

MAGNETIC-FIELD / LOW-FREQUENCY TEST SYSTEM & EQUIPMENT

FOR EMISSION AND IMMUNITY TESTS

acc. to automotive and military standards



MAGNETIC-FIELD / LOW FREQUENCY TEST SYSTEM – MTS-800



Description

The MTS-800 is a compact test system for broadband generation and measurement of magnetic fields. Its internal components allow automatic EMC tests according to automotive standards where high field strength need to be generated or measured.

In combination with our triaxial Helmholtz coils full automated susceptibility tests are possible at magnetic field strength up to 1000 A/m for frequencies from DC to 1 kHz. Lower field strength can be generated for frequencies up to 250 kHz. Due to the triaxial set-up of our Helmholtz coil major improvement in device handling is achieved because there is no need to turn an EUT during tests.

Tests and measurements are controlled by a program which will set most parameter automatically. For any relevant standard, which are fulfilled by the MTS-800, limit values are already included into the software package, although any different value can be defined by a user. After every test full reports will be created automatically. Report layout is pre-defined, though any user-defined layout is possible. High performance is guaranteed by a self-calibration process which utilizes an internal source as reference.

Applications:

Magnetic Field Generation

MTS-800 enables a user to generate strong magnetic fields up to 1000 A/m. Even alternating fields up to 250 kHz can be generated by the magnetic test system.

Low Frequency emission and immunity tests

acc. to MIL-STD 461, CE 101, RE 101, CS 101, CS 109 and RS 101. Individual software modules and hardware accessories are available for each of these tests.

Automotive Testing

Intensive testing is required for new products which should be used in any automotive application. The MTS-800 allows fast and easy testing according to many automotive standards as described before.

Special Features:

- Frequency range for emission and immunity measurements: DC–250kHz
- 800W precision power amplifier, signal generator and spectrum analyzer in one compact unit
- All instruments may as well be used as stand-alone devices
- Powerful but easy to operate software, fully expandable for future standards modifications
- Standard software allows easy operation, report generation and integration of external measuring instrument for EUT monitoring
- Prepared for connection of external multimeter for EUT control
- Fully automated tests with triaxial Helmholtz coil. Software controlled generation of magnetic field in x-, y- and z- direction; no need to turn the EUT!
- Large variety of extensive accessories available
- The MTS-800 complies to all magnetic field requirements of relevant EMC and military standards

Options:

- Common mode test adapter for balanced signal and control connections according to IEC/EN 55103-3
- Calibration network for common mode test adapter according to IEC/EN 55103-2
- Current transducer for balanced video connections according to IEC/EN 55103-2
- Enclosed variable transformer for short term field according to IEC/EN 61000-4-8; prim. 230 V, sec. 0 to 230 V, max. current 20 A; incl. supply cable

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Technical specifications

Voltage input (Analyzer)

Frequency range	DC – 250 kHz
Input impedance	1 M Ω / 50 Ω switchable
Connector	XLR, unbalanced
Max. input voltage	100 V continuous (attenuator autoset at overvoltage); 10 V at 50 Ω
Gain	-20/0/20 dB Preamplifier, 0/20/40 dB ADC Amplifier; Self-calibration with ultra stable on-board reference

Current input

Frequency range	DC – 250 kHz
Shunts	10 m Ω / 1 Ω / 100 Ω
Max. input current	20 A continuous (overload protection); 1 Ω and 100 Ω shunt are protected by an additional 1.5 A fuse
Connector	4 mm safety jack (+, -) measurement via insulation amplifier or input jacks
Measurement range	20 A, 10 A, 1 A, 100 mA, 10 mA, 1 mA automatic offset and gain; Self-calibration with ultra stable on-board reference

AD converter

Resolution	16 Bit
Sampling rate	1.25 MSPS
Aliasing filter	0.01 dB Tschebyscheff filter, f_g = 260 kHz; filter may be switched off

