

## NMR MAGNETIC FIELD CAMERA MFC2046

PRECISION FIELD MAPPING FOR MRI AND NMR MAGNETS



*Global Market leader for precision magnetometers*

Launched 25 years ago, Metrolab's NMR Magnetic Field Cameras expedite field mapping for Magnetic Resonance Imaging (MRI) magnets. They reduce acquisition times from hours to minutes, positioning errors to fractions of a millimeter, and they render human and drift errors negligible.



Extended measurement range with fields up to 1.1 GHz or 30 T



User-friendly software: task-driven and with real-time data acquisition



Efficient workflow: MRI probe arrays can include a wide-range probe for field ramping



Improved flexibility: a single instrument for multi-point mapping and single-point measurements



Up to 255 probes on a probe array



Standard USB and Ethernet interfaces



Wide selection of probe array geometries to map MRI magnets or NMR spectroscopy magnets



ISO 17025 ACCREDITED

### ABOUT METROLAB

We are the **global market leader** for precision magnetometers.

Established in Switzerland in **1985**, we have won the trust of all the large physics laboratories and all leading players in Magnetic Resonance Imaging, **across the world**.

With Metrolab, you measure magnetic fields with **Swiss precision and quality**.



## PRECISION FIELD MAPPING FOR MRI AND NMR SPECTROSCOPY MAGNETS

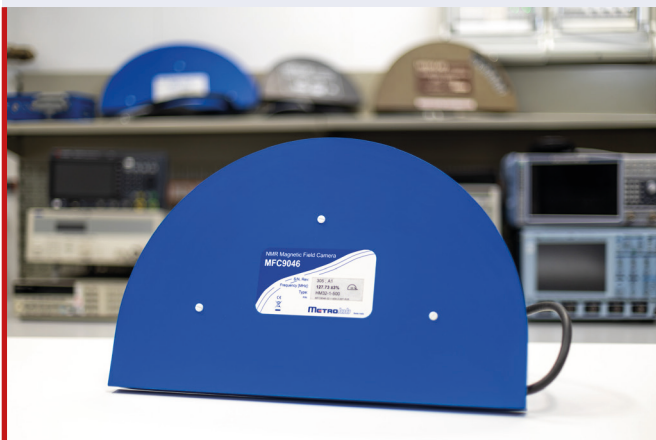
The measurement principle of Metrolab's new generation NMR Magnetic Field Camera is the unbeatably accurate pulsed-wave NMR technology. It measures Fields from 200 mT to over 30 T with a resolution as good as 10 ppb. This resolution, combined with sub-ppb stability and single-probe update rates of up to 33 Hz, allows you to monitor the decay of superconducting magnets and, for example, the noise from cryopumps.

### 01 NMR PROBE ARRAY

Maps the field, usually on a sphere or a cylinder generated by rotating the Probe Array around its centerline.

Tailor each Probe Array (field strength, geometry, number of probes) to your magnet. The Probe Array MFC9046 supports up to a 600 mm DSV, and the Probe Array MFC9146 supports down to 20 mm magnet bores.

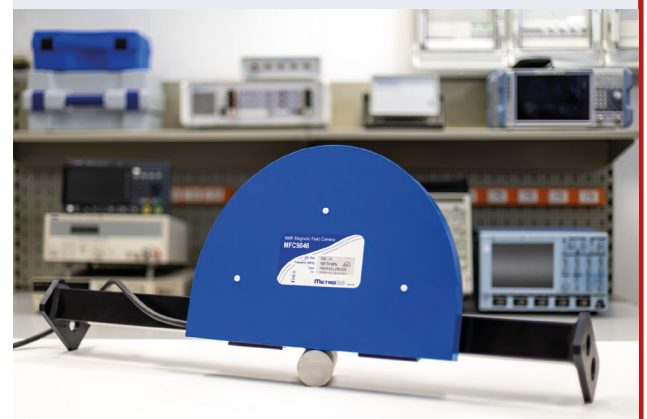
They are mechanically compatible with previous holders and provide an unprecedented high measurement point density, with a limit of 255 points, including an optional wide-range probe.



### 02 PROBE ARRAY HOLDER (OPTIONAL)

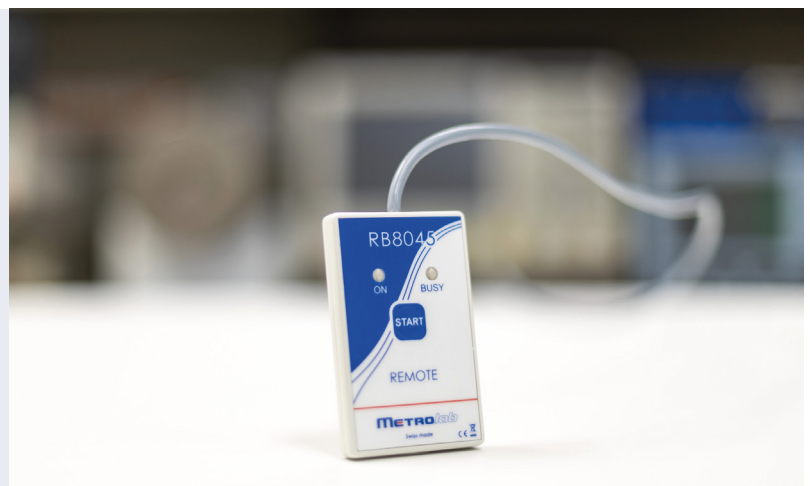
Allows the operator to rotate the Probe Array inside the magnet, accurately and reproducibly.

