

Installation, Operation and Maintenance Instructions



SAFEHOLD® RPL SERIES SWITCHABLE PERMANENT LIFTING MAGNETS

ERIEZ MAGNETICS HEADQUARTERS: 2200 ASBURY ROAD, P.O. BOX 10608, ERIE, PA 16514-0608 U.S.A.
WORLD AUTHORITY IN ADVANCED TECHNOLOGY FOR MAGNETIC, VIBRATORY and METAL DETECTION APPLICATIONS

Introduction

This manual details the proper steps for installing, operating and maintaining the Eriez SafeHold® RPL Series Lifting Magnet.

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 lifting magnet 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

The Eriez SafeHold RPL series magnet is a permanent type magnet in which the magnetic field is turned off and on mechanically, resulting in controllability similar to that of an electromagnet. Several sizes are available.

A unique feature of the SafeHold RPL series, is the use of NdFeB (rare earth) magnets, which enables these magnets to generate lifting power approaching that of electromagnets.

CAUTION

This manual covers the factors that must be considered by the user in most common lifting applications. However, not every application may be addressed.

If the instructions are not clear, or if some aspect of your lifting application is not covered in this manual, or if you have any questions about magnetic lifting, call Eriez at (814) 835-6000 before attempting the lift.



Installation

Handling

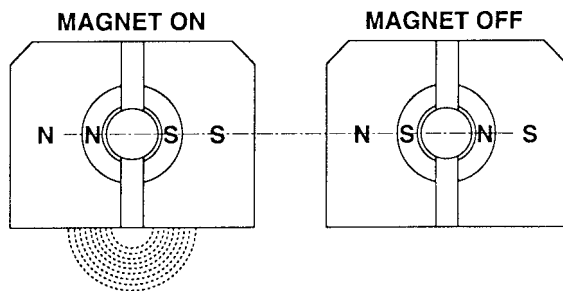
All Eriez lifting magnets are packed for shipping in a manner that provides adequate protection for the pole faces and other critical areas. SafeHold RPL magnets do not present any potential hazards for magnetic attraction in the “as shipped” condition.

Inspection

Inspect the pole faces carefully for evidence of damage in shipment. Nicks or burrs that would prevent the poles from fully contacting the objects to be lifted, should be sanded, filed or machined to a surface finish of $6.3\ \mu\text{m}$ (250 micro-inches) or better. Determine whether any parts are obviously missing or broken, and, if so, do not attempt to use the magnet until corrective action is taken.

Operation

To activate the magnet, PLACE IT IN CONTACT WITH THE OBJECT TO BE LIFTED (the “workpiece”) and move the handle from OFF to ON (approximately 120 degrees counterclockwise when facing the “handle end” of the magnet)(see Figure 1). Verify that the security latch on the end of the handle is engaged, BEFORE STARTING TO LIFT. Attach an appropriate cable to the lifting shackle and start to lift.



Rotatable element is turned 120° from OFF to ON, or vice versa, to energize or de-energize the magnet.

Figure 1. Safehold RPL Series Magnetic Circuit

As the workpiece starts to rise, verify that the magnet has been properly placed so that the lifting force is approximately through the center of gravity of the workpiece. Excessive tilting of the workpiece is an indication that the surface contacting the magnet is not perpendicular to the line of action of the magnetic force. SUCH A CONDITION REDUCES THE EFFECTIVE LIFTING CA-

PACITY OF THE MAGNET by generating a sliding or peeling force at the magnet pole faces. It should be corrected by repositioning the magnet and/or by reducing the effective lift rating of the magnet for this particular lift.

Move the workpiece to its destination, LOWER IT ONTO APPROPRIATE SUPPORTS, and release it by pressing the security latch and moving the handle of the SafeHold RPL from ON to OFF.

⚠ CAUTION

The handle on manually operated SafeHold magnets will tend to override the operator's control through part of the stroke. Failure to grip the handle firmly could result in injury.

⚠ WARNING

Because the operator inherently works very close to the magnet when using the SafeHold RPL, THE WORKPIECE SHOULD NEVER BE DROPPED FROM MID-AIR. Release of the workpiece from the magnet may be uneven for any of several reasons, causing rotation of the workpiece and an unpredictable fall path, resulting in serious personal injury or property damage.

Limitations

The ability of the SafeHold RPL series magnets to operate without an external power supply provides an inherent safety feature. However, these magnets must be used strictly within their rated lifting capacity to prevent accidents. THE NOMINAL RATED CAPACITY MUST BE REDUCED TO ACCOUNT FOR MANY SPECIAL CONDITIONS, some of which are discussed below. If the conditions of your application are not addressed below, to assure safe operation contact Eriez for advice, BEFORE ATTEMPTING THE LIFT.

