

## MAGNETIC FIELD HiTESTER 3470

Environmental Measuring Instrument



Fully Meeting the Testing Needs to Assure a Safer Environment Against Exposure to Magnetic Fields



Time domain evaluation complying with IEC 62233\*1 and EN 50366\*1 magnetic flux measurements to gauge human exposure to electromagnetic fields.

Choose from two magnetic field sensors: 100 cm<sup>2</sup> and 3 cm<sup>2</sup>.

Bundled with PC application offering RMS logging, batch export and tester setup functions.



ISO 9001  
JMI-0216



ISO 14001  
JQA-E-90091



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# Accurately measure magnetic field density to determine human exposure levels

## Features

■ **Exposure level measurements for compliance testing**  
Time domain evaluation as per IEC62233\*1 and EN 50366\*1

■ **A choice of two tri-axial isotropic magnetic field sensors**  
Two magnetic field sensors that have a cross-sectional area of 100 cm<sup>2</sup> and 3 cm<sup>2</sup>, respectively

■ **Memory function for saving measurement data**  
Store up to 99 measured data items like a digital camera stores images

■ **Three selectable magnetic flux density units**  
Select T (Tesla), G (Gauss) or A/m.

■ **Bundled PC application software**

The tester comes with three convenient functions available via the USB interface.

■ **Wide 10 Hz – 400 kHz measurement frequency band**  
Covers both commercial and IH (induction heating) frequency ranges.

■ **A wealth of output functions**

Output tri-axial waveforms and composite RMS values for analysis on an oscilloscope or monitoring on a PC.

■ **Three selectable magnetic flux density units**  
Select T (Tesla), G (Gauss) or A/m.

## Compliance testing of household appliances

The Magnetic Field HiTESTER 3470 easily and quickly provides tri-axial RMS and composite RMS values for the general public and occupational exposure levels as stipulated in ICNIRP 1998. This enables the tester to perform time domain evaluations as prescribed in IEC 62233\*1 and EN 50366\*1, making it the ideal tool for compliance testing of household appliances.

**Magnetic field sensor 3471** (100 cm<sup>2</sup>)  
Use this sensor for IEC 62233 and EN 50366 standard measurements

**Magnetic field sensor 3472** (3 cm<sup>2</sup>)  
Use this sensor for measuring spatial distribution of magnetic fields and for determining coupling factors in the standard.

## Customer service related to magnetic field testing

The exposure level measurement mode measures human exposures levels as a percentage of the reference level for human exposure level stipulated in ICNIRP 1998. These measurements can be used as a customer service in magnetic field testing other than product compliance testing. (\*)

(\*) Exposure level mode indicates a percentage (%) of the general public and occupational exposure levels set out in ICNIRP 1998. However, this does not indicate the level of risk involved.

## Magnetic Field HiTESTER 3470

**Easy to read axis indicator sensor!**

**Axis indication**  
R (composite)  X  Y  Z  
X (x-axis)  X  
Y (y-axis)  Y  
Z (z-axis)  Z

Mode for compliance testing of household appliances (ICNIRP 1998 General Public)

Measurement mode

Camera tripod screw and battery compartment (on the back)

