Installation, Operation and Maintenance Instructions

METAL SEPARATOR
MODEL CF 70-150
Introduction

This manual details the proper steps for installing, operating and maintaining the Eriez Metal Separator.

Careful attention to these requirements will assure the most efficient and dependable performance of this equipment.

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

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⚠️ 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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General Information

Introduction
The texts and illustrations in this instruction manual are for the exclusive purpose of explaining how to operate and handle the CF metal separator. Based on the data in this instruction manual the manufacturer accepts no responsibility for direct or consequential damage resulting from the use or misuse of this equipment. All appropriate safety rules and regulations for the use of this equipment must be adhered to. If you should have any questions with regard to the installation and operation of this equipment please do not hesitate to contact us. This instruction manual may not be copied, saved on computer or otherwise reproduced without the prior explicit written permission of the manufacturer. Nor should any extract of this instruction manual be similarly reproduced.

Field of Application
The CF metal separator is specifically designed for inspecting plastics pellets or other free-flowing granulates in slow-moving material columns, as is the case in the feeding of extruders and injection molding machines. Because of its compact design, material feeding units can be mounted directly on the metal separator.

Application Reasons
- Product liability
- ISO 9000
- TQM (Total Quality Management)
- Protection of machines and quality assurance

System Identification
The information in this instruction manual only applies to the CF Metal Separator. A label with the respective data is attached at every system.

Important Functional Notes
The stated detection sensitivity (ferrous ball Ø in mm) applies for nonconductive products at the standard operation frequency and refers to the center of the detection aperture (most disadvantageous position). Products that show intrinsic conductivity due to moisture content, electrolytes or other conductive contents may reduce the sensitivity as well as variations of product temperature, environmental effects (mechanical shock and vibration, electromagnetic interference) or the set product angle. The detectable size of metal particles depends on their nature, shape and position while passing the metal detector.

The metal separator is designed and built to provide optimum detection and separation of metal contaminants.

However, it is important to be aware of the circumstances in which metal detection may be compromised when conveying and processing bulk materials.

- Accumulation of metal residues. Accumulation of metal particles in a batch of bulk material. This may occur with ground or shredded material if a larger metal piece has been ground.
- Turbulence in the reject unit and reject flap reaction time. If there is an accumulation of metal particles the flap cannot react to the control signals without delay. Occurs when recycled or reground material is processed, even when blended with virgin material.
- Material jamming with gravity feed type metal separators using a reject flap separation system (wrong type of equipment).
- Pipe conveying with high fill ratio. Depends on the bulk material, particularly for gravity and vacuum/pressure systems.
- Conveying rate or fall velocity too high or too low.
- Type, size, and position of the metal contamination.

For these reasons no general guarantee can be given that the unit will operate with 100% accuracy.

For bulk materials containing a high proportion of metal contaminants it is recommended that two or more separators are connected one after the other (for gravity systems) and additional permanent magnets are installed in free-fall pipes or hoppers (for pipeline systems). Suitable metal separators and magnet systems are also available for pre-separation in vacuum and pressure pipes.

EC Declaration of Conformity
This equipment complies with machine guideline 98/37/EWG
**Design and Method of Operation**

**Control Elements/Complete Unit**

**EXAMPLE: CF METAL SEPARATOR**

(a) Inlet  
(b) Reject Outlet  
(c) Material Outlet  

**Basic Elements**
1. Detection unit  
2. Control unit  
3. Diverter unit  
4. Button for manual ejection in a separate housing  
5. Push button for functional test in a separate housing  

**Optional Accessories (not shown):**
6. Signalling device (audible alarm, visual alarm or combination alarm)  
7. Counter (detection counter) in a separate housing  
8. Inlet adaptor for Jacob-pipe  
9. UL/CSA certificate  
10. Compressed-air monitor in electronics housing  
11. Monitor system for separation unit  
12. Extended system version for free-fall application to 19.69 in.  
13. Cable set for remote control unit 19.7 ft, 32.8 ft, and 49.2 ft.  
14. Bulk material temperatures of up to 284° F  

