P/N sm1082 - ULTRA DIRECT CONVEYOR MANUAL.doc
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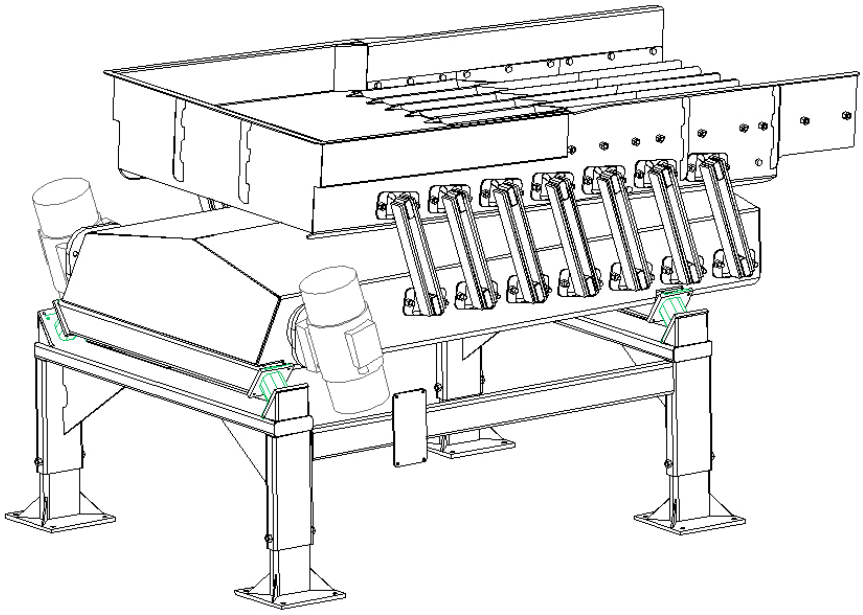
10/26/2020

Ultra and Ultra Direct Conveyors



Installation Operation and Maintenance Manual

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1	4/2/04	Added P/N & date to header	All	NJD
2	9/3/04	Safety Sling Information	All	NJD
3	2/8/08	Updated to PPM Technologies	All	SS
4	12/13/10	Updated office locations	2	DER

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1 PPM TECHNOLOGIES ULTRA FEEDER CONVEYORS

Thank you for buying your equipment from PPM Technologies. This service instruction manual will help you to understand how your equipment operates and what is required to maintain peak performance. Please read it thoroughly and keep it on file for reference. Your satisfaction is very important to us. Please direct any comments, questions or concerns to our Service Department.

Date Purchased: _____
Serial No.: _____
Factory Order No.: _____
General Arrangement Drawing No.: _____

1.1 SAFETY INSTRUCTIONS

WARNING: PPM Technologies is not liable for any damage or reduced performance that may occur as a result of improper equipment assembly and installation, or due to unauthorized alterations. Such actions will void any and all warranties.

WARNING: These instructions and safety precautions must be followed. There is danger of electrical shock to the operator.

WARNING: The unit must be properly grounded and verified at installation.

WARNING: The electrical power supply connection to the PPM-supplied unit must be made through a customer-supplied safety disconnect switch. Incorporation of an emergency stop may also be required, according to local codes.

CAUTION: Local safety codes and regulations must be considered when installing and/or operating this equipment.

Product safety labels must be highly visible on the equipment. Check visibility regularly. If safety labels need replaced, contact PPM Technologies for an additional supply free of charge.

Supporting information that may be attached (e.g., drawings) takes precedence over corresponding information printed in this manual.

Safety is a basic factor in the maintenance and operation of Ultra and Ultra Direct Vibrating Conveyors. Proper clothing, tools and methods of handling can prevent serious injury to you or a fellow worker. A number of safety precautions are listed throughout this manual. Please study and follow the precautions and insist that your coworkers to the same.

1.2 SPECIAL CONSIDERATIONS

Each conveyor by design has components or properties that may require special consideration. These items are noted here to avoid potential problems when operating or servicing Ultra and Ultra Direct conveyors.

Ultra and Ultra Direct conveyors are dynamically balanced machines; it is imperative that no weight be attached in any way as it may negatively affect performance and void the warranty. A one-inch (25 mm) clearance must be maintained at all points so that there is no contact while the conveyor is operating.

Do not lubricate the drive bearings with food grade grease. Please refer to the **VIBRATOR MANUAL (M3286FMC)** section for further information.

1.3 DESCRIPTION

PPM Technologies Ultra and Ultra Direct are dynamically balanced, vibrating conveyors. Material is conveyed along the trough in a rapid succession of short hops by the vibratory action of the conveyor. The vibration is generated by a pair of counter-rotating electric motors with unbalanced shafts. The motors (vibrators) synchronize as they come up to speed to produce straight-line motion in the trough.

The trough on an **Ultra** conveyor is supported and guided by a tuned fiberglass leaf spring system that is mounted on a base (see **Figure 1**.) The two vibrators are also mounted on the base. The base is supported on a set of isolation springs. During normal operation, there is minimal motion of the base, and therefore, negligible forces transmitted to the support structure. Because it is a tuned system, the trough stroke of Ultra conveyors varies with speed. The higher the speed, the larger the stroke will be. The base stroke also varies with speed, and will be approximately zero at the design speed of the unit.

Ultra Direct conveyors (see **Figure 2**) are direct drive type units and do not have fiberglass leaf springs. The vibrators are mounted directly to the trough. The stroke of the Ultra Direct conveyor does not vary with speed. The trough is mounted on a set of isolation springs to minimize the dynamic loads to the support structure.

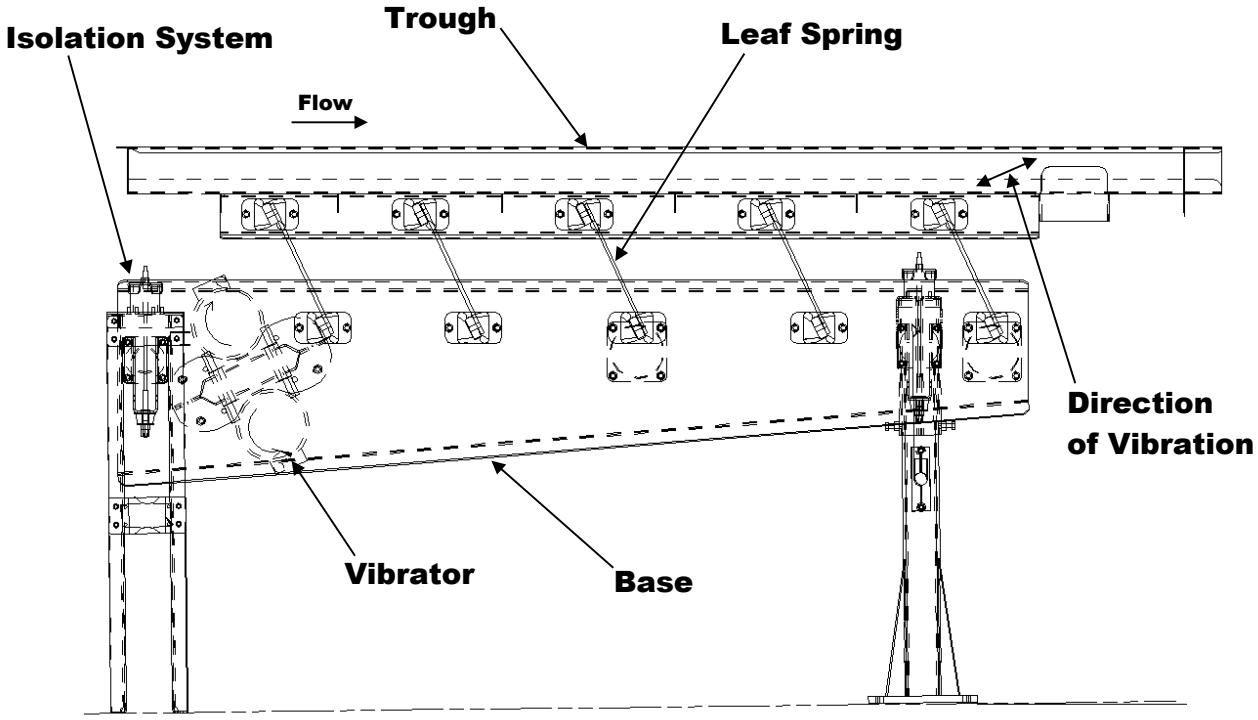

Figure 1: PPM Technologies Ultra Conveyor

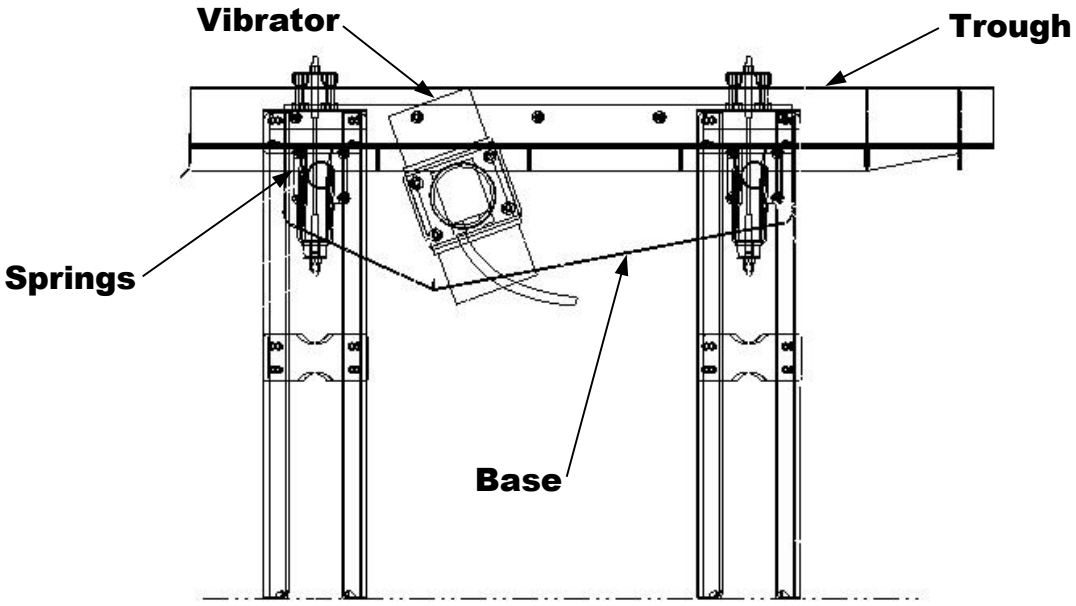

Figure 2: PPM Technologies Ultra Direct Conveyor

2 INSTALLATION

2.1 LONG TERM STORAGE

Ultra and Ultra Direct Conveyors should be stored indoors. If stored off-site, place on cribbing, cover with plastic, and remove motor to an inside storage area. Rotate the shafts periodically.

