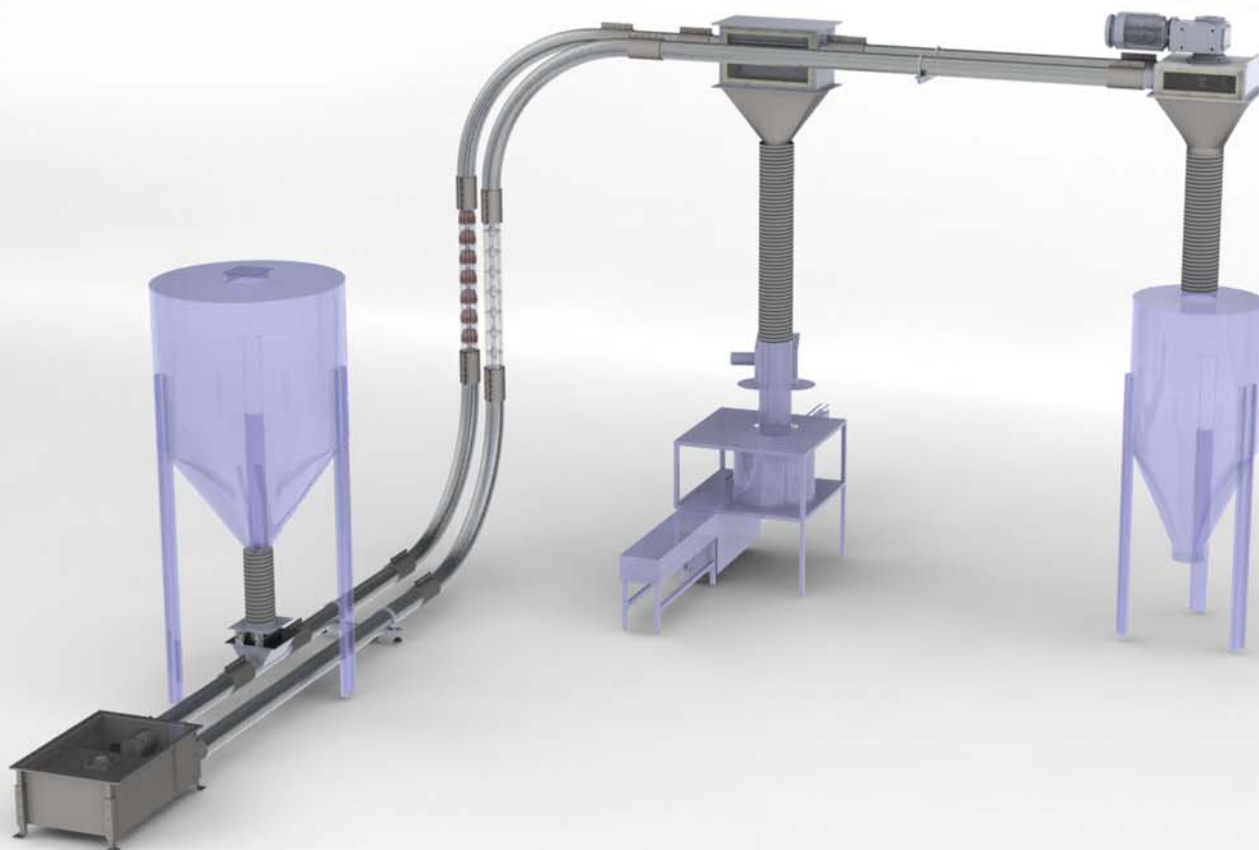
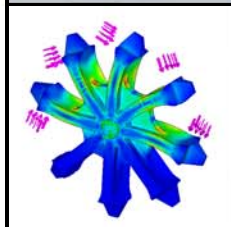
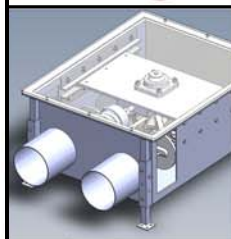
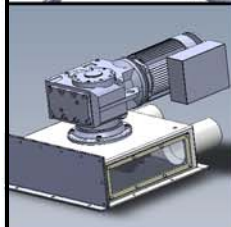
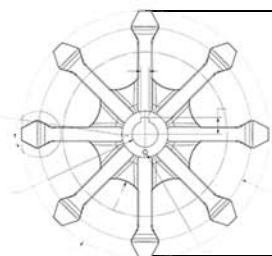


CHAIN-VEY™



4" TUBULAR DRAG CONVEYOR

INSTALLATION & OPERATION MANUAL



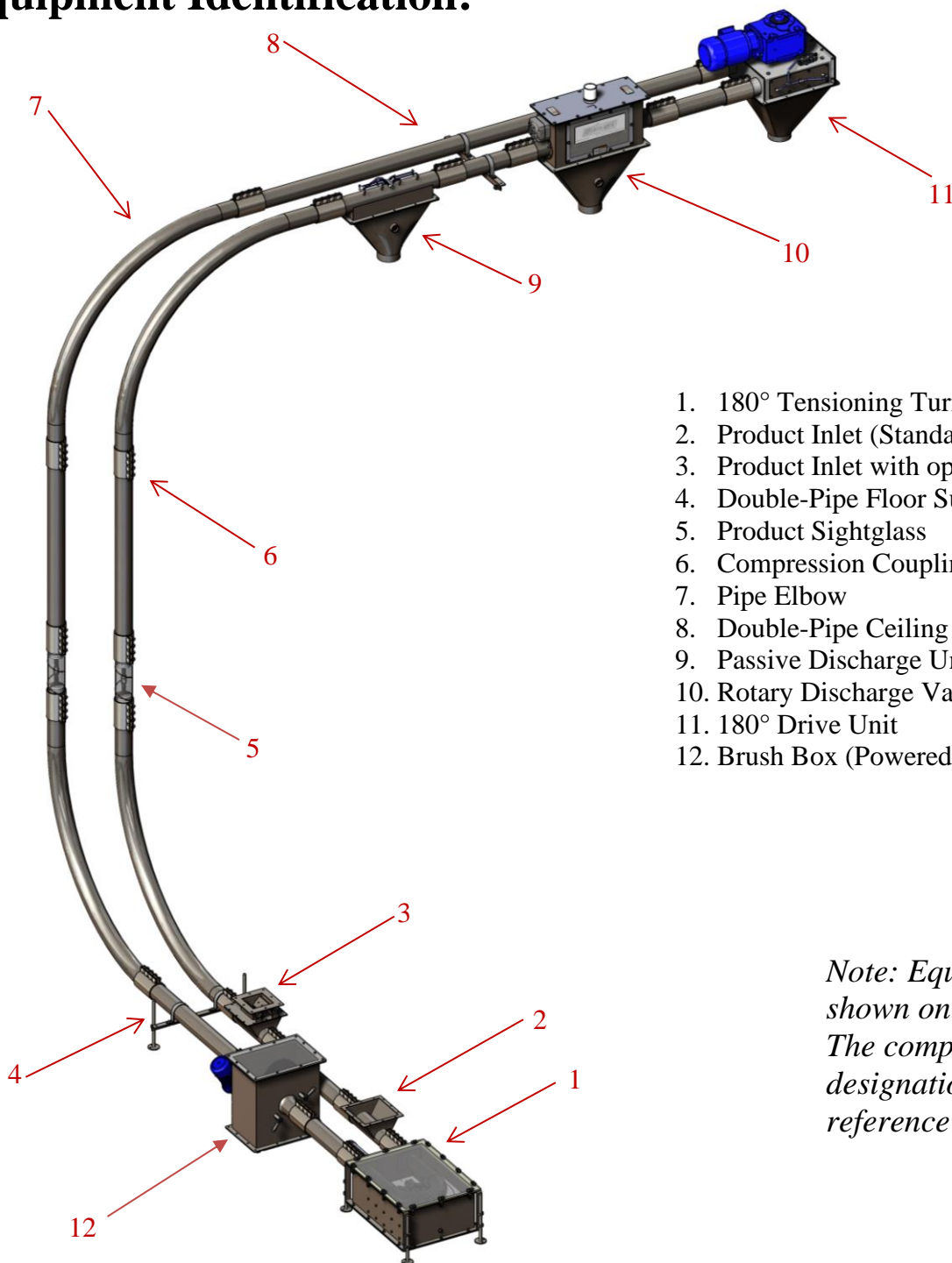
MODERN PROCESS EQUIPMENT
3125 S KOLIN AVE, CHICAGO, IL 60623 USA
T: 773.254.3929 W: WWW.MPECHICAGO.COM



Equipment Introduction

MPE's Chain-Vey system is a tubular drag chain conveyor used to convey various different bulk materials and solids. The conveyor system is very flexible with layouts and can be set up in many different configurations. There can be one inlet or various inlets along the system at different points where the material can enter the conveyor. It uses pucks connected to a chain to drag the solids through the system in order to discharge at one or multiple outlets. The conveyor has a motor at the drive unit that moves the chain and then a turnaround unit that is passive but is also used to tension the chain in the system. If desired, there are multiple cleaning options offered by MPE including dry cleanout systems, drop in sponges, various stage hybrid cleanout options, or full CIP cleaning capabilities.

Equipment Identification:



1. 180° Tensioning Turnaround Unit
2. Product Inlet (Standard or Low Breakage)
3. Product Inlet with optional Flow Baffle
4. Double-Pipe Floor Support
5. Product Sightglass
6. Compression Coupling
7. Pipe Elbow
8. Double-Pipe Ceiling Suspension Support
9. Passive Discharge Unit
10. Rotary Discharge Valve
11. 180° Drive Unit
12. Brush Box (Powered or Passive)

Note: Equipment layout is shown only as an example. The component numerical designations are shown for reference purposes only.



General Information:

Safety Recommendations & Warnings

MPE Chain-Vey conveyors are built and tested to comply with current safety regulations and laws. To continue this practice of safety, MPE requires that the following is noted:

- Before installing, operating, or servicing the conveyor, it is necessary to completely understand the information found in this manual.
- The tubular drag conveyor is designed to be operated only as specifically stated in this manual. MPE can only warrant safety and proper performance of equipment that is used in accordance with this manual.
- All planning, installation, transport, assembly, commissioning, maintenance, and repair (mechanical and/or electrical) may only be completed by qualified personnel.

Safety Instructions

1. Do not attempt to install, connect power to, operate, or service Chain-Vey equipment without proper instructions, or until personnel have been thoroughly trained in its use.
2. Do not attempt to work on, clean, or service the conveyor until the power had been turned off and locked out. IF and when necessary to momentarily start and stop (jog) the conveyor, use extreme caution and ensure that all personnel are clear of the conveyor chain or any moving parts.
3. Do not manually override or electrically bypass any protective device.
4. Do not connect power to or operate conveyor unless all moving parts are covered and all covers, guards, safety grids, and maintenance panels are in place and securely fastened.
5. Do not place any part of your body or loose clothing within the feed hoppers, discharge hoppers, or any other access point on the conveyor while it is in operation.
6. All conveyor inlet and discharge openings and access panels must be completely enclosed to prevent human access when the conveyor is running and remain enclosed until power has been turned off and locked out.
7. All protective covers, guards, grates, maintenance panels, and warning decals must be kept in place. Any equipment with damaged, defective, or missing protective devices must be taken out of service until such protective devices can be repaired or replaced.

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Operation

The conveyor should only be operated by authorized personnel who are familiar with the specific features of the equipment and have read and understood the contents of this manual.

If it important to feed the conveyor at a rate less than the capacity stated in the technical specifications. Otherwise damage to the sprockets and chain and all moving parts may result. The conveyor should only be used with products/materials evaluated and approved MPE personnel. Unless tested onsite, MPE will utilize best judgement and previous experiences in product suitability and functionality with the Chain-Vey.

Let me machine run empty before turning it off. Any product left within the system could harden or become gummy over an extended period of time, therefore potentially hindering restarting the conveyor.

All conveyors are required to be operated in conjunctions with a Variable Frequency Drive (VFD). Additional information in regard to wiring and startup can be found on Page 29 of this manual.



The chain should be checked regularly for the correct tension and length. Additional information in regard to preventative maintenance practices can be found on Page 39 of this manual.

IF the motor starter, fuse, or shock relay trips, the conveyor may only be turned back on after the origin of the malfunction is detected and has been properly addressed.

E-Stop buttons should only be used when immediate safety is impaired and should not be used for regular operation. After an E-Stop has been used, be sure that the cause of the emergency is established and resolved before putting the conveyor back into service.

Functional Description

A. General Controls Information

- a. A VFD is required to control speed of the Chain-vey system.
- b. A shock relay is provided with all Chain-vey systems. The shock relay is mounted in the system control panel and is used to monitor the motor current and indicate when a motor overload has been detected. If the overload lasts for longer than a preset amount of time, the shock relay will act as an electric shear pin and interrupt the supply of power to the motor.

B. Process Description

- a. The Chain-Vey will have a hand mode, as well as an automatic operation mode.
 - i. In hand mode, the Chain-Vey may be run in forward and reverse at a specified speed.
 - ii. In automatic operation mode, the Chain-Vey will be given a run signal if it detects that it has an input an upstream feeder or a hopper level sensor being installed at the inlet.
- b. All discharge locations should be protected from product back either via level sensors, mechanical means or other.
- c. Each discharge may be activated and de-activated from the HMI and will provide open or close signals via a position sensor mounted on the discharge. In the case where a drive unit is being used as the discharge you will not have position feedback as discharge will always be open.
- d. When using multiple discharge locations, a purge process must take place when switching discharge locations in order to prevent product carryover into unwanted areas.

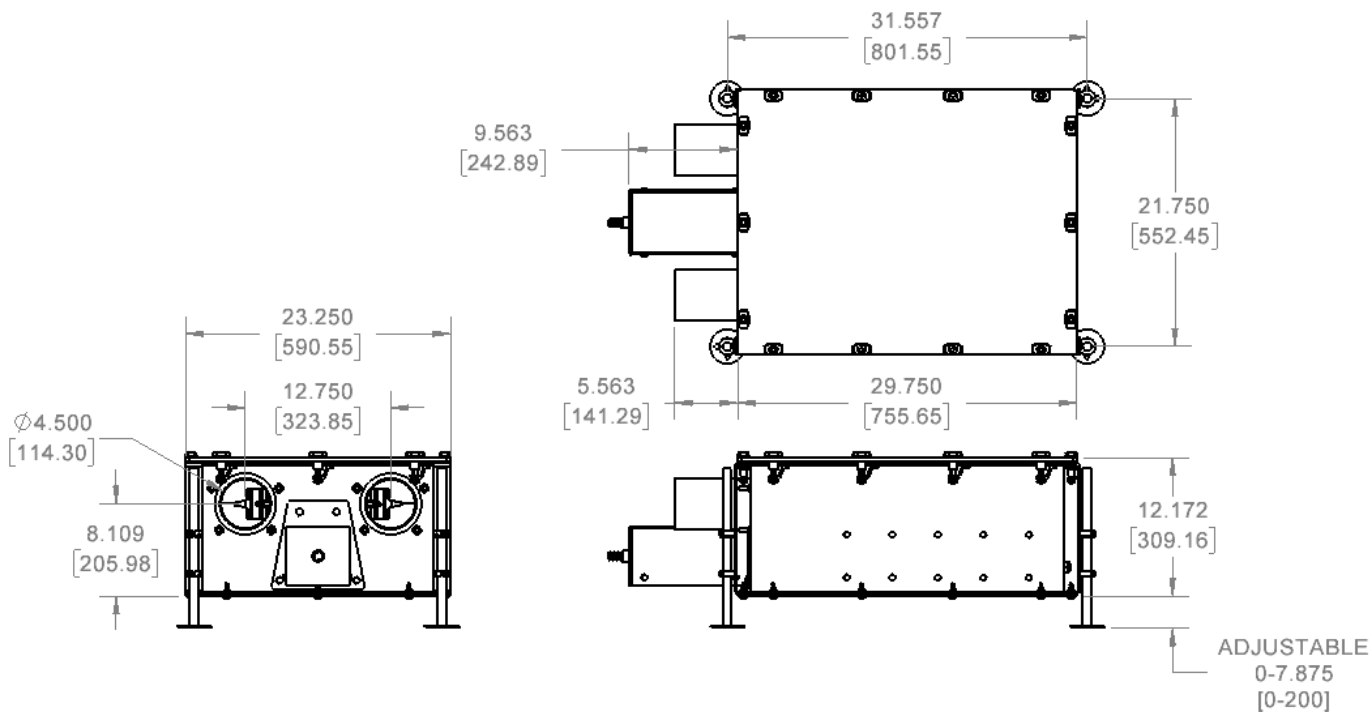
C. Process Faults, Alarms, and Safety Interlocks

- a. The Chain-Vey will stop running when the shock relay is tripped. An alarm will display on the HMI.
- b. The Chain-Vey will stop running when the Tension switch is tripped. An alarm will display on the HMI.
- c. The Chain-Vey will stop running when a VFD Fault is tripped. An alarm will display on the HMI.
- d. If the Chain-Vey VFD is commanded to run, but does not return a running signal after a specified amount of time, the Chain-Vey will stop running and an alarm will display on the HMI.
- e. If the discharges return both an open and closed signal simultaneously, or neither signal for a specified period of time, then the discharge will be commanded closed and an alarm will display on the HMI. If an automatic sequence is running, then the Chain-Vey will stop until the alarm is cleared.
- f. If the discharge is commanded to close, and does not close, or is commanded to open, and does not open, an alarm will display on the HMI. If a semi-automatic sequence is running, then the Chain-Vey will stop until the alarm is cleared.
- g. A high level sensor may be installed on each one of the discharges, as well as the drive unit. If this sensor is triggered, the Chain-Vey will stop running.
- h. If the PLC receives a high level input from a discharge, but does not receive a low level input from the same discharge, this discharge will close and an alarm will display on the HMI.

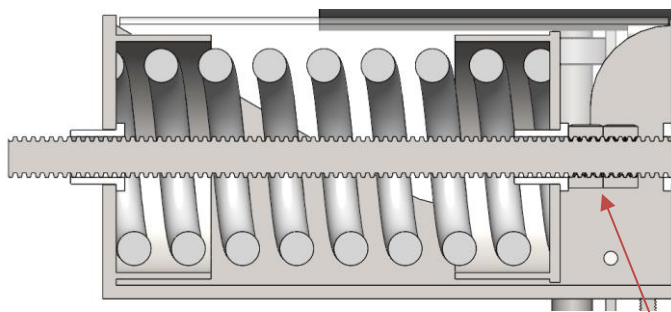
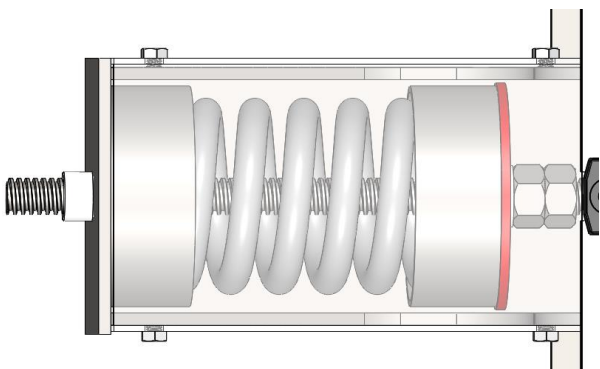


180° Turnaround Unit:

Used in conjunction with the 180° drive unit, the 180° turnaround unit is the mechanism that keeps the chain tensioned within the system. The turnaround unit may be run in either direction, and the chain can enter or exit through either of the two ports, but must correspond with the direction of travel on the drive unit.