**Control Elements/Control Unit**

**Control Unit**  
Used mainly in the plastics industry, equipped with 10 product memories.

**Control Elements/Control Unit**

| 1 | Graphic Display LCD module | Display of operating and input masks |
| 2 | Operator Keys + - ↔ Esc | For operating and machine settings |
| 3 | Function Key Reset | Reset to restore the unit after metal or fault signal |
| 4 | Function Key Test | Test function for metal detectors |
| 5 | Red LED Metal | Illuminates when metal detected |
| 6 | Green/Red LED Operating | Lights green in normal operating mode |
| 7 | Green/Red LED Fault | Lights red in case of fault and error |
**Functional Principle**

**Design**
Compact unit with integrated metal detector, diverter unit and remote control unit; inlet prepared for the mounting of a material feeding unit; reject and material outlets prepared for the attachment of adaptors with Jacob flange.

**Technical Description**
The CF Metal Separator is used for removing metal particles from ground material, repelletized, and new material. It is mounted at the material inlet of injection molding machines, extruders, and blow molding machines, where it detects all magnetic and non-magnetic metal contaminations (steel, stainless steel, aluminium, ...)—even if such contaminations are embedded in the product. Metal contamination is sorted out by means of a separation slide.

Detection is performed by a search coil that comprises a transmitter and two receiver coils and operates according to the transmitter-receiver principle. The excitation frequency for the transmitter coil is between 16 kHz and 300 kHz. Identical voltages are induced in the two receiver coils on the left and right side of the transmitter coil. When a metal particle passes through the search coil, it unbalances first the inductive field of receiver 1 and then of receiver 2. These small voltage changes are evaluated by the control unit, which generates a metal signal and triggers a separation process.

Due to their intrinsic conductivity that is caused by moisture, metal oxides, grease, salts, etc. many bulk materials have a so-called “product effect”. To detect metal contamination the control unit must suppress or reduce this product effect.

This “suppression” of product effects may lead to a reduction of the stated scanning sensitivity.
Dimensions and Technical Data

Environmental Conditions for Operation, Storage, and Transport
The environment of the metal separator should be dry, dust-free, free of vibrations, of other influencing magnetic fields, of chemical vapours such as softeners, chlorine, and similar substances. The metal separator must not be exposed to direct sunlight or to other environmental influences (rain, snow, storm, etc.).

Noise Levels
Sound pressure level measurements (in acc. with DIN 45 635)

Peak value of sound pressure level at a distance of 1m from the machine surface and 1.60m above the floor, $L_{pA, 1m, max.}$

Result:
- Idling: < 70 dB(A)
- Activated: < 90 dB(A)

We reserve the right to change the contents due to product innovation or technical improvement.

Safety
The safety of our equipment and machines complies with all official technical safety regulations. However, as a manufacturer we believe it is our duty to make you aware of the following information.

⚠️ DANGER
The following safety and danger notes are intended for your protection, for the protection of third parties, and for the protection of the equipment. The safety notes therefore should always be observed! Please also observe the chapter on safety in the operating instructions of the control unit!

Intended Use
The equipment is designed for installation in closed pipes or hoppers, in which a column of material is slowly moving downwards. Larger models also can be used for applications in which bulk material is initially in free-fall through the metal separator. No chemically aggressive bulk material should be fed through the equipment. Inlets and outlets should be connected to funnels, hoppers, pipes etc. to avoid hand injuries during operation. Ensure that the installation area is free from vapours, plasticizers or other materials that may damage the PVC cable sheathing.

If there is a high proportion of metal contaminants or the bulk materials being inspected are abrasive it is likely that any surfaces in contact with the product will show signs of wear and tear (separation slide, pneumatic cylinder etc). In this case it is important that surfaces in contact with the product (scanning pipe, adaptors, reject device, drive unit etc) are checked at regular weekly or monthly intervals. Worn parts must be replaced immediately to ensure the machine functions properly.

