ELEKTRO GENESIS UK LTD.

MRI SITE PREPARATION GUIDE

E_Space 1.5T MRI System

Engineering · Infrastructure · RF Shielding · HVAC · Safety · Compliance

01 EXECUTIVE SUMMARY

This document provides complete MRI infrastructure preparation guidance for installation of the Elektro Genesis E_Space 1.5T MRI system. It includes environmental requirements, RF shielding standards, HVAC requirements, electrical specifications, quench system guidance, transportation logistics, and load-bearing requirements.

94.3 KVA	150 KVA	4600kg	>90dB
System Power	Transformer	Magnet Weight	RF Shielding

Parameter	Specification
System Power	94.3 KVA
Transformer	150 KVA
Magnet Weight	4600kg
RF Shielding	>90dB

KEY INSIGHT

All MRI infrastructure preparation should be completed before equipment shipment to minimize installation delays and ensure compliance.

02 ENVIRONMENTAL REQUIREMENTS

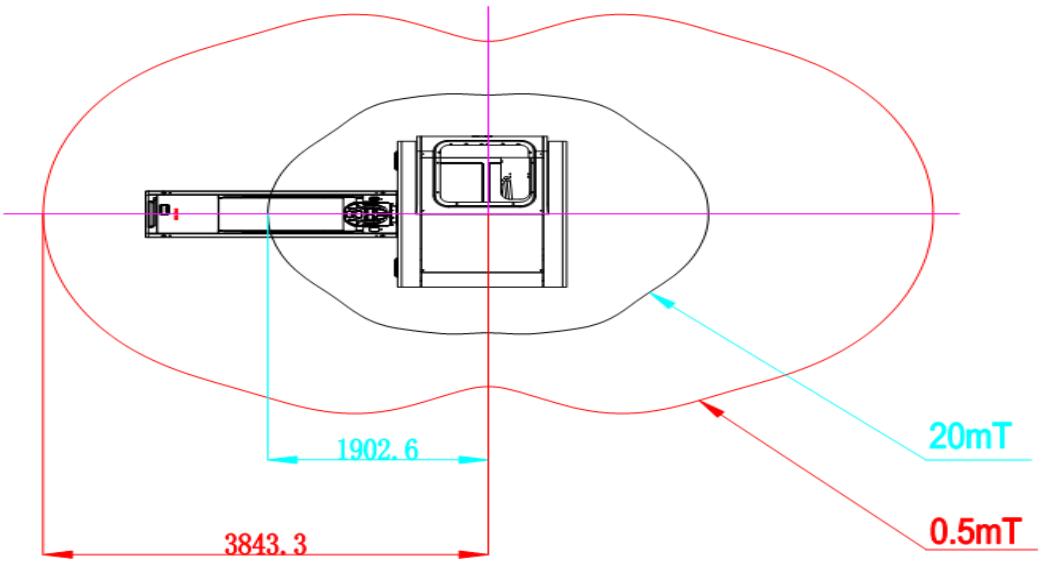
Strong magnetic fields interact with surrounding ferromagnetic objects and electrical systems. Site planning must minimise vibration, electromagnetic interference, and nearby moving metal structures.

5.5m	6.2m	40m	<100kg/m²
Vehicle Clearance	Freight Elevator	Train / Tram	Steel Content Limit

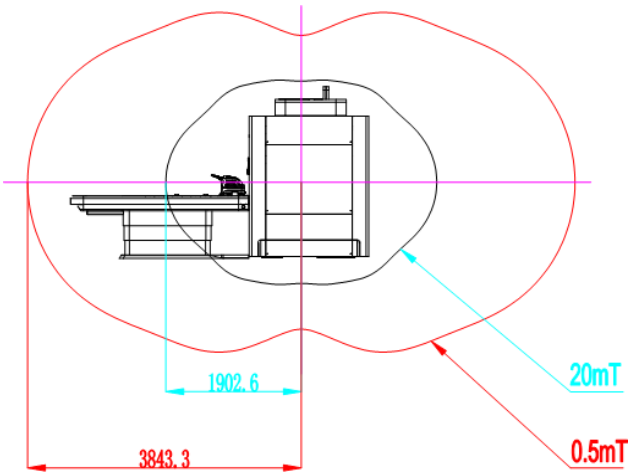
Parameter	Specification
Vehicle Clearance	5.5m
Freight Elevator	6.2m
Train / Tram	40m
Steel Content Limit	<100kg/m²

