GE HealthCare

1.5T PM Series Magnets

Magnet Handling Manual

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US English

Language Policy

DOC0371395 - Global Language Procedure

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Contents

Chapter 1 Getting started

1.1 Overview

Safety
Before working in any GE HealthCare MR suite or doing any GE HealthCare service procedure, you must: • Have read and understood all hazard conditions and safety requirements in the latest revision of the GE HealthCare *MR Service Safety Manual* (5452735). • Have successfully completed all relevant GE HealthCare Environmental Health and Safety (EHS) courses (or for non-GE HealthCare employees, equivalent workplace training courses). • Comply with all site-specific training and workplace safety requirements. If you have any safety concerns at any time, do not begin work or immediately stop work and move to a safe location. Immediately contact your supervisor or site safety officer for instructions on how to proceed.

This *Magnet Handling Manual* manual addresses moving, storage, delivery, and installation of a PM series (as defined by the two characters of the magnet serial number) zero boil-off magnet. The sequence of events involved in magnet delivery and installation, along with functions, responsibilities, and associated documentation, are shown in the table below.

Table 1-1 Magnet handling functions and responsibilities

	Function	Responsibility	Reference document
1	MR Magnet Safety Document Review and Compliance	GE HealthCare Project Manager of Installation (PMI), GE HealthCare Field Engineer and Rigger	The *MR Service Safety Manual* (5452735).
2	Site Delivery and Review: • Access and Route • Clearances	GE HealthCare Project Manager of Installation (PMI), GE HealthCare Field Engineer and Rigger	This *Magnet Handling Manual* and the appropriate *Preinstallation Manual* (see Appendix B *Preinstallation Manual* reference on page 111).
3	Magnet Transportation	Transportation Team, Rigger	Section 1.3 Truck loading specifications on page 11 in this manual.
4	Magnet Delivery	Rigger	Chapter 2 Unloading and moving the magnet on page 17 in this manual.
5	Prepare the Scan Room: • Clear the Room • Put the Positioning Template in Position • Set Up the Lasers • Mark the Room for Reference	GE HealthCare Field Engineer	Chapter 5 Preparing the scan room on page 53 in this manual.
6	Put Vibroacoustic Damping Mats in Position	Rigger	Chapter 6 Installing a nonseismic vibroacoustic damping mat and leveling the magnet on page 63 or Chapter 7 Installing a seismic vibroacoustic damping mat and leveling the magnet on page 81 in this manual.

Table 1-1 Magnet handling functions and responsibilities (Table continued)

	Function	Responsibility	Reference document
7	Moving Magnet to MR Suite	Rigger	Chapter 6 Installing a nonseismic vibroacoustic damping mat and leveling the magnet on page 63 or Chapter 7 Installing a seismic vibroacoustic damping mat and leveling the magnet on page 81 in this manual.
8	Magnet Leveling and Bolt Down	Rigger and GE HealthCare Field Engineer	Chapter 6 Installing a nonseismic vibroacoustic damping mat and leveling the magnet on page 63 or Chapter 7 Installing a seismic vibroacoustic damping mat and leveling the magnet on page 81 in this manual.
9	Magnet Cryocooler Connections pending room installation as soon as possible but no later than **24 hours**	GE HealthCare Field Engineer	Chapter 3 Magnet storage conditions, pending ramp on page 39 in this manual.
10	Magnet Conversion to Operating Configuration	GE HealthCare Field Engineer	Installation/Conversion sections (for the defined magnet style) in the *Magnet and Cryogen Manual for 1.5T PM Series Magnets* (5968610-8EN).
11	Exhaust Gas Vent Connection as soon as possible - must be done prior to ramping magnet	GE HealthCare Field Engineer	Exhaust Gas Vent Connection section (for the defined magnet style) in the *Magnet and Cryogen Manual for 1.5T PM Series Magnets* (5968610-8EN).
12	Continue with Magnet Commissioning using the Setup and Calibration chapter (for the defined magnet style) in the *Magnet and Cryogen Manual for 1.5T PM Series Magnets* (5968610-8EN).		

Photos and images contained within this manual are representative of the system(s) and configuration(s) shipped. The system received may vary slightly.

The latest release of this manual can be obtained through the SIMS Content Viewer or through your GE HealthCare Field Service Representative. Before using this document, make sure you are using the most current released version of this document.

1.2 Examining packages for damage in transportation

Examine all packages closely at delivery. If damage is apparent, do the following:

1. Make sure the notation *damage in shipment* is written on all copies of the freight or express bill before delivery is accepted or signed for by a GE HealthCare representative or a hospital receiving agent.
2. Whether noted or concealed, you must report damage to the carrier immediately upon discovery, or in any event, within 14 days after receipt, and hold the contents and containers for inspection by the carrier. A transportation company will not pay a claim for damage if an inspection is not requested within this 14-day period.
3. Call Global Parts at 1-800-548-3366 (option 6) to file a report of the damage.

NOTE
Contact your local service coordinator for more information on this process.

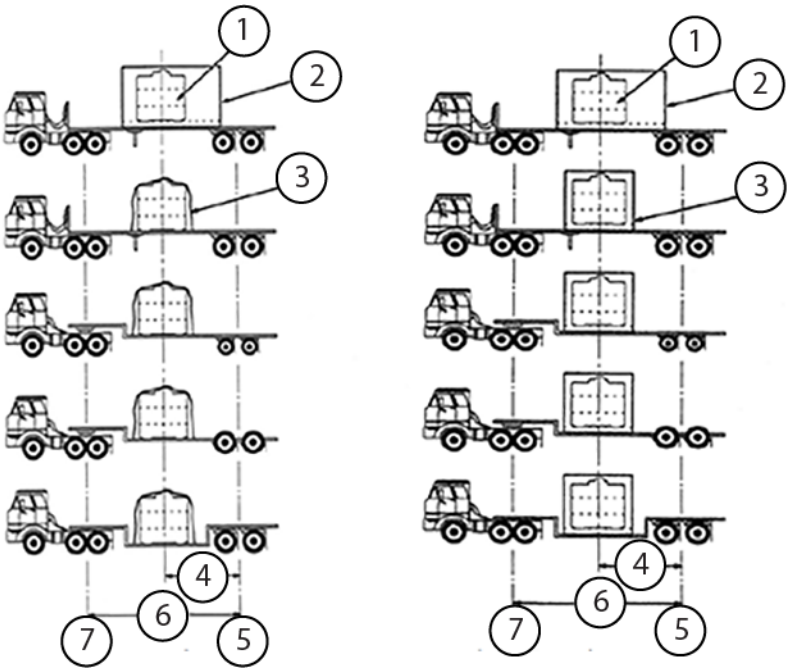
1.3 Truck loading specifications

Safety
NOTICE EQUIPMENT DAMAGE RISK Improper transportation can result in damage to the magnet. Review guidelines with the carrier prior to transporting the magnet. Any other shipping configuration must be demonstrated through testing and be approved by GE HealthCare.

Required conditions
Air ride trailers must be used.
The magnet must be centered on the trailer with the magnet bore parallel to the truck.
The magnet **must not** be put over the trailer axles.
Extreme care must be used during forklift use. The magnet crate must be picked up from the sides only. The forks must be put directly under the four magnet feet. The magnet can be identified by the steel plates attached to the pallet. See Chapter 2 Unloading and moving the magnet on page 17 for more detailed handling requirements pertaining to forklift and/or crane moves.
Crate and/or frame top and sides **must not** be used to secure the magnet to the trailer. Magnets should be secured to the trailer using crate/magnet base.

Required conditions
A maximum of two magnets per trailer is allowed. Acceptable dual load configurations are as follows: • Two 1.5T (HM, PM, R, or RD series) magnets • One 1.5T (HM, PM, R, or RD series) magnet and one 3.0T (AR or UA series) magnet

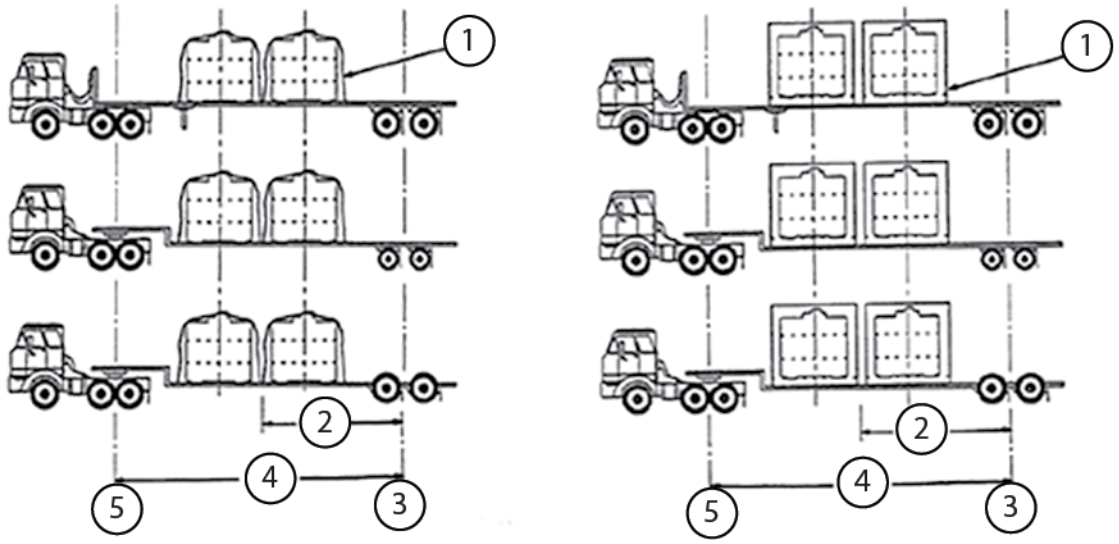
Figure 1-1 Single magnet ground transportation truck loading requirements, tarped configuration (left) and crated configuration (right)



Item	Description	Item	Description
1	Magnet	5	Rear axle centerline
2	ISO box container	6	Length from king pin centerline to rear axle centerline (L)
3	Tarp (left) or crate (right)	7	King pin centerline
4	Length from the midpoint to the rear axle centerline (L/2)	-	-

Required conditions

Figure 1-2 Two magnet ground transportation truck loading requirements, tarped configuration (left) and crated configuration (right)



Item	Description	Item	Description
1	Tarp (left) or crate (right)	4	Length from king pin centerline to rear axle centerline (L)
2	Length from the midpoint to the rear axle centerline (L/2)	5	King pin centerline
3	Rear axle centerline	-	-

Table 1-2 Magnet loading specifications

Max tilt when suspended by lifting lugs	30°
Allowable shipping modes	• Airplane (any plane that has openings large enough to accept a magnet) • Air ride trailer (see Figure 1-1 Single magnet ground transportation truck loading requirements, tarped configuration (left) and crated configuration (right) on page 12 and Figure 1-2 Two magnet ground transportation truck loading requirements, tarped configuration (left) and crated configuration (right) on page 13) • Boat or ocean-going ship
Forklift capability	Yes
Shipping temperature	-30 to 50°C (-22 to 122°F)
Maximum shock load	1.5g

1.4 Predelivery instructions

Safety
NOTICE EQUIPMENT DAMAGE RISK Impacts/jolts/drops to the magnet while lifting/moving/lowering the magnet can cause expensive internal magnet damage. The rigger is responsible for actual equipment/procedures used to lift and move a magnet into the customer facility, including through a raised opening in an exterior wall. The following EXAMPLE procedure only outlines the concept of one method. Lift/move/lower the magnet smoothly. Do not let the magnet bump or hit anything forcefully. Avoid tilting the magnet more than the maximum tilt (30° from horizontal level). Do not apply any force to the magnet enclosures. Protect all customer surfaces during any and all move operations.
NOTICE IMAGE QUALITY RISK Improperly located anchors can cause image quality issues. Make sure that all equipment anchors are located in conformance with the site's architectural drawings and are installed and tested per the *Anchor Hardware Requirements for MR Equipment inside RF Shield Room* section of the appropriate *Preinstallation Manual* (see Appendix B *Preinstallation Manual* reference on page 111).

1. Before magnet delivery, the GE HealthCare PMI and rigger must do the following:
   1.1. Visit the magnet site with the rigging foreman before magnet delivery to plan the move. The GE HealthCare PMI must hand-deliver a copy of this document to the rigging foreman.
   1.2. Review the guidelines for shipping/handling and for equipment/tools with the rigging foreman per Chapter 2 Unloading and moving the magnet on page 17 in this manual.
   1.3. Caution the rigger that the magnet is extremely fragile. Sudden jolts can damage the magnet. (Make riggers aware of the cost of a magnet replacement. This usually promotes more care while handling the magnet.)
   1.4. Make sure all routes and paths leading to the magnet room are level and free from obstacles and holes. (The rigger will be required to construct platforms where needed.)
   1.5. Make sure that clearance dimensions along the path to the magnet room meet the requirements stated in the *Preinstallation Manual* (see Appendix B *Preinstallation Manual* reference on page 111). In the case of a magnet being lifted by a crane through a raised opening, make sure the opening is of sufficient size to fit the magnet and all rigging equipment without interference.
   1.6. If roller dollies are to be used, have the rigger bring steel plates to put along the delivery route.
   1.7. The rigger must take actions necessary to ensure that walls, floors, and so on along the transportation route/path are be protected from potential damage.

1.8. The GE HealthCare PMI and rigger must review the *Rigging* guidelines (see 1.5 Rigging on page 15).

2. Before magnet delivery, the GE HealthCare PMI and Shield Room Vendor must do the following:

   2.1. Make sure that floor levelness specifications stated in the *Preinstallation Manual* (see Appendix B *Preinstallation Manual* reference on page 111) are met after the finished flooring is installed.

   2.2. Make sure that the vent is located according to the specifications stated in the *Preinstallation Manual* (see Appendix B *Preinstallation Manual* reference on page 111).

   2.3. Make sure that markings are present on the magnet room floor in accordance to the specifications stated in the *Preinstallation Manual* (see Appendix B *Preinstallation Manual* reference on page 111).

1.5 Rigging

This section provides guidance on lifting a GE HealthCare MRI magnet.

DANGER

DEATH OR SERIOUS INJURY

MRI magnets have unique shapes which increases the difficulty of rigging and may result in **bodily harm or in severe cases, death**, if done incorrectly since the load may fall/tip.

Review the following chapters in their entirety to make sure the MRI magnet lifting requirements are clearly understood.

- Chapter 2 Unloading and moving the magnet on page 17
- Chapter 6 Installing a nonseismic vibroacoustic damping mat and leveling the magnet on page 63
- Chapter 7 Installing a seismic vibroacoustic damping mat and leveling the magnet on page 81

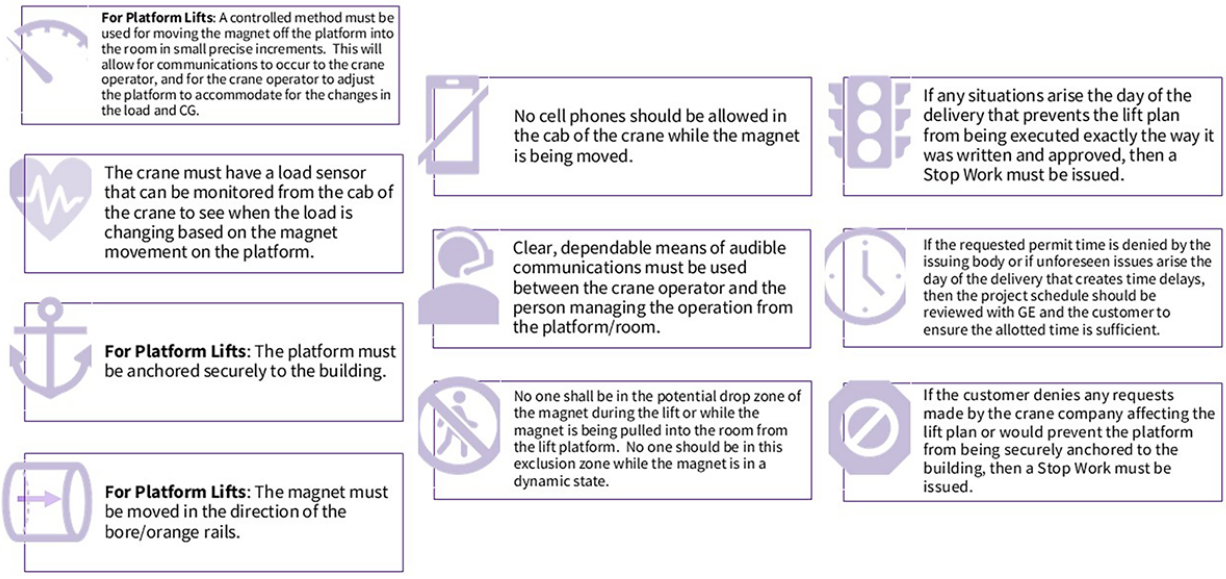
These chapters detail the MRI weights, dimensions, lifting anchor points, and forklift access areas. GE HealthCare MRI magnets can only be rigged from the lifting anchor point and forklift access areas specified in this manual.

Removing the MRI magnet off the flatbed trailer and putting the MRI magnet at its final location is the **responsibility of the rigging company**.

Although lift plans are only required for lifts that are considered a critical lift by GE HealthCare standards, GE HealthCare strongly recommends that a thorough lift plan is developed and reviewed with a GE HealthCare representative for all crane lifts, **preferably using the GE HealthCare Lift Plan template which can be provided by the GE HealthCare EHS team**. Following the review, if changes are required, discuss and review the plan (with a GE HealthCare representative) prior to the lift to make sure all parties are satisfied with the lift plan execution, and can safely lift and move the magnet to the desired location.

Shown below are lifesaving principals for rigging MRI magnets that should be followed on the day of delivery to help make sure lifting occurs safely.

Figure 1-3 Life saving principals



Chapter 2 Unloading and moving the magnet

2.1 Shipping and crate configurations

Safety
 **⚠ DANGER** POTENTIAL ASPHYXIATION HAZARD Loss of magnet vacuum will result in the rapid expulsion of helium gas, which can cause asphyxiation in enclosed areas. Use extreme caution and do not contact or damage the vacuum vessel during magnet transit or siting.
 **⚠ WARNING** POTENTIAL INJURY Magnet is an unbalanced load. Tilting can result in a hazardous condition that can cause magnet damage or serious personal injury. Do the following to avoid tilting: • Make sure that the lifting apparatus (crane, spreader beam, and so on) meets the specifications stated in this manual. • Put the spreader beam (if used) parallel to the lifting rails. • Adjust the lifting cables/slings and spreader beam (if used) lift point to level the magnet before fully lifting the magnet off the surface. • Make sure that the entire area where lifting will occur is free of obstructions and unauthorized personnel. • Make sure the surface where the magnet will be put after lifting is flat. • Do not crane lift a magnet during dangerous weather conditions.
 **⚠ CAUTION** HEAVY EQUIPMENT Two people are required to lift the magnet lifting rails.
 **⚠ WARNING** RISK OF DEATH, PERSONAL INJURY, OR EQUIPMENT DAMAGE The use of used and/or damaged bolts, lock washers, flat washers, and nuts could result in equipment and/or component damage, death, or serious physical injury! Use new, undamaged mounting hardware.

Safety

NOTICE

COMPONENT DAMAGE RISK

Improper transportation can result in damage to the magnet.

Tasks in this section are to be done by riggers, not by GE HealthCare Personnel.

Weights referenced in section 2.2 Equipment requirements on page 20 are rigging weights (rounded up from actual weights) and are not actual shipping weights. Refer to magnet shipping documents for actual weights of the magnet and crate.

Do not use a crane to lift a magnet that is on a pallet or inside a crate. Crane lifting can only be done using the magnet lifting rails, which are not accessible while the magnet is inside the crate.

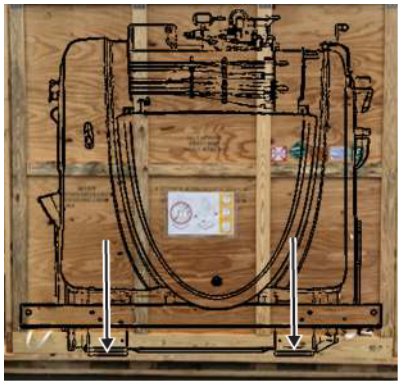
Domestic Shipping Crate (5151624)

Figure 2-1 Shipping crate

- Approved for use on truck transportation only. (Not approved for flight or ocean usage.)
- Cage/frame is put over/around the magnet after the magnet is loaded onto truck.
- Cage must be removed prior to magnet unload from truck (making orange beams accessible).

Platform International Shipping Crate (5806856)

Figure 2-2 Fork position



NOTE
Magnet image superimposed on crates is for reference only. Magnet image shown is representative and may differ from the configuration shipped.

- Approved for use on truck, ocean, or air transportation.
- Forklift approved moves only. (Crane movement of magnet in crate is not permitted.)
- Crate is designed to put forklift forks directly beneath magnet feet - lifting from the side of the magnet, perpendicular to the magnet bore.
- Minimum distance between forks = 1016 mm (40 inches).

2.2 Equipment requirements

Table 2-1 Forklift requirements*

Item and quantity	Equipment specification/rating		Furnished by	Function
Forklift quantity = 1	Magnet weight only (as shipped configuration with gradient, does not include crate)	4990 kg (11,000 lbs)	Rigger	Unloading or moving magnet
	Crated magnet weight	5715 kg (12,600 lbs)		
	Magnet only - minimum distance between forks using lifting rails	2032 mm (80 inches)		
	Crated magnet - minimum distance between forks	Platform International Shipping Crate (5806856): 1016 mm (40 inches)		
	Minimum fork length	2363 mm (93 inches)		
*Forklift and forklift equipment must be rated for the referenced magnet loads.				

Table 2-2 Crane requirements*

Item and quantity	Equipment specification/rating		Furnished by	Function
Crane quantity = 1	Magnet weight only (as shipped configuration with gradient, does not include crate)	4990 kg (11,000 lbs)	Rigger	Unloading or moving magnet
	Crate weight only	751 kg (1,654 lbs)		
Spreader beam quantity (if used) = 1	Distance between lifting points, underside of spreader beam	2286 mm to 2439 mm (90 inches to 96 inches)		
Slings, hoists, bridles, shackles	Requirement to be determined by rigger. **NOTE** Refer to magnet weights noted above.			
*Crane and crane equipment must be rated for the referenced magnet loads.				

Table 2-3 Miscellaneous equipment and tools*

Item	Equipment/tool required	Responsible	Function
Magnet mechanical interface drawing (bare magnet) **NOTE** Interface drawings may not contain shipping configurations and are for reference only	See clearance dimensions in 6.3 Preparing to move the magnet on page 65.	Project manager of installation (PMI)	Identifying magnet dimension and features
Magnet weight only (as shipped configuration with gradient, does not include crate)	4990 kg (11,000 lbs)	Reference	Moving the magnet
Hydraulic or toe jack	Must support one end of magnet on two jacks or both ends of magnet on four jacks. **NOTE** Refer to magnet weights noted above.	Rigger	Raising the magnet for roller dollies or leveling plates
Roller dollies	Must support magnet on at least three dollies. (Four dollies must be installed; however, the dollies must be able to support full weight on three dollies in case one foot is not touching.) **NOTE** Refer to magnet weights noted above.	Rigger	Moving the magnet
Magnet Leveling Shim Kit	5819317	GE HealthCare Field Engineer	Leveling the magnet
PH Alignment and Magnet Leveling Kit	5897979	GE HealthCare Field Engineer	Leveling the magnet
*Miscellaneous equipment and tools must be rated for the referenced magnet loads.			

2.3 Removing subsystem crates

1. Carefully inspect all packaging for damage that may have occurred during shipping.
2. Remove all subsystem crates, except the magnet crate, from the trailer/transport using a crane or forklift. To handle the magnet crate in transit from the truck or plane, see 2.5 Handling the crated magnet in transit with a forklift on page 22.

3. Inspect all crates for visible damage. Report any damage you find in conformance with the 1.2 Examining packages for damage in transportation on page 11 procedure.
4. Move subsystem crates to a receiving location protected from the weather, preferably close to and at the same level as the MR suite/magnet room.

2.4 Handling the crated magnet in transit with a crane

Do not use a crane to move the magnet if it is still in the crate. Using a crane requires clear access to the orange lifting beams, which are not accessible while the magnet is inside the crate.

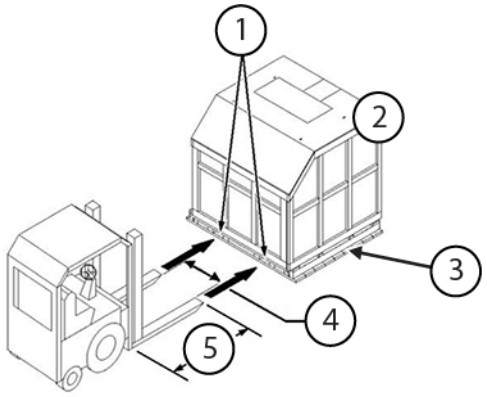
2.5 Handling the crated magnet in transit with a forklift

Safety
NOTICE EQUIPMENT DAMAGE RISK Improper transportation during forklift operations can result in magnet damage. Forklift must meet the minimum capacity and dimension requirements stated in section 2.2 Equipment requirements on page 20. The magnet must be picked up from the magnet side orientation only with the forks inserted into the designated slots on the crate. Avoid sudden jolts. Do not allow the crate/pallet to bump anything forcefully. Avoid tilting the magnet/crate/pallet package more than the maximum tilt specified (30° from the horizontal level).

1. Put a forklift in position beside the magnet crate/pallet meeting the requirements stated in section 2.2 Equipment requirements on page 20.

2. Carefully insert the forklift forks completely into the holes in the long side of the shipping pallet.

Figure 2-3 Forklift lifting points of magnet/crate/pallet package



1	Insert forks here only
2	Crate
3	Pallet
4	Crated magnet - minimum distance between forks: Platform International Shipping Crate (5806856): 1016 mm (40 inches)
5	Minimum fork length, 2363 mm (93 inches)

3. Smoothly lift the crate/pallet with the forklift, and move the crate/pallet to the desired location.

NOTE
Magnet lift must be perpendicular to magnet bore. Crate slots for forklift are designed to ensure proper lift orientation.

4. Lower the entire package to rest on a flat, smooth surface. Do not rest the magnet/crate/pallet on any surface that is not flat or strong enough to support the magnet/crate/pallet package.
5. Avoid tilting the magnet; every effort should be made to minimize tilt during transport or movement. Tilt must not exceed 30° from the horizontal level.

2.6 Removing the shipping cage

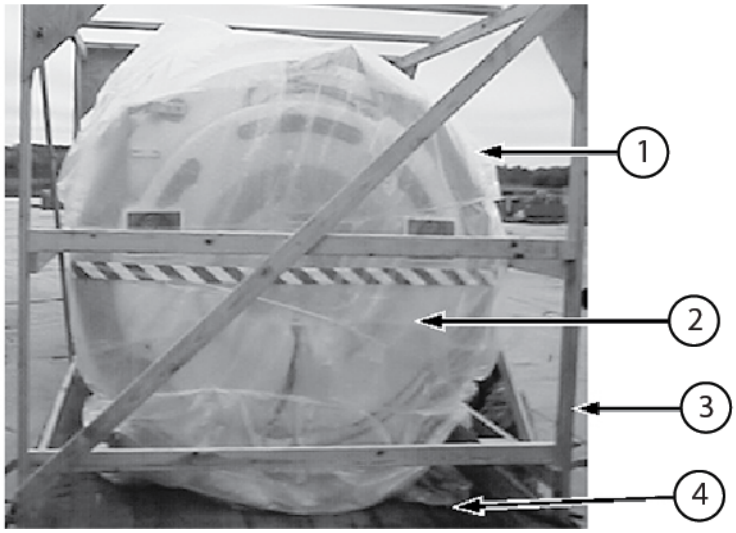
Safety
NOTICE EQUIPMENT DAMAGE RISK Improper removal of the shipping cage can result in damage to the magnet. Do not use a crane to move the magnet if it is still in the cage. If you are using a crane, you need clear access to the orange lifting beams, which are not accessible while the magnet is inside the cage. Remove the magnet's shipping cage while the magnet/cage/pallet package is on the trailer/transport.

Safety

NOTICE

EQUIPMENT DAMAGE RISK

Care must be taken not to scrape or hit the sides of the magnet. The magnet is shipped inside plastic bubble wrap. The bubble wrap should be left intact until the magnet is set down inside the magnet room. Take care not to nick or cut any electrical cables during removal of the plastic bubble wrap. The sample shipping cage configuration (domestic shipping option) below shows intact bubble wrap.



1	Plastic bubble wrap
2	Magnet
3	Cage
4	Pallet

1. Remove the driver-supplied tarp from the shipping cage.
2. Unstrap the cage if any straps were applied. Then unchain the magnet from the flatbed.
3. To remove the shipping cage from the magnet, follow the steps below for one of the options:

Using a crane	1. Strap the frame in four locations. 2. Lift the cage straight up and move it away from the magnet.
Not using a crane	1. Unbolt the boards on one end of the cage. 2. Move the cage away from the magnet in the other direction.

4. Before trying to unload and move the magnet into the building, make sure the magnet pressure is ≤ 3 psig. If the pressure is greater than 3 psig, contact the Online Center or Florence before continuing.