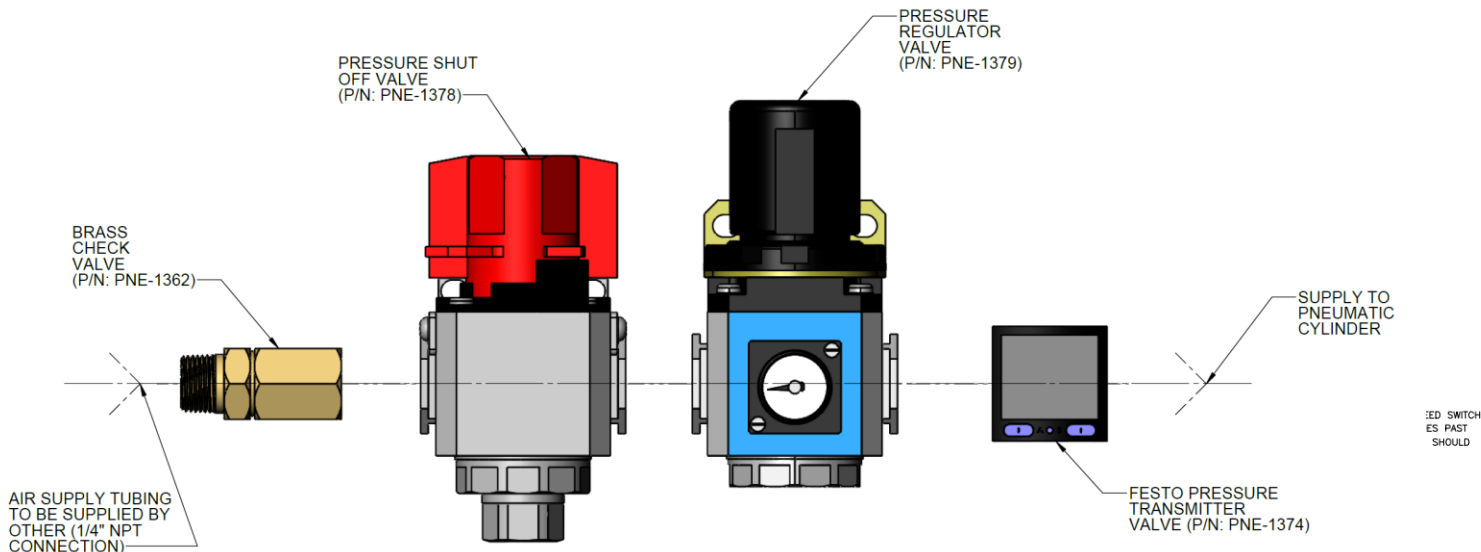
If a mechanical spring setup is used, the turnaround will be configured as followed. In order to tension this system, two nuts will need to be tightened or loosened. Tightening the nuts and compressing the spring will increase tension in the system and loosening the nuts completely will release all tension in the system. The nuts must always be tightened together, and both pressed up against each other.



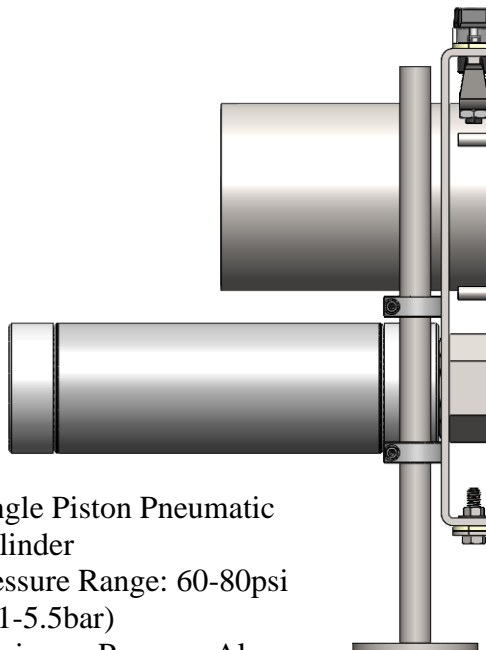
Nuts must always be touching this plate and be pressed together



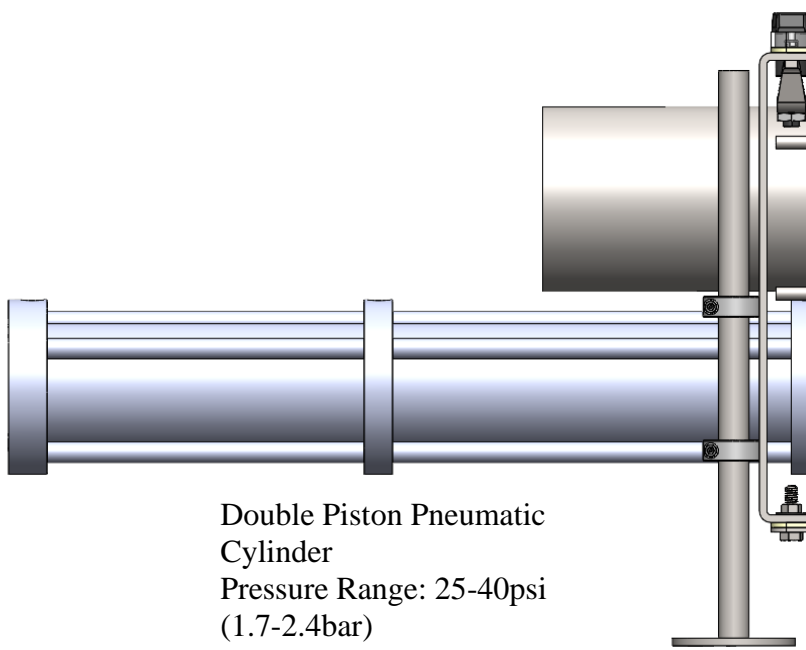
If a pneumatic spring tensioning system is used, the turnaround will be configured as followed. With the pneumatic cylinder, a pressure shut off valve, pressure regulator, check valve, and pressure transmitter will be sent with the system. All of these components should be set up in the order below in order for the pneumatic cylinder to perform optimally.



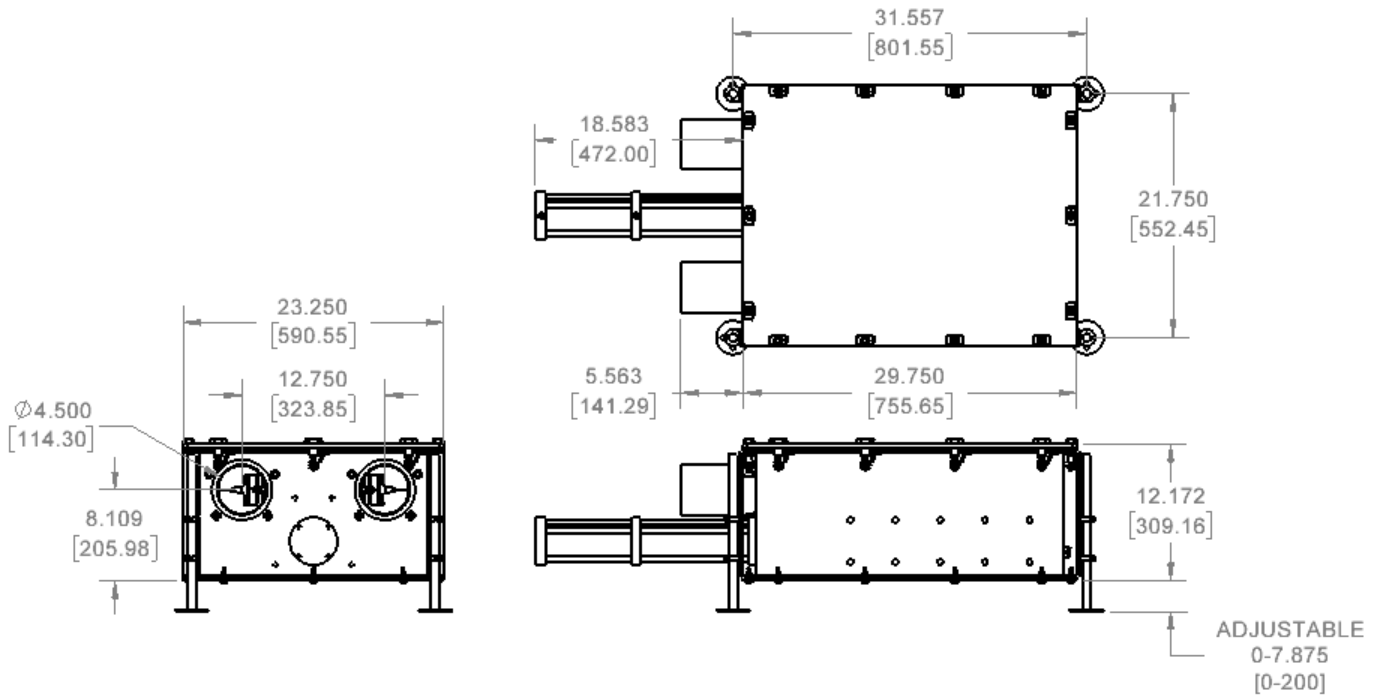
Two pneumatic cylinders will be used on these systems depending on the product and system layout. Below are the optimal pressure ranges that can be used for each one. If other pressures may be needed outside of this range for each one, please contact MPE before continuing with that pressure.



Single Piston Pneumatic Cylinder
 Pressure Range: 60-80psi (4.1-5.5bar)
 Minimum Pressure Alarm: 50psi (3.5bar)

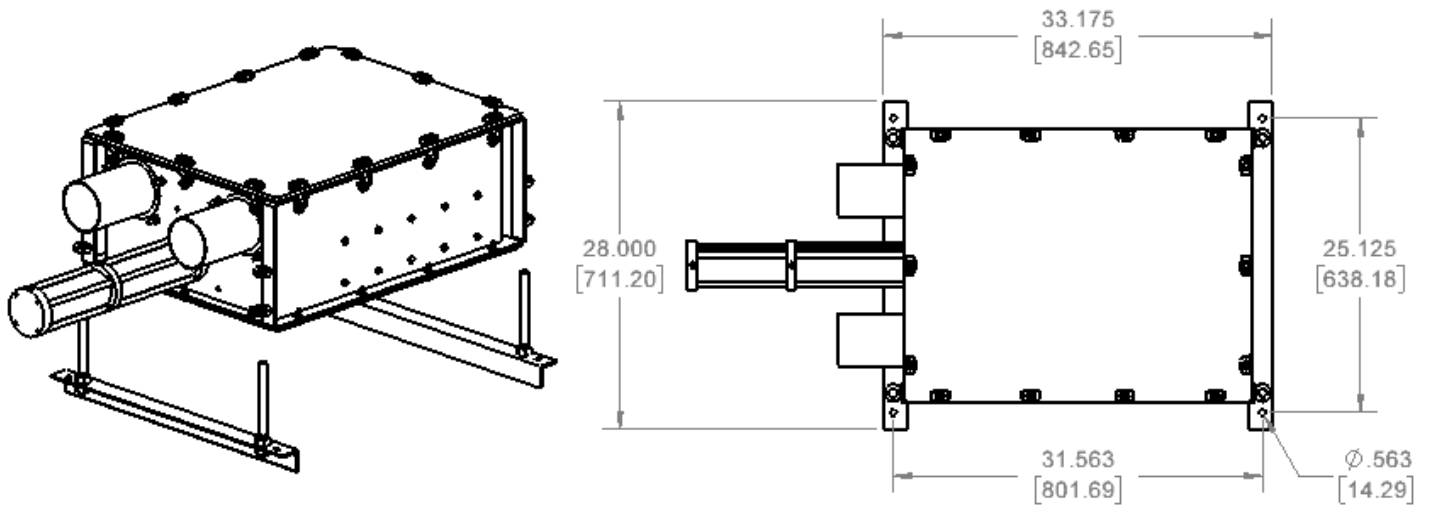


Double Piston Pneumatic Cylinder
 Pressure Range: 25-40psi (1.7-2.4bar)
 Minimum Pressure Alarm: 20psi (1.4bar)



The 180° turnaround unit is to be ceiling suspended or base mounted. If ceiling suspended, the unit weighs app. 250 lbs (113.4 kg)

In instances where the 180° Turnaround is to be ceiling suspended, the standard mounting legs can be replaced with two suspension supports which allow for suspending the unit at four points by 1/2" threaded rod. (Suspension supports are supplied by request only)

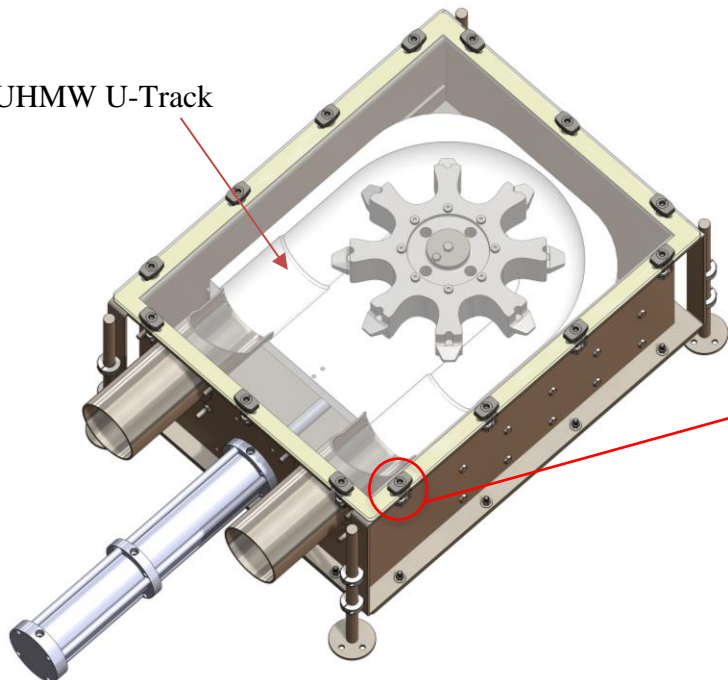




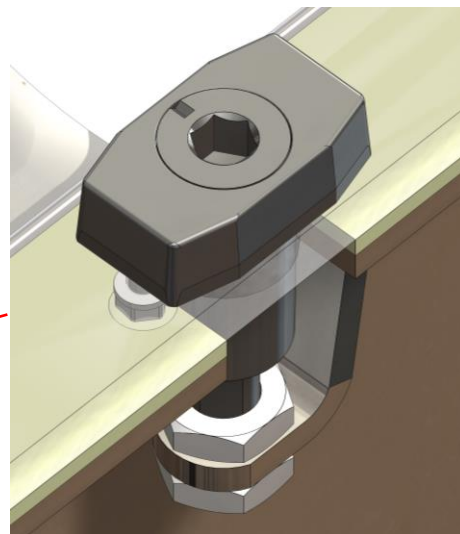
Turnaround Options

A food grade UHMW U-track can be added to the system if product carryover into the turnaround is imminent. This u-track will recirculate any product that makes its way into the turnaround back through the system so less product is wasted. If carryover is occurring and the turnaround unit doesn't have a U-Track in it, retrofit U-Track kits are available to add a U-track to the system after it is installed. If this retrofit kit is desired, please contact MPE for further information.

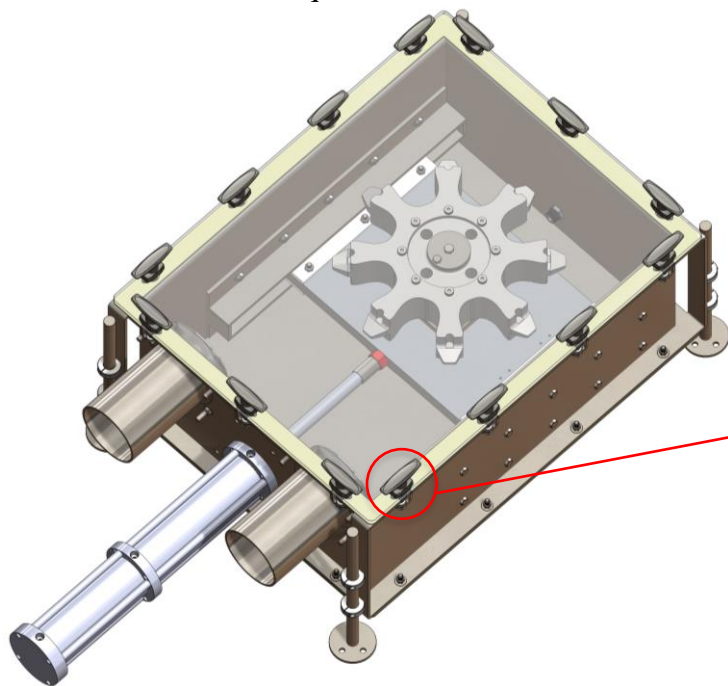
UHMW U-Track



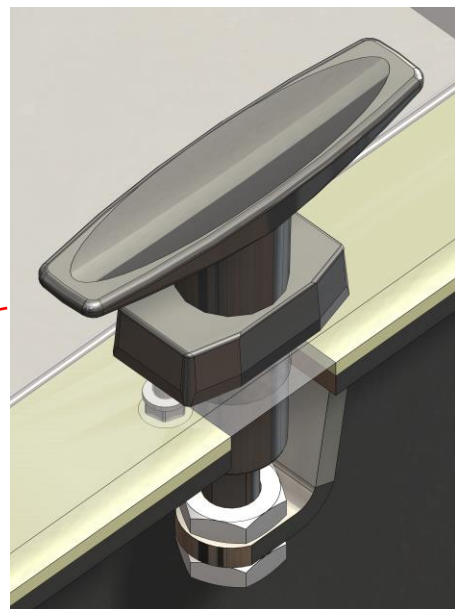
Semi tooled hex head quarter turn latches



If hex head quarter turn latches seen above are used on the turnaround unit lid, they will use a 5/16" or 8mm hex key in order to be opened or closed. These semi tooled latches provide ample clamping force around the lid and can be used for many different products including dusty applications. If full toolless entry is selected, the turnaround will use T-handle quarter turn latches as seen below.

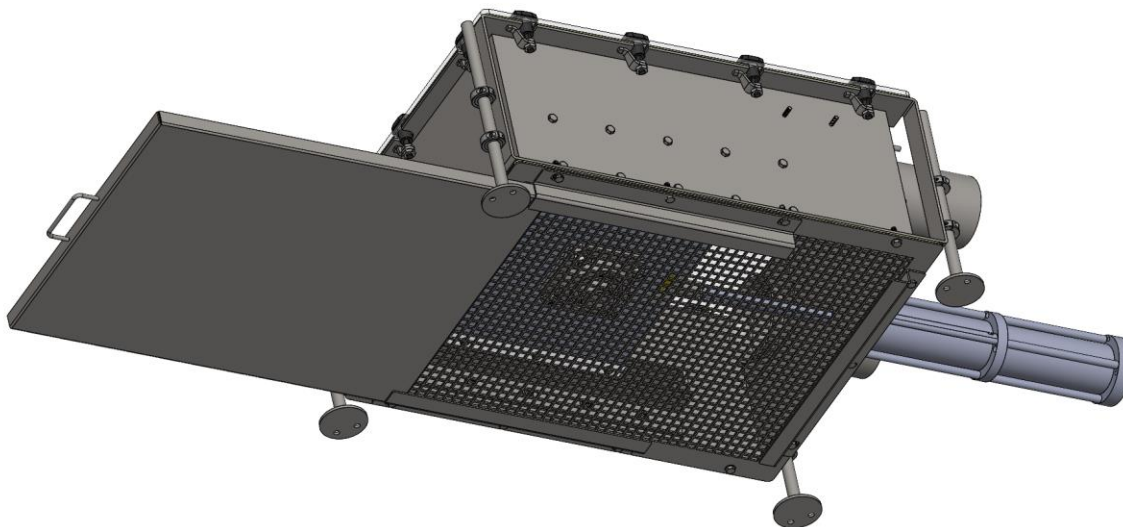


Toolless entry T-Handle Latches





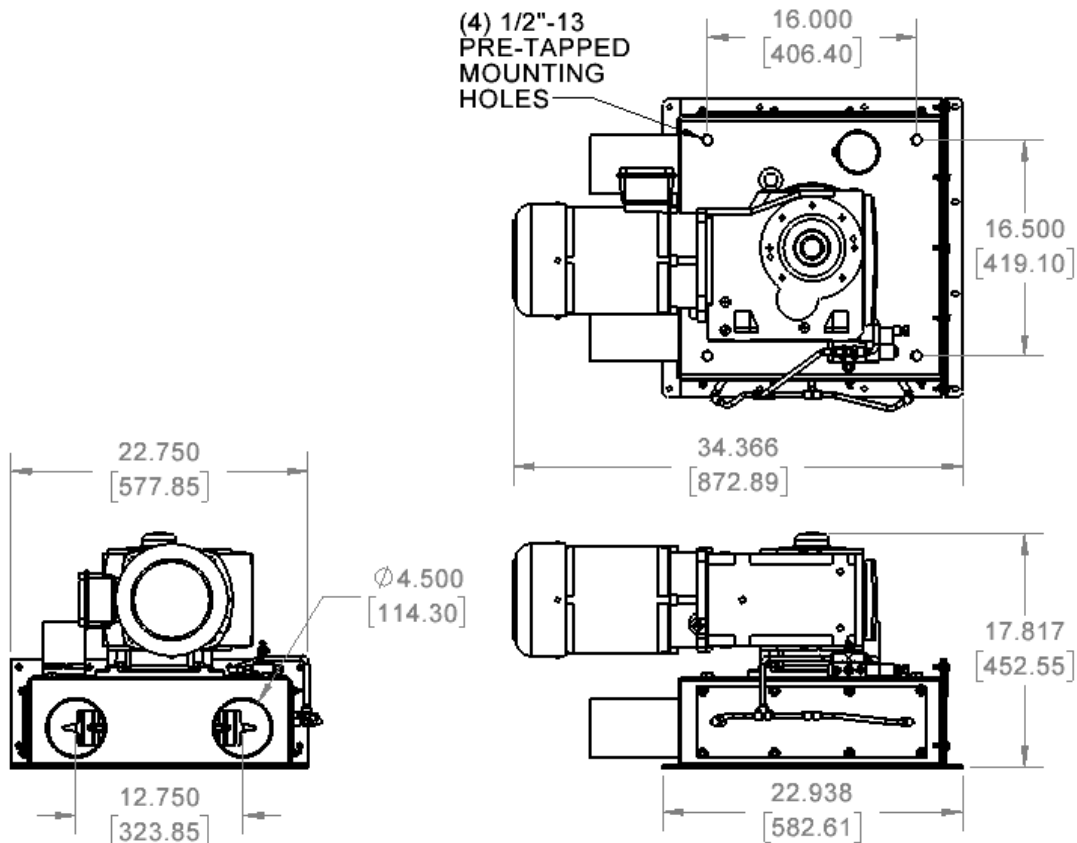
A tray bottom is also an option for the turnaround. It will catch any excess product that falls into the bottom of the turnaround. When needed, the tray can easily be slid out (can be configured to slide out the side or back of turnaround) and all of the excess product can be vacuumed or cleaned out of the bottom of the turnaround.





