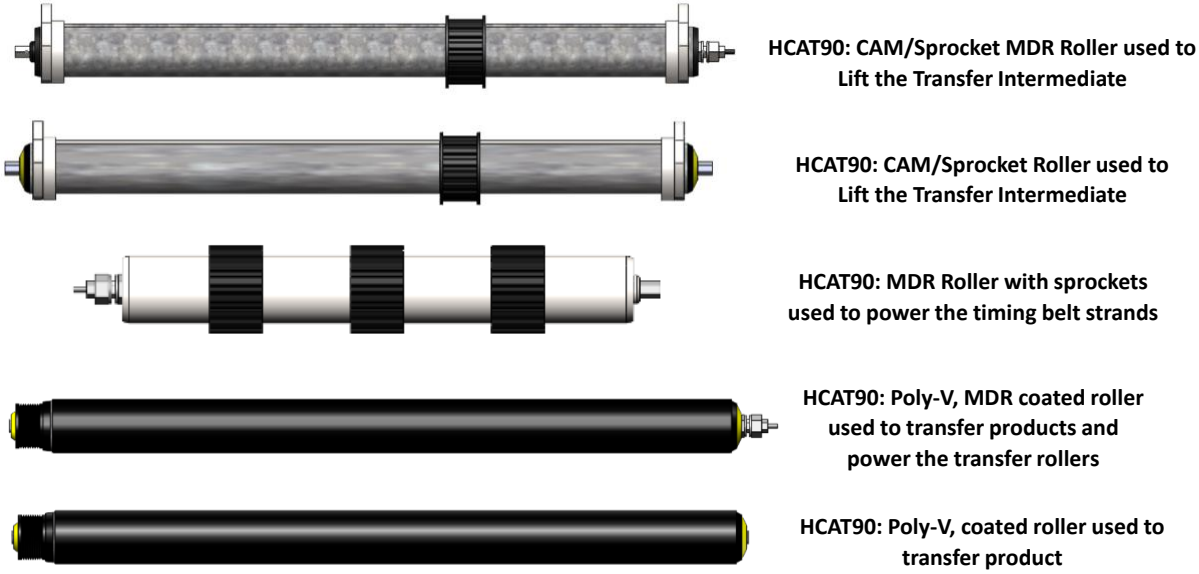


Figure 49: HCAT90 Rollers

1.5.10 Full/Auto System Kits

Photo eye Kits
HA1-007-Photo Eye Kit – ASi – In-Frame Retro-Reflective
HA1-020-Photo Eye Kit – ASi – Under Roller Background Suppression Diffused
HA5-005-Photo Eye Kit – ASi – Guarded Retro-Reflective

Momentary Footswitch
HA3-025-Momentary Footswitch Kit – ASi

Additional Field I/O Kits
HA2-028-Field I/O Kit – ASi 1 Input: 1 Output
HA2-029-Field I/O Kit – ASi 3 Inputs: 3 Outputs
HA2-022-Handoff Kit- G20 to H20

H20 Auto Control Systems – ONLY USED FOR AUTO CONTROL SYSTEMS

Start Photo eye Kits
HA1-044-Start Photo Eye Kit - Auto - In-Frame Retro-Reflective
HA1-045-Start Photo Eye Kit - Auto - Under Roller Background Suppression Diffused
HA1-046-Start Photo Eye Kit - Auto - Guarded Retro-Reflective
HA1-047-Start Photo Eye Kit - Auto – MDR Belted Bed

Line Full Photo eye Kits
HA1-034-Line Full Photo Eye Kit w/ On-Off Delay Timing Relay - Auto - Under Roller
HA2-030-Line Full Photo Eye Kit w/ On-Off Delay Timing Relay - Auto - Guarded Retro-Reflective

Momentary Footswitch
HA1-038-Momentary Footswitch Kit - Auto

Selector Switch
HA5-062-2-Position Maintained Selector Switch - Auto

Handoff Kits
HA2-026-Infeed and Discharge Kit - Auto - Relay Handoff
HA2-022-Handoff Kit- G20 to H20

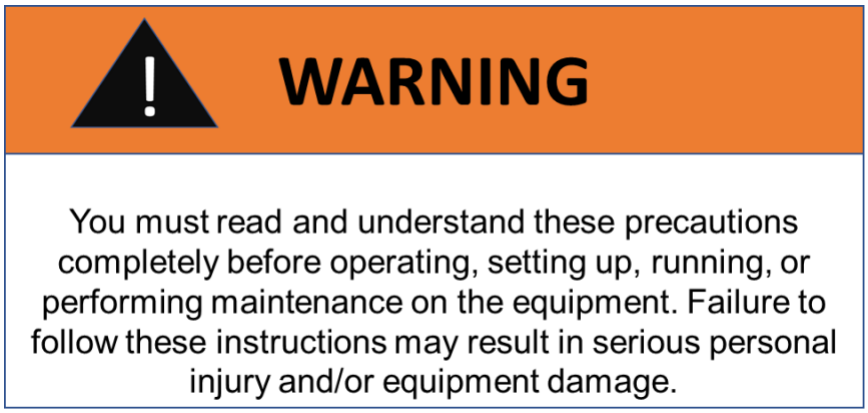
Chapter 2 - Safety

(Section Page Range: 48-57)

2.1 Safety Introduction – Important Message

Failure to adhere to the instructions contained in this manual and to the warning labels on the conveyor may result in personnel injury or damage to the conveying equipment. Alteration or Modification of any 1500 Series Equipment may also be unsafe.

To mitigate the risk of injury, critical warnings in this document will be boxed with an orange warning label. An example of these critical warning messages is shown below:



Special attention to all WARNING, DANGER and CAUTION signs is strongly recommended.

The safety precautions in this manual are intended to compliment the following:

1) Federal and State safety laws, regulations, and codes.
2) Facility safety rules and practices.

Other useful safety references are as follows:

1) The American National Standard Institute (ANSI) website: https:/webstore.ansi.org.
2) The Conveyor Equipment and Manufacturers Association (CEMA) www.cemanet.org.
3) Code of Federal Regulations (CFR), Title 29 Labor, Part 1010-Occupational Safety and Health Standards.

Some information contained in this section has been reprinted from ASME, B20.1--2000 with permission from The American Society of Mechanical Engineers.

2.2 Safety Rules, Procedures and General Practices

Only trained personnel must be permitted to operate a conveyor. Training must include instruction in operation under normal conditions and emergency situations.

Where safety is dependent upon stopping devices or starting devices or both, they must be kept free of any obstructions that prevent their intended use.

The area around loading and unloading points must be kept clear of obstructions that could endanger personnel.

Personnel working on or near a conveyor must be instructed as to the location and operation of pertinent stopping devices.

A conveyor must be used to transport only the material it is designed to carry.

Under no circumstances must the safety features of the conveyor be altered if such alterations endanger any personnel.

Routine inspections and preventive or corrective maintenance actions must be conducted to ensure that all guards and safety features and devices are retained and function properly.

Personnel should be alerted to all potential entanglement hazards in the conveying equipment. Items such as long hair, loose clothing or jewelry are examples of entanglement hazards.

Conveyors must not be maintained or serviced while in operation unless proper maintenance or service requires the conveyor to be in motion. In these events, personnel must be made aware of the hazards and how the tasks may be safely accomplished.

Qualified and trained personnel must only perform maintenance and service.

It is Important to establish a maintenance program to ensure that all conveyor components are maintained in a condition which does not constitute a hazard to personnel. Additional Maintenance Safety Precautions are as follows:

When a conveyor is stopped for maintenance or service, starting devices or power accessories must be locked or tagged out in accordance with a formalized procedure designed to protect all personnel in the event of an unexpected start.

Personnel must be alerted to the hazard of stored energy, which may exist after the power source is locked out. Refer to ANSI Z244.1—1982, American National Standard for Personnel Protection – Lockout/Tagout of Energy Sources – Minimum Safety Requirements, and Occupation Safety and Health Agency (OSHA) Standard 29 CFR 1910.147, “The Control of Hazardous Energy (Lockout/Tagout).”