Power switch and battery power indicator button

LED indicating connected sensor

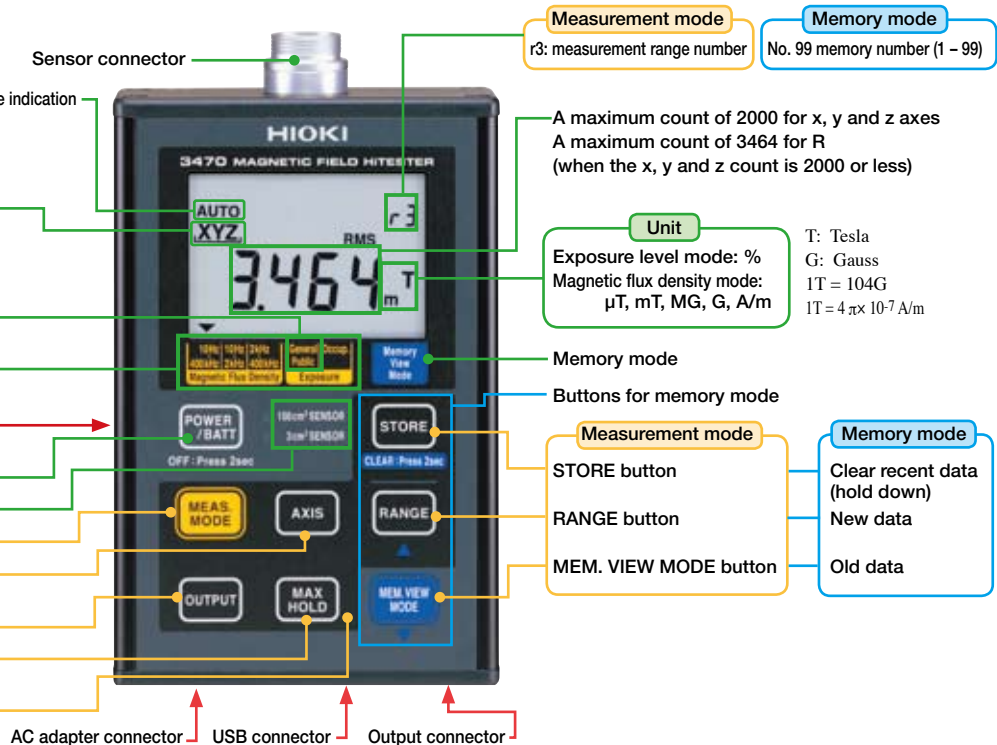
Measurement mode button

Axis button (R/x/y/z)

OUTPUT button (no output/tri-axial waveform/composite RMS)

MAX HOLD button

Buttons inside this frame are available in the measurement mode.



## Glossary

● **IEC 62233 and EN 50366**

IEC 62233 is an international standard while EN 50366 is a European standard for measuring human exposure to magnetic field emissions generated by household electrical appliances. The award of the CE mark requires passing an EN 50366 test.

● **ICNIRP 1998**

A set of guidelines announced by the ICNIRP (International Commission on Non-Ionizing Radiation Protection) in 1998 defining reference levels of general public and occupational exposure to magnetic and electrical fields

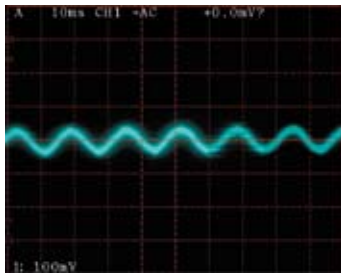
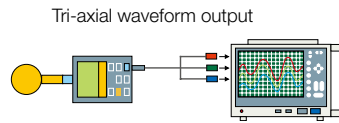
● **Time domain evaluation**

This is an evaluation method often combined with FFT and other frequency domain evaluation methods. The Magnetic Field HiTESTER 3470 uses an ICNIRP 1998 compliant filter to generate the necessary weighting in the instrument to enable time domain evaluation.

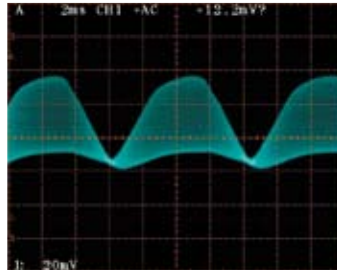
# Measurement examples provided by the output function

## Tri-axial waveform monitoring and FFT analysis

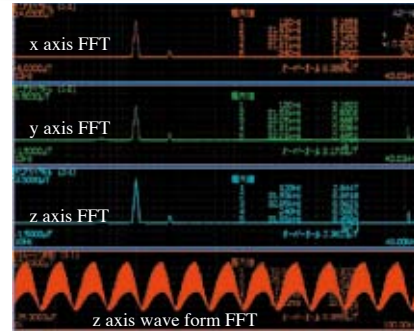
When connected to a Memory HiCORDER or oscilloscope, the Magnetic Field HiTESTER 3470 can output three-axial waveforms for monitoring both in the magnetic flux density and exposure level measurement modes.



■ Example of waveform measurement using 3471, 60 Hz, 0.1  $\mu$ T (= 1 mG)  
(When the tester is connected to an analog oscilloscope.)



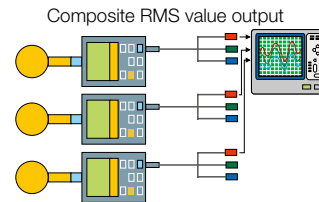
■ Example of IH equipment waveform measurement  
(When the tester is connected to an analog oscilloscope.)



■ 3-channel FFT measurement of IH rice cooker  
(When the tester is connected to an 8861 Memory HiCORDER.)

## Extended RMS measurements

The Magnetic Field HiTESTER 3470 enables recording of RMS values when connected to a logger or recorder. Two or more testers can be combined for simultaneous recording of data for separate locations.



