INSTALLATION MANUAL

SUSPENDED OVERHEAD ELECTROMAGNET (SEMO) - SELF-CLEAN

TRAMP METAL GROUP

TOLL FREE: 888.582.0821

P.O. #: _____ Order #: _____

Part #: _____ Power Supply #: _____

Sold To: _____ Ship To: _____

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INDUSTRIAL MAGNETICS, INC. 05/10

1385 M-75 South • Boyne City, Michigan 49712 • Phone: (231) 582-3100

Fax: (231) 582-2704 • Web: www.magnetics.com • E-mail: imi@magnetics.com

AUTOMATION 888-582-0823 MAG-MATE™ 888-582-0822 TRAMP METAL 888-582-0821

Magnet Installation

When determining the location for the installation of a suspended electromagnet, consider the fact that any ferrous material within the field of the magnet will become magnetic and may attract other ferrous materials. When the magnet is located directly over the conveyor belt, conveyor sections below the magnet need to be made of non-ferrous material. In addition, all conveyor sections directly beneath the magnet need to be made of non-ferrous materials.

The magnet should be as close to the conveyed material as possible, but clearance must always be maintained between the conveyed material and the tramp metal that accumulates on the magnet. The most efficient separation is accomplished by controlling the burden depth of the material flow. Using a Burden leveler ahead of the magnet will limit any irregularities. Check the area around the unit to be certain that it has adequate room allowed for maximum cooling and that measures have been taken to collect discharged tramp metal.

Turnbuckles are strongly recommended for mounting of the magnet. They allow for the proper adjustment of height and angle once the magnet is suspended. The magnet face and the product should be parallel. This normally eliminates the need for heavy equipment after the initial hanging of the magnet. The closer the face of the magnet is to the burden the stronger the magnet will be.

If the magnet is to be installed at an angle to accommodate the incline of a conveyor, the expansion tank must be the highest point of the magnet case and the angle must not exceed 15 degrees from horizontal.

CAUTION: Angles greater than 15 degrees may cause the oil level within the magnet case to drop enough to uncover the magnet coil, leading to coil damage. Consult factory for installations requiring angles greater than 15 degrees.

Magnets installed in areas with ambient temperatures that exceed 95° - 104°F (35° - 40°C) should have the oil levels checked frequently and have the oil changed annually.

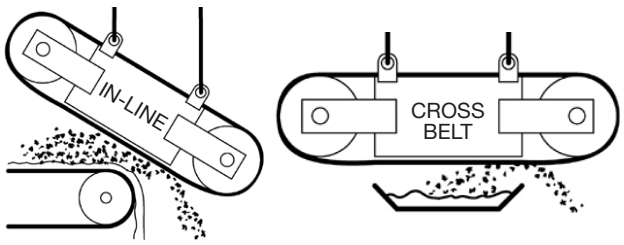
IN-LINE INSTALLATION

When the conveyor belt speed is greater than 350 FPM, use the in-line installation method for the best possible results. The magnet should be located so that the material being conveyed passes approximately 2 inches from the face of the magnet towards the center of the magnet. If the belt speed is changed the magnet location may have to be adjusted to maintain proper clearance between the face of the magnet and the material being conveyed. For the best magnetic performance, a non-ferrous pulley should be used under the magnet.

CROSS BELT INSTALLATION

The magnet should be located as close to the conveyed material as possible, but clearance must always be maintained between the conveyed material and the tramp metal that accumulates on the magnet's belt. The most efficient separation is accomplished by controlling the burden depth. Using a leveler ahead of the magnet will limit any irregularities. Check the area around the unit to be certain that it has adequate room to run freely and that measures have been taken to collect the discharged tramp metal.

MAGNET ORIENTATION



Power Supply Installation

Standard power supplies are designed for operation in ambient temperatures less than 40°C (110°F). De-rating is necessary for operation in higher ambient temperatures or at higher elevations (consult Industrial Magnetics, Inc. Engineering Department).

ENCLOSURE RATINGS:

NEMA TYPE 1 (General Purpose): A general purpose enclosure is intended primarily to minimize contact with the enclosed apparatus, and may be appropriate for general purpose applications indoors, where it is not exposed to unusual service conditions. A Type 1 enclosure offers protection against dust, light, and indirect splashing, but is not dust-tight.