Replace all safety devices and guards before starting equipment for normal operation.

Conveyors must not be lubricated while in operation unless it is impractical to shut the equipment down for lubrication. Only trained and qualified personnel who are aware of the hazards of the conveyor in motion must be allowed to lubricate a conveyor that is operating.

Guards and safety devices must be maintained in a serviceable and operational condition. Warning signs must be maintained in a legible and operational condition. Examples of warning signs are shown later in this section.

It is the responsibility of the owner/user to add any additional protective components that may be needed whenever changes or modifications are made to any of the equipment or in its operational characteristics.

2.3 Lockout/Tagout Procedure

Effective January 8, 1990, OSHA. has designated the need for a ‘positive, lockable’ means to remove all energy sources from equipment prior to service or maintenance.

The electrical power to your equipment can be locked out at the main disconnect switch, which is normally located on the electrical cabinet. When this is done, residual energy remains for a period of time in the capacitors associated with the electrical system. This residual energy is automatically depleted by features built into the equipment. After locking out the main disconnect switch, wait at least 60 seconds before beginning any maintenance procedures. This allows the residual energy to diminish. If an equipment-mounted plate indicates that you should wait longer than 60 seconds, wait the recommended period before beginning any maintenance work.

Whenever you need to perform maintenance on the equipment, or whenever you need to shut it down for any other reason, a lockout procedure must be followed. OSHA requires your employer to develop a written lockout/tagout procedure for this equipment. The following items should be considered in developing this procedure.

1) Notify everyone who normally operates, sets up, or performs maintenance on the equipment that it will be shut down.

2) Turn off all electric motors.

3) Turn off the main electrical disconnect switch.

4) Lock the main disconnect switch in the ‘Off’ position and place a tag on the switch to indicate that work is being performed on the equipment.

5) If there is any auxiliary equipment associated with the equipment, make sure the main electrical disconnect switch is also turned off for each piece of auxiliary equipment. Then lock each disconnect switch in the ‘Off’ position and tag each switch to indicate that work is being performed on the equipment.

6) Lock the air supply valves to make sure no air can be supplied to the equipment.

7) Verify that no sources of residual energy (capacitors, suspended equipment components, etc.) are present on the equipment or any piece of auxiliary equipment. If any such energy sources are located, make sure they are neutralized. If necessary, manually discharge air pressure and capacitor voltage from charged components. Also, block all suspended or spring-loaded mechanical parts to prevent movement.

8) Verify that electrical power has been disconnected from the equipment, and from any auxiliary equipment, by trying to energize the equipment and any auxiliaries with the appropriate control switches. If any piece of equipment is found to be operational, locate the electrical circuit(s) supplying the power, and disconnect all such power sources. Then lock and tag these power sources.

9) Make sure the air system pressure is 0 PSI.

10) Before you begin any work on the equipment or any auxiliary equipment, make sure that at least 60 seconds has elapsed since you turned off the main disconnect switch in Step 3 (If an equipment-mounted plate indicates that you

should wait longer than 60 seconds, wait the recommended period before beginning any maintenance work).

11) Verify that any equipment which may have been added, and which is not covered by Steps 1 - 10 above, is considered for the lockout/tagout procedure.

12) After you have completed your work on the equipment, make sure all guards, gates and other safety related devices are in place and functioning properly.

13) When the equipment is completely ready to resume operation, remove your lock and tag from the main electrical disconnect switch. If someone else has placed a lock and/or tag on the main disconnect, do not remove the additional lock or tag. If there is no other lock or tag on the main disconnect, turn on the main disconnect switch and the electric motors, then perform the daily safety checks.

2.4 Safety Labels/Signs

To reduce the possibility of injury to personnel working around conveying equipment, warning signs are placed at various points on the equipment to alert them of potential dangers. Please check the equipment and note all warning signs. Make certain your personnel are alerted to and obey these warnings. Figure 50 shows typical signs that are attached to this equipment.

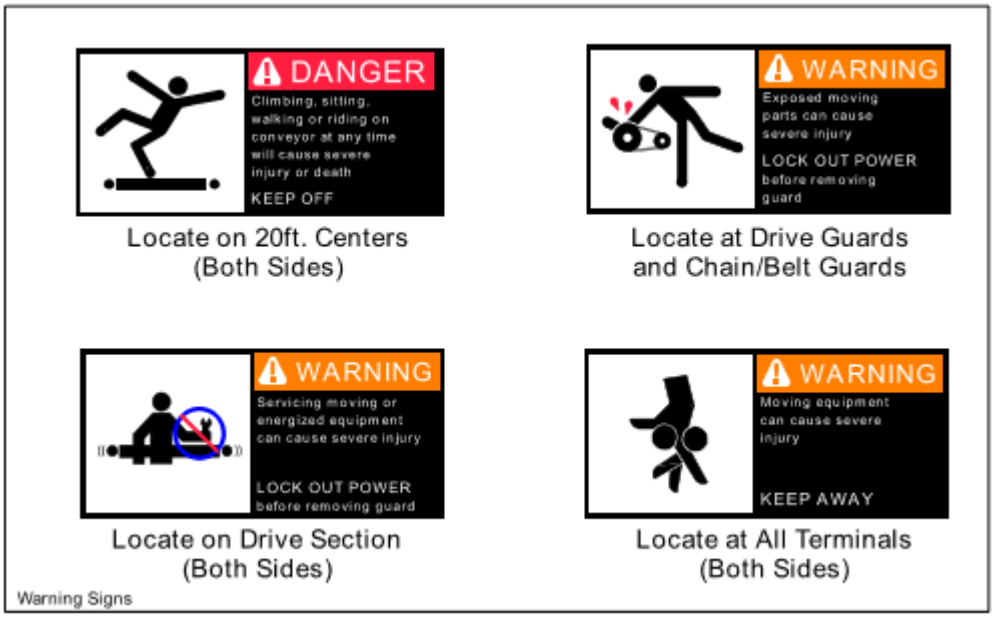


Figure 50: Safety Labels on Conveyor

2.5 General Safety Practices

General conveyor safety rules are as follows:

1) Keep jewelry, clothing, hair, etc., away from the conveyor.

2) Know the location and functionality of all start/stop devices and keep those areas free from obstruction.

3) Clear all personnel away from the equipment before starting the conveyor.

4) DO NOT touch moving conveyor parts.

5) DO NOT walk, ride, or climb on the conveyor.

6) DO NOT operate the conveyor with any of the protective guards removed.

7) DO NOT attempt to clear any project jams while the conveyor is running.

8) DO NOT load the conveyor beyond the specified design limits.

9) DO NOT attempt to make repairs to the conveyor while it is running.

10) DO NOT modify the equipment without checking with the manufacturer.

11) DO NOT operate or perform maintenance on the conveyor when taking any type of drug or sedative.

12) DO NOT operate or perform maintenance on the conveyor when under the influence of alcohol or when over-fatigued.

13) Report any unsafe condition to your supervisor or maintenance staff.

2.6 Safety Equipment Regulations

2.6.1 Guards and Guarding

All exposed moving machinery parts that present a hazard to employees must be mechanically and/or electronically guarded for personnel safety.

2.6.2 Interfacing of Equipment

When two or more pieces of conveying equipment have the potential to cause injury, special attention (warning labels and physical guards) should be used to mitigate the risk of injury.

2.6.3 Guarded by Location or Position

Remoteness from frequent presence of public or employed personnel must constitute guarding by location. Overhead conveyors, such as trolley conveyors and hanger suspended tray conveyors, for which guarding would render the conveyor unusable or would be impracticable, must have prominent and legible warnings posted in the area or on the equipment, and, where feasible, lines must be painted on the floor delineating the danger area.

When a conveyor passes over a walkway, roadway, or workstation, it is considered guarded by location if all moving parts are at least 8 ft. (2.00 m) above the floor or walking surface or are otherwise located so that the employee cannot inadvertently encounter hazardous moving parts.

Although overhead conveyors may be guarded by location, spill guards, pan guards, or equivalent must be provided if the product may fall off the conveyor for any reason and endanger personnel.