180° Drive Unit:

Used in conjunction with the 180° turnaround unit, the 180° drive unit is the mechanism that pulls the chain through the system. The chain is pulled through the drive unit by a sprocket which is powered by an electric gearmotor. The drive unit may be run in either direction, and the chain can enter or exit through either of the two ports. The drive unit is installed at the end of the circuit system. Typically, the drive unit is used as the final or single discharge point.



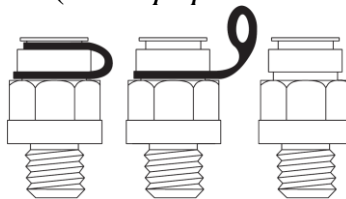
The drive unit is to be ceiling suspended or base mounted. The unit may be oriented horizontally or vertically. For ceiling suspension, (4) 1/2"-13 thru holes are located at the top of the drive unit. These mounting holes may be used for running through threaded rod or placing eye-bolts.

*the unit weighs app. 350 lbs (158 kg) for a 10 HP or less drive and 600 lbs (272 kg) for a 15 HP drive

Note:

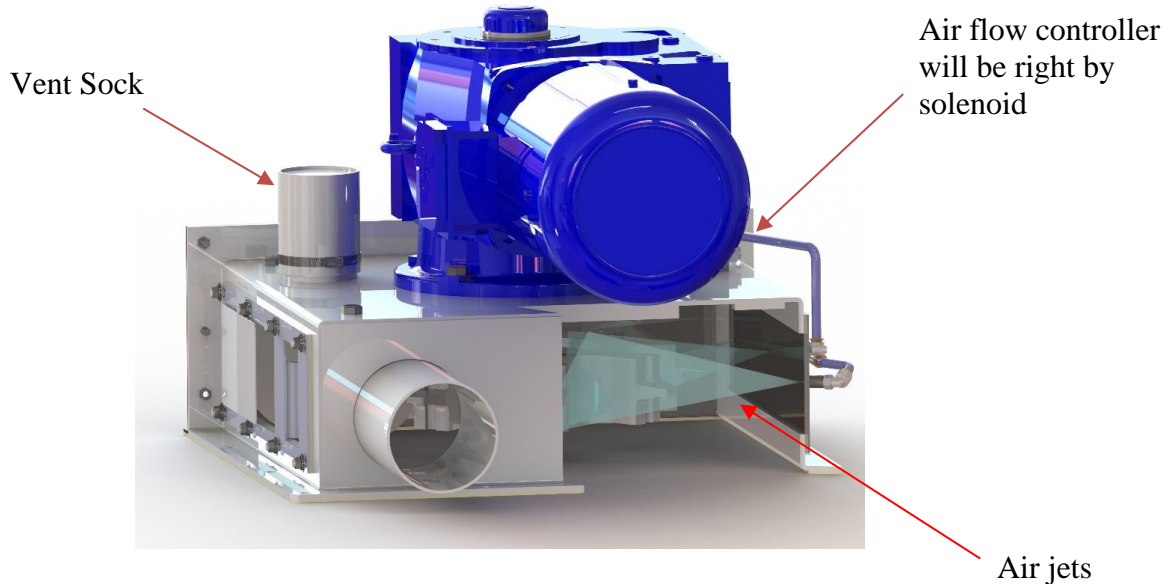


The Drive unit is shipped with a breather plug already mounted on the gearmotor. Once the unit is installed, the black rubber seal located on the breather **MUST BE REMOVED**. In addition, the oil level should be checked. (see *Equipment Lubrication* pg. 16)





When the drive is used as a discharge point, the unit may be equipped with adjustable air jets. The air jets aid the discharge of product and keep the chain/discs clean of any residue. The air jets are adjusted by using the air flow controller to reduce and increase air flow to the jets. To allow for air pressure relief, all units are supplied with a vent port and polyester vent sock. In applications where the breather vent is not desired, MPE can supply a rubber cap for the port.



Note:

- For best results, a filter separator should be used on all compressed air supplies.
- The drive unit air knives should only come on when the system is running.
- Each air jet assembly uses a total of 5-10 SCFM of air at 80-100 PSI [5.5-6.9 Bar].

Manual Motor Rotation:

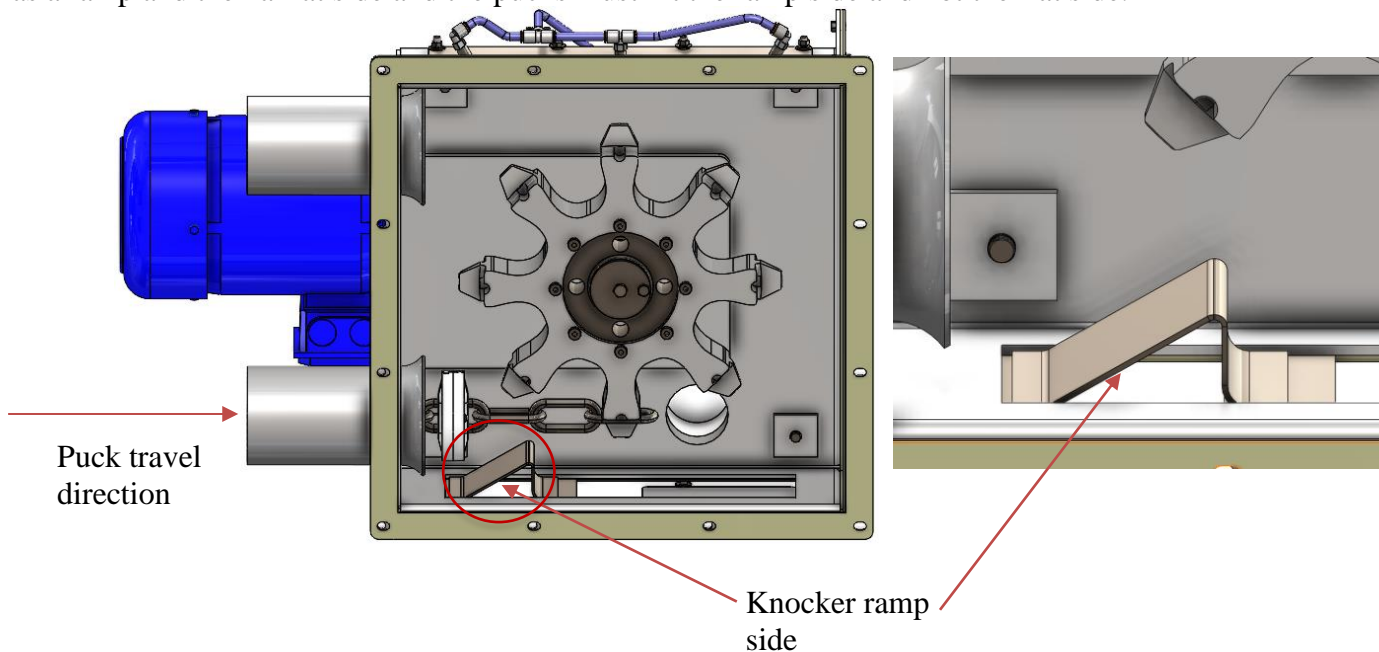


A notable feature of the drive unit gearmotor is that it can be used to manually rotate the drive sprocket. This is often helpful during chain installation and other maintenance events. To manually rotate the drive sprocket, simply remove the motor fan cover and slowly turn the fan in the desired direction. Note that before removing any guards that the machine should be powered off and secured against unintended activation.

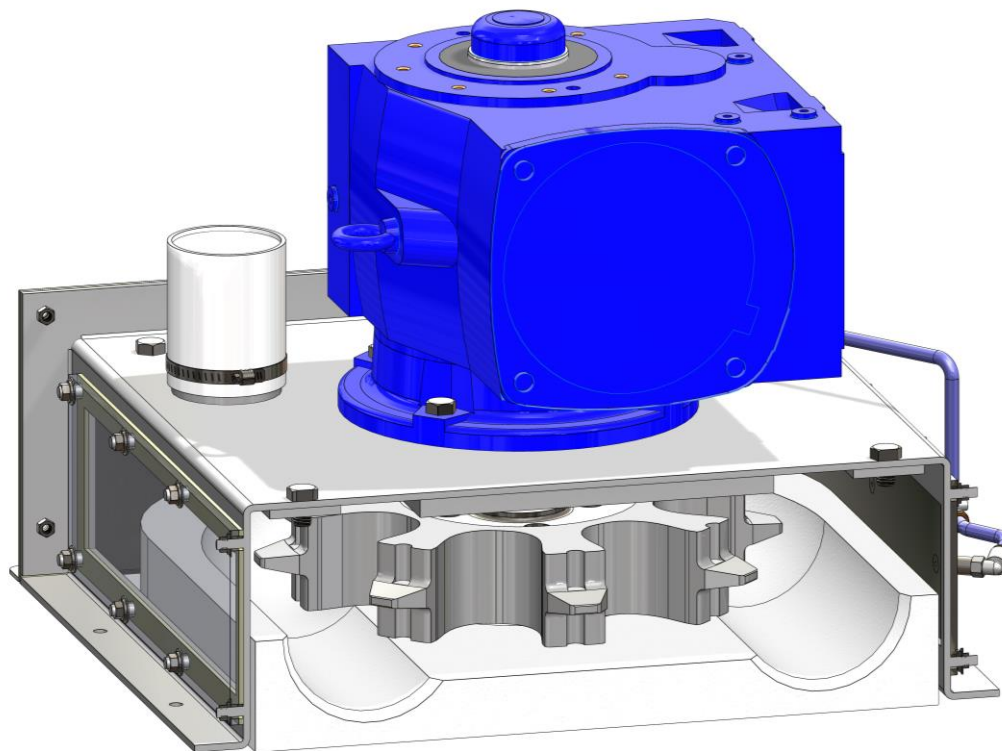


Drive Unit Options

If a knocker is included as an option on the drive unit, it'll be preinstalled when it gets to its destination. It is important to note that the drive unit knocker is unidirectional and must be installed on the product side of the system. When installed, the system can NOT be ran in reverse or damage to the pucks will occur. The knocker has a ramp and then a flat side and the pucks must hit the ramp side and not the flat side.



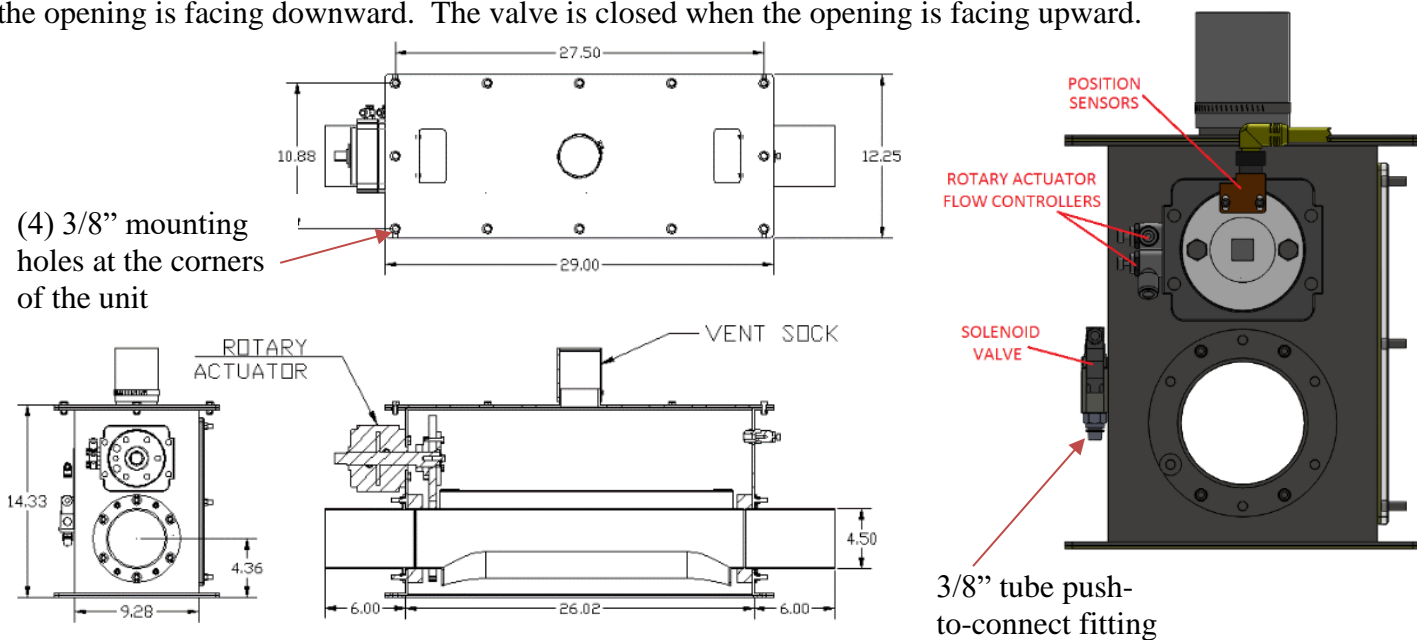
The drive unit may also be configured to have a U-Track in it also. Similar to the turnaround unit's U-Track, it will recirculate any product in it back through the system. If there is a U-Track in the drive unit, it cannot be used as a discharge point.





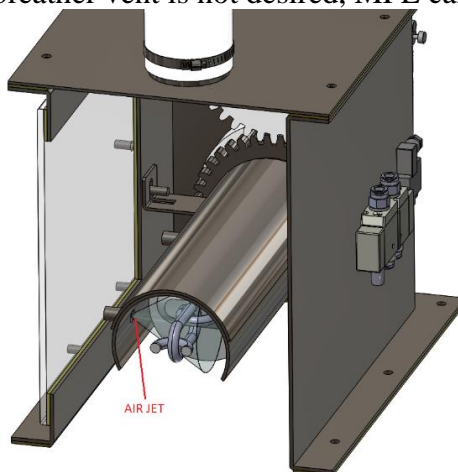
Rotary Discharge Unit:

Discharge units are placed in the conveyor system at any location of desired product discharge. Multiple discharge units may be placed in a system when multiple discharge points are required. The rotary discharge valve has a pneumatic rotated inner pipe which has an opening on one half. The valve discharges product when the opening is facing downward. The valve is closed when the opening is facing upward.



The rotary-pipe discharge unit is to be individually ceiling suspended or base mounted. If ceiling suspended, a 5/16" threaded rod will be used at the four corners of the unit. Using these holes allows the lid to be taken off if needed since the lid holes at the four corners are slotted for maintenance. *unit weighs app. 96 lbs (43.5 kg)

To aid in the discharge of product and to keep the chain/discs clean of any residue, each discharge unit is equipped with adjustable air jets. The air jets are adjusted by using the air flow controller to reduce and increase air flow to the jets. To allow for air pressure relief, all units are supplied with a vent port and polyester vent sock. In applications where the breather vent is not desired, MPE can supply a rubber cap for the port.



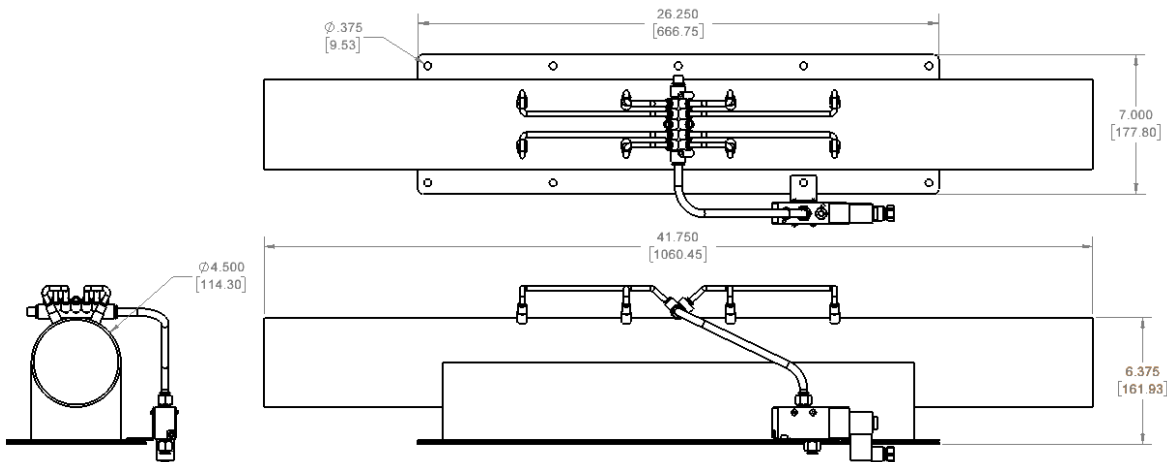
Note:

- The air jets of each Discharge Valve use an approximate total of 5-10 SCFM of air at 80-100 PSI [5.5-6.9 Bar]
- Air pressure to the rotary actuator should not exceed 120 PSI [8.3 Bar].
- The air knives should only be on when the Discharge Valve is open and product is dropping out of it

- Air flow controllers are used to control the speed of the door actuation by controlling the air flow into and out of the rotary actuator. Adjust the air flow so that the door does not slam closed, or swing open too quickly.
- The rotary actuator uses app. 6.5 in³ [.10 liters] of air at 87 PSI [6 bars] to cycle one time (open & close).
- For best results, a filter separator should be used on all compressed air supplies.

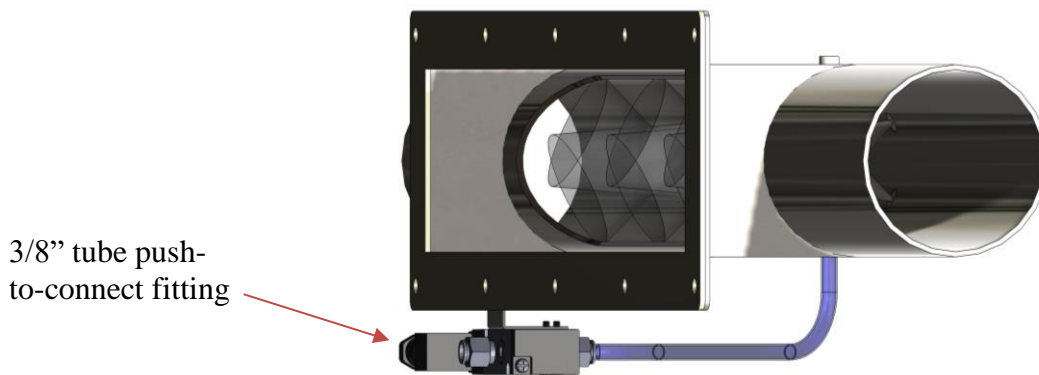
Passive Discharge Unit:

Similar to the Rotary Discharge Unit, the Passive Discharge Unit can be used as an outlet point for a Chain-Vey system. The passive discharge unit can't be opened or closed so any product that goes through this unit will be discharge out of it. This unit can be used as a final discharging point for the system or in systems where headheight is a factor.



