

Installation, Operation and Maintenance Instructions



SE SERIES 2400 ELECTROMAGNETS

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WORLD AUTHORITY IN ADVANCED TECHNOLOGY FOR MAGNETIC, VIBRATORY and INSPECTION APPLICATIONS

Introduction

This manual applies to the two basic types of Eriez Magnetics SE-2400 electromagnets: chute style and suspended type. The slight differences in installation and maintenance procedures for these magnets are detailed in the text.

A careful reading of these Installation, Operation and Maintenance Instructions will assure your magnet's most efficient and dependable performance.

If there are any questions or comments about the manual, please call Eriez Manufacturing at 814/835-6000 for assistance



CAUTION - STRONG MAGNET

This equipment includes one or more extremely powerful magnetic circuits. The magnetic field may be much stronger than the Earth's background field at a distance several times the largest dimension of the equipment.

- If you use a heart pacemaker or similar device you must never approach the equipment because your device may malfunction in the magnetic field, with consequences up to and including death.
- To avoid serious pinch-type injuries caused by objects attracted to the magnet, keep all steel and iron objects well away from the equipment. Do not allow hands, fingers, and other body parts to be caught between the equipment and "workpiece" being lifted.
- Keep credit cards, computer disks, and other magnetic storage devices away from the equipment because magnetically stored information may be corrupted by the magnetic field.
- Keep electronic devices, such as computers or monitors, away from the equipment because exposure to the magnetic field may result in malfunction or permanent damage to such devices.

Contact Eriez if you have a question regarding these precautions.



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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Description

Suspended electromagnets are heavy duty DC powered separators designed for removing iron from material that is being moved on wide, non-troughed belts or other wide flat conveyors. The specially designed box-shaped structure houses oil-cooled coils that generate a powerful magnetic field.

These units are furnished in two styles: chute style and suspended, with the later being available in either a manual cleaning type or self-cleaning type.

Suspended units can be installed in either Position 1 (over the conveyor head pulley) or Position 2 (across the width of the conveyor). Sizes are readily available to accommodate most any conveyor width.

Manual cleaning magnets are intended for use where the amount of iron to be retrieved is not abnormally high. An adjustable means of suspension is achieved through use of four turn-buckles supplied with the unit. To clean accumulated tramp iron from the magnet it is necessary to shut off the power.

Self-cleaning units are basically manual cleaning magnets with short belt conveyors built around them to provide automatic discharge of tramp iron. They are suspended in the same manner as manual cleaners.



FIGURE 1

Typical SE-2400 suspended electromagnet



FIGURE 2

Typical SE-2400 chute electromagnet

Installation

GENERAL

Use care in uncrating to avoid damage to the equipment. Check the area where the magnet is to be installed for magnetic material. All magnetic material within the field of the magnet (up to 4' (122 cm) may become induced and tend to attract iron. This can interfere with the magnet's performance. Change to non-magnetic material.

For Chute Style: These are shipped with mounting pads suitably positioned for installation at the angle specified on the order (usually 45-60°). When positioned at the specified angle, the integral oil expansion chamber will be properly oriented.

For Suspended Models: Be sure the magnet is oriented properly. In all installations, the external oil expansion chamber must be at right angles to the direction of material flow and on the high side if installed at an angle.

Check the pressure relief valve located on the high end of the oil expansion chamber to make sure it is free to operate. This is done by pulling the stem and releasing it. It is spring loaded and will re-seat itself when released.

MAGNET POSITIONS

Chute Style

Place the magnet on a foundation with the face on the same plane as the working face of the chute. Holes are provided for foundation bolts to secure the unit in place once it has been positioned. Joints between the magnet and chute work should be as smooth as possible to assure an uninterrupted material flow and provision should be made for gaining access to the magnet face for removing accumulated iron (See Figure 3).