2.6.4 Guarding Exceptions

Wherever conditions prevail that would require guarding under these standards, but such guarding would render the conveyor unusable, prominent warning means such as signs or warning lights must be provided in the area or on the equipment in lieu of guarding.

2.6.5 Headroom

If the conveying equipment is installed above exit passageways, aisles, or corridors, there must be provided a minimum clearance of 6 ft. 8 in. (2.00 m) measured vertically from the floor or walking surface to the lowest part of the conveyor or guards. If the conveying functionality is impaired by the minimum clearance, it is permissible to allow passage under conveyors with less than minimum standard if suitable warning indicates the low headroom space.

2.6.6 Controls

All electrical installations and wiring must conform to the National Electrical Code (Article 670 or other applicable articles) as published by the National Fire Protection Association and as approved by the ANSI.

2.6.7 Control Stations

Control stations should be located such that the operation of the relevant equipment is visible from its operator. Control stations must be clearly marked or labeled to indicate the function controlled.

2.6.8 Start/ Stop Controls

Conveyors with the potential of causing injury when started must not be started until all personnel are alerted by a signal or by a designated person that the conveyor is about to start.

Where safety is adversely affected by other situations (i.e., a work area with many different conveyors using various warning devices), a clear, concise, and legible warning sign must be provided. These additional warning measures should indicate that a known danger exists, and that personnel must keep clear. These warning signs must be provided along the conveyor at areas not guarded by position or location.

2.6.9 Remote and Automatic Controls

Conveyors with the potential of causing injury when remotely started must have an audible and/or an optical (i.e., a flashing light) device such that personnel may be clearly warned.

Manned areas that are beyond voice or visual contact from hazardous areas such as drive areas, loading areas, transfer points, or areas not guarded by location or position, or guards, must be furnished with emergency stop buttons, pull cords, limit

switches, or similar emergency stop devices. All such emergency stop devices must be easily identifiable in the immediate vicinity of such locations unless guarded by location, position, or by guards.

Where the design, function, and operation of such conveyor clearly is not hazardous to personnel, the emergency stop device is not required. The emergency stop device must act directly on the control of the conveyor concerned and must not depend on the stopping of any other equipment. The emergency stop devices must be installed so that they cannot be overridden from other locations.

Inactive and unused actuators, controllers, and wiring should be removed from control stations and panel boards, together with obsolete diagrams, indicators, control labels, and other material which may confuse the operator.

2.6.10 Safety Devices

All safety devices, including wiring of electrical safety devices, must be arranged to operate such that a power failure or failure of the device itself will not result in a hazardous condition.

2.6.11 Emergency Stops and Restarts

Conveyor controls must be so arranged that, in case of emergency stop, manual reset or start at the location where the emergency stop was initiated, must be required of the conveyor(s) and associated equipment to resume operation.

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 will be determined. The starting device must be locked or tagged out before any attempt is made to remove the cause of the stoppage unless operation is necessary to determine the cause or to safely remove the stoppage. Refer to ANSI Z244.1-1982, American National Standard for Personnel Protection - Lockout/Tagout of Energy Sources - Minimum Safety Requirements, and OSHA Standard 29 CFR 1910.147, “The Control of Hazardous Energy (Lockout/Tagout)”.

Chapter 3

Installation

(Section Page Range: 58-74)

3.1 Installation Introduction

This section contains instructions for installing the equipment and preparing it for operation. It is essential that the equipment be properly installed, and subsequently maintained to obtain maximum productivity.

WARNING

The installer must be qualified and must comply with all applicable codes, ordinances, specifications, and/or other governing data related to the installation of the equipment. Read the installation section of this manual and resolve any questions you may have before attempting to move or install the equipment. Obey all safety precautions. Failure to follow these instructions may result in serious personal injury and/or equipment damage.

Safety Note: It is imperative that all safety precautions are planned and implemented prior to the beginning of the installation process. All associates must be aware of the rules and regulations that they must follow and expect from other associates. At no time should any installer be working in or around any open structure or surface without the appropriate OSHA approved safety gear and applicable barrier protection.

In Table 7, a summary of detailed Installation documents can be found.

Table 7: Installation Documentation Summary

Document ID Number	Document Title
INS-101	Installation Standards
INS-104	Lockout-Tagout Process
INS-106	Belt Tensioning Process
INS-108	Installation Receiving Procedure
INS-109	Site Readiness Checklist for Installation Mobilization
INS-113	Safety Audit Process
INS-114	Electrical Completion Status Reporting
INS-116	Post-Installation Inventory Process
INS-116	Turnover to Commissioning
INS-119	Installation Turnover Checklist

3.2 Receiving and Pre-Inspection

3.2.1 General Instructions

During the process of receiving and unloading the material, it is important to:

Be sure that the quantity of items received matches the count listed on the Bill of Lading. Once the Bill of Lading has been signed, the liability for any shortage is with the receiver.

Inspect each item for damage to the product, especially if there is any damage to the crate or container. Any obvious shortage or damage should be noted on the Bill of Lading before it is accepted.

Damage to the product that cannot be detected upon the initial receiving inspection must be reported to the carrier within 24 hours of the receipt of the product to qualify for a damage claim against the delivering carrier. It is the responsibility of the recipient to file claims for shipping shortages or damage whenever that recipient bears the freight charges.

Please notify the distributor or contact your Trew customer service representative whenever shipment shortage or damage occurs so that support services can be provided as well as track carrier performance. If the shipment is refused, it is imperative that the distributor or your customer service representative be contacted immediately for return authorization approval to avoid demurrage costs.

If you need further assistance, please visit our website at www.Trewstore.com or call our Customer Service Department at 800-571-TREW (8739)

3.2.2 Unstacking Shipments

The Engineer assigned to a given product is required to send the Installation Site Supervisor a complete list of materials to be received. Once the Installation Team arrives on site, they will begin by reviewing the site layout and will prepare a “layout space” to unpack and organize the bundled conveyor modules.

Prior to and during the unstacking process, the installation team must look for any damage or out of place wiring or components. Take pictures of any questionable concerns and contact Trew for support. A final pre-inspection of the modules should be made prior to placing the component assembly in its service location.

In general, the unstacking inspection team will perform the following:

1) Ensure the rollers are not damaged. If the rollers are dented or bent, they should be removed and replaced. Instructions for removal are in this manual.

2) Visually inspect the o-bands for any damage. Replace damaged O-Bands.

3) Inspect the motor control modules to ensure that they are properly secured, and their wiring connections are not loose.

4) Inspect any guarding and check where connections are loose. Do not apply power if any wiring or components appear to be out of place or damaged.

In Figure 51, a bundled Series 1500 Intermediate module can be seen for reference purposes.

Figure 51: Bundled Intermediate Module

3.3 Staging and Installing

3.3.1 Layout Requirements

Conveyor layout drawings are typically used to determine the conveyor location and elevation based on the building grid. Layout drawings should be referenced in the installation preparations to determine the conveyor layout area and to make sure there are no physical obstructions to the conveyor. Special consideration should be given to drives (motor/reducer combinations), which extend beyond the conveyor layout area.

In addition, measurements should be taken along the conveyor layout to ensure that the support adjustment falls within the conveyor elevation requirements.

3.3.2 Installation Notes

Your conveyor has been shipped in major sub-assemblies to simplify and accelerate the installation process. Typically, the conveyor sub-assemblies consist of the following components:

- Intermediate sections
- Curves
- Spurs
- Supports
- Accessories

All installation should be done by a qualified installation specialist who understands conveyor and conveyor layout. Wiring and controls should always be the responsibility of experienced, licensed electricians. To ensure satisfactory performance, follow these instructions in the installation of every section of the conveyor:

1) Mark a line on the floor to locate the centerline of the conveyor frame.

2) Preset frame supports to proper elevation and attach the first frame section to its supports.

3) Position the conveyor according to the conveyor tag information provided. Each component is tagged with its respective identification and flow arrow.

4) Adjust the location of the conveyor using a plumb-bob to locate the center of the conveyor carrying surface relative to the centerline on the floor within a tolerance of (+/-) 1/8”.