2.7 Removing the shipping crate

Safety

NOTICE

EQUIPMENT DAMAGE RISK

Improper removal of the shipping crate can result in damage to the magnet.

Do not use a crane to move the magnet if it is still in the crate. If you are using a crane, you need clear access to the orange lifting beams, which are not accessible while the magnet is inside the crate.

Remove the magnet's shipping crate while the magnet/crate/pallet package is on the trailer/transport.

Damage to the magnet and/or magnet enclosures may result if the crate is removed while the crate's side panels are in their closed (shipping) position, or if the crate is disassembled while the magnet is inside the crate.

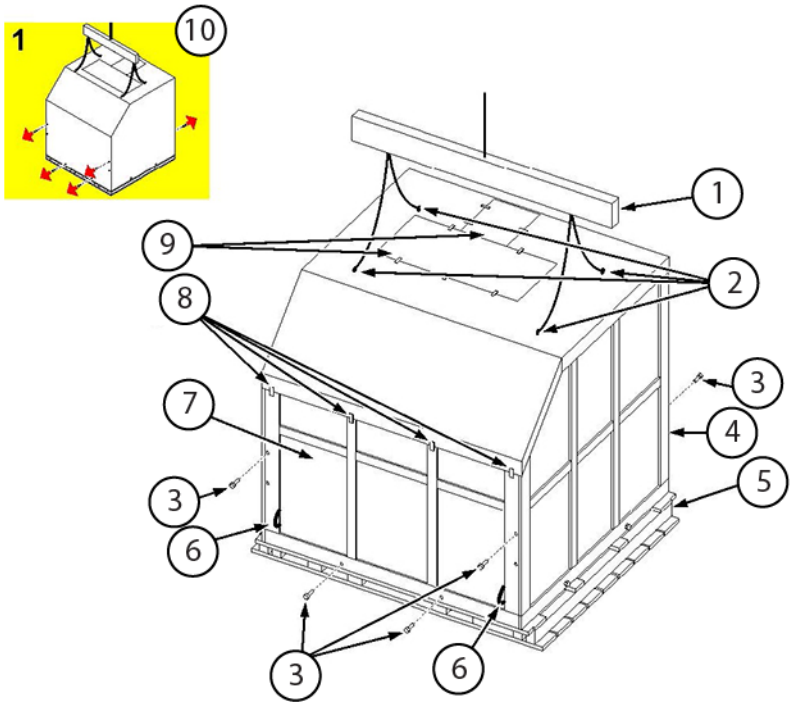
Do not remove any lag screws on the crate or pallet until the crane is in position, and the slings/cable bridles are attached to the lifting rings on the crate.

1. Remove the driver-supplied tarp from the shipping crate.
2. Unchain the crate from the flatbed.
3. Put a crane meeting the specifications in Table 2-2 Crane requirements* on page 20 above the center of the crate.

4. Attach the slings/cable bridles of a spreader beam to the lifting rings on top of the crate.

NOTE
Either a hook/shackle and slings or a spreader beam and sling/cable bridles may be used during crate removal.

Figure 2-4 Crane positioning, lag screw removal to open crate side panels

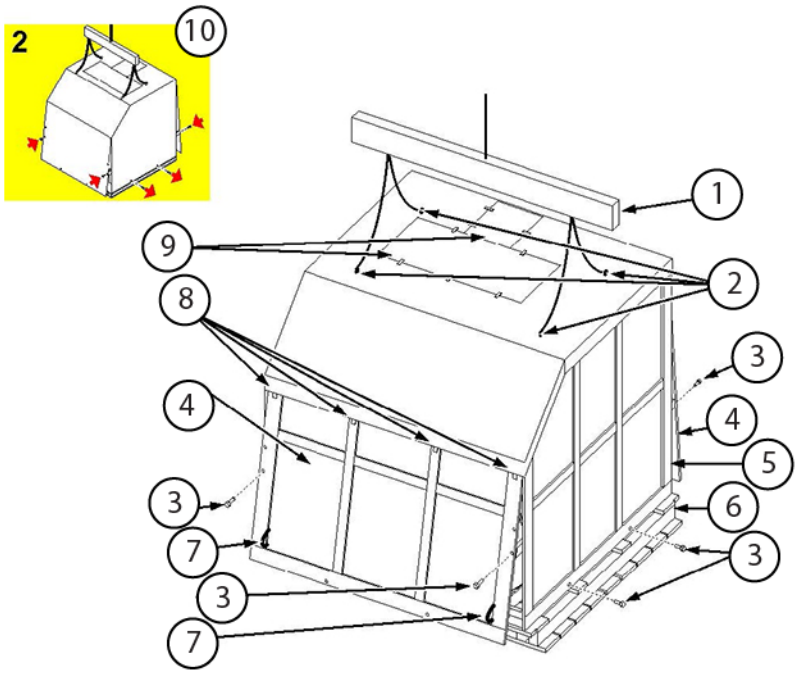


Item	Description	Item	Description
1	Spreader beam with slack lifting straps/ cables	6	Rope handle
2	Four lifting rings for lifting crate	7	Crate side panel
3	Lag screw	8	Side panel hinges
4	Front of crate	9	Access panels
5	Front of pallet	10	Graphic on crate

5. Remove the lag screws along the lower edges of the crate's left and right side panels that secure those panels to the pallet. Do not remove the lag screws securing the crate's front and back end panels to the pallet until after the crate's side panels are secured in their open position.
6. Remove the lag screws securing the crate side panels to the crate end panels. Do not remove the hinges along each crate side panel's upper edge.

7. Pull open the crate's left and right side panels using the rope handle on each side panel. The crate's left and right side panels are hinged along their upper edges.

Figure 2-5 Securing crate side panels in open position

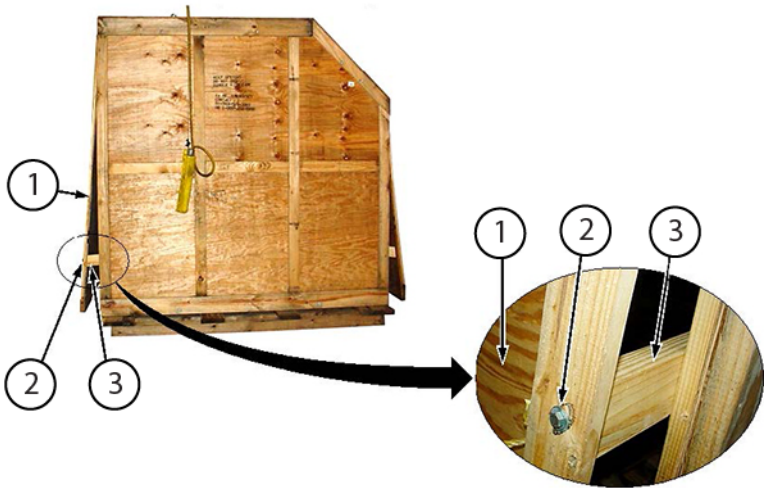


Item	Description	Item	Description
1	Spreader beam with slack lifting straps/ cables	6	Front of pallet
2	Four lifting rings for lifting crate	7	Rope handle
3	Lag screw	8	Side panel hinges
4	Crate side panel	9	Access panels
5	Front of crate	10	Graphic on crate

NOTE
This figure shows the use of a spreader beam and cable bridles/slings. You can also use a hook or shackle and slings. All equipment must meet or exceed the size and loading specifications stated in this manual.

8. Swing the wooden block found inside each vertical corner of the crate outward.

Figure 2-6 Rear view of shipping crate with side panels raised

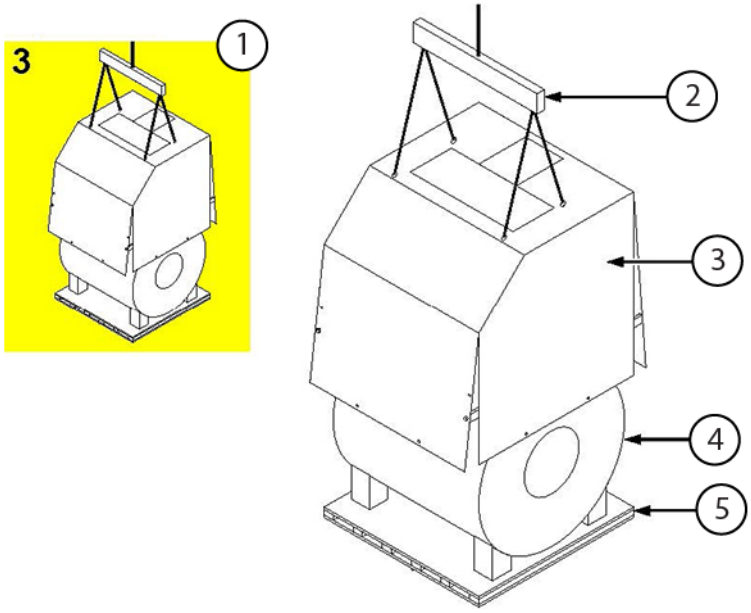


1	Side panel
2	Lag screw
3	Wooden block

9. Attach the loose end of each block to the adjoining side panel using one of the lag screws removed previously.
10. Remove the lag screws along the lower edges of the crate's front and back end panels that secure those panels to the pallet. Refer to Figure 2-5 Securing crate side panels in open position on page 27.

11. Tighten the slings/cable bridles and carefully begin lifting the crate. (Refer to graphic 3 on the shipping crate.) If the crate does not remain approximately level, carefully lower the crate and adjust the lifting configuration, then lift the crate again.

Figure 2-7 Lifting the crate using a crane



Item	Description	Item	Description
1	Graphic on crate	4	Magnet
2	Spreader beam with slack lifting straps/ cables	5	Pallet
3	Crate	-	-

NOTE
This figure shows the use of a spreader beam and cable bridles/slings. You can also use a hook or shackle and slings. All equipment must meet or exceed the size and loading specifications stated in this manual.

12. Using the crane, lift the crate top off the magnet's shipping pallet and fully above and clearing the magnet.
13. Put the crate in a clear area.

14. Unbolt and remove the four bolts (one per magnet foot) securing the magnet feet to the pallet.

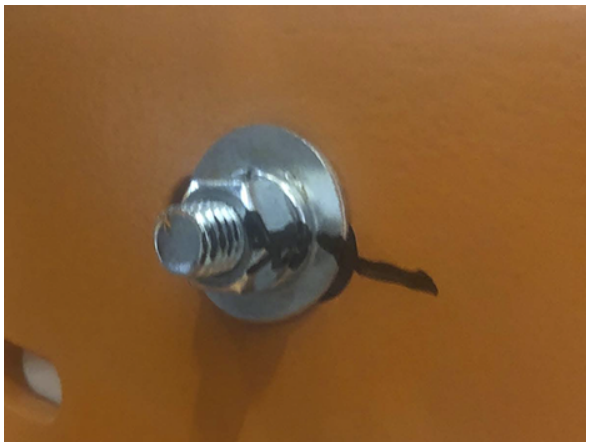
Figure 2-8 Unbolting the magnet from a shipping pallet

15. Visually examine the witness marks on each bolt and orange lifting rail at each of the four magnet feet. Look for witness mark misalignment between the nut/bolt head and the orange lifting rail.

NOTE
See the examples below for correctly aligned witness marks.

Figure 2-9 Legacy process, pre-2023 and possible storage

Figure 2-10 New process, starting mid-2023



- If witness marks are aligned correctly, continue with Step 16.
- If witness marks do not align as shown above, complete these steps:

15.2.1. Make sure the rails are installed against the magnet feet at all four locations.

15.2.2. Look inside of the magnet foot. If a through bolt is used (new process), make sure the lock washer is compressed under the bolt head. If it is not, tighten the bolt until the lock washer is compressed, but do not exceed 90 ft-lbs (122 N m).

NOTE
If the nut turns (new process only) but does not tighten, then the bolt hole on the magnet foot was drilled out and the head of the bolt (which is inside the magnet foot) will need to be held by a second wrench while torquing the nut.

15.2.3. Torque the bolt head (legacy) or nut (new process) to 90 ft-lbs (122 N m) on the outside of the orange rail.

NOTE
Do not use powered torque drivers. Powered drivers may supply higher torque that can damage the bolts. Do not overtighten the bolts/nuts.

15.2.4. Use a permanent marker to add a new witness mark only on the bolt or nut that was just torqued.

15.2.5. Continue with Step 16.

16. Before trying to unload and move the magnet into the building, make sure the magnet pressure is ≤ 3 psig. If the pressure is greater than 3 psig, contact the Online Center or Florence before continuing.

17. Rig and lift the magnet off the pallet in conformance with section 2.8 Unloading and moving the uncrated magnet with a forklift on page 31 or section 2.9 Unloading the uncrated magnet with a crane to ground on page 34 of this manual.

2.8 Unloading and moving the uncrated magnet with a forklift

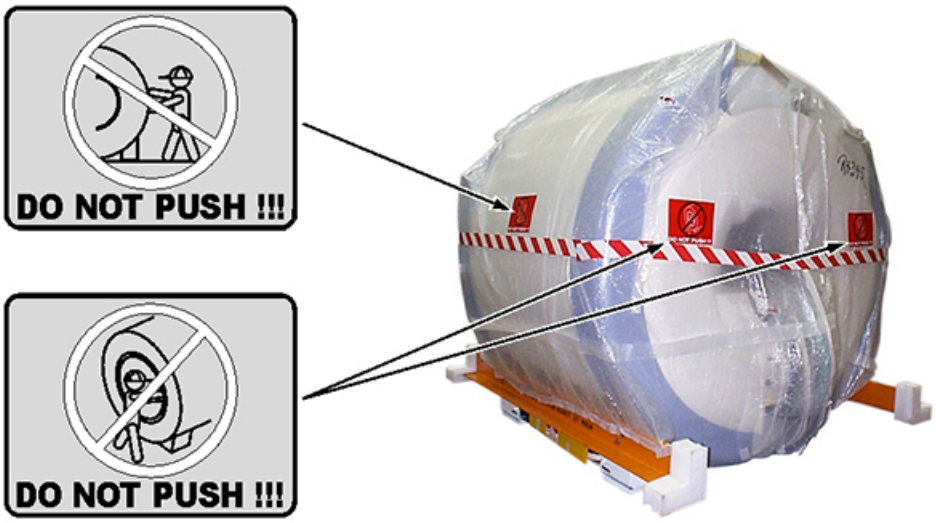
Safety

⚠ CAUTION

POTENTIAL INJURY HAZARD

Pushing magnet enclosures may result in bodily injury to personnel.

Do not push magnet enclosures. Follow the directions on the six "Do Not Push" signs (one on each side, and two on each end).



Safety

NOTICE

EQUIPMENT DAMAGE RISK

Improper transportation can result in magnet damage.

Do the following to prevent magnet damage:

- Do not apply any force to the magnet enclosures.
- Only use equipment/tools that meet the specifications stated in section 2.2 Equipment requirements on page 20.
- Do not move the magnet to the MR Suite while the magnet is on its shipping pallet. Before moving the magnet to the MR Suite, refer to Chapter 2 Unloading and moving the magnet on page 17.

NOTICE

EQUIPMENT DAMAGE RISK

Improper transportation during forklift operations can result in magnet damage.

Forklift must meet the minimum capacity and dimension requirements stated in section 2.2 Equipment requirements on page 20.

The magnet must be picked up from the magnet side orientation only with the forks inserted into the designated slots on the crate.

Forklift forks can damage the magnet enclosure or components. Use protective padding around the forks.

Avoid sudden jolts. Do not let the crate/pallet bump or hit anything forcefully.

Avoid tilting the magnet/crate/pallet package more than the maximum tilt specified (30° from the horizontal level).

NOTE

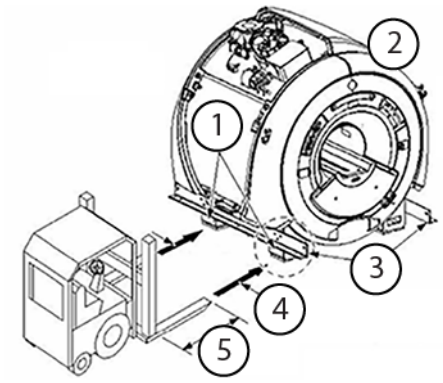
The rigger is responsible for actual equipment/procedures used to lift and move a magnet into the customer facility, including through a raised opening in an exterior wall. The following procedures are guidelines only. It is the responsibility of the rigger to safely move the magnet into the facility.

1. **NOTE**

   See Step 15 in 2.7 Removing the shipping crate on page 25 for the procedure on examining witness marks before lifting with the orange rails.

Put a forklift that meets the specifications in section 2.2 Equipment requirements on page 20 at the side of the magnet facing the magnet. Put the forks under the lifting rails to the outside of the magnet feet.

Figure 2-11 Forklift under lifting rails



Item	Description	Item	Description
1	Magnet feet	4	2032 mm (80 inches) inside forks, minimum
2	Magnet (protective wrap not shown)	5	2363 mm (93 inches) minimum
3	Lifting rails	-	-

NOTE
Figure is not to scale. Put the forks under the lifting rails, outside of the magnet feet.

2. Carefully drive the forklift until the forks are completely under both lifting rails in the areas shown in Figure 2-11 Forklift under lifting rails on page 33.

NOTE
The forks must be put in position under both ends of the lifting rails outside of and 254 mm (10 inches) away from the magnet feet. The outsides of the feet are 1524 mm (60 inches) apart. The lifting rails are 2388 mm (94 inches) long.

3. Lift the forks to right below the lifting rails, adjust the distance between forks so that padded forks lightly touch the enclosure, and finish raising the forks to the lifting rails.
4. Lift the magnet with the forklift.
5. Smoothly move the magnet to the desired location, and carefully lower to rest on a flat surface.

2.9 Unloading the uncrated magnet with a crane to ground

Safety

⚠ WARNING

POTENTIAL SERIOUS INJURIES

Moving a magnet through a raised opening in an exterior wall can result in serious injuries and magnet/equipment damage.

Do the following before moving the magnet:

- Make sure a complete walk-through of the crane lift process was done prior to the actual event to make sure all process details are covered.
- Make sure all necessary equipment is on-site and inspected for safety and load ratings.
- Make sure all necessary personnel are trained and ready.
- Make sure that the entire area where lifting will occur is free of obstructions and unauthorized personnel.
- Make sure the surface where the magnet will be put after lifting is flat.
- Do not crane lift a magnet during dangerous weather conditions.

⚠ WARNING

POTENTIAL INJURY HAZARDS

Improper lifting of the magnet may be hazardous to personnel and can result in damage to the magnet and equipment.

Make sure that the entire area where lifting will occur is free of obstructions and unauthorized personnel.

Make sure that the surface where the magnet will be put after lifting is flat.

NOTICE

EQUIPMENT DAMAGE RISK

Improper transportation can result in expensive internal damage to the magnet.

Avoid sudden jolts. Lift/move/lower the magnet smoothly. Do not allow the magnet to bump or hit anything forcefully.

Avoid tilting the magnet more than the maximum tilt (30° from the horizontal level).

Do not apply any force to the magnet enclosures.

Do not crane lift a magnet that is on a pallet or inside a cage or crate.

Crane lifting can only be done using the magnet lifting rails, which are not accessible while the magnet is inside a cage or crate.

Safety

NOTICE

EQUIPMENT DAMAGE RISK

Improper crane transportation can result in damage to the magnet.

Do not crane lift crated/palleted magnets. Crated/palleted magnets must be handled in conformance with the other sections in Chapter 2 Unloading and moving the magnet on page 17 of this manual.

Only a rigger should unload and move the magnet.

NOTE

The rigger is responsible for actual equipment/procedures used to lift and move a magnet into the customer facility, including through a raised opening in an exterior wall. The following procedures are guidelines only. It is the responsibility of the rigger to safely move the magnet into the facility.

1. Make sure that there are no obstructions in the area where lifting will occur and that a flat surface is available to put the magnet after lifting.
2. Put the hook of a crane and spreader beam (if used), which meet the specifications stated in section 2.2 Equipment requirements on page 20, centrally over the magnet to ensure a vertical lifting force on the lifting cables/slings. If a spreader beam is not used, make sure that the strap length and crane lifting height are long enough so that the straps do not contact any part of the magnet above the magnet lifting beam and the magnet can reach the desired height.

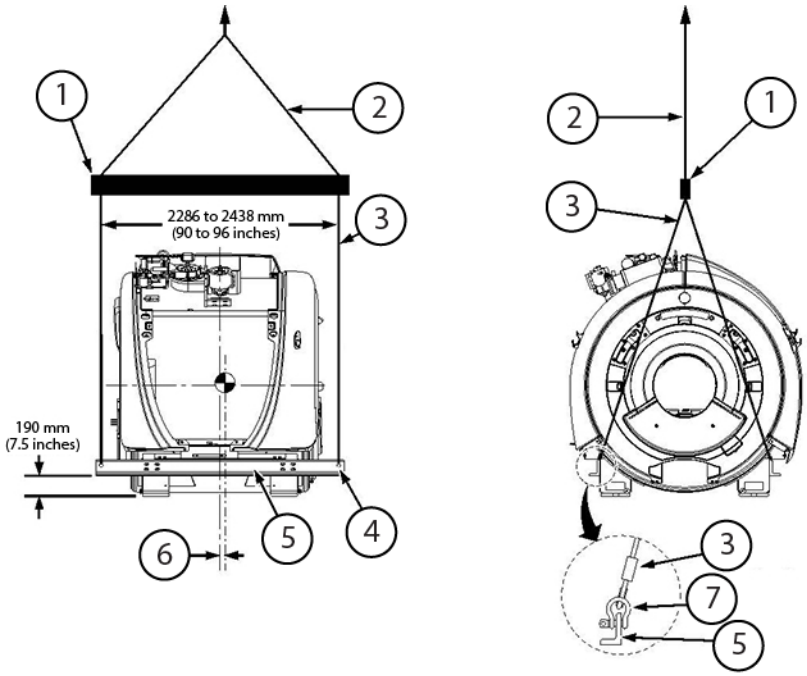
NOTE

Align the spreader beam parallel to the magnet bore.

NOTE

Make sure the cable bridles/slings do not touch the magnet covers.

Figure 2-12 Crane lift configuration, magnet side view (left) and front view (right)



Item	Description	Item	Description
1	Spreader beam with top rigging	5	Lifting rail
2	Two-legged cable bridle/sling (spreader beam to crane)	6	Center of gravity (CG), offset approximately 25 mm (1 inch) to rear of magnet isocenter
3	Two-legged cable bridle/sling (spreader beam to lifting rail)	7	Shackle (typically 4 locations)
4	Lifting holes (each end of each lifting rail)	-	-

3. **NOTE**
   See Step 15 in 2.7 Removing the shipping crate on page 25 for the procedure on examining witness marks before lifting with the orange rails.

   Attach the rigging to the lifting cables/slings at each end of the magnet.

   NOTE
   Wire rope is recommended for better length match and stretch control.

4. Attach the bridle slings to the magnet lifting rails with 25 mm (1.0 inch) pin shackles.
5. When beginning to lift the magnet, if it does not remain close to level, carefully lower the magnet and adjust the lifting configuration, and then lift the magnet again.
6. Smoothly move the magnet to the desired location, and carefully lower so it rests on a flat surface.

2.10 Lifting the magnet with a crane through the opening in the exterior wall

Safety
⚠ **WARNING** POTENTIAL SERIOUS INJURIES Moving a magnet through a raised opening in an exterior wall can result in serious injuries and magnet/equipment damage. Do the following before moving the magnet: • Make sure a complete walk-through of the crane lift process was done prior to the actual event to make sure all process details are covered. • Make sure all necessary equipment is on-site and inspected for safety and load ratings. • Make sure all necessary personnel are trained and ready. • Make sure that the entire area where lifting will occur is free of obstructions and unauthorized personnel. • Make sure the surface where the magnet will be put after lifting is flat. • Do not crane lift a magnet during dangerous weather conditions.
⚠ **WARNING** POTENTIAL INJURY HAZARDS Improper lifting of the magnet may be hazardous to personnel and can result in damage to the magnet and equipment. Make sure that the entire area where lifting will occur is free of obstructions and unauthorized personnel. Make sure that the surface where the magnet will be put after lifting is flat.
NOTICE EQUIPMENT DAMAGE RISK Improper transportation can result in expensive internal damage to the magnet. Avoid sudden jolts. Lift/move/lower the magnet smoothly. Do not allow the magnet to bump or hit anything forcefully. Avoid tilting the magnet more than the maximum tilt (30° from the horizontal level). Do not apply any force to the magnet enclosures. Do not crane lift a magnet that is on a pallet or inside a cage or crate. Crane lifting can only be done using the magnet lifting rails, which are not accessible while the magnet is inside a cage or crate.

Safety

NOTICE

EQUIPMENT DAMAGE RISK

Improper crane transportation can result in damage to the magnet.

Do not crane lift crated/palleted magnets. Crated/palleted magnets must be handled in conformance with the other sections in Chapter 2 Unloading and moving the magnet on page 17 of this manual.

Only a rigger should unload and move the magnet.

NOTE
The rigger is responsible for actual equipment/procedures used to lift and move a magnet into the customer facility, including through a raised opening in an exterior wall. The following procedures are guidelines only. It is the responsibility of the rigger to safely move the magnet into the facility.

1. Make sure that the opening is at least 2439 mm (96 inches) wide and 2591 mm (102 inches) tall, minimum. The magnet should pass through the opening side first without hitting the opening.

   NOTE
   A larger opening will make both the operation easier and accidental magnet damage less likely.

2. Put the hook of a crane and spreader beam (if used), which meet the specifications stated in section 2.2 Equipment requirements on page 20, centrally over the magnet to ensure a vertical lifting force on the lifting cables/slings (see Figure 2-12 Crane lift configuration, magnet side view (left) and front view (right) on page 36). If a spreader beam is not used, make sure that the strap length and crane lifting height are long enough so that the straps do not contact any part of the magnet above the magnet lifting beam and the magnet can reach the desired height.

   NOTE
   Align the spreader beam parallel to the magnet bore.

   NOTE
   Make sure the cable bridles/slings do not touch the magnet covers.

3. Rig the magnet with chain hoists toward the building, lifting cables/slings away from the building and a spreader beam.

4. **NOTE**
   See Step 15 in 2.7 Removing the shipping crate on page 25 for the procedure on examining witness marks before lifting with the orange rails.

   Attach lifting straps to both ends of the lifting rail to face toward the building.

5. When beginning to lift the magnet, if it does not remain close to level, carefully lower the magnet and adjust the lifting configuration and then lift the magnet again.

6. Smoothly move the magnet through the raised opening in the exterior wall, and carefully lower so it rests on a flat surface.

Chapter 3 Magnet storage conditions, pending ramp

3.1 Connecting the magnet to the compressor

Safety	
	**⚠ WARNING** POTENTIAL COLD BURN OR ASPHYXIATION HAZARD Gaseous helium (odorless, colorless gas) is discharged from the magnet venting activities, and can cause cold burns or asphyxiation. Wear protective clothing, nonabsorbent gloves, and goggles when venting the magnet. Do not go on or near the venting region.
	**⚠ WARNING** ELECTRIC SHOCK Contact with connectors leading to an energized compressor can cause electrical shock. Disconnect input power to the compressor and follow LOTO procedures to make sure power is not supplied to the compressor.
	NOTICE EQUIPMENT DAMAGE RISK Improper operation/maintenance of equipment can result in equipment damage. For detailed information about the operation, function, and maintenance of the cold-head and compressor, refer to the appropriate cryocooler and/or compressor vendor technical operating manual (Vendor Manuals CD32ZZ-227, CD33ZZ-073, CD33ZZ-080, and others), available through the support documentation library at gehealthcare.com or your local GE HealthCare Service Representative. For detailed information about the operation, function, and maintenance of the Magnet Monitor, please refer to the appropriate technical operating manual (*Magnet Monitor 4 Operating and Service Manual*, 5804162), available through the support documentation library at gehealthcare.com or your local GE HealthCare Service Representative.

This magnet has superconducting coils immersed in a liquid helium vessel that is surrounded by an insulating cryostat. Due to site readiness delay, sometimes it is necessary to store the magnet in its shipping configuration at a warehouse. During this storage period, the magnet cryocooler must be connected to the compressor and the Magnet Monitor system to maintain proper temperature and pressure, and minimize helium loss as well as risk for internal icing issues.

NOTE
The following instructions apply to the F50SH compressors. You can find information on other compressor models in the appropriate technical publications/operating manuals.

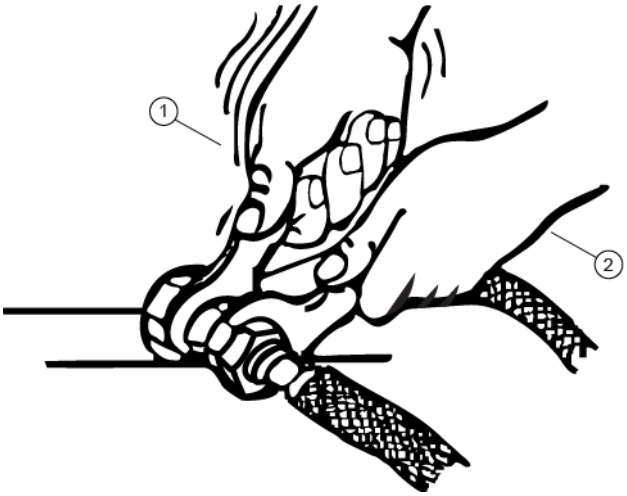
1. Make sure that the F50SH compressor supply static pressure is between 1.6 MPa and 1.65 MPa.