NEMA TYPE 4 (Watertight): A watertight enclosure is intended to meet the hose-down test as described in the NEMA Standards Publication. A Type 4 enclosure may be suitable for certain outdoor applications on ship docks, and in dairies, breweries, etc.

NEMA TYPE 9 (Hazardous Locations) An enclosure designed to meet requirements of the National Electrical Code for Class2, Group E, F, G, Hazardous Locations. Designed according to specifications of Underwriter's Laboratories, Inc.

NEMA TYPE 12 (Industrial Use): A Type 12 enclosure is intended for use in those industries where it is desired to exclude such materials as dust, lint, fibers, oil seepage, or coolant seepage.

Connecting Line Voltage to the Power Supply

Consult the nameplate on the power supply and drawings to determine the required input line voltage for the supply. Ensure that the available line voltage matches the required input line voltage. Line voltage must be within +/- 2.5% of the nameplate rating, +5% continuous being the maximum allowable. Continuous voltage greater than 5% above the nameplate rating can result in magnet and/or power supply failure.

In most cases, the transformer used in IMI power supplies has a tapped primary. The taps are 440V, 460V, 480V and 575V. The proper tap has been selected based upon customer provided information and is wired at the factory. If necessary, the taps can be changed in the field.

A label is provided on the enclosure door that lists the Line-to-Line current required by the power supply at the required line input voltage. A fused, disconnect- switch or line switch is to be supplied by the user in the line feeding the power supply. The fuses are to be sized per national and local electrical codes. A rule of thumb is to size the fuses at 175% of the Line-to-Line current shown on the label. The rating of the fuses must not exceed the ampacity of the conductors used to feed the power supply from the switch. If 175% of full load current does not correspond to a standard fuse size, select the next larger standard size (not to exceed 225% of full load current). Use dual-element, time delay fuses.

Connect the line voltage to the terminals marked “L1”, “L2”, & “L3”. Electrical ground is to be connected to the terminal marked “G”.

IMI power supplies are unregulated, electromagnet supplies.

Connecting the Power Supply to the Electromagnet

The SEMO is to be connected to the terminals marked (+) and (–) and (G) on the power supply terminal block. The electromagnet has a terminal box installed which contains two electrical feed-through studs (1/4-20 thread) for wire termination of the (+) and (–) leads. The stud nuts accommodate a 7/16” wrench or nut-driver and are furnished with two nuts each. Use an appropriately sized ring terminal (by others) on each lead and tighten the stud nuts on each side of the ring terminal. Carefully tighten the stud nuts so that the stud posts are not turned or bent.

Caution: Do not attempt to twist the terminal studs. Internal damage to the magnet will occur.

The ground wire is to be connected to the ground stud of the terminal box. **DO NOT CONNECT EITHER MAGNET LEAD TO GROUND. DAMAGE TO THE MAGNET COULD RESULT.**

Upon completion of the wiring, the line switch may be closed; the power supply will energize the electromagnet. The SEMO is now ready to attract tramp metal. When operating properly, the magnet will become hot. This is normal. The magnet coil is completely immersed in transformer oil. This oil circulates around the coil, carrying away heat from the coils to the sides and top of the magnet case.

Maintenance (General)

CAUTION: The external temperature of these suspended electromagnets when continuously operated in an ambient temperature of 70°F is approximately 220°F.

- Provisions should be made at installation for adequate space around the magnet to perform preventive maintenance.
- Bearings should be lubricated on a schedule consistent with the environment and other equipment being used at the plant or site. Multipurpose lithium base grease is recommended such as Lubriplate No. 930-2. For motor and drive maintenance, refer to the manufacturer’s instructions.
- Before applying power to the electromagnet, ensure the belt tracks and the belt motor is running. Failure to do so could result in damage to belt, motor, and reducer due to excessive buildup of tramp metal on magnet face.
- Oil level must be checked daily. Failure to do so may lead to coil degradation. Coils not completely immersed in oil are not covered by the standard coil warranty!

Maintenance (Checking Oil Levels)

The manganese wearplate should be checked periodically for wear. Failure of the wearplate will allow the transformer oil to leak and possibly cause the electrical coils to burn out. Oil level must be checked once every 3 months. Failure to do so may lead to coil degradation. Coils not completely immersed in oil are not covered by the standard coil warranty!

IMI overhead electromagnets are equipped with an external expansion tank. The main oil tank remains filled 100% at all times to insure coils are submerged. As the oil heats up it expands and overflows into the expansion tank. The oil is siphoned back into the main tank as it cools and contracts. The expansion tank is fitted with a sight glass on each end panel.

