

Application Note

Using a Gaussmeter to map an MRI installation

Abstract:

The rapid increase in the use of MRI equipment for patient diagnostics has ushered in a new opportunity for the use of Gaussmeters in the installation and user safety of these machines.

Fielded Magnetic Resonance Imaging equipment currently utilizes magnetic fields of up to 3 Tesla, and machines on the drawing board have upper field limits of 7 Tesla. These field levels can cause ferrous objects in the vicinity or the aperture to be drawn into the machine at high velocity. Numerous cases of diagnostic equipment being propelled into the aperture with devastating consequences have been documented. In one case the patient was killed by an oxygen tank being drawn into the aperture and striking the patient in the head.

Application:

Due to the fact that currently there are no specific worldwide regulations relating to the “safe zone” around the MRI Equipment, several agencies have issued guidelines for the installation of the equipment and arbitrary “Gauss lines” to be displayed on the floor around the MRI. The most common value in the United States is 5 Gauss. Installers are required to mark this line on the floor so that operators do not inadvertently move ferrous materials too close to the machine while it is operating. Also, MRI rooms are required to be shielded from the rest of the facility to prevent magnetic field interference of surrounding equipment. This shielding is normally performed by the installation of several tens of thousands of pounds of steel in the walls surrounding the MRI room.

Resolution:

The use of a Gaussmeter in the above application is ideal to determine the ambient field levels and to accurately mark them. The suggested meter should be 3 axes capable to be able to measure all three axes simultaneously and produce a summation of the field level. An example would be the FW Bell model 7030 with the three axis probe. This data can then be used to mark the 5 Gauss line as well as measure the field levels beyond the shielding to insure compliance. Single axis handheld models can also be used, however, the operator will need to manipulate the probe thru all three axes and mathematically perform the calculations to determine the ambient field level at his/her test point. An example of this type of meter would be the FW Bell model 5180.

Prepared By:

Mark Green, Applications Engineer

Sypris Test & Measurement/FW Bell