KEY INSIGHT

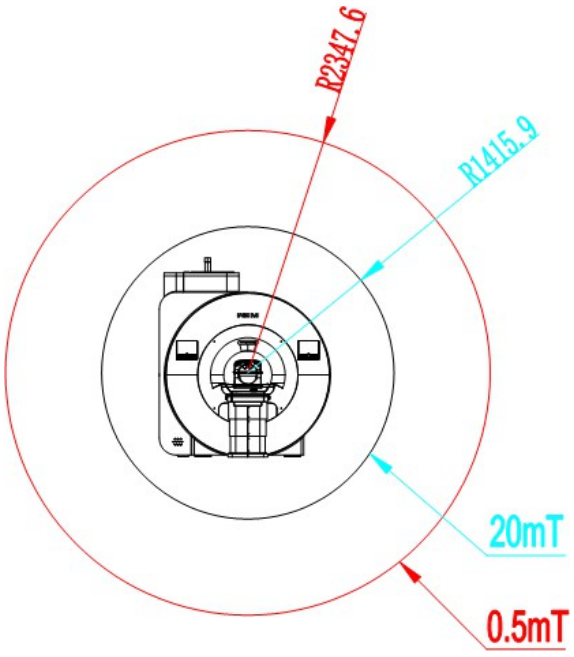
All MRI infrastructure preparation should be completed before equipment shipment to minimize installation delays and ensure compliance.