Figure 3-1 F50SH compressor unit, supply pressure

2. Make sure that the O-rings are in the coldhead supply and coldhead return line connectors.
3. Connect the cooling water for the compressor (or do a check of the connection, if already connected).
4. Make sure that the default running mode is internal. FE or warehouse staff must not change this.
5. Using two wrenches (one to hold the backside adapter connection, and one to tighten), connect the coldhead compressor lines in the following order:

NOTE
The hold wrench maintains the backside adapter connection, making gas leaks in the system less likely. Do not overtighten.

Figure 3-2 Using two wrenches to tighten a connection



1	Tighten
2	Hold fast

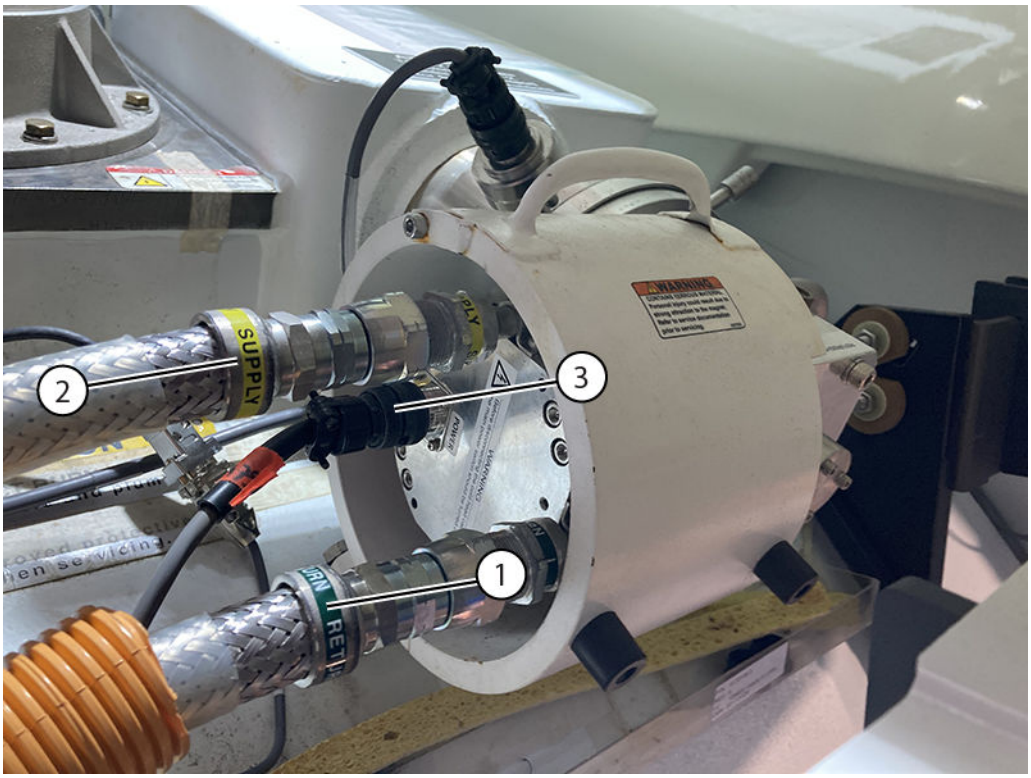
NOTE
Do not put any bending force on Aeroquip fittings while connecting/disconnecting helium flexlines. A bending force will create difficulty in the rapid engagement/ disengagement required to prevent helium loss and system contamination. Support the gas lines when connecting/disconnecting them to the compressor.

5.1. Attach the coldhead return line.

5.2. Attach the coldhead supply line.

5.3. Attach the coldhead power cable.

Figure 3-3 Coldhead compressor connections



1	First attachment - coldhead return
2	Second attachment - coldhead supply
3	Third attachment - coldhead power

6. To turn on the compressor, complete the following substeps using switches and connections on the compressor's front panel:

6.1. For new compressor installations, make sure the input power voltage is connected to the compressor. If the input power voltage is 480V at 60Hz, no change on the voltage tap setting is required. Otherwise, set up the terminal wiring, located at the voltage tap area, per the input power voltage. Refer to vendor manuals for this procedure.

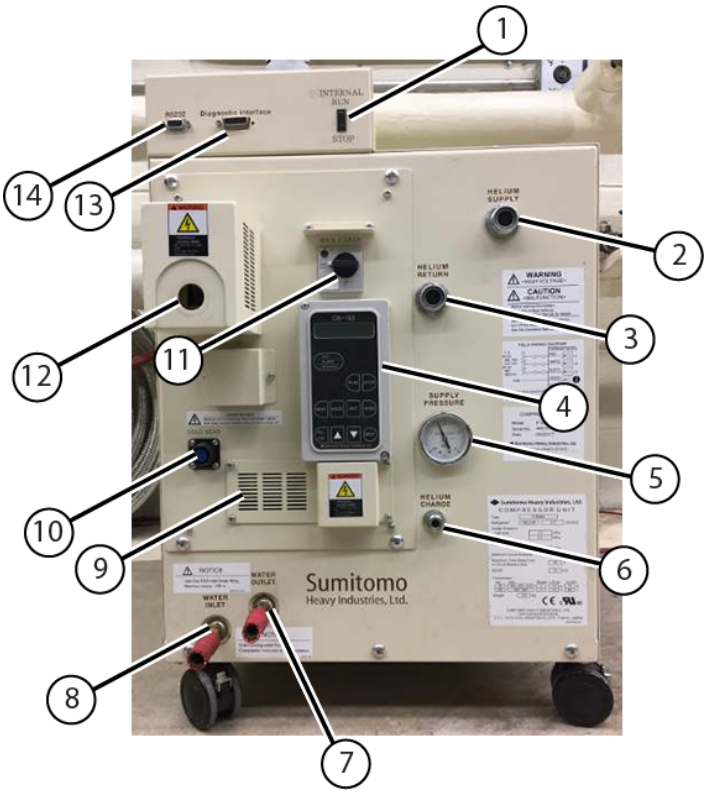
6.2. Make sure the Run/Stop switch on the compressor's front panel is in the RUN position.

6.3. Turn on main power switch, and wait 1 to 3 seconds for the compressor to start.

6.4. Do a check for warnings or alarms.

IMPORTANT
Whenever the compressor shows an alarm or warning, investigate the cause and solve the problem before resetting the alarm and running the compressor.

Figure 3-4 F50SH compressor unit, front view



Item	Description	Item	Description
1	Run/Stop switch	8	Water inlet
2	Helium supply	9	Voltage tap
3	Helium return	10	Coldhead power line
4	Operation panel unit (OPU)	11	Main power switch
5	Pressure gauge (supply)	12	Compressor power cable
6	Helium charge port	13	Diagnostic interface (MM4)
7	Water outlet	14	RS232C (MM4)

7. To turn off the compressor, complete the following substeps using switches and connections on the compressor's front panel:

   7.1. Turn off main power switch.

   7.2. Disconnect and lockout/tagout (LOTO) input power to the compressor. Use a digital voltmeter (DVM) or equivalent measuring device to make sure that no voltage is present.

   7.3. To prevent contamination of gas lines and the compressor, make sure the gas lines are removed immediately after power is disconnected.

NOTE

Do not put any bending force on Aeroquip fittings while connecting/disconnecting helium flexlines. A bending force will create difficulty in the rapid engagement/disengagement required to prevent helium loss and system contamination. Support the gas lines when connecting/disconnecting them to the compressor.

3.2 Connecting the magnet monitoring connections

When connecting the cables, do not route the cables in a way that causes unnecessary strain or bending on the cables. Hand-tighten the screws on each connector; loose connections can cause reading errors.

1. Examine the cables used to monitor the magnet's pressure and helium level before connecting them to the magnet. Make sure that all pins are straight and almost level with the connector casing (for example, not pushed back). The cables should also not have any broken insulation. If you see any damage, get a new cable and replace the old one as soon as possible.

   NOTE
   Each Magnet Monitor should have a dedicated cable set, which is firmly attached to the unit. Swapping cables between different magnet monitoring units can cause early failure of the connectors.

2. Connect Cable, Run 850 MON J-2 to Compressor RS232 (5807125) from the Magnet Monitor to the compressor.

3. Attach the magnet pressure cable to the pressure transducer.

   Figure 3-5 Absolute pressure transducer

4. Attach the helium level sensor cable into the LHe1 or LHe2 port (typical connection ports shown below).

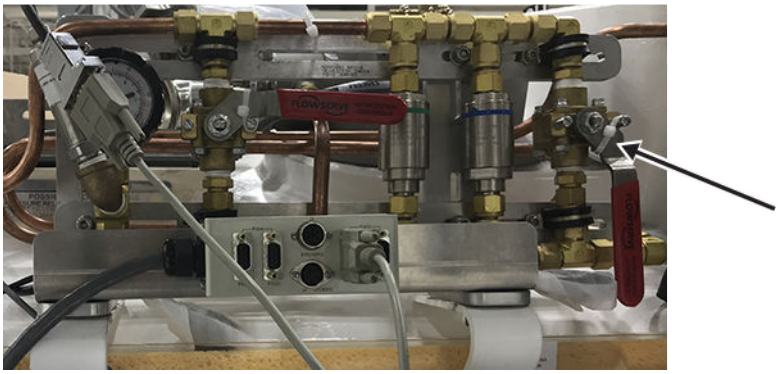
   Figure 3-6 Typical instrumentation connector assembly ports

5. Close the V3 valve during storage to prevent helium loss from the 15.7 psia valve.

Figure 3-7 V3 valve in the closed position

NOTE
The V3 valve must be reopened before the magnet resumes shipping.

Figure 3-8 Plumbing assembly, V3 valve in the open position



3.3 Monitoring the magnet

Using the Magnet Monitor front panel user interface, monitor the magnet pressure and helium level at least once per day to minimize loss of liquid helium and minimize internal icing situations.

The front panel of the Magnet Monitor unit is made up of the following elements:

- LEDs showing AC power, heater activity, and alarm activity
- LCD display for user interaction
- 16-button soft keypad

1. Press the **Home** button to change the display to usual operating mode. This mode shows the following information:

Screen	Display	
1	Date Software Revision	Title Number of Alarms
2	He Level xxxx Liters or xx.xx%	
3	He Pressure x.xxx psig	

Figure 3-9 Magnet Monitor front panel user interface, He Pressure (psig) (left) and He Level (%) (right)

2. At the time of helium level monitoring, press the **Sample** button to initiate a helium level sample.

NOTE
It can take up to 90 seconds for the display to update and show the new level(s). Helium level requirements can vary according to purchase agreements. Work with your Logistics Team and/or Field Service Contact to determine helium level requirements.

3. Monitor helium pressure from the Home screen. If the magnet fails the following conditions, contact GE HealthCare service:

   3.1. The expected arrival pressure should be between 0.9 and 2.0 psig.

3.2. The pressure setting on the Magnet Monitor should be set to 0.7 to 0.9 psig for storage. These are not the default parameters and will need to be set. Refer to the *Magnet Monitor 4 Operating and Service Manual* (5804162).

NOTE
Magnet Monitor 4 (MM4) can also be set to Storage mode by doing the following in order:

- Press the **Fill** mode button until the option for Storage mode prompts `yes/no`.
- Select **`yes`**.

Storage mode holds the magnet pressure at 0.8 psi until MM4 reboots (about once every 2 weeks). When MM4 reboots, it will exit Storage mode and this setting will need to be reconfigured.

3.3. The helium level should never drop more than 5% (approximately 100L) below the arrival level.

3.4. The pressure should never be less than 0.7 psig.

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Chapter 4 Doing in-transit service and magnet system checks

4.1 Preparing to do an in-transit helium refill

Safety

NOTICE

EQUIPMENT DAMAGE RISK

Improper transportation can result in damage to the magnet.

Before you continue with an in-transit helium fill, make sure the shipping crate is removed from the magnet (see 2.7 Removing the shipping crate on page 25).

In-transit service and magnet electrical checks must be done by qualified personnel only and in strict conformance with the *Doing a liquid helium fill* procedure stated in the appropriate manual:

- *Magnet and Cryogen Manual for 1.5T PM Series Magnets* (5968610-8EN)
- *MR Service Safety Manual* (5452735)

These documents are available through the support documentation library at gehealthcare.com or your local GE HealthCare Service Representative.

The images below show in-transit plumbing configuration examples.

NOTE
Magnet images shown are representative. Actual magnet configuration may vary.

Figure 4-1 Plumbing assembly, V3 valve in the open position

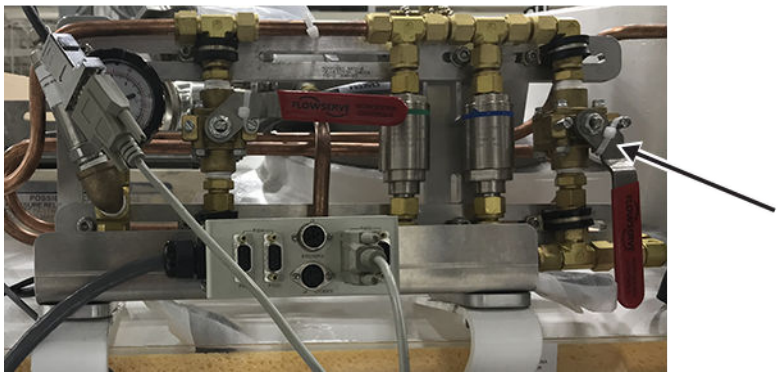


Figure 4-2 Vent adapter replaced with international shipping plate assembly

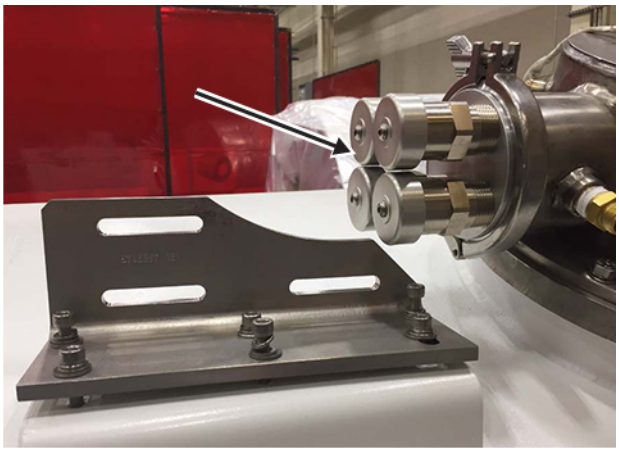
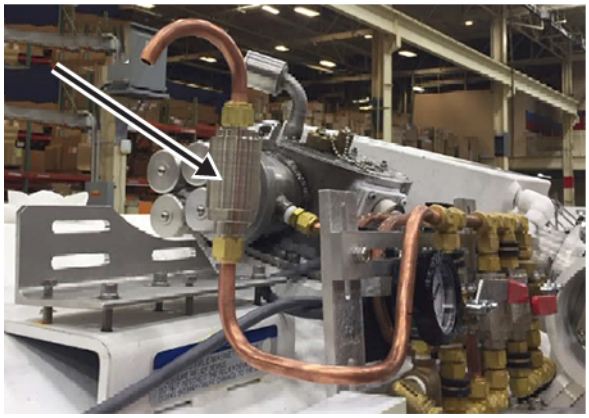


Figure 4-3 15.7 PSIA valve assembly



4.2 Doing a magnet system check

Safety

NOTICE

EQUIPMENT DAMAGE RISK

Improper transportation can result in damage to the magnet.

In-transit service and magnet electrical checks must be done by qualified personnel only, after the magnet is sited and in strict conformance with the *Doing a liquid helium fill* procedure stated in the appropriate manual:

- *Magnet and Cryogen Manual for 1.5T PM Series Magnets* (5968610-8EN)
- *MR Service Safety Manual* (5452735)

These documents are available through the support documentation library at gehealthcare.com or your local GE HealthCare Service Representative.

NOTE
Magnet system checks are a physical inspection done by GE HealthCare Service.

1. Locate the Pre-Delivery Information Package shipped with the magnet. It contains the Bill of Material for the magnet system delivered.
2. Make sure that all boxes indicated on the Bill of Material are included.
3. Make sure that the contents of each box matches its packing list when the boxes are brought into the MR site.
4. Inspect the magnet for physical damage and icing/condensation on the body, and do one of the following:
   - If no problems are found, unload the magnet.
   - If there is damage, report the damage in conformance with the procedure 1.2 Examining packages for damage in transportation on page 11. Report all problems found to the regional Magnet & Cryogenics (MAC) Team Leader.
5. If there is icing or condensation on the exterior or the bore of the magnet, check the liquid helium level before unloading. Refer to the Installation chapter's "Magnet Monitor Installation" section in the *Magnet and Cryogen Manual for 1.5T PM Series Magnets* (5968610-8EN).

   NOTE
   If the magnet has been sitting for a period of time with the coldhead inoperative, the magnet may be depleted of cryogens. Contact the logistics or field service team for further directions.

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Chapter 5 Preparing the scan room

1. Remove any debris from the magnet room floor where the mats will be put in position.
2. Make sure that there are no RF seams under the vibroacoustic damping mats.
3. Move the vibroacoustic damping mats to the MR suite.

NOTE
The vibroacoustic damping mats may arrive in a cold state preventing compression. Put the vibroacoustic damping mats in the magnet room prior to moving the magnet to the MR suite to let their temperature stabilize.

5.1 Preparing the scan room for leveling a PM series magnet

Tools and test equipment			
Item	**Quantity**	**Part number**	**Manufacturer**
PH Alignment and Magnet Leveling Kit	1	5897979	-

PH Alignment and Magnet Leveling Kit (5897979)			
Item	**Quantity**	**Part number**	**Manufacturer**
Laser Level PLS 180R Z	2	5831466	-
Tripod, Vanguard Alta Pro 263AB 100	2	5829559	-
Folding Ruler, 2 meters, FM-DELA.401.00	1	5897974	-
PM Series Magnet Template	1	5810898	-

1. Make sure that markings are present on the magnet room floor in either of the following locations.
   - Magnet geometric isocenter location and z-axis vector (longitudinally through the bore).

Figure 5-1 Isocenter location and z-axis vector, SIGNA Sprint

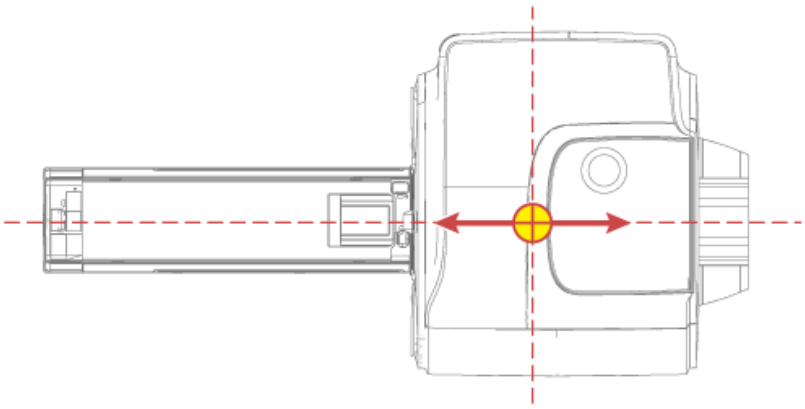


Figure 5-2 Isocenter location and z-axis vector, SIGNA Artist

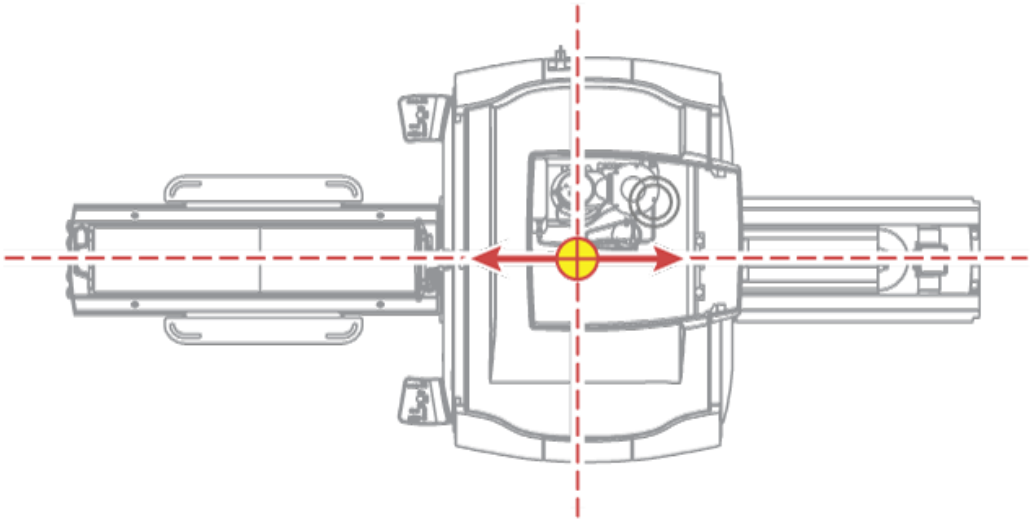


Figure 5-3 Isocenter location and z-axis vector, SIGNA Prime, SIGNA Victor, and SIGNA Champion

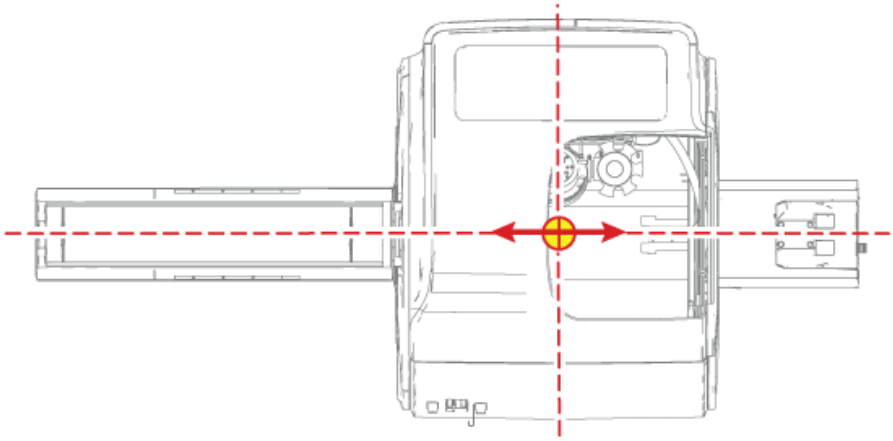
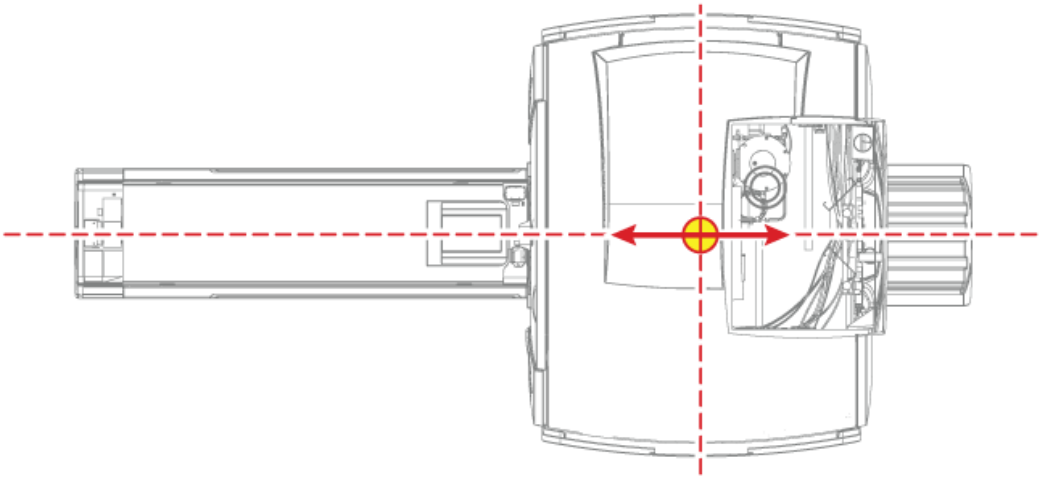


Figure 5-4 Isocenter location and z-axis vector, SIGNA Voyager



- Magnet geometric isocenter location and center of vent pipe.

Figure 5-5 Isocenter location and vent pipe location, SIGNA Sprint

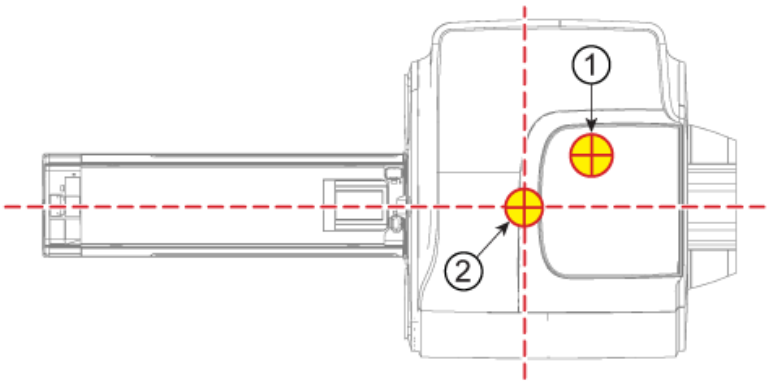


Figure 5-6 Isocenter location and vent pipe location, SIGNA Artist

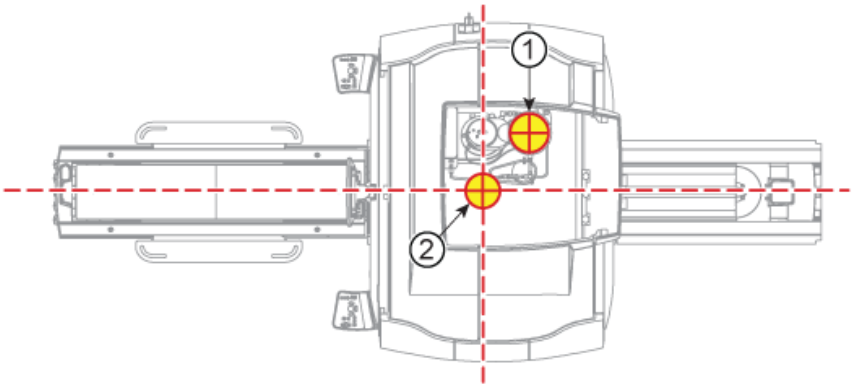


Figure 5-7 Isocenter location and vent pipe location, SIGNA Prime, SIGNA Victor, and SIGNA Champion

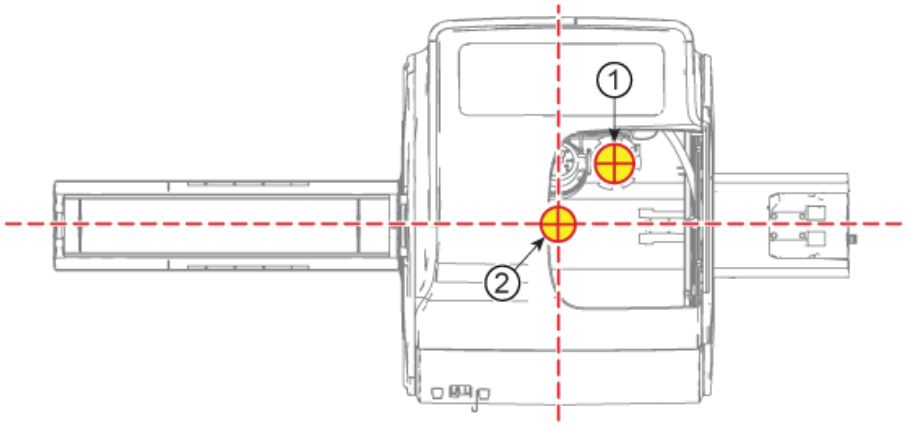
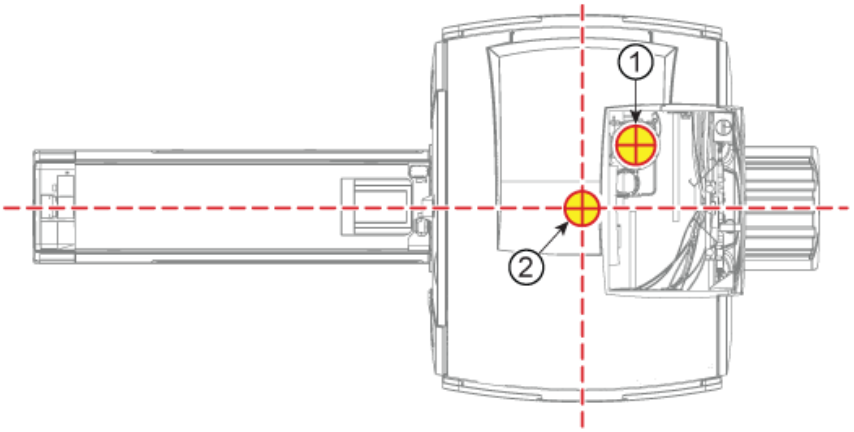


Figure 5-8 Isocenter location and vent pipe location, SIGNA Voyager

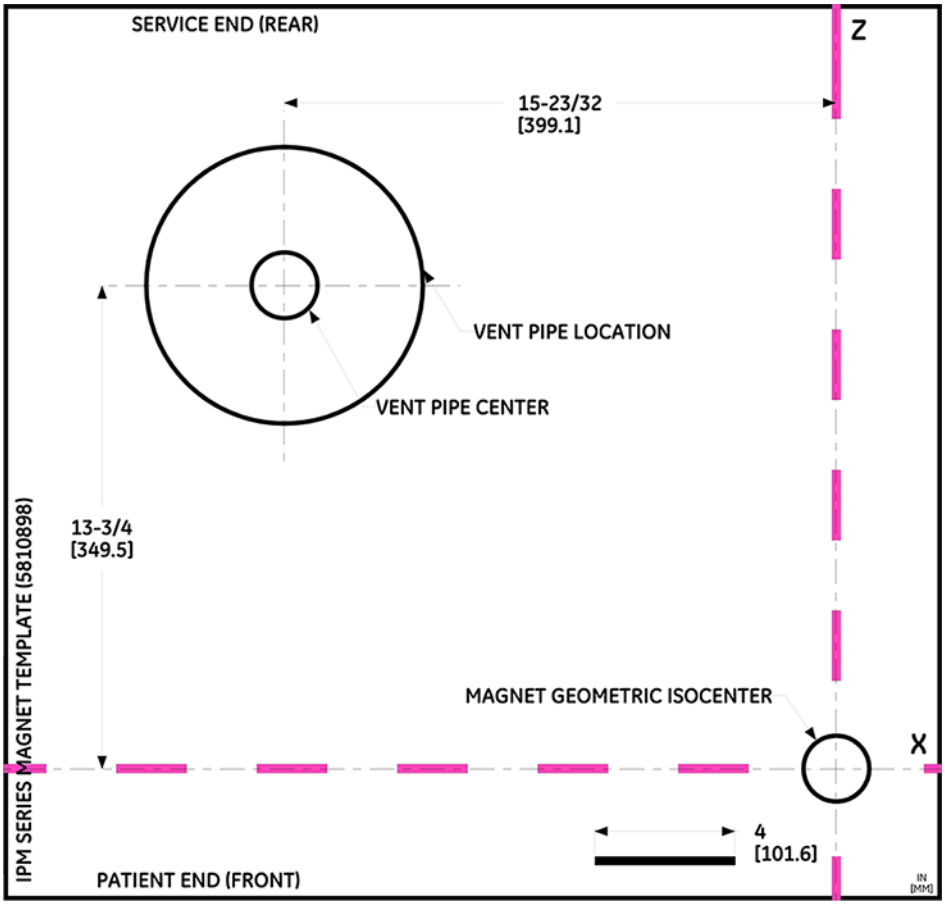


1	Vent center
2	Magnet isocenter

2. If needed, transcribe the marks from the ceiling to the floor with tape from the kit, using laser levels as needed.
3. Align the positioning template (5810898 or 5810898-2) in accordance to the markings, using one of the following strategies:
   - Align the centerline of the positioning template with the marked z-axis vector.