Transformer Oil – The oil level should be inspected at least every 3 months by viewing the oil level in the magnet expansion tank at one of the two sight glasses. Monthly checks are strongly recommended.

When possible, draw a sample of the oil and inspect the color and odor. Dark Color and/or a burned odor are indicative of coil failure.

Laboratory analysis of the oil should be undertaken annually. The analysis must include testing for moisture content, contaminants and dielectric strength.

Oil replacement is recommended every two to three years. Use Shell Diala AX or an equivalent such as Exxon Univolt N61B or Texaco #600. Please see Table 1 (Page 5) for the quantity required for the magnet model in question.

TO ADD OIL: Remove pressure relief valve located on the expansion tank. Replace oil, as required.

IMPORTANT: Oil level is checked and filled only in the expansion tank. **Cold: 1" deep in expansion tank or halfway up sight glass. Hot: 1" from top of expansion tank. (Maximum)**

CAUTION: The external temperature of these suspended electromagnets when continuously operated in an ambient temperature of 70 degrees Fahrenheit is approximately 220 degrees Fahrenheit.

DO NOT *open relief valve or plugs while magnet is HOT! Hot oil could be expelled causing severe burns.*

Maintenance (To Change Oil)

DRAIN

1. Place magnet case at an angle so that the side opposite the drain plug is higher than the side with the drain plug.
2. Remove vent plug in expansion tank and fill plug(s) in top of magnet case.
3. Remove drain plug and drain until empty according to EPA and local DEQ regulations.

FILL (See Table 1 for type and quantity of oil for the magnet)

1. Ensure drain plug(s) have been replaced and tightened properly. Replace the two fill plugs on the magnet case that are opposite the expansion tank.
2. Raise side of magnet with expansion tank about 2" so that case is at a slight angle.
3. Fill case with transformer oil until oil begins to enter expansion tank. Replace remaining fill plugs on magnet case.
4. Return unit to level.
5. Add additional transformer oil to expansion tank until level reaches halfway across sight glass in the end-panel of expansion tank.
6. Replace vent plug.
7. Return magnet to proper operating position.

COLD - Magnet has been de-energized for 24 hours or more

HOT - Magnet has been energized continuously for 18 to 24 hours or more

TABLE 1

Magnet	Case LxWxH (Inches)	Power (Watts)	Voltage (V.D.C.)	Current (A) Cold	Resistance (Ohms) Cold	Resistance (Ohms) Hot	Oil Capacity (Gallons)
241	24x24x14	1652	115	14.4	8	12	30
301	30x30x16	2700	115	23.5	4.9	7.33	50
361	36x36x20	3800	115	33	3.48	4.87	75
422	42x42x22	5000	230	21.7	10.6	14.6	125
482	48x48x24	6600	230	28.7	8	11.3	205
542	54x54x26	8000	230	34.8	6.6	10	297
602	60x60x30	10000	230	43.5	5.3	7.5	385
662	66x66x32	12250	230	53.3	4.32	6	420
722	72x72x37	14500	230	63	3.66	5.2	660

Trouble Shooting (General)

MAGNET WILL NOT ATTRACT METAL

POSSIBLE CAUSE	SOLUTION
A. Burden depth is too deep.	A. Check depth of burden and use leveling bar to reduce if possible.
B. Magnet is too far from burden.	B. Check distance of magnet from burden and determine that it is within the recommended height.
C. Tramp Metal is non-ferrous	C. Check with permanent magnet to determine whether Tramp Metal is magnetic.
D. Magnet surface temperature is higher than 230 degrees F.	D. Check proper voltage at magnet terminals. Check for proper current. Current should not be more than amount listed on schematic. Check oil level.
E. Zero or low voltage at magnet.	E. Check DC voltage at magnet terminals. Refer to electrical schematic for V.D.C. rating.
F. Magnet Coil(s) failing/failed.	F1. Check current draw of magnet. Place a DC ammeter in series with the magnet coil or use a clamp-on style DC ammeter on just one of the magnet leads. Read the DC current and compare it to the entry for the appropriate magnet model listed in the table. A current reading higher than that shown in the table indicates a short circuited coil(s). A current reading of zero indicates an open coil(s). In either case, consult IMI for coil replacement information. F2. Determine coil resistance by first removing power from the magnet. Disconnect one or both of the leads from the magnet feed-through terminals in the magnet terminal box. Connect the leads of an ohmmeter to the feed-through terminals. Compare the meter reading to the coil resistance entries for the appropriate magnet model listed in the table. A resistance reading substantially higher than the “hot” reading shown in the table indicates an open coil(s). A current reading of 10% or more below the “cold” reading indicates a short circuited coil(s). In either case, consult IMI for coil replacement information.