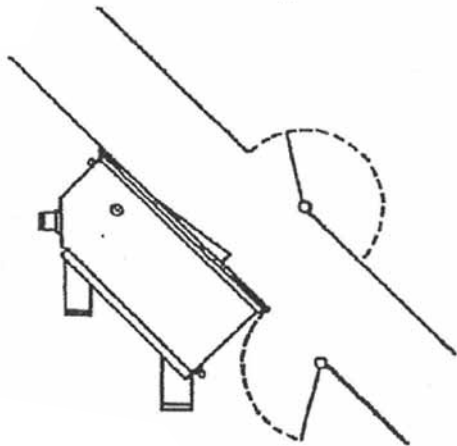


FIGURE 3

Suspended Style Position 1 (in-line)

The installation of a suspended magnet over the trajectory of material discharged from the belt conveyor is referred to as POSITION 1 (See Figure 4 & 5).

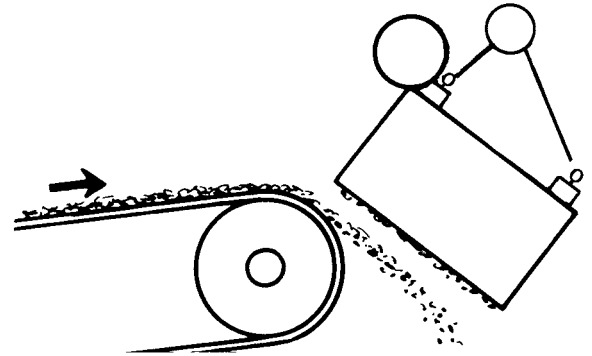


FIGURE 4
Manual cleaning position 1

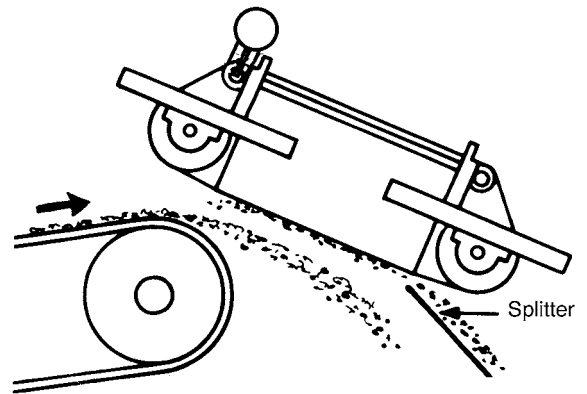


FIGURE 5
Self-cleaning position 1

For optimum separation in Position 1 installations, provisions must be made to adjust the location of the magnet to suit the trajectory of the material.

For Position 1 installations with conveyor belt speeds of less than 350 fpm (107 m/min), greater separation will be achieved by using a non-magnetic head pulley.

If a Self-Cleaning unit is being installed, examine the area to make sure that the self-cleaning belt around the separator has adequate room to run properly and that provisions have been made to collect the discharged tramp iron. A hinged non-magnetic splitter, adjustable in length, will be required to prevent extracted tramp iron from re-entering the product.

Installation (cont.)

Position the magnet so that the face of the belt is approximately 2" (50 mm) from the trajectory of the material being discharged. The centerline of the magnet should be approximately perpendicular to the material at that point.

Position 2 (Cross-belt)

Installation of the separator over the moving bed of material at right angles to the conveyor is referred to as POSITION 2 (See Figures 6 and 7). This location sometimes presents a more difficult separation problem than Position 1 and may require a lower suspension. Position 2 mounting is generally not recommended where belt speed is in excess of 350 fpm (107 m/min.).