02 ENVIRONMENTAL REQUIREMENTS

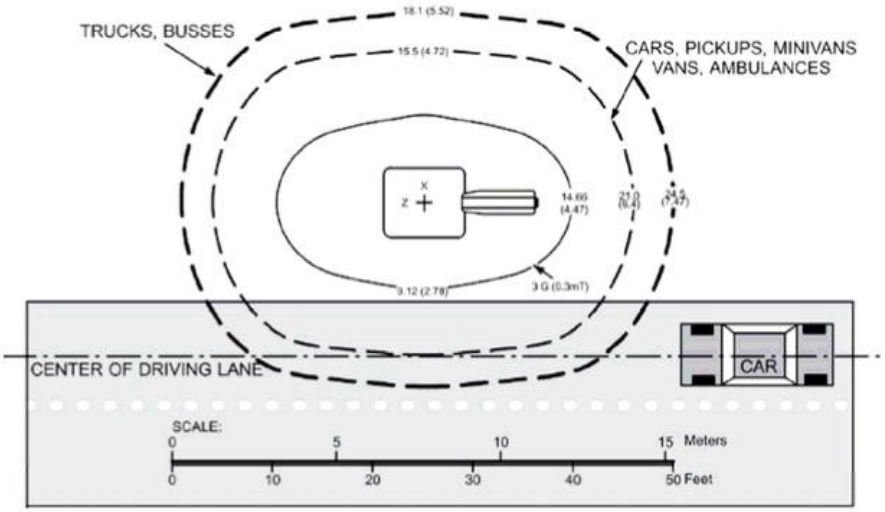


Side view of magnetGauss line distribution

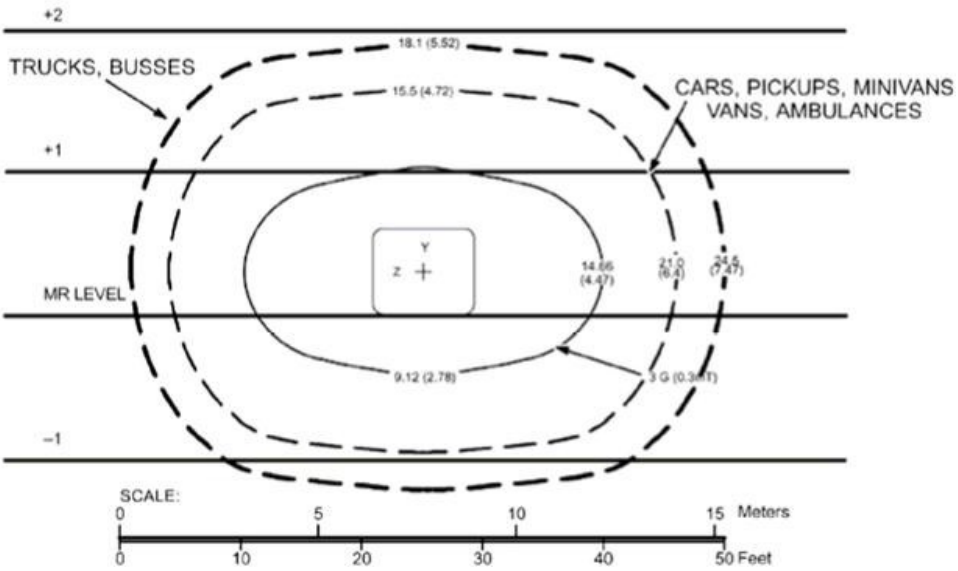


Front view of magnet Gauss line distribution

02 ENVIRONMENTAL REQUIREMENTS



Top view of magnet sensitive area



Side view of magnet sensitive area

03 ROOM SIZE REQUIREMENTS

MRI suites should include dedicated scanning, operation, and equipment rooms with controlled access and sufficient maintenance clearance.

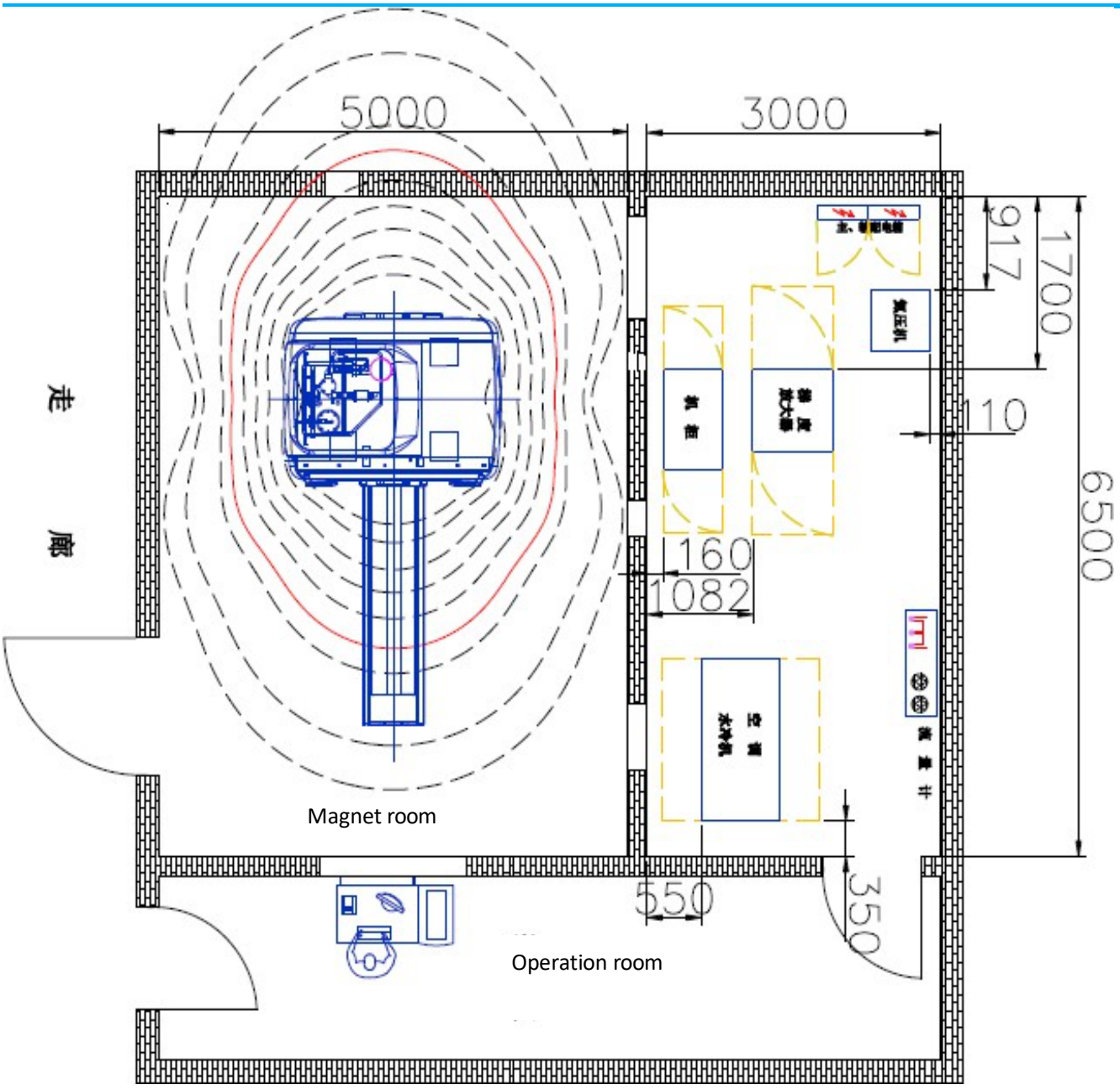
6.5m × 5m × 3.1m	3m × 5m × 3.1m	3m × 5m × 3.1m	1.2m × 2.1m
Scanning Room	Operation Room	Equipment Room	Door Size

