VM-3650G

Installation, Operation and Maintenance Instructions

HVF FEEDERS AND HVC CONVEYORS

ERIEZ MAGNETICS HEADQUARTERS: 2200 ASBURY ROAD, ERIE, PA 16506–1440 U.S.A.
WORLD AUTHORITY IN ADVANCED TECHNOLOGY FOR MAGNETIC, VIBRATORY and INSPECTION APPLICATIONS

Introduction

This manual describes Eriez' new mechanical vibrating feeders and conveyors.

The easy-to-clean, all-metal pans provide low cost movement to a wide variety of materials. The pans can be supplied open or enclosed, with liners or screens, and with a variety of inlets and outlets.

A careful reading of these Installation, Operation and Maintenance Instructions will assure the most efficient and dependable performance of this equipment.

Please include the model and serial number found on the nameplate with any correspondence concerning your feeder or conveyor.

⚠ WARNING: Suspension mounting inherently involves risk of damage to property or injury to personnel located under or near the equipment, should a suspension component fail. As with all suspended equipment, access to the area under this machine should be restricted. Specifications for suspension components given in this manual are suggestions only, and the user is entirely responsible for final selection of suspension method and details. Select and properly use suspension components with rated capacities (including all appropriate reduction factors) that provide adequate safety when the weight of the equipment and all possible loading conditions and upsets are taken into account. Consult Eriez at 814-835-6000 if additional information regarding Eriez equipment is needed to make this selection.

⚠ CAUTION: Safety labels must be affixed to this product. Should the safety label(s) be damaged, dislodged or removed, contact Eriez for replacement.

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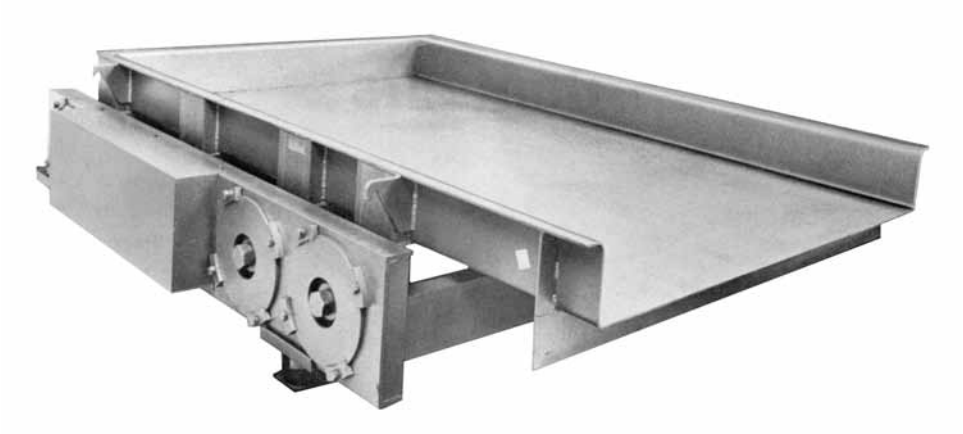
ERIEZ HVF FEEDERS AND HVC CONVEYORS



TYPICAL ERIEZ MODEL HVF HIGH VOLUME FEEDER

TYPICAL ERIEZ MODEL HVC HIGH VOLUME CONVEYOR

Installation

SHIPPING DAMAGE
When you receive your feeder or conveyor, examine it carefully for damage. If damage is found, report it immediately to Eriez Magnetics and the carrier.

HANDLING
It is important to handle this equipment carefully to avoid twisting or bending the frame or pans. If lift lugs are provided, they must be used; otherwise, lift with slings.

A spreader board over the pan should be used to prevent your chain or cable from bending the pan while lifting.

An excessively large amount of weight placed on the pans or springs could damage the unit.

INSTALLATION
Feeders are usually suspended from hooks on the pan with rubber isolation springs. Base mounting is used only where the headload from customer's material is small.

The isolation assemblies should be welded to suitable overhead structure or hopper (Figure 1). Wire rope and/or turnbuckles may be used for greater suspension heights. For proper operation, all suspension points should have nearly equal tension.

When base mounting is used, attach the spring pads provided to floor or framework. Be sure that there is adequate clearance between any solid object and the pan or base.

