

DrX Application Note

DrX	All variants
Subject	Effect of MV/HV electrical fields on DrX performance
Note Ref.	AN270.14

CE marking and EMC

All DrX modules carry CE marking and have been tested for both EMC emissions and effects of conducted and radiated interference. However, in practical terms, the visualisation of what this means when applying the units into certain hostile environments is often difficult to perceive.

The purpose of this application note is to report on the performance of DrX modules in the presence of high electrical fields by practical example, supported by photographs of the units under test. Its aim is to illustrate DrX operating in real-life, but controlled, examples.

Case#1 - 11kV/415V pole mounted transformer

A useful test environment was available using a pole mounted 11kV/415V transformer in a rural location. Two DrX units were used in the tests to demonstrate the operation of the units in the presence of a high electric field; DrSonic and DrHiss.

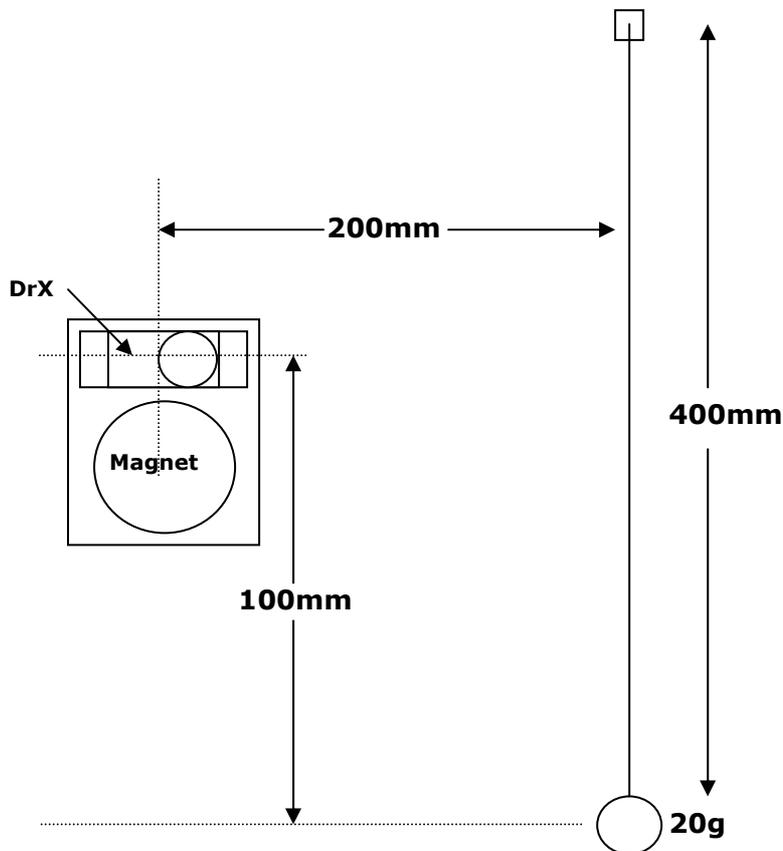


The units were mounted to a small metal plate which was then mounted to the transformer by means of a magnet. A simple 16V battery supply was used to power the units.



A consistent signal input was supplied by means of a fixed pendulum with a measured swing. This would ensure that the same force of impact was used in both the controlled and test applications for both units. In order to maximise any influence of noise on the signal a very low impact force was used and the DrX units set to high sensitivity.

The sensor and pendulum were arranged as follows:



Once setup was complete three measured swings were made at 30, 15 & 7.5mm displacement. By calculation this gives impact forces of:

Swing (mm)	Impact Force (N)
30	0.015
15	0.007
7.5	0.004

As a control experiment the same process was set up on a steel panel in free space, 30m from the nearest source of electrical noise. The same DrX units were used and the same three swing distances. The units were not adjusted between the two test sites.