The rotary-pipe discharge unit is to be individually ceiling suspended or base mounted. If ceiling suspended, a 5/16" threaded rod will be used at the four corner holes of the unit. *unit weighs app. 58 lbs (26.3 kg)

As with the Rotary Discharge Unit, this Passive Discharge Unit uses similar air jets to knock off any product or residue that is on the pucks. Depending on product, the air jets may need to be adjusted but as long as the system is on, so should the air jets.



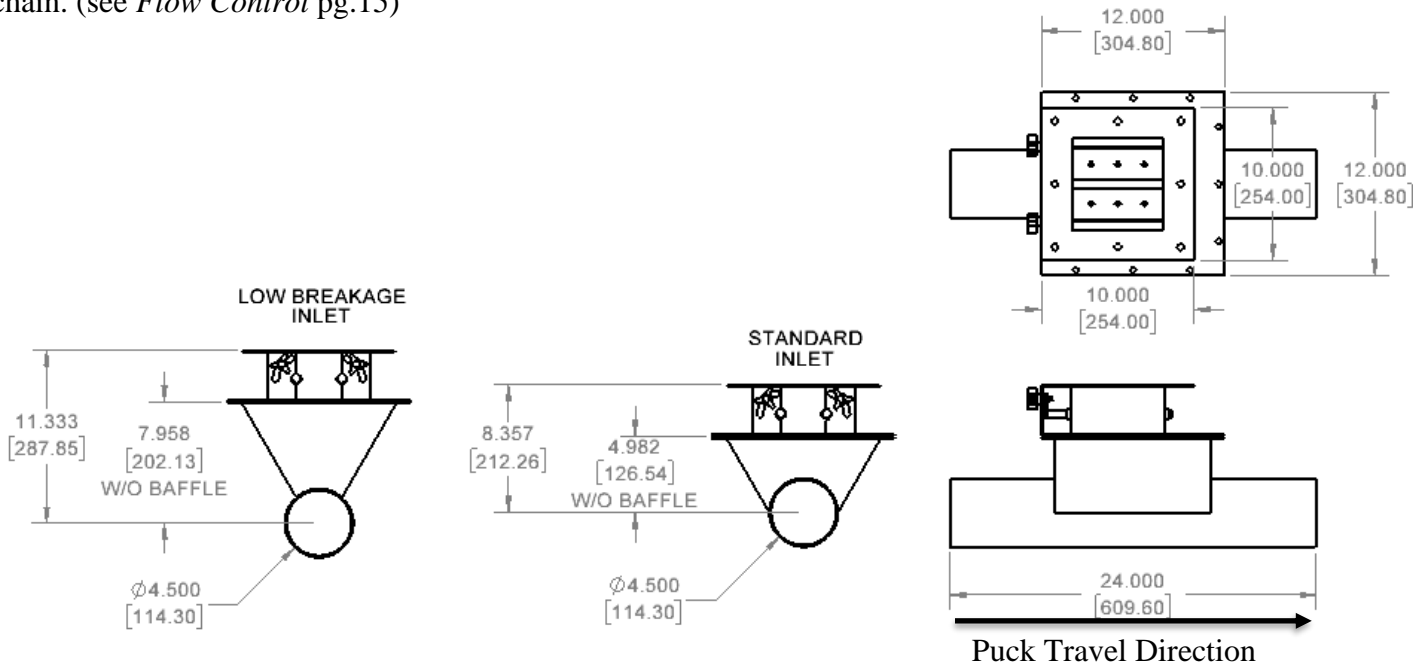
Note:

- The air jets of each Passive Discharge Valve use an approximate total of 5-10 SCFM of air at 80-100 PSI [5.5-6.9 Bar]
- Air pressure to the rotary actuator should not exceed 120 PSI [8.3 Bar].
- For best results, a filter separator should be used on all compressed air supplies.



Inlets:

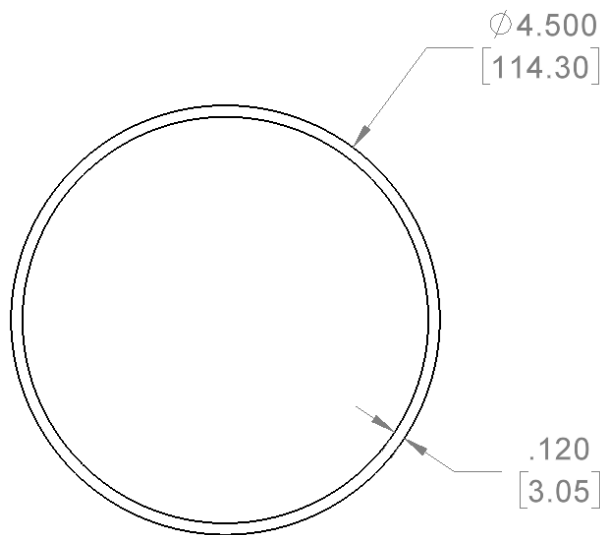
Inlets are the entry point of product into the conveying system. Systems using the 180° drive and turnaround units should normally be configured having a “product side” and a “clean side”. If an inlet is needed on both sides of the system, MPE should be contacted first before continuing. For head loaded applications, such as under a storage hopper without a metering device, a flow control baffle can be used. This device is used to set the product fill level and prevent product shear reducing product breakage and minimizing excessive pull on the chain. (see *Flow Control* pg.15)



Conveyor Piping:

Piping:

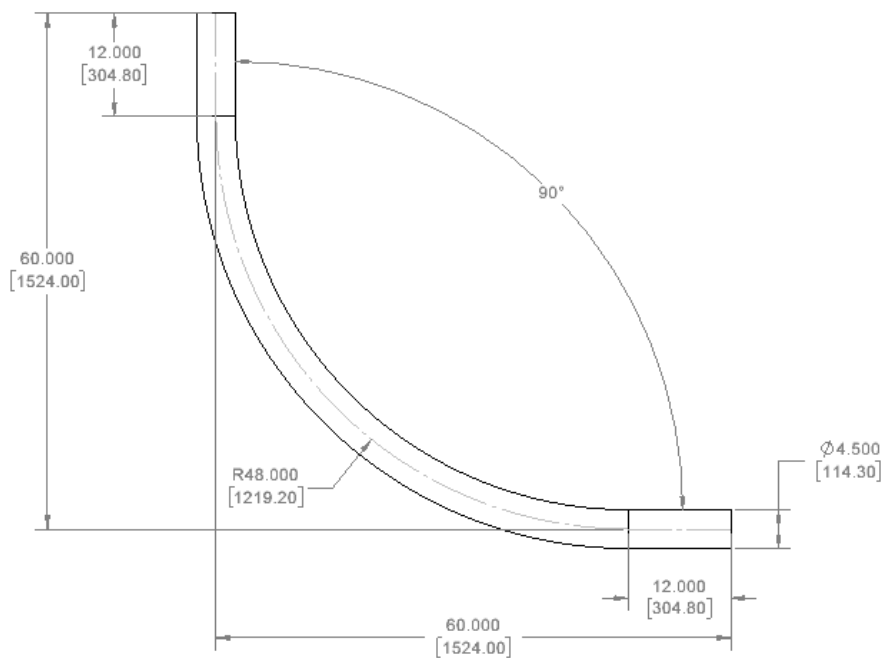
Chain-Vey conveying pipe is seamless 4"sch10 stainless steel pipe. The pipe OD is 4.5” [11.43cm] with a wall thickness of 0.12” [0.31cm]. The weight of the pipe is approximately 5.60 lbs/ft [8.33 kg/m]





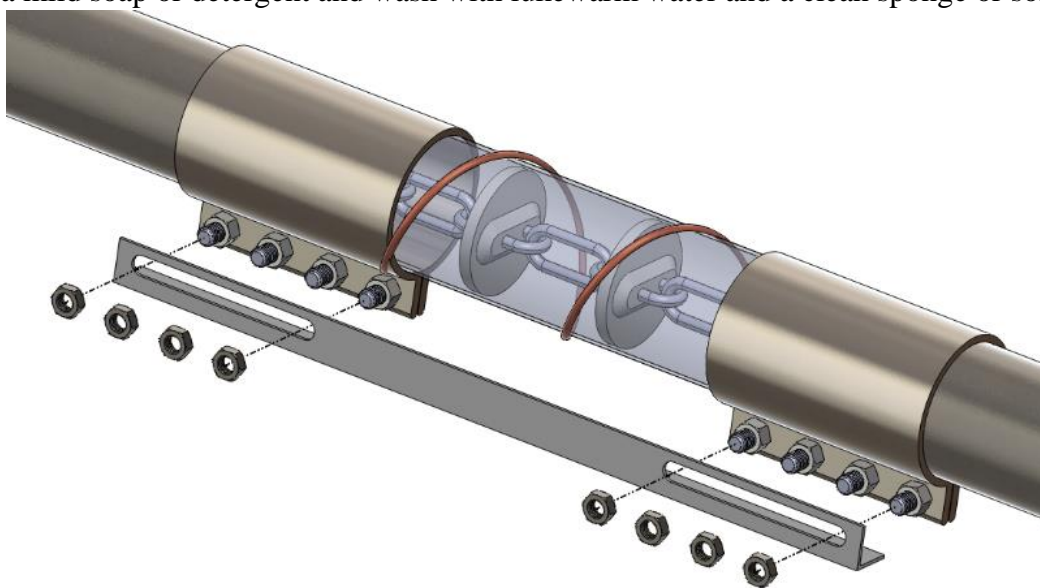
Elbows:

Conveying elbows are used for gradual transitions in the direction of chain travel. The elbows are bent seamless 4"sch10 stainless steel pipe. The pipe O.D. is 4.5" [11.43cm] with a wall thickness of 0.12" [0.31cm]. The pipe is bent uniformly to keep the pipe I.D. concentric, and avoid any ovality. The standard pipe elbow is 90° with a centerline radius of 48" [121.92cm]. Elbows are also available with bends between 5°-90° and a centerline radius of 36"-72" [91.44-182.88cm]. The weight of the standard elbow is approximately 44 lbs [19.9 kg].



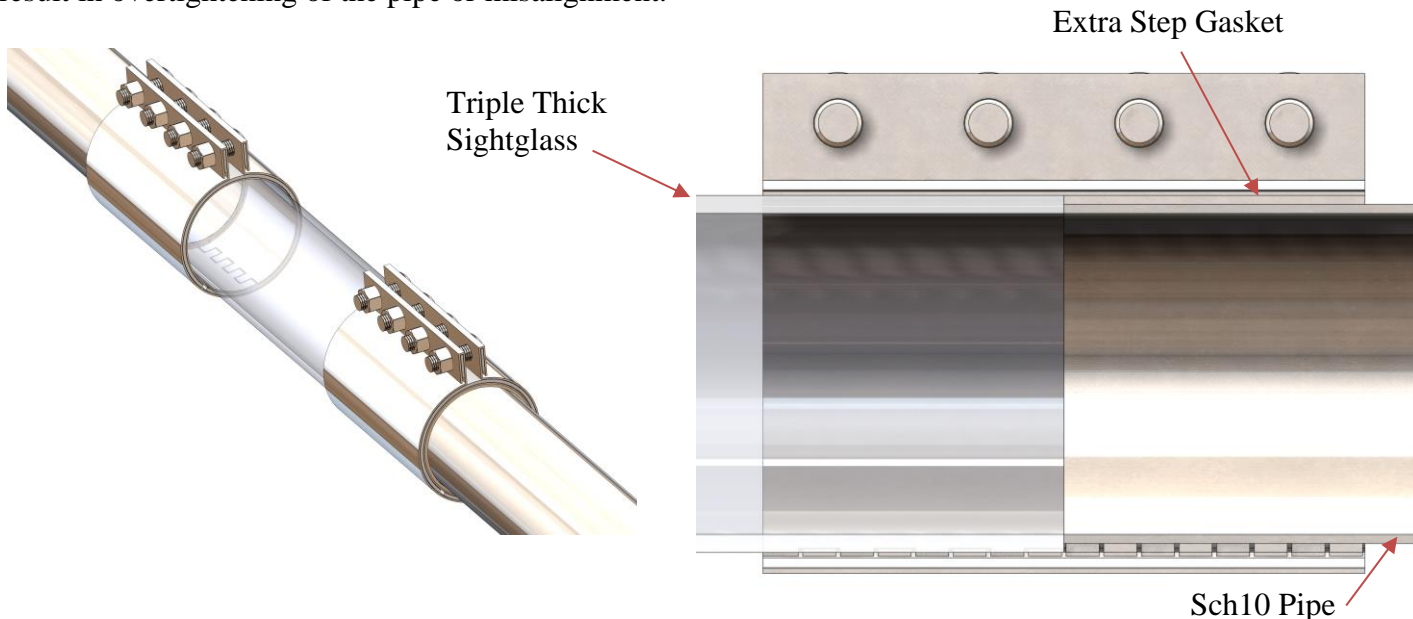
Sightglass Options:

The sightglass has the same dimensions as the stainless steel conveying piping, and is installed to enable viewing the product as it is being conveyed, as well as permit inspection of the chain and discs. The sightglass is made from durable polycarbonate but can be scratched or dented if not handled properly. When cleaning the sightglass, use a mild soap or detergent and wash with lukewarm water and a clean sponge or soft cloth.





A triple thick sightglass may be provided with the system when conveying abrasive material. The interior dimension of these sightglasses is the same as the stainless steel pipe, but the material wall is three times as thick as the Sch10 piping wall. When this type of sightglass is provided, special couplings will be sent with the system also. Due to the sightglass having an outer dimension that is larger than the stainless steel pipe, the special couplings will have an extra half gasket inside them to step down to the Sch10 pipe. These couplings can only be used for the triple thick sightglass and using them when connecting metal pipe to other pipe will result in overtightening of the pipe or misalignment.



Another sightglass option for extremely abrasive material is a partially metal backed sightglass. This sightglass is a split design so it still offers the ability to see into the system for inspection but will hold up to material constantly rubbing against it. Due to having a sightglass sleeve over a metal tube, these sightglasses also have a step gasket that will allow this sightglass type to connect to the Sch10 pipe.





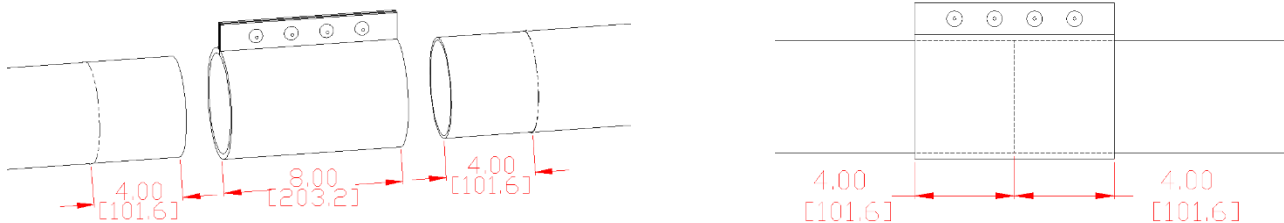
To avoid buildup of static electricity at the sightglass, it is important to ground the piping. Wrap the supplied copper grounding wire around a sightglass to create a “bridge” reaching from the bolts of the compression couplings at each end of the sightglass. Approximately 3ft [1m] of wire is needed to accommodate a standard 20” [51cm] long sightglass. In some cases, the weight of the surrounding conveying pipe may cause the sightglass to bend or bow. To avoid this, the supplied structural support bar should also be installed as shown above.

Installation:

Before installing any pipe section, elbow, sightglass, etc... first assure that all cuts are square, and that both pipe ends are free of dents, sharp edges, or burrs.

The tube ends are to be joined together with 4-bolt (8” [20.32cm] long) compression couplings. The pipe connection point should be centered within the coupling, with equal lengths grasping each pipe section. For best results, each pipe end should be marked at 4 inches (half of coupling length) from its end. When tightening the coupling, assure that the pipe ends are held together squarely, and that the ends do not separate when tightened.

Note: For better likelihood of keeping the pipe ends square and together, first partially tighten all bolts and then go back and apply a final torque, always tightening the outer bolts first, then inner bolts.



* Shorter 3-bolt (6” [152.4] long) and 2-bolt (4” [101.6] long) compression couplings may be used if space is limited, but the 4-bolt compression coupling is recommended for ideal support and straighter connections.

Chain/Disc:

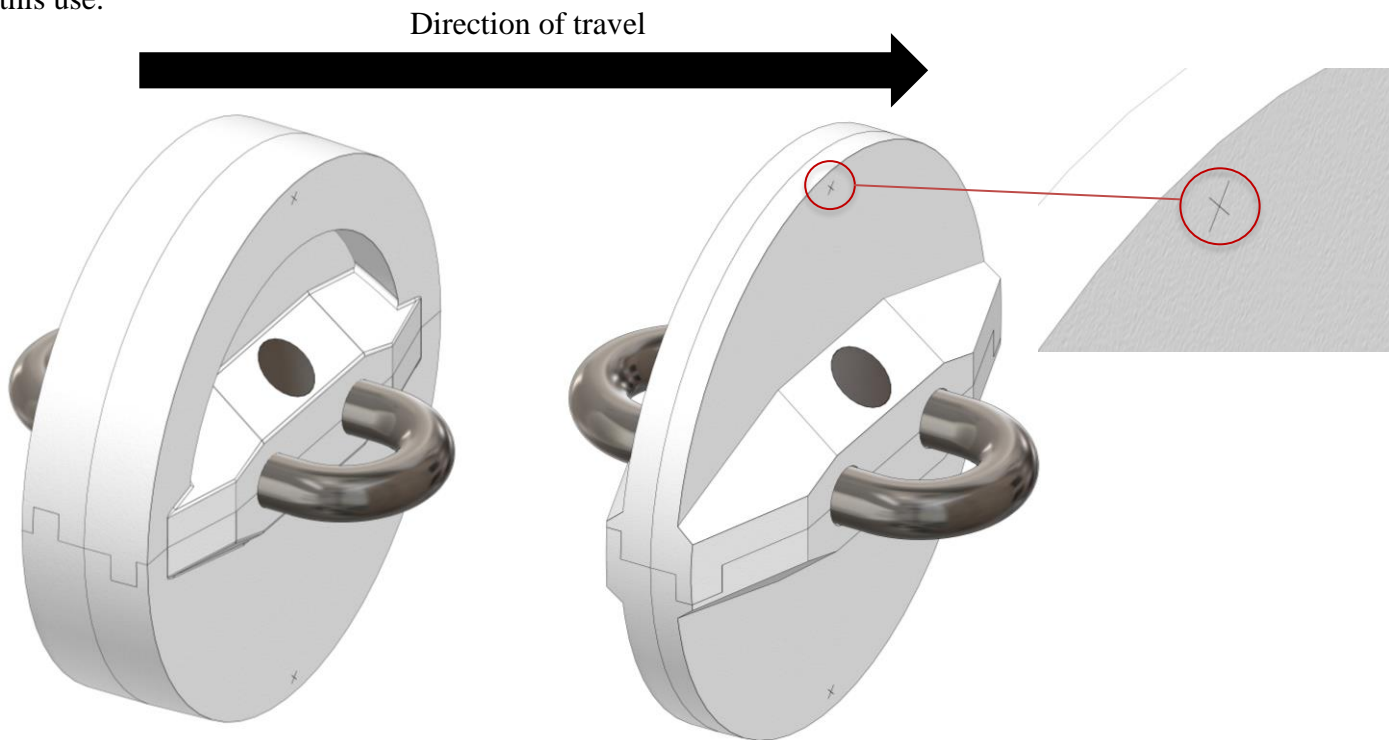
Chain-Vey chain is custom made and is rated for a minimum breaking load of 9,000 lbs [4,082 kg]. Conveying discs are compression molded from FDA compliant, ultra-low friction UHMW. The weight of the chain and molded discs is approximately 1.91 lbs/ft [2.84 kg/m].