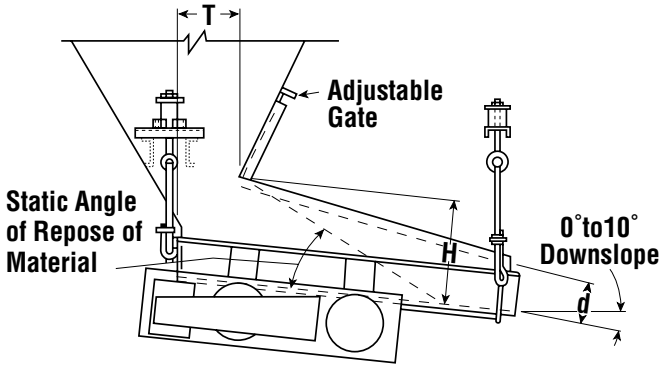
Feeders are usually suspended with a downslope of up to 10 degrees. At this downslope the Model HVF feeders can attain velocities of up to 100 feet per minute (.5 mps), depending upon material characteristics.

⚠ WARNING
Suspension components provided by Eriez have been properly sized for the equipment weight and normal operating loads, including reasonable upset conditions and safety factors. However, the design cannot take account of extreme operating or installation conditions of which Eriez may not be aware. The ultimate decision as to the adequacy of any suspension component, whether Eriez-supplied or customer-supplied, is the responsibility of the installer and user.

You should select all suspension components with proper consideration of the equipment weight, normal and upset operating loads, and safety factors. If you need any further information about the equipment characteristics for your suspension design, please contact Eriez. The suspension design itself should be carried out by properly qualified engineering personnel, Failure to observe these precautions can result in death, serious personnel injury, and/or equipment damage.

HOPPER DESIGN AND FEEDER CAPACITY
For vibratory feeders to perform at maximum capacity, it is important to design bins and hoppers for optimal material flow patterns. This is best achieved with the following guidelines.

The hopper throat opening T (see Figure 1) should be at least 2.5 times the largest particle diameter, for randomly sized material. 'Diameter' here refers to the size of the largest circle that will barely contain an irregularly-shaped particle. For applications with all particles nearly the same size, T should be 5 times the nominal particle diameter.



T = Hopper-Throat Opening
H = Gate-Height Opening
d = Material Depth of Flow

FIGURE 1

Installation (cont.)

Best flow patterns result when the gate height H is at least twice the throat dimension T, as shown in Figure 2. Values of H equal to T are acceptable, but when H becomes less than T material flow patterns are not uniform and usually result in dead zones where little or no flow occurs, as shown in Figure 3.

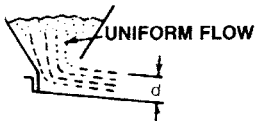


FIGURE 2

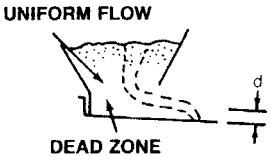


FIGURE 3

The capacity of a vibratory feeder is given by:

Q = (W x d x D x v) / K

Where	English	Metric
Q = capacity	TPH	MTPH
W = tray width	inches	mm
d = material depth	inches	mm
D = material density	lb/cu ft	g/cu cm
v = flow velocity	ft/min	m/min
K = constant	4,800	16,700

Along with the hopper design, the flow velocity v depends on material characteristics such as particle size, size distribution, and moisture content.

WIRING

Wiring to the motor should enter from a flexible conduit. Use of a motor starter and circuit protection is recommended. Wiring must be properly sized to prevent line voltage drop.

Motors commonly supplied are 1725 rpm, dual voltage polyphase. Connect wiring according to the manufacturer's instructions, usually located on the nameplate or in the conduit box cover.

Motor rotation should be such that the top of the pulley rotates in the opposite direction from the feed of the pan. However, some materials feed better with the belt turning in the same direction as the feed.

When controller is supplied connect according to instructions enclosed with this equipment.

SPECIAL TROUGHS AND ATTACHMENTS

Eriez Engineering Service Department should always be consulted before undertaking the design or construction of special troughs. The troughs as furnished by Eriez should not be modified or attachments added without first consulting Eriez, as the feeders and conveyors are a tuned mass system and damage will result. Doing so will void the warranty.