2.2 SITE PREPARATION

The Ultra and Ultra Direct Conveyors' isolation system is designed to prevent transmission of dynamic loads to the support structure. However, the natural frequency of the support structure must not be too close to the operating speed of the conveyor. This condition results in large support structure displacements and stresses that may cause failure of the support structure. **The natural frequency of the support structure must be greater than or equal to 1.5 times the operating speed of the unit. Also, the support structure design should limit the calculated dynamic deflections to ± 0.004 inches (0.1 mm) in all directions.** Static and dynamic forces for each conveyor can be obtained from the general arrangement of the unit.

WARNING: PPM Technologies is not responsible for damage or personal injury resulting from improperly designed or constructed supports. Installation of the conveyor on improperly designed or constructed supports will void any and all warranties.

Regardless of whether this equipment is installed at grade level, elevated, or on upper floors, the mounting surfaces at the location of the coil spring isolators must be level or at a uniform slope, within ± 1/16 inches (1.6 mm). Grade 5 bolts (minimum) are recommended for connections to elevated steel work.

When designing the site layout for the conveyor system, it is important that a one-inch (25 mm) clearance be maintained at all points. It is also important to provide clearance in the layout for drive (and drive guard) removal and accessing the drive for maintenance. Avoid severe inclines that reduce the capacity of the conveyor.

Ultra and Ultra Direct Conveyors are designed to operate in wet or dry environments. The ambient temperature should be between 0°F (-18°C) and 110°F (43°C). **NOTE: Ambient and product temperatures must be specified when ordering a conveyor.**

The air supply (if required) must be clean, dry or slightly oily, and regulated. Normally 80 psi is more than adequate for accessory operation. (For additional information, see **ACCESSORIES.**) Refer to the drawings supplied with each order for specific air pressure recommendations.

2.3 EQUIPMENT INSTALLATION

WARNING: PPM Technologies is not responsible for damage or personal injury resulting from improperly designed or constructed supports. Installation of the conveyor upon improperly designed or constructed supports will avoid any and all warranties.

CAUTION: Do not make any alterations to the conveyor without first contacting PPM Technologies. PPM Technologies will not assume any responsibility for poor conveyor performance or mechanical failure as a result of unauthorized alterations to the equipment. Such actions will void any and all warranties.

CAUTION: Local safety codes and regulations must be considered when installing and/or operating this equipment.

NOTE: **The natural frequency of the support structure must be greater than or equal to 1.5 times the operating speed of the unit. The support structure design should limit the calculated dynamic deflection to ± 0.004 inches (0.1 mm) in all directions. Isolation forces for each model can be obtained from the factory.**

CAUTION: Isolation cables must not come into contact with the isolation bracket or any surrounding structures. Do not exceed inclines or declines shown on the General Arrangement drawing provided with the conveyor.

If rubber seals are installed between the pans of in-line conveyor units, contact should not restrict the motion of the machines. **Freedom of motion should be checked in both the loaded and unloaded conditions.**

NOTE: Due to the short burst of high inrush current that occurs when starting Ultra and Ultra Direct Conveyors, it is recommended that slow-blow type fuses be used to avoid nuisance tripping.

CAUTION: The conveyor must not come into contact with any rigid object or adjacent surface that could hamper its vibrating action. A one-inch (25 mm) clearance must be maintained.

CAUTION: The rubber components of the conveyor must not be exposed to oil or to an oil intense atmosphere.

2.3.1 INSTALLATION EQUIPMENT AND TOOLS

The following equipment and tools are required or recommended for conveyor installation:

- Transit
- Crane or forklift and come-along
- Lifting straps
- Digital level
- Tape measure
- Plumb bob
- Chalk line
- Heavy duty drill and masonry bits

2.3.2 SUPPORT ERECTION

Before starting, review all equipment drawings for specific installation instructions, support loads, and dimensions. Lay out conveyor centerlines first, and then lay out support centerlines with a chalk line. Position supports on centerlines and transfer hole locations from supports to the floor. Drill holes for anchor bolts based on recommendations by the anchor bolt manufacturer. Insert the anchor bolts in the holes, and place supports into position. Using a transit, place steel shims at each anchor bolt location to raise supports to the proper elevation, making sure to allow one inch for installation of grout. (See **Figure 3a.**) Plumb the supports with shims, using a plumb bob or digital level. Tighten anchor bolts and recheck plumbness and hole centers at the top of the supports. After all bolts are tightened, install non-shrinking grout between floor and bottom of support.

