

# MFC2046: SPECIFICATIONS AND OPTIONS



## SYSTEM MFC2046

<b>MEASUREMENT PRINCIPLE</b>	Pulsed wave NMR (Nuclear Magnetic Resonance of protons)
<b>RESOLUTION</b>	< 0.01 ppm in uniform 1.5 and 3.0 T field (typical)
<b>MAPPING TIME</b>	5 seconds per angle (typical, depends on parameters)
<b>READINGS</b>	All probes sequentially
<b>OPERATING TEMPERATURE</b>	10 – 40°C; no air inlet
<b>POWER</b>	50 VA, 100 – 240 VAC, 50/60 Hz

## MAIN UNIT PT2026

<b>FREQUENCY RANGE</b>	1 MHz – 1.1 GHz
<b>ABSOLUTE ACCURACY</b>	±5 ppm, independent of temperature
<b>MAX GRADIENT</b>	> 1000 ppm/cm at 1 T field
<b>MEASUREMENT RATE</b>	Up to 33 Hz (single probe)
<b>MAGNETIC ENVIRONMENT</b>	< 0.2 T (some magnetic components will generate mechanical forces)
<b>COMPUTER INTERFACE</b>	USB / USBTMC and Ethernet / VXI-11; IEEE 488.2; SCPI
<b>CLOCK CONNECTOR</b>	10 MHz; External Reference in or Internal Reference out

## FIELD CAMERA AMPLIFIER FCA7046

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

## SOFTWARE MFCTOOL V10

<b>SUPPORTED PLATFORMS</b>	Microsoft Windows 7 or higher
<b>SOFTWARE API</b>	Access to all system features
<b>OPERATING MODES</b>	Search, Positioning, Mapping, Field drift, Ramping, Advanced, Normalization
<b>MAIN FEATURES</b>	Graphical displays; 3D plots, continuous or step-by-step measurements, MHz or Tesla units Save or load measurement file

## PROBE ARRAY MFC9046 / MFC9146

<b>MEASUREMENT POINTS</b>	Up to 255 probes
<b>PROBE TUNING</b>	To one dedicated frequency
<b>WIDE RANGE PROBE</b>	One optional wide range probe with a dynamic range of x3 below the nominal Probe Array value
<b>MAGNETIC FIELD RANGE</b>	Nominal Probe Array value ±3% (typical)
<b>PROBE POSITION ACCURACY</b>	Better than ±0.3 mm
<b>PROBE NORMALIZATION</b>	≤ ±0.2 ppm (discrepancy between probes placed in exactly same field)
<b>SIZE</b>	MFC9046: DSV up to 600 mm MFC9146: magnet bore down to 20 mm diameter
<b>GEOMETRY</b>	Standard sizes and geometries available, customizable on request
<b>CABLE LENGTH</b>	4 meters

## NORMALIZATION AND CALIBRATION

Performed at factory  
 Warranty: 2 years  
 Calibration interval of the main unit PT2026: 12 months  
 Normalization interval of the probe array MFC9046: 12 months  
 CE marked

## PROBE ARRAY HOLDERS

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

## TRANSIT CASE MFC-TC

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

# MFC2046 NMR MAGNETIC FIELD CAMERA PRECISION FIELD MAPPING FOR MRI AND NMR MAGNETS

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.



Based on pulsed NMR technology, the **Magnetic Field Camera MFC2046** is an extension of the Precision Teslometer PT2026.

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

Wide selection of probe array geometries to map MRI magnets with DSV from 100 mm to 600 mm or NMR spectroscopy magnets with bores as small as 20 mm

Up to 255 probes on a probe array

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

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

Standard USB and Ethernet interfaces

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

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# MFC2046 NMR MAGNETIC FIELD CAMERA