Case#1 - Results

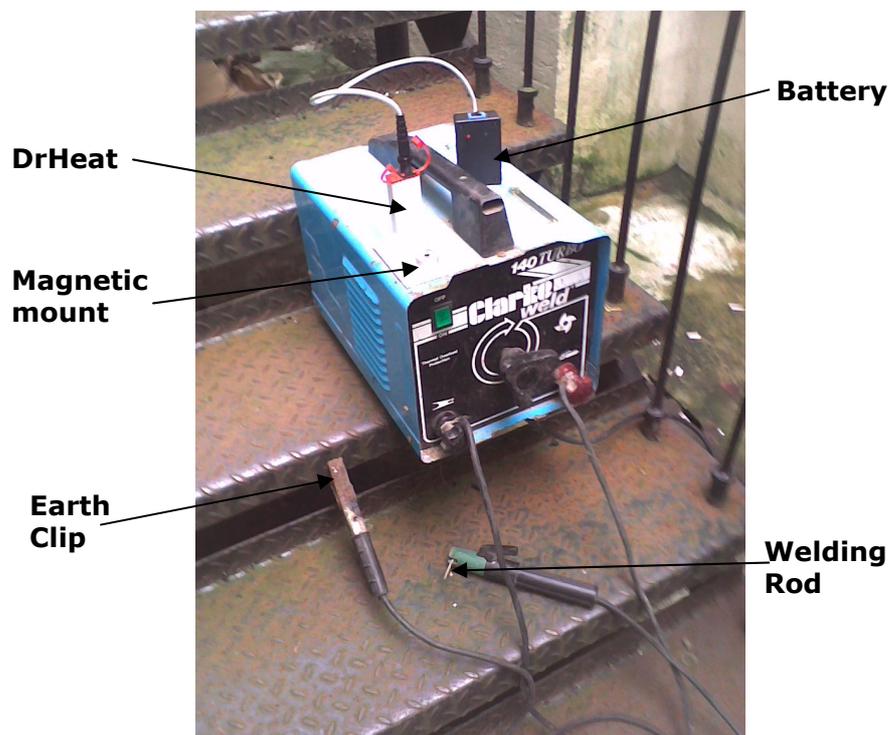
Both of the DrHiss and DrSonic modules used in the experiments, for each of the three impact-force conditions, gave the following results:

For the control experiment on the isolated steel panel in a free field both units triggered on all three impact-forces.

For the electric field test (i.e. mounted on the transformer) both units operated exactly the same, under all three impact-force conditions, as in the control experiment.

Case#2 - 240V portable welding kit

As a common practical example of EMC radiation and DrX's noise immunity to it, a small portable welding kit was used to demonstrate the effects. The unit used for this test was manufactured several years before the tightening of EMC regulations and was therefore a better example of a 'noisy' transformer.



The mounting of the DrX used a magnetic clamp on a steel sheet, similar to that of case#1, but the particular module in this case was DrHeat. (Obviously the sparking of the welding process would be picked up by any of the ultrasonic or sonic variants). The DrHeat was mounted directly onto the case of the welding transformer.

Two tests were undertaken: Firstly the DrHeat was adjusted from green to red and then turned back 1/8th of a turn; secondly the adjustment was from the red condition to green and then turned back 1/8th of a turn. In both cases the welder was set at 120A and the welding rod struck against the earthing point several times so as to spark off. The effect of tapping the rod and sparking causes high energy broadband radiation. Similarly the impulse loading of the welder's transformer will be at its most extreme.

Case#2 - Results

No change of condition was detected in the DrHeat module in spite of a number of sparks being generated within 300mm of the unit, and the threshold setting of the DRX unit being very small.

Conclusions

- 1) Two practical examples of DrX modules operating in aggressive static and dynamic electric fields have shown to have no effect on their performance.
- 2) The EMC testing during product approval has been verified to some extent by practical examples.
- 3) DrX modules can be applied to areas of high and variable electric fields without degradation in performance.