5) Adjust the frame level within a tolerance of (+/-) 1/16” for each conveyor section from the charge end to the discharge end.

6) Measure across both frame section diagonals to confirm that it is square within 1/16”. (Refer to the squaring instructions in this section.)

7) Anchor section in place.

8) Add the next frame section, leaving a 1/16” gap at the bed joints for squaring. The gap provides clearance for adjusting and squaring the frame.

9) Check to make sure the section is square.

10) Adjust the frame level within a tolerance of (+/-) 1/16” for each conveyor section from the charge end to the discharge end.

11) Anchor the section in place, attach an appropriate frame coupler, and repeat Steps 8-11, for additional sections.

3.3.3 Leveling the Conveyor

To level a conveying surface, a builder’s level, laser level, transit, or other leveling device should be employed. Adjust the frame level within a tolerance of (+/-)1/16” for each conveyor section from the charge end to the discharge end. (See Figure 52)

All conveyors are typically shipped with adjustable support feet. These supports negate grouting and/or shimming to provide a level conveying surface. If the support feet are not adjustable, shimming or grouting may be necessary to ensure a level conveying surface.

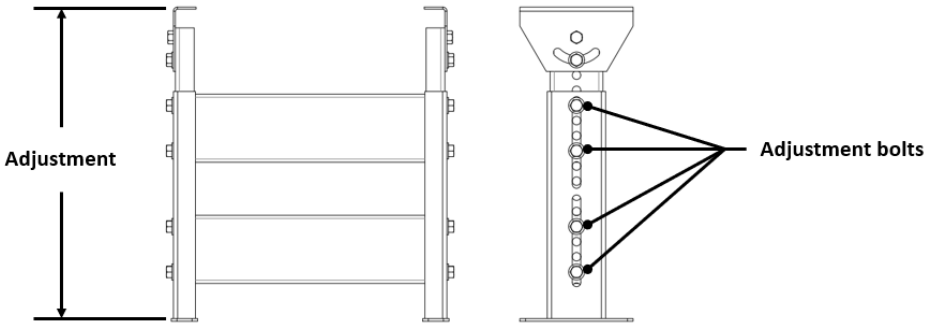


Figure 52: Leveling Conveyor

If the conveyor is being suspended from overhead structures, adjust the conveyor using the adjustment nuts on the Hanger Crossmember Support Rod to achieve a level conveying surface. (See Figure 53)

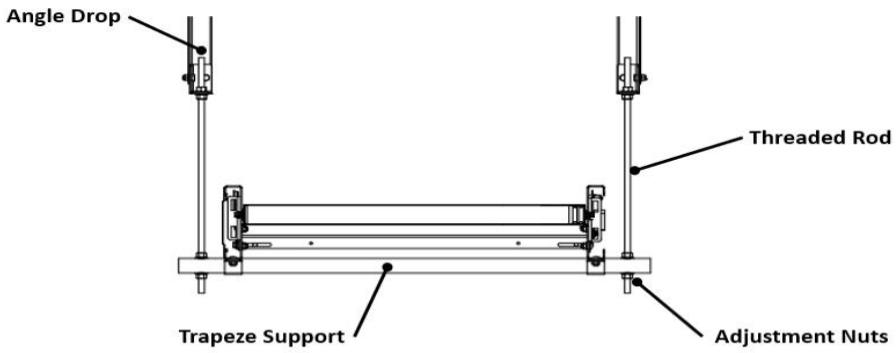


Figure 53: Adjustment for Overhead Structures

WARNING

When installing ceiling hanger rods in an existing building, it is the owner's responsibility to confirm that the structure loading and connection method is approved to by the appropriate authority to support the conveyor components and intended loads for conveyed materials and humanlive load (where applicable). Also, all methods of attachment must comply with Federal, State, and Local building codes. Failure to follow these instructions may result in serious personal injury and/or equipment damage.

3.3.4 Squaring the Conveyor

During shipment, sections may be knocked out of square. If these conditions are not corrected before the section is installed, operating problems may occur. Be sure to check each section before installing. See Figure 54.

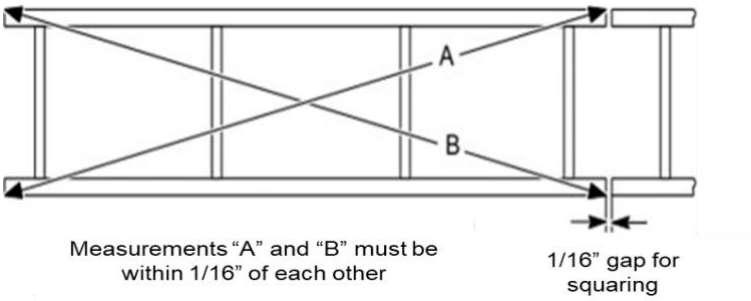


Figure 54. Squaring Conveyor Change Gap Measurement

Steps to square a given section are as follows:

1) Measure each section diagonally from corner to corner as designated by Lines A and B in Figure 40. These measurements should be within 1/16" of each other.

2) If the measurements are not within the tolerance, attach a suitable pulling device across the corners with the longest dimension. An example of pulling devices is shown in Figure 55.

Figure 55. Pulling Devices

3) Pull the corners until the measurements are within 1/16" of each other.

4) Remove the pulling device and repeat Step 1. If the bed is not square, repeat steps 2-4 as necessary.

3.3.5 Bracing

Knee braces are used to give leg supports better stability by connecting to both leg support and conveyor as shown in Figure 56. The angle between the knee bracing and conveyor should be no less than 30° and not to exceed 45°. If the leg support height is greater than 30”, the gap between knee bracing cannot exceed 40’.

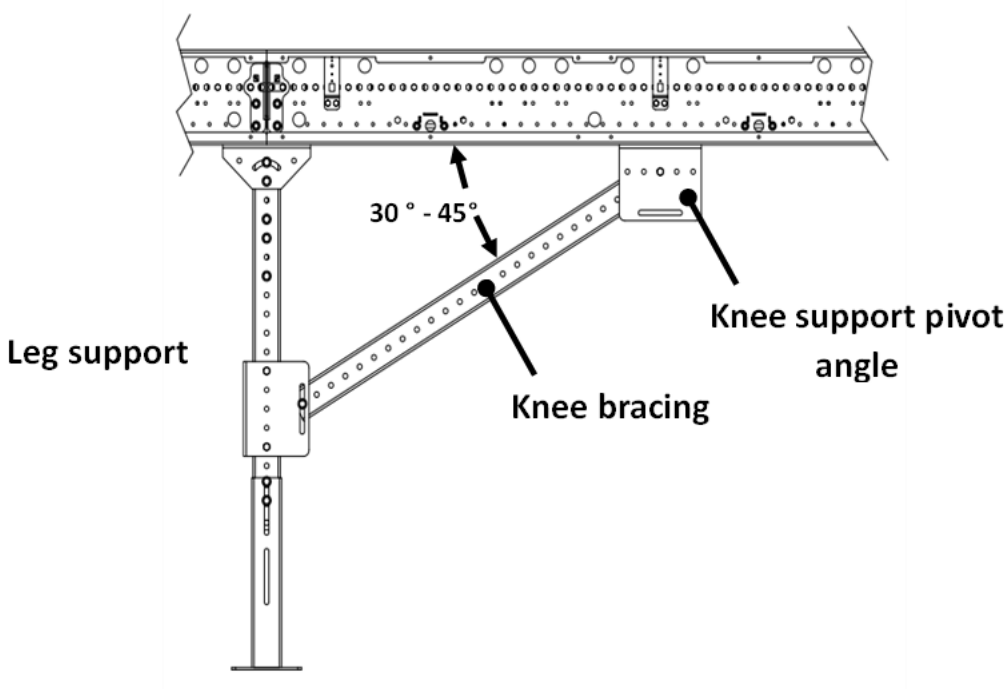


Figure 56: Knee Bracing

Scissor (sway) bracing provides extra support and reduces side movement in the HD support. Side movement is most prevalent on long straight runs and when support

heights exceed 84 inches. Scissor bracing should be installed on every third support when the support height equals or exceeds 84 inches. Each scissor brace should include (4) scissor mounting brackets and (2) scissor brace straps. See Figure 57.