OIL LEAKAGE

POSSIBLE CAUSE	SOLUTION
A. Wearplate has worn through or been punctured.	A. Call Industrial Magnetics, Inc. customer service at (231) 582-3100. Damage may have occurred to the coils in the unit due to loss of oil in the unit. If it has been determined that no coil damage has occurred and the hole is small, the hole in the wearplate may be patched by customer. The patch should be made of manganese or stainless steel. The patch should be ground smooth once it is on the unit.

CAUTION: All oil should be drained from unit prior to repair work. Oil may be very hot, use caution when draining the oil. All vent plugs should be opened to prevent hazardous vapor buildup in the unit during welding. Allow the patch to cool before refilling unit with oil.

TRAMP METAL REENTERING THE PRODUCT FLOW

POSSIBLE CAUSE	SOLUTION
A. Clearance not sufficient for discharge of tramp metal from the magnet.	A. Check clearance between bottom of magnet belt and edge of conveyor and adjust as necessary.
B. Magnet position	B. Centerline of magnet should be located over the centerline of the belt conveying product. Slight offset position toward the discharge area may help with tramp metal discharge. Too much offset could jeopardize magnet performance.

Trouble Shooting (Power Supply)

IF POWER SUPPLY FAILS TO OPERATE:

1. Open fused line safety switch and check the supply input fuses. If fuses are blown, attempt to locate short circuit by first checking the three phase bridge rectifier module. Isolate the rectifier first by disconnecting the three A.C. input terminals and the two D.C. output terminals on the module. With a digital Multimeter (DMM) set to Ohms, check the output of the module by checking the resistance. Check with one polarity then the other. A high resistance (Mega-Ohms) in one polarity and a low resistance (Kilo-Ohms) in the opposite polarity indicates a good rectifier. Low both ways indicates a shorted rectifier module. High both ways indicates an open module. Replace the rectifier module. Replace blown fuses.
2. Open fused line safety switch. Disconnect the wires to the magnet at the terminal blocks marked (+) and (–), check the resistance between the two magnetic wire leads. The resistance should not be lower than the minimum load resistance recorded on your electrical schematic. If resistance is lower, check lead wires going to magnet for shorts. If no shorts in lead wires, remove them from magnet and check resistance directly across the magnet input terminals. If resistance across magnet input terminals is lower than recorded on the power supply, call Industrial Magnetics, Inc. CUSTOMER SERVICE OFFICE AT 1-888-582-0821.

Belt Tracking & Stretch Adjustments (Two Pulley Designs)

The conveyor belt on this unit has been operated and adjusted at the time of manufacture. Belt rotation is counter clockwise when looking at the motor and electrical hook up side of the unit. The belt will settle during shipment so some adjustment may be required. After installation, momentarily operate the belt drive to determine if the belt tends to wander, and if so, see directions below for belt tracking and tension adjustments.

1. Position yourself on the take up end (opposite of motor/drive end) and face the magnet.
2. To move belt to the right:
   A. Tighten left hand take up (move pulley toward you and away from magnet)
   B. Adjust only 1/4 turn at a time and recheck belt track (momentarily run magnet belt).
3. To move belt to the left:
   A. Tighten right hand take up (move pulley toward you and away from magnet)
   B. Adjust only 1/4 turn at a time and recheck belt track (momentarily run magnet belt).
4. **DO NOT** allow the belt to run until it is properly adjusted.
   A. Belt tension should clear top of the unit and be as loose as possible, but tight enough that no slippage occurs during operation. (Approximately 1” to 2” inch off the face).
   B. ***CAUTION:*** The belt will be harder to track, and can cause overloading on the shaft and bearing, if it is too tight.

Belt Tracking & Stretch Adjustments (Four Pulley Designs)

1. Position yourself on the take up end (opposite of motor/drive end) and face the magnet.
2. To move belt to the right:
   A. Tighten right hand take up (move pulley toward you and away from magnet)
   B. Adjust only 1/4 turns at a time and recheck belt track (momentarily run magnet belt.
3. To move belt to the left:
   A. Tighten left hand take up (move pulley toward you and away from magnet.)
   B. Adjust only 1/4 turn at a time and recheck belt track (momentarily run magnet belt)

NOTE: There should be about 1” to 2” between belt and magnet face.