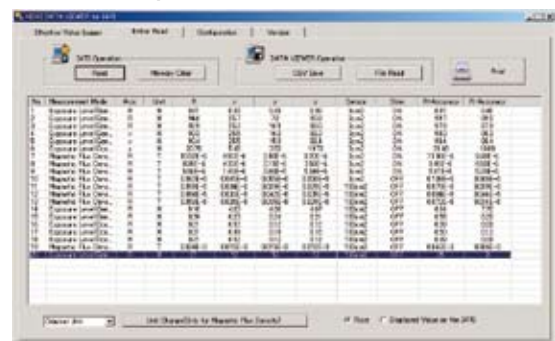
# USB interface links to three useful PC applications

### ● RMS logger



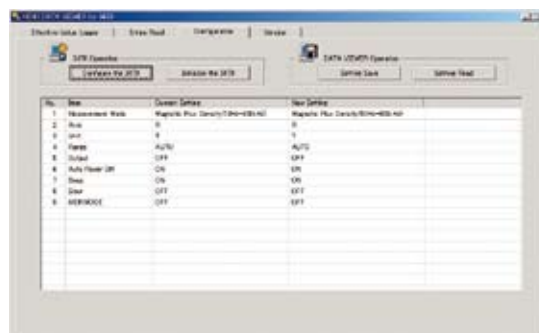
Connect the Magnetic Field HiTESTER 3470 to a PC for extended recordings of measurement data such as tri-axial (x, y, z) and composite (R) RMS values in CSV format. Select from three sampling methods: fixed interval, average and maximum value.

### ● Batch export



This function enables quick exporting of up to 99 measurement data items stored in the Magnetic Field HiTESTER 3470, a convenient feature when a device must be measured at multiple points.

### ● Tester Setup



The Magnetic Field HiTESTER 3470 can be set up from the PC application. The settings or measurement conditions are stored on the PC to permit any subsequent downloading that may become necessary

### ■ Application software specifications

**Compatible OS:** Windows 98, ME, 2000, XP

**Functions:** RMS logger, batch export and tester setup

**Maximum number of data items handled:** 32000 (RMS logger), 99 (batch export) measurement data items

**Storage format:** CSV format

## ● Magnetic Field HiTESTER 3470 specifications

Measurement accuracy will be maintained when the tester and sensor are used in an environment where the temperature is 23°C ±5°C and humidity is 80% RH or less and no condensation

### Basic specifications

#### ● Measurement mode

**Magnetic flux density** : 10Hz to 400kHz / 10Hz to 2kHz / 2kHz to 400kHz

**Exposure level** : General Public/ Occupational

(Exposure level is defined as a measurement method whereby the time domain evaluation introduced in EN 50366 and IEC 62233 applied to the magnetic flux density indicated in the ICNIRP 1998 Guidelines.)

Measurement range :

Range number	r0	r1	r2	r3	
Magnetic flux density	2.000 μT	20.00 μT	200.0 μT	2.000 mT	(At single axis)
Exposure level	20.00%	200.0%	2000%	-	(At single axis)

Range switching : Auto/manual

#### ● Indication


**Digital indication** : 2000 count for single axis and 3464 count for composite value R (a count of 2000 or less for the x, y and z axes)

**Indicated axes** : x, y, z, R

**Magnetic flux density unit** : T

**Exposure level unit** : %

**Switching magnetic flux density** : G (1T = 10<sup>4</sup>G), A/m (the magnetic permeability of air being  $4\pi \times 10^{-7}$ H/m, 1T =  $4\pi \times 10^{-7}$ A/m)

**Battery low warning** :  on icon lights (measurement accuracy is not guaranteed when this icon is on)

Maxi value hold indication : MAX

Auto power off indication : APS

**Display update rate** : 250 ms (slow function off)/approx. 2 s (slow function on)

#### ● Measurement items

**Measured axes** : x, y, z

**Measurement method** : True rms

**Measurable magnetic flux density** : (Frequency derating)

Measurement items	Magnetic flux density (Tesla)	Magnetic flux density (Gauss)	Magnetic flux density (A/m)
x, y, z	0.050μT <sup>*1</sup> to 2.000mT	0.50mG <sup>*1</sup> to 20.00G	0.040A/m <sup>*1</sup> to 1592A/m
R	0.100μT <sup>*2</sup> to 3.464mT <sup>*3</sup>	1.00mG <sup>*2</sup> to 34.64G <sup>*3</sup>	0.080A/m <sup>*2</sup> to 2757A/m <sup>*3</sup>

\*1: Range r0 for the magnetic field sensor 3472 is 0.2 μT (= 2 mG = 0.16 A/m) in the magnetic flux density mode (10 Hz - 400 kHz and 10 Hz - 2 kHz).

\*2: Range r0 for the magnetic field sensor 3472 is 0.4 μT (= 4 mG = 0.32 A/m) in the magnetic flux density mode (10 Hz - 400 kHz and 10 Hz - 2 kHz).

