

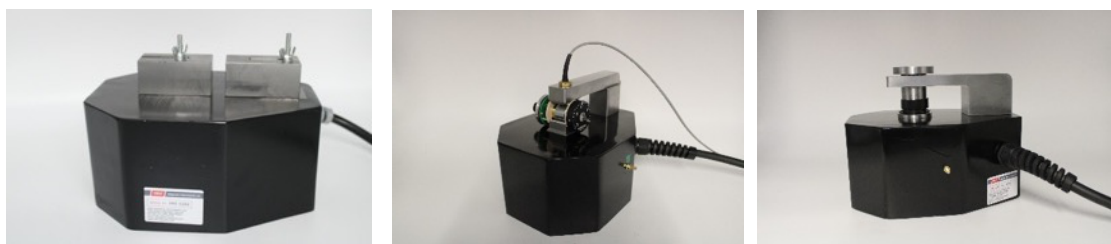
Product Brochure

Standard 2 pole coil magnetiser fixtures - steel core and solenoid

The energy from the magnetiser is delivered to the permanent magnet material to magnetise via the fixture coil or fixture. The fixture has the precise mechanical dimensions needed to hold the magnet or magnet assembly in place and wound coils needed to deliver the energy to the part being magnetised. Magnetising fixtures are usually made of single or multiple wound coils of wire encased in a high-performance glass fibre resin for strength and stability. Sometimes a mechanical clamp is used. A large amount of energy is used in the magnetising process and often fixtures are cooled to increase production throughput. In addition, the large magnetic fields used in the magnetising process can be hazardous to health thus guard rails or automated part handling is needed to ensure safe operation. This is vital to stay within guidelines set by Control of Electromagnetic Fields at Work 2016 (HSE). The detailed design process Hirst conducts on each fixture design covers all mechanical handling, production throughput and health and safety requirements.

The number of poles used in a fixture refers to the number of magnetic poles the part being magnetised has. For applications like a single magnet a 2-pole fixture is needed (north and south). The fixture usually only has one coil to deliver the energy to the magnet to magnetise it. The applications for 2 pole devices are typically in single magnet calibration, sensor parts or navigation compass production.

Hirst offers standard steel core and solenoid (air core) fixtures.



Above standard Hirst J2A, 2 pole steel core axial fixture up to 500J for sensor and other applications showing custom pole pieces example



Above JS2 solenoid fixture

Key benefits

- **Standard 2 pole magnetiser fixture** – 1000V maximum
- **Robust construction** - copper magnetiser coils, around steel former encased in moulded resin case for long life
- **Cooling** – advanced high performance resin moulded case construction that requires no additional cooling
- **Rugged steel core construction** - with user modifiable / custom pole pieces (M6 thread – max 50 mm x 50 mm pole piece dimensions)

Applications

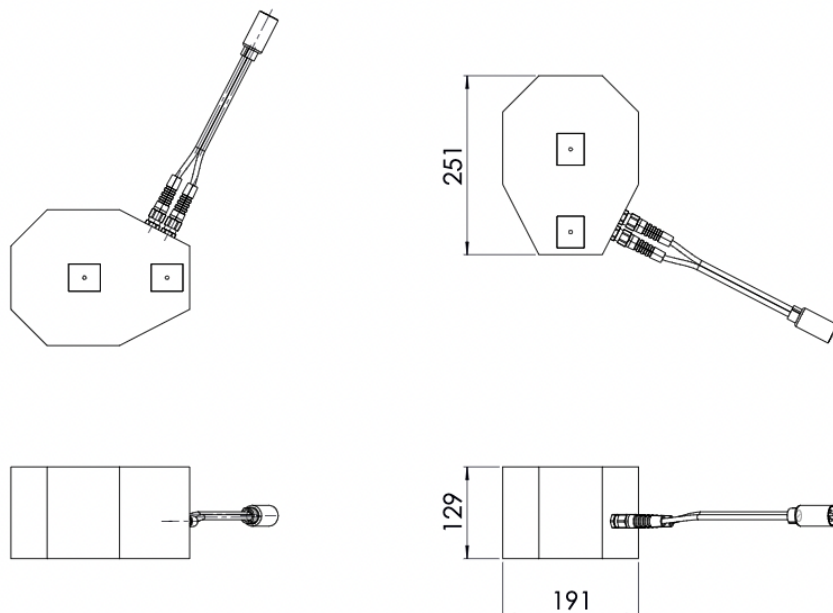
- Magnetisation to saturation for all types of magnetic materials
- Aerospace Sensors – magnetic calibration of sensors critical aircraft sensors, backup compasses, cockpit oxygen sensors
- Audio – small loudspeakers
- Reed relay manufacture
- Small electric motors, valves and actuators

Technical Data – J2A

J2A – 100J-500J

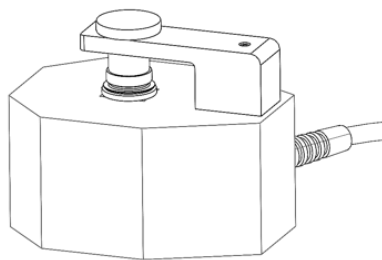
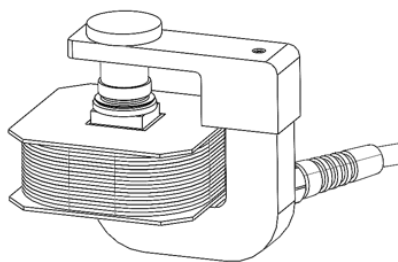
Steel core fixture. The max. field 2.1T as the steel essentially will saturate. The maximum air gap between steel pole pieces is 40mm 40x40mm cross section pole pieces. The J2A fixture is particularly well suited to AlNiCo magnet assemblies when paired with a 100J or 200J, and for ferrite when paired with a 500J.