Installation:

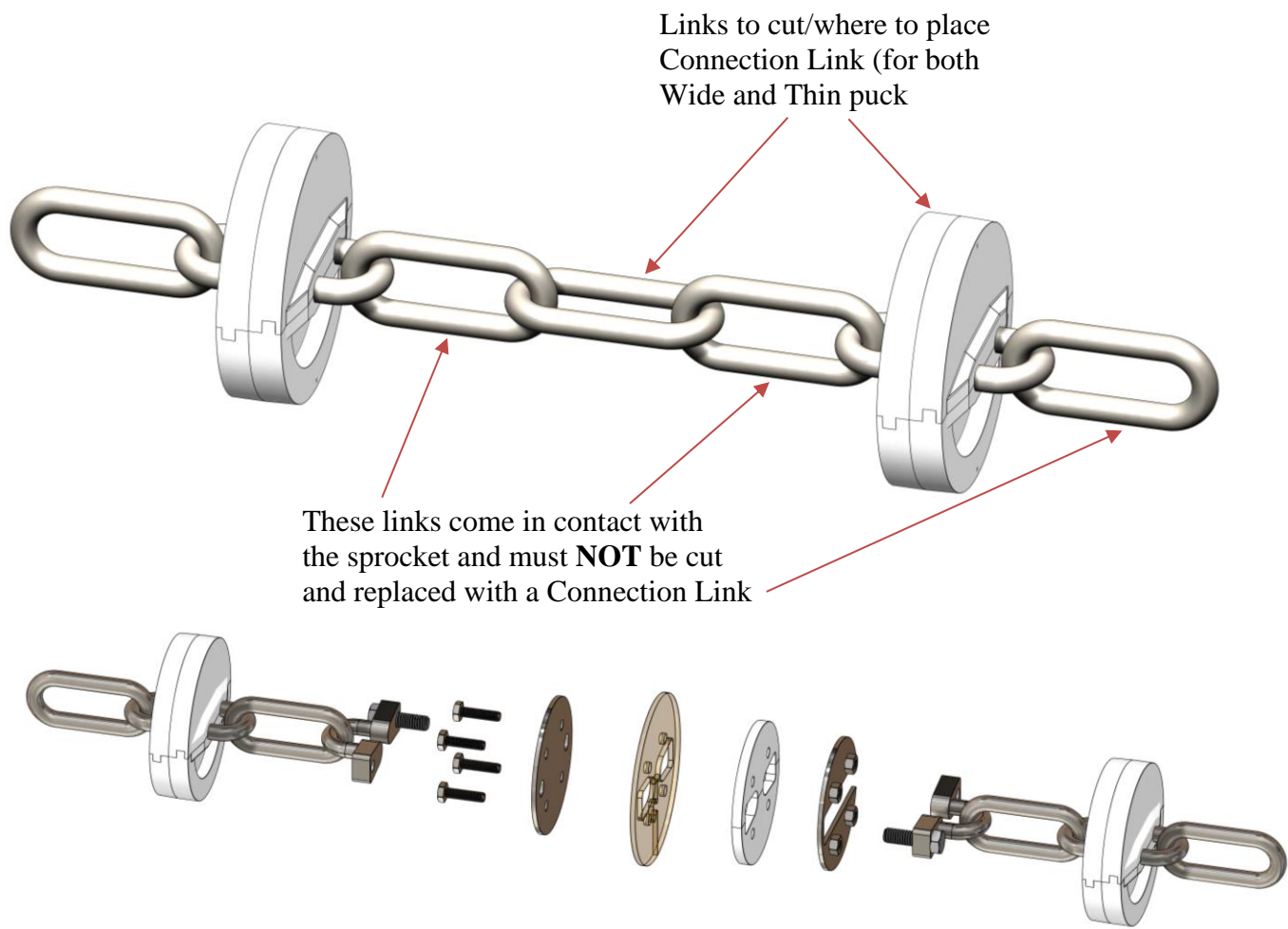
After the tubing circuit is installed, use a cable-puller or wire snake, equipped with a steel cable to route through the conveying pipe. Connect the chain to the cable and pull or winch the chain through the tube. If rope is used to pull the chain, braided rope should be used instead of laid (twisted) rope. It is very important to avoid twists in the chain. One method to ensure the chain is not twisted is to mark a point, for example the “top” of each disc with a marker. When the chain is fed into the system, be sure to always feed the discs with the mark oriented in the same direction. Such as the “top” always up.



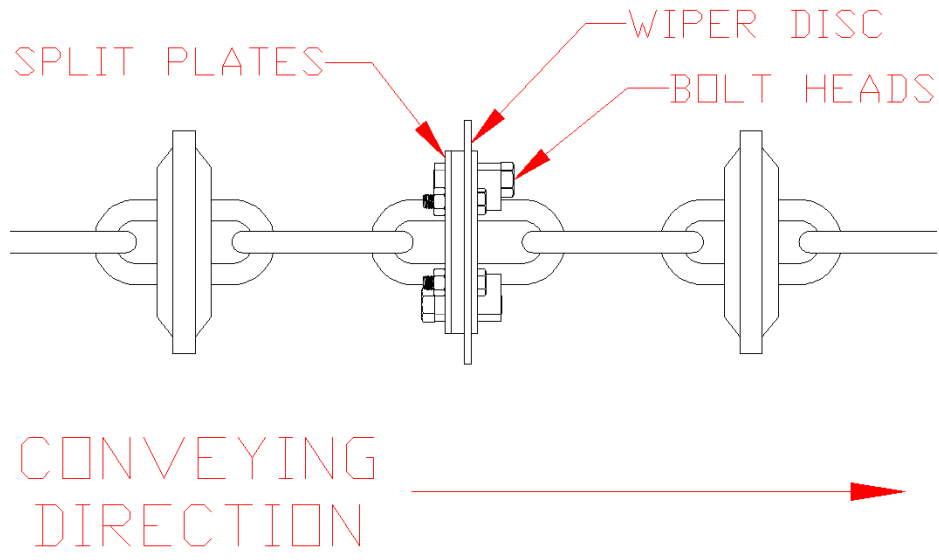
All of the pucks (wide or thin) have a preferred direction of travel which is important to know. The front facing part of the pucks have a small “X” notched into them to denote which way they should be facing. Along with that, the pucks have a small chamfer on the top edge of the puck to help reduce friction throughout the system and reduce motor load as a result. The pucks can be run in reverse if need be but the motor load may higher or some noise might be created. If bi-direction travel is needed, the wide pucks seen below will be more beneficial for this use.



Once the chain is pulled through the system, cut off any excess chain links with a grinder/cutting wheel or large bolt cutter. When cutting the chain, always error on the conservative side by leaving a few more links than will probably be needed. Be sure that the connector link is spaced between two empty links so it is spaced where a puck should be located. The chain ends can then be connected using the provided chain connector.



The chain connector link joins the two ends of the chain together to complete the loop. The clean-out disc is a 1/8" [.32cm] thick FDA compliant polyurethane disc used for wiping the inside walls of the conveyor piping. An FDA magnathane metal detectable wiper disk is also available if needed. Because the OD of the clean-out disc is larger than the ID of the piping, it is able to collect any product that is left behind by the conveyor discs.



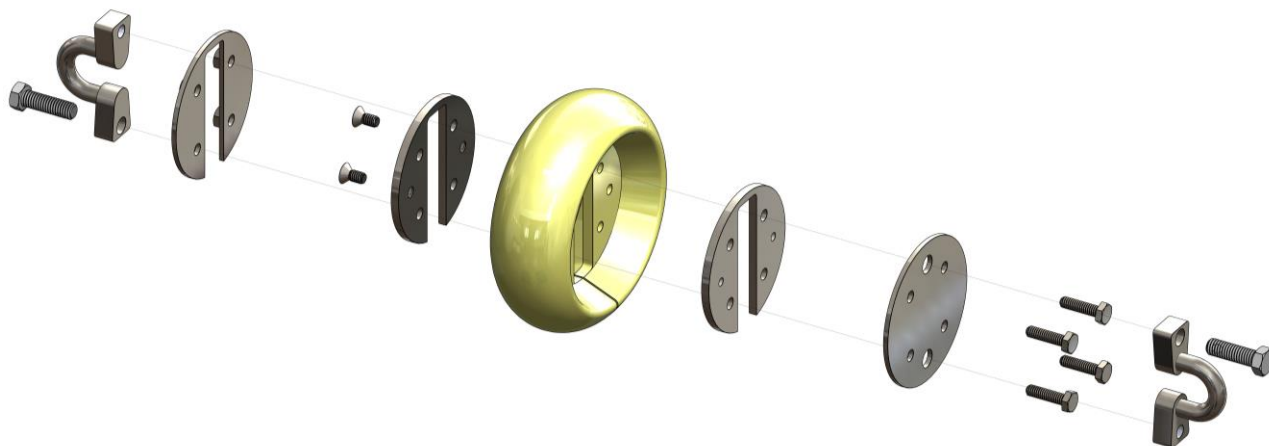


*Installation of the connector link in accordance with the direction of travel is important for reducing the wear on the cleanout disc.

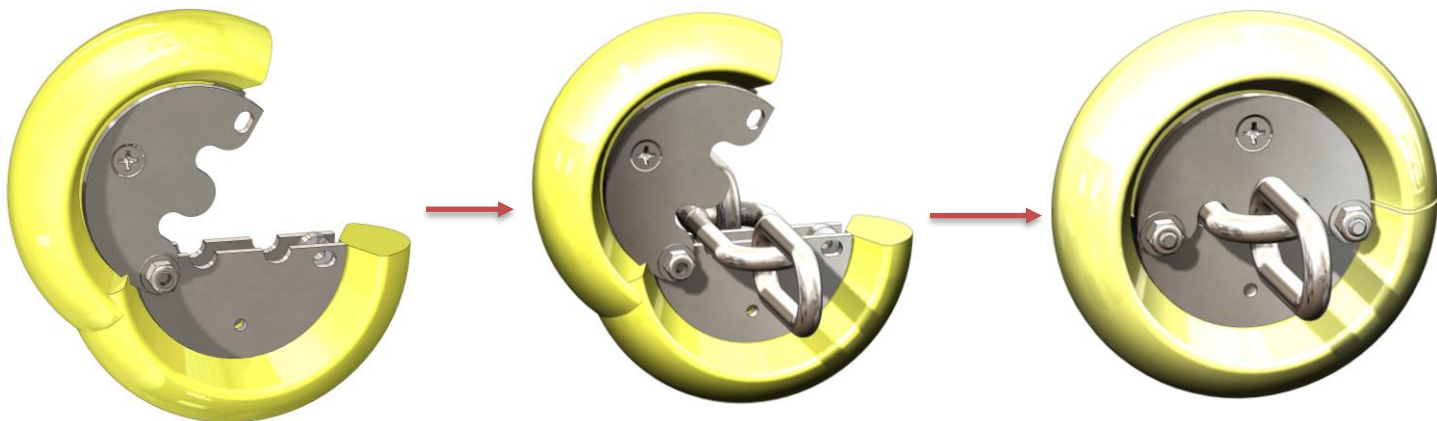
*It is very important to avoid stripping the threads of the connector link. Stainless steel bolts (provided with the stainless steel connector assembly) are recommended to be installed with a stainless anti-seize lubricant and should be torqued to 268 in-lb [30 N-m]. Zinc plated bolts (provided with the carbon steel connector assembly) should be torqued to 444 in-lb [50 N-m]

The sponge connector link is an option available for the system. It can be inserted into the system in order to clean the side walls and wipe any excess material off the tube. To maximize effectiveness, douse the sponge in alcohol or any acceptable cleaning solution and run it through the pipes for a few cycles in order to completely clean out and sanitize the tubes. Both sponge links should never be in the system when product is being run through the system.

The first sponge option utilizes the connection link by replacing some of the components with sponge components. The sponge itself is installed in between two sponge compression plates in order to keep it secure while it wipes off the interior walls of the pipes.

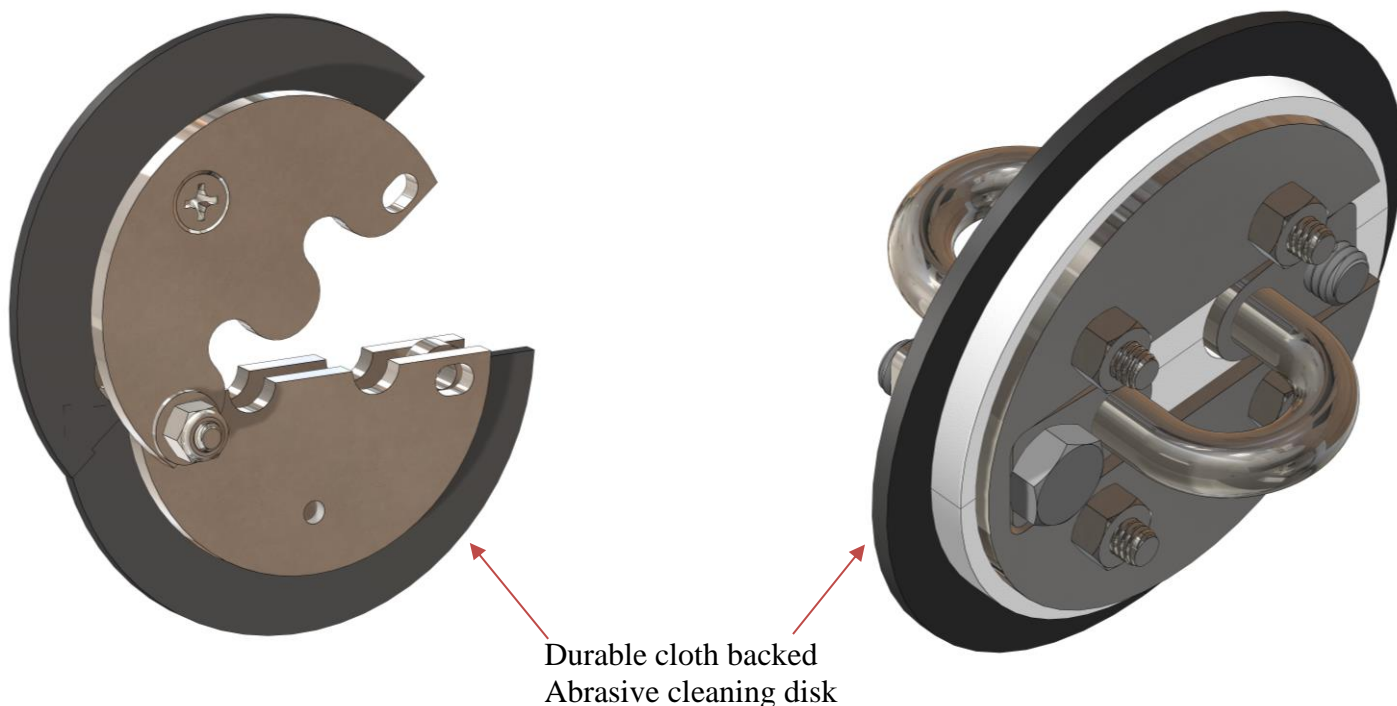


The second sponge option is independent of the connection link and can be placed on one of the standard open chain links in the system. This open link must be one link away from a puck and **NOT** one that comes in contact with the sprocket. Reference the page above for which link this is. This clamshell sponge link can easily be taken in and out of the system without the need to removed components of the connection link. It opens and closes on a hinge for easy insertion and removal from the system. The sponge is easily removable to clean it off post run in the system or to insert a new one into the link.



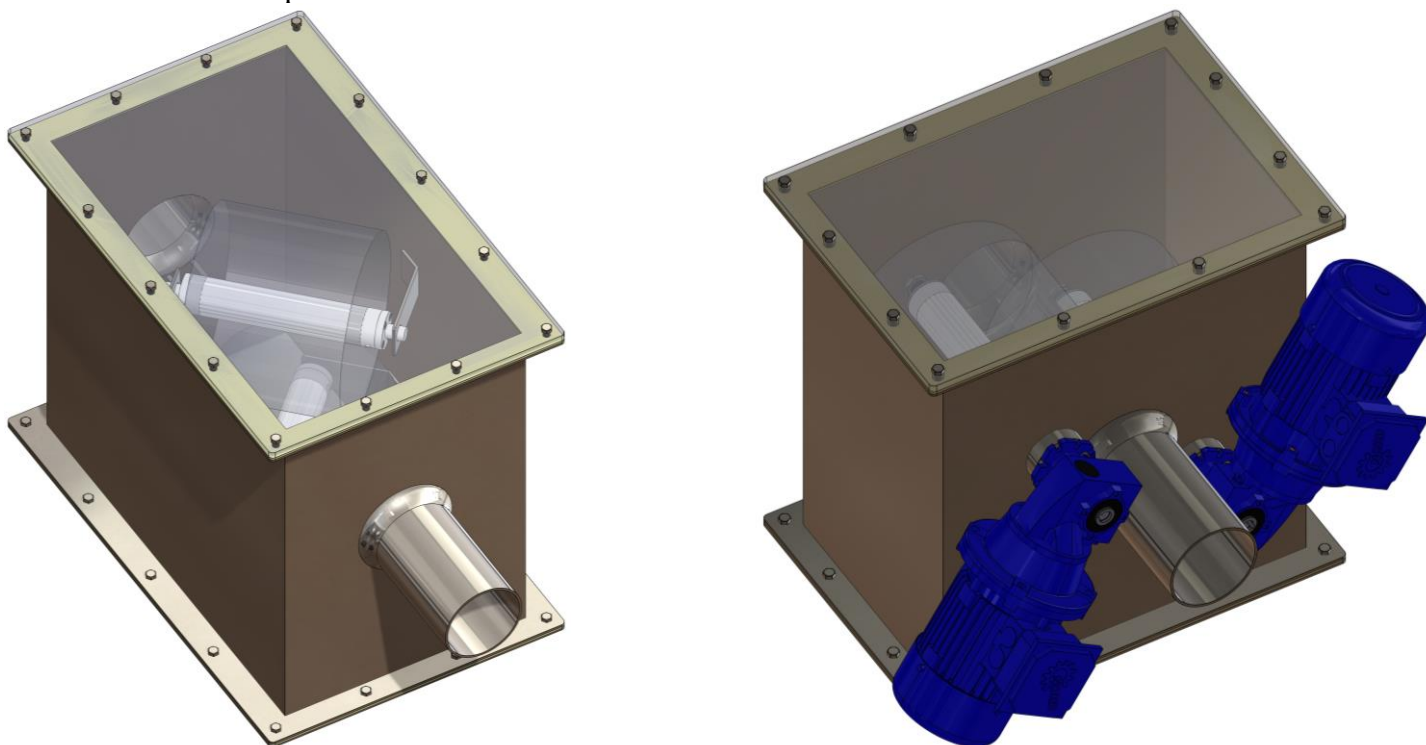


An abrasive cleanout disk is available as an option and can be used in applications where abrasive material is ran through the system or where product is building up on the side walls of the pipe. This abrasive disk is available in both clamshell form and connection link form.



Brush Box Options:

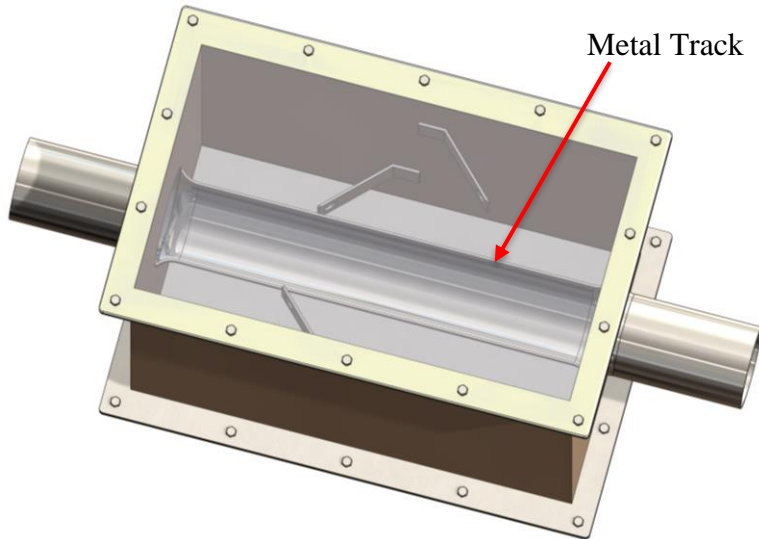
A brush box can be added to the system on the return non-product side of the conveyor. The brush box will actively clean off the pucks by using rigid brushes to scrape off any residue that is left on the pucks. These brushes have FDA approved nylon bristles that are tightly wound and secured to a UHMW rod. The brush box can either be had in a passive form or in motorized active form.