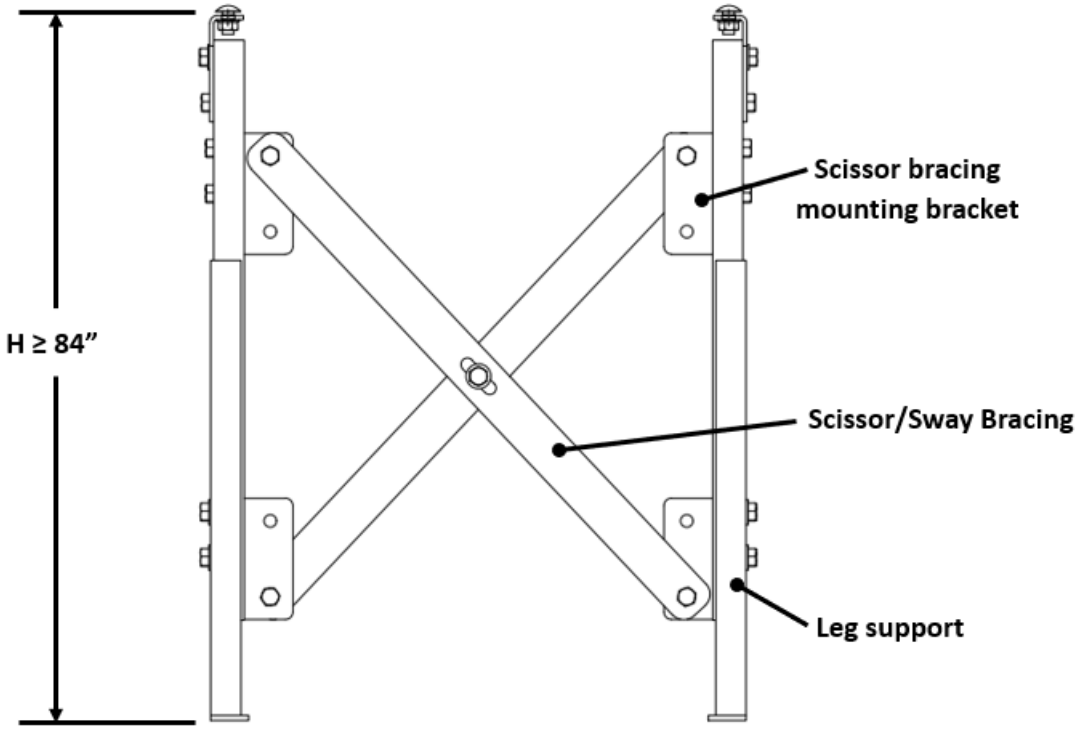


Figure 57: Scissor Bracing

3.3.6 Conveyor Frame Coupling

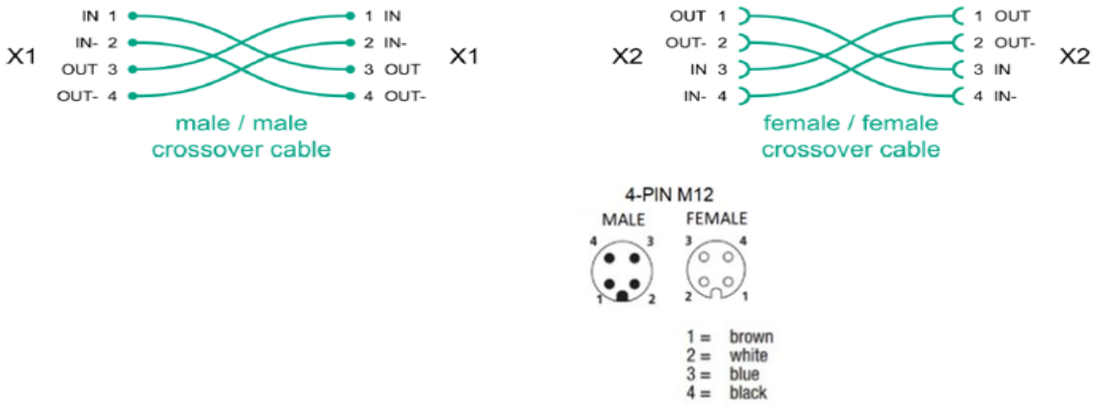
When the conveyor has been leveled and aligned to its final position, fasten the sections together using the couplers provided. The Splice Plate is used between intermediate frames. NOTE: Butt Couplers are ONLY provided on curves to mount to an Intermediate section. This kit is available upon request. See Figure 58.

Figure 58. Frame Coupling

3.4 Crossover Hardware

3.4.1 Curve Crossover (H20 Control Only)

Conveyor system layouts, at times, may require the orientation of the beds to be oriented mirrored with respect to the product flow. An example of this can be seen in Figure 59.



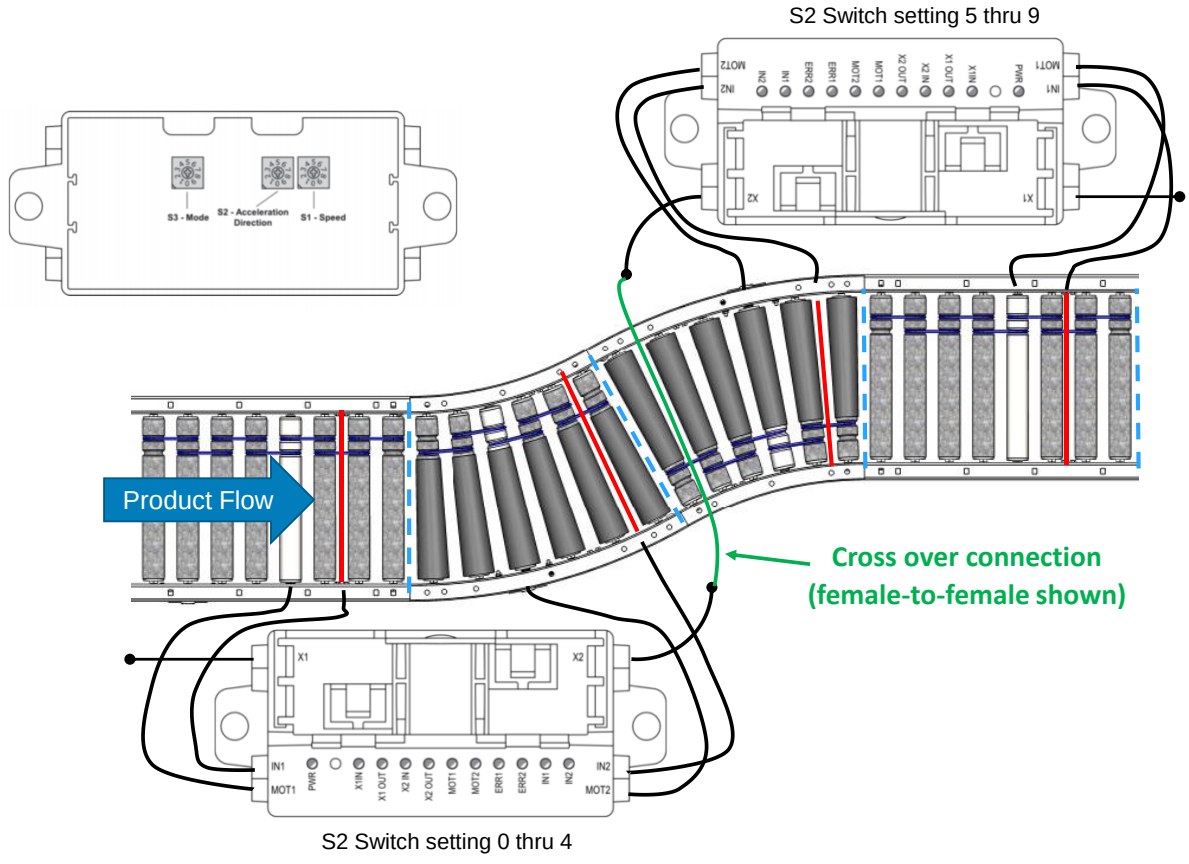


Figure 59: Crossover Cable Curve Example

Note the orientation of the product flow, the location of the O-Bands and the location of the control cards. To accomplish this configuration, a crossover cable between the control cards is required for proper operation.

