MMPM-360B

Installation, Operation and Maintenance Instructions

DF HIGH-SPEED DRUM

MODELS DFA-10, DFA-25, DFA-50, DF-RE

ERIEZ MAGNETICS HEADQUARTERS: 2200 ASBURY ROAD, ERIE, PA 16506–1402 U.S.A.
WORLD AUTHORITY IN SEPARATION TECHNOLOGIES

Introduction

This manual describes Eriez' Permanent Magnetic DF High Speed Separators. Dry Drum Separators provide superior magnetic protection and higher levels of purity in food, grain, chemical and ore treatment applications.

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 Drum Separator.

If there are any questions or comments about the manual, please call the factory at 814-835-6000 for Dry Drum Separator 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 nearby steel or iron objects.**
- **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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ERIEZ PERMANENT MAGNETIC DRY DRUM SEPARATORS

General

Magnetic drums with high peripheral shell speeds were developed to satisfy a need for a dry magnetic separator capable of processing large volumes of relatively fine ferromagnetic particles (-1") (-25mm). Units previously available did not provide high capacity or efficiency. The DF High Speed Drum is a highly efficient unit for processing large volumes of material and producing high grade magnetic concentrates or removing very fine, highly magnetic particles for purification.

Capacity, grade and recovery are directly related to the peripheral speed of the drum. For high recovery of magnetics or purification of non-magnetics coarser than 1/8" (3mm), the Model DFA-10 at a relatively slow peripheral shell speed is used. The DFA-25 is used at moderate speeds for cobbing or roughing concentration jobs. When a very high grade, finished magnetic concentrate is desired, the DFA-50 is used at a high shell speed.

Description of Equipment

Eriez DF High Speed Drum Separator consists of a rotating drum shell within which is a permanent magnetic element attached to a stationary support and shaft. The magnetic element covers an approximate 210° arc. Depending on the application the drums are furnished with an A10, A25, or A50 agitating magnetic element or with an RE (rare earth) magnetic element. A 1-1/2" (38mm) diameter hole and magnetic turnbuckle is drilled through the shaft at the side opposite the motor drive for positioning of the magnetic element. A turnbuckle is currently used to make element adjustments. (See Figure 1).

The shell is made from 1/8" (3mm) thick 304 stainless steel and typically has a 1/8" (3mm) thick abrasion resistant rubber liner. Drum heads are high strength aluminum alloy castings. Bearings are completely sealed oversized antifriction type for durability and trouble free operation.

A rectangular shaped dust-tight housing with provision for dust collector connections is furnished within a heavy steel angle superstructure. Housing end panels have ¼" (6mm) thick abrasion resistant rubber lining to reduce wear. An adjustable splitter is furnished to separate the magnetic and nonmagnetic fractions.

For periodic inspection of the housing interior and the drum shell, a large hinged inspection panel is provided.

A feeder is normally required for efficient operation of the DF drum. An Eriez vibrating feeder is recommended for most applications.

A TEFC motor and drive is furnished as standard for all applications. The drive consists of a chain and sprockets with an oil tight chain guard. A VFC is recommended to vary the drum speed.

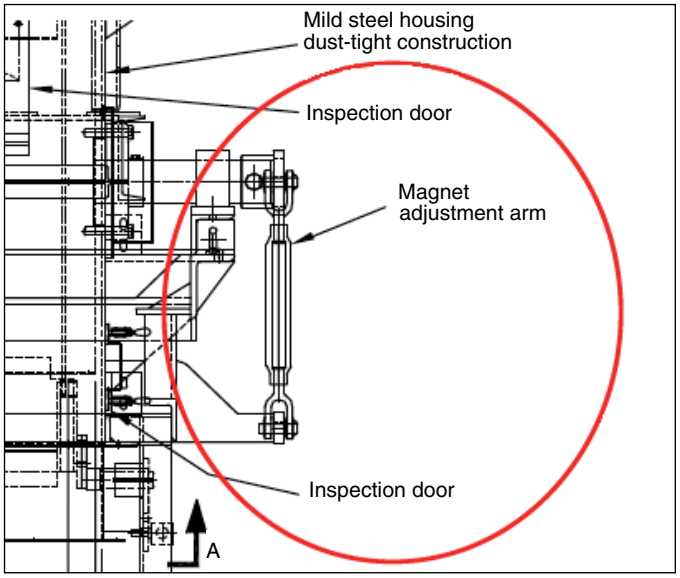

Figure 1

Installation Instructions

Installation is very straightforward. The system has been assembled and has run at our factory to assure quality. The DF drum separator comes completely assembled. The vibratory feeder and control has to be mounted to the drum housing per the outline drawing for the particular order. Attach the feeder as shown on the drawing and wire the control per the included electrical schematic. All dust boots must be attached and loose enough to prevent binding of the feeder. Make sure the Vibratory Feeder has the proper deflection. (See feeder IOM elsewhere in this manual for deflection).