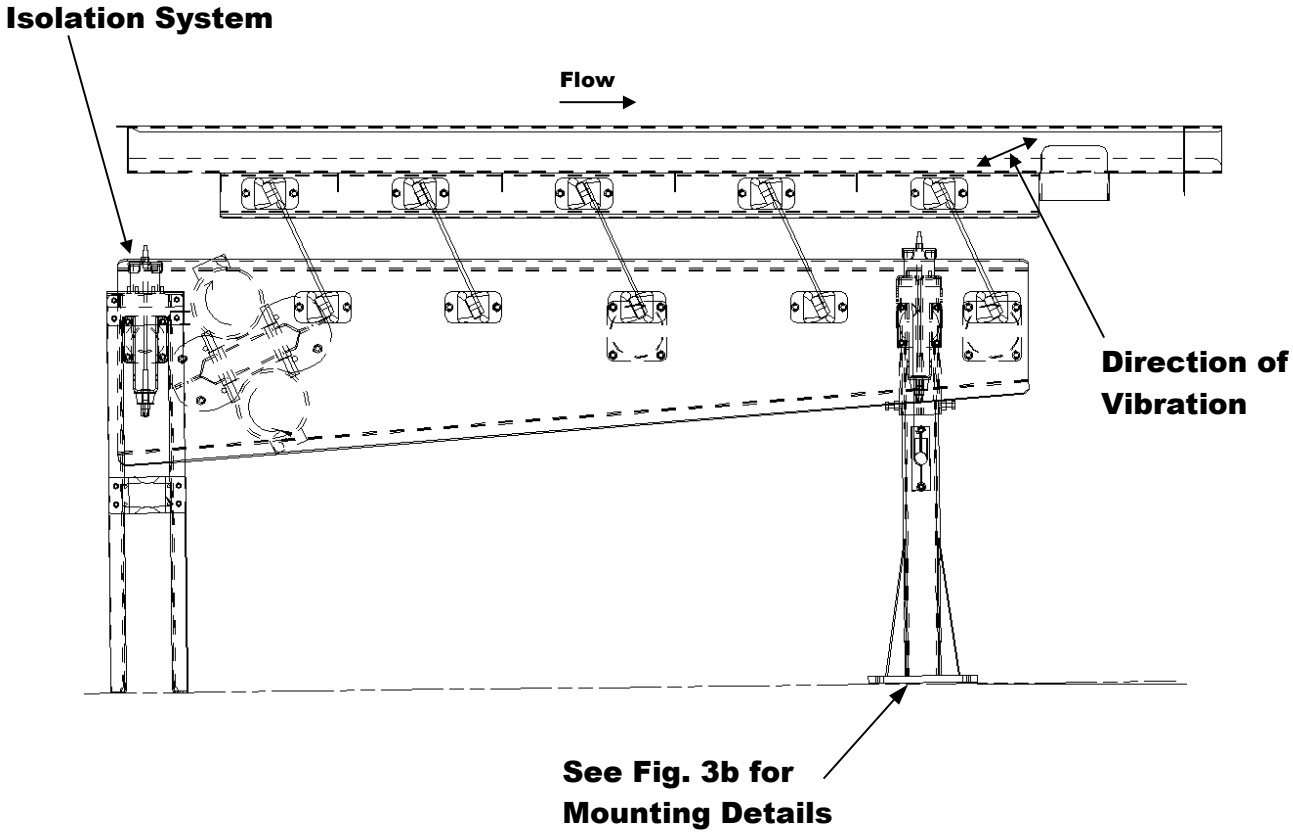

Figure 3a: Typical Floor-Mounted Installation

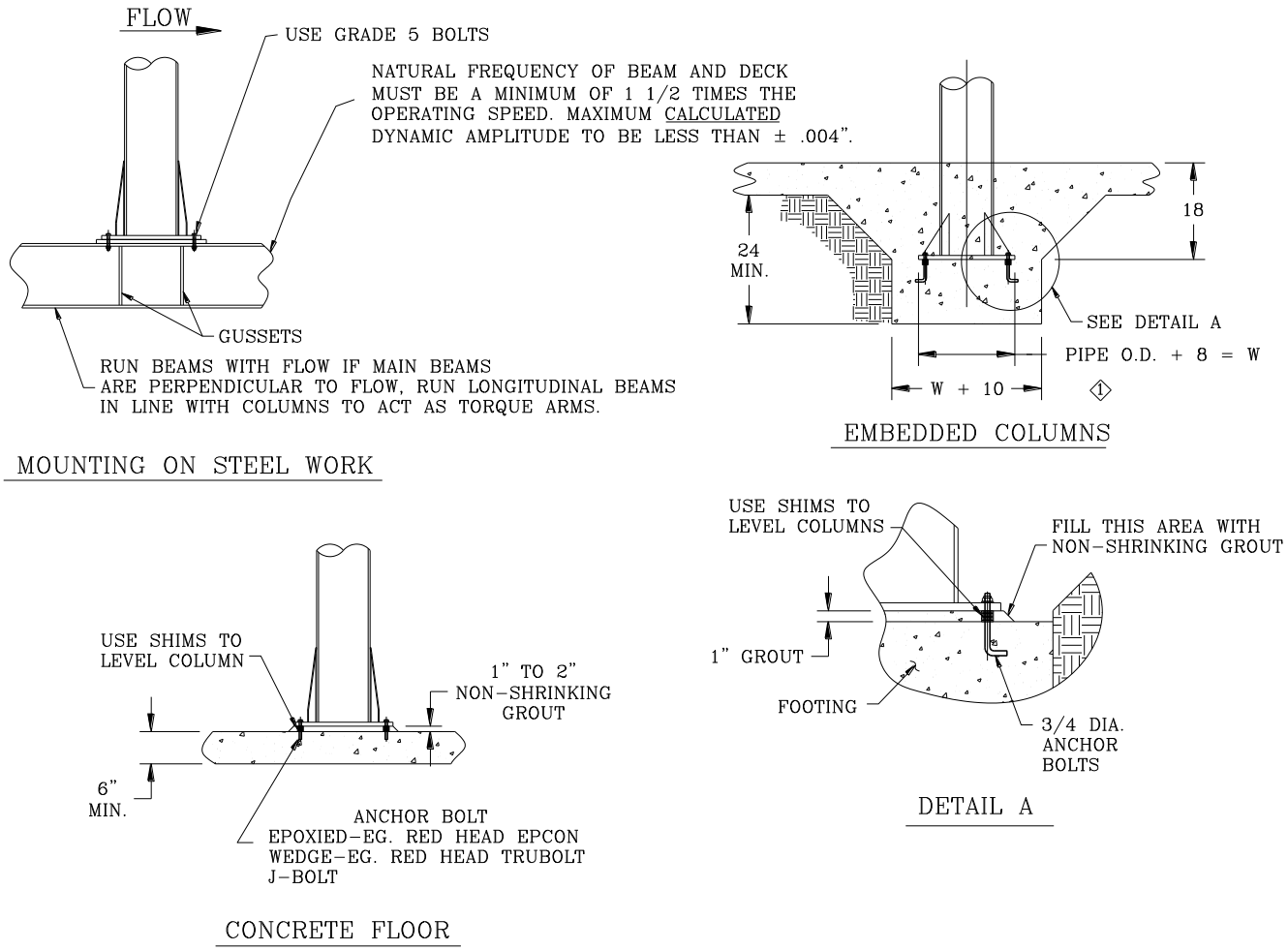

Figure 3b: Floor Mounting options

2.3.3 ISOLATORS AND ISOLATOR SUPPORT BRACKETS

The isolation system can be either floor-mounted or suspension-mounted. The base isolator bracket that is furnished for a floor-mounted isolation system is different from the suspension-mounted isolation system bracket. Therefore, the type of isolation system (floor-mounted or suspension-mounted) must be specified when the conveyor is ordered from PPM Technologies.

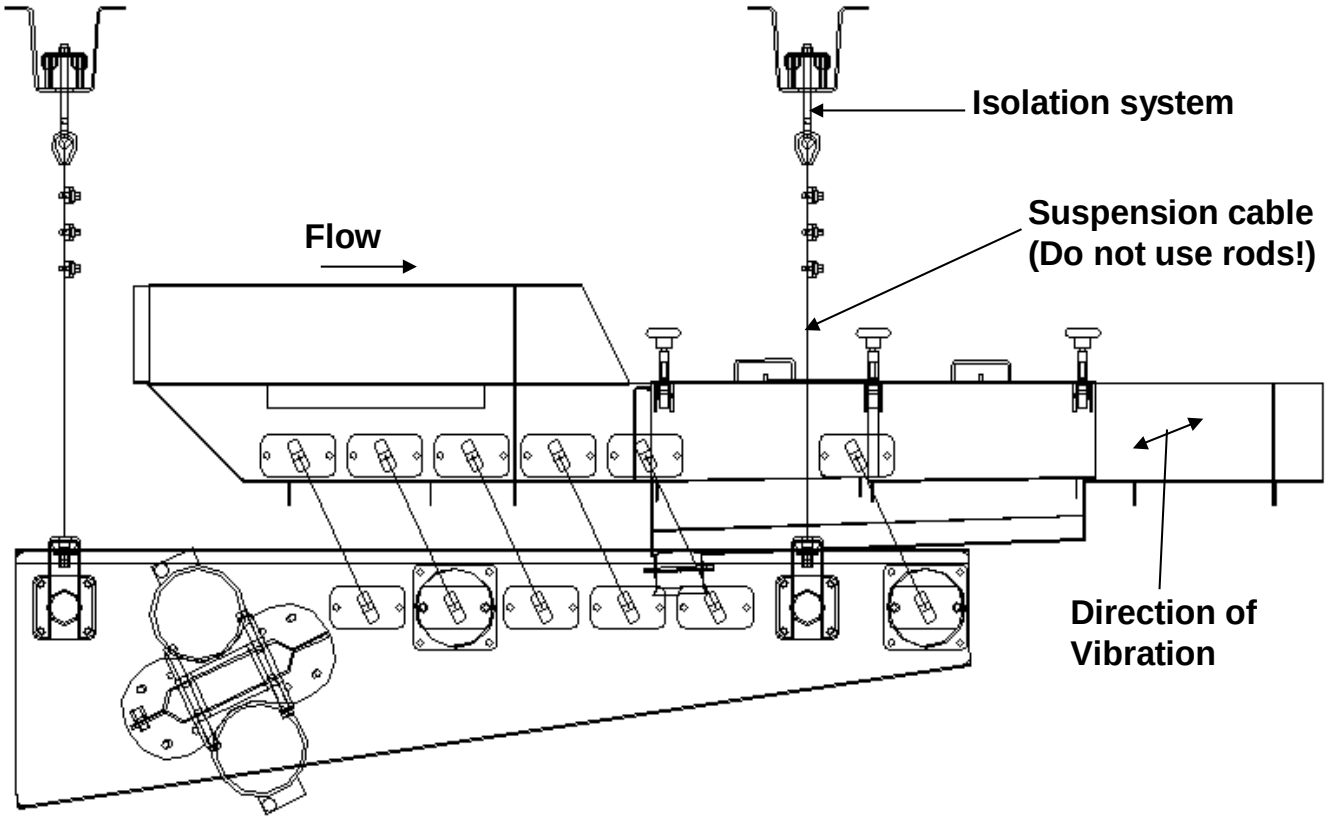

Figure 4: Typical Suspension-Mounted Installation

Figures 5 and 6 on the following pages illustrate typical cable isolation assemblies. If the cable isolation assembly is not as shown, contact PPM Technologies. The isolators are shipped loose and must be assembled. The coil springs and rubber springs must be seated in the spring retainers.

CAUTION: After the isolator is assembled, at least one full thread on the cable fitting must protrude through the locknut.

For both floor-mounted and suspended isolation systems, conveyor installation must include a final adjustment to ensure that the isolators are loaded equally on the left and right sides of the conveyor.

For suspended units, the top isolator bracket must be attached to a rigid structure. Clamp the top isolator bracket tight using a Grade 5 bolt (minimum).

Base-mounted conveyors may use rubber springs for the isolation system. **Figure 7** shows side-mounted isolators. In this configuration, it is critical that the springs be installed with the word "TOP" on the side face and the arrow pointing upwards. **Figure 8** shows bottom-mounted isolators. In this configuration, it is critical that the springs be installed with the lean of the isolators opposing each other.

On most units, isolator stiffness corresponds to a specific location. The coil spring isolators have a color-coded stripe on them and the rubber isolators have the stiffness designation, K1 through K8, molded into the side of the rubber. Refer to the General Arrangement drawing supplied with the conveyor to determine the proper location of each pair of isolators.

CAUTION – Safety cables should be installed on all units that are in areas where person can walk under suspended units. Failure to do so could result in severe injury.

