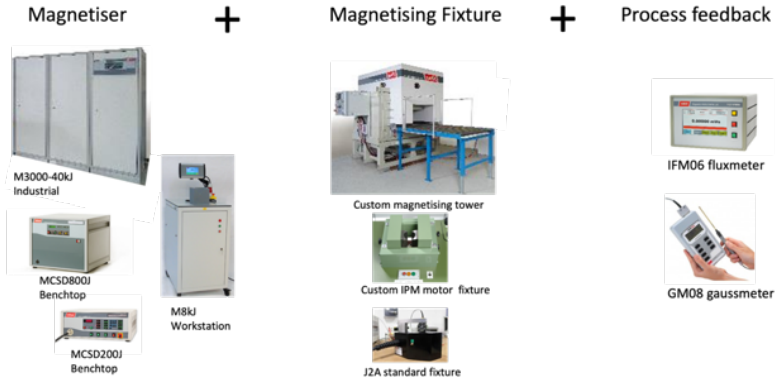
Product Range Overview

Magnetiser Product Selection Guide

Hirst has been making magnetiser products for over 60 years and offers a comprehensive range of magnetisers that are designed for magnetising all permanent magnet material types from individual magnets to complex magnet assemblies.

How to magnetise permanent magnets

Each application requires a magnetiser and a magnetising fixture. The design of magnetising fixture is based on the magnet or magnet assembly that requires magnetisation. There are standard fixtures for common applications, but most require custom fixtures which Hirst design and build in-house. In production systems where high accuracy and yield is required, adding feedback to the magnetising cycle with a fluxmeter or gaussmeter probe greatly improves process accuracy and yield. Hirst's IFM06 fluxmeter and Hirst's GM08 gaussmeter are ideal as they have all the standard industry communication interfaces to control the Hirst magnetisers and integrate with other production line equipment.



This guide is designed to help select the right product; however, it is not exhaustive and is subject to change following detailed design and modelling of the part to magnetise and the required production throughput and budget.

Range	Size	Magnetiser Energy	Maximum Voltage (V)	Magnetisation / De-magnetisation	Magnetic Materials	Typical Applications
MCSD100J and 200J	Benchtop-mini	100J, 200J	1000	Magnetiser, & De-magnetiser	Ferrite, AlNiCo	Magnetisation and calibration of small to medium sensors and magnets
MCSD500J and 800J	Benchtop-midi	500J, 800J	1000	Magnetiser, & De-magnetiser	Ferrite, AlNiCo, NdFeB, SmCo	Magnetisation and calibration of large sensors and multi-shot magnetising of small loudspeakers and small motors including IPM & SPM
M1kJ and M4kJ	Workstation	1kJ and 4kJ	800	Magnetiser Only	Ferrite, AlNiCo, NdFeB, SmCo	Single-shot magnetisation of speakers and Multi-shot magnetisation of small motors inc IPM & SPM
M8kJ and M12kJ	Workstation	8kJ and 12kJ	800	Magnetiser Only	Ferrite, AlNiCo, NdFeB, SmCo	Single-shot magnetisation of larger speakers and Multi-shot magnetisation of medium motors inc IPM & SPM
M1000-20kJ and 40kJ	Industrial - 2 towers	20kJ and 40kJ	1000	Magnetiser Only	Ferrite, AlNiCo, NdFeB, SmCo	Multi-fixture, multi-shot magnetisation of small and medium SPM & IPM & small Axial flux motors
M3000-20kJ and 40kJ	Industrial - 2 towers	20kJ and 40kJ	3000	Magnetiser Only	Ferrite, AlNiCo, NdFeB, SmCo	Multi-fixture, multi-shot magnetisation of medium to large SPM & IPM & medium Axial flux motors
M3000-60kJ and 80kJ	Industrial - 3 towers	60kJ and 80kJ	3000	Magnetiser Only	Ferrite, AlNiCo, NdFeB, SmCo	Multi-fixture, single-shot magnetisation of larger of SPM & IPM motors and multi-shot or step and repeat magnetisation of larger Axial flux motors
M3000-100kJ	Industrial - 3 towers	100kJ	3000	Magnetiser Only	Ferrite, AlNiCo, NdFeB inc AH grade, SmCo	Multi-fixture, single-shot magnetisation of large of SPM & IPM motors and multi shot or step and repeat magnetisation of high performance Axial flux motors
M800-200kJ	Industrial - 4 towers	200kJ	800	Magnetiser Only	Ferrite, AlNiCo, NdFeB, SmCo	Multi-fixture, single-shot magnetisation of large ferrite magnets for recycling or large electric generators
M800-300kJ and 400kJ	Industrial - 5 towers	300kJ and 400kJ	800	Magnetiser Only	Ferrite, AlNiCo, NdFeB, SmCo	Multi-fixture, single-shot magnetisation of larger ferrite magnets for recycling or large electric generators