Maximum voltage	Up to 1000V
Maximum Magnetiser Energy	500J
Cooling	No cooling required
Coil connections	Fast swap connector – 30 second switch over
Colours and materials	Copper magnetiser coils, around steel former encased in moulded resin case for long life
Dimensions / Weight	J2A - 251 x 191 x 129 mm approx. / 14 kg
Operating Temperature Range	+5° C to +40° C
Power connections	Supplied with 1.5m cable to connect to Hirst MCSD100J ,200J or 500J



Drawing of the base J2A fixture – note pole pieces are usually application specific.

Image of J2A shows magnetising coil, core pieces which transfer the magnetic field and custom 'pole pieces'. This is enclosed in a moulded resin case.



Schematic of J2a with moulded outer removed. Complete J2a with moulded outer, with example pole pieces.

J2B -500J - 800J

Larger version of J2A. 90mm between pole pieces and 50x50mm cross-section of poles. A steep core fixture generating fields up to 2.1T. J2B also has larger core windings, so can be used for higher duty cycles (limited by thermal effects) than the J2A.

Magnetising Fixtures – Solenoid

Solenoid magnetising fixtures are available in a range of sizes to match your magnet requirements. The direction of magnetisation is along the axis of the bore. Solenoid coils can be paired with the whole MCSD range, and are plug and play with an HV connector.



Above JS2 fixture

The table below shows the field across the working length of the coil when paired with different energies. The maximum energy (at 1000V) is shown.

NAME	BORE	AXIAL LENGTH	FIELD - 100J	FIELD 200J	FIELD 500J	FIELD 800J	Dimensions and Weight
JS1	25mm	75mm	1.6T	2.2T	3.4T	4.2T	150h x150l x150d mm ~8kg
JS2	50mm	100mm	0.6T	0.9T	1.3T	1.5T	180h x180l x180d mm ~9kg
JS3	100mm	150mm	0.35T	0.5T	0.9T	1.2T	200h x200l x200d mm ~10kg

As a guide to saturate the following materials:

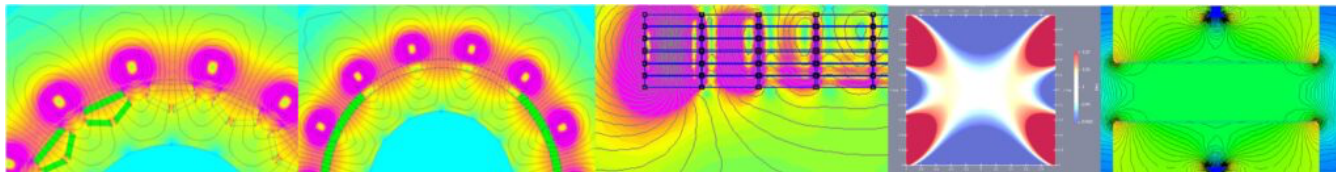
- AlNiCo 0.3T to 0.7T (grade dependant)
- Ferrite – 1 – 1.2T (grade dependant)
- NdFeB 3 – 5T (grade dependant)
- SmCo 3-5.5T (grade dependant)

Warranty and Calibration

A calibration for magnetisers, fluxmeters and gaussmeters is required every year to maintain the highest levels of performance – Hirst has a dedicated team of installation and service engineers, available to travel worldwide to install and support equipment. Service contracts are available. See website for details.

Custom Fixture design

Most fixtures are custom including multi-pole axial fixtures (axis of the coil and the magnet are the same) and multi-pole radial designs. The smallest fixtures Hirst have produced magnetise magnets a few millimetres in diameter. The largest Hirst have worked on have been magnet assemblies 5 metres in diameter and requiring specialist lifting equipment. More complex fixture designs are needed when making motor assemblies and the number of poles can be up over 40 as energy needs delivering to individual magnets in an assembly. All without demagnetising other parts in the assembly. Hirst's patented Step and Repeat method can be used where only certain sections of the rotor assembly are magnetised and then the fixture is either moved or different parts of the fixture circuit are switched to achieve a step and repeat function. The Hirst team are experts in making fixtures for all current motor topologies including Interior Permanent Magnet (IPM), Surface Permanent Magnet (SPM) and Axial flux designs. Full state-of-the-art FEA analysis and design optimisation is undertaken by our Magnetic design team when designing a custom fixture – see website for more details.



Our custom-made magnetic solutions have been employed all over the world in a wide array of applications, ranging from automotive industry to aerospace.

Examples of custom projects

- **Aerospace Sensors** – magnetic calibration of sensors critical aircraft sensors, backup compasses, cockpit oxygen sensors
- **Audio** – loudspeakers, pick up coils
- **Industrial** – Reed relay manufacture, valves and actuators
- **Consumer** – single magnet assemblies
- **Electric motors / EVs** – SPM & IPM motors and multi-shot or step and repeat magnetisation of large Axial flux motors including Skew patterns, Halbach arrays and multiple magnet geometry layouts
- **Recycling and clean energy** – recycling magnets up to two tonnes and very large electric generators for offshore wind applications.



Hirst Magnetic Instruments has been active in providing solutions for 60 years in magnetics and magnetic measurement. Hirst manufactures precision hand-held gaussmeters, fluxmeters, demagnetisers, bench top & workstation industrial magnetisers, industrial production-line magnetisers, pulse field magnetometers (PFMs) for developing characterising magnetic materials and many custom projects.

Hirst Magnetic Instruments Ltd reserves the right to make changes to any specifications or performance implied in this product brochure without notice – please refer to www.hirst-magnetics.com for the latest version.

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