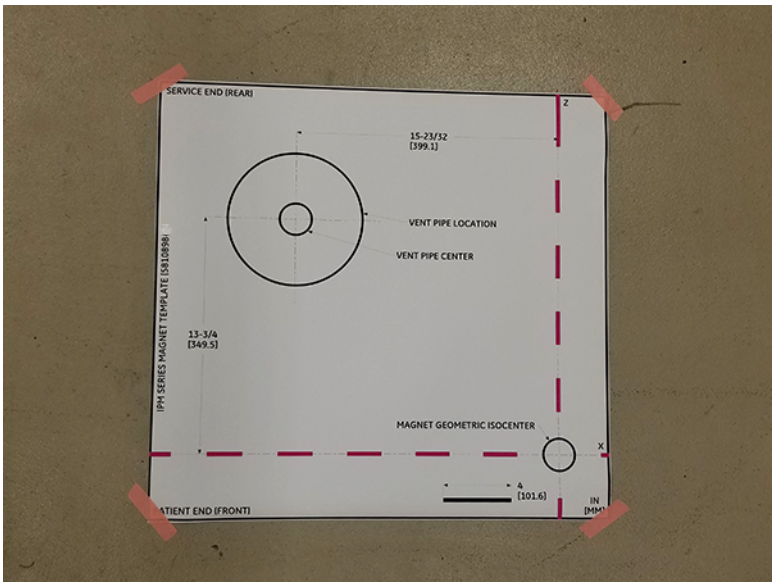
- Align the template to magnet isocenter and vent stack location.

Figure 5-9 Positioning template (5810898)



4. Use tape from the kit to secure the positioning template to the floor.

Figure 5-10 Securing the positioning template to the floor



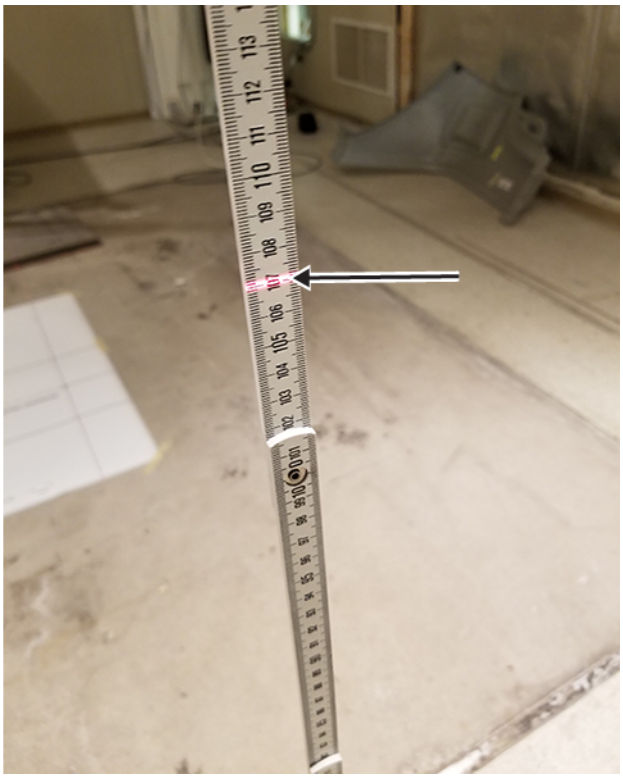
5. Make sure the first laser level from the kit is in self-leveling mode.

NOTE
In self-leveling mode, if the laser level tilts > 4° in any direction, the lasers do not show. When the laser level tilt is ≤ 4°, the level indicator LED is green and the lasers show.

Figure 5-11 Laser level in self-leveling mode (unlocked position)

6. Put the first laser level on a tripod in the front of the room.
7. Put the folding ruler from the kit vertically near the front center of the planned magnet location.
8. Adjust the tripod height until the horizontal laser line aligns on the ruler approximately 1070 mm (42.13 inches) from the floor. Accuracy is not critical here.

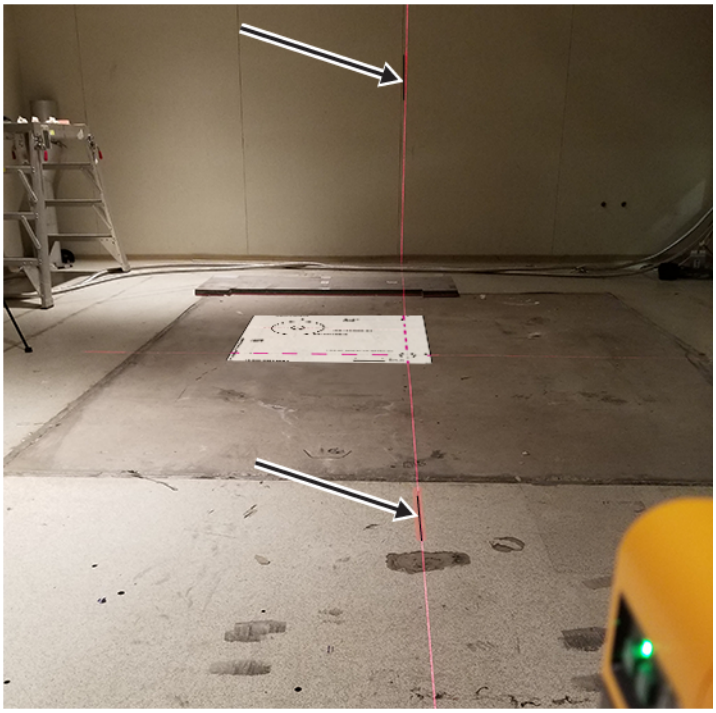
Figure 5-12 Magnet isocenter height



The laser line passes through the isocenter along the z-axis vector.

9. Mark at least two reference locations - one close to the laser and one far away - on the floor, wall, or ceiling. Do **not** mark any references on the floor where the magnet will be set. Make sure that the reference marks will still be within sight of the laser when the magnet is in position.

Figure 5-13 First laser reference marks



The reference marks will help you realign the laser level in the event of an accidental movement during the magnet installation.

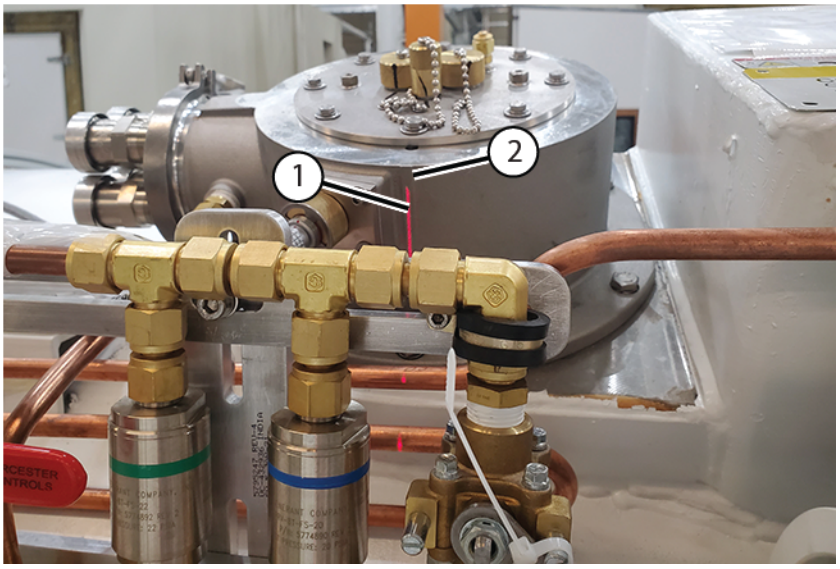
10. Make sure the second laser level from the kit is in self-leveling mode.

NOTE
In self-leveling mode, if the laser level tilts > 4° in any direction, the lasers do not show. When the laser level tilt is ≤ 4°, the level indicator LED is green and the lasers show.

Figure 5-14 Laser level in self-leveling mode (unlocked position)

11. Put the second laser level on a tripod on the left side of the room (electronics side of the magnet).
12. Adjust the second laser level until the vertical laser line passes through the lateral (x-dir) centerline axis on the template and will be visible on the magnet's cryogen plenum when in position.

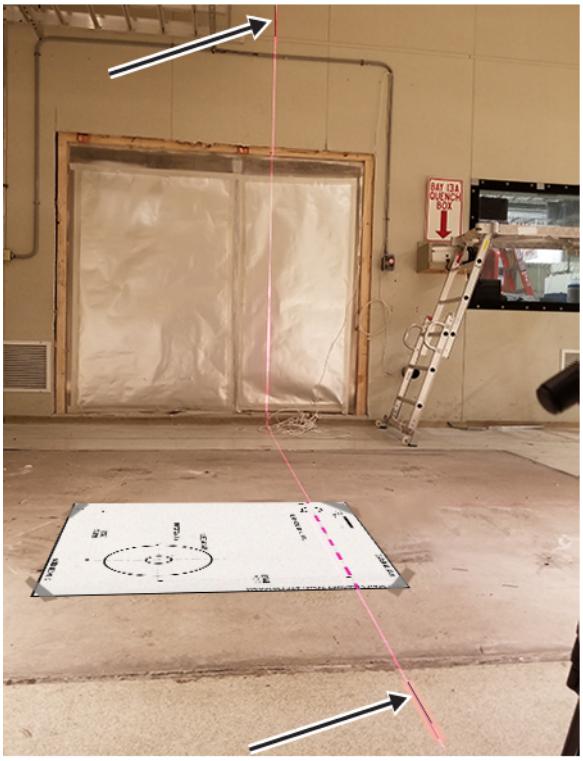
Figure 5-15 Laser line in the center of the cryogen plenum rib



1	Laser line
2	Cryogen plenum rib

13. Mark at least two reference locations - one close to the laser and one far away - on the floor, wall, or ceiling. Do **not** mark any references on the floor where the magnet will be set. Make sure that the reference marks will still be within sight of the laser when the magnet is in position.

Figure 5-16 Second laser reference marks



The reference marks will help you realign the laser level in the event of an accidental movement during the magnet installation.

14. Remove the template from the floor.
15. Continue to the appropriate chapter based on your type of installation.

Installation type	Next steps
Nonseismic	**Chapter 6 Installing a nonseismic vibroacoustic damping mat and leveling the magnet on page 63**
Seismic	**Chapter 7 Installing a seismic vibroacoustic damping mat and leveling the magnet on page 81**

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Chapter 6 Installing a nonseismic vibroacoustic damping mat and leveling the magnet

Safety
NOTICE EQUIPMENT DAMAGE RISK Improper damping mat installation can result in damage to the magnet. Tasks in this section must be completed by riggers, not GE HealthCare Service Personnel.

6.1 Equipment overview

Tools and test equipment			
Item	**Quantity**	**Part number**	**Manufacturer**
PH Alignment and Magnet Leveling Kit	1	5897979	-
Tape Measure	1	-	-
Magnet Leveling Shim Kit	2	5819317	-
Vibromat Assembly, Platform	4	5802910	-

PH Alignment and Magnet Leveling Kit (5897979)			
Item	**Quantity**	**Part number**	**Manufacturer**
Laser Level PLS 180R Z	2	5831466	-
Tripod, Vanguard Alta Pro 263AB 100	2	5829559	-
Folding Ruler, 2 meters, FM-DELA.401.00	1	5897974	-
PM Series Magnet Template	1	5810898	-

Magnet Leveling Shim Kit (5819317)			
Item	**Quantity**	**Part number**	**Manufacturer**
Shim Plate, 0.5 mm Thick	8	5872197-05	-
Shim Plate, 1.5 mm Thick	8	5872197-15	-
Shim Plate, 3.0 mm Thick	4	5872197-30	-

Required conditions
Magnet and dock installation and placement are critical to image quality and hardware reliability.

6.2 Putting a nonseismic mounted vibroacoustic damping mat into position

1. Make sure that the vibroacoustic kit contains the parts listed in the following table.

Table 6-1 Vibroacoustic damping mat kit (5802910)

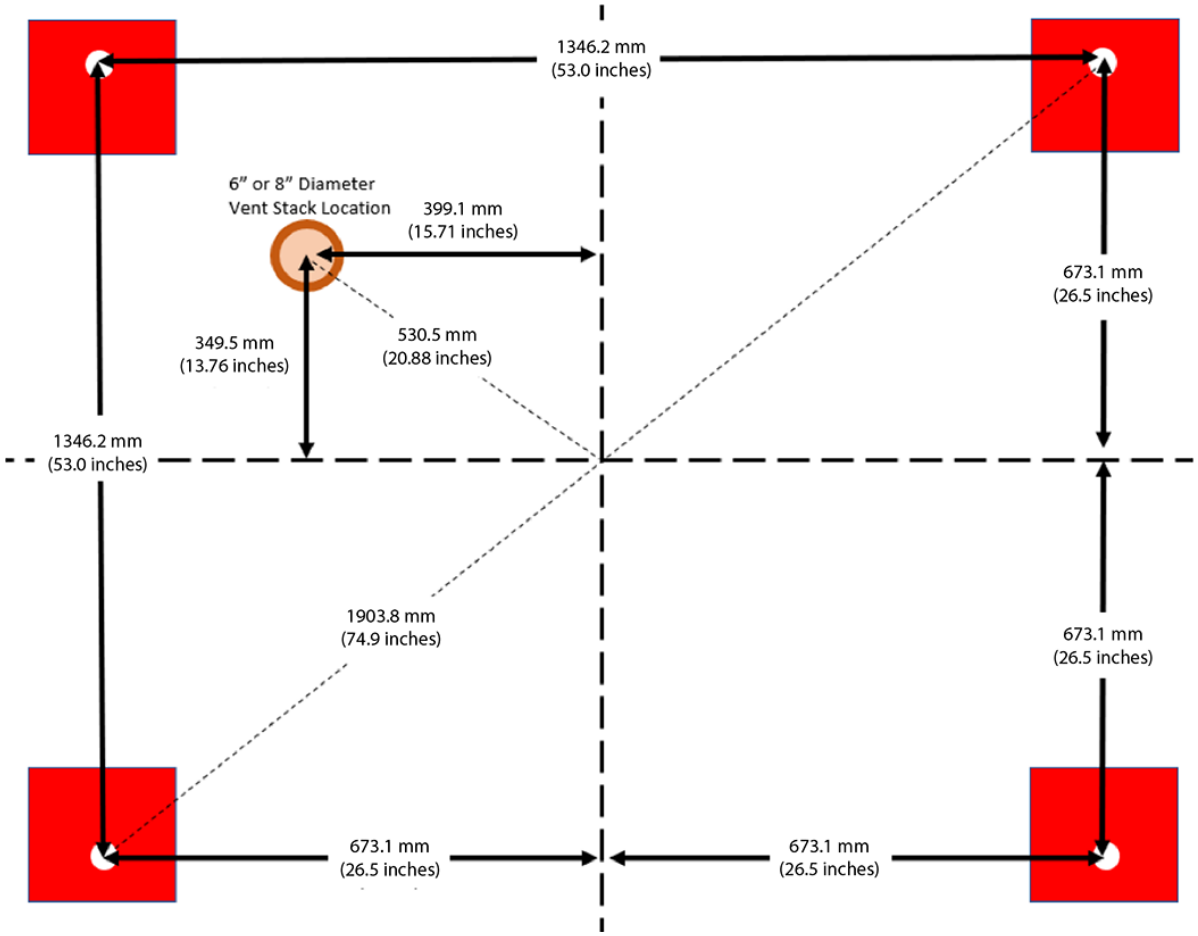
Quantity	Part number	Description
4	5802910	Vibromat Assembly, Platform

2. Put the vibroacoustic damping mats on the floor, in the appropriate location where the magnet will be set.

Figure 6-1 Vibroacoustic damping mat (5802910), side view

1	Aluminum
2	Red pad

Figure 6-2 Vibroacoustic mat placement (patient end is at the bottom)



6.3 Preparing to move the magnet

Safety
⚠ DANGER POTENTIAL ASPHYXIATION HAZARD Loss of magnet vacuum will result in the rapid expulsion of helium gas, which can cause asphyxiation in enclosed areas. Make sure that hospital personnel are aware of this situation prior to the magnet being moved within the enclosed areas. Use extreme caution and do not contact or damage the vacuum vessel during magnet transit or siting.
⚠ WARNING POTENTIAL INJURY HAZARD Moving the magnet improperly will cause personal injury or magnet damage. See Chapter 2 Unloading and moving the magnet on page 17 before moving the magnet using a forklift or crane.

Safety

NOTICE

EQUIPMENT DAMAGE RISK

Improper transportation can result in damage to the magnet.

Tasks in this section are to be done by riggers, not by GE HealthCare Personnel.

Do not apply any force to the magnet's enclosures.

Any floor anchors that are used to move the magnet must not penetrate the RF shield.

Magnet and dock installation and placement are critical to image quality and hardware reliability. The magnet must be installed level with the isocenter to the specifications listed in this chapter.

After the magnet is moved to the building using a crane or forklift (see Chapter 2 Unloading and moving the magnet on page 17), it needs to be moved to the magnet room. There are many methods to help move the magnet, including the use of a motorized tow vehicle, a come-along, or a chain jack. When you are moving the magnet, make sure that you are moving it in a smooth, controlled manner.

NOTE

Remove the lifting rails and bubble wrap at any point forward when the process allows, and you are done using the rails. When removing the bubble wrap, do not nick or cut any electrical cables.

⚠ WARNING

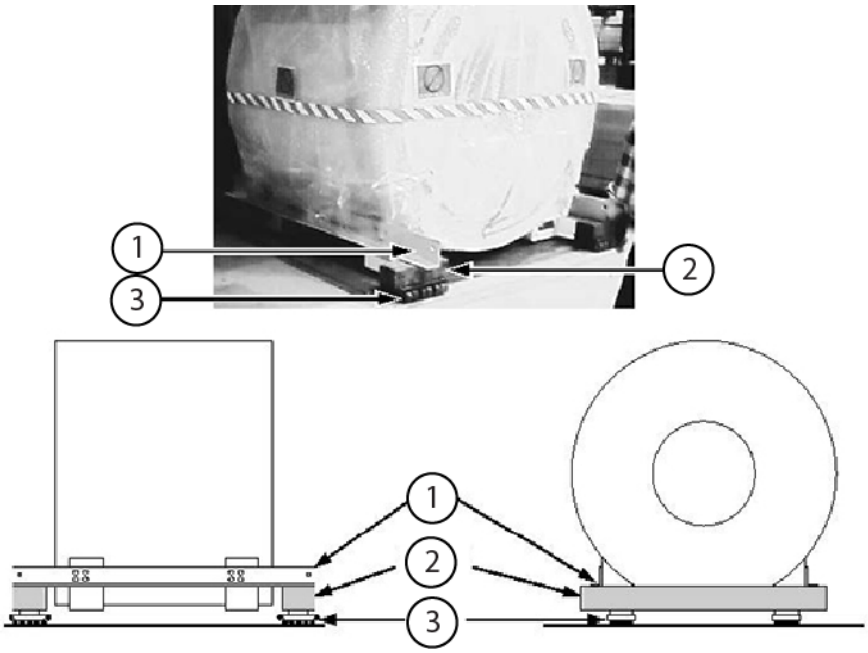
RISK OF DEATH, PERSONAL INJURY, OR EQUIPMENT DAMAGE

Used and/or damaged lifting rail bolts, lock washers, flat washers, and nuts can cause equipment and/or component damage, death, or serious physical injury!

Discard the used lifting rail hardware after it is removed from the magnet. This hardware must only be used one time. If lifting rails are to be reinstalled, use new, undamaged bolts, lock washers, flat washers, and nuts, which are available as FRUs that can be ordered from GE HealthCare.

1. Optionally, roller dollies are recommended for moving the magnet inside a building. If you use roller dollies, put steel floor plates along the magnet delivery route.

Figure 6-3 Magnet on roller dollies



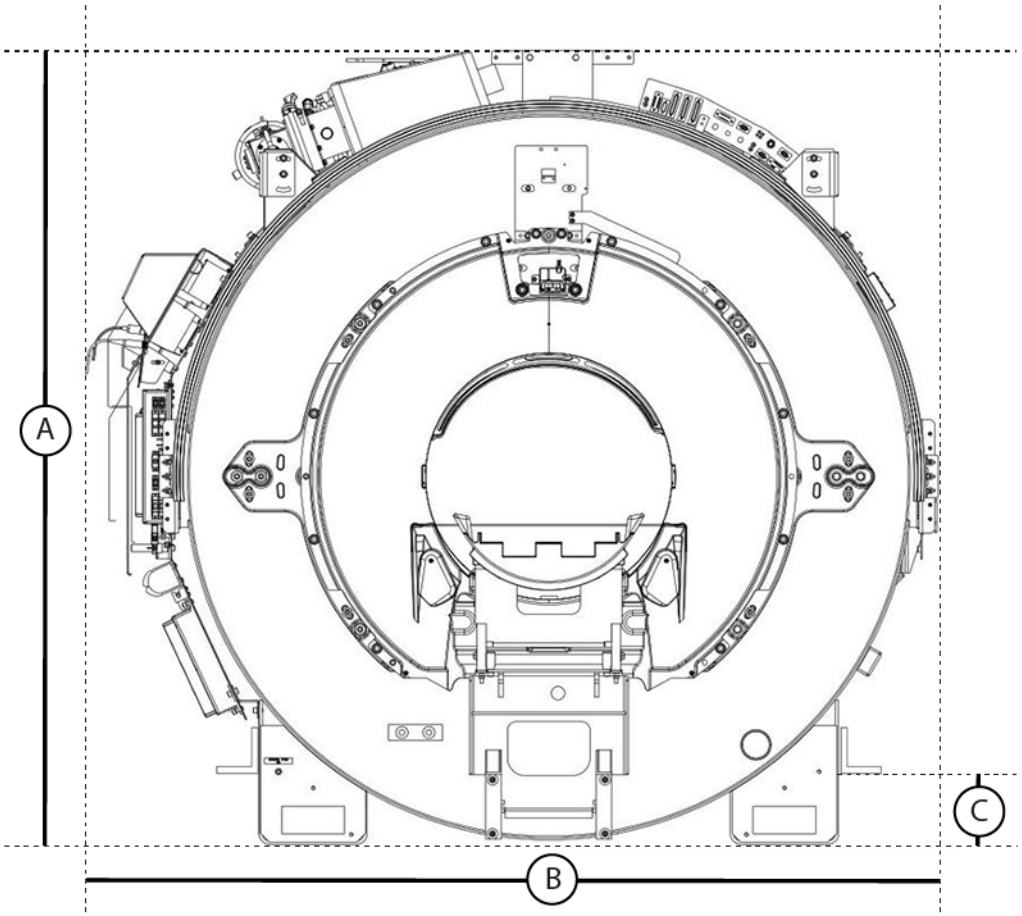
1	Lifting rails
2	100 mm x 150 mm (4 inch x 6 inch) wood beams
3	Roller dollies

2. Have the rigger make sure that walls, floors, and so on along the transportation route are protected from potential damage.
3. Attach any cables, chains, or straps used for moving the magnet to the orange lifting rails.
4. Make sure that the magnet front-rear orientation is relative to the magnet room's front and rear.
5. Do a check of all clearances along the route that the magnet will move to get to the magnet room. Compare those clearances with the appropriate illustration below.

NOTE
Magnet image is shown for reference and may differ from the configuration shipped. The dimensions indicated are for the condition as shipped.

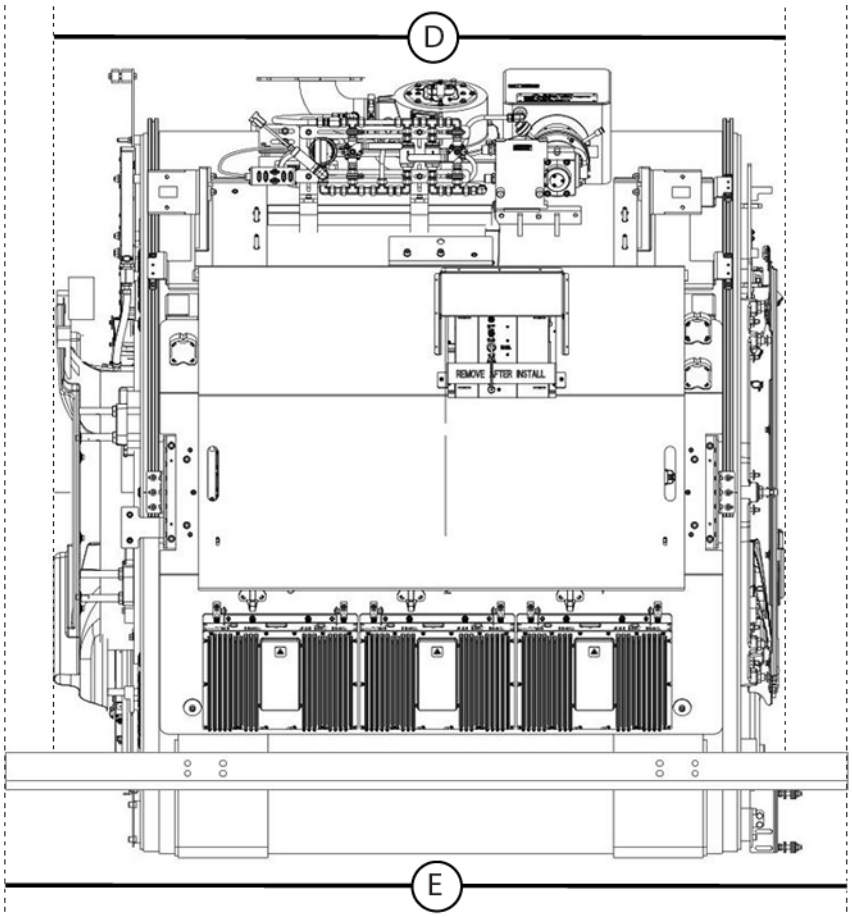
NOTE
Dimensions referenced are worst-case scenarios.

Figure 6-4 Clearance dimensions, magnet patient end as-shipped condition



Maximum dimension	PM series magnet
A	2250 mm (88.58 inches)
B	2303 mm (90.67 inches)
C	194 mm (7.64 inches)

Figure 6-5 Clearance dimensions, magnet service side as-shipped condition



Maximum dimension	PM series magnet
D	2151 mm (84.69 inches)
E	2388 mm (94.00 inches)

The actual dimension could be less than or equal to the maximum dimension.
Refer to the appropriate Preinstallation Manual (see Appendix B *Preinstallation Manual* reference on page 111). Only dimensions B and D are variable based on system type.

6. Compare the dimensions of the magnet on the moving fixtures being used with the clearances measured along the magnet delivery route. The height can be reduced by putting the moving fixtures directly under the lifting rails.

