BAMRR MRI Safety Week 2025

Day 3: Oxygen Sensors and Alarms:

According to the MHRA guidelines:

'Death by asphyxiation has occurred from the leaking of helium, which displaces oxygen in the room. Monitors and their alarms should be able to be seen and heard at all times and they should be checked regularly as part of a planned preventative maintenance programme.
Monitors should be set to sound an alarm if the oxygen concentration goes below a specified level (19% would be a suitable level).
The MR unit should then be evacuated immediately in line with the written and approved policy, and only re-entered after inspection by a suitably qualified person or representative of the manufacturer or supplier authorised by the MR Responsible Person/ MRSE'.

What is an Oxygen Monitor?

- A system used to monitor the level of oxygen in the magnet room.
- Composed of a sensor (located either within the magnet room for a mobile MRI or within the air handling system ducts within a department) with an associated display in the control room, encompassing an audible alarm.
- A safety measure to alert staff, so they can evacuate the magnet room or take appropriate other actions according to their departmental policy.

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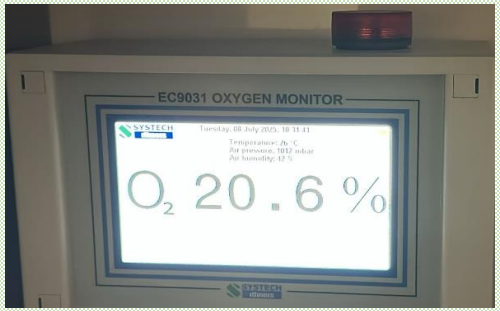
What does it look like?

The display is usually on the control room wall for a departmental scanner

Displays can differ, even between the same manufacturers- (needle versus digital display)



Mute button

Percentage of oxygen present in magnet room

Mute buttons can be in different places (within the O_2 monitor panel itself or in a more comprehensive wall display panel).

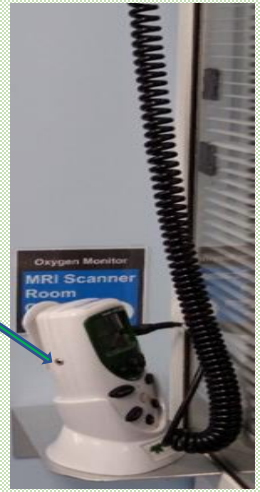
Know the difference between an oxygen sensor alarm and a chiller fault alarm.

The display should be clearly labelled for easy identification

Styles can differ between departmental and mobile units.

Mobile MRI units often use a portable oxygen monitoring system,

Check if the batteries need to be replaced.



Example of a sensor in mobile MRI unit

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Why might it alarm?

- In the event of a quench, if the helium gas enters the magnet room instead of exiting to the outside via the quench pipe, there will be a displacement of oxygen. If the oxygen concentration in the magnet room drops below a safe level (19%), the alarm should sound.
- False alarms may occur if the oxygen sensor is not regularly maintained (it may alarm if the filter is overdue for replacement or service etc).
- It may also alarm due to a fault, so it is important to be able to recognise the signs of a quench and know how to check the helium level on your system and what the values should be on your oxygen monitor display.

What to do if it alarms?

- Depending upon your departmental policy, it can be muted to make using the telephone/hearing each other easier, whilst the necessary checks are done.
- MHRA recommend the MR environment should be evacuated immediately.
- Typically, activation of the oxygen alarm will also trigger the emergency air extract system for the magnet room, so the helium gas should be pulled by a powerful fan to the outside via the ceiling ducting.
  Do you know how to manually activate this system in the event of malfunction?

Additional point:

If the emergency extract fan does start running by itself, check your oxygen and helium levels are normal and there are no other obvious causes, before reporting accordingly.

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Key Takeaways:

- MRI units (whether it be a departmental, static or mobile scanner) should have an oxygen detection system for staff and patient safety in case of any unplanned leakage of helium.
- Ensure you are familiar with the location of the detector/sensor, the alarm panel and what the normal value on the display should be
- Know what to do if it alarms. Follow your policies and procedures.
- Remember different designs exist and mute buttons can be in different places.
- Be aware of reasons for false alarms and ensure it is serviced and maintained.
- Know who to report any issues to.
- If in doubt, never be afraid to ask ☺ and try to be

BAMRR are also pleased to direct you to what BIR and ISMRT and SCoR have produced for MR Safety Week

https://bir.org.uk/get-involved/special-interest-groups/bir-magnetic-resonance.aspx

https://www.ismrm.orgmr-safety-links/mr-safety-week-2025//

https://www.sor.org/

Materials from MR Safety Week from previous years are available on the BAMRR website https://www.bamrr.org/safety/