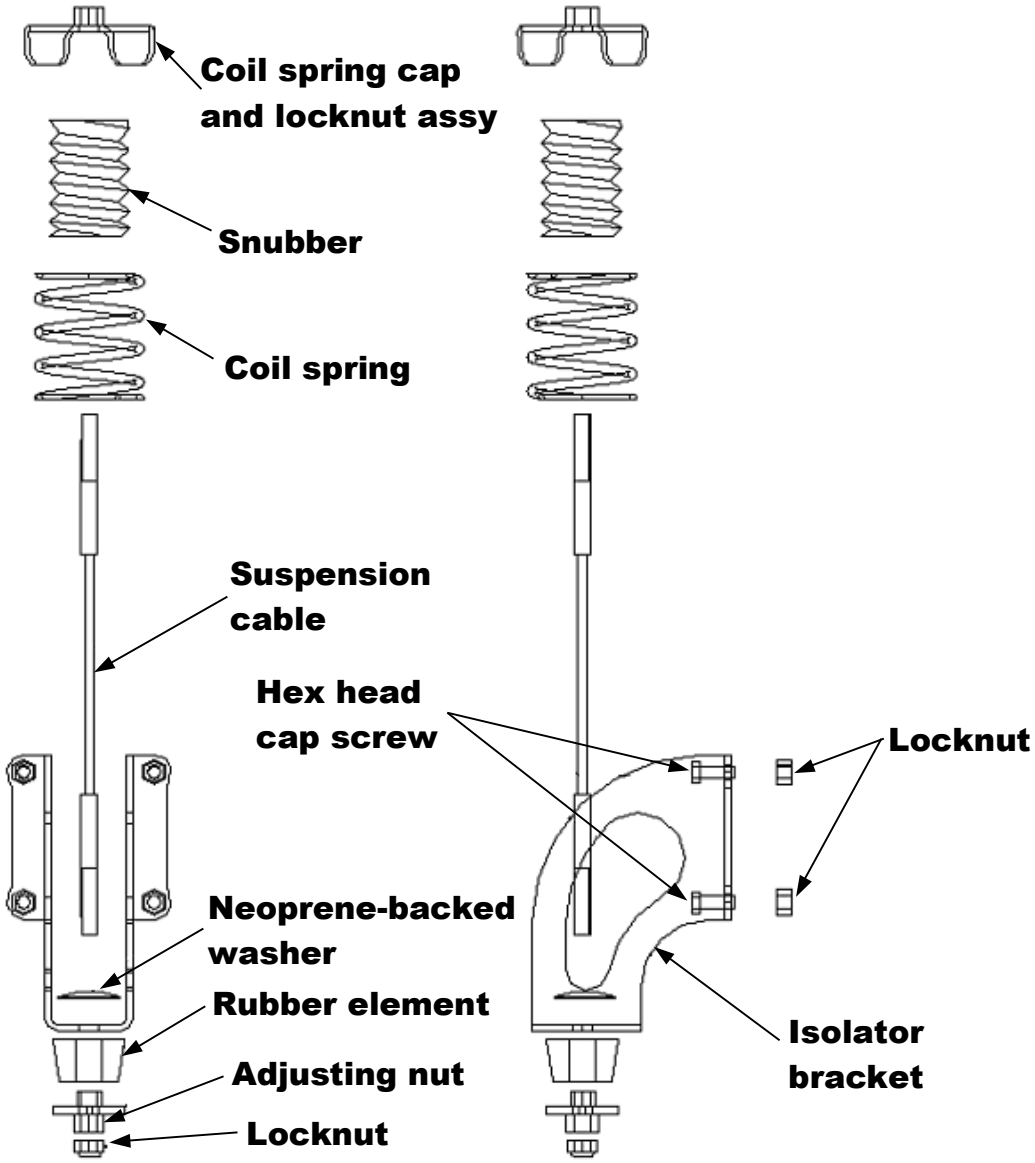

Figure 5: Typical Floor-Mounted Isolation Assembly

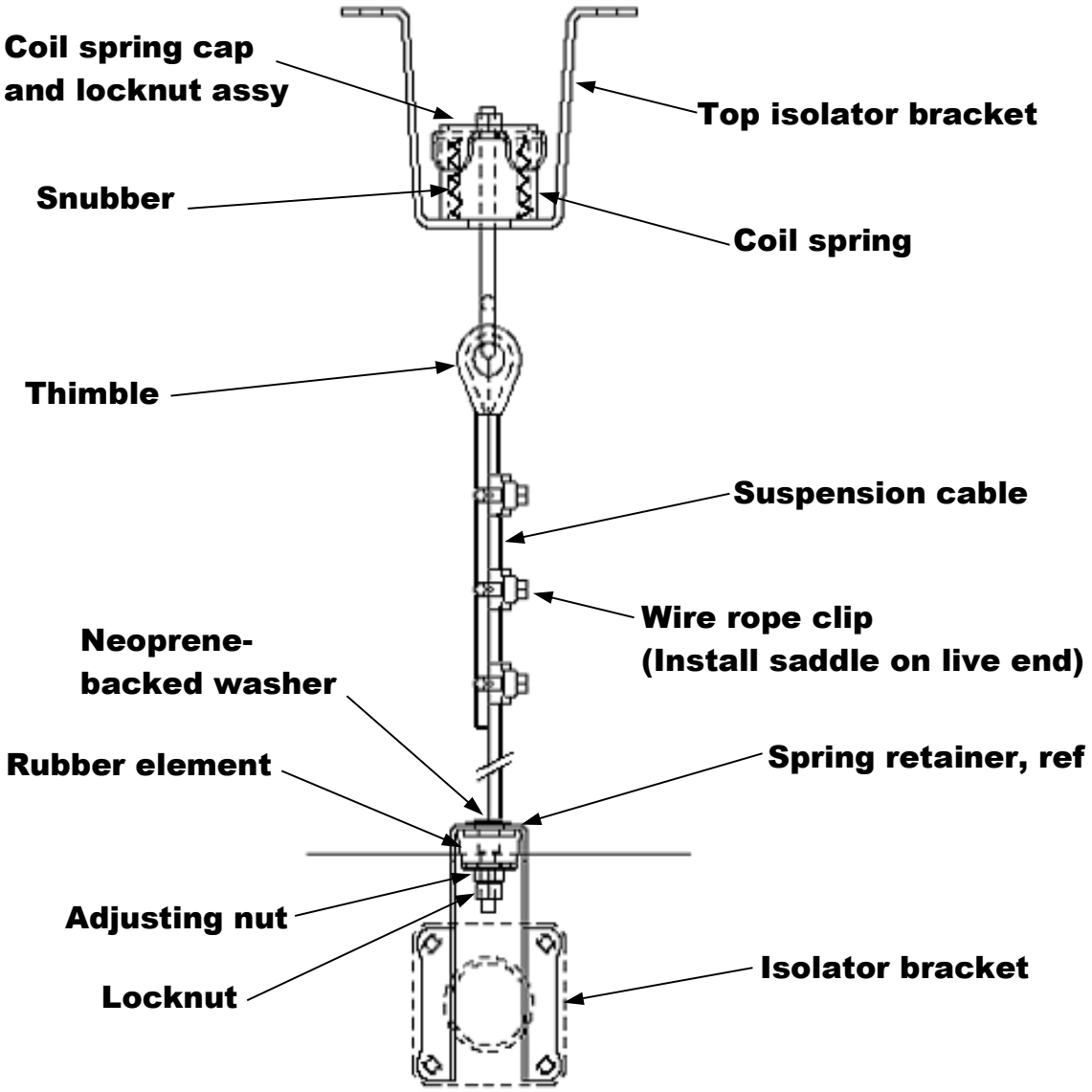

Figure 6: Typical Suspension-Mounted Isolation Assembly

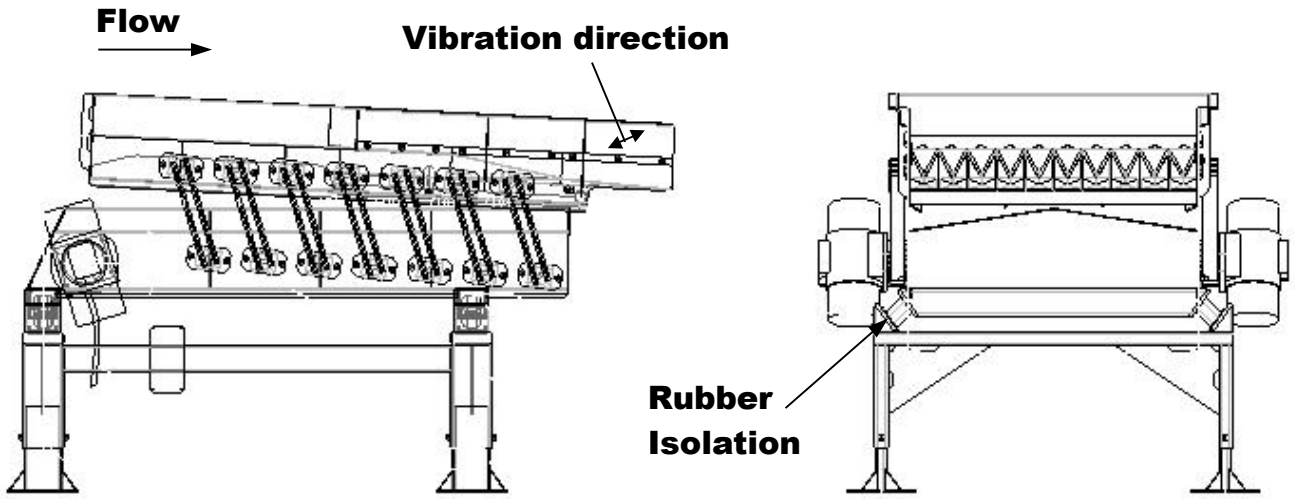

Figure 7: Side-mounted Isolators

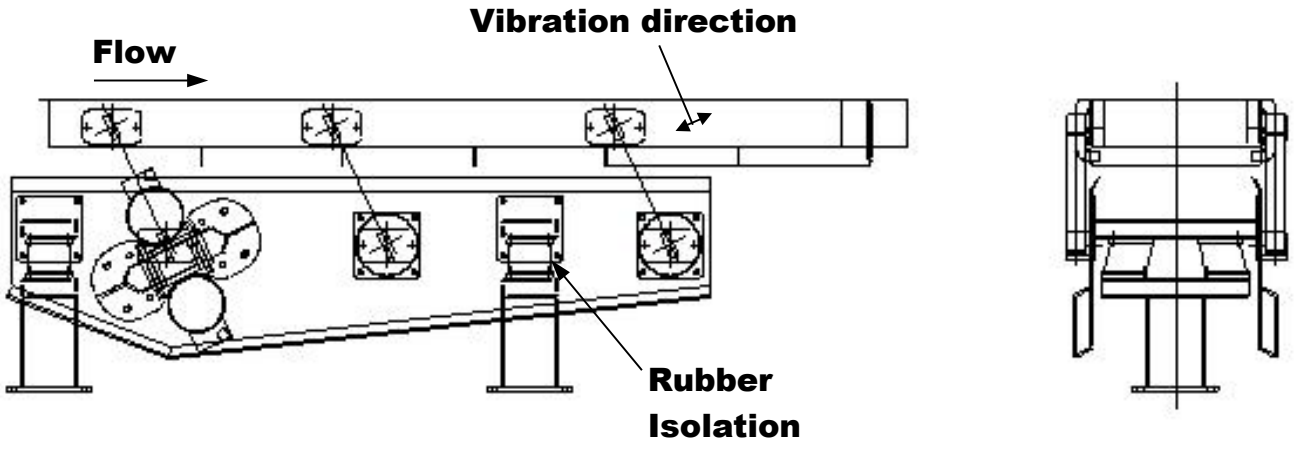

Figure 8: Bottom-mounted Isolators

2.3.4 CONVEYOR INSTALLATION AND ISOLATOR ADJUSTMENT

When lifting the conveyor, make sure that the lifting straps straddle the center of gravity of the conveyor to ensure a safe lift. To ensure a safe lift on cable-isolated conveyors, the unit can be lifted by wrapping a chain around the isolator bracket, as long as the chain angle is within 30° of vertical. **NOTE: Use edge protectors around sharp edges, and a spreader bar above the trough to prevent bending the sheet metal.** Lift the conveyor into position and install the isolators in the proper locations.