Parameter	Specification
Scanning Room	6.5m × 5m × 3.1m
Operation Room	3m × 5m × 3.1m
Equipment Room	3m × 5m × 3.1m
Door Size	1.2m × 2.1m

KEY INSIGHT

All MRI infrastructure preparation should be completed before equipment shipment to minimize installation delays and ensure compliance.

03 ROOM SIZE REQUIREMENTS



Room layout diagram

03 ROOM SIZE REQUIREMENTS

MRI systems require dedicated medical-grade power distribution with stable voltage and protective grounding systems.

380V ±10%	50Hz ±3Hz	154KVA	<2 Ohms
Voltage	Frequency	Peak Current	Ground Resistance

Parameter	Specification
Voltage	380V ±10%
Frequency	50Hz ±3Hz
Peak Current	154KVA
Ground Resistance	<2 Ohms

KEY INSIGHT

All MRI infrastructure preparation should be completed before equipment shipment to minimise installation delays and ensure compliance.

1. The power supply of this system adopts the power supply system that complies with national regulations. The voltage is 380V, and the maximum deviation shall not exceed ±10%. The frequency is 50Hz, and the maximum deviation shall not exceed ±3Hz. The maximum deviation between phase voltages shall not exceed 2% of the minimum phase voltage.
2. The maximum instantaneous power of the equipment in this system is

94.3KVA, the continuous power is 74KVA, and the power factor is 0.9; the maximum instantaneous peak current of the equipment is 154KVA, and the continuous current is 114A; the recommended minimum rated current of the overcurrent protector is 150A.

3. This system equipment requires a dedicated power supply. It is recommended to use a dedicated transformer with a capacity of 150KVA. The three-phase line is marked with phase sequence and introduced into the distribution cabinet together with the PE line. The incoming cable must use multi-strand copper core wire and connect to the circuit breaker with a rated current of 150A in the cabinet. The cable color and circuit breaker specifications must comply with the provisions of the standard electrical installation manual. The distribution cabinet must have an anti-opening locking function to ensure the need for electrical safety operations. The emergency power-off button of the distribution cabinet is optionally installed on the wall next to the operating table in the operation room, so that the operator can cut off the system power supply in an emergency.

4. The cross section of the power supply cable should be selected to ensure that the voltage drop from the output end of the independent transformer to the equipment distribution cabinet is less than 2%. When selecting copper core wire, the following data can be used for reference:

Distance between transformer and distribution cabinet (m)	＜60	＜90	<120	>120

Multi-strand copper core cable cross section (mm ^{2}) Main distribution	50	75	95	Please contact Elektro engineers for confirmation
Multi-strand copper core cable cross section (mm ^{2}) Auxiliary power distribution	35	50	70	Please contact Elektro engineers for confirmation

5. The power used by the computer room air conditioner (usually 40-50KW), water cooler (usually 20KW), film processor, lighting and power sockets must be separated from the power used by this system. Please supply power separately according to the load of the required equipment.

6. The cable trough is only for this system equipment, and must have a flat surface, be waterproof and oil-proof, and be away from heat sources to avoid drastic temperature changes. It is strictly forbidden to use ferromagnetic metal cable troughs between magnets. The size of the cable trough between magnets is (width*depth) 0.6m*0.3m, and the size of the cable trough in the operation room is (width*depth) 0.2m*0.2m.