Operation

DEFLECTION

Eriez mechanical conveyors and feeders are normally set at approximately 7/16" (11 mm) pan deflection. This can be checked with an Eriez deflection sticker. The sticker is read while the equipment is operating by looking at the optical illusion in which the printed circles appear as double. Read the deflection where a pair of circles just touch together. A deflection sticker is shown actual size in Figure 4

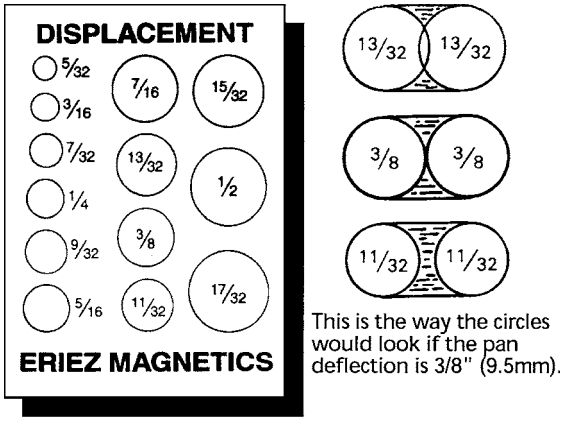


FIGURE 4

The deflection may also be read by holding a pencil very steadily (resting against a solid object) and touching the pan side with the pencil point while the pan is operating. Then stop the equipment and measure the deflection indicated by the line drawn on the side of the pan.

Do not operate at pan deflections greater than 7/16" (11 mm) because spring damage will result.

The total of pan deflection and base deflection must not exceed 11/16-inch (17 mm). These deflections should be taken at full voltage and with material feeding at maximum capacity.

DEFLECTION ADJUSTMENT

The deflection may be changed by means of the adjustable drive sheave. Making the sheave smaller in pitch diameter will slow down the eccentric shaft and decrease the deflection. Increasing the drive sheave pitch diameter will increase deflection.

To adjust the drive sheave:

1. Loosen motor plate mounting bolts (Figure 5).
2. Slide motor plate forward to loosen belt.
3. Loosen set screws that lock sheave halves.
4. Turn sheave halves so they move apart to decrease the pitch diameter or turn the opposite way to increase diameter.
5. Replace key and tighten set screws.
6. Reinstall belt and pull motor tight against belt.
7. Tighten motor plate mounting bolts.

If the driven sheave is removed, the tapered bushing must be carefully tightened to prevent slipping on the shaft. Tighten each bolt in the bushing until each is tightened to about 10 ft. lb (7 Nm). Be sure to recheck the torque because tightening one bolt will loosen the others.

NOTE: Material build-up on pan may increase pan deflection and cause tray, base or tuning spring failure.

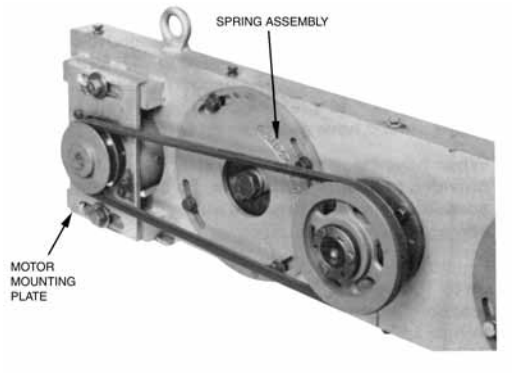


FIGURE 5

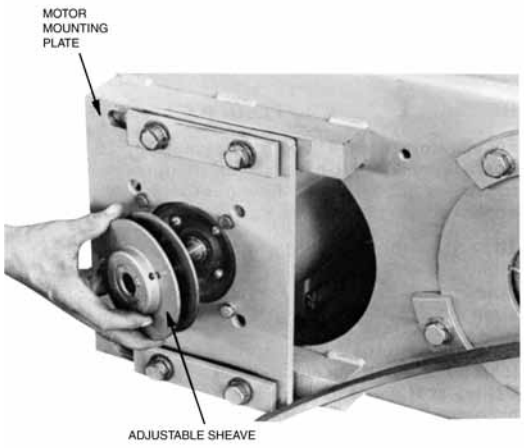


FIGURE 6

⚠ CAUTION

Do not operate the unit with any associated equipment in direct contact with any part of the vibratory unit.

The manual variable speed drive (MVS) consists of a variable pitch sheave with an adjustment handwheel on the motor and a spring loaded companion sheave on the eccentric shaft. The companion sheave will change pitch diameter in response to changes made to the adjustable motor sheave while remaining at the same center distance.

In operation, turning the handwheel counterclockwise while the motor is running will increase the speed and deflection and turning the handwheel clockwise will decrease speed and deflection.