On cable-isolated conveyors, check for even loading on the isolators by measuring the compressed height of the coil springs. The height of the coil springs should be the same from one side of the conveyor to the other within 1/8 inch (3.2 mm). For each pair of suspension cables, the left-side cable should have the same tension as the right-side cable. This can be gauged by pushing and pulling laterally on the cables. Also, check the side-to-side levelness of the conveyor with a level. If adjustment is required, lift the conveyor off of the coil springs by an inch or two (25 or 50 mm), and adjust the effective length of the cable by turning the adjusting nut at the bottom of the cable. Set the conveyor back down on the coil springs. Re-check all isolator locations and repeat the process, if required.

IMPORTANT: For conveyors located above floor level that are suspension-mounted, PPM Technologies requires that safety cables be installed around the conveyor.

WARNING: Do not use rods for suspending the conveyor PPM Technologies is not liable for any damage or reduced performance that may occur as a result of improper equipment installation, or due to unauthorized alterations. Such actions will void any and all warranties.

2.4 ELECTRICAL

WARNING: These instructions and safety precautions must be followed. There is danger of electrical shock to the operator. The unit must be properly grounded and verified at installation.

WARNING: The electrical power supply connection to the PPM Technologies-supplied unit must be made through a customer-supplied safety disconnect switch. Incorporation of an emergency stop may also be required, according to local codes.

WARNING: The electrical power supply must be of sufficient size to carry the current designated on the equipment nameplate.

WARNING: Do not attach electrical conduit to the conveyor. PPM Technologies is not responsible for poor conveyor performance as a result of unauthorized alterations. Such actions will void any and all warranties.

The electrical power supply must not vary beyond the standard IEEE tolerance of +10% / -6%.

NOTE: **Due to the short burst of high inrush current that occurs when starting Ultra and Ultra Direct Conveyors, it is recommended that slow-blow type fuses be used to avoid nuisance tripping.**

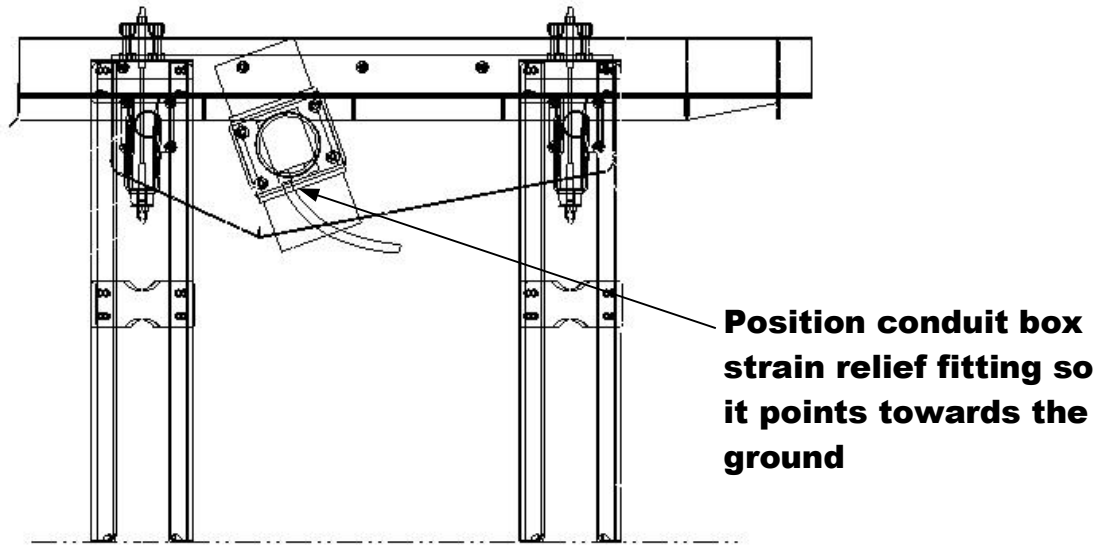

Figure 9: Conduit Box Orientation

2.4.1 ULTRA DRIVE CONDUIT BOX CABLE ORIENTATION

Extra caution must be taken to ensure that the ultra vibratory drive enclosure remains watertight. The vibratory drive is a self-contained unit. A possible water entry point is at the strain relief fitting where the power cable enters the conduit box. To keep this point water tight, the vibratory drive must be installed so that the strain relief fitting is oriented so that it points towards the ground (see **figure 9**.)

2.4.2 POLARITY/MOTOR ROTATION

The motors must be wired to rotate in opposite directions when mounted on the machine. This is normally addressed at the motor conduit box. Therefore, the connections at the junction box will have like-colored wires on the same terminals.

WARNING: Before performing any maintenance, the electrical power supply must be disconnected at the safety disconnect switch.

If the conveyor does not produce a smooth straight-line motion after several seconds of operation, immediately turn off the conveyor. Lock out the power and reverse any two of the leads (except the ground lead).

2.4.3 VARIABLE FREQUENCY DRIVES

Variable frequency drives must be of the pulse-width-modulated type. The current rating of the VFD must be 1.25 times the sum of the current ratings on the two vibrators.

In order to avoid resonant frequency problems, the acceleration time should be set to 1 to 2 seconds and the deceleration time should be set to 2 to 4 seconds.

WARNING: Never adjust the frequency above 60 Hz without consulting the PPM Technologies; serious machine damage and or personal injury will result.

2.5 SAFETY SLING INFORMATION

- For Information Purposes Only -

Safety cables should be used on all PPM Technologies equipment that is either: (i) hung from the ceiling; or (ii) mounted in any other area that could result in bodily or physical harm should the unit become dislodged from its mounting position. Below are basic guidelines that PPM Technologies suggests for using safety cables.

1. PPM Technologies recommends installing safety cables at each conveyor support location. On short equipment use at least two (2) safety cables spread far enough apart to equally distribute the conveyor's weight.
2. Safety cables should be wrapped around the base, unless there is a chance that the cable could slip off under dynamic loading, in which case it is recommended to wrap the cable between the trough and base as close to the conveyor as possible without coming in contact with the conveyor as it vibrates.
3. On most PPM Technologies models, use at least ¼" diameter coated wire rope (5/16" O.D.) for the safety slings, rated at a minimum breaking strength of 7000 lbs.
4. If using cable clamps, make sure that the load bearing side of the safety cable is on the nut/saddle side of the clamps. Use a minimum of three clamps on each cable end. 5/16" diameter wire rope cable clamps should be torqued to a minimum of 30 ft-lbs.
5. On FMC/Allen Models: *BL*, *LBL*, *Dynatron*, *Magnatron*, and *Vastron* use 3/8" diameter coated cables (7/16" O. D.). 7/16" diameter wire rope cable clamps should be torqued to a minimum of 65 ft-lbs.
6. Safety cables must be secured to existing building ceiling structure. Fastening must be done in the manner specified by the manufacturer(s) of the fastener and safety cable. Installation must be done only by a certified or otherwise qualified person experienced in this type of installation. Structural integrity and installation shall be the responsibility of "others" and not PPM Technologies.

REQUIREMENTS

- **Safe Work Load.** The safe working load of the wire rope slings must not exceed rated capacities. Installation by "others" should follow the wire rope sling manufacture's recommended safe working load for the specific angle of loading, provided that you maintain a safety factor of five (5).
- **Environmental Effects.** Do not expose fiber core wire rope slings to temperatures above 180 ºF. Consult sling manufacturers before using slings in chemically active environments or in temperatures above 400 ºF or below -60 ºF.
- **A preventive maintenance program** should be established based on all applicable manufacturers' recommendations and/or experience gained from use of the equipment. The program shall include procedures and a scheduling system for normal periodic maintenance items, adjustments, replacements, and repairs. The program shall also ensure that records are kept and unsafe test and inspection discrepancies are documented and corrected. The need to repair or replace slings shall be determined by a certified or otherwise qualified person based on an evaluation of inspection results.

Disclaimer

PPM Technologies and its agents to ensure the accuracy and reliability of the information contained in this reference guide have put every reasonable effort forth. However, neither PPM Technologies, its agents, nor its consultant(s) make any effort representation, warranty, or guarantee in connection with the publication of these recommended methods and procedures. PPM Technologies hereby disclaims any reliability for loss or damage resulting from their use; for the violation of any federal, state, county, or municipal regulations with which these recommended methods and procedures may conflict; or for the infringement of any patent resulting from use of these recommended methods and procedures. These handling and installation instructions are not intended to preclude normal safety procedures, which should be followed to prevent injury to personnel. SAFE INSTALLATION PROCEDURES SHALL BE ENTIRELY THE RESPONSIBILITY OF THE INSTALLER.

