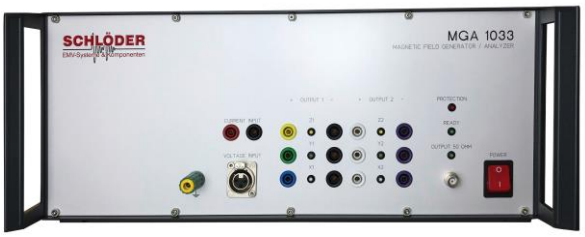
MGA 1033

Magnetic Field Generator - Analyzer

IEC / EN 61000-4-8, ISO 11452-8
MIL-STD-461, IEC / EN 55103-1/2 a. o.

- Magnetic field tests and measurement DC to 250 kHz
- Complies to all relevant EMC, automotive and military standards
- Magnetic field strength up to 1000 A/m at 1000 Hz
- Fully automated tests with optional triaxial Helmholtz coil.



With self-calibration!
Integrated spectrum analyzer!

Overview

The MGA 1033 is a compact test system for generating and measuring magnetic fields in the frequency range from DC to 250 kHz. The integrated high-power amplifier allows the high field strengths required by numerous military and automotive standards to be easily achieved.

In combination with the triaxial Helmholtz coil MGA_HCST_50/28, field strengths of 1000 A/m can be generated in the frequency range from DC to 1 kHz. The test is extremely convenient: due to the triaxial design, the fields are generated fully automatically in all three spatial axes - the test object no longer needs to be rotated.

The MGA 1033 consists of three main modules:

- Signal generator (DC - 250 kHz)
- Power amplifier (800 W output power, DC - 1 MHz bandwidth)
- Spectrum analyzer (16 bit, 1 MS/s sampling rate)

All modules can be used like single units. Although originally developed for the measurement and generation of magnetic fields, the MGA 1033 can be used for a wide range of measurement and testing applications.

Key facts

- Consisting of the following modules: signal generator (DC - 250 kHz), power amplifier (800 W output power, DC - 1 MHz bandwidth) and spectrum analyzer (16 bit, 1 MS/s sampling rate)
- **Tests with magnetic field requirements for the following standards:** ISO 11452-8, MIL-STD-461, IEC/EN 55103-1/2, IEC/EN 61000-4-8, SAE J1113-2, SAE J1113-22, Ford ES-XW7T-1A278-AC, GM W3097, PSA B217110, Renault 36-00-808, DC-11224, DC-10614 and similar standards.
- Measurements and tests according to the following **standards** additionally implemented **in the application software:** MIL-STD-461 (CE101, CS101, CS109), EN 61000-4-16 and IEC / EN 61543
- **Application software** for Microsoft Windows with preset parameters/limit values, transfer of own routines possible, data transfer from external multimeter via serial port
- Extensive range of accessories: coils, adapters, coupling devices

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Technical data

Analyzer

Voltage input	
Frequency range	DC - 250 kHz
Input impedance	1 MΩ / 50 Ω switchable
Connector	XLR, unbalanced
Max. input voltage	100 V continuous (attenuator autoset at overvoltage); 10 V at 50 Ω
Gain	-20/0/20/40 dB preamplifier 0/20 dB ADC amplifier self-calibration with ultra stable on-board reference
Current input	
Frequency range	DC - 250 kHz
Shunts	10 mΩ / 1 Ω / 100 Ω
Max. input current	20 A continuous (overload protection) 1 Ω and 100 Ω shunt are protected additionally by an 1.5 A fuse
Connector	4 mm safety jack (+, -)
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	1.0 MS/s
Aliasingfilter *(filter may be switched off)*	0.01dB Tschebyscheff filter, fg = 260 kHz;

Generator

Frequency range	DC - 250 kHz
Output impedance	50 Ω
Connector	BNC, unbalanced
Signal	sine wave / square wave / triangular / DC
Amplitude	0 – 10V AC, -10V - +10V DC
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 V_{DC}
Distortion (DC – 100 kHz, load ≥ 4 Ohm)	< 0.10 %
Voltage amplification	10 ± 0.1 % (± 0.01 % / °C)

General data

EUT control / Connector	9-pin Sub-D; RS-232
Connection to computer	USB
Temperature range	0 to 40 °C
Warm-up time	15 min
Housing	19“ subrack or desktop case
Mains voltage	115 / 230 VAC ± 10%, 50-60 Hz
Housing	19“ subrack or desktop case
Dimensions (W x H x D)	449 mm x 177 mm x 580 mm
Weight (shipping)	approx. 40 kg (net 34 kg)

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Options	
Loop sensor/radiating loops	Field loops are required to generate magnetic fields. Magnetic fields are measured with sensor loops. The loops are manufactured according to the definitions in MIL-STD 461 and EN 55103.
Helmholtz coil	Helmholtz coils are the ideal instruments for generating homogeneous magnetic fields. The models HCS_50/28 and HCST_50/28 generate field strengths from 1000 A/m to 1 kHz. The MGA 1033 with the optional compensation board is required for this.
Coupling transformer	A coupling transformer is used for testing for conducted immunity on power lines according to MIL-STD-461, CS 101. Due to the high common-mode voltage on the mains side, a differential amplifier is built into the coupling transformer, which enables simple measurement of the coupled differential voltage.
Testing equipement acc. To EN 55103-2	Annex B of EN 55103-2 describes various test adapters intended for immunity tests from 50 Hz to 10 kHz.