Dust extraction couplings are on the top cover of the drum housing for use by the customer. If using Rare Earth magnet material, avoid moisture weeping in to the magnetic element. It would cause irreparable harm. Avoid exposing the standard Rare Earth magnet material to high temperature. The standard circuits can only handle 150°F (65°C). Other circuits are available to handle higher temperatures.

Operating Instructions

Models DFA-10, DFA-25, DFA-50, DF-RE
A predetermined drum speed is selected to begin operation. Normal speed range in FPM:

DFA-10	400-800 (122-244 mpm)
DFA-25	700-1,200 (213-366 mpm)
DFA-50	1,000-1,500 (305-457 mpm)
DF-RE	50-300 (15-90 mpm)

The material to be processed is introduced to the drum by a vibratory feeder that evenly distributes the material over the top vertical centerline of the drum.

As the material is fed onto the rotating drum, the magnetics are immediately influenced by the alternating polarity magnetic element which causes the magnets to flip end-over-end (180°) as they pass from pole to pole. This flipping action agitates free the non-magnetics. Centrifugal force, which is directly related to the speed of the drum, discharges the non-magnetics as they are agitated free into the nonmagnetic product hopper.

In some applications composite grains are present. These are not completely magnetic nor completely nonmagnetic. Their presence necessitates the use of a special middling hopper that would require the second product to be discharged from the drum. The magnetic portion is discharged near the end of the magnetic element into the magnetic product hopper.

Model DF-RE
Normal speed range in FPM 50-300 (15-90mpm)

Feed is brought to and introduced to the DF-RE drum in the same manner as for the DFA models. The DF-RE is designed for maximum removal or recovery of magnetic particles from a product. Normally for this type of application, agitation is neither required nor desirable. The magnetic particles are attracted to the drum surface and held fast by the strong element while centrifugal force ejects the nonmagnetic particles. When the magnetic traveling with the shell reach the end of the magnetics element, they are released down the magnetic discharge chute.

Application & Capacity Data
The DF drum has been designed for high capacity dry separation of fine particles. The basic criteria of application include:

1. Particles to be separated or concentrated must be ferromagnetic (strongly magnetic).
2. Feed should be free flowing.
3. Material to be processed should normally be -1" (-25mm) plus 20 microns. Normal particle size ranges:

DFA-10	-1+¼" (-25mm+6mm)
DFA-25	-¼" (-6mm)
DFA-50	-100 mesh (-149 micron)
DF-RE	-1+¼" (-25mm+6mm)
DF-RE	-¼" (-6mm)
DF-RE	-100 mesh (-149 micron)

The capacity of the DF drum depends to a great extent on the particle size and drum speed since the material is treated at preferably a single particle depth on the shell. Consequently, particle size, peripheral speed and magnetic susceptibility affect the capacity. Capacity per foot (300mm) of magnetic width varies from approximately 3 TPH to 25 TPH (2.7 to 23 MTPH).

Grade and recovery are directly related to the peripheral speed of the drum. For high recovery of magnetics or purification, the Model DFA-10 or DF-RE at a relatively slow peripheral shell speed is used. When a very high grade magnetic concentrate is desired the DFA-50 is used at a higher shell speed. The DFA-25 is used at moderate speeds for "cobbing" or "roughing" operations. (Selectivity increase when the products to be separated are within four Tyler mesh sizes.)

Some operations require the use of multiple stage units. For example, in iron ore beneficiation the initial stage would provide a high recovery, low grade concentrate with minimum loss of magnetics in the tailings. The magnetic concentrate from the first drum is re-cleaned on the second stage to produce a high grade concentrate and a middling product. The middling can be sent back for further grinding or can be re-circulated without grinding.

Normally it will be necessary to make some adjustments in shell speed, feed rate and splitter location to attain optimum conditions.

Splitter Setting

The splitter segregates the magnetic from the nonmagnetic product. Its best position balances the maximum removal of magnetic products with minimal misplacement of non-magnetics for a given feed rate and drum rotation speed. Both increased drum speed and increased feed rate will move the main non-magnetic flow away from the drum. Drum speed has a much greater effect on splitter position than feed rate does.