IN NO EVENT SHALL FMC/ALLEN BE LIABLE FOR CLAIMS OF PERSONAL INJURY OR FOR SPECIAL, INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS OR REVENUE, LOSS OF USE OF THE CONVEYOR OR ANY ASSOCIATED EQUIPMENT, COST OF CAPITAL, COST OF THE SUBSTITUTE EQUIPMENT, FACILITIES OR SERVICES, DOWNTIME COST, CLAIMS OF CUSTOMERS OF THE OWNER FOR SUCH DAMAGES, OR FOR DAMAGE TO PROPERTY, WHETHER SUCH CLAIM SHALL BE FOR BREACH OF CONTRACT, BREACH OF WARRANTY, NEGLIGENCE OR STRICT LIABILITY, AND WHETHER SUCH CLAIM ARISES OUT OF OR RESULTS FROM THIS LIMITED WARRANTY, OR EXPRESS OR IMPLIED WARRANTIES, OR FROM THE DESIGN, MANUFACTURE, SALE, DELIVERY, RESALE, INSTALLATION, TECHNICAL DIRECTION OF INSTALLATION, INSPECTION, REPAIR, OPERATION OR USE OF THE CONVEYOR OR SAFETY CABLES.

All specifications are subject to change without notice.

3 OPERATION

3.1 OPERATIONAL LIMITS

WARNING: Do not operate Ultra and Ultra Direct Conveyors in a frequent start-stop mode. Violent conveyor motion, which may result in equipment damage or serious personal injury, will result as the speed passes through the natural frequency of the isolation system. For feed, no-feed operation, it is recommended that the conveyors be operated in a two-speed mode. For two-speed operation, consult PPM Technologies. Failure to follow these instructions will void the warranty.

WARNING: PPM Technologies is not responsible for any damage or injuries that may occur as a result of improper use of unauthorized alterations to the conveyor. Such actions will void any and all warranties.

The speed and stroke of the conveyor are preset at the factory and should not need adjusted. Over time, variations in material handling characteristics, and leaf spring fatigue may require an adjustment. The allowable variations from the nameplate settings are:

Stroke: ± 0.030 inches (0.8 mm)
Speed: ± 20 rpm

If greater deviation is required, contact the factory.

Another consideration during initial operation is increased motor current. During initial operation, motor current may be higher than normal. Due to variances in load, motor type and design, the actual break-in current level is not specified. As long as the motor current does not exceed the rated value of the motor by 10%, adjustments are not required.

3.2 UNUSUAL MOTION

During initial operation, observe the conveyor for any unusual motion. Unusual motion is any motion that does not correspond to basic conveyor operation. Examples of unusual motion associated with an improperly tuned conveyor would be:

- Stroke not within the design stroke tolerance.
- Base motion that occurs across the conveyor width. (Check for side-to side motion by observing the end of a base member in the product flow direction.)
- Base motion that occurs along the direction of flow greater than 1/16-inch (1.6 mm) total stroke. (This can be measured by placing a piece of masking tape on the base member face and turning on the machine. Once the machine is running, place the tip of a ballpoint pen on the tape only long enough to produce a mark. This mark can be measured and compared to the maximum allowable base stroke. Please note that this measurement does not apply to machines that are running at multiple speeds.
- Isolation cable whip during steady-state operation. (This type of motion is mainly observed in suspension mounted isolation systems. Please note that cable whip could be produced by excessive base motion. The amount of base motion should be determined before further investigation.)

WARNING: Cable whipping will result in rapid deterioration of the cable. This condition must be corrected immediately to prevent failure of the cable. Cable failure could result in damage to the equipment or serious bodily injury.

- Vertical motion in the isolation coil spring during steady-state operation greater than 1/8 inch (3 mm). This motion can be observed by holding a small ruler beside the coil spring while the conveyor is running. **Do not place fingers near the coil spring coils when taking this measurement because serious bodily injury could result.** Please note that this measurement does not apply to machines running at multiple speeds.)

If any of these unusual motions (or any other motion that does not correspond with basic conveyor operation) occurs, please contact PPM Technologies.

Ultra and Ultra Direct Conveyors are dynamically balanced machines; **it is imperative that no weight be attached to the equipment in any way, as it will negatively affect performance and void the warranty.** A one-inch (25 mm) clearance must be maintained at all points so that accessories do not contact the conveyor while it is operating.

3.3 TUNING

Tuning is the process of matching the operating speed of the conveyor with the leaf spring system as well as the weight of the conveyor. If any of these three parameters change, at least one of the other parameters must change to compensate. Over time, the leaf springs will lose stiffness due to fatigue and loss of clamping in the connection. This will cause the stroke to gradually increase. If unchecked, this process can "snowball" and result in extremely high strokes that could result in structural failures to the conveyor. **Therefore, the stroke should be monitored daily and recorded weekly in a logbook for early detection of any changes in the operating characteristics of the conveyor.**

For the first stroke increase of 0.030 inches (0.8 mm), the spring clamping bolts should be retorqued to 75 ft-lbs (102 N-m) to adjust for some initial loosening that may take place. After that, additional leaf springs should be added to tune the conveyor back to the nameplate values. Add two springs, one to each side of the conveyor directly across from each other, and check the stroke**.** This should be enough to bring the stroke down to an acceptable value. There are two ways to tell whether the conveyor is tuned properly:

1. **The stroke matches the nameplate value.**

2. **The base of the conveyor has no vibration (less than 1/16 inch (1.6 mm) in the direction of flow.)**

If both of these conditions cannot be met, contact PPM Technologies for assistance.

If the stroke starts to increase at a noticeable rate, it is time to replace the entire spring system. (Refer to **PREVENTATIVE MAINTENANCE.**)

3.3.1 MEASURING THE STROKE

Stroke is the overall dynamic displacement of the trough. The stroke of an Ultra or Ultra Direct Conveyor is measured on the stroke gauge provided with the unit. When the conveyor is running, the stroke of the unit is determined by the intersection of the inner lines, as indicated in **Figure 10**. When the inner lines appear as an **"X"**, the stroke should be read at the intersection of the **"X"**. The actual stroke should match the nameplate stroke. Position and age of the individual stroke gauge may cause a variance of as much as ± 0.010 inches (0.25 mm); this is a generally acceptable reading.

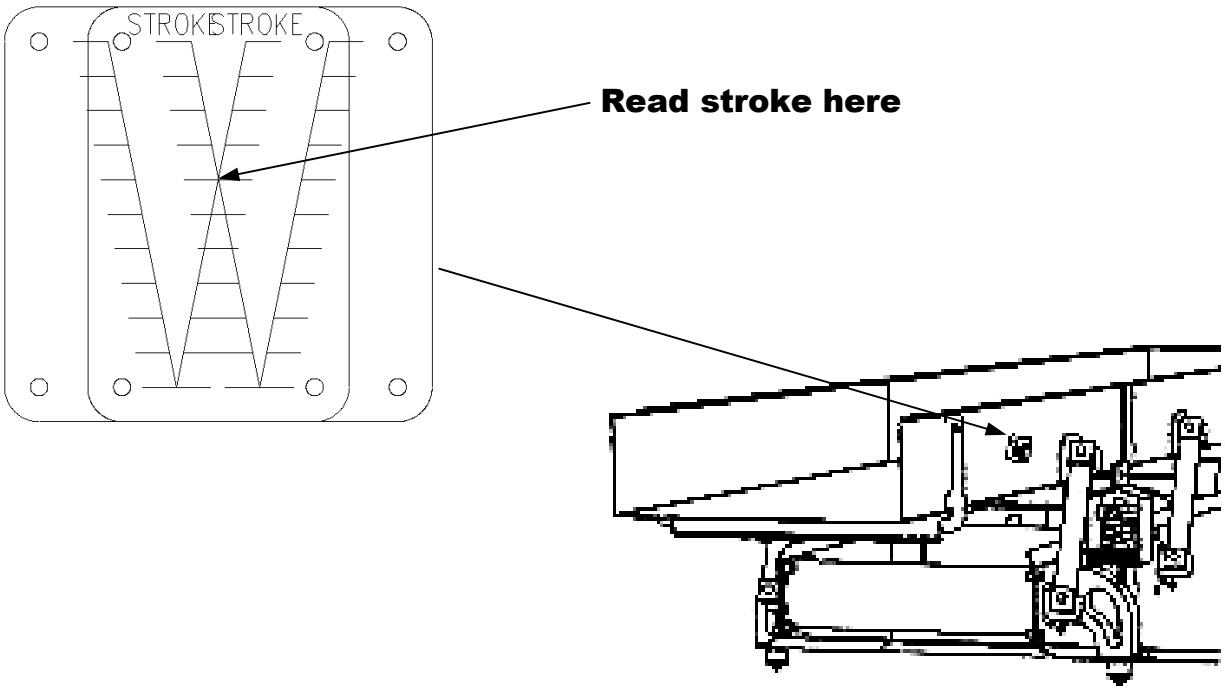

Figure 10: Reading the Stroke Gauge

3.3.2 CHECKING THE SPEED

To check the speed of the conveyor, aim the light beam of a digital tachometer at a vertical or near-vertical edge of the trough while the conveyor is running. (See **Figure 11.**) Hold the tachometer steady until a consistent readout is obtained.