Belt Replacement Instructions

The following steps are to be used when replacing the belt:

1. Verify that the width and length are correct.
2. Loosen take-ups and remove belt hinge pin.
3. Lay out new belt with cleats down.
4. Center magnet assembly equidistant on the belt.
5. Fold belt over the pulleys and line up the edge of the belt and the belt fastener splice.
6. Slide a 1/4” rod through the belt fastener mesh leaving a 2” opening on one end to start hinge pin. Pull 1/4” rod out while feeding hinge pin through the splice.
7. Crimp keepers on hinge pin.
8. Tighten belt using the take ups on the tail pulley.
9. Belt tension should clear top of the unit and be as loose as possible, but tight enough that no slippage occurs during operation. (Approximately 1” to 2” inch off the face).
10. See belt-tracking instructions for additional tracking adjustments.

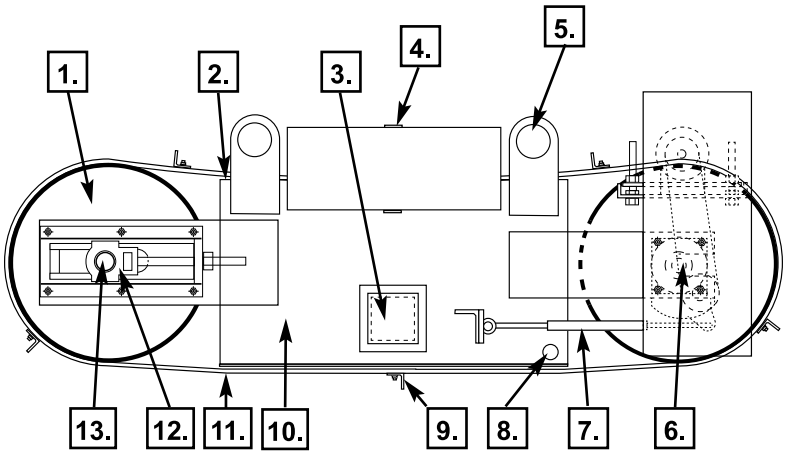
CAUTION: The belt will be harder to track, and can cause overloading on the shaft and bearing, if it is too tight.

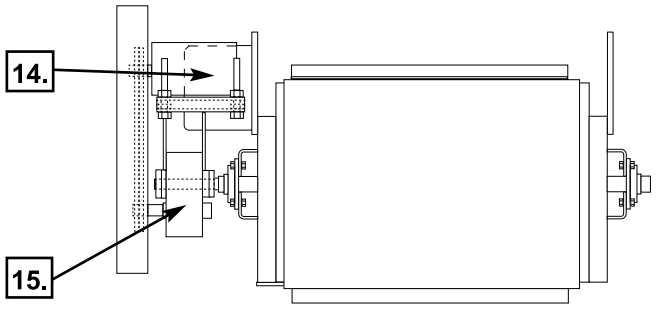
Illustrations & Parts (Two Pulley Design)

MAGNET ASSEMBLY PARTS LIST

Ref. No.	Description	Qty.
1.	Tail Pulley	1
2.	Fill Plug	3
3.	Junction Box	1
4.	Vent Plug	4
5.	Magnet Hanger	1
6.	Drive Shaft	1
7.	Tie Rod	1
8.	Drain Plug	1
9.	Cleat	*
10.	Magnet Box, including coils	1
11.	Belt	1
12.	Take Up Bearing	2
13.	Tail Shaft	1
14.	Motor	1
15.	Reducer	1

***Quantity depends upon unit size**





POWER SUPPLY PARTS LIST

Description
Fuse Line Voltage Input
Fuse Transformer Secondary
Bridge Rectifier ECG5338 (Philips)
Varistor 275LA0A (Harris)

Illustrations & Parts (Four Pulley Design)