The splitter may be observed from the side port in the housing of the drum. Typically, the splitter is adjusted to be close to the main non-magnetic flow, allowing all deflected particles to report to the magnetic fraction. This could include non-magnetic particles that have magnetic particles embedded or locked to them. For some materials there may be a clear visible color difference between the flows. For other materials the difference may only be seen in the assays.

When concentrating magnetic ores or materials, the splitter will be located along the centerline of the drum shaft or a few inches behind. The drum speed is typically higher which forces the discharge of the magnetic product near the back of the drum housing.

The splitter tip may be adjusted up or down when there is no feed. It would be accessed from the lower front panel of the drum housing. Normally, this would not be adjusted. It would be lowered to accommodate large chunks of magnetic or to clear the drum if the splitter is canted back into the drum to limit misplaced non-magnetic material. It would be adjusted up or down to obtain the best placement for the chosen magnet rotation discussed below. (See Figures 2-4).

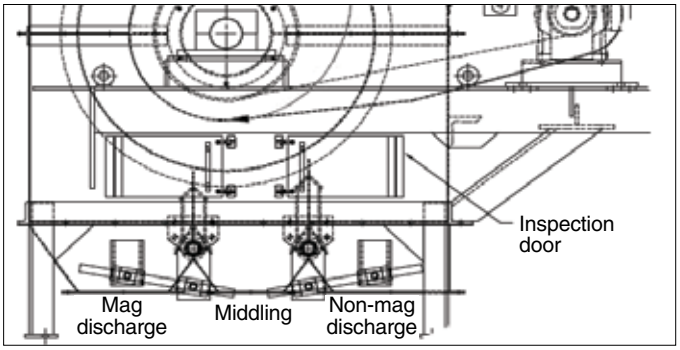

Figure 2 - Multiple Splitters

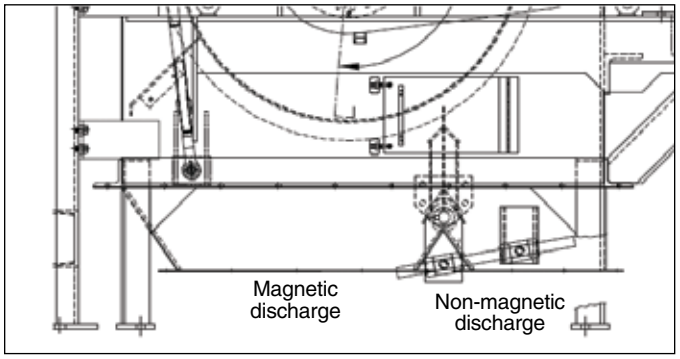

Figure 3 - One Splitter/Clean Non-Mag

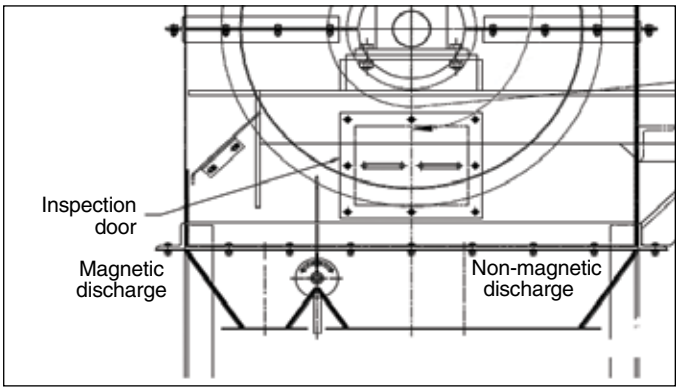

Figure 4 - One Splitter
Clean Magnetic Concentrate

Magnet Rotation

On the drum shaft there is either an arrow indicating the center of the magnet arc or a colored section indicating the magnet arc. The normal position for the magnet element has the arc center slightly elevated in the front half of the drum. The drums are usually shipped with the magnet arc hanging down and must be repositioned for startup.

The magnetic material will stand up in the center of a magnetic pole where the field is perpendicular to the material flow. At the pole edge the magnetic material will lay down and point towards the next pole or away from the magnet arc almost tangent to the drum surface. Sometimes this pole edge can be seen as a line of magnetics before a drum cleat wipes the magnetics away.

The splitter tip will separate magnetics better if it is located between the pole edges, rather than in the center of a pole. If the edge can be seen, the splitter tip can be adjusted accordingly. However, sometimes the splitter cannot be adjusted to the optimum length. In this case, the magnet rotation can be adjusted by loosening the set screws on the flange mounted on the non-drive side of the drum. The magnet adjusting arm turnbuckle is used to adjust the magnet to fit the splitter position and the set screws re-tightened.