Please note that any preventive measures which may have been taken at the time of construction will merely delay the onset of wear and tear but will not eliminate it completely. The metal separator may only be operated with a corresponding control unit.
Safety Signs
Warning signs attached at the system and control unit: The purpose of these symbols is to draw the attention of the system operator to the text of the respective safety notes.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Location</th>
<th>Meaning</th>
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<td>🔄</td>
<td>Cover of the electronics housing</td>
<td>Main Voltage</td>
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<td>🔄</td>
<td>Normal Outlet, Reject Outlet</td>
<td>Danger of Crushing</td>
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<tr>
<td>🚨</td>
<td>Reject Outlet</td>
<td>Danger</td>
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<td>🔴</td>
<td>Pipes</td>
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Dangers Arising from Non-Compliance with Safety Notes

⚠️ DANGER
Any non-observance of safety notes constitutes a danger for life and health.

Safety Information for Operators

⚠️ DANGER
The CF Metal Separator may only be operated in the intended purpose and in a perfect functioning condition, especially all the covers have to be closed during operation.

When the separation unit is operating there is danger of crushing between the separation slide and the base plate. Danger spots can be reached at the inlet and at the normal and reject outlet. A pipe of 20 inches in length must be flanged to the inlet, and pipes of 35 inches in length to the outlets, or other measures must be taken to prevent people from reaching the danger spots. If the product temperature is higher than 140° F there is danger of burning at parts in contact with the product. It is recommended to use an enclosure or another measure to prevent touching of the metal separator surface. The weight load on the metal separator, aligned above its center axis, must not exceed 1100 lbs. The metal separator may only be operated if all the provided protective devices are installed and any reaching of the danger spots is reliably prevented. All the safety and warning signs at the system must not be removed and must be kept in well recognizable condition. The operating instructions always have to be in a legible condition and complete available. The owner may only appoint qualified personnel for operation, maintenance and repair work.

Before working on the pneumatic or the electric section the power supply and compressed air supply must be interrupted or disconnected.

⚠️ DANGER: EMITTED INTERERENCE
Test report according to the provisions of:

BGV B11:2001-06:
Regulations of the professional association for safety and health at work. Accident prevention regulations for electromagnetic fields.

E DIN VDE 0848-3-1: 05-2002:
Safety in electrical, magnetic, and electromagnetic fields, part 3-1: Protection of persons with active implants in the frequency range of 0Hz to 300 GHz.

In the area where the operating personnel is working the electromagnetic field of the metal detector or separator does not exceed the limits stated in the provisions. Therefore there are no health impairments due to electromagnetic fields in this area for persons and for wearers of medical implants such as cardiac pacemakers. Inside the coil of round or closed tunnel coils, or on the surface of flat coils, the limits may be exceeded depending on design and system version. If work is to be performed inside or at the search coil, persons and wearers of medical implants such as cardiac pacemakers may only enter the equipment when it is turned off, provided that size and design allow this.

Metal Separator: Model CF 70-150
Safety Information for Operation and Maintenance

⚠️ DANGER
There is danger of injury in the form of electric shocks or burns due to energized parts in the connection box. The cover of the connection box must always be kept closed during operation. Operation and cleaning of the equipment may only be performed by qualified personnel. If the connection box must be opened for maintenance or cleaning purposes, remove any dirt and moisture from the box so that no larger quantities may get into the interior. Always disconnect the power supply and any connected external circuits before opening the cover. Any moisture that has penetrated into the interior must be removed from the box!

⚠️ DANGER OF CRUSHING
The separation mechanism is covered by a removable protective cover. Due to the cylinder movements there is danger of hand injuries in the separation mechanism. If the protective cover of the separation mechanism is removed, the compressed-air supply must first be interrupted and the air tubes must be vented. Compressed-air supply may only be connected again after the protective cover has been successfully attached again. The protective cover of the separation mechanism must always be kept closed during operation.