\*3: 2 mT (= 20 G = 1592 A/m) or less for x, y and z

**Combined indication accuracy** : ±3.5%rdg.±0.5%f.s. (when combined with a 3471 or 3472 magnetic field sensor with the same model number)

Prescribed accuracy range :

Measurement items	Measurement mode	Prescribed accuracy range	f.s.
x, y, z <sup>*4</sup>	Magnetic flux density mode	0.050μT to 2.000mT	2000 count
	Exposure level mode	0.50% to 2000%	
R <sup>*5</sup>	Magnetic flux density mode	0.100μT to 3.464mT	3464 count
	Exposure level mode	1.00% to 3464%	

Range r0 (10 Hz - 400 kHz and 10 Hz to 2 kHz) in the magnetic flux density mode for the magnetic field sensor 3472 is described below

Measurement items	Measurement mode	Prescribed accuracy range	f.s.
x, y, z <sup>*4</sup>	Magnetic flux density mode (10Hz to 400 kHz, 10 Hz to 2 kHz)	0.200μT to 2.000μT	2000 count
		0.400μT to 3.464mT	3464 count

\*4: Specified at an input of 50 counts or more of the range \*5: Specified at 100 counts of the range and where the total x, y and z input is 2000 counts or more

Prescribed accuracy range (frequency) :

Measurement mode	Prescribed accuracy range
Magnetic flux density mode (10Hz to 400kHz)	50Hz to 120kHz
Magnetic flux density mode (10 Hz to 2 kHz)	50Hz to 1kHz
Magnetic flux density mode (10Hz to 400kHz)	5kHz to 120kHz
Exposure level (General Public)	Prescribed at 50 Hz and 10 kHz of the 10 Hz to 400 kHz band in ICNIRP 1998
Exposure level (occupational)	

#### ● Output

**Output mode** : Magnetic flux density (T or G; A/m indication can be converted to T) or exposure Output mode e level

**Output voltage rate** : 200 mV/f.s. (f.s. for single axis of each range; single axis f.s. is also used for composite RMS value)

**Output type/accuracy** : tri-axial waveform, composite RMS/indication accuracy ±2 mV

### General specifications

**Interface** : USB 1.1

**Memory function** : Records up to 99 measurements

**Auto power off** : 10 min after last operation

**Buzzer sound** : Can be turned on/off

**Temperature characteristics** : 0.1x accuracy specification/ °C at 0 to 40°C

**Storage environment** : -10 to 50°C, 80% RH or less (no condensation)

**Operating environment** : 0 to 40°C, 80% RH or less (no condensation)

**Period of guaranteed accuracy** : 1 year

**Power supply** : Size AA alkaline batteries (LR6) × 4 or AC adapter

**Battery life** : Approx. 10 h

**Dimensions & mass** : 100(W)×150(H)×42(D) mm, 870 g (including batteries)

**Applicable standards** : Safety EN61010-1:2001

EMC EN61326:1997+A1:1998+A2:2001+A3:2003

EN61000-3-2:2000 EN61000-3-3:1995+A1:2001

**Accessories** : User's Guide, CD-R (proprietary PC application), USB cable, size AA batteries (LR6) × 4, carrying case

## ● Magnetic field sensor 3471/3472 specifications

**Sensor cross-sectional area** : 3471; 100 cm<sup>2</sup>  
3472; 3 cm<sup>2</sup>

**Rated magnetic flux density** : 2 mT (frequency derating)

**Frequency characteristics** : 10Hz to 400kHz

**Measured axes** : x, y, z

**Storage** : -10 to 50°C, 80% RH or less (no condensation)

**Operating** : 0 to 40°C, 80% RH or less (no condensation)

**Period of guaranteed accuracy** : 1 year

**Dimensions & mass** : 3471; Ø122×295 (L) mm • 220g

3472; □27×165 (L) mm • 105g

**Applicable standards** : Safety EN61010-1:2001

EMC EN61326:1997+A1:1998+A2:2001+A3:2003

EN61000-3-3:2000 EN61000-3-3:1995+A1:2001

#### \*1 ICNIRP1998

### MAGNETIC FIELD HiTESTER 3470-01

**Includes:** Magnetic Field HiTESTER 3470  
Magnetic field sensor 3471 (3 axis, 100 cm<sup>2</sup> sensor)  
AC adapter 9445-02 or 9445-03 (EU)

### MAGNETIC FIELD HiTESTER 3470-02

**Includes:** Magnetic Field HiTESTER 3470  
Magnetic field sensor 3471 (3 axis, 100 cm<sup>2</sup> sensor)  
Magnetic field sensor 3472 (3 axis, 3 cm<sup>2</sup> sensor)  
AC adapter 9445-02 or 9445-03 (EU)  
Extension cable 9758  
Output cable 9759

### Options

**Extension cable** 9758 (length from sensor to tester: 1.5m)  
**Output cable** 9759 (1.5 m, output BNC terminal x 3)

The extension cable 9489 for connecting insulation BNC is available upon special order. Please inquire with your authorized HIOKI distributor.

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