Bearing Replacement

The standard units have four bolt flange bearings which are sealed and greaseable. Remove the drum from the housing. Support the drum shaft on blocks to take the weight of the bearings. When removing the bearings you should first clean the shaft thoroughly with solvent then attempt to remove the four bearing mounting bolts and bearings set screws.

Pry between the bearing and the drum head to slide the bearing off the end of the shaft. If the bearing is not moving (usually due to the head flexing inward), you will have to remove all the fasteners holding the drum head to the shell.

You would then use the tapped holes in the head with threaded rod and porta power pushing against the end of the shaft. Make sure to match mark the heads and shell before going this route. (See Figure 5)

To Install a New Bearing

1. Inspect the shaft. Remove burrs, verify diameter and clean mounting surface.
2. Place bearing on the shaft. Apply light film of oil. Do not hammer onto shaft.
3. Bolt housing to mounting surface. Make sure the magnetic element is centered between the heads. Rotate shaft to make sure it turns smoothly.
4. Bolt up the bearing to the mounting surface and torque bolts to 75 ft.-lbs.
5. With two setscrews, torque set screw ‘A’ to ½ recommended torque (73-95ft.-lbs.), torque set screw ‘B’ to full torque. Torque setscrew ‘A’ to full torque.

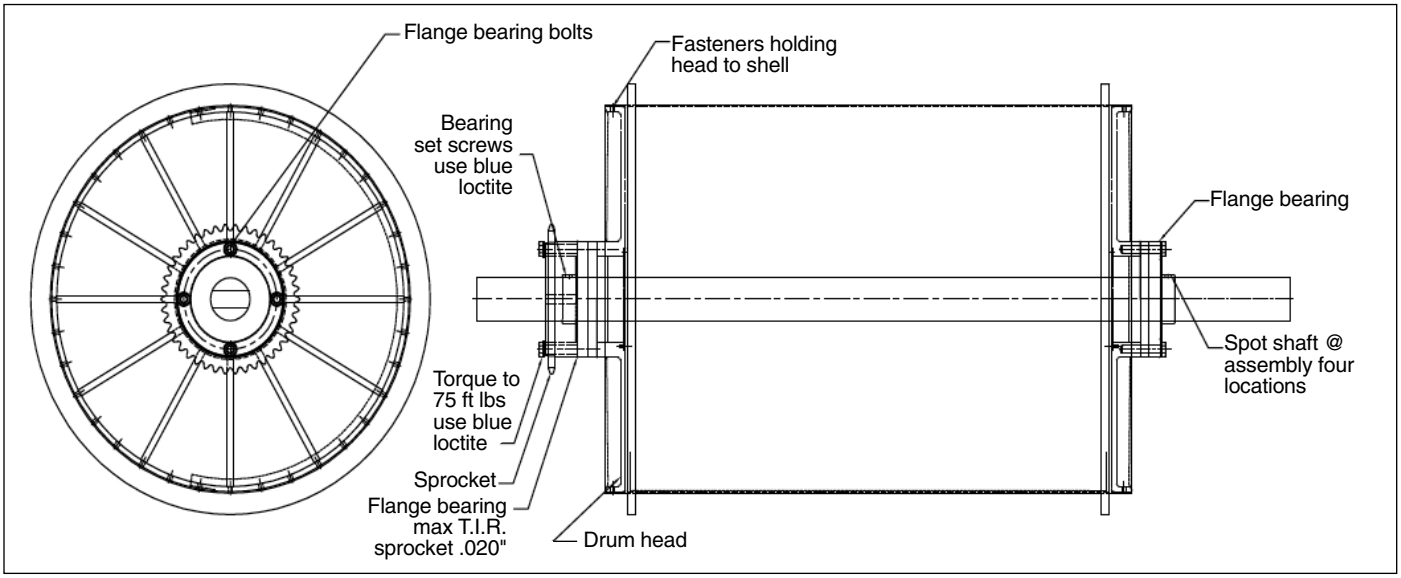

Figure 5

Maintenance

The Eriez DF High Speed Drum is a heavy-duty unit designed to be as maintenance free as possible. Periodic inspection of the unit is necessary to locate any areas of unusual wear. In certain abrasive applications, extreme wear due to the high shell speeds can take place and is not unusual.

Abrasion-Resistant Rubber Liners
Rotate the drum slowly to locate any worn spots in the rubber liner and also inspect the housing end panels to determine if excessive wear has taken place. If worn spots are noticed, replace the liner.

Bearings
Readily accessible grease fittings are provided on both hubs for bearing lubrication. Lubricate approximately every two weeks with Lubriplate #70 grease, or equivalent, through these grease fittings. The drum cannot be operated while performing lubrication.

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