⚠️ DANGER OF CRUSHING
When the separation unit is operating there is danger of crushing between the separation slide and the base plate. During operation all the protective devices that prevent any reaching into the inlet, normal outlet, or reject outlet must always be attached. The metal separator must be properly installed in the conveyor pipe. If protective devices or the metal separator are removed from the conveyor pipe for maintenance or cleaning purposes, the compressed-air supply must first be interrupted and the compressed-air tubes must be vented.

The separation unit may only be connected to the compressed-air supply again when all the protective devices have been attached and the metal separator has been successfully installed in the conveyor pipe.

⚠️ BURN HAZARD
In case of product temperatures of more than 140° F there is danger of burning at parts in contact with the product. During operation suitable protective covers must be attached that prevent any touching of the danger spots. The product flow must be interrupted before any maintenance or cleaning work is started. Any such work may only be performed after the parts in contact with the product have cooled down.

Safety Information for Installation and Dismantling

⚠️ DANGER
In case of incorrect installation the own weight of the metal separator may lead to personal injuries. Always use suitable lifting means to transport the machine to the intended place, or to install it in the conveyor pipe or on the plastics processing machine. The lifting means may only be removed when the metal separator has been successfully installed. Dismantling is done in reverse order.

Safety Information for Storage and Transport

⚠️ DANGER
Always observe the information to avoid any transport damage and personal injuries.

Notes of Residual Risks

⚠️ DANGER
Possibly installed compressed air tanks can still contain pressure in spite of interruption of compressed air supply. Where appropriate, vent!

Notes on Stable Standing Requirements

⚠️ DANGER
To avoid any loss of stable standing, the information for transport, commissioning and operation must always be observed.
Consequences of Unauthorized Modification

⚠️ In case of unauthorized modification or repair work all the declarations and guarantees given by the manufacturer will become void.

Inadmissible Operation

⚠️ The CF Metal Separator is not intended for any other applications. Any other applications will be regarded as inadmissible operation.

Inadmissible is the operation out of the specifications given in the technical data and the operation under high mechanical static or dynamic loads (e.g. heavy system parts or strong vibrations). Also inadmissible is the inspection of aggressive materials such as materials containing alkaline solutions, acids and solvents, of materials that are sensitive to electromagnetic fields, and of living people and animals.

The metal separator must not be operated in explosive areas.

Basically it is possible to also use the system in other applications than the intended use stated herein, but such applications always require the prior consultation and approval of Eriez.

Installation

⚠️ DANGER

Only connect the compressed-air supply when all the covers have been closed, all the required protective measures have been taken, and the machine has been properly installed in the conveyor pipe.

Mechanical Installation

It is important to pay attention to the following items:

• The free fall height of the fed product should not exceed the value stated in the technical data sheet.
• Solid and vibration-free mounting, including the feeding hopper and blender on top of the inlet plate.
• Avoid electromagnetic interference in the surrounding of the detector, e.g. caused by electric motors, frequency converters, power lines etc.
• Ensure there are no moving or vibrating metal parts in the immediate vicinity of the metal separator.
• Indoor mounting and operation is necessary
• Prevent electrostatic charging by grounding the frame
• A pipe of 20 inches in length must be flanged to the inlet, and pipes of 35 inches in length to the outlets, or other measures must be taken to prevent people from reaching into the separation unit.

Note: It is recommended to place a lockable opening in the pipe in front of the detector (inlet). This opening allows to put in test samples for performance checks of the equipment.

Connections

⚠️ DANGER

Any work at electric equipment may only be performed by qualified personnel. Before opening the housings make sure the equipment is isolated from mains or external voltage.

• Ensure the metal separator framework is earthed.
• Connect the compressed air supply.
• Check the cable or plug connection of the pneumatic valve.
• Check the air pressure. Adjust it to 87 psi if necessary.
• For service unit settings see the attached manual.