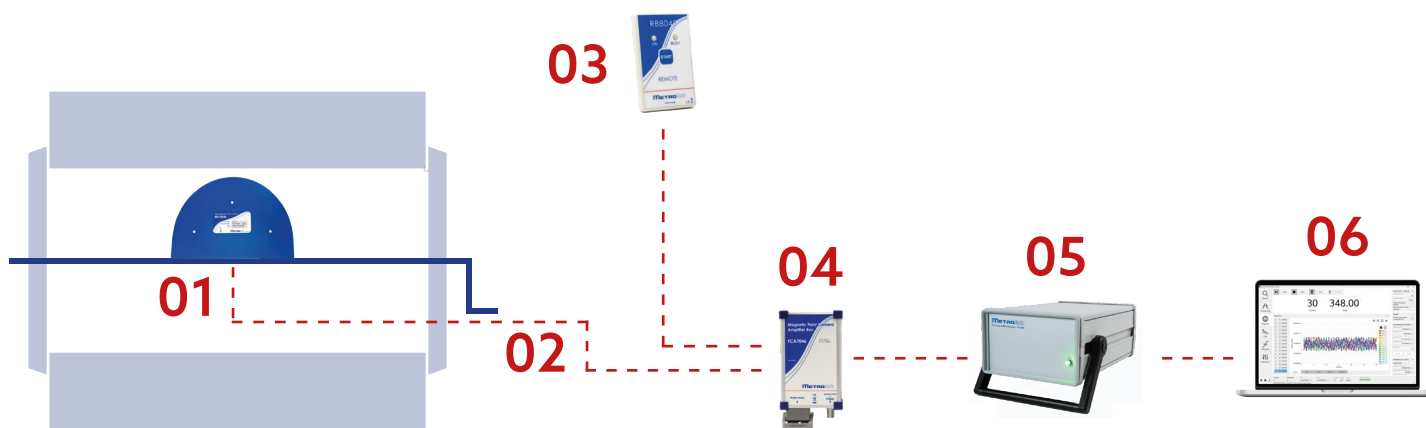
Constructed of non-magnetic materials, with a positioning precision of < 1 mm. Different models are adapted for solenoid or dipole magnets.



### 03 REMOTE CONTROL

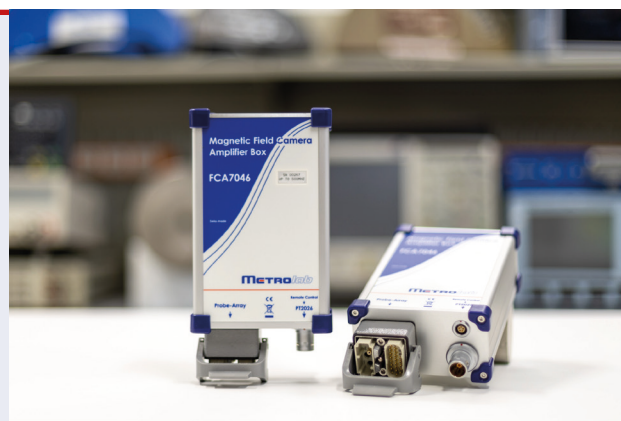
Allows the operator standing near the magnet to initiate a measurement once the Probe Array Holder is set at the correct angle.





## 04 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.



## 05 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.

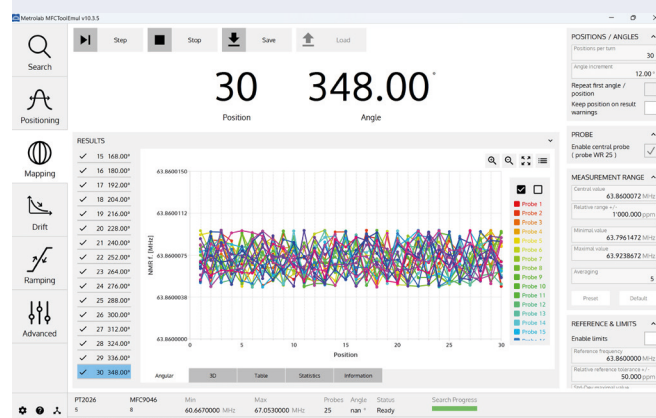
Now the same technology comes to multi-point field mapping; with the Camera firmware option, the PT2026 recognizes the Field Camera Amplifier, in addition to standard probes and multiplexers.



## 06 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.



## SYSTEM MFC2046

MEASUREMENT PRINCIPLE	Pulsed wave NMR (Nuclear Magnetic Resonance of protons)
RESOLUTION	< 0.01 ppm in uniform 1.5 and 3.0 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 – 1.1 GHz
ABSOLUTE ACCURACY	±5 ppm, independent of temperature
MAX GRADIENT	> 1000 ppm/cm at 1 T field
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

## 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 nominal Probe Array value
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 600 mm MFC9146: magnet bore down to 20 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 displays; 3D plots, continuous or step-by-step measurements, MHz or Tesla units Save or load measurement file

## FIELD CAMERA AMPLIFIER FCA7046

MAGNETIC ENVIRONMENT	< 1 T (some magnetic components can generate mechanical forces)
CABLE LENGTH	From FCA7046 to Main Unit: 10 meters

## TRANSIT CASE MFC-TC

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

## PROBE ARRAY HOLDERS

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

## RECOMMENDED NORMALIZATION & CALIBRATION

Performed at factory

Warranty: **5 years**

Calibration interval of the main unit PT2026: **12 months**

Normalization interval of the probe array MFC9046: **12 months**

CE marked

Specifications are subject to change; for details and up-to-date specifications, see:  
[www.metrolab.com/products/nmr-magnetic-field-camera-mfc2046/](http://www.metrolab.com/products/nmr-magnetic-field-camera-mfc2046/)

### METROLAB TECHNOLOGY SA

110, ch. du Pont-du-Centenaire, 1228 Geneva, Switzerland

+41 22 884 33 11

contacts@metrolab.com

www.metrolab.com