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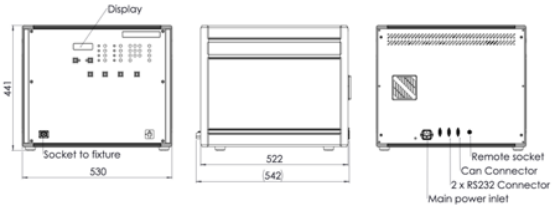
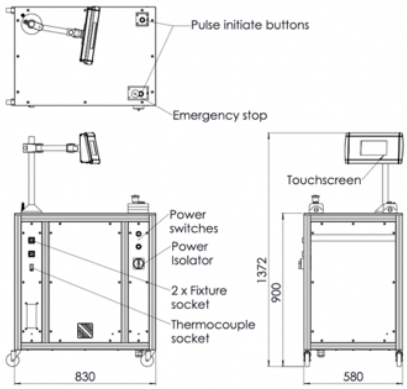
Magnetiser

This is the product that delivers the energy (via the fixture coil) to the permanent magnet material to magnetise it. The magnetiser consists of a low voltage capacitor charging circuit, a modular expandable bank of capacitors rated at a maximum voltage (800V, 1000V or 3000V) and energy discharge circuit connected to the fixture. The amount of energy stored in the capacitor bank is in Joules and the larger the stored energy the larger the volume of magnetic material that can be magnetised. The number of shots needed to fully magnetise or saturate a magnet or magnet assembly is also determined by the energy. Generally, it is desirable to deliver this energy in as few shots as possible to increase production throughput and reduce the likelihood of demagnetisation. The speed at which these capacitors charge up and the number of magnetiser shots determines the throughput of the magnetiser in production. Hirst magnetisers come with industry standard interfaces such as PLC, RS232 and CANopen for integration with production automation.

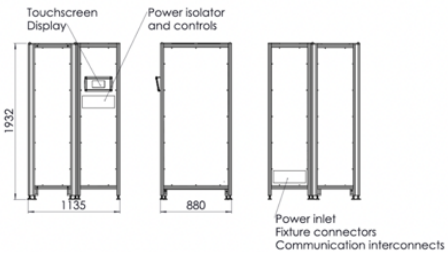
Benchtop-mini MCSD100J and 200J
with Magnetiser, Calibrator, Setter and Demagnetiser

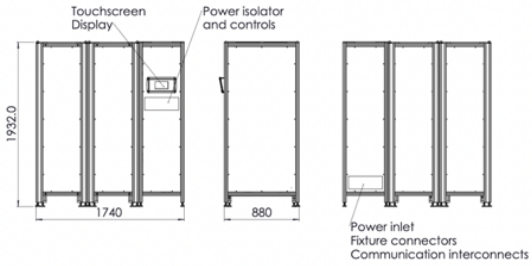


Benchtop – midi MCSD500J and 800J
with Magnetiser, Calibrator, Setter and Demagnetiser

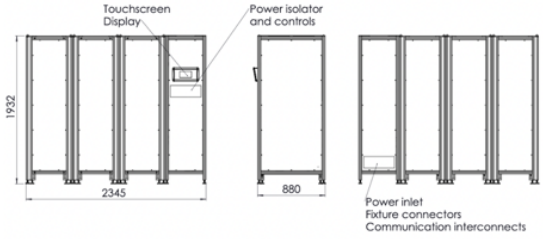


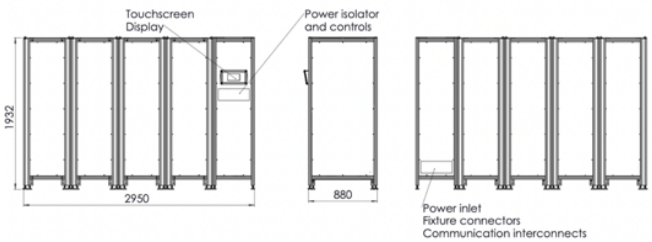
Workstation Magnetisers M1kJ, M4kJ, M8kJ and M12kJ - 800V Magnetiser note fixtures can be added to the workstation for an ultra-compact and relocatable production solution.





M1000-20kJ & 40kJ and M3000-20kJ & 40kJ industrial magnetisers uses 2 towers as shown above on the left. The M3000-60kJ, 80kJ and 100kJ industrial magnetisers uses 3 towers as shown on the right.