Note: Reliable metal separation only is guaranteed if the air pressure always is above 72 psi.
For electrical power connection see attached manual for the control unit.
Setting of Operating Parameters

⚠️ DANGER
Close the covers of the control unit and the coil connection boxes.

After correct installation and connection of power supply (115/230 VAC; 60/50Hz) and compressed air supply (87 psi), check the separation mechanism manually by activating the pneumatic valve (Test button).

Activate the conveying and adjust the metal detector such that there is no incorrect activation. If necessary, eliminate the reasons for occurring incorrect activations. Convey a suitable test sample, e.g. a plastic ball with embedded metal part of the desired size (see note under Mechanical Installation), and check whether it is properly separated. If necessary adjust the reject duration.

Errors and Fault Rectification

⚠️ WARNING
If products should get jammed in the conveyor pipe, disconnect the system from the mains supply, turn off the compressed-air supply, and vent the air tubes. The jammed products can then be removed without danger.

⚠️ WARNING
If you should have any questions, or if there should be any malfunctions, please contact the manufacturer.

Maintenance

⚠️ DANGER
Prior to any maintenance and cleaning work, disconnect the system from the mains supply, turn off the compressed-air supply and vent the air hoses. Always observe the safety information.

⚠️ WARNING
If there is a high proportion of metal contaminants or the bulk materials being inspected are abrasive it is likely that any surfaces in contact with the product will show signs of wear and tear (separation slide, normal and reject outlet etc).

General notes
In appropriate periods of time (every week or month):

- Perform a visual inspection of all the parts in contact with the product, such as scanning pipe, trans-sitions, separation mechanism, and drive elements.
- Replace worn parts to ensure proper function.
- Check all the screws and nuts for tightness, and tighten them if necessary.
- Do not use aggressive cleaning agents.
- When carrying out repairs, clean dirty parts and drain off condensate at compressed air supply.

⚠️ WARNING
In our company all the bolts are secured against coming loose by means of medium-strength threadlocker. If bolts have to be removed or loosened, they must for reassembly by all means be secured again against coming loose by means of medium-strength threadlocker, e.g. Loctite 243.

Cleaning
Advice
- Please make sure you follow the cleaning instructions.
- Specific machine components must be cleaned with specific substances. Please use the correct materials and clean at regular intervals as suggested!
- Prior to any cleaning work, disconnect all the supply lines and the compressed-air supply!
- If the building is being cleaned ensure the machines are covered up!

Eriez Service: Telephone: 814-835-6000
The following must not be used for cleaning:

- Sharp, hard or pointed objects
- Water or steam jet devices
- Compressed air
- Hazardous, solvent-containing or chemical cleaning materials
- Cleaning agents that may attack the materials used

Cleaning instructions
We recommend cleaning with a soft, lint-free cloth using warm water and the appropriate cleaning agent. After cleaning, wipe up any remaining water with a dry, lint-free cloth.

Separation Unit
First remove the cover of the separation mechanism. The pneumatic components are now accessible and can be checked, cleaned or replaced. Damaged or worn brushes on the diverter slide are easy to replace. To reassemble, follow these instructions in reverse order.

If mainly regrind material is run, cleaning of the mechanical components after approx. 300 rejections or at least every three months is strongly suggested due to the high dust content to ensure proper function of the mechanical components.

Performance Check
The performance check of the detection unit is carried out by pressing the test button. It is recommended to use a test piece that is inserted into the conveying pipe, because this procedure ensures that both the detection and the separation unit are checked. If the system works properly, the test piece must be separated via the reject outlet. The interval for the performance check depends on the contamination level of the inspected bulk material and on quality assurance specifications. If necessary, a performance check should be performed every day; the minimum interval is every two weeks.

⚠️ Please take care that the test piece doesn’t drop in your good product in case of malfunction of the system.

Spare Parts
If you should have any questions please give equipment type and serial number!