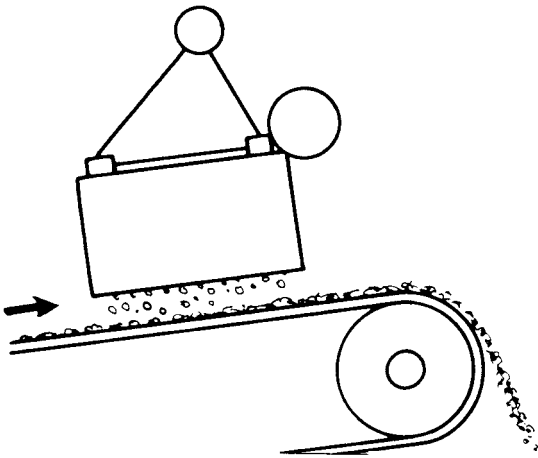


FIGURE 6
Manual cleaning position 2

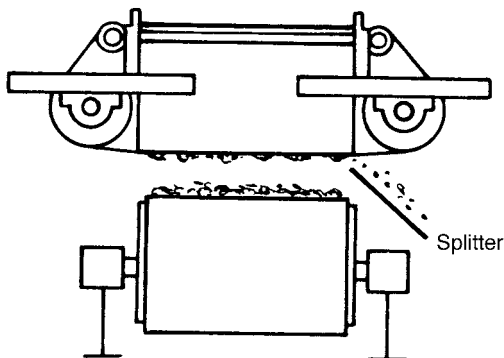


FIGURE 7
Self-cleaning position 2

For Position 2 installations, steel conveyor idlers cannot be used in the length of the conveyor beneath the separator. Any conveyor idlers beneath the separator must be made of rubber, wood, or some other non-magnetic material.

Both the Manual Cleaning and the Self-Cleaning units should be installed on the centerline of the material conveyor.

SUSPENSION HEIGHT

These magnets are designed for 20" (51 cm) suspension height. This height should be considered a maximum and the magnet should be lowered as close to the actual burden as possible. When lowering the magnet to the burden, be sure that plowing does not occur. If the unit is a self-cleaning magnet, make sure that the separator belt has room to operate and discharge tramp iron properly. A clearance of 3" (75 mm) between the magnet or belt and the top of the burden should be maintained for self-cleaning units. This clearance can be reduced to 2" (50 mm) for manual cleaning units.

BURDEN DEPTH

The best separator performance is achieved by controlling the burden depth. A plow or leveler positioned above the conveyor and **before** the magnet will help level high spots or surges in Position 2 installations. For Position 1 installations, the recommended installation location is calculated on expected tonnage. Any variation from this rate changes the trajectory of the burden with respect to the working surface of the magnet and may result in poor separation.

! CAUTION

After installation and prior to start-up, check the oil level at the Oil Level Plug located on the side corner of the magnet near the expansion tank. If the level is low, add oil of the type specified on the plate attached to the top of the magnet beside the Oil Fill Plug.

WIRING

Wiring for Eriez electromagnets is very simple (See Figure 8). Connect the two DC leads from the DC power source to the two terminal posts in the magnet outlet box and tighten the terminal nuts.



CAUTION

Do not attempt to turn the terminal posts themselves. This may result in internal damage.