M800-200kJ industrial magnetiser uses 4 towers as shown above on the left. The M800-300kJ and 400kJ industrial magnetisers uses 5 towers as shown on the right.

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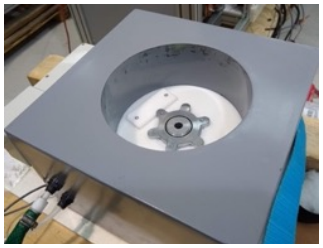
Magnetising Fixtures – standard and custom options

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.

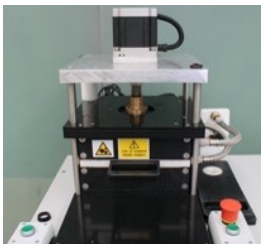
The number of poles used in a fixture refers to the number of magnetic poles the part being magnetised has. For applications like a single magnet a 2-pole fixture is needed (north and south) and the fixture usually only has one coil to deliver the energy to the magnet to magnetise it. The applications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

Above J2A 2 pole axial fixture
Up to 500J for sensor applications



A custom 2 pole axial fixture water-cooled for loudspeaker production



A custom radial fixture connected to a M12kJ workstation

Magnetising process feedback options – fluxmeters and gaussmeters

Fluxmeters: The IFM06 Fluxmeter measures the total magnetic flux with an external coil (usually Helmholtz for measurement or a search coil or custom coil fixture for production magnetisation). In a production environment the Fluxmeter when used with a search coil can be integrated with Hirst Magnetisers and other production control systems via a range of industry standard interfaces to optimally magnetise the production part and generate the highest yield production process possible today.

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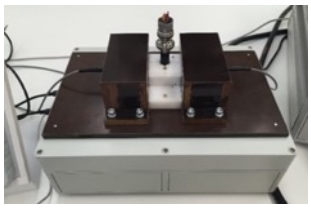
Gaussmeters: In certain projects point magnetic field measurements are the best feedback and a gaussmeter can be used.

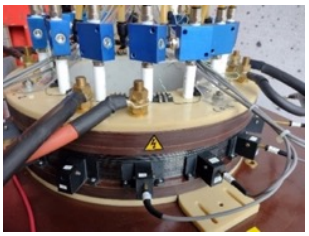
Above GM08 gaussmeter and transverse probe

GM08 used to test J2a fixture field

Hirst can provide custom tooling for these measurements, or even embed gaussmeter probes into the fixture.



Gaussmeter probes integrated into a calibration fixture for a sensor application



Gaussmeter probes embedded into a 16-pole fixture for an IPM motor for EV application

Warranty and Calibration

Supplied calibrated with 1 year warranty. A calibration 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.

Product and Application examples

MCSD-100J Magnetiser

MCSD500J Benchtop-midi magnetiser

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MCSD200J magnetiser and custom fixture and 2 gaussmeter probes GM08 used for navigation sensor production

A custom M12kJ magnetiser workstation with custom fixture for valve actuator application

MCSD-100J Magnetiser with custom fixture for production of critical aircraft sensors with IFM06 Fluxmeter control in a production rack

M8kJ magnetiser workstation with 2 pole custom fixture for loudspeaker production

M4kJ workstation with custom fixture and high throughput conveyor system with 1.2 second duty cycle running 24hrs a day

M800-400kJ Magnetising system with handling equipment and custom 2 pole fixture for magnets used in the recycling industry weighing up to 1 Tonne

M3000- 40kJ Magnetiser with custom skewed multipole fixture for IPM motor applications with IFM06 fluxmeter and embedded gaussmeter feedback

Above a custom 2 pole fixture for use with a M800-400kJ magnetiser for manufacturing 1.4 tonne magnets for use in recycling applications

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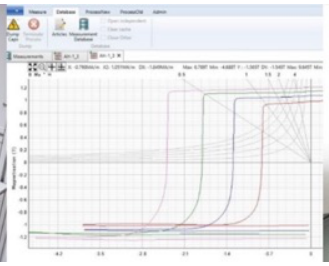
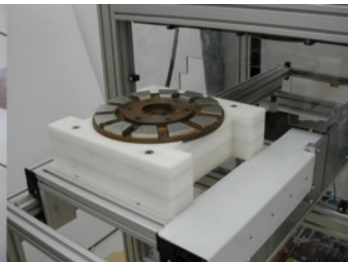
Above a M12kJ workstation with custom fixture for medium IPM motor production

Above a custom production enclosure containing a M3000-100kJ magnetiser

Hirst Magnetic Instruments has been active in providing solutions for 60 years in magnetics and magnetic measurement. Hirst manufactures precision hand-held gaussmeters, Fluxmeters, de-magnetisers, 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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