The communication interconnection plugs having the same gender that need to be connected to each other to keep the downstream signals consistent with the card. This is done via a crossover cable with the matching gender. The crossover cable ensures that outputs of one interconnection line are connected to the inputs of the other line.

In Figure 60, a schematic of a male-to-male and female-to-female crossover is found.

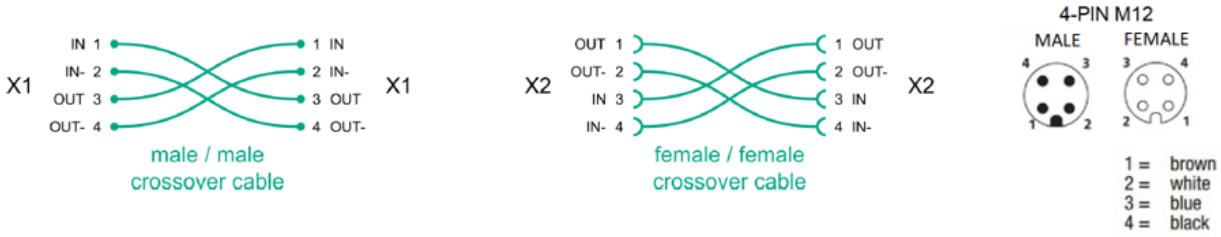


Figure 60: Crossover Plug Orientation

For connections between (2) X1 connectors a male/male crossover cable is needed, for the X2 connectors a female/female crossover cable is needed.

The 4 Conductor cable can be positioned through the conduit with the cable stripped back on each end. The M12 Male and M12 Female field attachable should then have wires landed in their respective pin. Lever Nuts can also be used as a form of wire connection within the Junction Box located on each side of the Conduit Crossover.

3.4.2 Single and Double Gate Crossover

Trew offers Single or Double Gate crossover structures to avoid any personnel trip hazards. These structures are typically used with the Series 1500 Gate Modules. An example of a single Gate Crossover structure can be found in Figure 61. A double Gate Crossover structure can be found in Figure 62.

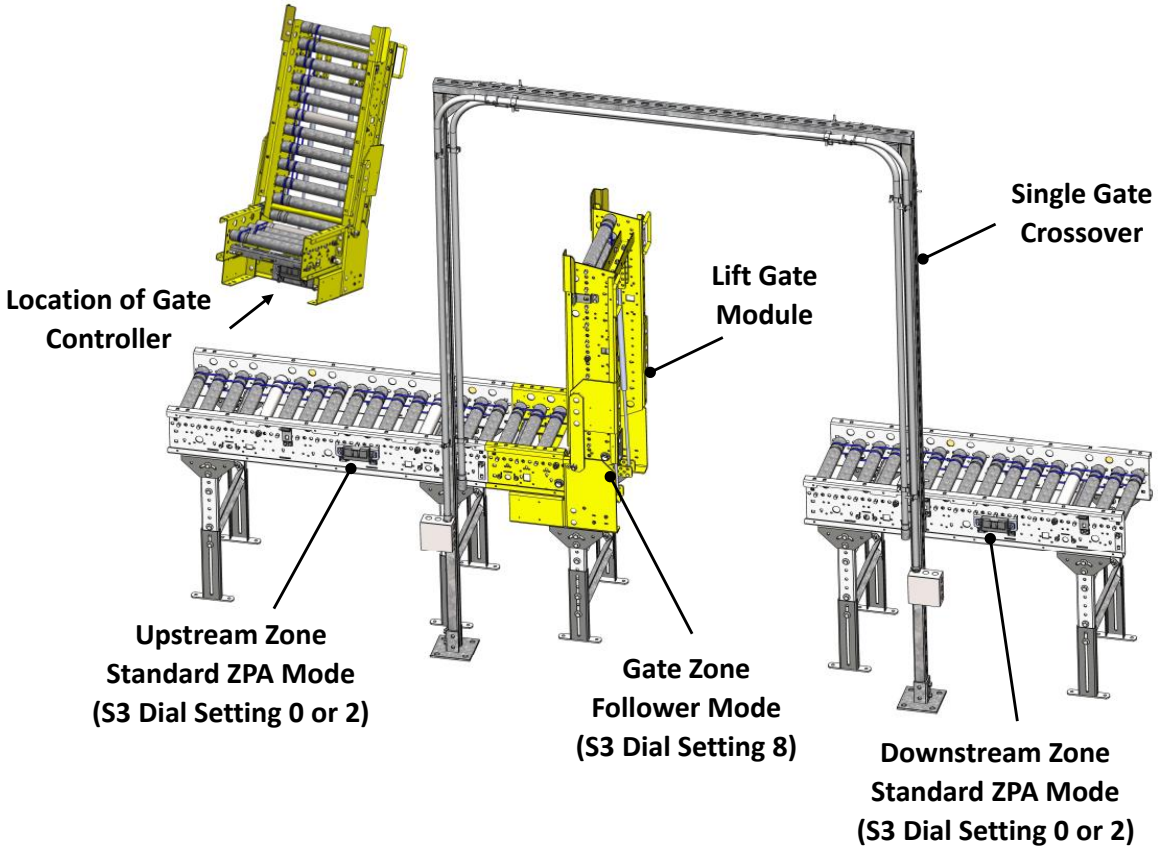


Figure 61: Single Gate Crossover

NOTE: Wiring for the Crossover requires a 4 Conductor Cable with M12 Male and Female Field attachable connectors.