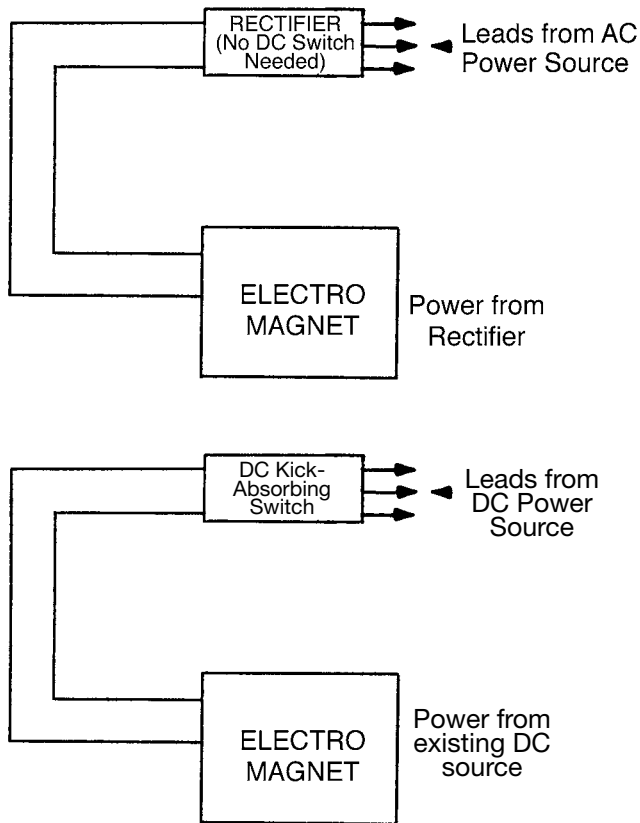


FIGURE 8

Operation

START-UP OF SELF-CLEANING UNITS

1. Be sure the frame is visibly square and has not been damaged or twisted.
2. After installation, momentarily close the AC switch to the belt drive to determine if the belt tends to wander and, if so, in which direction.
3. Belt Adjustment
 - a. The SE-2400 magnets have a four-pulley design and two tracking adjustments. The bottom tail pulley is initially used to take up the slack and track the belt.

If tracking cannot be achieved by this adjustment, the small pulley located on the same end has a horizontal adjustment available to aid in tracking the belt.

- b. To track the belt, the pulley should be moved in a direction to tighten the belt on the side to which the belt wanders.

NOTE: Never start the belt drive and allow it to run continuously until the belt is properly tracked.

Maintenance

FOR CHUTE TYPE & MANUAL CLEANING MODELS:

1. The oil level should be checked periodically. The level must be maintained. Replace the oil as required with the same brand and type as noted on the plate beside the Oil Fill Plug. Do not attempt to mix brands or types since many substitutes for the original are not compatible. Check the oil level only when the magnet is cold.
2. Be sure the expansion tank pressure relief valve is free. This should be checked frequently.

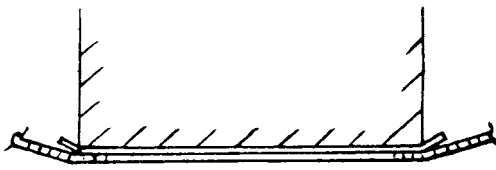
NOTE: Normal external operating temperature of Eriez oil-cooled electromagnets is approximately 160°F (70°C) for air-cooled magnets, approximately 150°F (65°C). These temperatures are extremely hot to the touch. Skin burns at 130°F.

FOR SELF-CLEANING MODELS:

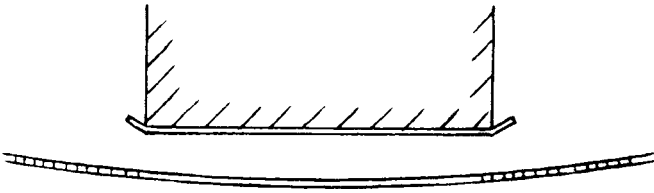
1. Lubricate bearings on a schedule consistent with other equipment in use with your product and environment. An NGL1 No. 2 lithium-base grease is recommended.
2. Check V-belt tension frequently. Adjust by tightening the reducer torque arm as required.
3. For motor and reducer maintenance, refer to the manufacturer's instruction sheets packed with the shipment.
4. If the separator is to be installed inside a fabricated enclosure, provisions must be made to maintain and adjust moving parts as required.
5. After 250 hours of running check pulley hubs and tighten set screws to 17 lb. ft. torque.
6. Belt tracking should be checked frequently and adjusted as necessary. Tighten the belt on the side to which the belt wanders.
7. Once the belt has been tracked, further adjustment may be required to achieve proper tension. Excess tension applied in an effort to keep the belt flat against the face of the magnet can lead to pulley, shaft or bearing failure.

It is normal for the belt to sag due to its own weight and this becomes more prevalent on the larger units. Efficient operation can be achieved without applying excess tension so the belt should be tightened only enough to prevent slipping on the pulleys when it is conveying iron off the face of the magnet. Usually a sag of up to 2" (50 mm) is not detrimental unless it interferes with material flow. See Figure 9.