Generator

Frequency range	DC – 250 kHz
Output impedance	50 Ω
Connector	BNC, unbalanced
Signal	Sine wave / triangular / square wave / DC
Amplitude	0 to 10 VAC, -10 V to +10 VDC
Resolution	12 Bit (2.5 mV), Switchable - 20 dB Attenuator; Self-calibration with ultra stable on-board reference

Amplifier

Frequency range	DC – 1 MHz
Connector	4 mm safety jacks (output); BNC, unbalanced (input)
Current	16 Arms
Voltage	50 Vrms / 75 VDC
Distortion (DC-100 kHz, load \geq 4 Ω)	< 0.10 %

General data

EUT control / Connector	9-pin Sub-D; RS232
Connection to Computer	USB
Temperature range	0 to 40 $^{\circ}$ C
Warm-up time	15 min.
Housing	19"-Subrack or desktop case
Dimensions (W x H x D)	449 x 177 x 580 mm
Weight (shipping)	approx. 40 kg (net 34 kg)
Gain	10 \pm 0.1% (\pm 0.01% / $^{\circ}$ C)

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Features:

Automatic Testing Capabilities

Full compliance with several immunity test as ISO 11452-8, MIL-STD-461 RS101, CS101, CS109, IEC/EN 55103-2, IEC/EN 61000-4-8, SAE J1113-2, SAE J1113-22, Ford ES-XW7T-1A278-AC, GM W3097, PSA B21 7110, Renault 36-00-808, DC-11224, DC 10614 and similar standards. Furthermore the MTS-800 allows emission measurements according to MIL-STD-461E/F RE101, CE101 and IEC/EN 55103-1.

Software

Any function is controlled via a software which also guide the user through any test or measurement. Adaptation of signal strength or measurement graphs are possible at any stage. User defined signals complement the usage for fast and reliable tests. The software is written in LabVIEW which guarantees stable and fast performance on any Microsoft® Windows platform.

Components

MTS-800 consists of 3 independent modules: a signal generator (DC – 250 kHz), a power amplifier (800 W output maximum, DC – 1MHz bandwidth) and spectrum analyzer (16 Bit, 1 MSPS sampling rate). All modules can be used as stand-alone units.

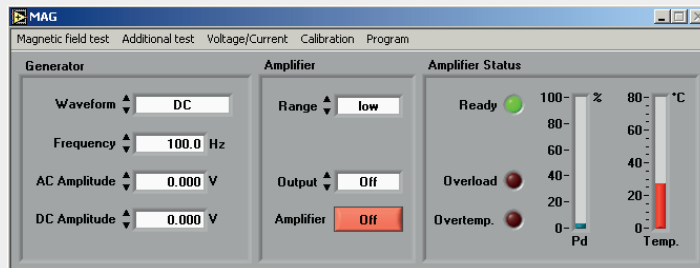
Self-calibration

Using an ultra-stable voltage source self-calibration correction values are stored in an internal EEPROM. Any voltage signal or voltage measurement device is calibrated at a self-calibration process automatically in about a minute.

Accessories

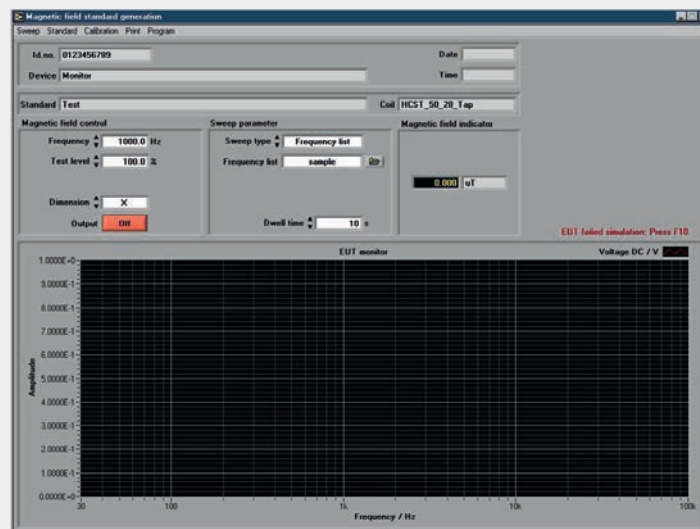
Frankonia provides also many different coils and loop sensor which are ideally suited for the described tests. Any additional equipment is ready to use without a need for recalibration. Not only our own equipment can be used with the MTS-800, but also user defined coils. A calibration mode is included in the software to complement the magnetic test system with any further equipment.