WARNING

At no time should any magnet be used to move or hold heavy material over the operator or any other person. All personnel should keep clear of the lift area at all times. Failure to observe this warning can result in serious injury or death.

The lifting capacity of any magnet is influenced by the thickness and surface finish of the object to be lifted (the workpiece). A thin workpiece may not provide an adequate path for the full magnetic field generated by the magnet, and, thus, less magnetic force may be generated when lifting thin objects than when lifting thick objects. SafeHold magnet ratings are based on a workpiece thickness that provides an adequate path for the magnetic field. This thickness is generally an inch (25mm) or more. Very thin workpieces also tend to flex and generate a “peeling” force which further reduces the effective magnet capacity. If you are lifting pieces much thinner than one inch (25mm), you should test first to determine the magnet capacity for those specific pieces.

Safehold magnets are either fully on or fully off, without any in-between conditions to provide partial magnetic strength. Consequently, for any given size, the field has a fixed depth of penetration. Therefore, these magnets are not recommended for lifting single thin steel plates from a pile, unless non-magnetic spacers are used between the plates.

The surface finish of the workpiece should be evaluated. If the surface is rougher than 6.3 μm (250 micro-inches), an effective air gap will exist, which will reduce the lifting capacity of the magnet. Other surface conditions that can reduce the lifting capacity of the magnet are scale, ice, or surface coatings.

The composition of the workpiece also will influence the lifting capacity of the magnet. If low-carbon steel is regarded as the reference, with a relative lifting capacity of 1, medium carbon-steel will have a relative lifting capacity of 0.95, and high-carbon steel a relative lifting capacity of 0.90. The relative lifting capacity for low-alloy steel is 0.75 and for cast iron is 0.50.

When lifting a cylindrical workpiece, the “vee-slot” in the lifting surface of the SafeHold RPL should be centered on the cylindrical surface so that a vertical line through the center of the magnet will pass through the center of gravity of the workpiece. Since a cylindrical surface contacts the vee-slot only along two lines, the lifting capacity on cylinders will be only 30 - 50% of the rated capacity for plates.

The magnet should be operated in an ambient temperature less than 65°C (150°F). Failure to do so can result in loss of magnet field. It should not be subjected to strong vibration or impact, or to corrosive materials.

Important - Safe Operation

Suspending equipment inherently involves risk of damage to property or injury to personnel located under or near the equipment, should a suspension component fail. In the case of suspended magnets, there is an additional hazard associated with unexpected dropping of the load, as a result of conditions that could not be anticipated by the magnet's supplier. **As with all suspended equipment, personnel access to the area under and around suspended magnets should be restricted.**

Ratings for Eriez magnets are based on maximum capacity under ideal conditions, reduced by a safety factor of two. If ideal conditions for the lift are not present, determine an application-specific rating for the magnet(s) by trial and error, under carefully controlled conditions simulating the planned lifting procedure. **This rating should be based on the measured maximum capacity of the magnet(s) under simulated conditions, reduced by a factor of at least two.** The appropriate reduction factor may be much larger than two, for situations involving multiple magnets; extended, flexible, or off-center loads; or loads with variable surface conditions. The user is responsible for determining the

appropriate reduction factor, based on knowledge of the variation in conditions to be encountered during production.

Illustrations of suspension components given in this manual are examples only, and the user is entirely responsible for final design of his installation. 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.

A person responsible for safety should review lifting magnet rating and procedures periodically to assure that safe procedures are observed.

This manual covers the factors to be considered by the user in the most common lifting magnet applications. However, not every application may be addressed. If the instructions are not clear, or if some aspect of your lifting operation is not covered in this manual, or if you have any questions about magnetic lifting, call Eriez *before attempting the lift*.

Maintenance

A rigid maintenance schedule is not required for these magnets. A periodic visual inspection of the pole plate contact area is recommended. **The pole plates must be free of foreign material, burrs or indentations, and deterioration (rust pockets) due to caustic solutions. As a result this can interfere with proper contact and thereby detract from holding.**

Should repair or replacement parts be required, refer to the following parts list.

CAUTION

Never weld or bolt special attachments to the equipment. Doing so can alter the magnet's performance and will void warranty.