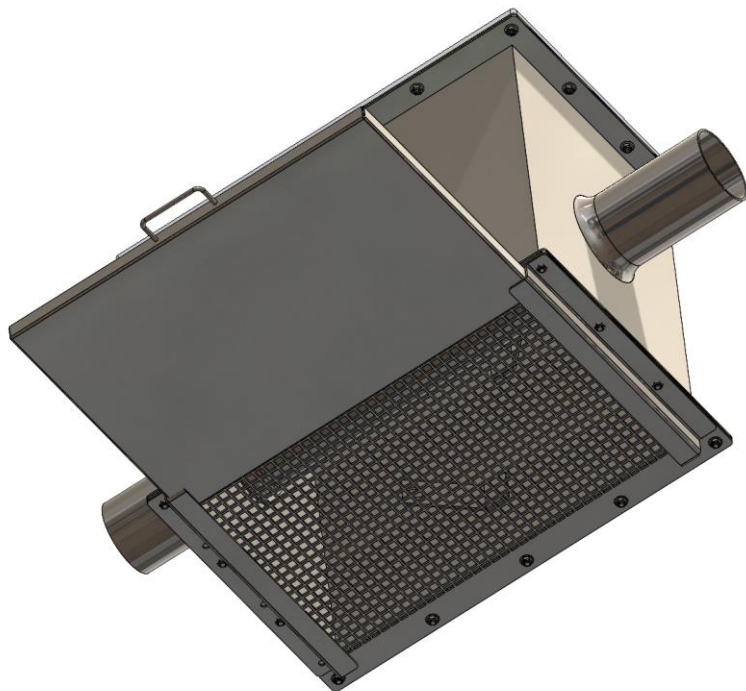


Brush Box Options

A metal track can be had in either the passive brush box or the active one. This track will be put in the box when the brushes aren't in the system and will let any residual product going through the return side to be recirculated back through the system if a U-Track is in the turnaround unit or for the product to drop into the turnaround unit if there is no U-Track. This track just sits in the brush box so it can easily be switched out for the brushes when a cleaning cycle is needed.



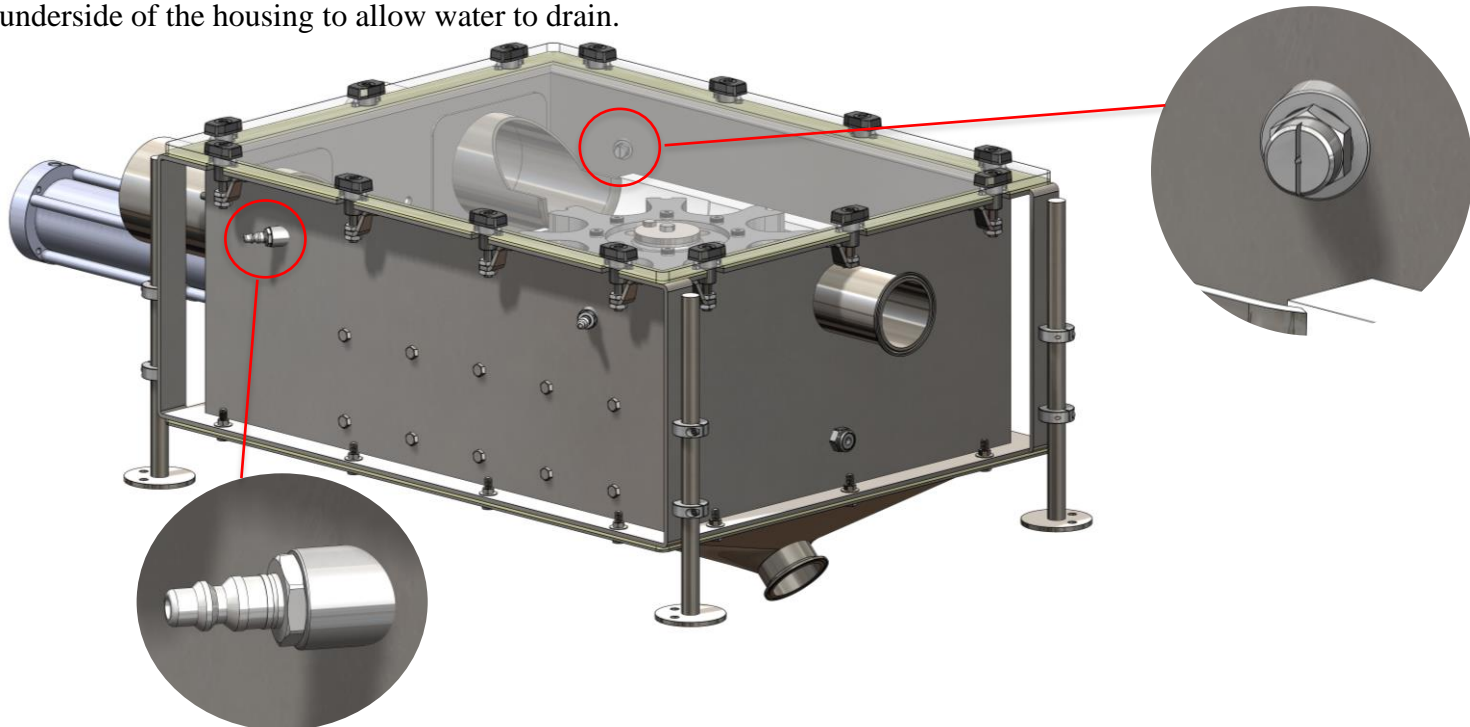
A tray bottom can also be had on either the passive or the active brush box. This tray bottom performs exactly like the turnaround unit's tray bottom and will collect any material that falls into the tray. Once enough product is in the tray, it can be slid out and vacuumed or cleaned out completely.





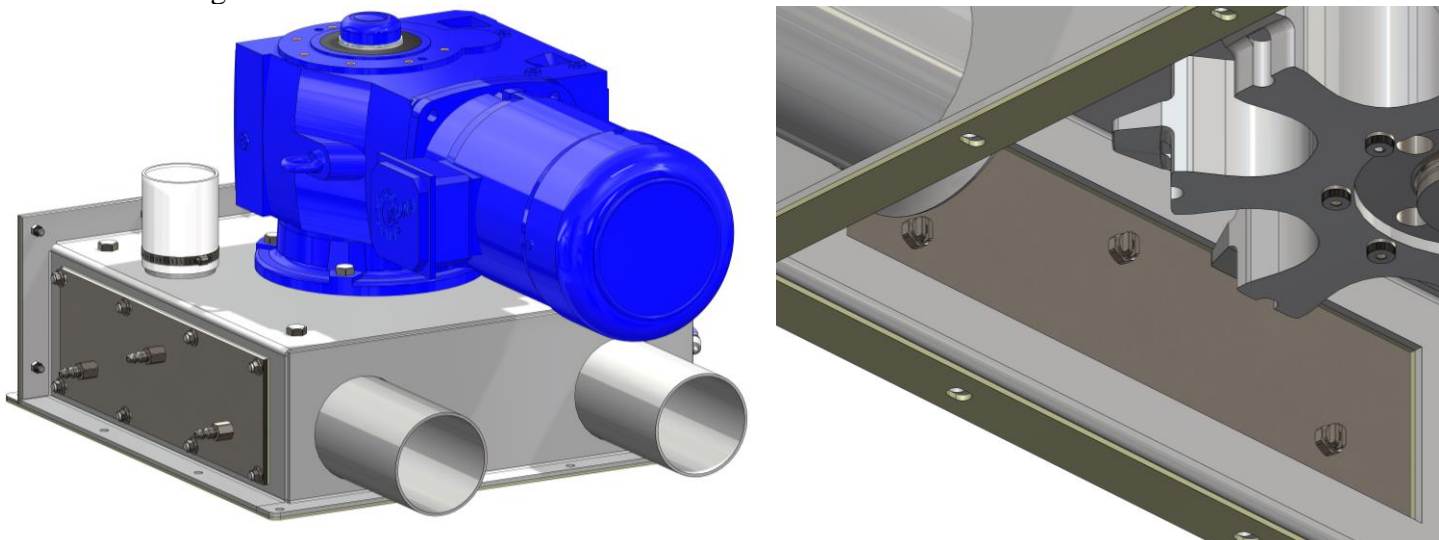
Hybrid Units:

The Hybrid Turnaround unit includes four 1/4" NPT nozzles on the side of the housing with high pressure spray nozzles on the inside of the turnaround and 1/4" quick disconnect fittings on the outside of the turnaround. These nozzles will be used to spray down the pucks as they go by in order to clean them off. A 3" sanitary tube fitting dry air inlet will be installed on the back of the housing. Forced air can be pushed in through that inlet in order to dry the system as it runs. Finally, a drain with a 2-1/2" sanitary tri-clamp tube fitting is mounted on the underside of the housing to allow water to drain.



Foaming units can also be attached to the Hybrid Turnaround unit and can force cleaning foam through the nozzles or from the rear port of the system.

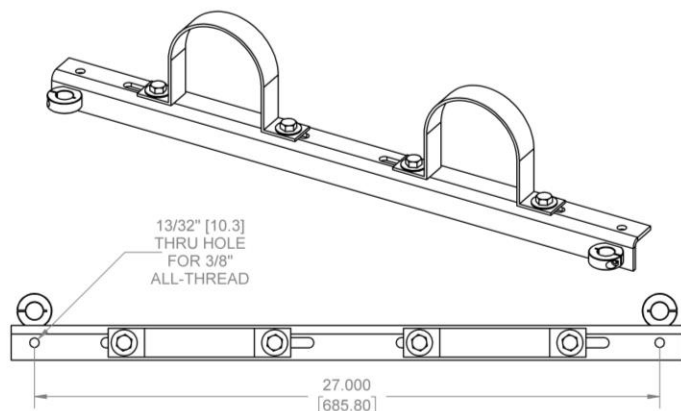
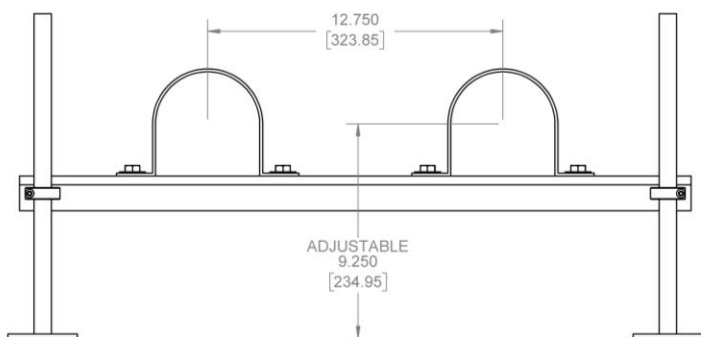
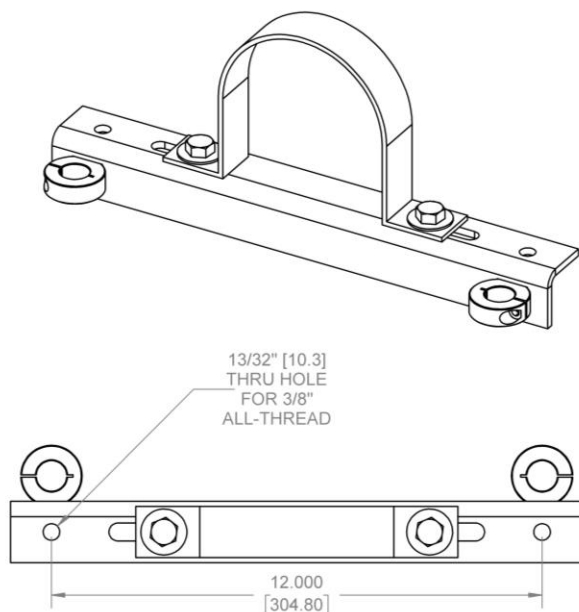
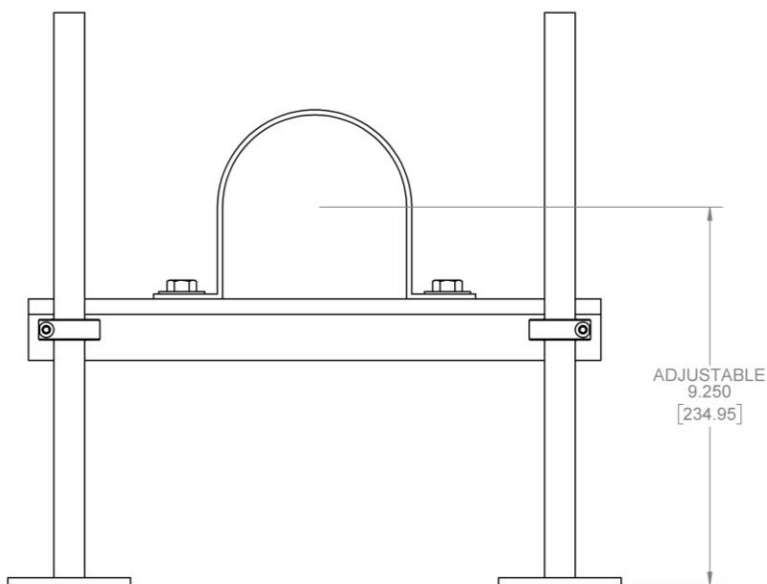
The 180° Drive Unit can be had in hybrid form too. On the return side of the drive unit, there are air nozzles like on the standard drive unit but on the product side, there are now three water spray nozzles with 1/4" quick disconnect fittings on the outside.





Ceiling / Floor Supports:

Ceiling and floor supports are used to support the conveyor pipe and keep them at the set center-to-center distance of 12.75" [32.39cm]. The floor support stand is designed to utilize leveling mounts that allow for vertical adjustment of horizontal piping. The ceiling support is designed to allow for suspension from the ceiling using 3/8" [10mm] threaded rod. The ceiling support may also be used on vertical piping to keep the piping at the set center-to-center distance of 12.75" [32.39cm]. A ceiling support or floor support should be used to support the piping approximately every 8ft [2.44m]. Both the ceiling and floor supports come in single and double support design.





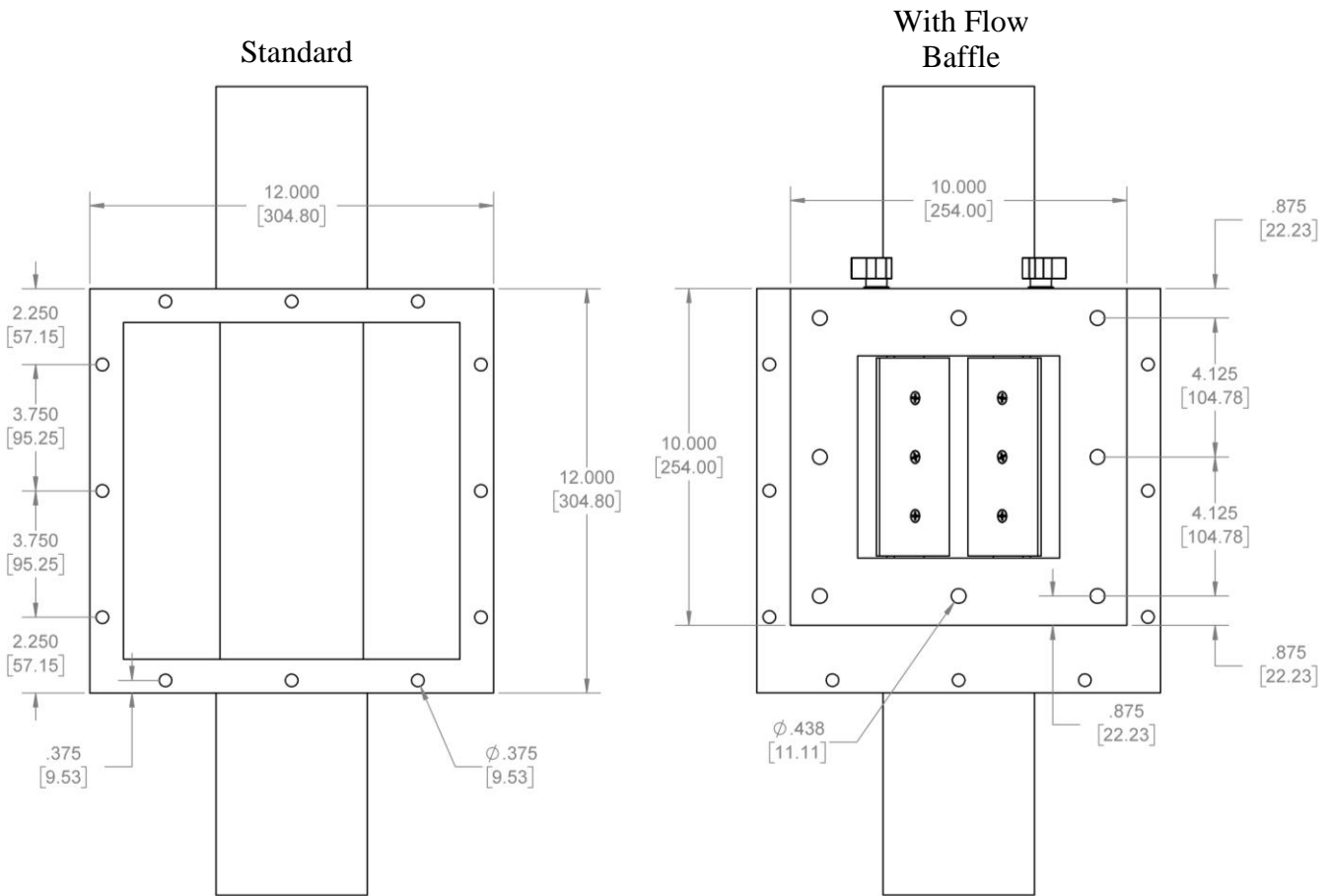
Vertical sections of the pipe should be supported off either a floor mounted structure or a nearby wall. A support after the elbow is recommended to reduce the sway in the vertical sections.