Control Panel:



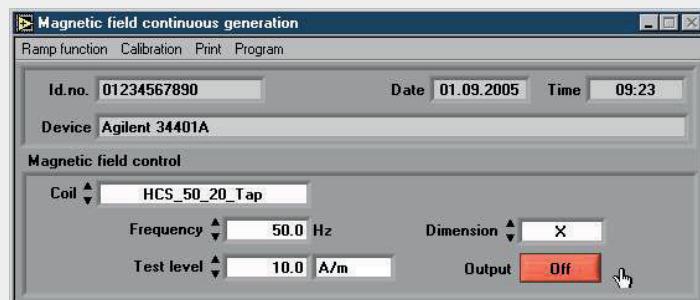
The software starts with the generator/amplifier control panel. This window allows basic settings of generator and amplifier.

Standard generation window:



Open the Magnetic field generation window for susceptibility tests according to predefined standards.

Magnetic field continuous generation window:

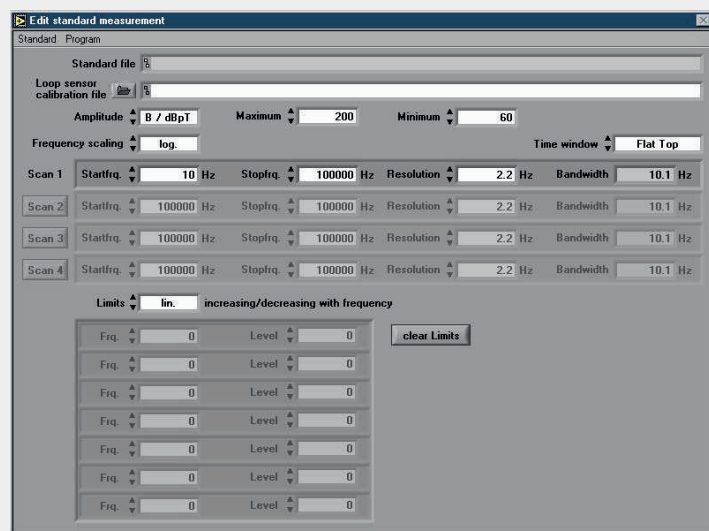


Open the continuous generation window for long term magnetic field test.

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Example standard file:



Edit a predefined standard or create a new one. Load, save and print data.

Measurement results:

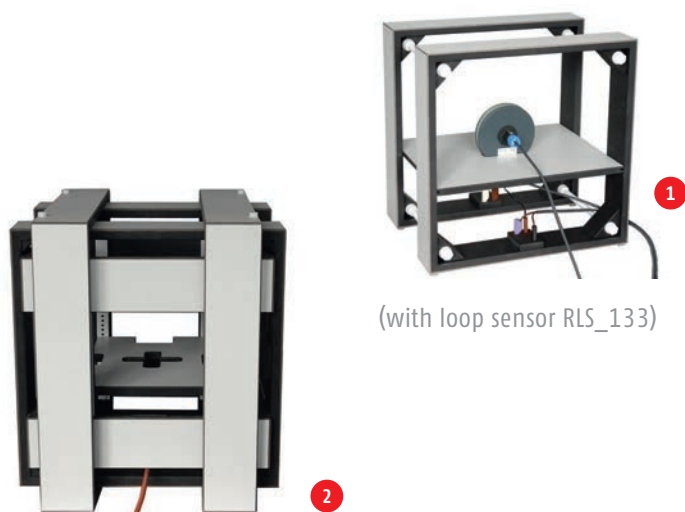


Open the Magnetic field measurement window for spectrum analyzer measurements. Perform a single or continuous measurement. Perform test according to predefined standards.