6.4 Moving the magnet into the MR suite

Safety
 **⚠ CAUTION** POTENTIAL PERSONAL INJURY Uneven jacking of the magnet's corners could result in the magnet shifting on the jacks, which may lead to personal injury or magnet damage. Keep the magnet level at all times during any jacking operation.
NOTICE EQUIPMENT DAMAGE RISK Improper loads on enclosure cover parts can result in damage to the enclosure. Do not apply any loads to enclosure cover parts. Do not allow straps, cables, or chains to scrape enclosure cover parts.

1. If raising the magnet is required, the lifting portion of the jack must be fully below the lifting rails.
2. Avoid tilting or rotating the magnet while moving it into the MR suite.
3. From the magnet room entrance to the magnet's final position, put steel floor plates as needed to protect the magnet room floor. The rigger must take actions necessary to ensure that walls, floors, and so on along the transportation route/path are protected from potential damage.
4. Move the magnet to the magnet room. (If using a motorized tow vehicle, attach cables, chains, or straps to the magnet's lifting rails with shackles.)
5. Make sure that there is adequate distance between the service side of the magnet and the magnet room wall as specified in the appropriate *Preinstallation Manual* (see Appendix B *Preinstallation Manual* reference on page 111).

6.5 Centering a PM series magnet in the MR suite

1. Make sure the laser levels are still in position and activated. If they are not, see Chapter 5 Preparing the scan room on page 53.
2. Carefully cut out the bubble wrap or plastic from the bore opening on the front and rear of the magnet to provide a clear view of the six leveling targets.

   NOTE
   When cutting off the bubble wrap, do not nick or cut any electrical cables.

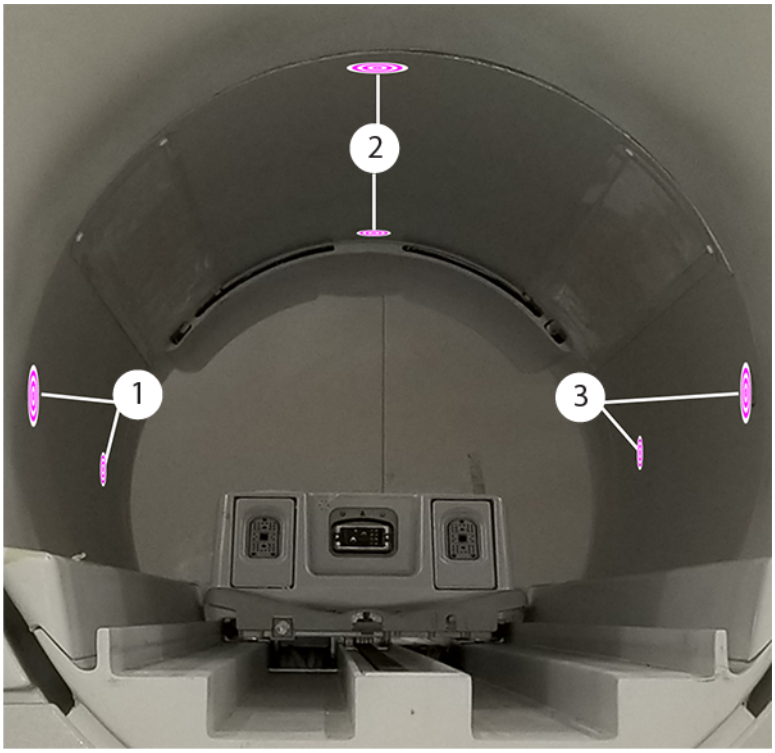
3. Make sure the laser levels are in self-leveling mode.

   NOTE
   In self-leveling mode, if the laser level tilts > 4° in any direction, the lasers do not show. When the laser level tilt is ≤ 4°, the level indicator LED is green and the lasers show.

Figure 6-6 Laser level in self-leveling mode (unlocked position)

4. Do a check of the magnet left-to-right alignment relative to the 12 o'clock leveling markers at both ends of the body coil.

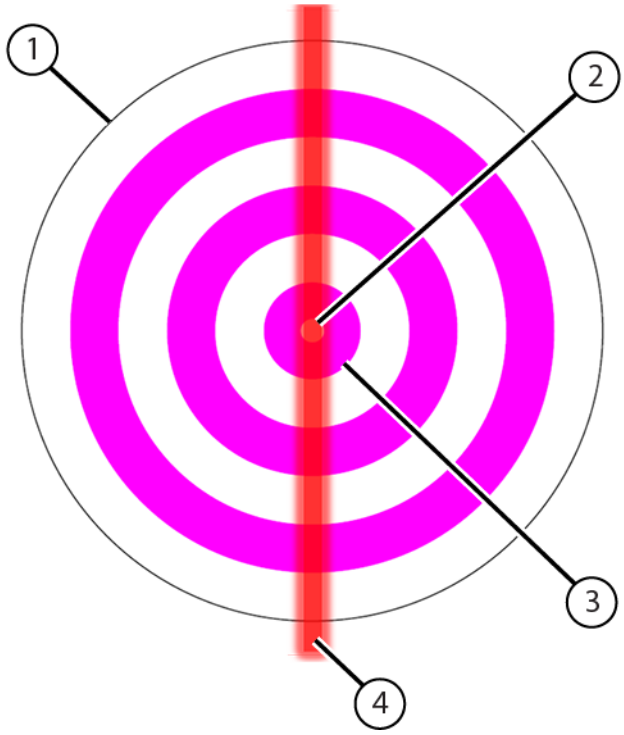
Figure 6-7 Leveling marker positions



1	9 o'clock
2	12 o'clock
3	3 o'clock

5. Make sure the projected laser line completely covers the primary target circle on the two leveling targets.

Figure 6-8 Parts of a leveling target

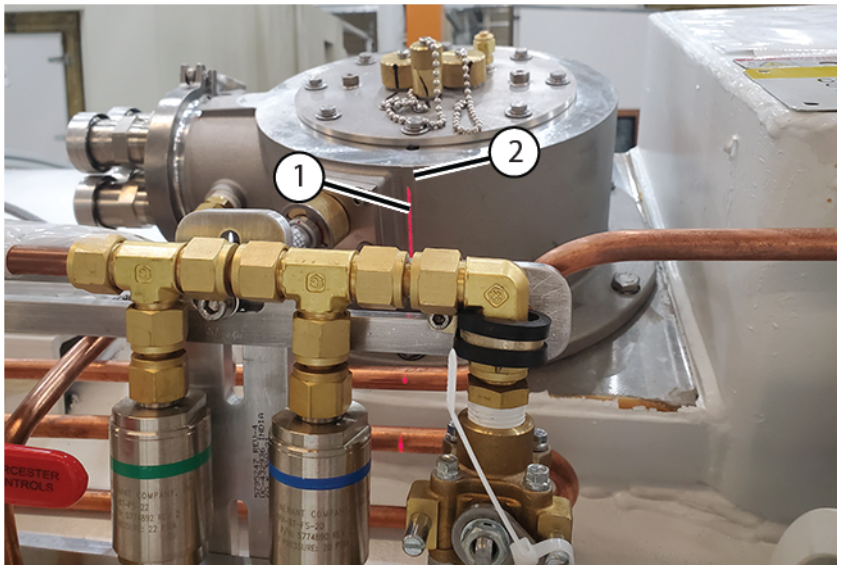


1	Leveling marker
2	Primary target circle, Ø 1.5 mm (0.06 inches)
3	Secondary target circle, Ø 6.4 mm (0.25 inches)
4	Projected laser line

NOTE
This figure is not to scale.

6. Adjust the magnet position front-to-back until the laser line appears on the center of the rib of the cryogen plenum.

Figure 6-9 Laser line in the center of the cryogen plenum rib



1	Laser line
2	Cryogen plenum rib

6.6 Lowering the magnet into position

1. Cut open and remove enough of the bubble wrap to allow access to the feet and for leveling operations.

   NOTE
   When cutting off the bubble wrap, do not nick or cut any electrical cables.

2. Align the holes in the magnet feet to the anchor holes in the vibroacoustic damping mats.
3. Make sure that the four holes, one per each magnet foot, align centered ± 3 mm (± 0.125 inches) over the anchor stud holes in the vibroacoustic damping mats.
4. Jack the magnet up sufficiently at the two lifting rails (four corners), and remove the moving fixtures.
5. Put the vibroacoustic mats below the magnet feet.
6. Slowly lower the magnet onto the vibroacoustic mats.

Figure 6-10 Lowering the magnet onto the vibroacoustic damping mats

7. Release pressure simultaneously in both jacks on one end of the magnet until that end is 25 to 50 mm (1 to 2 inches) lower than the opposite end.
8. Simultaneously lower both jacks on the other end 25 to 50 mm (1 to 2 inches).
9. Repeat lowering the magnet end to end until all feet are on the vibroacoustic mats.

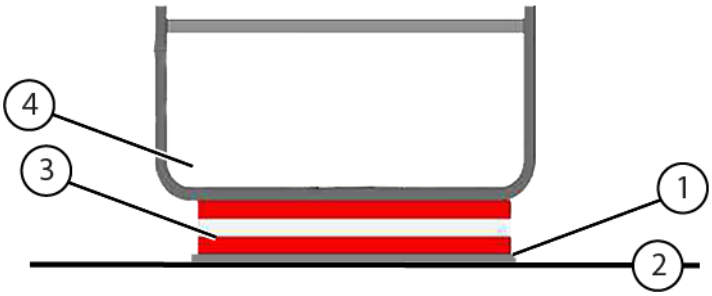
6.7 Adding leveling shims

Review this section before you begin to level the magnet. If, while leveling the magnet, you need to insert shims under a magnet foot to achieve correct leveling, this section provides instructions for raising any one of the four magnet feet and properly placing shims with respect to the specific vibroacoustic mat.

1. Use a jack to raise the lowest magnet foot.
2. Insert the appropriate thickness of aluminum shim plates under the low magnet foot.

3. Put the shims on the floor, under the vibroacoustic mat, making sure the surface is solid and can support the magnet weight.

Figure 6-11 Shim arrangement



1	Leveling shims
2	Floor surface
3	Vibroacoustic mat
4	Magnet foot

6.8 Leveling a PM series magnet

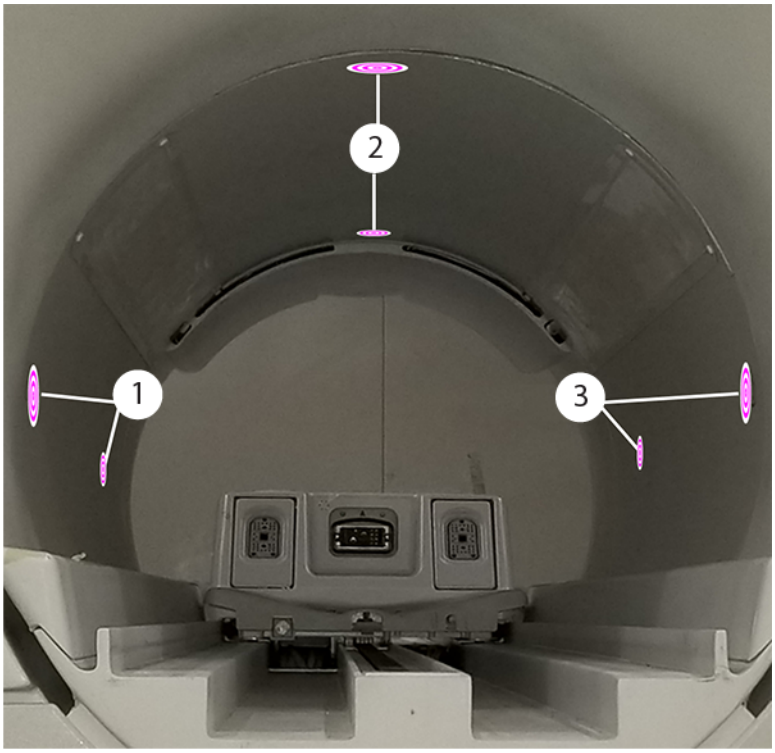
1. Make sure the laser level is in self-leveling mode.

NOTE
In self-leveling mode, if the laser level tilts > 4° in any direction, the lasers do not show. When the laser level tilt is ≤ 4°, the level indicator LED is green and the lasers show.

Figure 6-12 Laser level in self-leveling mode (unlocked position)

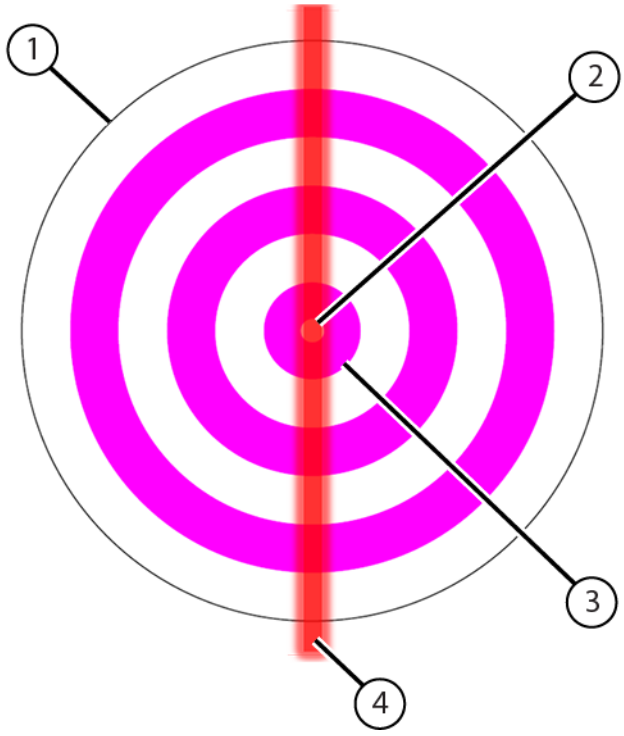
2. Set the laser level height to the center of the highest of the four side targets (3 o'clock and 9 o'clock leveling markers).

Figure 6-13 Leveling marker positions



1	9 o'clock
2	12 o'clock
3	3 o'clock

Figure 6-14 Parts of a leveling target



1	Leveling marker
2	Primary target circle, Ø 1.5 mm (0.06 inches)
3	Secondary target circle, Ø 6.4 mm (0.25 inches)
4	Projected laser line

NOTE
This figure is not to scale.

3. Complete the following substeps to check front-to-back (superior to inferior) levelness:

NOTE
Measure front-to-back leveling relative to the 3 o'clock and 9 o'clock leveling markers at both ends of the body coil.

3.1. Make sure the projected laser line completely covers the primary target circle on the leveling target.

3.2. Add leveling shims under the vibroacoustic damping mat at each magnet foot, per the 6.7 Adding leveling shims on page 74 procedure, to achieve the correct front-to-back levelness based on the laser line positions and shim requirements shown below.

NOTE
If you need to open a second box of shims, check the floor levelness or contact Florence.

Figure 6-15 Laser line positions on a leveling target

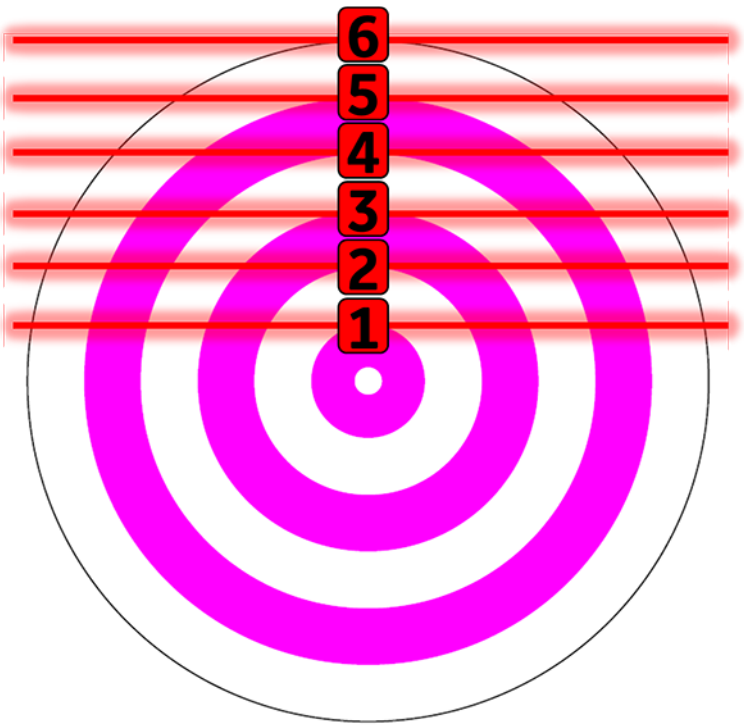


Table 6-2 Laser line shim requirements (front-to-back)

Laser line position	How far magnet foot needs to be raised (mm)		Number of 1.5 mm shims		Number of 0.5 mm shims	
	SIGNA Artist, SIGNA Voyager, SIGNA Champion, SIGNA Sprint	SIGNA Prime, SIGNA Victor	SIGNA Artist, SIGNA Voyager, SIGNA Champion, SIGNA Sprint	SIGNA Prime, SIGNA Victor	SIGNA Artist, SIGNA Voyager, SIGNA Champion, SIGNA Sprint	SIGNA Prime, SIGNA Victor
1	3.5	4.1	1	1	4	5
2	6.9	8.3	4	5	1	1
3	10.4	12.4	6	7	2	3
4	13.9	16.6	8	10	3	2
5	17.3	20.7	11	13	0	1
6	20.8	24.9	Check floor levelness			

4. Complete the following substeps to check left-to-right levelness:

NOTE
Measure left-to-right leveling relative to the 3 o'clock and 9 o'clock leveling markers at both ends of the body coil.

4.1. Make sure the projected laser line completely covers the primary target circle on the leveling target.

4.2. Add leveling shims under the vibroacoustic damping mat at each magnet foot, per the 6.7 Adding leveling shims on page 74 procedure, to achieve the correct left-to-right levelness based on the laser line positions and shim requirements shown below.

NOTE
If you need to open a second box of shims, check the floor levelness or contact Florence.

Table 6-3 Laser line shim requirements (left-to-right)

Laser line position	How far magnet foot needs to be raised (mm)		Number of 1.5 mm shims		Number of 0.5 mm shims	
	SIGNA Artist, SIGNA Voyager, SIGNA Champion, SIGNA Sprint	SIGNA Prime, SIGNA Victor	SIGNA Artist, SIGNA Voyager, SIGNA Champion, SIGNA Sprint	SIGNA Prime, SIGNA Victor	SIGNA Artist, SIGNA Voyager, SIGNA Champion, SIGNA Sprint	SIGNA Prime, SIGNA Victor
1	4.2	4.4	2	1	2	6
2	8.4	8.8	5	5	1	2
3	12.6	13.2	7	7	3	4
4	16.7	17.6	10	10	2	4
5	20.9	22.0	12	12	4	6
6	25.1	26.4	Check floor levelness			

5. Complete the following substeps to check magnet height:

NOTE
Measure height leveling relative to the 3 o'clock and 9 o'clock leveling markers at both ends of the body coil.

5.1. Make sure the projected laser line completely covers the primary target circle on the leveling target.

5.2. Make sure the horizontal laser line from the front laser level still aligns 1070 mm (42.13 inches) from the floor at the front of the magnet. Accuracy is critical here.

5.3. If necessary, put a folding ruler in position vertically near the front center of the magnet, and adjust the tripod height until the horizontal laser line aligns on the ruler 1070 mm (42.13 inches) from the floor (the magnet isocenter should be 1064 to 1076 mm). Compare the laser position to the targets inside the body coil.

5.4. Add leveling shims under the vibroacoustic damping mat at each magnet foot, per the 6.7 Adding leveling shims on page 74 procedure, to achieve the correct height based on the laser line positions and shim requirements shown below.

NOTE
If you need to open a second box of shims, check the floor levelness or contact Florence.

Table 6-4 Laser line shim requirements (height)

Laser line position	How far magnet foot needs to be raised (mm)	Number of 1.5 mm shims	Number of 0.5 mm shims
1	3.2	2	0
2	6.4	4	0
3	9.6	6	0

Table 6-4 Laser line shim requirements (height) (Table continued)

Laser line position	How far magnet foot needs to be raised (mm)	Number of 1.5 mm shims	Number of 0.5 mm shims
4	12.8	8	0
5	16.0	10	1
6	19.2	12	1

6. Some of the leveling markers may no longer fit in the primary target circle on the leveling target. **For acceptability, at least three of the four side leveling markers must be completely covered by the primary target circle. The remaining marker must have complete coverage in the secondary target circle. (For seismic installations, the markers in the 12 o'clock position are not used.)**
7. Test-fit the cryogen vent stack to make sure it aligns with the scan room vent pipe.
8. After the magnet is leveled, remove the six leveling markers.

Chapter 7 Installing a seismic vibroacoustic damping mat and leveling the magnet

Safety
NOTICE EQUIPMENT DAMAGE RISK Improper damping mat installation can result in damage to the magnet. Tasks in this section must be done by riggers, not GE HealthCare Service Personnel. The vibroacoustic damping mats used for seismic install must be installed over the seismic studs before moving the magnet into the magnet room.

7.1 Equipment overview

Tools and test equipment			
Item	**Quantity**	**Part number**	**Manufacturer**
PH Alignment and Magnet Leveling Kit	1	5897979	-
Tape Measure	1	-	-
Magnet Leveling Shim Kit	2	5819317	-
Vibromat Assembly, Platform	4	5802910	-
Seismic Anchor Kit, Platform (contents detailed in table below)	1	M6001AH	-

PH Alignment and Magnet Leveling Kit (5897979)			
Item	**Quantity**	**Part number**	**Manufacturer**
Laser Level PLS 180R Z	2	5831466	-
Tripod, Vanguard Alta Pro 263AB 100	2	5829559	-
Folding Ruler, 2 meters, FM-DELA.401.00	1	5897974	-
PM Series Magnet Template	1	5810898	-

Magnet Leveling Shim Kit (5819317)			
Item	**Quantity**	**Part number**	**Manufacturer**
Shim Plate, 0.5 mm Thick	8	5872197-05	-
Shim Plate, 1.5 mm Thick	8	5872197-15	-
Shim Plate, 3.0 mm Thick	4	5872197-30	-

Seismic Anchor Kit, Platform (M6001AH)			
Item	**Quantity**	**Part number**	**Manufacturer**
Mounting Plate	4	5817179	-
Center Ring	4	5817180	-
Collar, Seismic Kit Collector for Platform	4	5822743	-
Hex Tool, Seismic Kit Collector for Platform	1	5822744	-
Hexagon Head Screw, ISO 4017, M10-1.5 x 35 mm Long, A2-70 Stainless Steel, RoHS Fastener	16	1000-M10C035-31	-
Hexagon Socket Head Cap Screw, ISO 4762, M14-2 x 50 mm Long, A2-70 Stainless Steel, Passivate, RoHS Fastener	12	1000-M14C050-31	-
LOCTITE #242	1	46-170686P2	-

Required conditions
Magnet and dock installation and placement are critical to image quality and hardware reliability.

7.2 Putting a seismic mounted vibroacoustic damping mat into position

NOTE
The vibroacoustic damping mat must be installed on the floor before moving the magnet into the magnet room.

1. Make sure that the vibroacoustic kit contains the parts listed in the following table.

Table 7-1 Vibroacoustic damping mat kit (5802910)

Quantity	Part number	Description
4	5802910	Vibromat Assembly, Platform

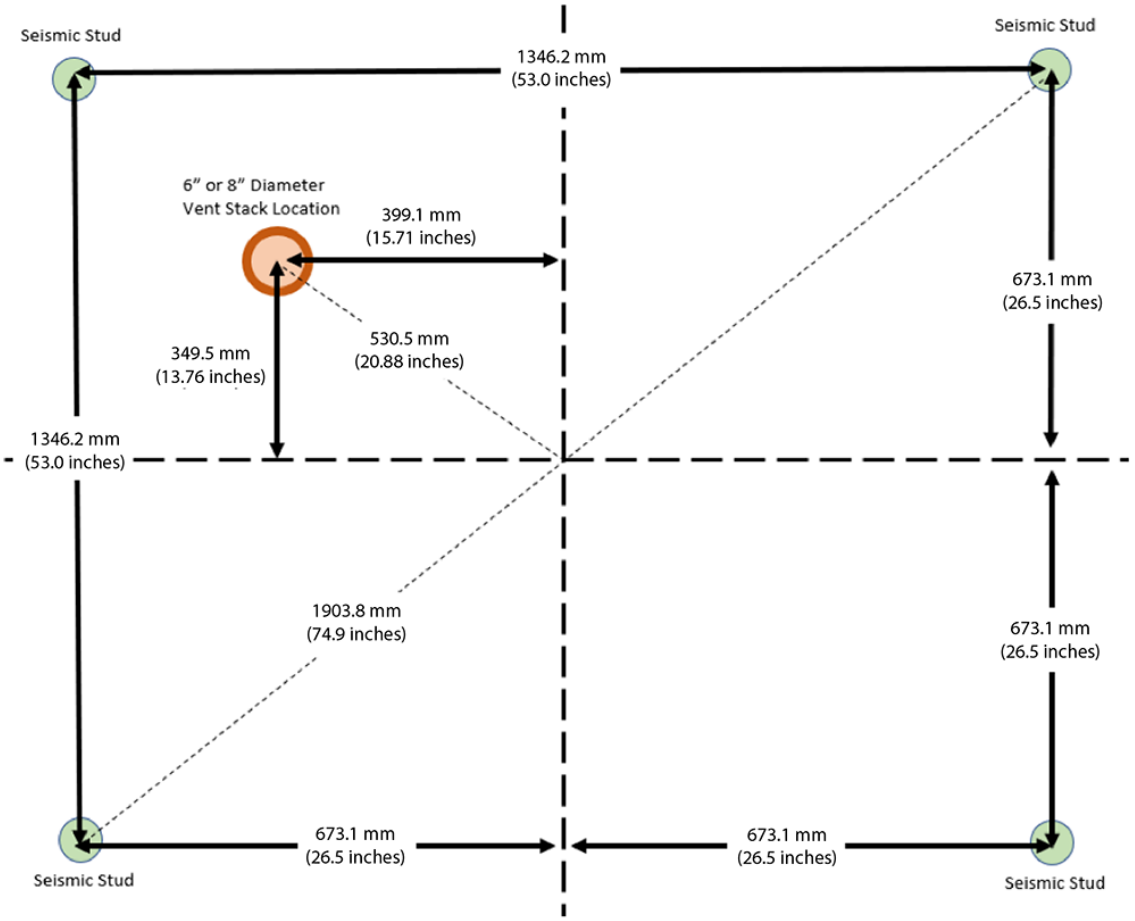
Figure 7-1 Vibroacoustic damping mat (5802910), side view

1	Aluminum
2	Red pad

2. Make sure that the customer has installed seismic threaded rods in the concrete to match the magnet foot pattern. The rods must meet seismic requirements and have a maximum diameter of 1.25 inches and be between 5.5 and 6 inches in height above the finished floor.

NOTE
Installing GE HealthCare magnets in seismic regions is the responsibility of the customer, and should be done by riggers, not by GE HealthCare Service Personnel. The customer is required to make the decision as to how seismic regulations are met in the region based off the architect's recommendations.