Operation (cont.)

The motor sheave has an internal maximum speed stop which is factory set; however this stop may be overpowered and damaged by continued turning the handwheel with excessive force after the maximum speed stop has become engaged. This will cause the unit to over-deflect beyond its design deflection and cause premature failures. When the handwheel is turned to the point where the maximum speed stop is engaged, DO NOT FORCE IT TO TURN ANY FURTHER!

When replacing belts, be sure to set the motor at the same center distance as it came from the factory. Incorrect center distances will cause the maximum speed to increase which will cause the unit to over-deflect and fail.

To set the proper center distance, you must open the motor sheave until the belt can ride at the smallest pitch diameter at the bottom of the groove. Then position the belt in the driven sheave so that the top of the belt is even with the outside diameter of the driven sheave (at the maximum pitch diameter). Slide the motor mount back until there is some tension on the belt and lock the mount in that location. Upon starting the motor, turning the handwheel counterclockwise will give the proper belt tension.

Some MVS drives use asymmetrical belts which means that one side of the belt is made at a different angle than the other. On these units it is necessary to install the belt so that the sides of the belt match the sides of the sheaves.

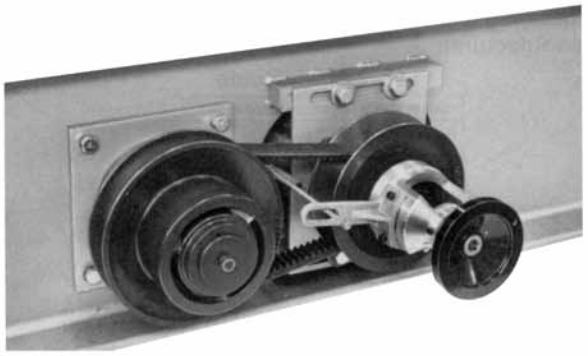


FIGURE 7

Maintenance

LUBRICATION

Bearings should be lubricated approximately every 200 hours of operation with grease gun suitable for roller bearings.

This bearing is factory lubricated with No. 2 consistency lithium base grease which is suitable for most applications. However, extra protection is necessary if bearing is subjected to excessive moisture, dust, or corrosive vapor. In these cases, bearing should contain as much grease as speed will permit (a full bearing with consequent slight leakage through the seal is the best protection against contaminant entry).

In extremely dirty environments, the bearing should be purged daily to flush out contaminants. For added protection, it is advisable to shroud the bearing from falling material.

The following table is a general guide for normal operating conditions. However, some situations may require a change in lubricating periods as dictated by experience. If the bearing is exposed to unusual operating conditions, consult a reputable grease manufacturer.

Suggested Lubrication Period in Weeks				
Hours Run Per Day	251 to 500 RPM	501 To 750 RPM	751 To 1000 RPM	1001 To 1500 RPM
8	12	10	7	5
16	7	5	4	2
24	5	3	2	1

ADJUSTMENTS

DEFLECTION

As mentioned earlier, the deflection is set at time of manufacture at approximately 7/16" (11 mm). Deflection may be adjusted by changing the speed as described in the preceding section.

SPRING ANGLE

Spring angle is factory set at the optimum setting.

If special conditions warrant changing the spring angle proceed as follows (see Figure 8):

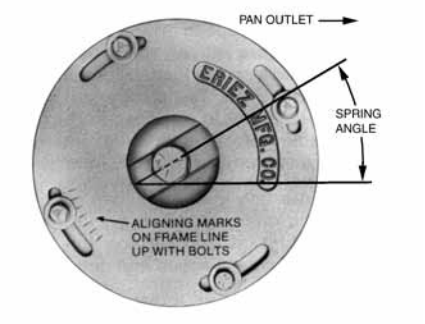


FIGURE 8

1. Loosen spring center bolt.
2. Loosen clamp bolts.
3. Rotate spring in the base channel to the desired angle. Normally all springs are set at the same angle.

   NOTE: Alignment marks on the spring frame represent 5°.
4. Tighten clamp bolts.
5. Tighten center bolts and torque to required values.

Torque spring center bolts as follows:

Bolt Size	Torque	
	ft lb	Nm
3/4 – 10	260	190
1 – 8	640	475
1-1/4 – 7	1120	830
2 – 4-1/2	2500	1850

If these springs are removed for any reason, they must be replaced and set at the same angle of inclination from the horizontal as originally set.