## 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.



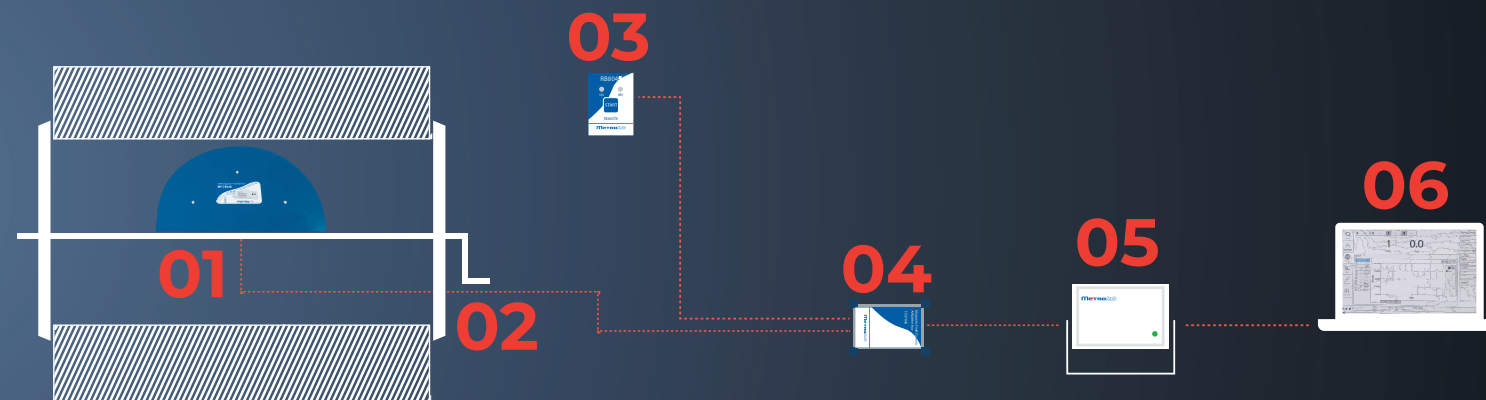
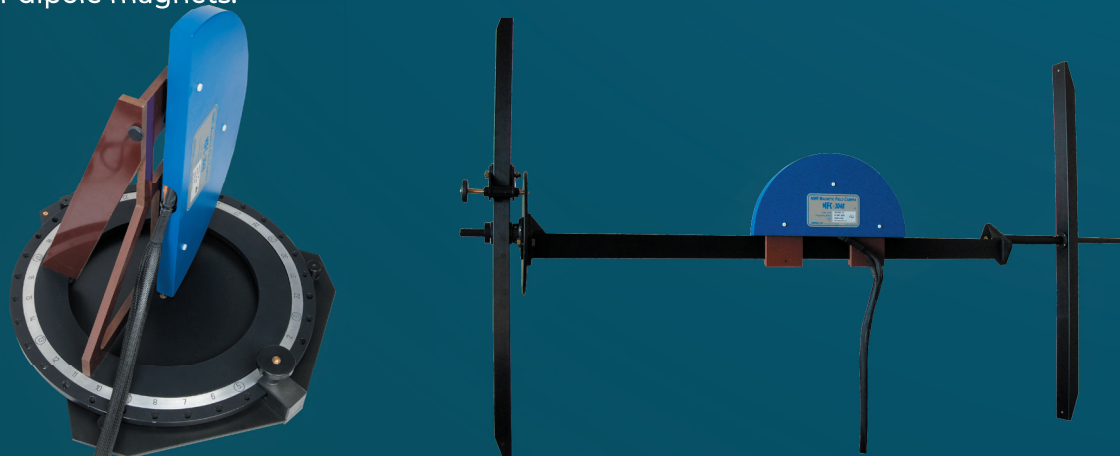
### 03 REMOTE CONTROL

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



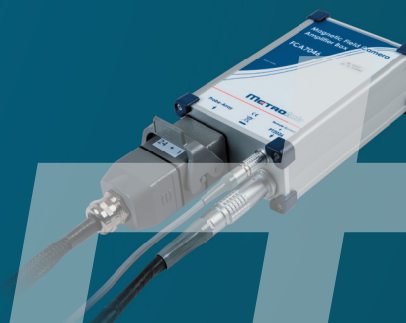
### 02 PROBE ARRAY HOLDER (OPTIONAL)

Allows the operator to rotate the Probe Array inside the magnet, accurately and reproducibly. Constructed of non-magnetic materials, with a positioning precision of <math>< 1\text{ mm}</math>. Different models are adapted for solenoid or dipole magnets.



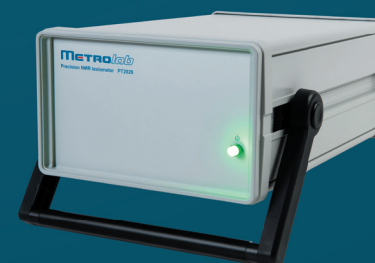
### 04 FIELD CAMERA AMPLIFIER

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.

