



## MFC3045 NMR MAGNETIC FIELD CAMERA UP TO 32 POINTS WITHIN 5 SECONDS

This Field Camera system has revolutionized field mapping for MRI magnets. The acquisition time has been reduced from several hours to a few minutes. In addition to reducing human errors and remaps, rapid mapping avoids inconsistencies due to the drift of the magnet. The probe positioning error has been also reduced by an order of magnitude.

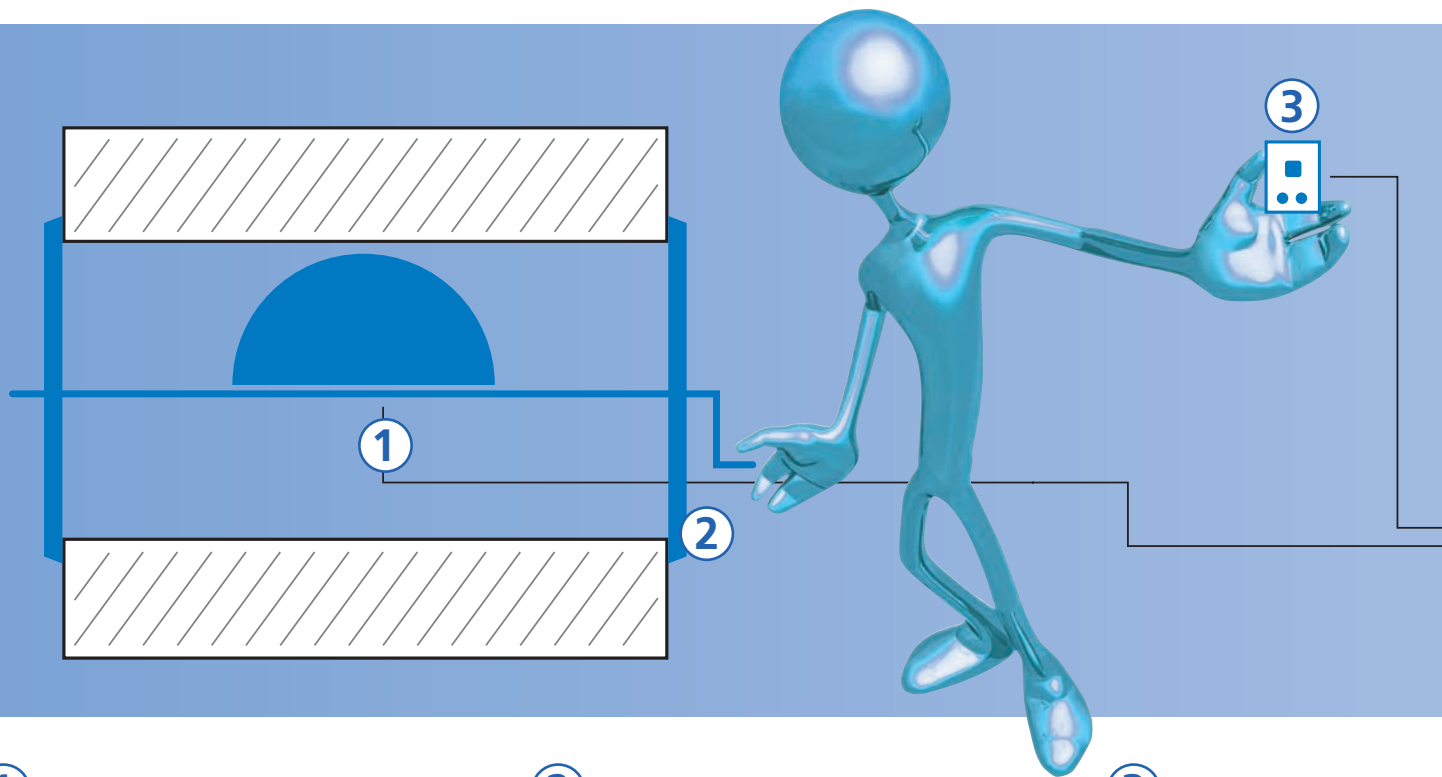
- Single operator system
- Standard or customized array of NMR probes
- Field range: 0.2 to 7 Tesla
- Mapping accuracy:  $\pm 0.2$  ppm
- Resolution: 0.01 ppm

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# MFC3045 NMR MAGNET MAPPING CAMERA UP TO 32 POINTS V



- 1 PROBE ARRAY**  
The mapping is performed by measuring points on the surface of a spherical or ellipsoidal volume by rotating a probe array around the magnet center line. The NMR probes are precision-mounted in a semi-circular pattern on a lightweight and perfectly flat composite base plate. A standard probe array includes up to 32 probes. Each probe array can be specifically tailored to your magnet, with a customized number of probes, shapes and field strengths.