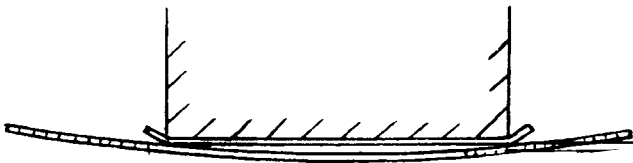
About every two years, have the oil tested for the dielectric rating. Minimum should be 20 kv. If lower than 20 kv, oil can be filter pressed to bring back a higher dielectric rating or replace with new oil using the same brand.



Belt is too tight



Belt is too loose



Belt must just touch the magnet corners

FIGURE 9

Warning

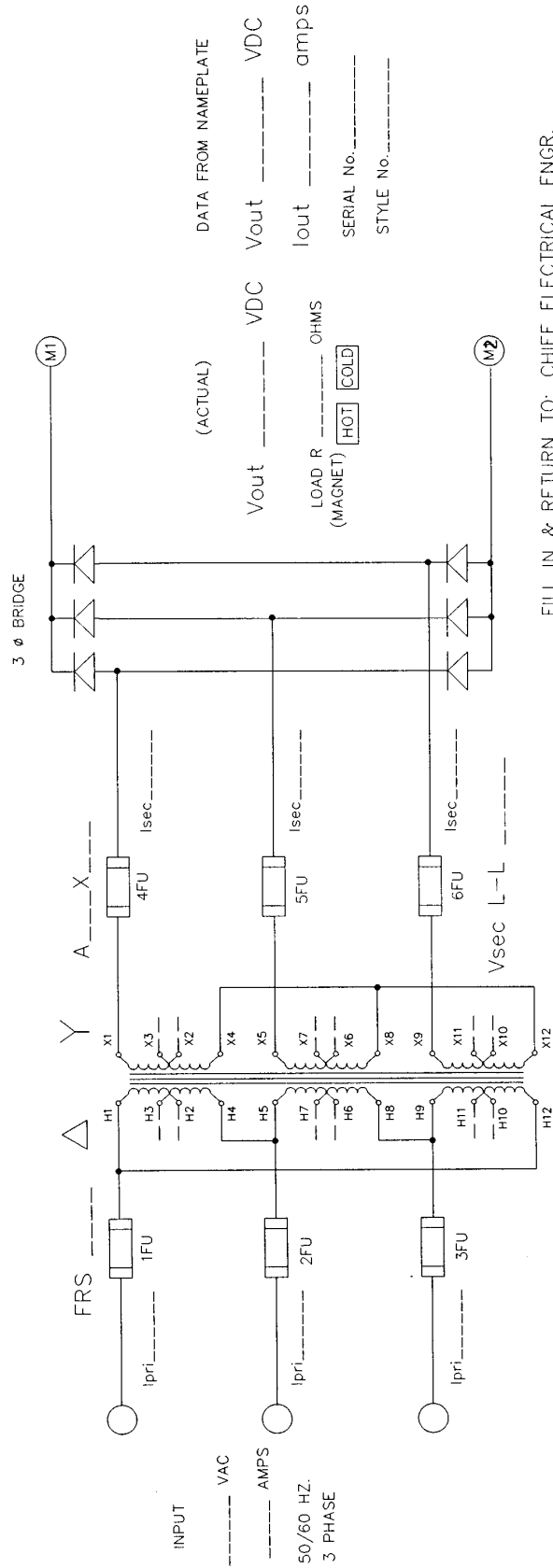
Suspended electromagnets with self-cleaning belts are normally suspended above conveyor belts away from personnel working areas. Eriez has no control over this location or adjacent areas.

Under certain conditions it may be necessary for the user to install additional safety devices to protect operating personnel.

Suspended electromagnets with self-cleaning belts have pinch points where the belt goes over the pulleys. When the belt is running, this is a hazardous area. Workers should be instructed not to perform duties on this equipment unless it is shut down and the electric supply source is locked out.

Warning and caution plates and decals on the magnet must not be removed or painted over. It is important that these warnings and cautions be legible and that they be followed.