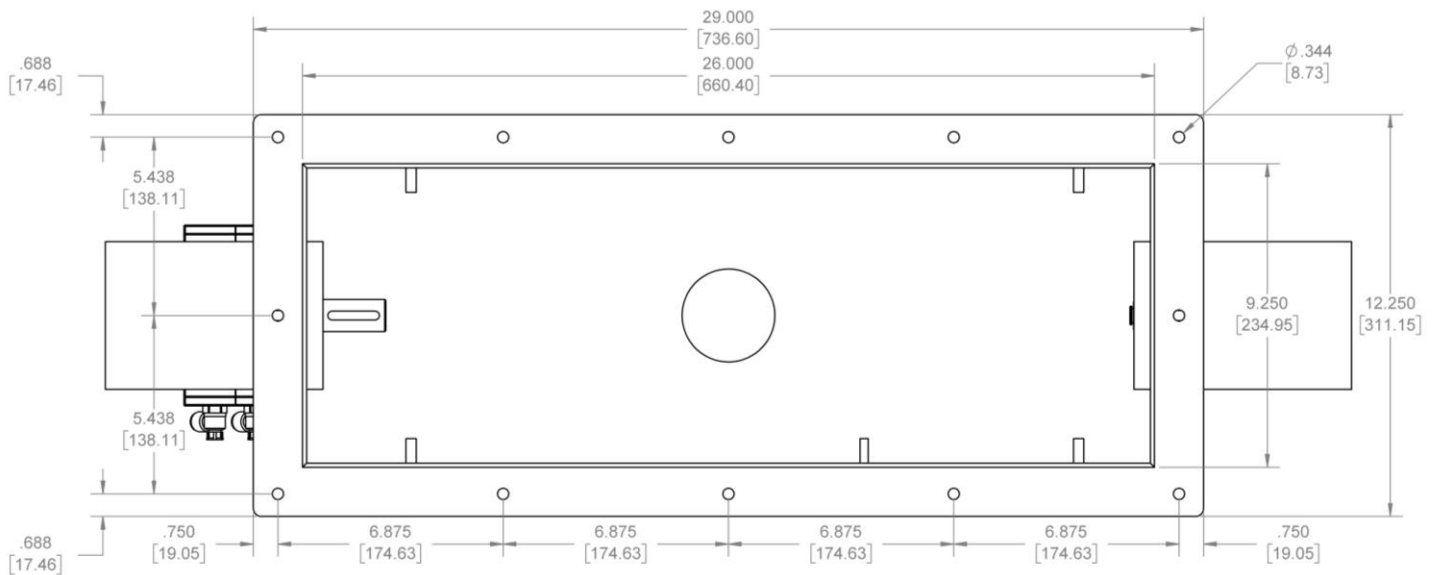


Component Flanges:

Inlet Flange (for both Regular and Low Breakage Designs)

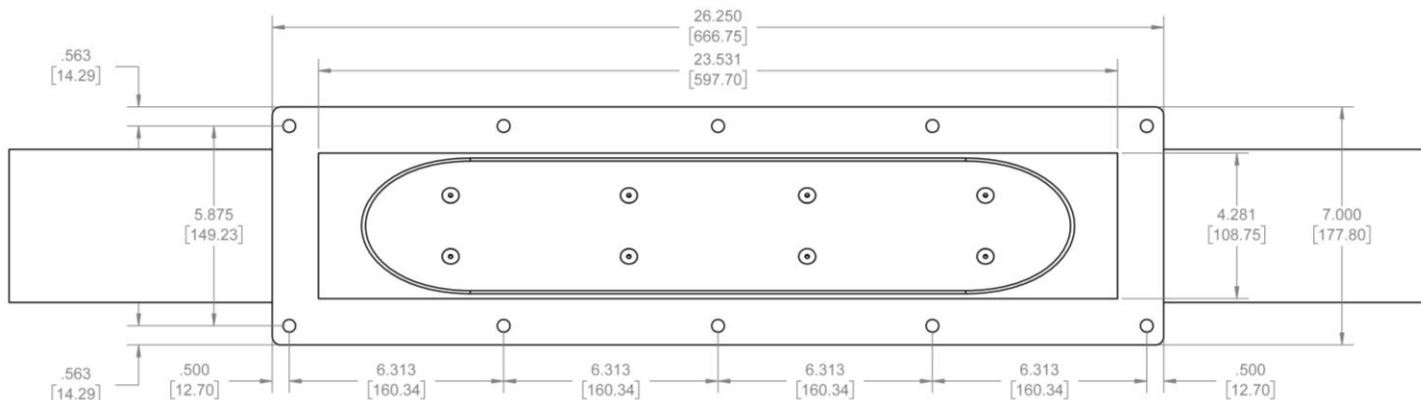


Rotary Discharge Unit

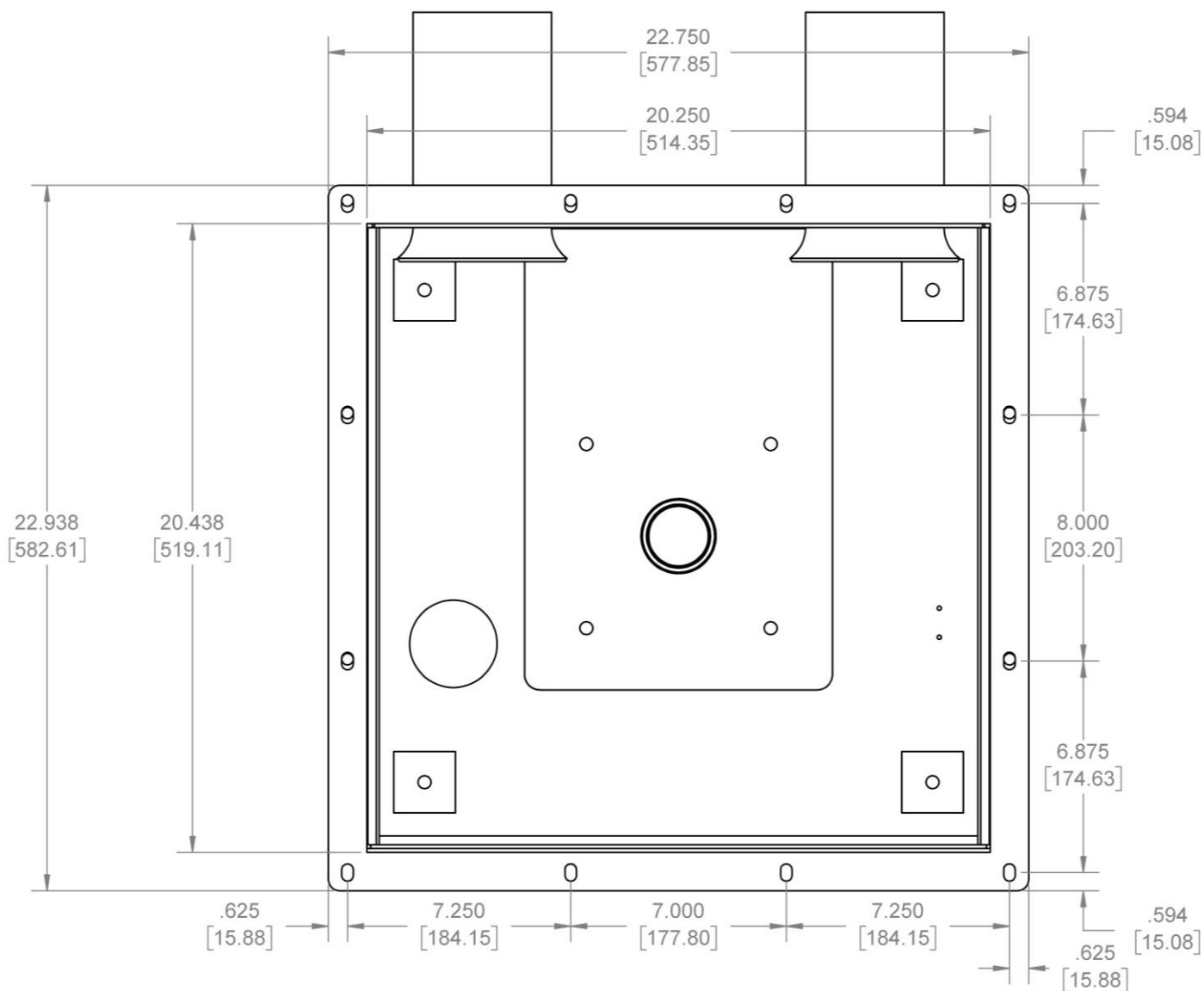




Passive Discharge Unit



Drive Unit





Installation

The conveyor should only be installed once an understanding of the scope of work, and function of the equipment is well understood. MPE can recommend installation contractors upon request. Below is an overview of typical installation tools and recommended best practices.

A. Tools Required

Below are a list of typical tools required for the installation of the chain-vey equipment.

- a. Orbital Pipe Cutter or Portable Band Saw – Pipe Cutting
- b. Angle Grinder/Side Grinder/Disc Grinder – Deburring & Squaring
- c. US Wrenches – 9/16", 1/2" & 7/16"
- d. US Ratchet Set
- e. Screw Drivers
- f. Level
- g. Fishing Wire
- h. Low Stretch Braided Rope for Lifting

B. General Overview – Mechanical Installation

- a. Mounting & Supports
- b. Pipe Cutting
- c. Pipe Coupling
- d. Chain Installation
- e. Connect Link

C. General Overview – Electrical & Utilities

- a. Shock Relay
- b. Tension Switch – Turnaround
- c. Solenoid Valve – Drive unit and Discharge Unit
- d. Position Switch – Discharge Valve only
- e. Pneumatic Tensioner (Reed Switch & Pressure Transmitter) – Turnaround
- f. VFD Wiring



Startup & Commissioning

The conveyor should only be installed once an understanding of the scope of work, and function of the equipment is well understood. MPE can recommend installation contractors upon request. Below is an overview of typical installation tools and recommended best practices.

A. Pre-Commissioning Checklist

Prior to bumping motors or beginning the run product the following items must be verified:

Install Pre-Start Checklist	Verification
Piping	
All Pipes Cut Square & Free of Dents, Burrs, Etc.	
All Gaps Less than 1/8" at Connection Points	
All Pipes Supported at 8-10ft. Intervals	
All Pipes are level and inline and concentric with each other/all components	
Chain	
Chain was fed straight through the system with braided, non twisting rope for lifting	
Chain was fed in correct direction if unidirectional pucks are utilized	
Chain was trimmed to correct length for sprocket positioning	
Chain was trimmed to correctly space the connector link to take the place of a puck.	
Connector link is assembled and torqued to the correct specification [xx lb-in]	
No significant twist is visible in the chain when entering/exiting Drive & Turnaround Ports.	
Drive Unit	
Motor Wired	
VFD Setting Updated	
Chain properly engaged with sprocket	
Compressed air line connected to the solenoid valve.	
Solenoid Valve Wired	
Motor breather plug removed	
Oil level checked	
Housing clear of obstructions/foreign material	
Any high level sensors present are wired	
Tripping high level sensors cause system alarm/shutdown	
Turnaround	
Chain properly engaged with sprocket	
Tension set so that spring plate rests in green area of tension gauge.	
Sprocket is positioned with ample clearance to turn w/o hitting the front of back of the housing.	
Tension limit sensor is wired & reset	
Tripping tension switch causes system alarm/shutdown.	
Tension sensor trip brackets are centered around the tension switch	
Housing clear of obstructions/foreign material	
Discharge Valve	
Compressed air line connected to the solenoid valve.	
Solenoid valve wired	
Discharge Valve responds in the correct direction to an open/close signal.	
Air knives are on while valve is open and off while valve is closed	
Rotary actuator air flow set so that the valve rotates quickly but does not slam open/close.	
Any high level sensors are present and wired	
Tripping high level sensor causes system alarm/shutdown	



B. System Calibration – Dry Run Set Up

Dry Run Checklist						Verification
Start Chain-Vey at 20% Speed. Ramp through the below setpoints, record motor load and tension and verify the following:						
	Speed	20%	50%	75%	100%	
	Motor Load (A)					
	Tension (in/psi)					
Piping						
No excessive vibration/movement visible during operation						
No clicking present in joints between pipes or components						
No knocking felt when hand is placed on joints						
Drive Unit						
Motor/sprocket is turning smoothly						
Chain is engaging and disengaging with sprocket smoothly in a level plane						
Air knives are functional						
Tripping high level sensor causes total system shutdown						
Chain twist is not excessive						
Turanround						
Sprocket is turning smoothly						
Chain is engaging and disengaging with sprocket smoothly in a level plane						
Tension is set so that the spring plate rests in green area of tension gauge						
Tension sensor trip buckets are centered around the tension switch						
Tripping tension sensor causes total system shutdown						
Sprocket is positioned with ample clearance to turn w/o hitting back of housing.						
Chain twist is not excessive.						
Discharge Valve						
Tripping high level sensor causes total system shutdown						
Discharge valve opens/closes smoothly						



C. System Calibration – Product Run Set Up

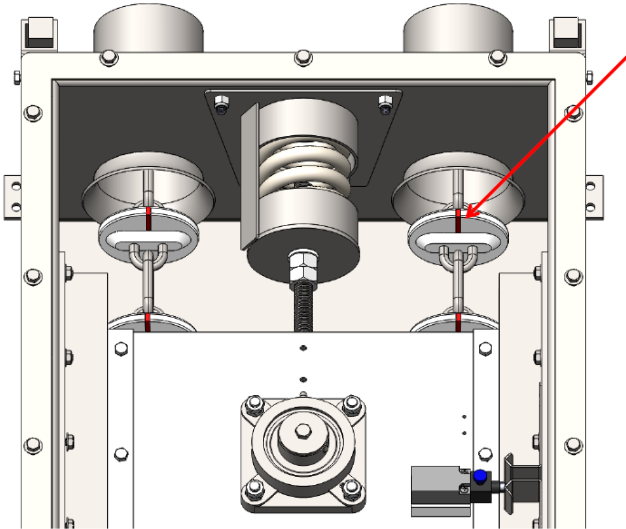
- a. Tension Verification
- b. Feeding & Pocket Fill

Product Run Checklist								Verification
Start Chain-Vey at 20% Speed. Ramp through the below setpoints, record motor load and tension and verify the following:								
		Speed	20%	50%	75%	100%		
		Pocket Fill	50%	50%	50%	50%		
		Motor Load (A)						
		Tension (in/psi)						
Piping								
No excessive vibration/movement visible during operation								
No clicking present in joints between pipes or components								
No knocking felt when hand is placed on joints								
Drive Unit								
Motor/sprocket is turning smoothly								
Chain is engaging and disengaging with sprocket smoothly in a level plane								
Pocket fill & speed of production operating conditions are not above 80%								
Carryover is not excessive								
Turanround								
Sprocket is turning smoothly								
Chain is engaging and disengaging with sprocket smoothly in a level plane								
Tension is set so that the spring plate rests in green area of tension gauge								
Tension sensor trip buckets are centered around the tension switch								
Tripping tension sensor causes total system shutdown								
Sprocket is positioned with ample clearance to turn w/o hitting back of housing.								
Discharge Valve								
Air knives adjusted to minimize carryover (typically 20-40% flow)								



Chain Un-Twist Procedure:

The chain should enter and exit the turnaround box with no twist or tilt in the links. Minor deviation from true 12 o'clock position is acceptable, but the discs should run through the conveyor as shown below. To properly diagnose and define a possible twist, the conveyor should be observed running at a low speed for at least one full cycle.



A red line has been added to the discs in the image to better highlight the orientation of the discs.

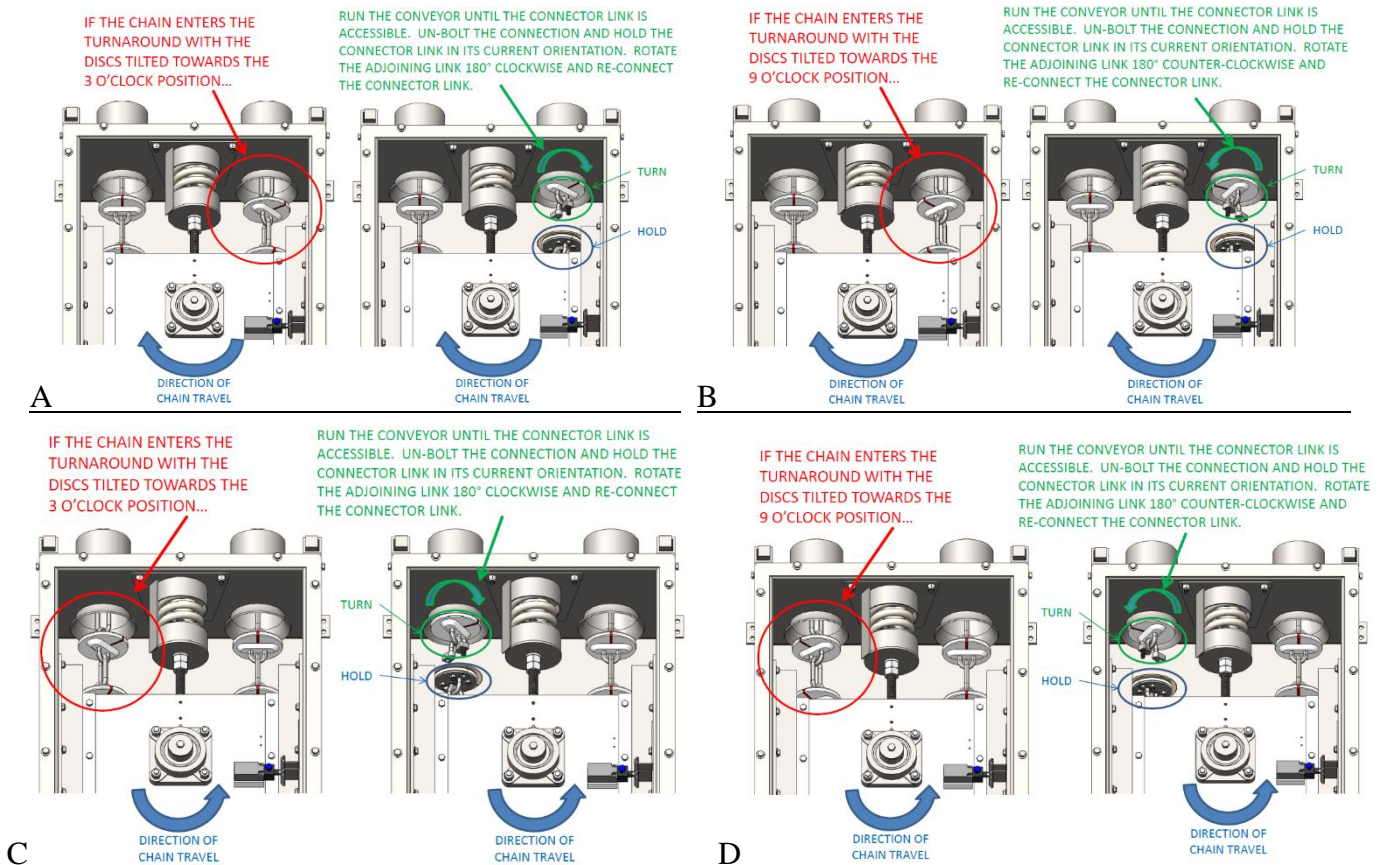
If this orientation isn't present in an installed length of chain & discs, the chain was likely twisted within the system.

Below are a few examples of twisted systems and the probable solution to un-twist them.

It's possible for a system to have a half twist, a full twist, or multiple twists, so the steps required to un-twist the chain may be more complicated than depicted.

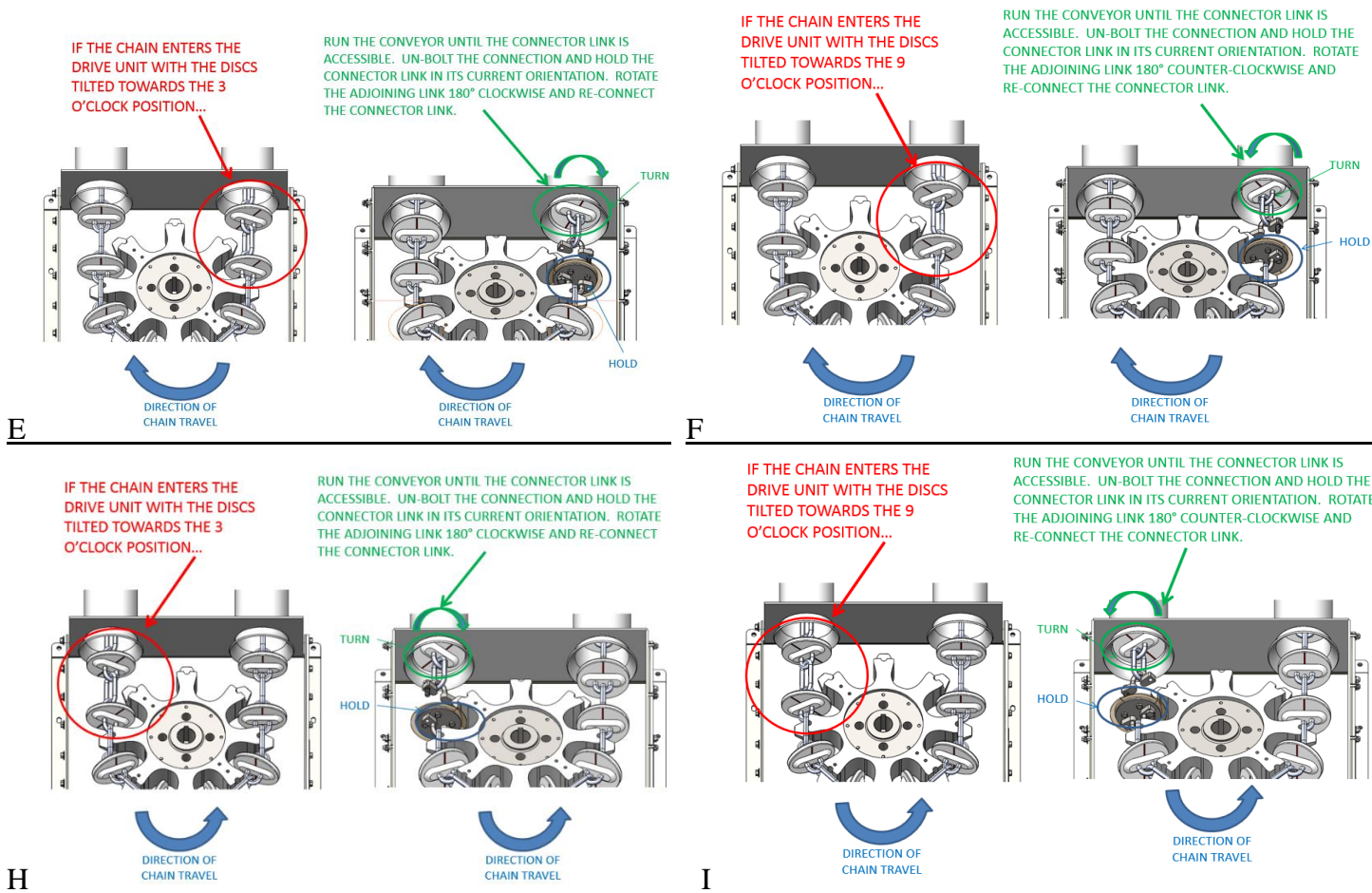
It's highly recommended that the chain is originally installed with careful precautions taken to avoid a twist in the chain.