7. Fluorescent lamps and dimming lamps are not allowed in the magnet room. It is recommended that the magnet room use two DC incandescent lamps for lighting, one for 150 Lux and the other for 350 Lux; the operating room uses two lighting, one for 350 Lux and the other for 30-150 Lux adjustable.

8. The magnet room, equipment room and operation room must all use

220V power sockets with ground wires for maintenance; all power sockets in the magnet room must enter through a power filter. A 220V power socket with a ground wire needs to be reserved above the magnet side. A 220V power socket with a ground wire needs to be reserved at the emergency demagnetization device. Two sets of 220V power sockets are reserved near the operating table to power the magnet monitoring and oxygen monitoring .

9. Prepare a five-core power cable with a conductor cross-sectional area of 50 mm2 for connecting the power distribution cabinet and the equipment cabinet. The power cable should comply with the relevant requirements of GB 9706.1 "Medical Electrical Equipment: Part 1 General Safety Requirements" and obtain CCC certification. The length of the power cable is determined according to the actual situation.

Note: The power supply, cables, grounding bodies, and distribution cabinets involved in the power supply requirements of this system must comply with the requirements of relevant national laws and regulations.

Protective ground wire

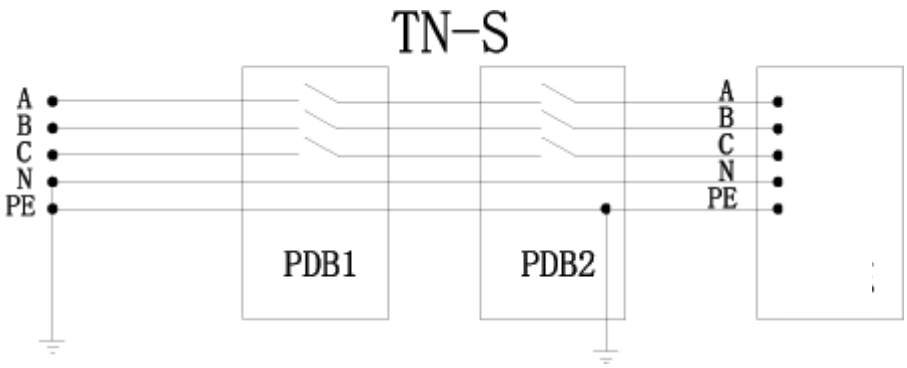
1. This equipment requires the installation of a dedicated PE line (protective grounding line) with a grounding resistance of less than 2 ohms, and must use a multi-strand copper core wire with the same cross-section as the power supply cable.

2. Special note: Under the premise that the grounding resistance meets the requirements, the equipotential bonding of the equipment must be done. For example, the PE line of the laser camera, workstation and other equipment connected to the equipment system

by cables and the socket must be connected to the PE line of this equipment.

3. When a hospital installs multiple devices, the PE line of each device must be led out from the grounding busbar to the device separately in accordance with this requirement.

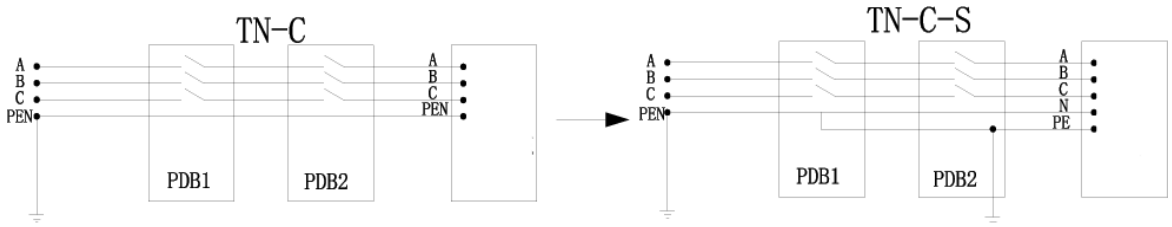
A. If the power supply system provided by the hospital is TN-S, the insulated PE line for the equipment can be drawn from the grounding busbar. At the same time, a repeated grounding electrode with a grounding resistance of less than 2 ohms must be set near the equipment and connected to the PE terminal in the equipment distribution cabinet. The specific connection method is shown in the figure below:



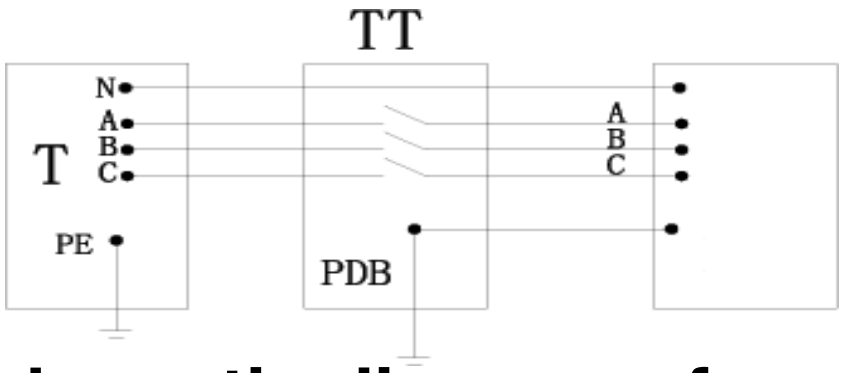
Note : Except for being connected to the N line at the main distribution box , the PE line must not be connected at other distribution boxes.

B. If the power supply standard provided by the hospital is TN-C, it must be changed to TN-CS. In the power distribution cabinet before the power distribution cabinet, the PEN line is divided into PE line and N line with the same cross-section as the PEN line. At the same time, a repeated grounding electrode with a grounding resistance of less than 2 ohms must be set near the

equipment and connected to the PE terminal in the equipment power distribution cabinet. The specific connection method is shown in the figure below:



C. If the power supply system provided by the hospital is TT, a grounding electrode with a grounding resistance of less than 2 ohms must be installed near the equipment . The specific connection method is shown in the figure below :



Schematic diagram of power distribution box

production

Main distribution cabinet P1 Schematic

Item	Name	Specification
QS	Isolated switch	Rate current 150A
QF1	Circuit break	Rate current 80A
QF2	Circuit break	Rate current 80A
QF3	Circuit break	Rate current 40A
KM	AC Contactor	Current 150A, Voltage 220V
F	Lightning arrester	Residual volt < 600V
SB1	Button	Stop button
SB2	Button	Stop button
SB3	Button	Start button

HL1	Indicator	Running indicator (Green)
HL2	Indicator	Stop indicator (Red)

Auxiliary distribution cabinet P2 Schematic

Item	Name	Specification
QS	Isolated switch	Rate current 125A
QF1	Circuit break	Rate current 40A
QF2	Circuit break	Rate current 40A
QF3	Circuit break	Rate current 63A
QF4	Circuit break	Rate current 100A
QF5	Circuit break	Rate current 25A
QF6	Circuit break	Rate current 25A
QF7	Circuit break	Rate current 25A
QF8	Circuit break	Rate current 25A
QF9	Circuit break	Rate current 25A
QF10	Circuit break	Rate current 16A
Suggested do not install leakage protector		

03 ROOM SIZE REQUIREMENTS

Equipment weight and dimensions

No.	Main Components	Weight (kg)	Dimensions (length * width * height, mm)
1	Magnet	4600	1596*1880*2260
2	Scanning bed	380	2600*650*890
3	Air conditioner	220	960*750*1850
4	System Cabinet	230	950*610*1950
5	Gradient Cabinet	450	880*620*1760
6	Helium compressor	120	490*450*600
7	Filter panel	30	640*1730*(310)
8	Water Chiller	377	1100*700*1750
9	Chiller outdoor	130	1540*1330*990
1 0	Operation table	88	1800*750*750
1 1	Coil cabinet	125	1350*500*2220

