

# MFC2046: SPECIFICATIONS AND OPTIONS

## SYSTEM MFC2046

Measurement principle	Pulsed wave NMR (Nuclear Magnetic Resonance of protons)
Resolution	0.01 ppm in uniform 1.5 T field (typical)
Mapping time	5 seconds per angle (typical, depends on parameters)
Readings	All probes sequentially
Operating temperature	10 – 40 °C; no air inlet
Power	50 VA, 100 – 240 VAC, 50/60 Hz

## MAIN UNIT PT2026

Frequency range	1 MHz – 1 GHz
Absolute accuracy	± 5 ppm, independent of temperature
Max gradient	> 1000 ppm/cm
Measurement rate	Up to 33 Hz (single probe)
Magnetic environment	< 0.2 T (some magnetic components will generate mechanical forces)
Computer interface	USB / USBTMC and Ethernet / VXI-11; IEEE 488.2; SCPI
Clock connector	10 MHz; external Reference in or internal Reference out

## FIELD CAMERA AMPLIFIER FCA7046

Magnetic environment	< 1 T (some magnetic components can generate mechanical forces)
Cable length	From FCA7046 to Main Unit: 10 meters

## PROBE-ARRAY MFC9046 / MFC9146

Measurement points	Up to 255 probes
Probe tuning	To one dedicated frequency
Wide range probe	One optional wide range probe with a dynamic range of x3 below the Probe Array nominal frequency
Magnetic field range	Nominal Probe Array value ± 3% (typical)
Probe position accuracy	Better than ± 0.3 mm
Probe normalization	≤ ± 0.2 ppm (discrepancy between probes placed in exactly same field)
Size	MFC9046: DSV up to 500 mm MFC9146: magnet bore down to 40 mm diameter
Geometry	Standard sizes and geometries available, customizable on request
Cable length	4 meters

## SOFTWARE MFCTOOL V10

Supported Platforms	Microsoft Windows 7 or higher
Software API	Access to all system features
Operating modes	Search, Positioning, Mapping, Field drift, Ramping, Advanced, Normalization
Main Features	Graphical display, 3D plots, continuous or step-by-step measurements, save or load measurement file, MHz or Tesla units

## PROBE ARRAY HOLDERS

MFC3039: Horizontal Probe Array holder (solenoidal magnets).  
MFC3040, MFC3040-ADP: Vertical Probe Array holder and adaptor plate (dipole magnets).

## NORMALIZATION

Can be performed at factory or by customer, using normalization template NJIG\_xx-yyy.

## TRANSIT CASE MFC-TC

Lightweight and robust, for entire MFC2046 system excluding Probe Array holder.

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

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Specifications subject to change



## MFC2046 NMR MAGNETIC FIELD CAMERA A REVOLUTIONARY SOLUTION – NOW EVEN MORE SO

Introduced 25 years ago, Metrolab's NMR Magnetic Field Cameras have revolutionized field mapping for MRI magnets. They reduced acquisition times from hours to minutes, positioning errors to fractions of a millimeter, and they rendered human and drift errors negligible.

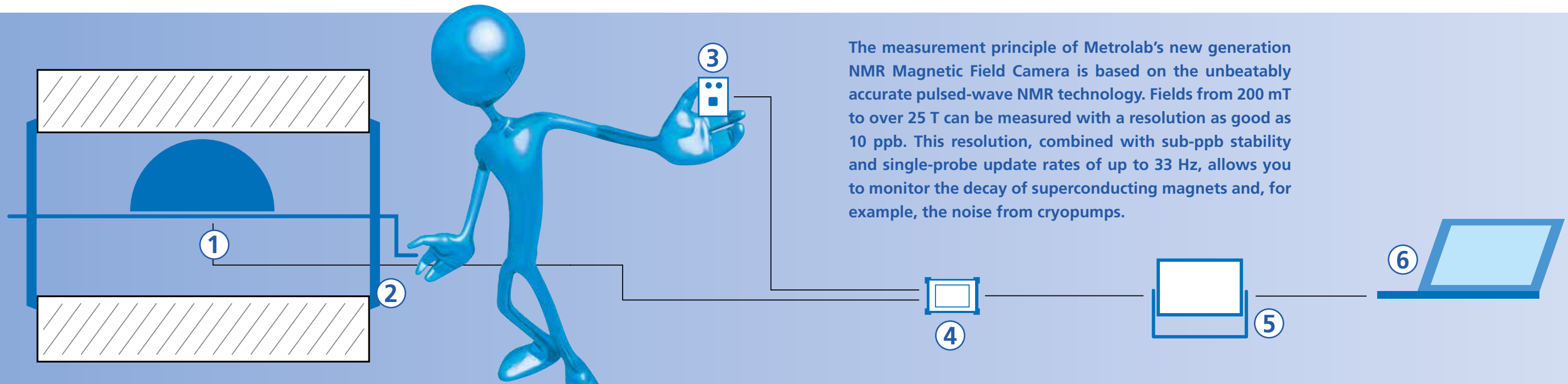
The latest generation NMR Magnetic Field Camera, the MFC2046, delivers even more:

- More measurement range: now for fields to over 1 GHz, or 25 T
- More magnet geometries: now for magnet bores as small as 40 mm
- More measurement points: now up to 255 probes
- More flexibility: now a single instrument for multi-point mapping and single-point measurements
- More efficient workflow: now with a wide range probe for field ramping
- More modern connections: now with USB and Ethernet interfaces
- More user-friendly software: now task driven and with real-time data acquisition
- More value for your money: all these benefits at the same system price

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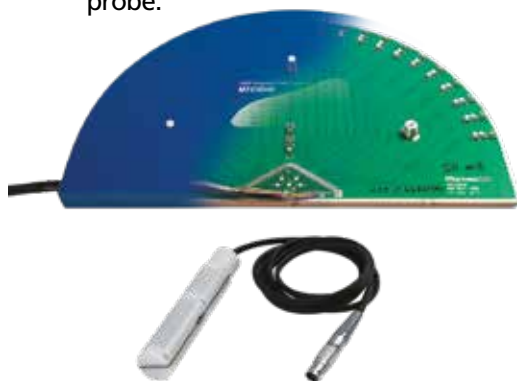
# MFC2046 NMR MAGNETIC FIELD CAMERA

## A REVOLUTIONARY SOLUTION – NOW EVEN MORE SO

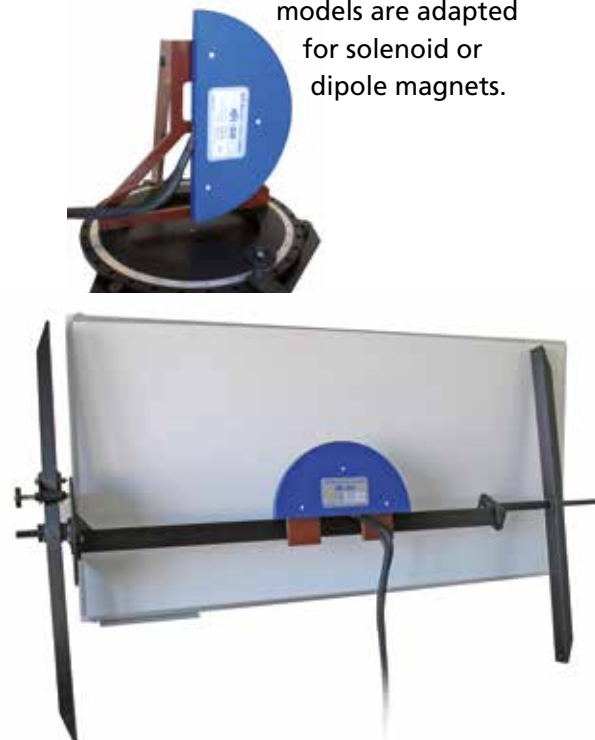


The measurement principle of Metrolab's new generation NMR Magnetic Field Camera is based on the unbeatably accurate pulsed-wave NMR technology. Fields from 200 mT to over 25 T can be measured with a resolution as good as 10 ppb. This resolution, combined with sub-ppb stability and single-probe update rates of up to 33 Hz, allows you to monitor the decay of superconducting magnets and, for example, the noise from cryopumps.

**1 NMR PROBE ARRAY**  
Measures the field at multiple points, usually on a sphere or cylinder generated by rotating the Probe Array around its centerline. Each Probe Array is tailored to your magnet, with an appropriate field strength, geometry and number of probes. The standard-size Probe Array MFC9046 supports up to a 500 mm DSV, and the new mini Probe Array MFC9146 supports magnet bores as small as 40 mm. The new generation Probe Arrays are mechanically compatible with previous instruments, but can provide an unprecedented point density, with a theoretical limit of 255 measurement points, including an optional wide range probe.



**2 PROBE ARRAY HOLDER (OPTIONAL)**  
Allows an operator to rotate the probe array inside the magnet, accurately and reproducibly. Constructed of nonmagnetic materials, with a positioning precision of < 1 mm. Different models are adapted for solenoid or dipole magnets.



**3 REMOTE CONTROL**  
Allows the operator standing near the magnet to initiate a measurement once they have placed the Probe Array Holder at the correct angle.



**4 FIELD CAMERA AMPLIFIER**  
Interfaces the Probe Array to the Main Unit. Equipped with a robust HARTING connector for MFC9046 Probe Arrays, or a compact LEMO connector for MFC9146 Probe Arrays.



**5 MAIN UNIT**  
Controls the measurements. Metrolab's NMR Precision Teslameter PT2026 has already established itself as the world's most precise magnetometer, using single-point probes. Now the same technology comes to multi-point field mapping; with the Camera firmware option, the PT2026 will recognize the Field Camera Amplifier, in addition to standard probes and multiplexers.



**6 ACQUISITION SOFTWARE**  
Provides a modern, task driven user interface. It connects to the Main Unit via USB or Ethernet. The software supports both the "classic" Metrolab file format as well as a powerful new XML-based format. A plugin module now also allows your analysis software to recover the measurement results in real time. Soon, the same software will support the previous generation Magnetic Field Camera MFC3045.