Figure 7-2 Seismic stud placement (patient end is at the bottom)



3. Put the vibroacoustic damping mats on the floor, over the seismic rods, according to the prescribed markings.

Figure 7-3 Vibroacoustic mat placement (patient end is at the bottom)

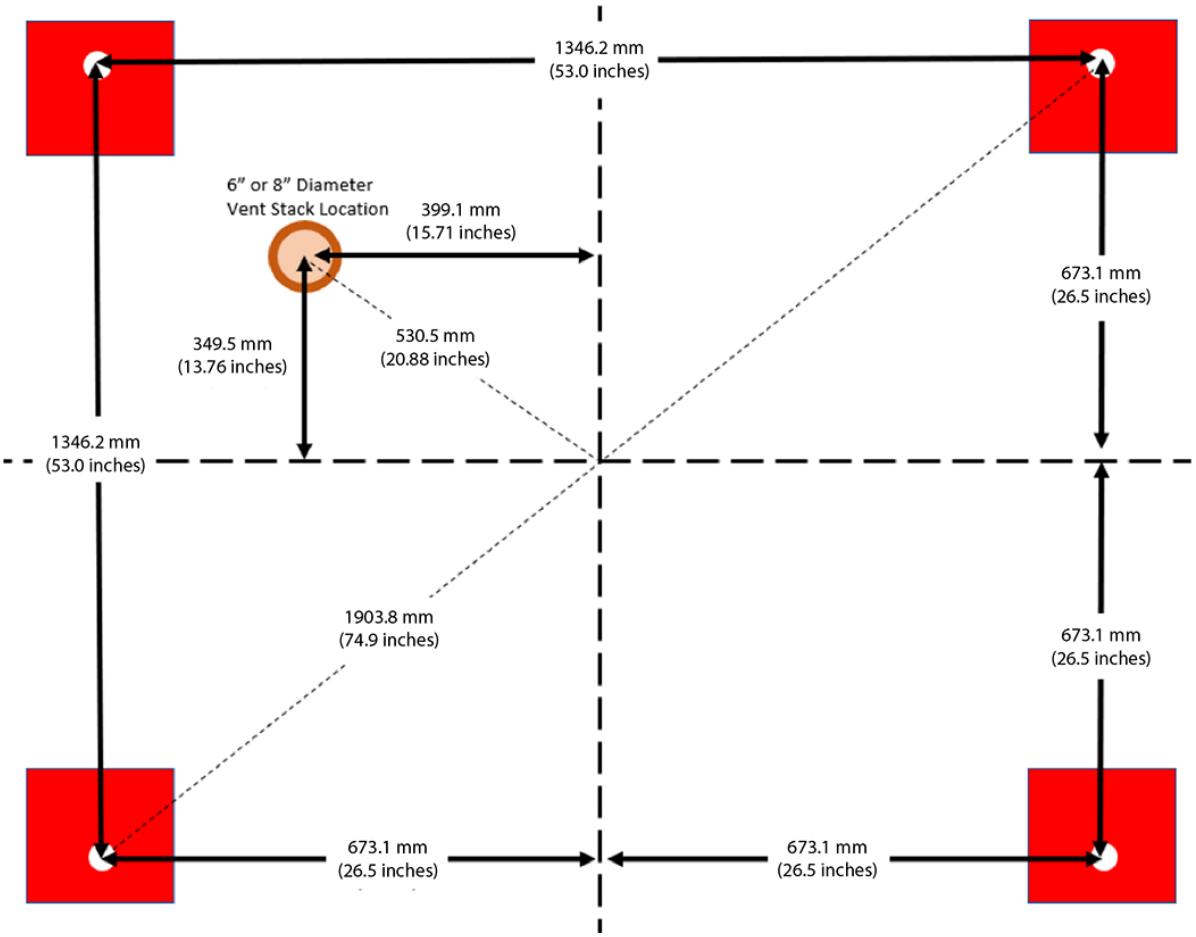
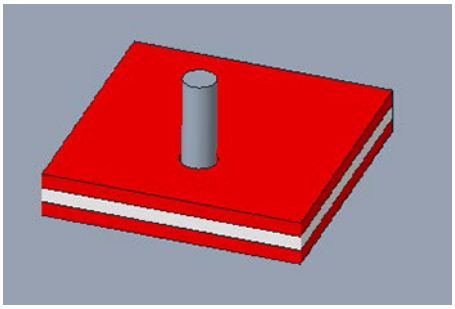


Figure 7-4 Vibroacoustic mat put over a seismic rod



7.3 Preparing to move the magnet

Safety	
	**⚠ DANGER** POTENTIAL ASPHYXIATION HAZARD Loss of magnet vacuum will result in the rapid expulsion of helium gas, which can cause asphyxiation in enclosed areas. Make sure that hospital personnel are aware of this situation prior to the magnet being moved within the enclosed areas. Use extreme caution and do not contact or damage the vacuum vessel during magnet transit or siting.
	**⚠ WARNING** POTENTIAL INJURY HAZARD Moving the magnet improperly will cause personal injury or magnet damage. See Chapter 2 Unloading and moving the magnet on page 17 before moving the magnet using a forklift or crane.
	NOTICE EQUIPMENT DAMAGE RISK Improper transportation can result in damage to the magnet. Tasks in this section are to be done by riggers, not by GE HealthCare Personnel. Do not apply any force to the magnet's enclosures. Any floor anchors that are used to move the magnet must not penetrate the RF shield. Magnet and dock installation and placement are critical to image quality and hardware reliability. The magnet must be installed level with the isocenter to the specifications listed in this chapter.

After the magnet is moved to the building using a crane or forklift (see Chapter 2 Unloading and moving the magnet on page 17), it needs to be moved to the magnet room. There are many methods to help move the magnet, including the use of a motorized tow vehicle, a come-along, or a chain jack. When you are moving the magnet, make sure that you are moving it in a smooth, controlled manner.

NOTE

Remove the lifting rails and bubble wrap at any point forward when the process allows, and you are done using the rails. When removing the bubble wrap, do not nick or cut any electrical cables.

⚠ WARNING

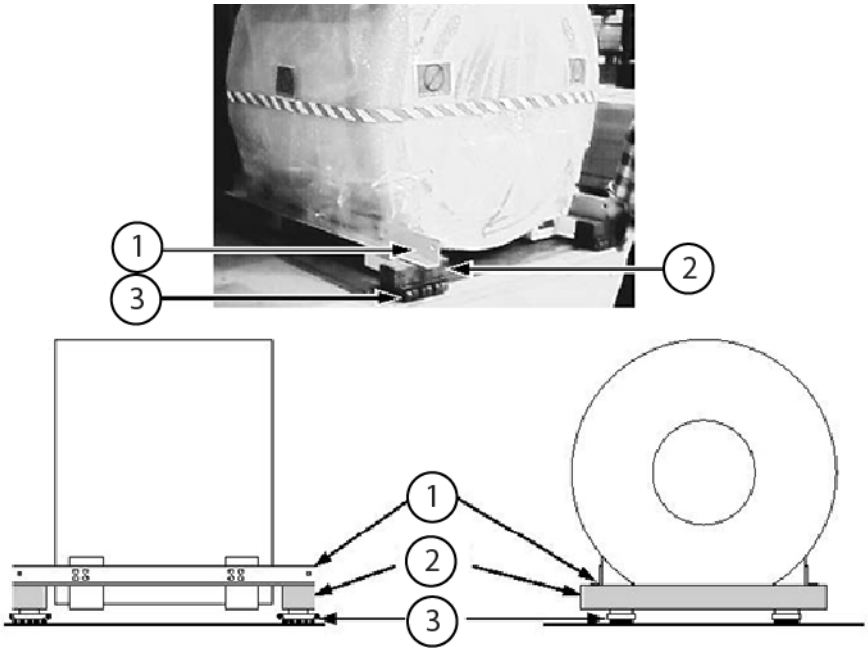
RISK OF DEATH, PERSONAL INJURY, OR EQUIPMENT DAMAGE

Used and/or damaged lifting rail bolts, lock washers, flat washers, and nuts can cause equipment and/or component damage, death, or serious physical injury!

Discard the used lifting rail hardware after it is removed from the magnet. This hardware must only be used one time. If lifting rails are to be reinstalled, use new, undamaged bolts, lock washers, flat washers, and nuts, which are available as FRUs that can be ordered from GE HealthCare.

1. Optionally, roller dollies are recommended for moving the magnet inside a building. If you use roller dollies, put steel floor plates along the magnet delivery route.

Figure 7-5 Magnet on roller dollies



1	Lifting rails
2	100 mm x 150 mm (4 inch x 6 inch) wood beams
3	Roller dollies

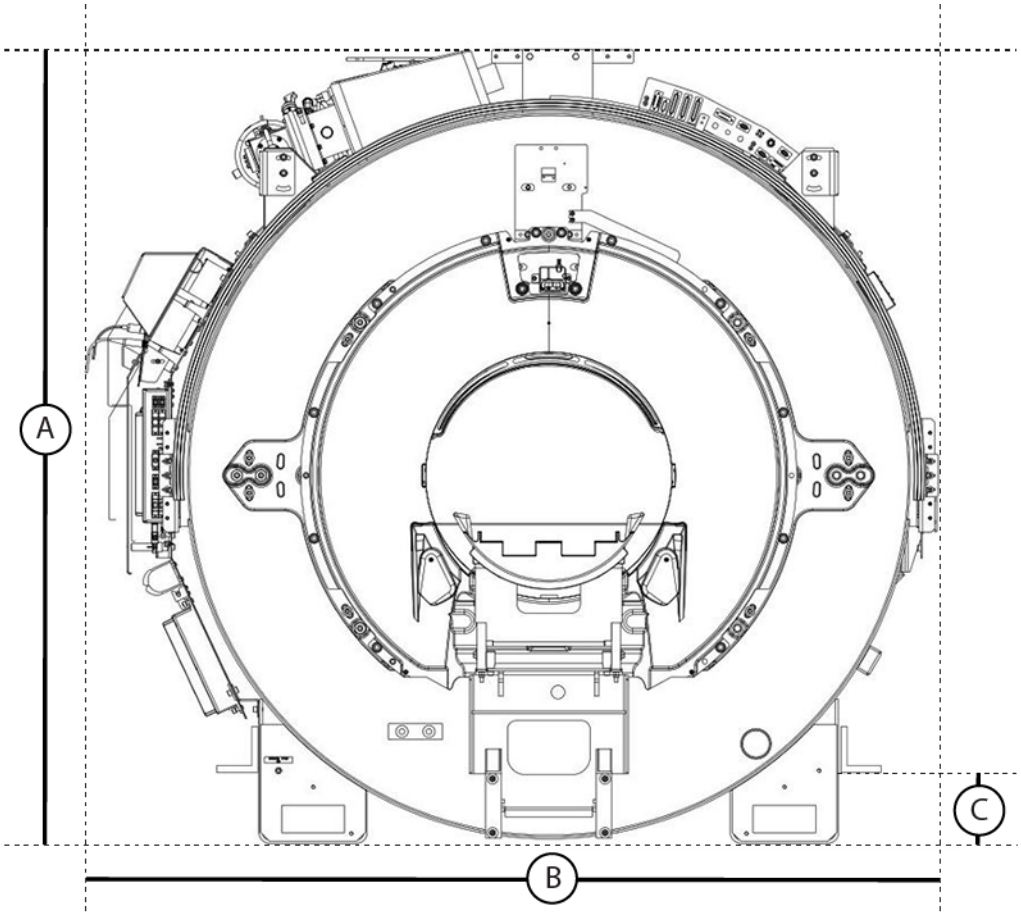
2. Have the rigger make sure that walls, floors, and so on along the transportation route are protected from potential damage.
3. Attach any cables, chains, or straps used for moving the magnet to the orange lifting rails.
4. Make sure that the magnet front-rear orientation is relative to the magnet room's front and rear.

5. Do a check of all clearances along the route that the magnet will move to get to the magnet room. Compare those clearances with the appropriate illustration below.

NOTE
Magnet image is shown for reference and may differ from the configuration shipped. The dimensions indicated are for the condition as shipped.

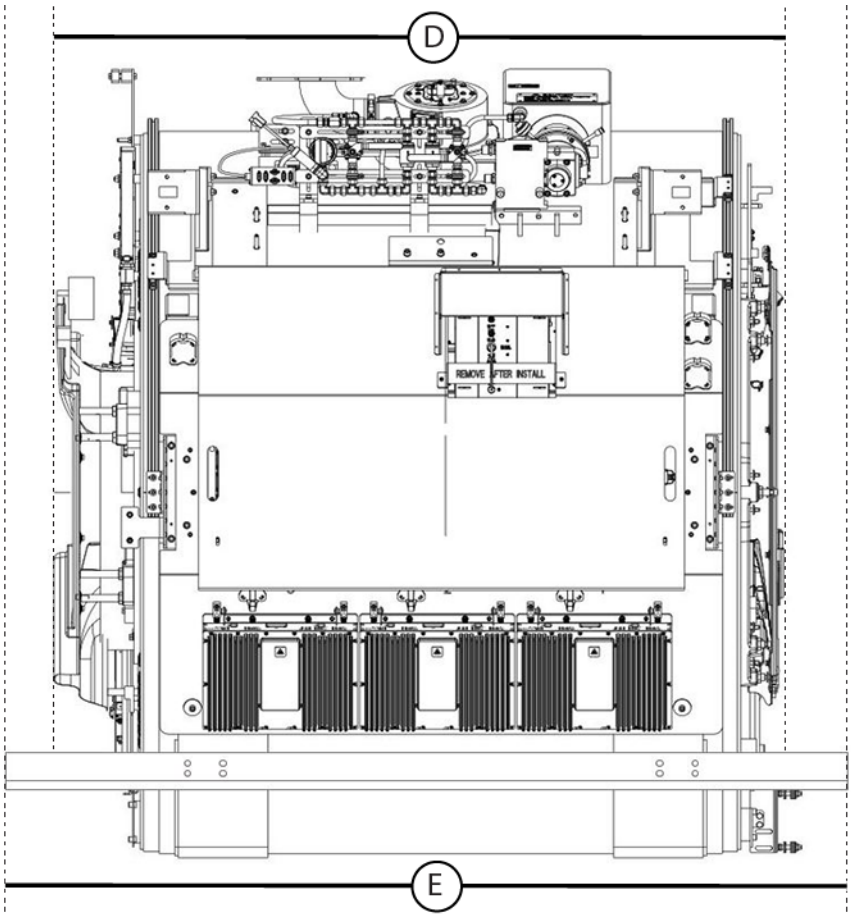
NOTE
Dimensions referenced are worst-case scenarios.

Figure 7-6 Clearance dimensions, magnet patient end as-shipped condition



Maximum dimension	PM series magnet
A	2250 mm (88.58 inches)
B	2303 mm (90.67 inches)
C	194 mm (7.64 inches)

Figure 7-7 Clearance dimensions, magnet service side as-shipped condition



Maximum dimension	PM series magnet
D	2151 mm (84.69 inches)
E	2388 mm (94.00 inches)

The actual dimension could be less than or equal to the maximum dimension.
Refer to the appropriate Preinstallation Manual (see Appendix B *Preinstallation Manual* reference on page 111). Only dimensions B and D are variable based on system type.

6. Compare the dimensions of the magnet on the moving fixtures being used with the clearances measured along the magnet delivery route. The height can be reduced by putting the moving fixtures directly under the lifting rails.

7.4 Moving the magnet into the MR suite

Safety
 **⚠ CAUTION** POTENTIAL PERSONAL INJURY Uneven jacking of the magnet's corners could result in the magnet shifting on the jacks, which may lead to personal injury or magnet damage. Keep the magnet level at all times during any jacking operation.
NOTICE EQUIPMENT DAMAGE RISK Improper loads on enclosure cover parts can result in damage to the enclosure. Do not apply any loads to enclosure cover parts. Do not allow straps, cables, or chains to scrape enclosure cover parts.

1. If raising the magnet is required, the lifting portion of the jack must be fully below the lifting rails.
2. Avoid tilting or rotating the magnet while moving it into the MR suite.
3. From the magnet room entrance to the magnet's final position, put steel floor plates as needed to protect the magnet room floor. The rigger must take actions necessary to make sure that walls, floors, and so on along the transportation route/path are protected from potential damage.
4. Move the magnet to the magnet room. (If using a motorized tow vehicle, attach cables, chains, or straps to the magnet's lifting rails with shackles.)

7.5 Lowering the magnet into position

1. Cut open and remove enough of the bubble wrap to allow access to the feet and for leveling operations.

   NOTE
   When cutting off the bubble wrap, do not nick or cut any electrical cables.

2. Move the magnet to align the holes in the magnet feet to the anchor holes in the vibroacoustic damping mats.
3. Make sure that the four holes, one per each magnet foot, align centered ± 3 mm (± 0.125 inches) over the seismic anchor holes in the vibroacoustic mats.
4. Jack the magnet up sufficiently at the two lifting rails (four corners), and remove the moving fixtures.
5. Slowly lower the magnet onto the vibroacoustic mats. Make sure the threaded seismic rods go through the holes in the magnet feet.

Figure 7-8 Magnet foot put on a vibroacoustic mat over a seismic rod

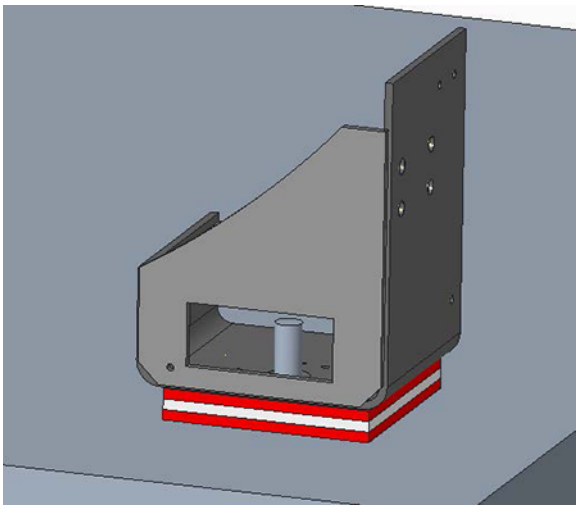


Figure 7-9 Lowering the magnet onto the vibroacoustic damping mats

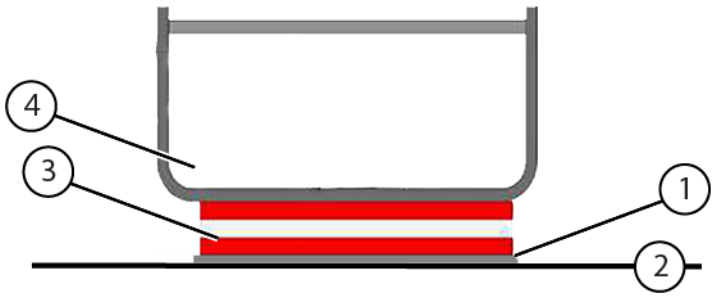
6. Release pressure simultaneously in both jacks on one end of the magnet until that end is 25 to 50 mm (1 to 2 inches) lower than the opposite end.
7. Simultaneously lower both jacks on the other end 25 to 50 mm (1 to 2 inches).
8. Repeat lowering the magnet end to end until all feet are on the vibroacoustic mats, correctly located on the magnet feet bolt holes.

7.6 Adding leveling shims

Review this section before you begin to level the magnet. If, while leveling the magnet, you need to insert shims under a magnet foot to achieve correct leveling, this section provides instructions for raising any one of the four magnet feet and properly placing shims with respect to the specific vibroacoustic mat.

1. Use a jack to raise the lowest magnet foot.
2. Insert the appropriate thickness of aluminum shim plates under the low magnet foot.
3. Put the shims on the floor, under the vibroacoustic mat, making sure the surface is solid and can support the magnet weight.

Figure 7-10 Shim arrangement



1	Leveling shims
2	Floor surface
3	Vibroacoustic mat
4	Magnet foot

7.7 Leveling a PM series magnet

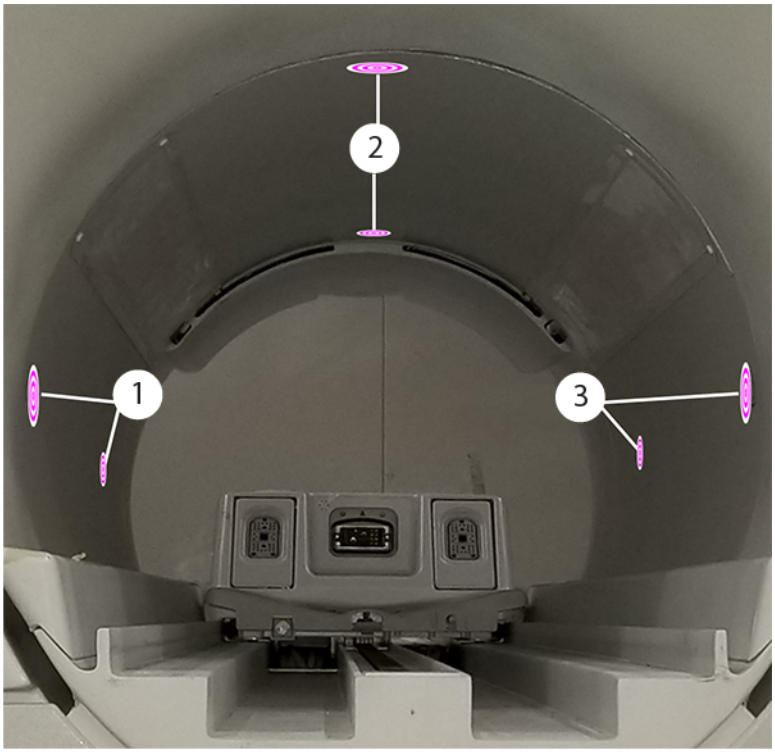
1. Make sure the laser level is in self-leveling mode.

NOTE
In self-leveling mode, if the laser level tilts > 4° in any direction, the lasers do not show. When the laser level tilt is ≤ 4°, the level indicator LED is green and the lasers show.

Figure 7-11 Laser level in self-leveling mode (unlocked position)

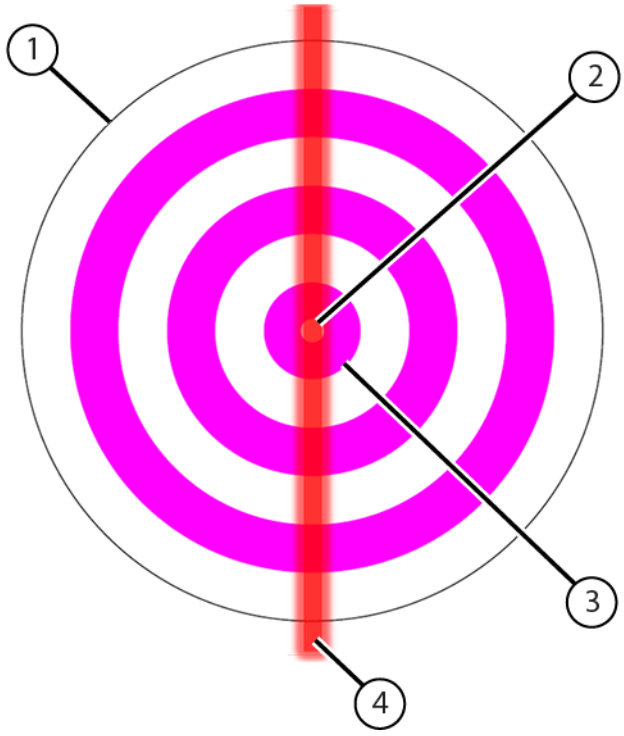
2. Set the laser level height to the center of the highest of the four side targets (3 o'clock and 9 o'clock leveling markers).

Figure 7-12 Leveling marker positions



1	9 o'clock
2	12 o'clock
3	3 o'clock

Figure 7-13 Parts of a leveling target



1	Leveling marker
2	Primary target circle, Ø 1.5 mm (0.06 inches)
3	Secondary target circle, Ø 6.4 mm (0.25 inches)
4	Projected laser line

NOTE
This figure is not to scale.

3. Complete the following substeps to check front-to-back (superior to inferior) levelness:

NOTE
Measure front-to-back leveling relative to the 3 o'clock and 9 o'clock leveling markers at both ends of the body coil.

3.1. Make sure the projected laser line completely covers the primary target circle on the leveling target.

3.2. Add leveling shims under the vibroacoustic damping mat at each magnet foot, per the 7.6 Adding leveling shims on page 92 procedure, to achieve the correct front-to-back levelness based on the laser line positions and shim requirements shown below.

NOTE
If you need to open a second box of shims, check the floor levelness or contact Florence.

Figure 7-14 Laser line positions on a leveling target

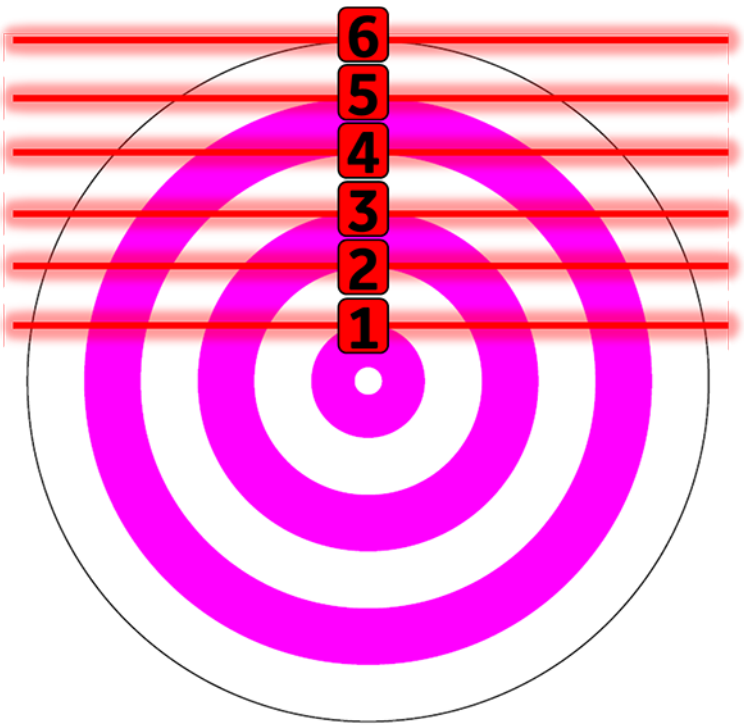


Table 7-2 Laser line shim requirements (front-to-back)

Laser line position	How far magnet foot needs to be raised (mm)		Number of 1.5 mm shims		Number of 0.5 mm shims	
	SIGNA Artist, SIGNA Voyager, SIGNA Champion, SIGNA Sprint	SIGNA Prime, SIGNA Victor	SIGNA Artist, SIGNA Voyager, SIGNA Champion, SIGNA Sprint	SIGNA Prime, SIGNA Victor	SIGNA Artist, SIGNA Voyager, SIGNA Champion, SIGNA Sprint	SIGNA Prime, SIGNA Victor
1	3.5	4.1	1	1	4	5
2	6.9	8.3	4	5	1	1
3	10.4	12.4	6	7	2	3
4	13.9	16.6	8	10	3	2
5	17.3	20.7	11	13	0	1
6	20.8	24.9	Check floor levelness			

4. Complete the following substeps to check left-to-right levelness:

NOTE
Measure left-to-right leveling relative to the 3 o'clock and 9 o'clock leveling markers at both ends of the body coil.

4.1. Make sure the projected laser line completely covers the primary target circle on the leveling target.

4.2. Add leveling shims under the vibroacoustic damping mat at each magnet foot, per the 7.6 Adding leveling shims on page 92 procedure, to achieve the correct left-to-right levelness based on the laser line positions and shim requirements shown below.

NOTE
If you need to open a second box of shims, check the floor levelness or contact Florence.

Table 7-3 Laser line shim requirements (left-to-right)

Laser line position	How far magnet foot needs to be raised (mm)		Number of 1.5 mm shims		Number of 0.5 mm shims	
	SIGNA Artist, SIGNA Voyager, SIGNA Champion, SIGNA Sprint	SIGNA Prime, SIGNA Victor	SIGNA Artist, SIGNA Voyager, SIGNA Champion, SIGNA Sprint	SIGNA Prime, SIGNA Victor	SIGNA Artist, SIGNA Voyager, SIGNA Champion, SIGNA Sprint	SIGNA Prime, SIGNA Victor
1	4.2	4.4	2	1	2	6
2	8.4	8.8	5	5	1	2
3	12.6	13.2	7	7	3	4
4	16.7	17.6	10	10	2	4
5	20.9	22.0	12	12	4	6
6	25.1	26.4	Check floor levelness			

5. Complete the following substeps to check magnet height:

NOTE
Measure height leveling relative to the 3 o'clock and 9 o'clock leveling markers at both ends of the body coil.

5.1. Make sure the projected laser line completely covers the primary target circle on the leveling target.

5.2. Make sure the horizontal laser line from the front laser level still aligns 1070 mm (42.13 inches) from the floor at the front of the magnet. Accuracy is critical here.

5.3. If necessary, put a folding ruler in position vertically near the front center of the magnet, and adjust the tripod height until the horizontal laser line aligns on the ruler 1070 mm (42.13 inches) from the floor (the magnet isocenter should be 1064 to 1076 mm). Compare the laser position to the targets inside the body coil.

5.4. Add leveling shims under the vibroacoustic damping mat at each magnet foot, per the 7.6 Adding leveling shims on page 92 procedure, to achieve the correct height based on the laser line positions and shim requirements shown below.

NOTE
If you need to open a second box of shims, check the floor levelness or contact Florence.

Table 7-4 Laser line shim requirements (height)

Laser line position	How far magnet foot needs to be raised (mm)	Number of 1.5 mm shims	Number of 0.5 mm shims
1	3.2	2	0
2	6.4	4	0
3	9.6	6	0

Table 7-4 Laser line shim requirements (height) (Table continued)

Laser line position	How far magnet foot needs to be raised (mm)	Number of 1.5 mm shims	Number of 0.5 mm shims
4	12.8	8	0
5	16.0	10	1
6	19.2	12	1

6. Some of the leveling markers may no longer fit in the primary target circle on the leveling target. **For acceptability, at least three of the four side leveling markers must be completely covered by the primary target circle. The remaining marker must have complete coverage in the secondary target circle. (For seismic installations, the markers in the 12 o'clock position are not used.)**
7. Test-fit the cryogen vent stack to make sure it aligns with the scan room vent pipe.
8. After the magnet is leveled, remove the six leveling markers.

7.8 Seismic mounting of a vibroacoustic damping mat to the floor

Installing GE HealthCare magnets in seismic regions is the customer's responsibility. This section provides the process of how to install magnets in seismic regions using GE HealthCare vibroacoustic mats. However, this is only one way to achieve seismic installation. The customer is required to make the decision as to how seismic regulations are met in the region based off the architect's recommendations.

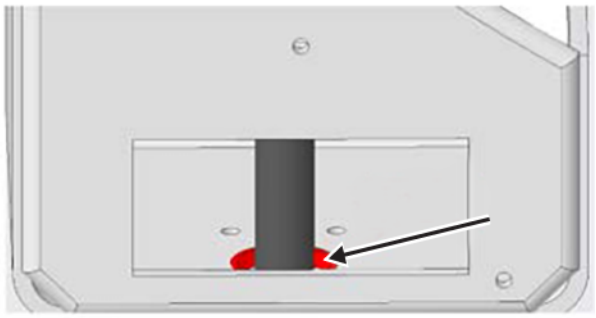
NOTE
Tasks in this section are to be done by riggers, not by GE HealthCare Service Personnel. The vibroacoustic mats used for seismic install must be installed over the seismic studs before moving the magnet into the magnet room.