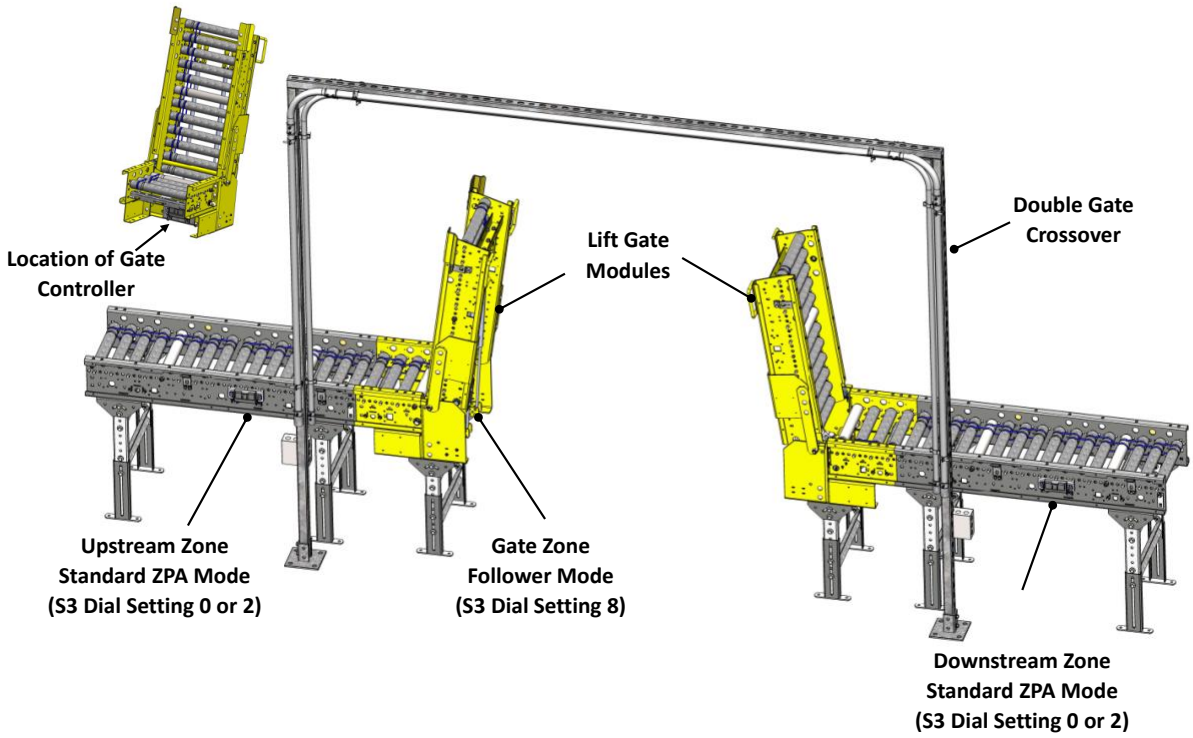


Figure 62: Double Gate Crossover

3.4.3 Connecting the AS-Interface and Auxiliary Power Flat Cable

The motor control module is connected to the AS-Interface network and the AUX auxiliary power via the AS-Interface flat cable. The yellow flat cable is for communication and the black flat cable is for the AUX auxiliary power. The permissible auxiliary power is 18 VDC ... 30 VDC. Contact between the motor control module and flat cables is established via two metal mandrels and using insulation piercing technology. The flat cables are routed through a hinged cable guide. When closed, the cable guide is locked using a locking bracket and can be opened again without the need for tools. The profiled flat cables have a narrow upper side (with a visibly offset profile edge) and a wide under side (profile edge not visible). The cable guide allows the flat cables to be inserted on both sides, for flexible connection of flat cables already laid in cable ducts. However, you must make sure that the profile edge always points to the motor control module when the hinged cable guide is open. Mechanical reverse polarity protection prevents complete closure of the cable guide if the flat cable is inserted incorrectly.

Caution! If one is inserted incorrectly, the motor control module will not work. If the flat cable is inserted in the cable guide in the wrong direction, the voltage is inverted. The motor control module will not work. However, internal electrical reverse polarity protection protects it against breakage.

3.4.4 Connecting Flat Cables on the Narrow Side

The profile edge is visible from above.

Open the cable guide. To do this, push the locking bracket (1) slightly to one side. Insert the black AUX flat cable with the profile edge (4) to the motor control module into the lower guide (see the module tag “Black AUX”). See Figure 63.

Insert the yellow AS-Interface flat cable with the profile edge (3) to the motor control module into the upper guide (see the module tag “YELLOW”)

Make sure that the profile edges of both flat cables are under the respective reverse polarity protection (2, 5)

Close the cable guide. It must engage securely in the locking bracket (1) → The metal mandrels contact the strands in the flat cables.

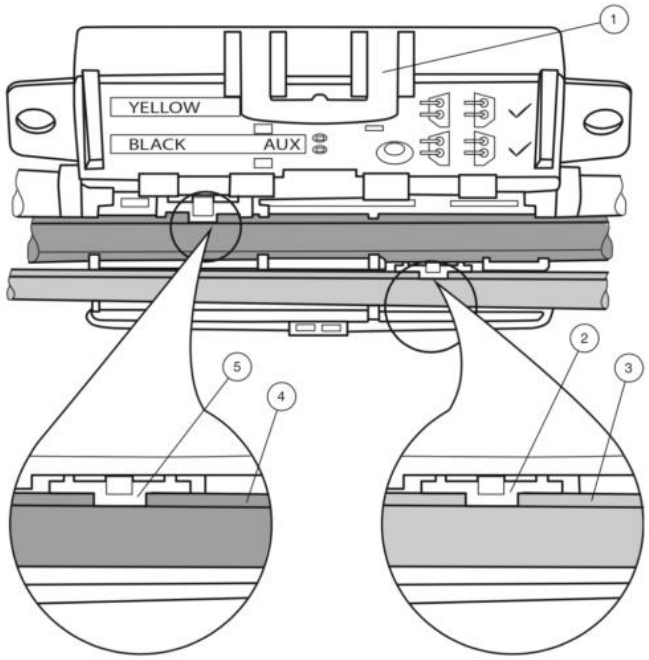


Figure 63: Connecting Flat Cables on the Narrow Side

3.4.5 Connecting Flat Cables on the Wide Side

The profile edge is not visible from above. For orientation purposes in Figure 64, the edge is shown as a hidden edge drawn with a dotted line.

Open the cable guide. To do this, push the locking bracket (1) slightly to one side.

Insert the black AUX flat cable with the profile edge (3) to the motor control module into the lower guide (see the module tag “Black AUX”)

Insert the yellow AS-Interface flat cable with the profile edge (2) to the motor control module into the upper guide (see the module tag “YELLOW”)

Close the cable guide. It must engage securely in the locking bracket (1) → The profile edges (2, 3) of both flat cables are above the two reverse polarity protections. The metal mandrels or vampire clips contact the strands in the flat cables.

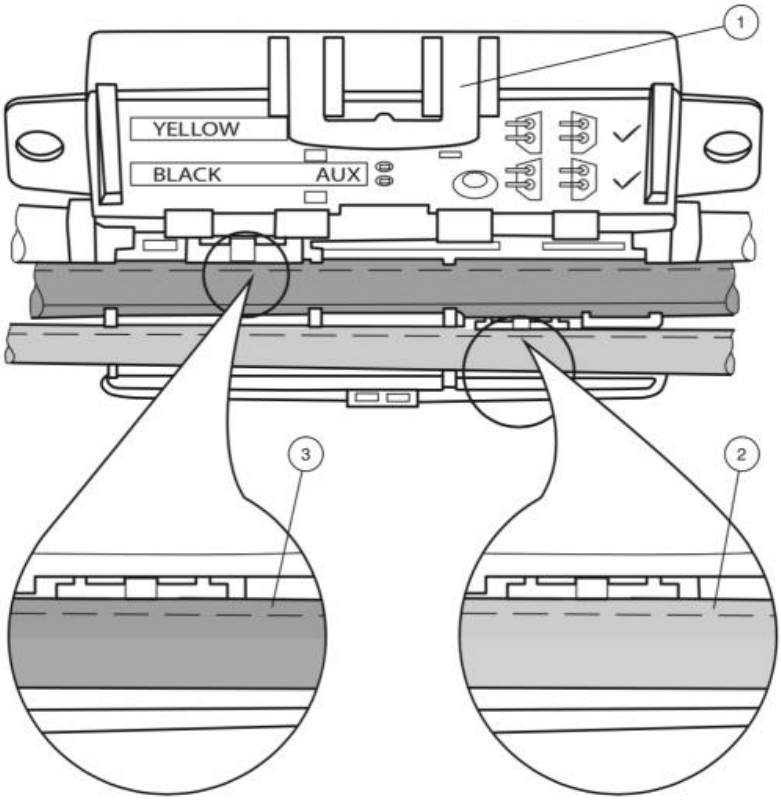


Figure 64: Connecting Flat Cables on the Wide Side

3.4.6 Flat Cable Inserted Incorrectly

Figure 65 shows an incorrectly inserted flat cable. The profile edge (2) does not point to the motor control module; the flat cable is therefore inserted with reverse polarity. The flat cable is located on the reverse polarity protection (1) with a curvature, which means that the cable guide cannot be closed completely (mechanical reverse polarity protection).