⚠️ Spare parts and wearing parts must always be obtained from the manufacturer or from a supplier that is certified by the manufacturer.

Shipping, Preservation, Waste Disposal, Transport, Storage

Shipping, Preservation, Waste Disposal

⚠️ WARNING
Choose packing that is suitable for the type and size of unit, taking into account whether the shipment is for export by sea or airfreight, or for national or international road transport. The packing material must protect the goods from all damage under normal transport conditions.

⚠️ WARNING
Depending on the size, weight and nature of the goods, packing in cardboard boxes, boxed pallets etc. is only suitable for road transport. Use reinforced card, corrugated cardboard, blister packing and shredded paper to fill and protect the goods.

Electrostatic sensitive components (electronic boards, electronic modules, etc.) must be packed in antistatic foil or foil bags prior to packing! (this is essential!)

Stick additional warning labels on the outside of the packaging e.g. “Attention, electronic equipment, do not drop,” etc. The packing should be sealed with adhesive tape and, where the weight exceeds 110 lbs, additionally with wrapping tape.

⚠️ WARNING
When packing for international road transport, use the instructions above (see point 2). Larger and heavier shipments must also be protected as for export in wooden crates. Care must be taken to ensure that the goods inside the packing are protected against corrosion.

Any parts that will corrode easily must be wrapped in oil paper or corrosion-protective foil. Care must be taken to prevent the components moving around within the packaging.
WARNING
International air freight shipments must be packed in wooden crates or on export paltainers.

Care must be taken that the goods are secure and well-protected inside the packing. Any parts liable to corrode must be wrapped in oil paper, protective foil or sprayed with anti-corrosion spray.

WARNING
Sea-freight must be packed in seaworthy export crates. These crates can be obtained from specialist suppliers.

The crates must be lined with oil paper to make them resistant to sea water and prevent corrosion. In addition the goods must be protected against corrosion by use of a spray or be wrapping in protective foil.

Care must be taken to ensure that the goods cannot move around inside the crate. After packing the sea-freight crates must be properly closed. The sea crates must also be fastened externally with securing tapes. During loading care must be taken not to damage the external packaging.

The carrier must certify that the shipment has been accepted and loaded correctly by detailing this on the bill of lading, loading list etc.

WARNING - WASTE DISPOSAL
Observe the national waste disposal regulations.

Transport
DANGER
In order to avoid injury or damage to the unit it must be handled properly. In addition to following the instructions below, general health and safety good practice and specific accident prevention guidelines should be observed.

For correct handling and storage comply with the following symbols:

- Protect Against Moisture
- Careful: Glass
- Up
- Center of Gravity

DANGER
Do not compress the side walls of the unit or any attached parts by pulling obliquely on ropes or chains.

Only remove handling safeguards once all installation work has been completed.

When handling in a loading area make sure the unit cannot topple over or slip.

Damage caused during transportation must always be reported to the manufacturer.
Storage
If possible the unit should be stored in a closed room until final installation.

If the unit is stored in the open it must be covered over with tarpaulins and open underneath, to allow condensation to drain off.

Avoid any higher temperature fluctuations. It is possible that condensed water that has formed in the packing cannot properly drain and may corrode equipment surfaces. If a formation of condensed water cannot be avoided, suitable desiccants e.g. in the form of bags must be placed in the packing.

If the unit has been packed for transportation by sea the packaging must not be damaged or opened during transit and storage.

For storage temperature and permissible air humidity please refer to the technical data sheet.

For correct storage comply with all storage and handling symbols:

- Protect Against Moisture
- Careful: Glass
- Up

Accessories
- Operating instructions for signalling device (visual alarm, audible alarm or combination alarm)
- Counter - data sheet
- Button for manual ejection - data sheet
- Push button for functional test - data sheet
- UL/CSA certificate
- Data sheet magnet
- Operating manual magnetic systems

Options
- Compressed-air monitor data sheet
- Monitor system for separation unit data sheet