04 ELECTRICAL INFRASTRUCTURE

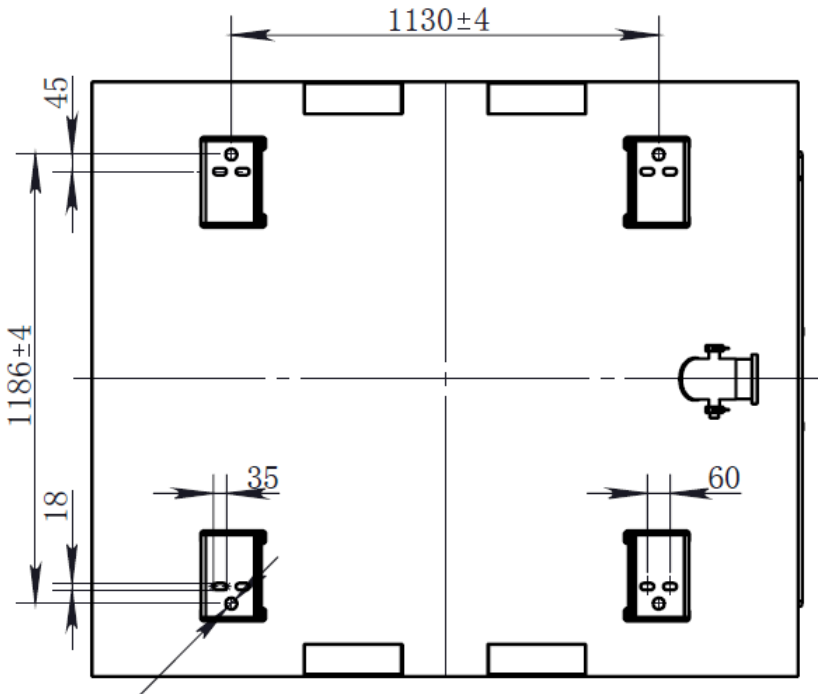
Load-bearing requirements between magnets

The magnet weighs about 4.6 tons and the scanning bed weighs 0.5 tons.

The ground level requirement for the magnet and scanning bed installation is less than 5mm within a distance of 3500mm.

Please consider the weight of the attached equipment and the person as appropriate.

Please hire an architectural design department to conduct load-bearing and force analysis to meet safety requirements.



Magnet base support position

05 RF SHIELDING REQUIREMENTS

RF shielding is required to eliminate electromagnetic interference and ensure optimal image quality.

>90dB	150MHz ±10MHz	>1000 Ohms	Specialist Contractor
Shielding Performance	Frequency	Ground Isolation	Installation

Parameter	Specification
Shielding Performance	>90dB
Frequency	150MHz ±10MHz
Ground Isolation	>1000 Ohms
Installation	Specialist Contractor

KEY INSIGHT

All MRI infrastructure preparation should be completed before equipment shipment to minimise installation delays and ensure compliance.

In order to achieve high-definition image quality, RF shielding is required between the magnets to prevent interference from external RF sources.

1. shielded room includes shielding body (ground, ceiling, walls), shielding door, shielding window, etc., and the attenuation of 150MHz±10MHz plane wave is greater than 90dB.
2. The insulation of the shielded room to ground is greater than 1000 ohms.
3. The shielding supplier needs to design and install all pipes leading into the shielding room: quench pipes , emergency exhaust ducts, air conditioning air inlet and return ducts, etc.
4. The shielding supplier is responsible for the conductive plate opening on the shield body and the installation of the conductive plate. The conductive plate should be placed in an area where the magnetic field strength is less than 200 Gs .
5. The shielding supplier is responsible for designing the fixing method for the equipment to be fixed in the shielding room and providing fixing parts such as bolts.

06 HVAC & VENTILATION

MRI rooms require dedicated ventilation, humidity control, emergency exhaust systems, and stable temperature conditions.

15-21°C	30-60%	>35m³/min	12x/hr
Magnet Room Temp	Humidity	Emergency Exhaust	Air Changes

Parameter	Specification
Magnet Room Temp	15-21°C
Humidity	30-60%
Emergency Exhaust	>35m³/min
Air Changes	12x/hr

KEY INSIGHT

All MRI infrastructure preparation should be completed before equipment shipment to minimise installation delays and ensure compliance.

07 QUENCH PIPE REQUIREMENTS

Cryogenic helium venting systems must safely discharge gas during emergency quench conditions.

850L	77.5m³/min	110mm	10.7m Restricted
Helium Volume	Peak Emission	Quench Pipe	Safety Zone

Parameter	Specification
Helium Volume	850L
Peak Emission	77.5m³/min
Quench Pipe	110mm
Safety Zone	10.7m Restricted

KEY INSIGHT

All MRI infrastructure preparation should be completed before equipment shipment to minimise installation delays and ensure compliance.

1. In order to ensure that a large amount of helium can be discharged to the outside when the magnet quenches, a quench tube is required to be installed between the magnets .
2. The helium emission during magnet failure is shown in the following table:
3.