NOTE
The sesimic kit does not include studs, washers, and nuts. It is the customer's responsibility to buy the correct studs, washers, and nuts for their region based off the architect's recommendation.

The following mounting depiction is one of many ways to install magnets seismically and by no means is the mandatory method. Follow these steps for each magnet foot.

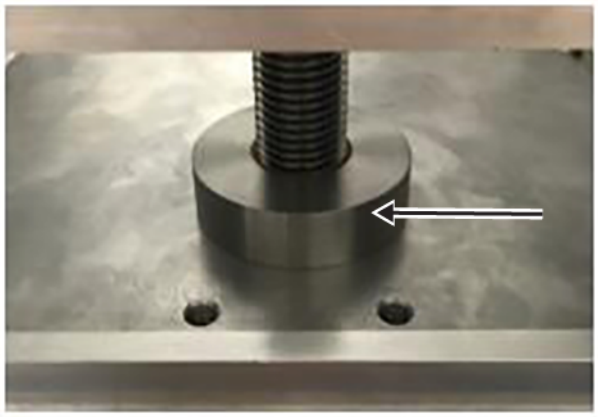
1. Install the rubber collar (5822743) from the Seismic Anchor Kit, Platform (M6001AH) on the inner diameter of the magnet foot.

Figure 7-15 Rubber collar on the magnet foot



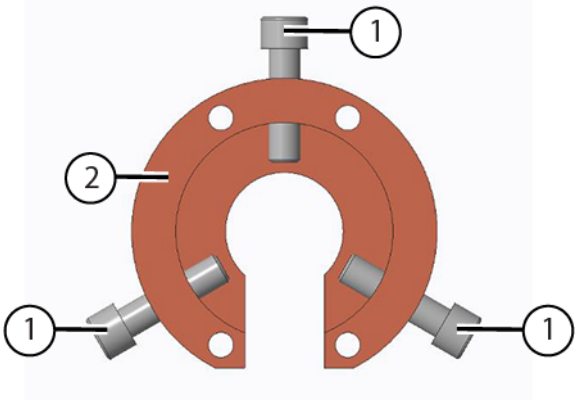
2. Put the stainless steel center ring (5817180) from the kit on the threaded seismic rod.

Figure 7-16 Center ring on a threaded seismic rod



3. Screw three of the M14 screws (1000-M14C050-31) from the kit into the stainless steel mounting plate (5817179) until the screws reaches the inner diameter of the plate, as shown below.

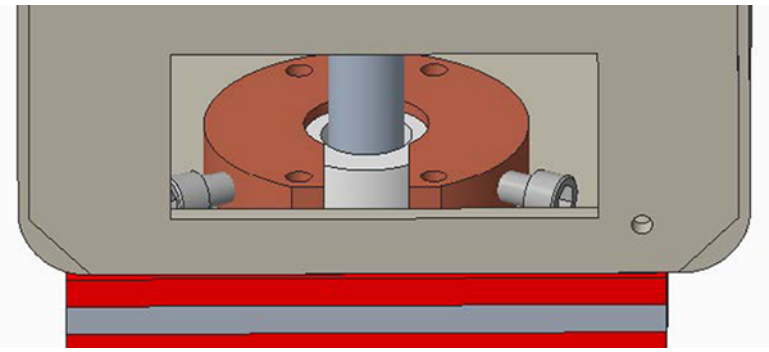
Figure 7-17 M14 screws installed in the mounting plate



1	M14 screws
2	Mounting plate

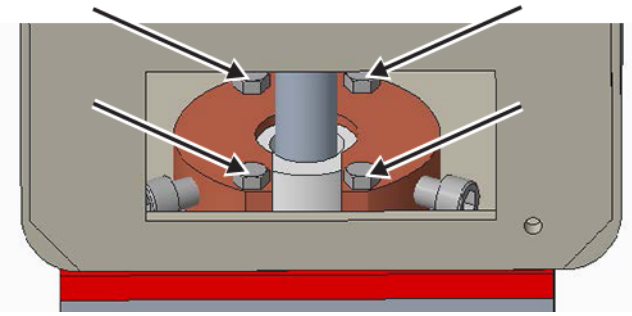
4. Put the mounting plate through the opening in the magnet foot, around the seismic rod and over the center ring, with the flush side of the plate pointed toward the ceiling. Make sure the flat edge of the mounting plate points toward the opening in the magnet foot.

Figure 7-18 Mounting plate around the seismic rod, over the center ring



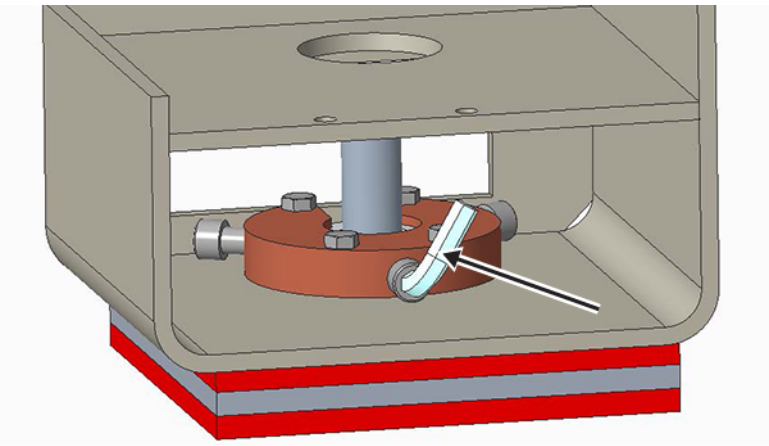
5. Screw four of the M10 screws (1000-M10C035-31) from the kit through the mounting bracket and engage the threads into the magnet foot. Using a ratchet or wrench, firmly tighten the M10 screws.

Figure 7-19 M10 screws



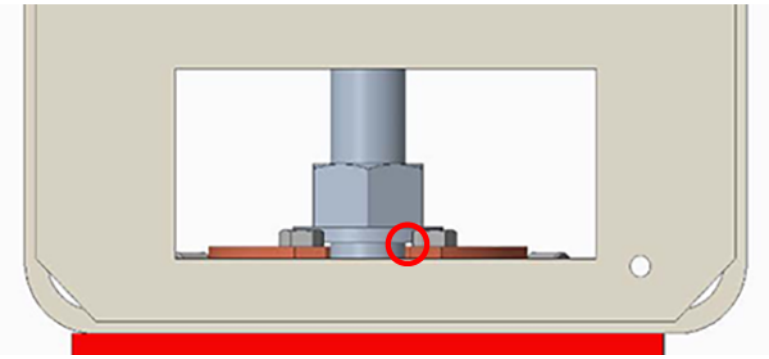
6. Hand-tighten the three M14 screws up to the center ring. If needed, use the hex tool (5822744) from the kit to help in tightening.

Figure 7-20 Using the hex tool to tighten M14 screws



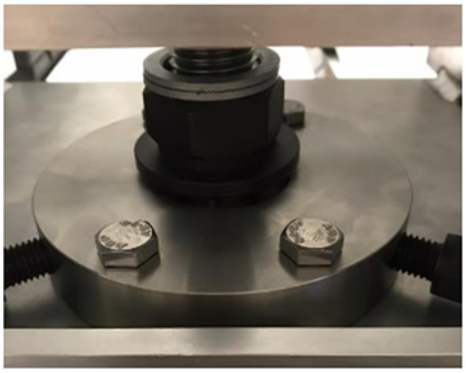
7. Put an appropriately sized flange nut on the seismic stud. Hand-tighten the flange nut toward the mounting plate; then back off one full turn to make sure there is a gap between the flange nut and the mounting plate.

Figure 7-21 Gap between flange nut and mounting plate



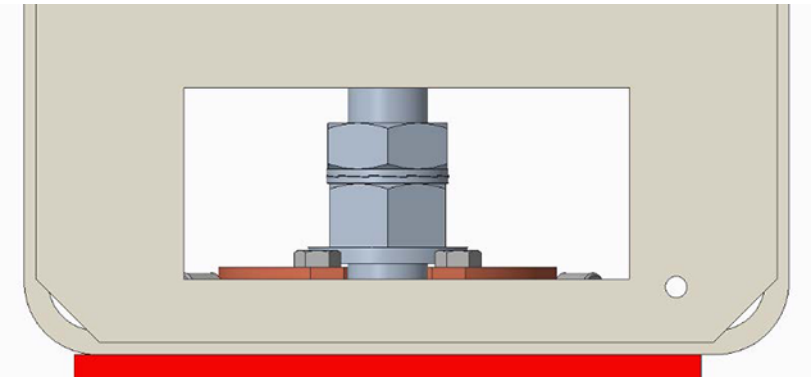
8. Put a Nord-Lock washer on top of the flange nut.

Figure 7-22 Nord-Lock washer on flange nut



9. Put a jam nut on top of the Nord-Lock washer and hand-tighten.

Figure 7-23 Jam nut on Nord-Lock washer



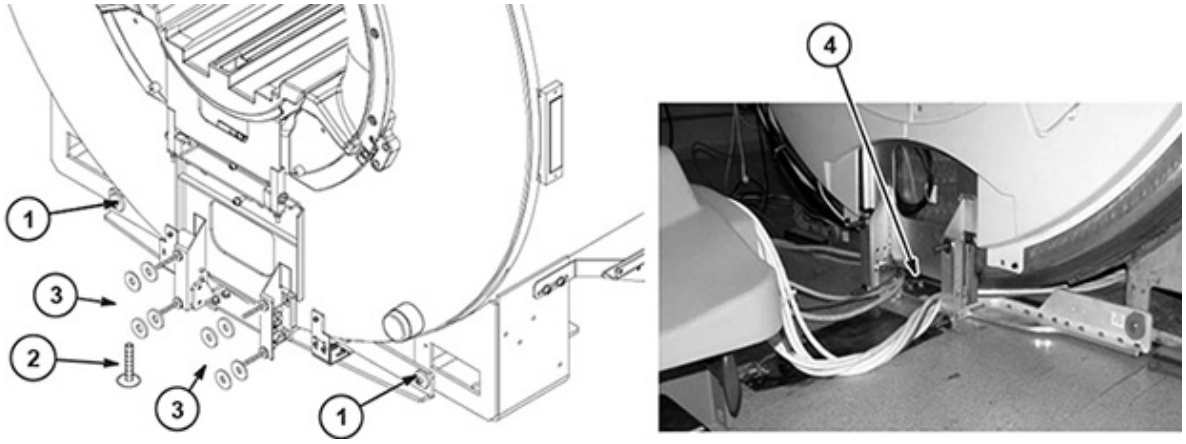
10. Using two wrenches, tighten the jam nut while keeping the flange nut in position. Make sure there is still a gap between the flange nut and the mounting plate.

Chapter 8 Centering the table dock bolt for a PM series magnet

(For SIGNA Artist) Replacement parts			
Item	**Quantity**	**Part number**	**Manufacturer**
M10 x 20 Socket Head Screw	4	1000-M10C020-33	-
M10 Stainless Steel Washers	4	2000-M10-17	-
M10 x 25 Socket Head Cap Screws	2	1000-M10C025-33	-
M10 Flat Side Washers	2	5372304	-

1. **(For SIGNA Artist)** Make sure the bridge support magnet mount assembly is securely attached to the magnet feet.

Figure 8-1 Installing the bridge support magnet mount assembly



1	M10 x 25 Socket Head Cap Screws (1000-M10C025-33)
2	M10 x 20 Socket Head Screw (1000-M10C020-33)
3	M10 Stainless Steel Washers (2000-M10-17)
4	Bridge Support Magnet Mount Assembly (5337932-2)

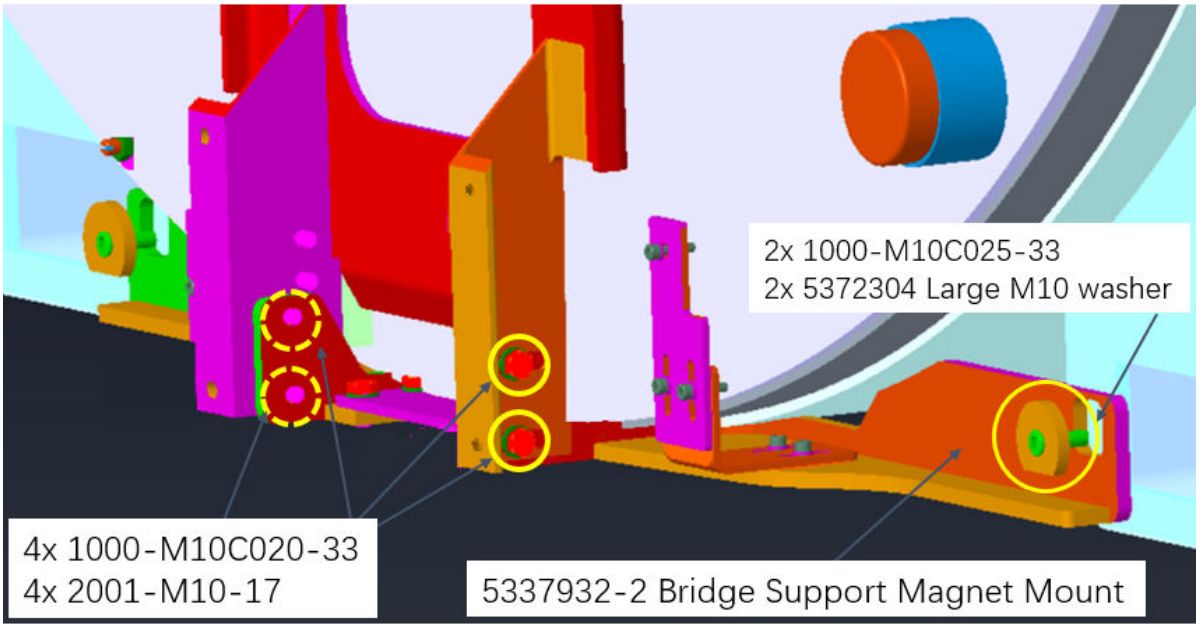
1.1. Attach the bridge support magnet mount assembly to the bridge lower support using the four M10 x 20 socket head screws and stainless steel washers.

1.2. Attach the assembly to the magnet feet with the two M10 x 25 socket head cap screws and flat side washers.

NOTICE

Make sure that the bottom surface of the bridge support magnet mount assembly bracket, only by the magnet feet, does not come in contact with the magnet room floor (recommend a 2 mm minimum clearance).

Figure 8-2 Installing the bridge support magnet mount assembly



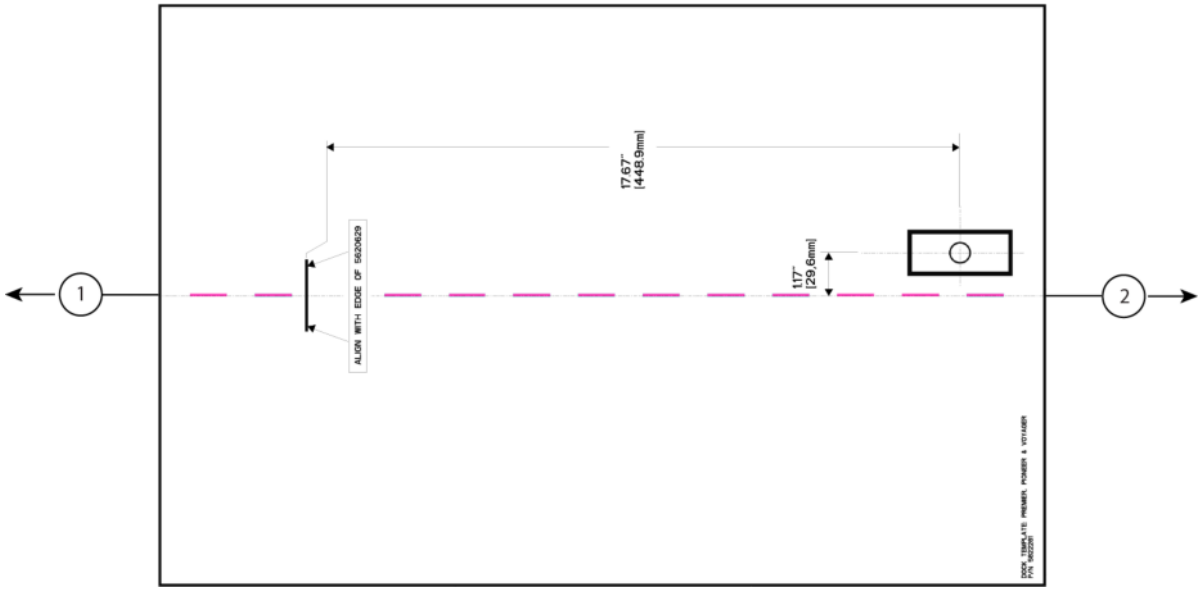
2. Put the appropriate *Dock Station (Detachable) and Fixed Table Positioning Template* on the floor in front of the magnet, following the instructions on the template (for example, for 5822261, put the template below the cable retention bracket).

NOTE
The *Dock Station (Detachable) and Fixed Table Positioning Template* ships with the magnet.

Table 8-1 Dock bolt positioning templates

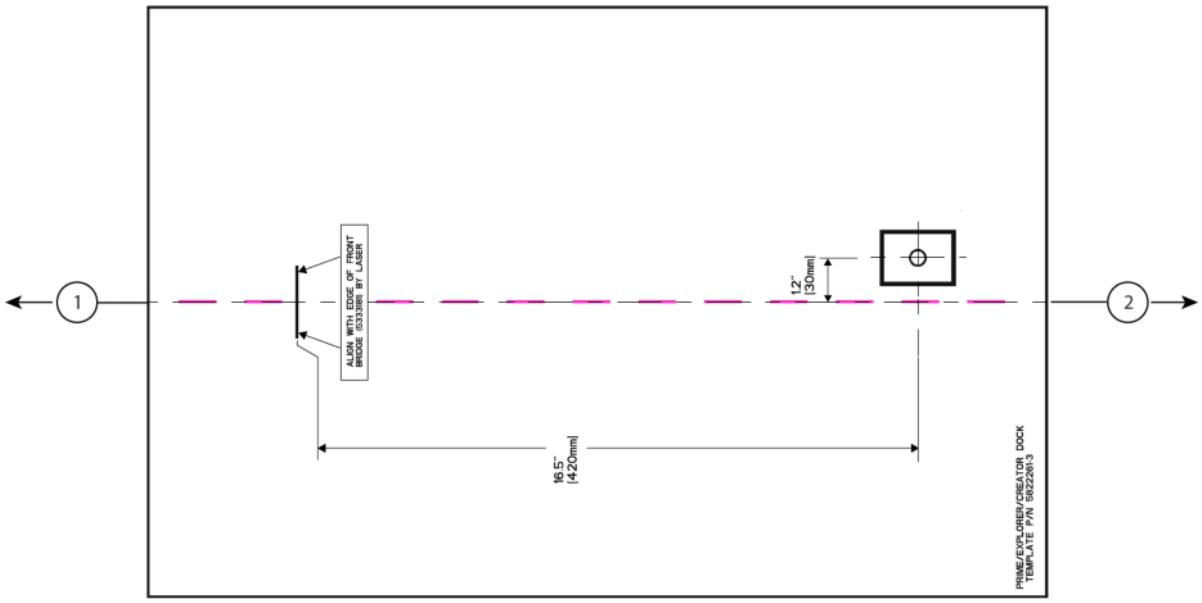
Product system	Template
SIGNA Voyager	5822261
SIGNA Sprint	
SIGNA Prime	5822261-3
SIGNA Victor	
SIGNA Champion	
SIGNA Artist	5822261-7 (formerly 5822261-4)

Figure 8-3 Dock bolt positioning template (SIGNA Voyager and SIGNA Sprint: 5822261)



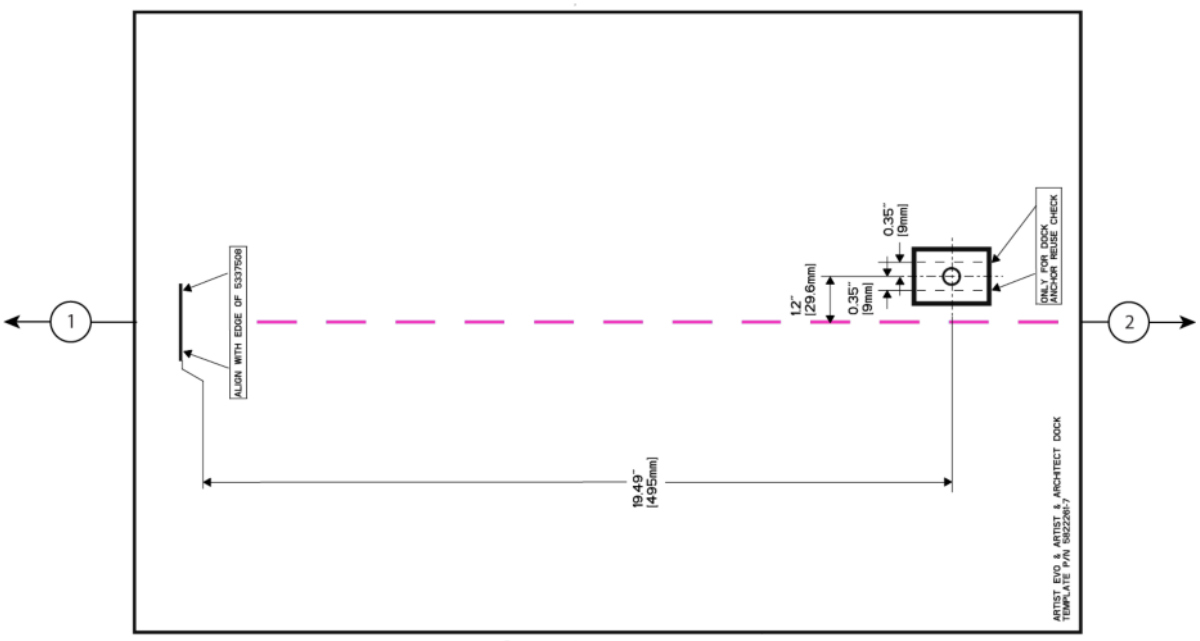
1	Toward the magnet
2	Away from the magnet

Figure 8-4 Dock bolt positioning template (SIGNA Prime, SIGNA Victor, and SIGNA Champion: 5822261-3)



1	Toward the magnet
2	Away from the magnet

Figure 8-5 Dock bolt positioning template (SIGNA Artist: 5822261-7)



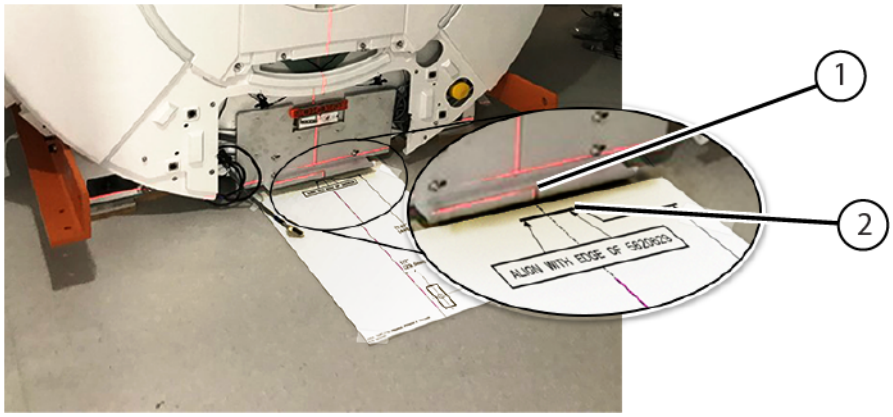
1	Toward the magnet
2	Away from the magnet

3. Align the lateral (x-dir) line of the positioning template as indicated on the template.

Table 8-2 Dock bolt positioning template alignment

Template	Alignment instruction
5822261	Use a straight edge to align with the leading edge of the cable retention bracket.
5822261-3	Use the second laser in the kit to align with the edge of the front bridge. **NOTE** **(For SIGNA Champion)** If the system does not have a bridge, align the positioning template with the edge of the front end-bell.
5822261-7	Use the second laser in the kit to align with the front edge of the plate base tie.

Figure 8-6 Aligning positioning template 5822261 with the cable retention bracket



1	Cable retention bracket leading edge
2	Lateral (x-dir) line of positioning template

Figure 8-7 (For SIGNA Champion) Aligning positioning template 5822261-3 with the edge of the front endbell

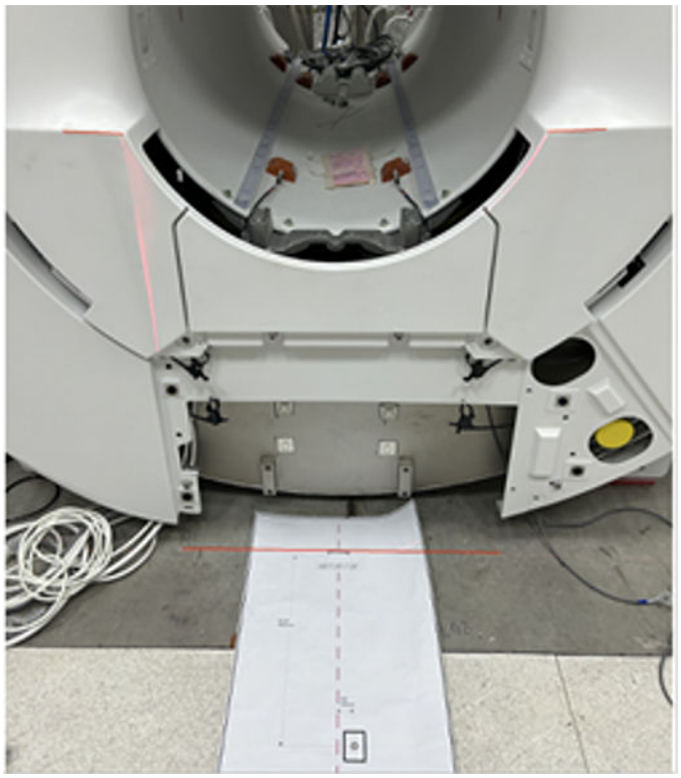
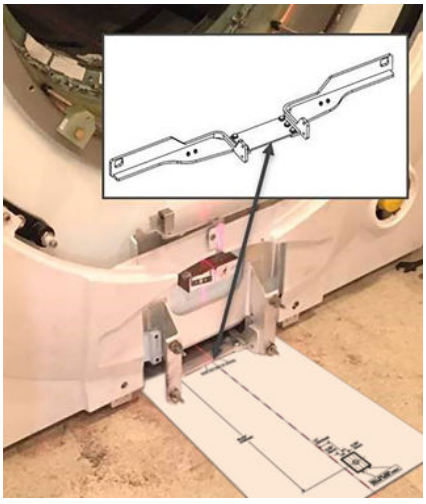


Figure 8-8 Aligning positioning template 5822261-3 with the edge of the front bridge

Figure 8-9 Aligning positioning template 5822261-7 with the front edge of the plate base tie



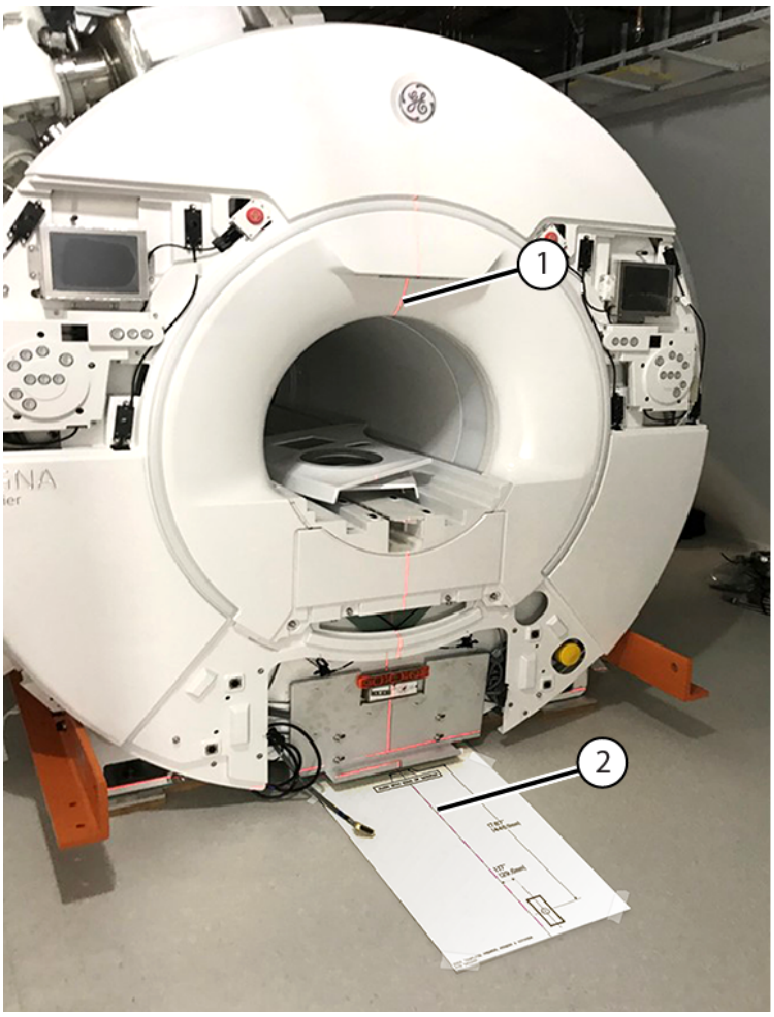
4. Adjust the laser level until the vertical laser line passes through the primary target circle on the 12 o'clock leveling markers at both ends of the body coil.