When replacing motors, replace with an identical hp, rpm and voltage motor and insure all sheaves are in proper alignment. Excessive belt wear will result if belts are operated misaligned. Always replace worn belts.

SPRING REPLACEMENT

1. Note angle at which old spring is set.
2. Remove old spring as shown (Figure 9).
3. Install new spring and set angle as described earlier.

NOTE: It is best to replace springs one at a time so that the pan will be supported by the remaining springs.

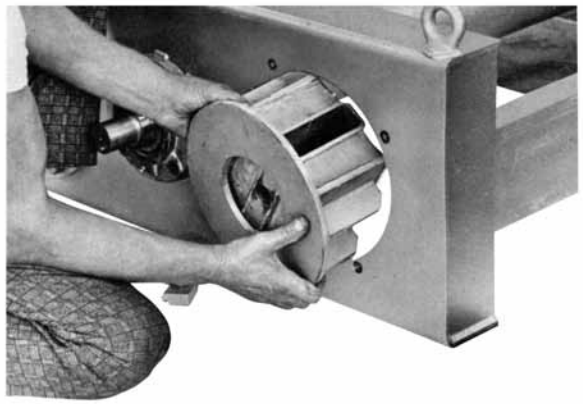


FIGURE 9

BELT

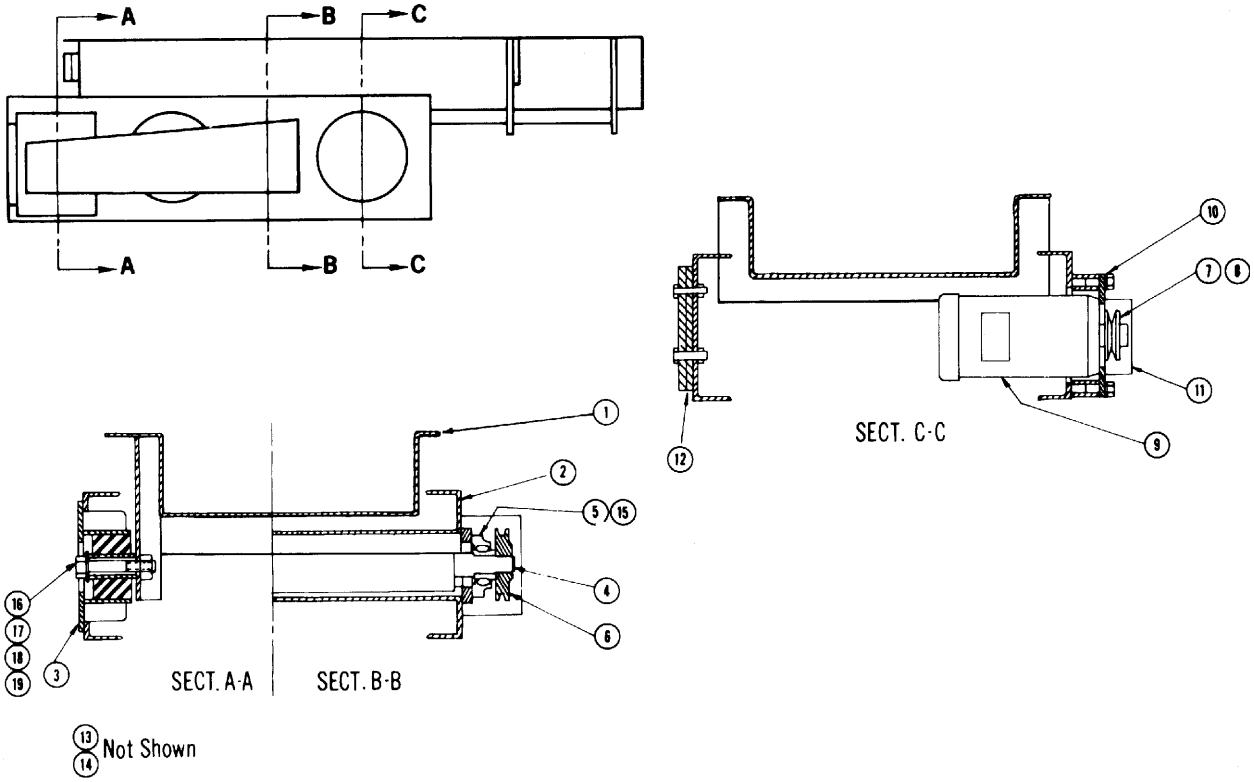
Periodically inspect the belt for tension and wear. The belt should be tensioned to allow approximately 1/2" (13 mm) deflection at the mid-span when moderate pressure is applied by hand. Excessively loose or tight belts will wear rapidly.