Troubleshooting



DATA FROM NAMEPLATE
 Vout ----- VDC
 Iout ----- amps
 SERIAL No. -----
 STYLE No. -----

(ACTUAL)
 Vout ----- VDC
 LOAD R (MAGNET) [HOT] [COLD] ----- OHMS

FILL IN & RETURN TO: CHIEF ELECTRICAL ENGR.
 ERIEZ MAGNETICS
 OUR FAX No. 814-838-4960

YOUR FAX No. -----
 NAME -----

RATING: EX. 10K42
 10000 WATTS (DC) OUTPUT
 4 = 460 VAC INPUT
 2 = 230 VDC OUTPUT



Troubleshooting (cont.)

PROBLEM	PROBABLE CAUSE	SOLUTION
Magnet will not attract iron	<ul style="list-style-type: none"> a. Magnet is not turned on or the magnet voltage is low b. Parts not being attracted are non-magnetic c. Induced iron in the area of the magnet prohibits the extraction of tramp iron d. Magnet is overheated e. Magnet coils are grounded f. Magnet coil is shorted or open 	<ul style="list-style-type: none"> a. Check power switch and check DC voltage at magnet terminals. Adjust as required. b. Check missed tramp iron with small permanent magnet to confirm that it is magnetic. c. Check area around the separator with a small steel probe to see if the structure or conveyor components are themselves acting as a magnet and attracting iron. Replace with a non-magnetic material as required. d. Check for proper DC voltage at the magnet terminals and check for proper current. Current should not be less than approximately 30% lower than nameplate current. Correct voltage. Allow magnet to cool. e. Take megohm reading between each magnet terminal and ground. 50 megohms should be minimum reading. f. Check for rated current at rated voltage at magnet or measure DC resistance of cold magnet. The resistance should equal the nameplate voltage divided by nameplate amperes.
Oil Leak	<ul style="list-style-type: none"> a. Damaged unit b. Excessive internal pressure 	<ul style="list-style-type: none"> a. Check and repair as required. Magnet may be welded or patched as required BUT EXTREME CAUTION MUST BE TAKEN TO PREVENT FIRE DURING ANY WELDING. b. Check freedom of pressure relief valve and replace if required.

TABLE 1
General troubleshooting chart

PROBLEM	PROBABLE CAUSE	SOLUTION
Magnet will not attract iron	<ul style="list-style-type: none"> a. Magnet face is overloaded with already-extracted iron 	<ul style="list-style-type: none"> a. Examine face of the magnet for build-up of excessive quantities of extracted tramp iron. Discharge more frequently as required.

TABLE 2
Adjustment guide for chute magnets.
(All general items also apply)



PROBLEM	PROBABLE CAUSE	SOLUTION
Magnet will not attract iron	<ul style="list-style-type: none"> a. Magnet face is overloaded with already-extracted iron b. Magnet set too far from burden c. Magnet set too close to burden d. Magnet is not installed at the proper suspension height 	<ul style="list-style-type: none"> a. Examine face of the magnet for build-up of excessive quantities of extracted tramp iron. Discharge more frequently as required. b. Check for proper clearance between the magnet and burden. Adjust for proper gap. c. Check for proper clearance between the magnet and the burden. If too close, material surges can occur and the surge may act as a wiper. d. Check location of magnet with respect to burden and confirm that it is within the recommended suspension height at the centerline of the magnet.

TABLE 3
Adjustment guide for manual cleaning units.
(All general items also apply)

PROBLEM	PROBABLE CAUSE	SOLUTION
Tramp iron re-entering the product	<ul style="list-style-type: none"> a. Not enough clearance for the iron to be discharged from the product magnet b. Splitter improperly positioned c. Magnet is not installed at the proper suspension height 	<ul style="list-style-type: none"> a. For self-cleaning units in position 2, check to see that enough clearance has been allowed between bottom of magnet and edge of conveyor belt for maximum sizes to be discharged. Adjust as necessary b. For self-cleaning units in position 1, check splitter for proper location and clearance with respect to the magnet. Adjust splitter angle and length as required c. Check location of magnet with respect to burden and confirm that it is within the recommended suspension height at the centerline of the magnet.

TABLE 4
Adjustment guide for self-cleaning units.



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