Magnet Type	Helium volume	Peak emission during time-out	Magnet quench tube size
1.5T	850L	77.5m3 /min	110 mm

The quench tube should lead to the safe outdoors as straight as possible, and the total pressure drop from the magnet interface to the outdoor outlet should be less than 20Psi (138kPa).

07 QUENCH PIPE REQUIREMENTS

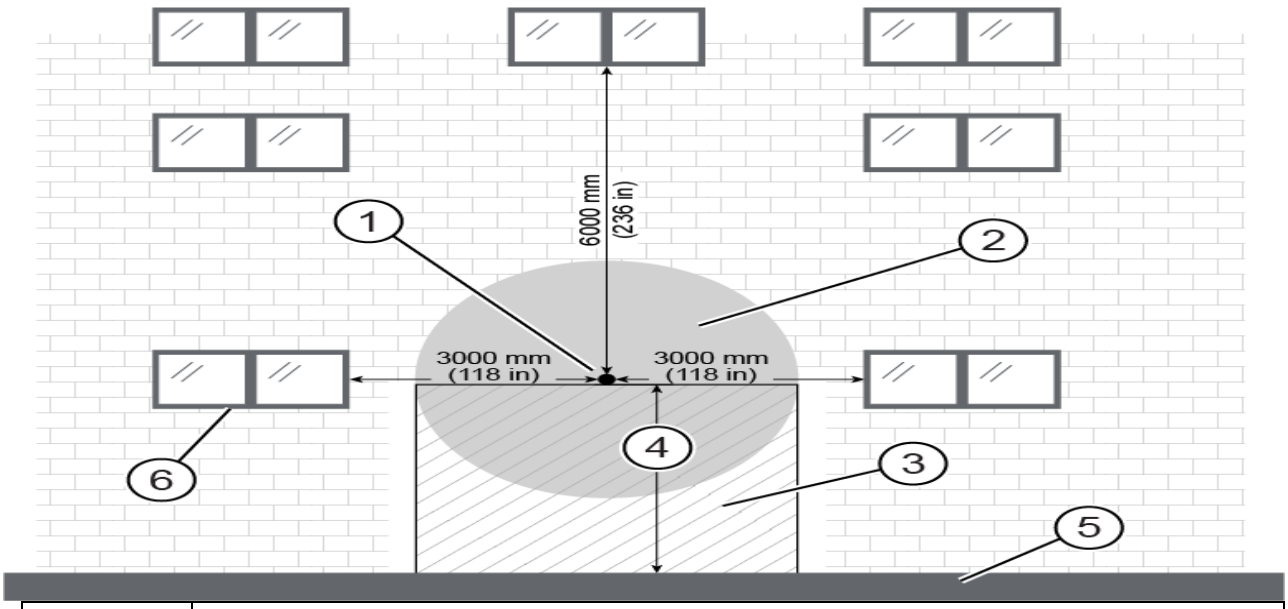
4. The gas temperature in the quench tube can be as low as -268 degrees Celsius.

5. The quench tube needs to enter the magnet room through a waveguide and connect to the magnet quench tube port .

6. The outdoor outlet of the quench pipe must be prevented from entering by rain, snow, mice and other foreign objects. The quench pipe outlet at the top outlet must be 0.9m higher than the roof, and the quench pipe outlet at the wall outlet must be 3.66m higher than the ground, or take corresponding measures to ensure the safety of personnel.

7. The area 10.7m outside the outdoor exit of the quench pipe and 4.6m wide is a restricted area. Warning signs must be set up to restrict entry, and there must be no air-conditioning inlets.

8. Hire a professional shielding supplier to design and construct the quench tube .



Item	Specification
1	Air outlet
2	Cylindrical ventilation area Dimension 4600mm x Length 6100mm
3	Exhaust area
4	Distance between ground and quench tube Min 3660mm , with fence If > 5000mm, without fence
5	Ground
6	Windows

08 EQUIPMENT WEIGHT & DIMENSIONS

Structural engineers must validate floor loading, transportation access, and installation logistics before delivery.

4600kg	380kg	450kg	377kg
MRI Magnet	Scanning Bed	Gradient Cabinet	Water Chiller

Parameter	Specification
MRI Magnet	4600kg
Scanning Bed	380kg
Gradient Cabinet	450kg
Water Chiller	377kg

KEY INSIGHT

All MRI infrastructure preparation should be completed before equipment shipment to minimise installation delays and ensure compliance.

THANK YOU

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