A new belt should be readjusted after a few hours of operation.

BEARING REPLACEMENT

When replacing bearings DO NOT use set screws to attach collar to shaft. Doing so will cause premature bearing failure. The eccentric shaft must be able to move freely on the inner race of the bearing.

Parts List



Item Number	Name	Quantity
1.	Trough (Specify width and length)	1
2.	Base Assembly (Specify width and length)	1
3.	Spring Assembly (Specify outside diameter)	As Req'd
4.	Eccentric Shaft (Specify diameter and length)	1
5.	Flange Bearing (Specify diameter of bore)	2
6.	Driven Sheave (Specify size)	1
7.	Variable Pitch Drive Sheave (Specify size)	1
8.	"V" Belt (Specify size)	1

Item Number	Name	Quantity
9.	Motor (Specify HP, RPM, phase and Hz)	1
10.	Motor Mounting Plate	1
11.	Belt Guard	1
12.	Balance Weights	As Req'd
13.	Vibration Isolator (Specify size)	4
14.	Isolator Base Plate	4
15.	Bearing Closure	2
	Spring Center Bolt (Specify size)	
16.	3/4 – 10	As Req'd
17.	1 – 8	As Req'd
18.	1-1/4 – 7	As Req'd
19.	2 – 4-1/4	As Req'd

NOTES: Parts not listed above (screws, nuts, washers, electrical cord, terminals, etc.) are standard items available at any industrial or electrical supply house. When ordering parts, be sure to specify feeder model and syle, part number and quantity.

Troubleshooting

PROBLEM	CAUSE	REMEDY
Low Deflection	Heavy load on pan.	Reduce load, improve hopper design.
	Pan hitting fixed object.	Provide clearance.
	Unit out of tune due to damaged springs.	Replace springs.
	Belt slipping.	Tighten belt. Replace if worn.
	Motor stalling due to incorrect voltage.	Check motor wiring and voltage and correct.
	Shaft running too slow due to incorrect ratio.	Check RPM and correct.
	Object added to pans.	Remove object.
	Malfunctioning control.	Check on direct line.
	Loose spring bolts.	Tighten Spring bolts.
	Material build-up on pan.	Keep pan clean.
No Deflection	See ‘low deflection.’	See ‘low deflection.’
	Motor failure.	Replace motor and find cause of failure.
	No electricity.	Check for electricity at terminals.
	Broken, loose or thrown belt.	Check belt and install properly.
High Deflection	Shaft running too fast.	Check RPM and correct.
	Broken or damaged springs.	Replace springs.
	Object added to pans.	Remove object.
	Excessive temperature.	Remove heat or reduce speed.
	Material build-up on pan.	Keep pan clean.
Noisy Operation	Mounting has come loose or is inadequate.	Check mounting and correct.
	Pan hitting material or object.	Provide clearance.
	High deflection.	See ‘high deflection.’
	Cracks or breaks in pan or frame.	Repair cracks or breaks.
	Loose object on pan.	Remove or secure objects.
	Bearing failure.	Replace bearing.
	Loose spring bolts.	Tighten bolts.
Motor Overload Protection Tripping	High deflection.	See ‘high deflection.’
	Inadequate ventilation.	Provide air circulation.
	Incorrect voltage.	Check motor wiring and voltage.
	Excessively tight belt.	Loosen belt.
	Defective motor.	Replace motor.
	Bearing failure.	Replace bearings.
	Operating on two legs of three phase line.	Check terminals and fuses.
	Pan jammed against external object or base.	Provide clearance.

World Authority in Advanced Technology for Magnetic, Vibratory and Inspection Applications
Headquarters: 2200 Asbury Road, Erie, PA 16506-1440 U.S.A.
Telephone: 814/835-6000 • 800/345-4946 • Fax: 814/838-4960 • International Fax: 814/833-3348
® Web Site: http://www.eriez.com e-mail: eriez@eriez.com
Manufacturing Facilities: AUSTRALIA • BRAZIL • CANADA • CHINA • INDIA • JAPAN • MEXICO • SOUTH AFRICA • UNITED KINGDOM • UNITED STATES

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