Further features and possibilities:

- Susceptibility tests with fixed frequencies and test levels or use the ramp function to sweep from start to stop level. Verify the generated field of any radiating coil with loop sensor.
- Short term generation window for short term magnetic field tests (optional).
- Scope mode window.
- Determine the coil factor of an unknown coil
- Self calibration of the MTS-800

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Helmholtz Coils

Several Helmholtz coils are available for susceptibility tests. We also offer tri-axial Helmholtz coils which are suitable for MTS-800. To achieve 1000 A/m at 1 kHz, it is absolute necessary to use our Helmholtz coils and an optional compensation board.

Coil-Type	Technical specifications
1 HCST_50/28_TAP	Tapped triaxial Helmholtz coil for immunity tests
2 HCS_50/28_TAP	Tapped single axis Helmholtz coil for immunity tests
Max. current	Designed for the generation of magnetic fields with field strength > 1000 A/m
HCS_125/75_TAP	Tapped single axis Helmholtz coil for immunity tests according to IEC / EN 55103



Loop Sensors / Radiating Loops

For immunity tests we offer radiating loops which are necessary to generate magnetic fields. The required loop sensors for measuring emission can also be ordered.

Coil-Type	Technical specifications
3 RL_120	120 mm radiating loop according to MIL-STD-461
4 LS_040	Electrostatically shielded loop sensor according to MIL-STD-461
LS_133	Electrostatically shielded loop sensor according to MIL-STD-461
RLS_133	Electrostatically shielded loop sensor according to IEC/EN 55103-1/2
Can be used as radiating loop and loop sensor	



Coupling Transformer

MIL-STD-461 CS 101 requires a coupling transformer for conducted susceptibility tests. Frankonia has developed a coupling transformer which meets all requirements. Due to direct coupling to voltage mains, the coupling transformer has an additional differential amplifier for common mode rejection of the AC mains. Using the coupling transformer without this amplifier can destroy any measurement instrument due to overvoltage.

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Current transducer incl.
correction network



Calibration network



Common mode test adapter

Testing equipment acc. to IEC/EN 55103-2

IEC/EN 55103-2 requires certain immunity tests for frequencies from 50 Hz to 10 KHz. The following test equipment fulfills all requirements according to IEC/EN 55103-2, annex B.

Accessories selecting table:

Test equipment MIL-STD 461	Recommended Model	CE101	CS101	CS109	RE101	RS101
Measurement receiver	MTS-800	•		•	•	•
Current probe	Any commercially available model	•				
Signal generator	MTS-800	•	•	•	•	•
Power amplifier	MTS-800		•	•		•
Data recording device	MTS-800	•			•	
Oscilloscope	MTS-800	•	•			
Coupling transformer	CT_2.5/50 AC		•			
Isolation transformer	IT-6/-16/-20		•	•		
LISNs	Any commercially available model	•	•		•	•
Radiating loop 12cm	RL_120					•
Loop sensor 4cm	LS_040					•
Loop sensor 13.3cm	LS_133				•	
Ohmmeter	Any commercially available model				•	

Standards

CE101	Conducted Emission, Power Leads, 30 Hz to 10 kHz
CS101	Conducted Susceptibility, Power Lead, 30 Hz to 150 kHz
CS109	Conducted Susceptibility, Structure Current, 60 Hz to 100 kHz
RE101	Radiated Emission, Magnetic Field, 30 Hz to 100 kHz
RS101	Radiated Susceptibility, Magnetic Field, 30 Hz to 100 kHz

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