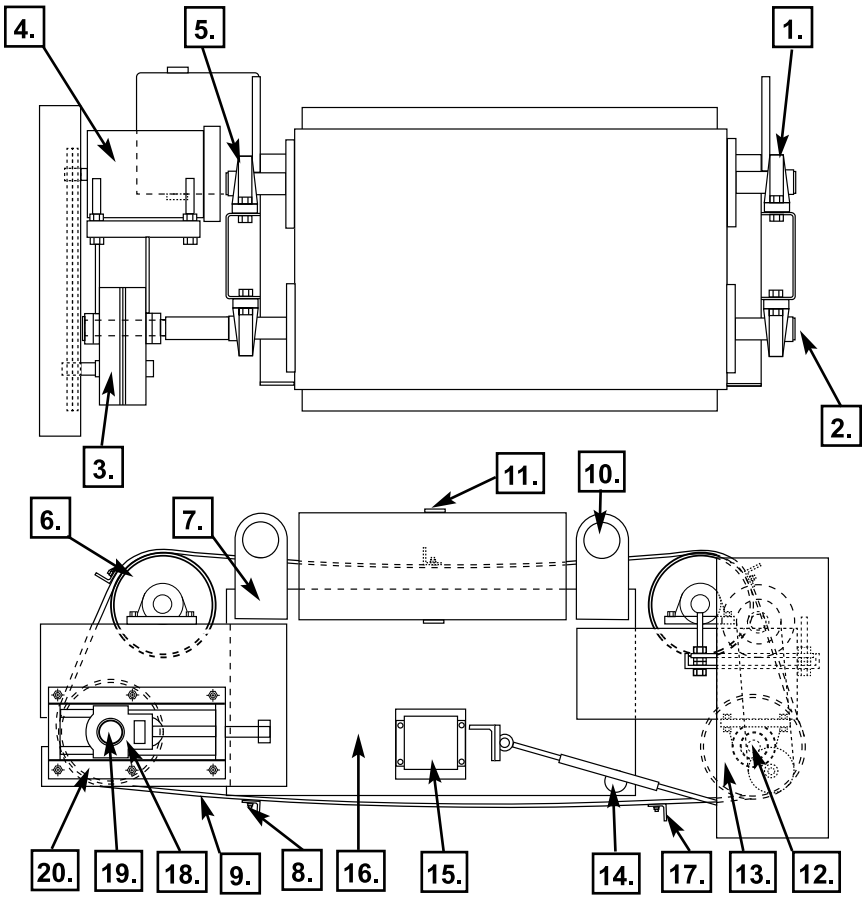
MAGNET ASSEMBLY PARTS LIST

Ref. No.	Description	Qty.
1.	Pillow Block Idler	4
2.	Pillow Block Main	4
3.	Reducer	1
4.	Motor	1
5.	Shaft Idler	2
6.	Idler Pulley	2
7.	Fill Plug	3
8.	Elevator Bolt	*
9.	Belt	1
10.	Magnet Hanger	4
11.	Vent Plug	1
12.	Drive Shaft	1
13.	Drive Pulley	1
14.	Drain Plug	1
15.	Junction Box	1
16.	Magnet Box, including coils	1
17.	Cleat	*
18.	Take Up Bearing	2
19.	Tail Shaft	1
20.	Tail Pulley	1

***Quantity depends upon unit size**

ADDITIONAL REPLACEMENT PART:

Transformer Oil (Shell Diala, Texaco 600 and Exxon Univolt 60 or equivalent)



OPTIONAL EQUIPMENT

Zero Speed Switch
Motor Starter: NEMA 1,4, & 12
Explosion Proof Motor
Replaceable 3/16” Wear Plate
Impact Package Inc: (Cladded Belt, Lagged Pulley Drive, & Replaceable Wear Plate)
Dust Hood

Comments or Concerns?

We believe Industrial Magnetics, Inc. offers the finest Self-Cleaning Suspended Overhead Magnets available today. Great pride has gone into the design and manufacture of this unit. Any comments or concerns should be directed to our Customer Service Department at 1-888-582-0821. **We appreciate the opportunity of serving you!**

When contacting IMI regarding your suspended electromagnet, please have the following information available:
- Model number or the measurements of the magnet case
- Serial number – Found inside cover of terminal box, near nameplate or inside power supply enclosure door
- Available mains voltage to power supply and/or belt motor
- Magnet coil resistance. Specify whether it is a cold or hot measurement.

INDUSTRIAL MAGNETICS, INC.

1385 M-75 South • Boyne City, Michigan 49712 • Phone: (231) 582-3100

Fax: (231) 582-2704 • Web: www.magnetics.com • E-mail: imi@magnetics.com

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