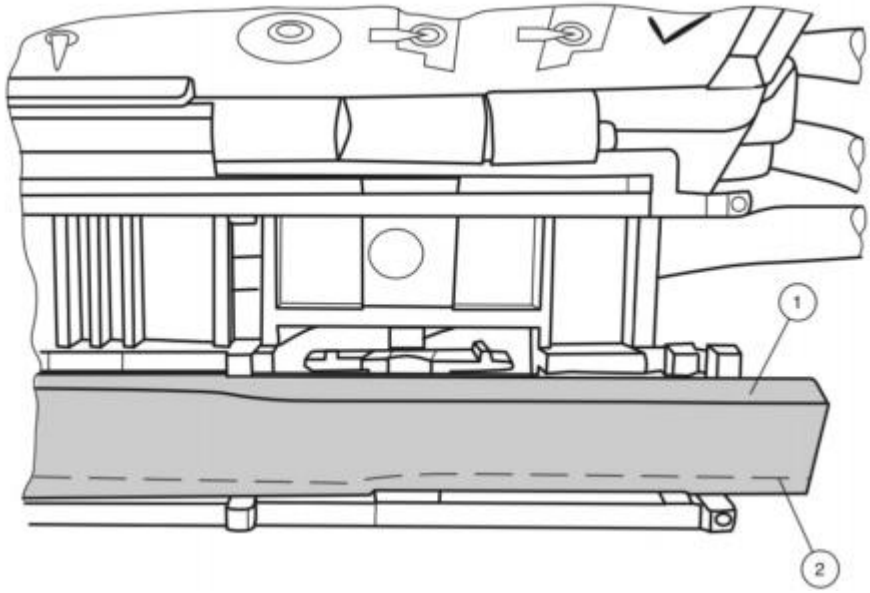


Figure 65: Flat Cable Inserted Incorrectly

CHAPTER 4

PREVENTATIVE MAINTENANCE AND TROUBLESHOOTING

(Section Page Range: 75-81)

4.1 General Preventative Maintenance (PM)

The satisfactory performance and reliability of this equipment is dependent upon a proficient PM program with scheduled equipment inspections under normal operating conditions.
.
Accurate records of maintenance and repairs will help to identify problem areas and repetitive problem patterns. It is imperative that adequate records be kept in connection with the PM program. These records should contain the date of inspection, inspection results, equipment services, repair history, part replacement history, and any other information that will help to make the maintenance process more efficient and accurate. It is recommended that each conveyor have its own record. Properly maintained, the conveyor record sheet will form a mechanical history of the equipment covered.

PM consists of regular service (lubrication, adjustments, cleaning, etc.). In addition, it consists of" keeping your eyes, ears, and nose open." Use your eyes to see potential component failure. Use your ears to listen for abnormal or louder than normal noises. Use your nose to smell a motor running abnormally warm in time to prevent its burnout. These sights, noises, and smells can be indicators of lack of lubrication, misalignment, or other potential trouble. Ignore them and you will be replacing a shaft, motor, or whatever does go out when a component is lacking proper PM.

Only qualified maintenance specialists should maintain the mechanical, electrical, and pneumatic portions of the conveyor.

4.2 PM Warnings

When testing operating performance, do not start the equipment until all operations and maintenance personnel are notified and clear of the unit being tested.

1) Be certain that required safety guards are never removed without authorization.

2) Never run the equipment under production conditions without safety guards in place.

3) Do not make any equipment repairs while the conveyor is running.

4) Keep hands, hair, and clothing clear of any moving parts.

5) Never attempt to clear load jams while equipment is running.

6) Always use appropriate tools when making repairs or adjustments.

7) Observe all warning labels and follow plant safety rules.

8) Make sure all connectors are secure and all wires are free from interference, obstruction, and any moving parts.

4.3 Cleaning and Inspection

There are many reasons for cleaning:

- To allow heat to dissipate (motors and gearboxes).
- To prevent wear on moving parts.
- To prevent binding.
- For proper operation.

Any prescribed cleaning schedule can be modified as experience is gained. A thorough inspection should be performed while cleaning problem areas.

The total value of inspection procedures is determined by the consistency and regularity of the schedule. A definite interval of inspection must be established and obeyed. It is recommended that a general inspection that will ensure a thorough examination of each component and assembly contained in the system be done at least once for each thirty-day period of operation. The results of these general inspections should be documented in the conveyor record of the unit inspected.

The probability of mechanical/electrical problems increases during periods of heavy usage, so an additional inspection immediately before and after these periods is recommended.

Table 8: Preventative Maintenance Schedule

Daily	Walk the entire length of the running conveyor system and listen for abnormal noises. Noises may indicate: Worn bearings in rollers, motors, reducers, etc. The belt rubbing on things it should not be (debris, guards, loose parts, etc.) Confirm all safety guards are in place. With the conveyor shut down, look for the following: Foreign material wrapped around bearings, shafts, or rollers. Shavings or belt dust under conveyor that would indicate misaligned or damaged components. Oil leakage that would indicate faulty bearings or seals in motor/reducers, etc.
Weekly	Visually inspect belts and rollers for wear, improper alignment, or buildup of foreign materials and repair/clean. Visually inspect all motors. Check pneumatic water traps and drain.
6-Month	Clean and lubricate all drive chains with SAE-10 to SAE-40 oil. Check all set screws and tighten, as necessary. These may work loose during normal operation. Check all bolted connections and tighten as needed. Bolted connectors may work loose during normal operation.

Table 9: Troubleshooting

TROUBLESHOOTING GUIDE		
Issue	Probable Cause	Fix
Single zone not running (Dead zone)	Motor failure Motor card failure Damaged cabling	Replace motor. Replace motor card. Check cabling for damage
Multiple zones not running	Power supply circuit is off. Damaged cabling Breaker blown at local power supply. Disconnected switch at local power supply	Check power supply for tripped breaker. Check cabling for damage. Reset breaker. Turn disconnect to ON position
Zone runs continuously	Photoeye sensor misaligned on upstream zone. Disconnected photoeye sensor Faulty communication cable	Align photoeye sensor, clean photoeye sensor lens. Reconnect photoeye sensor. Replace motor control card
Zone runs in wrong direction	Motor control card settings (dip switches) are incorrect. Faulty power supply	Verify dip switch setting according to electrical drawings. Replace power supply
Zone runs at different speed than rest of conveyor	Speed potentiometer on motor control card is incorrect. Gear ratio of MDR is incorrect. MDR is defective	Using a terminal screwdriver, adjust potentiometer on motor control card. Verify proper MDR, replace if needed. Replace MDR
Start/stop button not working (if applicable)	Fuse blown in power supply enclosure. Button has malfunctioned. Damaged cabling	Replace fuse in power supply Replace button. Check cabling for damage.
Grinding noise coming from motor	Motor rubbing on metal Damaged motor	Clear obstructions to motor Replace motor.

TROUBLESHOOTING GUIDE (CONT.)		
Issue	Probable Cause	Fix
PWR light is not illuminated on motor card	No power to motor card. Defective motor card	Check power supply for tripped breaker. Replace motor card
Green lights on card not illuminated	Motor control card is faulting. No voltage to motor control card	See: motor control card section of this maintenance manual for fault information Check voltage across motor control card, check power supply, inspect for loose wires.
ERR1/ERR2 illuminated on motor card	Motor has become unplugged. Motor has an internal failure	Plug motor into motor card. Replace motor
Light on outside of power supply enclosure (PSE) is not illuminated	Circuit breaker has tripped. No power to the PSE Fuse has blown inside PSE. Pilot light has malfunctioned	Check for tripped breaker. Check incoming power from power drop. Replace fuse. Replace pilot light
Products run into each other	Photoeye sensor not operating. Motor control card settings are incorrect Dead zone. Speed set too high Product larger than zone Photoeye sensor location is incorrect.	Verify photo sensor wiring, alignment. Clean sensor lens. Verify dip switch settings according to electrical drawing. see: zone will not run. see: zone runs at different speed than rest of conveyor. Verify product size to original conveyor specifications. Move photoeye sensor to proper location.

TROUBLESHOOTING GUIDE (CONT.)		
Issue	Probable Cause	Fix
Product bounces sporadically during transportation	Debris on conveyor Debris on conveyed product Conveyor sections do not have smooth transition at conveyor connection.	Remove debris from conveyor. Remove debris from conveyed product. Readjust convey height.
Irregular movement of product while in transportation	Product larger than zone Different zone speeds	Verify product size to original conveyor specifications. See: zone runs at different speed than rest of conveyor

5.1 Technical Support

Reach General Support, Parts, or Field Services:
Phone: 1-800-571-TREW (8739)

- 24x7 Technical Support
- Parts
- Field Service
- Assessments
- Modifications & Upgrades
- Warranty Claims / Returns

Scan For Support Website:

trewautomation.com/support

For all other inquiries or if you are unsure who to contact, or if you have a critical/downtime situation please contact your sales representative, or email info@trewautomation.com