Specifications

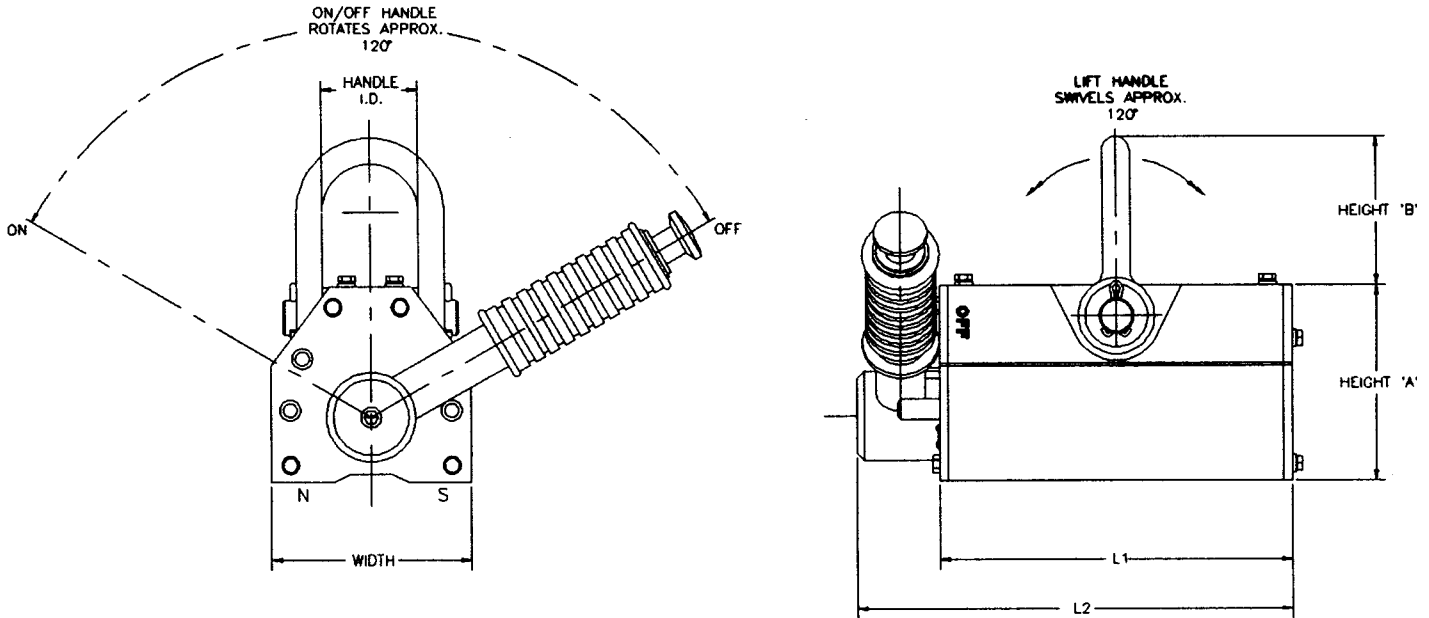


Table 1. Dimensions

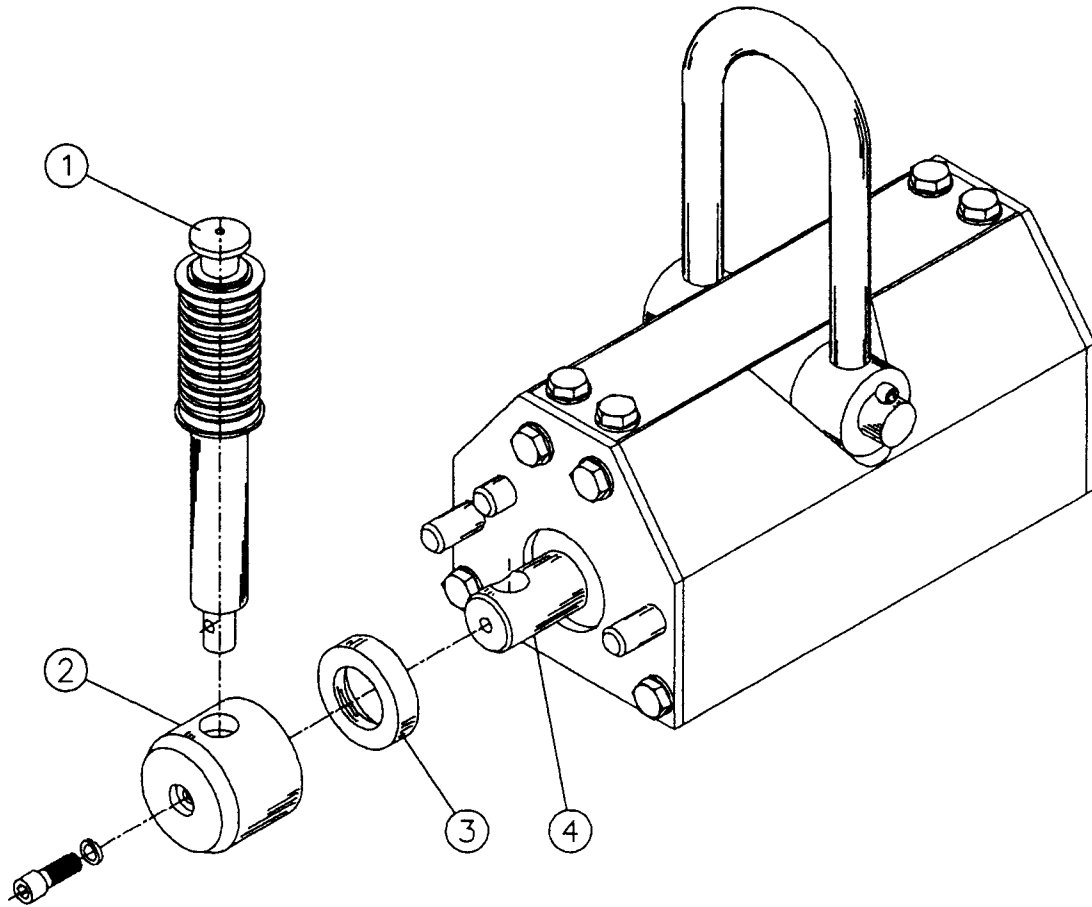
MODEL NUMBER	L1		L2		WIDTH		HEIGHT 'A'		WEIGHT		HANDLE I.D.		HEIGHT 'B'	
	in	mm	in	mm	in	mm	in	mm	lbs	Kg	in	mm	in	mm
RPL-3	3-9/16	90	4-3/4	121	2-1/2	64	2-5/8	67	6.6	3	1-1/4	32	2-3/16	56
RPL-11	6-3/8	162	7-3/4	197	3-5/8	92	3-9/16	91	22	10	1-3/16	46	3-7/32	90
RPL-22	9-1/8	232	10-23/32	272	4-13/16	122	4-5/8	117	53	24	2-9/32	58	2-9/32	58
RPL-35	10-5/8	270	12-1/2	318	6-15/16	176	6-13/32	163	110	50	3-13/16	97	5-1/8	130.5
RPL-70	14-7/8	378	16-27/32	428	9-7/32	234	8-11/32	212	276	125	5-1/32	128	6-11/16	170
RPL-100	18-1/32	458	20-13/32	518	11-1/4	286	10-9/32	261	485	220	6-3/16	157	7-21/32	194.5
RPL-200	23-5/8	600	26-5/32	664	16-15/16	430	13-31/32	355	926	420	2-5/32	55	4-3/4	121

Table 2. Capacity

MODEL NUMBER	MAXIMUM LIFTING CAPACITY WITH 2:1 SAFETY FACTOR		MAXIMUM BREAKAWAY CAPACITY		TEST PLATE THICKNESS	
	lbs	Kg	lbs	Kg	in	mm
RPL-3	300	136	600	272	1	25
RPL-11	1100	500	2200	1000	1	25
RPL-22	2200	1000	4400	2000	1-1/4	32
RPL-35	3500	1588	7000	3175	1-3/4	45
RPL-70	7000	3175	14000	6350	2	50
RPL-100	10000	4535	20000	9070	2	50
RPL-200	20000	9070	40000	18140	2	50

- NOTE:
- Capacities may vary 5%
 - These are actual ratings on flat, clean, polished steel plate.
 - Maximum attractive force of each model is approximately twice the Lifting Capacity.
 - Thin sheets, rough and irregular surfaces, odd shapes and scale all affect holding power adversely and must be considered in establishing safety factor.
- Dimensions and specifications are subject to change without notice.

Spare Parts



Item Number	Description of Part	Quantity Required	RPL-3 Part No.	RPL-11 Part No.	RPL-22 Part No.	RPL-35 Part No.	RPL-70 Part No.	RPL-100 Part No.	RPL-200 Part No.
1	Handle Assembly	1	443399	443395	441552	441556	443403	443407	443411
2	Hub	1	443400	443396	441553	441557	443404	443408	443412
3	Bushing	1	443401	443397	441554	441558	443405	443409	443413
4	Magnet Shaft/Rotor	1	443402	443398	441555	441559	443406	443410	443414