*Proper tensioning is also important to managing twists in the chain. Before determining if a twist is present or attempting to correct a twist, first ensure that the tension is set properly.





It's important to also inspect twist at the drive unit. Twist in the chain is independent between both the product and return side piping. Adjusting only one side will not affect the other. In some cases where the drive unit isn't easily accessible, it is easier to run the system in reverse for one full cycle inspecting for twist at the turnaround. If the system isn't capable of running in reverse, the drive transition or bottom cover must be removed to access the chain.



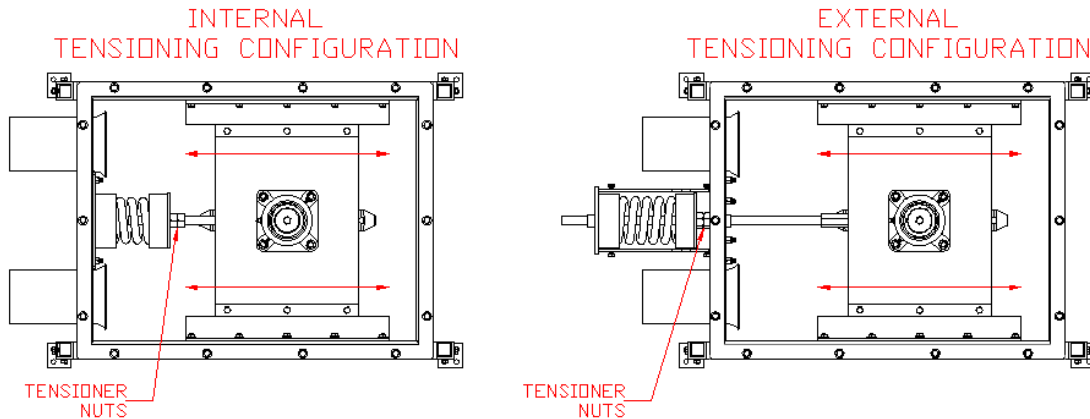
*After any attempt to correct a chain twist, the conveyor should be run one full cycle at a low speed to inspect for any improvement or adverse changes.

*If you are unable to correct a twist after several attempts, it may be necessary to remove the chain and rerun it through the tube. It's possible that there are multiple twists, or a complex twist, that cannot be corrected by any easy method.



Operations:

1. Setting the Tension



When rotated clockwise or counter-clockwise, the tensioner nuts move the tensioner plate towards or away from the inlet outlet ports, placing more or less tension on the chain. Once the desired tension is obtained, it is important to tighten the nuts against each other to ensure that the tension is locked. The tension is correct when the chain is taut, but will allow for approximately 1/16" [1.6mm] of movement (1/8" deflection) when the chain is tugged on by hand. If the discs touch the bottom of the tube when entering the return path, the tension is too low and needs to be adjusted.

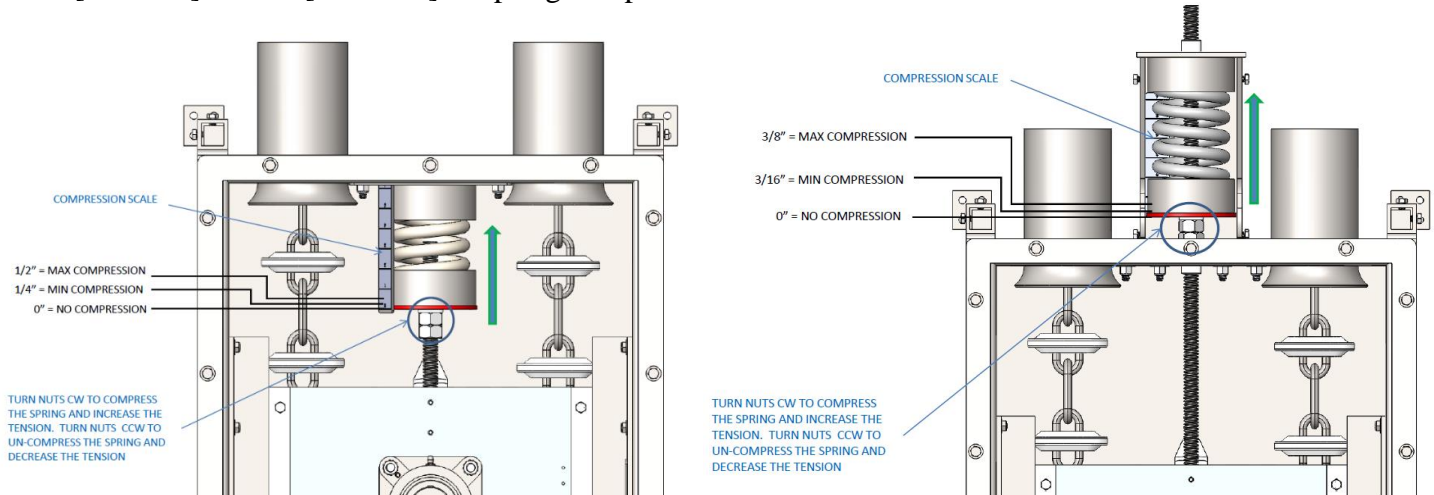


Too Loose



Correct

To help with finding the correct tension setpoint, a scale is provided next to the tensioning spring so that the amount of compression applied can be noted. Each system is different, but typically units with internal springs require 1/4" [6.35mm] to 1/2" [12.7mm] of spring compression. Units with external tensioning typically require 3/16" [4.76mm] to 3/8" [9.53 mm] of spring compression.

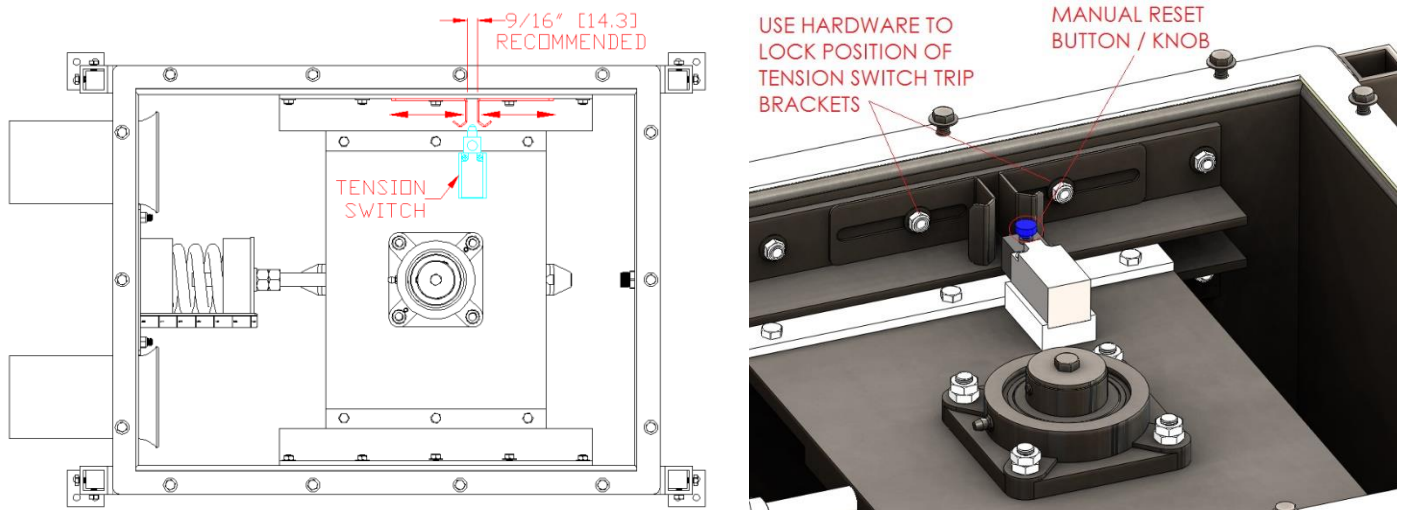


* If the tension of the chain is too high, it will cause excessive wear on the conveyor.

When adjusting the tension, it is also very important to allow for at least 1.5" [38.1mm] of clearance between the rotation of the pucks and the back wall of the 180° turnaround unit. It may be necessary to shorten the chain to obtain this clearance.



2. Setting the Tension Switch



To control any undesirable fluctuations in the tension of the system, each 180° turnaround unit is equipped with a tension limit switch. Any adverse changes in the tension (+ or -) will "trip" the switch which in-turn cuts power to the conveyor. This allows the operator the opportunity to examine the tensioning issue prior to damaging the equipment or causing disengagement from the sprocket.

To set the limit switch, first tension the system the appropriate amount. Once the tension is set, adjust the placement of the trip brackets so that the roller plunger of the limit switch is centered between them. The trip brackets should be spaced away from the roller-plunger to allow for some movement, but not drastic fluctuations. Typically a spacing of about 9/16" [14.3mm] is recommended between the trip brackets, but individual systems may vary.

If the tension switch trips, investigate to determine the cause and correct the issue prior to restarting the conveyor. To re-set the switch, the switch must be manual reset using the push-button on the opposite end of the roller-plunger.

*For maximum life, periodically put a drop of lightweight oil on the roller. Application conditions will determine lubricating frequency.

3. Testing

Check the conveyor thoroughly before first turning it on.

- check that all covers and safety features are installed and function properly
- check that all tools have been removed from the conveyor
- before running for a long period of time, check that the conveyor runs in the intended direction.

During the first hour of running, the equipment should be watched closely so that it may be stopped immediately if necessary. While running, each pipe connection point should be checked for any "clicking". Clicking is a good indicator that the pipe connection is not square or that a gap is between the two pipes.

Following the first hour of running, turn the conveyor off and again inspect all connections, the tension of the chain and the proper installation of the chain connectors.

Now the conveyor can be run loaded for a day shift before checking everything again.

After testing the equipment and a thorough inspection, the conveyor is ready for operation.



4. Operation

The conveyor should only be operated by authorized personnel who are familiar with the specific features of the equipment and have read and understood the contents of this manual.

It is important to feed the conveyor at a rate less than the capacity stated in the technical specifications. Otherwise damage to the sprockets and chain and all moving parts may result.

The chain should be checked regularly for the correct tension and length.

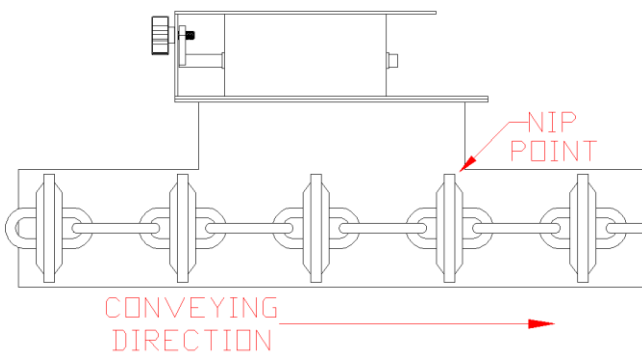
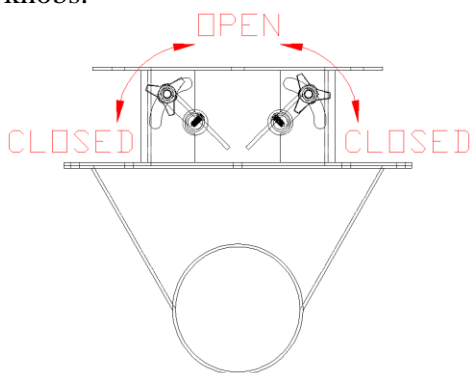
If the motor starter, fuse, or shock relay trips, the conveyor may only be turned back on after the origin of this malfunction is detected and has been properly addressed.

Let the machine run empty before turning it off. Any product left within the system could harden or become gummy over an extended period of time, therefore potentially hindering restarting the conveyor.

E-stop buttons should only be used when immediate safety is impaired, and should not be used for regular operation. After an E-stop has been used, be sure that the cause of the emergency is established and resolved before putting the conveyor back into service.

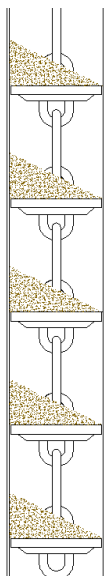
5. Flow Control

When there is a bulk source or direct head-load of product feeding the Chain-Vey conveyor, the inlet flow control baffle is very important. The flow control baffle utilizes two plates on a pivot which increase or decrease the opening of the inlet. Two hand knobs are used to adjust and also lock the plates' position once the desired feed rate is attained. If desired, a tamper-resistant, tooled adjustment is an available alternative to the hand knobs.

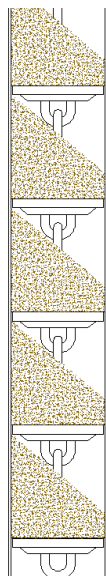


Note:

To prevent product shear and reduce excessive pull on the chain, the inlet and baffle must be installed in accordance with the conveying direction as shown above.



Low Fill
(<50%)



Standard Fill
(70%-80%)



Maximum Fill
(90%)

To achieve desired fill level, adjust the baffles of the inlet flow control, and make adjustments to the conveyor speed and feed rate.



Maintenance:

Maintenance should be carried out by trained personnel in order to avoid personal injury or damage to equipment. Deviations from normal performance (higher power input, higher temperatures, vibration, unusual noises or odors, etc.) indicate that functionality of the unit is impaired.

The frequency of inspections is dependent on several variables, but the should be routinely addressed.

1. Preventative Maintenance Schedule

TURNAROUND UNIT	As needed	Weekly	Monthly	Every 6 months
Inspect chain twist coming into housing (Anytime chain is removed from sprocket)	X			
Check for proper tensioning under product load, and note any changes since last inspection		X		
Slideplate is able to move freely in guides (should bounce slightly when under load)		X		
Ensure that all hardware on the sprocket and tensioning plate is present and tightly fastened			X	
Inspect the sprocket teeth for wear			X	
Check the position and functionality of the tension switch			X	
Remove any product build-up from all internal surfaces			X	
Lid and bottom hardware present and tight			X	
DRIVE UNIT				
Inspect chain twist coming into housing (Anytime chain is removed from sprocket)	X			
Ensure that all hardware on the sprocket is present and tightly fastened.			X	
Inspect the sprocket teeth for wear			X	
Test the air-jets for proper pressure and flow			X	
Remove any product build-up from all internal surfaces			X	
Check the gearbox oil level, and add oil if needed				X
Clean the fins of the motor fan to optimize cooling				X
Verify the motor and gearbox mounting bolts are tightly fastened				X
Inspect the shaft oil seal for wear or damage				X
DISCHARGE VALVE	As needed	Weekly	Monthly	Every 6 months



Inspect the alignment and open/close			X	
Verify the proper functioning of the open/close position switch			X	
Remove any product build-up from all internal surfaces			X	
Test the air lines for proper pressure and flow			X	
TUBES/SIGHTGLASSES				
Inspect all floor and ceiling supports for misalignment and verify that all hardware is present and tightly fastened			X	
Check for any dents or damage which may affect the inner diameter of the tube			X	
Inspect the inner walls for excessive wear				X

2. Troubleshooting

If in doubt, switch off the equipment immediately!!

ISSUE	PROBABLE CAUSE
Chain "jumps" Sprocket	Tension Too Low
	Tension Too High
	Product Build-Up on Sprocket
	Wear on Chain
	Wear on Sprocket
Chain / Connector Breaks	Twisted Chain
	Foreign Object in Conveyor
	Product Build-Up in Conveyor
	Conveyor is Overloaded
Conveyor Won't Start	Chain is Worn
	No Electricity
	Defective Motor
	Product Build-UP in Conveyor
	Check Shock Relay
	Reset Tension Switch

ITEM	REQUIRES REPLACEMENT WHEN...
Connector Link	Diameter of link is less than 5/16" (8mm) at point of contact with next link
Conveying Disc	Diameter of disc is less than 3-7/8" (98.5mm)
Cleanout Disc	Disc becomes torn, worn, or excessively discolored
Sprocket	Point of contact with chain is worn more than 3/32" (2mm)
Pipe	Wall thickness is less than 1/32" (1mm) note; pipe may be rotated up to 7 times, because the majority of wear occurs on the bottom of the pipe

When working on the machine, make sure the equipment is off, and secured against unauthorized activation.



3. Equipment Lubrication

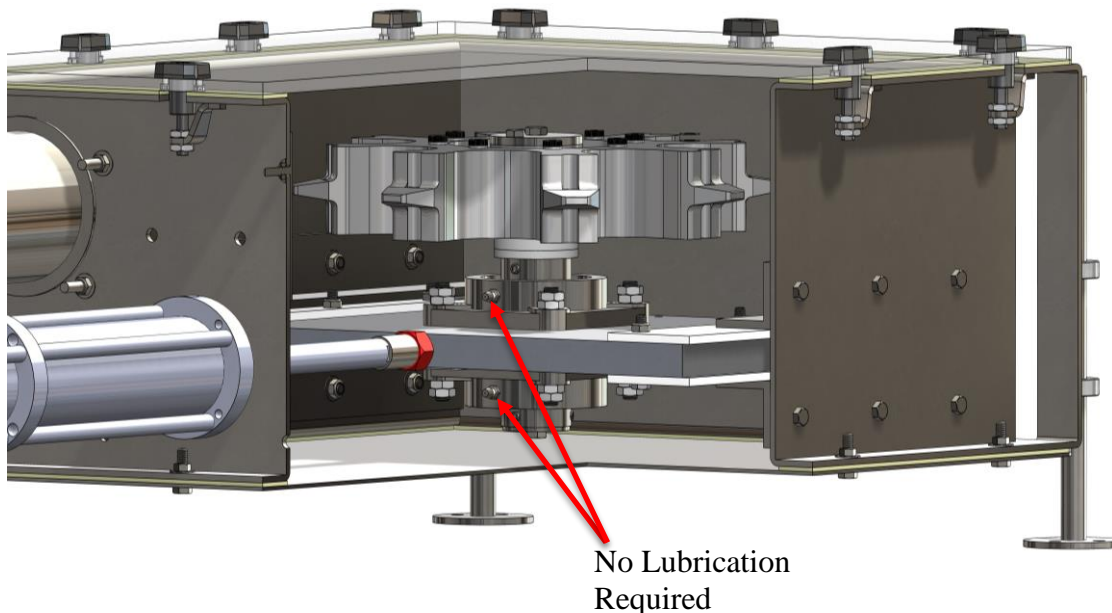
Drive Unit:

Unless otherwise specified, Drive Unit gearmotors are supplied with food grade Klüberoil 4UH1-460N lubricant. The gearmotor requires that this oil be changed every 10,000 operating hours or every two years, whichever comes first. In applications where hostile operating conditions exist, such as high humidity, corrosive environment, or large temperature changes, the oil should be changed at more frequent intervals. To check the oil level, remove the plated (non-painted) oil level plug. The oil level is correct when the surface of the oil is level with the lowest point of that tapped hole.

For units installed in the standard upright position (nameplate should state “Mount Pos. M5A”) the recommended amount of oil is 1.11 gallons [4.2 liters]. For any other mounting position, contact MPE for recommended oil amounts and oil level plug configuration.



Turnaround Unit:



The two flange bearings located on the Turnaround unit are double sealed and are permanently pre-lubricated with USDA approved H1 grease. These bearings have grease ports but require no relubrication in most environments.



4. Replacement of Chain

Before removing the chain, the conveyor must first be run until empty. The conveyor should then be run at low speed to allow for stopping the conveyor at the point when the chain connector link is easily accessible through the turnaround unit. The tension on the chain can now be released by turning the nut on the spindle, bringing the tensioner towards the inlet/outlet ports.

Once the connector link has been located, and the tension has been released from the chain, the chain may be removed as follows:

- remove chain connector
- pull the chain slowly with a chain block or winch through either the rear door of the drive unit or the top of the turnaround unit.

5. Replacement of Sprocket

Two bolts on top of the sprocket need to be removed in order to remove the sprocket. Once these are off and out of the way, the sprocket can be pulled off.