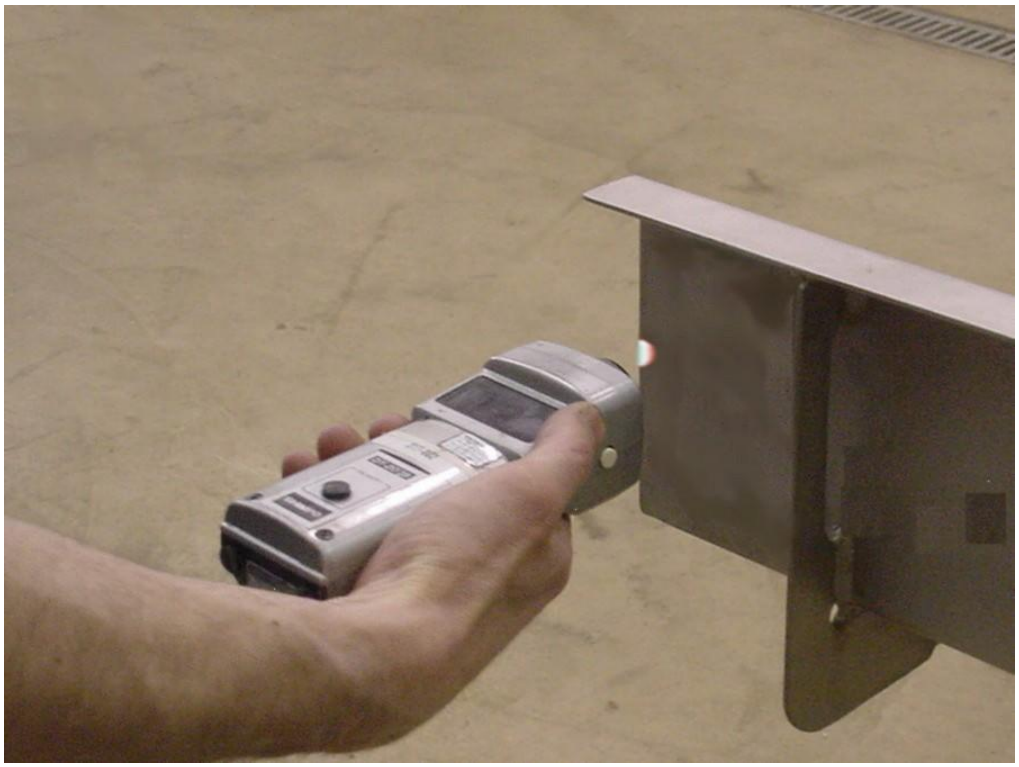

Figure 11: Checking Conveyor Speed with a Digital Tachometer

3.4 ACCESSORIES

There are several accessories available for Ultra and Ultra Direct Conveyors. All accessories are optional and must be specified when the order is placed.

3.4.1 COVERS

Covers are available for Ultra and Ultra Direct Conveyors. Since covers become a part of the vibrating weight of the conveyor, the unit should not be operated with a cover removed. If covers or any accessories need to be removed or added, consult PPM Technologies.

3.4.2 PNEUMATIC GATES

The normal operating pressure for pneumatic gates is 60 psi. All gates are preset at the factory. Flow control valves are provided, however, for adjusting the actuation speed of the gate as required for changes in friction characteristics and wear over the life of the gate. The closing speed should be set so that the gate plate accelerates past the product to avoid pinching the product, but not so fast as to slam shut. The opening speed should be just fast enough to provide a clean discharge into the takeaway chute without spilling product.

If excessive airflow is needed, check for material build-up that may be causing an interference condition. For slide gates, check that the gate springs are not set too tight. Gate springs should be adjusted to take up the clearance between the rail and the gate plate, and provide enough force to prevent rattling, but no more. Never replace the air cylinders with a different type, bore, or stroke from the original cylinders.

3.4.3 SCREEN CLOTH

Screen cloth can be stretched quickly to the required tension by tightening the tension wing nuts. Tighten nuts uniformly, working from the center of the screen panel out towards the ends. The panel should be approximately centered between the side plates. When replacing the screen cloth make sure that the rubber channels are installed on the bucker bar's and they are in good condition.

The gauging of proper tension is a matter of good judgment and experience. A properly mounted fine mesh screen cloth when struck between the deck supports with the open hand will be resilient and cause the hand to rebound. Heavier cloths, when struck with the side of the fist, should not slap against the supports. Relative motion between the screen cloth and supporting deck structure will decrease the screening efficiency and also shorten screen life.

3.4.4 ADJUSTABLE DIVERTERS, CLAMPED-IN SCREEN PANELS, ETC.

Periodically check to make sure that clamps are tight and in good working order. Loose panels will fatigue and crack and may also cause failures in the main trough structure.

4 MAINTAINENCE

4.1 PREVENTATIVE MAINTENANCE

WARNING: Before performing any maintenance, the electrical power supply must be disconnected at the safety disconnect switch.

WARNING: Each unit is factory tuned. Consult PPM Technologies prior to performing any modifications. PPM Technologies is not responsible for poor conveyor performance that results from unauthorized modifications. Such actions will void any and all warranties.

WARNING: PPM Technologies will not be responsible for any equipment damage caused by adding unauthorized grease to the main bearings. Such actions will void any and all warranties.

Some materials adhere to the trough surface that will affect the tuning and balance of the conveyor.

4.1.1 RECOMMENDED TOOLS

The following special tools and instruments are recommended for working on Ultra and Ultra Direct Conveyors:

- Torque wrenches (See **TORQUE SPECIFICATIONS**)
- Digital level (for installation)
- Tachometer, digital, non-contact

4.1.2 MAINTENANCE SCHEDULE

The Ultra conveyors are basically maintenance free, however operators should conduct the following checks and preventative maintenance in accordance with the Ultra Drive and VF maintenance manuals. This quick reference sheet is not intended to replace the operator's manual. When conducting preventative maintenance checks, please refer the operator's manual for proper maintenance procedures.

Model	Frequency	Maintenance Check	Action required
Ultra Ultra Direct	Daily	Check stroke of machine on stroke gage. It should not be more than .03" over the value on the nameplate	On Ultra conveyors, add additional fiberglass springs per the maintenance manual to bring stroke within tolerance. (Note: On Ultra & Ultra Direct conveyors, the drive thrust settings may need to be adjusted. Refer to Vibrator Manual # M3286FMC)
Ultra	Monthly	Inspect Springs for wear, damage or fatigue	If springs show signs of wear (black or gray residue originating from springs or cracks under the clamp bar), replace all worn springs and re-torque bolts to 75 ft-lbs using a torque wrench. Refer to operator's manual for proper spring replacement procedure.
Ultra Ultra Direct	Every 2000 Hours of Operation	Lubricate vibrators with the amount of grease specified in vibrator manual # M3286FMC. (If vibrator's operating temperature is greater than 194° F, lubricate drives every 1000 hours with half the specified amount). If temperature is above 212° F, contact PPM Technologies.	Use Kluber Isoflex NBU 8EPLubricant only). **Note: Use only approved grease per the Vibrator Manual! The warranty will be voided if unapproved grease is used**

4.1.3 LEAF SPRINGS

WARNING: Defective springs must be replaced immediately.

Inspect the leaf springs periodically. Worn springs are characterized by delamination of the fibers, discoloration and/or small cracks near the clamp bar. The springs must be removed from the conveyor to obtain a good check. If the springs are cracked at several locations, it is likely that all of the springs need replaced.

NOTE: **Leaf springs must be replaced with springs of the same size and thickness. Replacement leaf springs must be obtained through the PPM Technologies Service Department.**

IMPORTANT: **When replacing leaf springs, it is important to note the arrangement of the spring stack. The stack must be reassembled in the same order and same location on the conveyor. Figure 12 illustrates typical spring arrangements. Tighten to a torque of 75 ft-lb (102 N-m).**

If the speed is correct, an overstroking of the conveyor is corrected by adding more leaf springs. An understroking condition is corrected by removing leaf springs.

Spring quantities must always be symmetrical about the centerline of the conveyor.

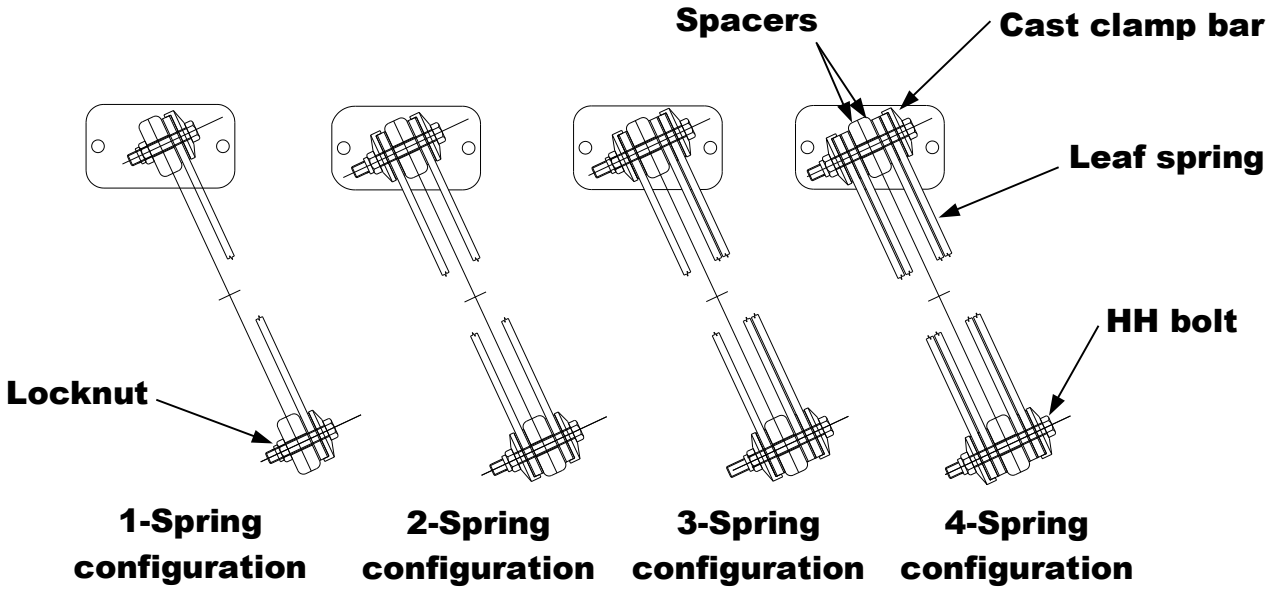

Figure 12: Typical Spring Arrangements

The maximum number of standard (15-3/4 inches overall length) springs that can be used per bracket on the cast stainless steel brackets are listed below.