NOTE
For SIGNA Voyager, do not assume the vertical line marked on the cable retention bracket is centered.

5. Use the laser line to align the longitudinal (z-dir) center line of the positioning template (dashed fuchsia line) with the magnet geometric isocenter (primary targets on the leveling markers).

NOTE
The front edge aligned in Step 3 should be on the same plane as the line on the template.

Figure 8-10 Aligning positioning template 5822261 with the primary targets on leveling markers



1	Laser line aligned with 12 o'clock leveling markers
2	Positioning template longitudinal (z-dir) axis

NOTE
While this figure shows template 5822261, its placement in the figure is representative of the placement of any PM series template.

6. Use tape to secure the positioning template to the floor.
7. Drill the dock anchoring hole using the prescribed marking on the positioning template for guidance.

NOTE
For details about dock anchor construction requirements, refer to the *RF Shielded Room Preinstallation Requirements for MR Systems* (5850260-1EN).

Appendix A Volumetric conversion of Magnet Monitor cryogen percentage to liquid helium level

Level (%)	Liquid helium (liters)	Level (%)	Liquid helium (liters)	Level (%)	Liquid helium (liters)	Level (%)	Liquid helium (liters)	Level (%)	Liquid helium (liters)	Level (%)	Liquid helium (liters)
0	0	17	569	34	984	51	1293	68	1603	85	1880
1	126	18	598	35	1004	52	1311	69	1621	86	1893
2	146	19	626	36	1024	53	1329	70	1640	87	1905
3	168	20	654	37	1043	54	1347	71	1658	88	1918
4	192	21	681	38	1062	55	1365	72	1675	89	1930
5	218	22	708	39	1080	56	1383	73	1693	90	1942
6	245	23	734	40	1099	57	1401	74	1710	91	1953
7	273	24	760	41	1117	58	1419	75	1727	92	1965
8	301	25	785	42	1135	59	1437	76	1744	93	1976
9	330	26	809	43	1152	60	1456	77	1761	94	1987
10	360	27	833	44	1170	61	1474	78	1777	95	1998
11	390	28	856	45	1188	62	1492	79	1793	96	2010
12	420	29	879	46	1205	63	1511	80	1808	97	2021
13	450	30	901	47	1223	64	1529	81	1823	98	2033
14	480	31	922	48	1240	65	1548	82	1838	99*	2046
15	510	32	944	49	1258	66	1566	83	1852	100*	2059
16	540	33	964	50	1276	67	1585	84	1866		

*Level sensor or Magnet Monitor cannot get readings above 100% or 2059 liters. **Please do not fill the magnet above 98% or 2033 liters for any reason.**

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Appendix B *Preinstallation Manual* reference

NOTE

The table below contains a selection of manuals for product systems with a PM series magnet. It is not an exhaustive list.

Description	Direction or part number
SIGNA™ Prime Preinstallation Manual	5538858-1EN
SIGNA™ Artist 1.5T (Platform Cooling Cabinet Configuration with ICC/pICC) Preinstallation Manual	5670001
SIGNA™ Voyager/SIGNA™ Voyager AIR Preinstallation Manual	5680008-1EN
SIGNA™ Victor / SIGNA™ Star AIR / SIGNA™ Aviator AIR Preinstallation Manual	5917976-8EN
SIGNA™ Artist, Optima MR450w 1.5T (Legacy Cooling Cabinet Configuration with HEC) Preinstallation Manual	5936619-1EN
SIGNA™ Champion / SIGNA™ Winner Preinstallation Manual	5941081-8EN
SIGNA™ Sprint Preinstallation Manual	5982837-8EN

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Revision history

Revision	Date	Description
Controlled document for English is posted as DOC2452726.		

Revision	Date	Description
5	August 2025	• In Chapter 1 Getting started: ◦ Section *1.1 Overview*, *Table 1-1 Magnet handling functions and responsibilities*: updated *Magnet and Cryogen Manual for Platform Magnets* to *Magnet and Cryogen Manual for 1.5T PM Series Magnets*, and updated manual part number from 5796143-4EN to 5968610-8EN. ◦ Section *1.4 Predelivery instructions*, step 1: added new sub-step 1.8 to review the *Rigging* section ◦ Added new section *1.5 Rigging*. • In Chapter 3 Magnet storage conditions, pending ramp, section *3.3 Monitoring the magnet*, substep 3.2, Note: ◦ Added the words "in order" to "Magnet Monitor 4 (MM4) can also be set to Storage mode by doing the following in order". ◦ Changed the substeps in the Note to a bulleted list. • In Chapter 4 Doing in-transit service and magnet system checks, sections *4.1 Preparing to do an in-transit helium refill* and *4.2 Doing a magnet system check*: updated *Magnet and Cryogen Manual for Platform Magnets* to *Magnet and Cryogen Manual for 1.5T PM Series Magnets*, and updated manual part number from 5796143-4EN to 5968610-8EN. • Chapter 5 Preparing the scan room, section *5.1 Preparing the scan room for leveling a PM series magnet*: ◦ Added *Figure 5-1 Isocenter location and z-axis vector, SIGNA Sprint*. ◦ Added *Figure 5-5 Isocenter location and vent pipe location, SIGNA Sprint*. ◦ Steps 9 and 13: changed "site" to "sight". • In Chapter 6 Installing a nonseismic vibroacoustic damping mat and leveling the magnet: ◦ Section *6.1 Equipment overview*, *Tools and test equipment* table, item *Magnet Leveling Shim Kit* (5819317): changed quantity from 1 to 2. ◦ Section *6.3 Preparing to move the magnet*, step 5: • Added the Note "Dimensions referenced are worst-case scenarios". • *Figure 6-4 Clearance dimensions, magnet patient end as-shipped condition*: • Renamed the first column to "Maximum dimension". • Deleted the "SIGNA Prime", "SIGNA Victor", "SIGNA Champion" column. • Renamed the "SIGNA Artist, SIGNA Voyager" column to "PM series magnet". • *Figure 6-5 Clearance dimensions, magnet service side as-shipped condition*: • Renamed the first column to "Maximum dimension". • Deleted the "SIGNA Champion", and "SIGNA Prime" "SIGNA Victor", columns. • Renamed the "SIGNA Artist, SIGNA Voyager" column to "PM series magnet".

Revision	Date	Description
		• Updated the D entry dimension to "2151 mm (84.69 inches)". • Added the following statement: "The actual dimension could be less than or equal to the maximum dimension. Refer to the appropriate Preinstallation Manual (see *Preinstallation Manual reference*). Only dimensions B and D are variable based on system type." ◦ Section *6.8 Leveling a PM series magnet*: added "SIGNA Sprint" to *Table 6-2 Laser line shim requirements (front-to-back)* and *Table 6-3 Laser line shim requirements (left-to-right)*. • In Chapter 7 Installing a seismic vibroacoustic damping mat and leveling the magnet: ◦ Section *7.1 Equipment overview*, *Tools and test equipment* table, item *Magnet Leveling Shim Kit* (5819317): changed quantity from 1 to 2. ◦ Section *7.3 Preparing to move the magnet*, step 5: • Added the Note "Dimensions referenced are worst-case scenarios". • *Figure 7-6 Clearance dimensions, magnet patient end as-shipped condition*: • Renamed the first column to "Maximum dimension". • Deleted the "SIGNA Prime", "SIGNA Victor", "SIGNA Champion" column. • Renamed the "SIGNA Artist, SIGNA Voyager" column to "PM series magnet". • *Figure 7-7 Clearance dimensions, magnet service side as-shipped condition*: • Renamed the first column to "Maximum dimension". • Deleted the "SIGNA Champion", and "SIGNA Prime" "SIGNA Victor", columns. • Renamed the "SIGNA Artist, SIGNA Voyager" column to "PM series magnet". • Updated the D entry dimension to "2151 mm (84.69 inches)". • Added the following statement: "The actual dimension could be less than or equal to the maximum dimension. Refer to the appropriate Preinstallation Manual (see *Preinstallation Manual reference*). Only dimensions B and D are variable based on system type." ◦ Section *7.7 Leveling a PM series magnet*: added "SIGNA Sprint" to *Table 7-2 Laser line shim requirements (front-to-back)* and *Table 7-3 Laser line shim requirements (left-to-right)*. • In Chapter 8 Centering the table dock bolt for a PM series magnet, step 2: added "SIGNA Sprint" to *Table 8-1 Dock bolt positioning templates* and to the title *Figure 8-3 Dock bolt positioning template (SIGNA Voyager and SIGNA Sprint: 5822261)*. • In Appendix B, *Preinstallation Manual* reference: added *SIGNA™ Sprint Preinstallation Manual* (5982837-8EN).

Revision	Date	Description
4	June 2024	• Added a Language Policy. • Updated all GE references to GE HealthCare. • Changed all instances of the verb form *position* to *put*. • In section 2.6, Removing the shipping cage, added step 4. • In section 2.7, Removing the shipping crate, added step 16. • In section 2.9, Unloading the uncrated magnet with a crane to ground, added a Note in step 2 to make sure the cable bridles/slings do not touch the magnet covers. • In section 2.10, Lifting the magnet with a crane through the opening in the exterior wall, added a Note in step 2 to make sure the cable bridles/slings do not touch the magnet covers. • Section 3.1, Connecting the magnet to the compressor: ◦ Updated Figure 3-2 Using two wrenches to tighten a connection. ◦ Updated Figure 3-3 Coldhead compressor connections. ◦ Added a Note to step 5 to not put any bending force on Aeroquip fittings while connecting/disconnecting helium flexlines. • In section 3.2, Connecting the magnet monitoring connections, updated the title of Figure 3-6 from *Typical instrumentation box ports* to *Typical instrumentation connector assembly ports*. • In section 4.2, Doing a magnet system check, removed the Note (*Because of the higher boil-off and helium gas flow through the vertical penetration on all shipments, some frost on the vertical penetration may be normal during periods when the coldhead has been shut off.*) from step 4. • In section 5.1, Preparing the scan room for leveling a PM series magnet, updated the title for Figure 5-2 and Figure 5-5 to include SIGNA Victor and SIGNA Champion. • Sections 6.3 and 7.3, Preparing to move the magnet: ◦ Added a Warning about lifting rail hardware to the Note about removing the lifting rails and bubble wrap. ◦ In step 5, added clearance dimension values for SIGNA Champion and SIGNA Victor. ◦ In step 5, consolidated the SIGNA Artist and SIGNA Voyager clearance dimension columns, since the values are the same. ◦ In step 5, updated the clearance dimension value C for all systems. • Sections 6.8 and 7.7, Leveling a PM series magnet: ◦ Added a Note after steps 3.2, 4.2, and 5.4. ◦ Updated the *Laser line shim requirements (front-to-back)* table (tables 6-2 and 7-2) to include SIGNA Victor and SIGNA Champion. ◦ Updated the *Laser line shim requirements (left-to-right)* table (tables 6-3 and 7-3) to include SIGNA Victor and SIGNA Champion. ◦ In step 5.3, changed *1070 ± 6 mm* to *1064 to 1076 mm*. ◦ Added step 8. • Chapter 8, Centering the table dock bolt for a PM series magnet: ◦ In step 1, changed *magnet legs* to *magnet feet*.

Revision	Date	Description
		◦ In step 2: • *Detachable* was added to the template name to clarify the term *Dock Station*. • Added a Note. • Updated *Table 8-1 Dock bolt positioning templates* to include SIGNA Victor and SIGNA Champion. • Updated the title for Figure 8-4 to include SIGNA Victor and SIGNA Champion. • In Table 8-2 Dock bolt positioning template alignment, for the 5822261-3 template, added a Note related to SIGNA Champion alignment. • Added *Figure 8-7 (For SIGNA Champion) Aligning positioning template 5822261-3 with the edge of the front endbell*. • In Appendix B, *Preinstallation Manual* reference: ◦ Updated the title for 5670001. ◦ Added 5936619-1EN, 5917976-8EN, and 5941081-8EN.

Revision	Date	Description
3	February 2023	• The Revision History was moved to the end of the manual. • Updated all dimensions to show metric first. • Modified some word choices and number formats to match style. • The phrase "Part Number" was removed from the cover page. • The Language Policy was removed. • In section 1.3, Truck loading specifications: ◦ The required condition about the maximum of two magnets per trailer was updated to include AR configurations. ◦ In Table 1-2 Magnet loading specifications, changed the maximum shock load label from "Gs" to "g". • The following changes were made to Chapter 2, Unloading and moving the magnet, to reflect CAPA-00013781: ◦ In section 2.1, Shipping and crate configurations, the Safety table now includes a caution requiring two people to lift the magnet lifting rails and a warning against using damaged mounting hardware. ◦ In section 2.7, Removing the shipping crate, added step 15, a procedure about examining witness marks before lifting with the orange rails. A note referring to this new step was added in the following locations: • Section 2.8, Unloading and moving the uncrated magnet with a forklift, before step 1. • Section 2.9, Unloading the uncrated magnet with a crane to ground, before step 3. • Section 2.10, Lifting the magnet with a crane through the opening in the exterior wall, before step 4. • In section 2.1, Shipping and crate configurations: ◦ In the Safety table, "(if used)" was added after two "spreader beam" references. ◦ For the Domestic Shipping Crate (5151624), changed "Not approved for flight usage." to "Not approved for flight or ocean usage." For the Platform International Shipping Crate (5806856), changed "Approved for use on truck or air transportation." to "Approved for use on truck, ocean, or air transportation." • In section 2.2, Equipment requirements: ◦ In the table *Crane requirements**, the "Crate weight only" was updated from 680 kg (1,500 lbs) to 751 kg (1654 lbs). ◦ In the table *Crane requirements**, "(if used)" was added after "Spreader beam quantity". ◦ In the table *Miscellaneous equipment and tools*, the Magnet Leveling Kit (46-260888G4) was replaced with the Magnet Leveling Shim Kit (5819317). • In section 2.4, Handling the crated magnet in transit with a crane, added the statement "Using a crane requires clear access to the orange lifting beams, which are not accessible while the magnet is inside the crate." • In section 2.5, Handling the crated magnet in transit with a forklift, the note in step 3 was updated to state "Magnet lift must be perpendicular to magnet bore." Previously it said "parallel."

Revision	Date	Description
		• The notice in section 2.6, Removing the shipping cage, about improper removal of the shipping cage had incorrect language referencing the crate. To fix this, the following changes were made: ◦ The notice, as is, was added to section 2.7, Removing the shipping crate, and the first and only instance of "cage" was changed to "crate". ◦ In section 2.6, the last two points were removed, as they only apply to the crate, and the remaining instances of "crate" were changed to "cage". • In section 2.6, Removing the shipping cage: ◦ Updated callout 3 in the second notice from "Crate" to "Cage". ◦ Added steps 1 and 2 about removing the tarp, unstrapping the cage, and unchaining the magnet. • In section 2.7, Removing the shipping crate, added a note to step 7 to clarify that the use of the spreader beam shown in the figure is optional. • In section 2.9, Unloading the uncrated magnet with a crane to ground: ◦ Added an equipment damage notice to the Safety table about improper crane transportation. ◦ Added a note about rigger responsibilities after the Safety table. ◦ Updated step 2. Changed "spreader beam" to "spreader beam (if used)"; added a sentence about what to do if a spreader beam is not used; added a note about spreader beam alignment; and added a figure showing the crane lift configuration. • Added section 2.10, Lifting the magnet with a crane through the opening in the exterior wall. • In section 3.1, Connecting the magnet to the compressor, the following changes were made: ◦ Added an electric shock warning that includes LOTO to the Safety table. ◦ Replaced the class M Sumitomo vendor manuals in the equipment damage notice (CD32ZZ-272, CD32ZZ-420, CD32ZZ-501, CD32ZZ-530, CD32ZZ-543) with class A Sumitomo vendor manuals (CD32ZZ-227, CD33ZZ-073, CD33ZZ-080). ◦ Added step 3, "Connect the cooling water for the compressor (or do a check of the connection, if already connected)." ◦ Removed step 4 (Make sure that the default coldhead frequency is 60 Hz. FE or warehouse staff must not change this.), since the default frequency is not editable. ◦ In step 4, corrected a typo. Changed "model" to "mode". ◦ Added substep 6.d, "Do a check for warnings or alarms." ◦ For the figure *F50SH compressor unit, front view*, updated callout 13 to reference MM4 instead of MM3. • In section 3.2, Connecting the magnet monitoring connections, the following changes were made: ◦ Added step 1 and the preceding paragraph to make sure cables are not damaged.

Revision	Date	Description
		◦ Added step 2, "Connect Cable, Run 850 MON J-2 to Compressor RS232 (5807125) from the Magnet Monitor to the compressor." ◦ In step 3, removed the phrase "as shown below" since the associated figure is showing a part and not the entirety of the step. ◦ The note "The V3 valve must be reopened before the magnet resumes shipping." was added to step 5. • In section 3.3, Monitoring the magnet: ◦ The listed conditions in step 3 were updated. ◦ Added a note about Magnet Monitor 4 Storage mode to step 3b. • In section 4.1, Preparing to do an in-transit helium refill, the following changes were made: ◦ The Notice was updated to include the following statement, per Service Note DOC2355412: "Before you continue with an in-transit helium fill, make sure that the shipping crate is removed from the magnet." ◦ Removed the text "In-transit helium refill is done based upon the magnet shipping date per the documents stated in the notice above. Access the plumbing through the access panels identified in the illustration below." and the *Crate access panels* figure. This information is not necessary to handle the magnet in transit. ◦ The figure title "Plumbing assembly, V3 valve in the closed position" was updated to state "open position," and the image was updated to show the V3 valve in the open position. • In Chapter 5, Preparing the scan room, the "equipment damage risk" notice was removed. • In section 5.1, Preparing the scan room for leveling a PM series magnet, the following changes were made: ◦ In step 1, the figures *Isocenter location and z-axis vector* and *Isocenter location and vent pipe location* were updated to match the *Preinstallation Manual*. ◦ Steps 5 and 10 were updated to include an image of the laser in self-leveling mode. ◦ Step 9 was updated to have the same verbiage as step 13. ◦ In step 12, the figure *Laser line in the center of the cryogen plenum rib* was updated to better show the plumbing that is in front of the laser line location. ◦ In step 15, the phrase "vibroacoustic damping mat" was updated to "type of installation." The heading in the table was also updated from "Vibroacoustic mat type" to "Installation type." • In Chapter 6, removed the following sentence from the "equipment damage risk" notice, since this chapter does not apply to seismic installations: "The vibroacoustic damping mats used for seismic install must be installed over the seismic studs before moving the magnet into the magnet room."

Revision	Date	Description
		• In sections 6.1 and 7.1, Equipment overview, the following changes were made: ◦ The Magnet Leveling Kit (46-260888G4) was replaced with the Magnet Leveling Shim Kit (5819317) in the tools table. ◦ The hammer and wood driving block were removed from the tools table. ◦ The Magnet Leveling Kit (46-260888G4) table was replaced with the Magnet Leveling Shim Kit (5819317) table. • In sections 6.3 and 7.3, Preparing to move the magnet, the clearance dimensions were updated. Significant digits in the clearance dimensions were also updated for consistency to two decimal places for inches and whole numbers for millimeters. • In section 6.5, Centering a PM series magnet in the MR suite: ◦ Step 3 was updated to include an image of the laser in self-leveling mode. ◦ In step 6, the figure *Laser line in the center of the cryogen plenum rib* was updated to better show the plumbing that is in front of the laser line location. • In section 6.6, Lowering the magnet into position: ◦ The following step was added after step 4: "Put the vibroacoustic mats below the magnet feet." ◦ In step 9, changed "...until all feet are on the floor." to "until all feet are on the vibroacoustic mats." • In sections 6.7 and 7.6, Adding leveling shims, the figure title in step 3 was updated from "Shim arrangement for gap fill" to "Shim arrangement," and the image was updated to no longer show shim edges and tape, as the shim pieces should not be sticking out since they match the size of the foot. • In sections 6.8 and 7.7, Leveling a PM series magnet, the following changes were made: ◦ Step 1 was updated to include an image of the laser in self-leveling mode. ◦ Steps 3b, 4b, and 5d were updated from stating "Add leveling shims under each magnet foot..." to "Add leveling shims under the vibroacoustic damping mat at each magnet foot..." ◦ The following tables were updated to include laser line shim requirements specific to each product system: • Laser line shim requirements (front-to-back) • Laser line shim requirements (left-to-right) ◦ In all three laser line shim requirement tables, the large shim size was changed from 1.57 mm to 1.5 mm, and the small shim size was changed from 0.51 mm to 0.5 mm. The terms "large" and "small" were also removed from the column headers. ◦ The step 6 acceptability statement was updated from "four of the six leveling markers" to "three of the four side leveling markers" and an additional statement "For seismic installations, the markers in the 12 o'clock position are not used." was added. • Removed sections 6.9 and 7.8, Securing the shim material. The shim pieces should not be sticking out since they match the size of the foot.

Revision	Date	Description
		• In section 7.1, Equipment overview, the Seismic Anchor Kit, Platform (M6001AH) was added to the tools table, and a separate table listing what is included in the kit was also added. • In section 7.2, Positioning a seismic mounted vibroacoustic damping mat, step 2 was updated to include the height requirement of the seismic rods. • In section 7.5, Lowering the magnet into position, simplified step 3 to read "align centered ± 3 mm (± 0.125 inches) over the seismic anchor holes in the vibroacoustic mats." • In section 7.7, Leveling a PM series magnet, the step 6 acceptability statement was updated from "four of the six leveling markers" to "three of the four side leveling markers" and an additional statement "For seismic installations, the markers in the 12 o'clock position are not used." was added. • The steps in section 7.8, Seismic mounting of a vibroacoustic damping mat to the floor, were updated to reflect using the equipment in the Seismic Anchor Kit, Platform (M6001AH). The second note was also updated to be more clear about what the seismic kit does not include. • Added Chapter 8, Centering the table dock bolt for a PM series magnet. • In Appendix A, Volumetric conversion of Magnet Monitor cryogen percentage to liquid helium level, the liquid helium liters at 0% was updated from 108 to 0. • Appendix B, Preinstallation Manual reference, was updated to only list manuals for systems with PM series magnets, and with a note to clarify that the table does not contain an exhaustive list of all product systems.
2	20 November 2019	• In step 7.b of section 3.1, Connecting the magnet to the compressor, the acronym LOTO was replaced with "lockout/tagout (LOTO)". • In sections 6.3 and 7.3, Preparing to move the magnet, the clearance dimension figures were updated. • In step 4 of sections 6.8 and 7.7, Leveling a PM series magnet, the note was updated to measure left-to-right leveling relative to the 3 and 9 o'clock leveling markers (not the 12 o'clock markers as previously stated).

Revision	Date	Description
1	8 October 2019	Initial release. Previously a preliminary release for internal use was routed in MyWorkshop as 5807458. • Document format updated to reflect SIMS standards. • Cross-references replaced any textual references to chapters or sections. • All references to VibroAcoustic were updated to vibroacoustic; all references to vibromat were updated to vibroacoustic damping mat. • The part number associated with all references to the *Magnet and Cryogen Manual for Platform Magnets* was updated from 5796143 or 5796143TPH to 5796143-4EN. • Chapter 1, Damage in Transportation, was renamed to section 1.2, Examining packages for damage in transportation; the introductory text was updated and step 3 added to reflect the same language now used in all installation and upgrade manuals moving forward. • Chapter 2, Safety Alert Usage, was replaced with the updated Safety table in section 1.1, Overview. • Chapter 3, Overview, was renamed to Chapter 1, Getting started. ◦ Paragraphs two and three were moved after Table 1 for better flow. ◦ Paragraph three was updated to reflect the replacement of the support documentation library with SIMS Content Viewer. ◦ Cross-references to appropriate chapters and sections were added to Table 1, where applicable. ◦ Function 5, Prepare the Scan Room, was added to Table 1 to account for new magnet leveling procedures. • Chapter 4, Truck Loading Specs, was renamed to section 1.3, Truck loading specifications. ◦ The Caution and Notice were formatted correctly into a single Notice. ◦ The Shipping Capability in Table 2, Magnet loading specifications, was replaced with Shipping temperature. ◦ The content in Note 1 was moved to the Allowable shipping modes column in Table 2, Magnet loading specifications. ◦ Notes 2, 3, and 4 were moved to the Required Conditions table; the content of Note 3 was paired with Figure 1 and 2, and updated to include configurations with the other magnet series. • Chapter 5, Pre-Delivery Instructions, was renamed to section 1.4, Predelivery instructions. ◦ The Notice was formatted correctly and split into two Notices. ◦ Cross-references to the new Preinstallation Manual (PIM) appendix were added to steps that referenced the PIM. • Chapter 6, Magnet Unloading and Movement, was renamed to Chapter 2, Unloading and moving the magnet, and the first Warning was changed to a Danger. • Table 5, Miscellaneous equipment and tools ◦ The phrase "must be specked" was replaced with "must be able".

Revision	Date	Description
		◦ The levels were removed, since they are not used to level PM series magnets. ◦ The PH Alignment and Magnet Leveling Kit (5897979) was added to use with leveling of PM series magnets. • In section 2.7, Removing the shipping crate, steps 1 and 2 were added. Step 14 (formerly step 6.7.4.a) was updated to include Figure 9, Unbolting the magnet from a shipping pallet. • Chapter 7, Magnet Storage Conditions, was renamed to Chapter 3, Magnet storage conditions, pending ramp. • In step 3 of section 3.2, Connecting the magnet monitoring connections (formerly step 7.2.3), the reference to the 16 PSIA valve was updated to 15.7 PSIA. • References to MM4 were removed from section 3.3, Monitoring the magnet (formerly section 7.3, Magnet Monitoring), so the content is more generic and can be reused in other series versions of the manual. • Chapter 8, In-Transit Service & Magnet System Checks, was renamed to Chapter 4, Doing in-transit service and magnet system checks. • In section 4.1, Preparing to do an in-transit helium refill: ◦ A sentence, "The images below show in-transit plumbing configuration examples." and Note were added before the many plumbing images, for clarification. ◦ The reference in Figure 22 to the 16 PSIA valve was updated to 15.7 PSIA. • Chapter 5, Preparing the scan room, was added. ◦ Steps 9.1.3, 9.1.4, and 9.1.5 were moved to this chapter. ◦ The Notice and Note at the beginning of former Chapter 9, VibroAcoustic Damping Mat Placement, were moved to this chapter. ◦ Section 5.1, Preparing the scan room for leveling a PM series magnet, was added to describe how to put the positioning template into position, set up lasers, and mark the room for reference. • Chapters 9, Platform Vibromat Placement; 10, Moving Magnet to MR Suite; and 11, Magnet Leveling and Foot Shimming were restructured into two chapters - Chapter 6, Installing a nonseismic vibroacoustic damping mat and leveling the magnet, and Chapter 7, Installing a seismic vibroacoustic damping mat and leveling the magnet. This restructuring helps clarify the exact steps a Field Engineer needs to follow and in what order for each type of vibroacoustic mat. • Step 9.1.1, about needing to install the vibroacoustic damping mat on the floor before moving the magnet into the magnet room, was not included in section 6.2, Positioning a nonseismic mounted vibroacoustic damping mat, because it does not apply to the new leveling procedure. • Step 9.1.6, about centering the magnet in the room based on the isocenter or the 6- or 8-inch quench vent location, was removed because it does not apply to the new leveling procedure. • The introductory paragraph; Equipment & Tools table; and Magnet Leveling Kit, 46-260888G4 table, formerly in Chapter 11, Magnet Leveling and Foot Shimming, were moved to Sections 6.1 and

Revision	Date	Description
		7.1, Equipment overview. PH Alignment and Magnet Leveling Kit (5897979) was added to the tools table. • In sections 6.3 and 7.3, Preparing to move the magnet, clearance dimension B was updated. • The following sections were added to describe the PM series magnet leveling process, and replace Chapter 11.2, Magnet Leveling: 1.5T Platform Series Magnets: ◦ Section 6.5, Centering a PM series magnet in the MR suite. ◦ Section 6.8 and 7.7, Leveling a PM series magnet. • In section 6.6, Lowering the magnet into position, step 3 (formerly 10.4.3) was revised to clarify that alignment of the magnet foot with a nonseismic vibroacoustic damping mat is over the anchor stud holes in the mat, but not any magnet anchors. • In sections 6.6 and 7.5, Lowering the magnet into position, step 5 (formerly 10.5.2) was revised to clarify lowering the magnet onto the vibroacoustic mats. This step now also includes the figure, Lowering the magnet onto the vibroacoustic damping mats. • In sections 6.7 and 7.6, Adding leveling shims, and sections 6.9 and 7.8, Securing the shim material, the figure, Shim arrangement for gap fill, was updated to show the vibroacoustic damping mat. • Former steps 9.3.4 to 9.3.6 were moved to a new section 7.9, Seismic mounting of a vibroacoustic damping mat to the floor. • Appendix B, *Preinstallation Manual* reference, was added. Mentions of the PIM throughout this manual now include a cross-reference to this appendix.

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