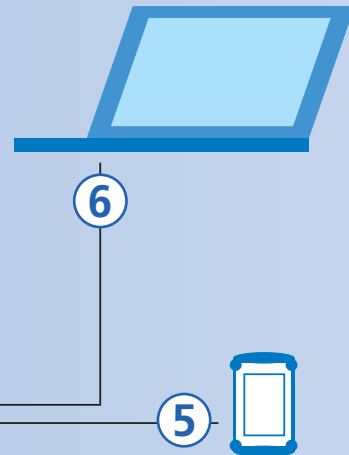
- 2 PROBE ARRAY HOLDER (OPTIONAL)**  
Mechanical device designed to hold the probe array and to rotate it inside the magnetic field, with a selection of up to 36 angles per full rotation. Built of non-magnetic material, different models are adapted for solenoidal or dipole magnets. Positioning precision < 1 mm.

- 3 REMOTE CONTROL UNIT**  
Connected to the Main Unit, the remote control allows the operator standing near the magnet to initiate a measurement once he has placed the jig at the correct angle.



# MAGNETIC FIELD CAMERA WITHIN 5 SECONDS

The measurement of the magnetic field is based on the NMR CW (Continuous Wave) principle, with frequency modulation. Fields from 0.2 to 7 T are measured with a relative precision better than 0.2 ppm. The stability and resolution of the system allow superconducting decay monitoring. The user can modify all measurement parameters.



## 4 MAIN UNIT

The computational heart of the Magnetic Field Camera, housed in a tough aluminium case, placed at the base of the magnet to be mapped. The MFC3045 processes 32 NMR channels in parallel, and includes an Oven-Controlled Crystal Oscillator (OCXO) for long-term stability.

## 5 POWER SUPPLY

Sensitive to magnetic fields, the power supply is generally placed near the computer.

## 6 ACQUISITION SOFTWARE

The system is computer controlled via an RS-232 or USB interface. A Windows program is provided with the system and gives the user easy control over all operations. This software is written in LabVIEW, and is compatible with Windows XP or later. Alternatively, the customer can write his own acquisition software; all interfaces are fully documented.



# MFC3045: SPECIFICATIONS AND OPTIONS

## MAIN UNIT MFC3045

Measurement principle	NMR (nuclear magnetic resonance of protons)
Magnetic field range	0.2 to 7 Tesla
Absolute accuracy	better than $\pm 5$ ppm
Resolution	0.01 ppm of measurement (RF > 10MHz) or 0.1 Hz (RF $\leq$ 10MHz)
Reference clock	Oven-Controlled Crystal Oscillator (OCXO)
Reference clock stability	$< \pm 0.1$ ppm over -25 to 70 °C, $< \pm 1$ ppb/day down to 0.03 to 0.05 ppm over a period of 3 days
Readings	all probes simultaneously
Mapping time	5 seconds (typical)
Interface	RS-232-C or USB (optional)
Operating temperature	10 °C to 40 °C
Storage temperature	-20 °C to +70 °C
Humidity	non-condensing
Magnetic environment	0.2 Tesla
Dimensions	270 x 210 x 75 mm
Weight	3 kg

## POWER SUPPLY MFC3046

Power requirement	40 VA max, 90 - 264 VAC, 47 - 63 Hz
Dimensions	210 x 120 x 50 mm
Cable length (MFC3045-CP)	from power supply to main unit: 10 meters
Weight	1.5 kg

## PROBE ARRAY MFC3048

Probe tuning	to one dedicated frequency
Frequency range	typically $\pm 2\%$
Probe position accuracy	better than $\pm 0.3$ mm
Discrepancy between probes placed in the very same magnetic field	$\max \pm 0.2$ ppm
Noise level in optimal conditions	down to 0.02 ppm RMS
Cable attached to the probe array	4 meters
Weight	approximately 3 kg (for the half moon)

## USB INTERFACE MFC-USB

Most modern laptops no longer have an RS-232 output. This option builds a USB to RS-232 adaptor right into the MFC3045 main unit.

## PROBE ARRAY HOLDERS

MFC3039: Horizontal probe array holder, for solenoidal magnets. Can be adapted for cryostat length, bore and mount points.

MFC3040: Vertical probe array holder, for dipole magnets. Can be adapted to most "open" magnets using a MFC3040-ADP adaptor plate.

## NORMALIZATION

The probe array needs to be normalized to compensate for small differences in magnetic susceptibility of the material surrounding each probe. The normalization can be performed at the factory or by the customer, using a NJIG\_xx-yyy normalization template (xx = # points, yyy = diameter in mm).

## TRANSIT CASE MFC-TC

Lightweight and robust carrying and transit case for the entire MFC3045 system, excluding the probe array holder. Dimensions 85 x 45 x 63 cm.

## TRAINING

Upon request, Metrolab can provide customized, on-site training for your technicians on the use of the MFC3045.

For detailed specifications,  
please see <http://www.metrolab.com>

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