TABLE 1
SPRING USAGE ON CAST SPRING BRACKETS

Trough stroke (Inch)	Springs per bracket
0.46 or less	4
0.39 or less	6

The spring quantity on each face of the bracket must be as even as possible. The difference between the front and back faces must never be more than one spring. Make sure that each face of each leaf spring has a spacer in contact with it and that all spacers are the same thickness. Clamp bars must be installed square with the leaf springs. The leaf springs should be evenly distributed on corresponding left to right spring brackets. Failure to do so could result in structural damage.

NOTE: **In some special cases the machine stroke may be set as high as 0.53 inches. In these cases limit the spring quantities to 4 springs per bracket.**

4.3 Troubleshooting – Ultra Conveyor

TROUBLESHOOTING - Ultra Conveyor: (Units with fiberglass leaf springs.)		
PROBLEM	**CAUSE**	**CORRECTION**
Drive does not run, no vibration.	1. Blown fuse/circuit breaker.	Replace fuse/reset circuit breaker.
	2. Broken wire/loose connection.	Repair wiring.
	3. Both vibrator motors have failed.	Replace.
Overstroking (high amplitude).	1. Material build-up.	Clean as required.
	2. Additional weight added to trough.	Contact PPM Technologies.
	3. Drive speed is too high.	Inverter max frequency should be no more than 60 Hz.
	4. Incorrect rate of leaf springs.	Check for broken springs. Tighten spring clamping bolts. Increase spring quantity.
	5. Defective or cracked trough.	Repair or replace. Contact PPM Technologies.
	6. Vibrator weight setting too high.	Reduce weight setting on both ends of both motors.
Understroking (low amplitude).	1. Weight removed from trough.	Replace weight.
	2. Broken isolation springs.	Replace.
	3. Excessive support structure motion.	Modify support structure to eliminate resonance.
	4. Drive speed is too slow.	Reset inverter.
	5. Excessive base motion.	See below.
	6. One motor not running.	Repair wiring. Replace failed motor.
	7. Both motors running in same direction.	Modify wiring so motors counter-rotate.
	8. Vibrator weight setting too low.	Increase weight setting on both ends of both motors.

TROUBLESHOOTING - Ultra Conveyor: (***Continued***) **(Units with fiberglass leaf springs.)**		
PROBLEM	**CAUSE**	**CORRECTION**
Excessive base motion.	1. Material build-up.	Clean as required.
	2. Excessive support structure motion.	Modify support structure to eliminate resonance.
	3. Incorrect drive speed.	Reset inverter.
	4. Incorrect rate of leaf springs.	Check for broken springs. Tighten spring clamping bolts. Increase spring quantity.
	5. One motor not running.	Repair wiring. Replace failed motor.
	6. Both motors running in same direction.	Modify wiring so motors counter-rotate.
	7. Vibrators accelerate too slowly.	Check for proper line voltage. Decrease acceleration time on inverter.
Side motion.	1. Broken isolation springs.	Replace.
	2. Excessive support structure motion.	Modify support structure to eliminate resonance.
	3. One motor not running.	Repair wiring. Replace failed motor.
	4. Both motors running in same direction.	Modify wiring so motors counter-rotate.
	5. Vibrators accelerate too slowly.	Check for proper line voltage. Decrease acceleration time on inverter.
Excessive bounce when stopping.	1. Coil spring inserts not installed.	Install coil spring inserts.
	2. Vibrators decelerate too slowly.	Decrease deceleration time.

NOTES:

1. The number designation under **CAUSE** indicates probability. That is, No. 1 should be investigated first because it is the most likely cause of the problem.

2. Support structure is defined as any item that supports the conveyor (i.e., pipes, tubes, cables, mezzanines, etc.)

4.3 Troubleshooting – Ultra Direct Conveyor

TROUBLESHOOTING – Ultra-Direct: (Units with NO leaf springs)		
PROBLEM	**CAUSE**	**CORRECTION**
Drive does not run, no vibration.	1. Blown fuse/circuit breaker.	Replace fuse/reset circuit breaker.
	2. Broken wire/loose connection.	Repair wiring.
	3. Both vibrator motors have failed.	Replace.
Overstroking (high amplitude).	1. Weight removed from trough.	Replace weight. Reduce vibrator weight setting.
	2. Defective or cracked trough.	Repair or replace. Contact PPM Technologies.
	3. Vibrator weight setting too high.	Reduce weight setting on both ends of both motors.
Understroking (low amplitude).	1. Material build-up.	Clean as required.
	2. Additional weight added to trough.	Contact PPM Technologies.
	3. Broken isolation springs.	Replace.
	4. Excessive support structure motion.	Modify support structure to eliminate resonance.
	5. One motor not running.	Repair wiring. Replace failed motor.
	6. Both motors running in same direction.	Modify wiring so motors counter-rotate.
	7. Vibrator weight setting too low.	Increase weight setting on both ends of both motors.

TROUBLESHOOTING – Ultra-Direct:
(*Continued)*
(Units with NO leaf springs)

PROBLEM	CAUSE	CORRECTION
Side motion.	1. Excessive support structure motion.	Modify support structure to eliminate resonance.
	2. Defective or cracked trough.	Repair or replace. Contact PPM Technologies.
	3. One motor not running.	Repair wiring. Replace failed motor.
	4. Both motors running in same direction.	Modify wiring so motors counter-rotate.
	5. Vibrators accelerate too slowly.	Check for proper line voltage. Decrease acceleration time on inverter.
Excessive bounce when stopping.	1. Coil spring inserts not installed.	Install coil spring inserts.
	2. Vibrators decelerate too slowly.	Decrease deceleration time.

NOTES:

1. The number designation under **CAUSE** indicates probability. That is, No. 1 should be investigated first because it is the most likely cause of the problem.

2. Support structure is defined as any item that supports the conveyor (i.e., pipes, tubes, cables, mezzanines, etc.)

4.4 MECHANICAL DISASSEMBLY/ASSEMBLY

4.4.1 REMOVAL AND REPLACEMENT OF THE DRIVE

WARNING: Before performing any maintenance work, the electrical power supply must be disconnected at the safety disconnect switch.

1. Before removing a vibrator, take note of the wiring connections in the junction box.
2. Disconnect the wires.
3. Remove the four mounting bolts at the base of the vibrator.
4. Remove both end caps and set the thrust of the eccentric weights at both ends of the vibrator to the thrust setting shown on the General Arrangement drawing and the same as the other vibrator on the unit. (Refer to the vibrator service manual #M3286FMC for additional information.)
5. Install end caps, making sure that the O-rings are seated entirely in the grooves of the end caps.
6. Install the new vibrator and tighten the bolts to the torque specified on the General Arrangement drawing.
7. Re-connect the wires in the same pattern that they were originally connected.

WARNING: It is important to replace vibrators with the same type and model number as the original.

WARNING: Failure to set the thrust and vibrator direction to the specified settings will cause undesirable motion in the conveyor and may cause serious physical injury.

4.5 ELECTRICAL DISASSEMBLY/ASSEMBLY

WARNING: Before performing any maintenance work, the electrical power supply must be disconnected at the safety disconnect switch.

WARNING: The electrical power supply conductor must be of sufficient size to carry the current designated on the equipment nameplate.

Always replace the vibrator with a vibrator of matching specifications. After each disassembly of the equipment, always restore the drip loop to the cable just as it was installed initially to ensure the continued protection against moisture traveling down the cable.

4.5 RECOMMENDED SPARE PARTS

TABLE 2 SPARE PARTS LIST		
ITEM #	**PART #**	**Description**
1	VARIES BY MODEL	VIBRATOR (1 PER EVERY 5 UNITS)
2	VARIES BY MODEL	VFD (IF SUPPLIED, 1 FOR EVERY 5 UNITS)
3	VARIES BY MODEL	ISOLATORS, COIL SPRING OR RUBBER (1 PER EVERY 5 UNITS)
4	VARIES BY MODEL	SPACERS
5	702715-002	LEAF SPRINGS (15.75”), (5% OF TOTAL ON UNIT)
6	702866-002	LEAF SPRINGS (18”), (5% OF TOTAL ON UNIT)
7	VARIES BY MODEL	ISOLATION CABLE (IF SUPPLIED, 1 PER 5 UNITS)

NOTES

Please furnish complete nameplate information when order parts.
Contact FMC/Allen Systems Customer Service at 800-246-2034.

NOTE: The torque rating for class 2, grade B8 stainless steel bolts is the same as for grade 5 bolts. Use a small amount of anti-seize when using stainless steel bolts.

TABLE 3 TORQUE SPECIFICATIONS		
Size	**Torque**	
	Ft-lb	**N-m**
1/2 - 13, GR5	75	102
1/2 - 13, SUPERTAINIUM	118	163
9/16-12, GR5	110	149
58/-11, GR5	150	203
3/4-10, GR5	260	353
7/8-9, GR5	430	483
1-8, GR5	640	868

WARNING: Always replace bolts with bolts of the same grade as indicated by the head marking. For class 2, grade B8 stainless steel bolts the B8 head marking must be underlined. Failure to use underlined bolts will result in serious machine damage and/or personal injury.