Technical data	Options: loop sensor / radiating loops			
Article	**Loop sensor LS_040**	**Radiating loop RL_120**	**Loop sensor LS_133**	**Loop sensor- / radiating loop RLS_133**
				
Diameter	40 mm	120 mm	133 mm	133 mm
Shielding	elektrostatic	-	elektrostatic	elektrostatic
Cable connector	XLR	4 mm MC plug	XLR	XLR / 4 mm MC plug
Coil factor (50 mm)	---	76,3 1/m	---	138,5 1/m
Correction factor	see calibration sheet (50 Ω / 600 Ω / 1MΩ)	---	see calibration sheet (50 Ω / 600 Ω / 1 MΩ)	see calibration sheet (50 Ω / 600 Ω / 1 MΩ)
Rated current	---	15 A	---	5 A
Connection cable	microphone cable	litz wire 2 x 1.5 mm²	microphone cable	microphone cable / litz wire 2 x 1.5 mm²

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Technical data	Options: Helmholtz coils		
Article	**Helmholtz coils HCS_50/28**	**Helmholtz coils HCS_125/75**	**Helmholtz coils HCST_50/28**
			
Number of axes	1	1	3
Dimensions [cm]	50	125	50 / 46 / 42
Number of turns (per coil)	22 + 4	40 + 10	22 + 4
Coil distance [cm]	28	75	28
Coil factor [m-1] (typical)	65.9 / 11.2	47.5 / 10.3	X-axis: 66.1 / 11.3 Y-axis: 67.8 / 11.8 Z-axis: 69.1 / 12.2
Rated current [A]	16	5	16

Technical data	Options: adapter, calibration network, current transducer, EN 55103-2		
Article	**Common mode test adapter MGA_B1** ***EN 55103-2***	**Calibration network MGA_B2** ***EN 55103-2***	**Current transducer MGA_B4** ***EN 55103-2***
			
Connectors	Generator in: BNC Output: XLR male	Input: XLR female Output: XLR male	Audio in: 4 mm MC safety jacket Input: XLR female Output: XLR male

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Technical data **Options: coupling transformer**

Coupling transformer ***MGA CT-50A/C*** *with differential amplifier*

Coupling transformer MGA CT-50 AC

Primary wingdings	
Inductance	> 12.5 mH (unloaded)
Rated current	16 A
Input voltage (saturation)	15 Hz: > 12,5 Veff 30 Hz: > 25 Veff
Connectors	safety panel receptacle Ø 4 mm
Secondary windings	
Inductance	> 2 mH (unloaded)
Saturation	50 A (AC or DC)
Connectors	high current plug Ø 6 mm (< 50 A) with integrated Ø 4 mm socket (< 32 A)
Secondary side (monitor)	0.1 A, BNC

Differential amplifier

Frequency range	DC - 700 kHz (small signal) / DC - 200 kHz (full power)
CMRR	> 60 dB (400 Hz)
Noise	< 6.5 mVrms (DC - 2 MHz)
Output	20 Vpp / 10 mA

General data

Frequency range	15 Hz - 250 kHz
Turns ratio	2.5 : 1 (step down)
Precision resistor	0.5 Ohm, 1 %, 100 W, aktive cooling
Case	19" desktop case (cabinet mounting optional)
Dimensions (W x H x D)	170 mm x 180 mm x 365 mm
Weight	approx. 20 kg

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Options	
MGA 1033	Generator/analyzer for magnetic field tests/measurements according to **ISO 11452-8, EN 55103-1/2, MIL-STD-461 and similar standards** frequency range: DC - 250 kHz; amplifier: 50 V / 16 A; scope of delivery: power cable, USB cable, system software WIN NT/2000/XP/ Vista 7/10
MGA_1032	Option: compensation board for MGA 1033; for compensation of the coil inductance of **MGA_HCS_50/28_TAP and MGA_HCST_50/28_TAP** (for field strengths up to 1000 A/m up to 1000 Hz)
MGA_LS 040	40 mm coil to **MIL-STD-461 (RE101);** incl. cable, 3 m
MGA_RL 120	120 mm coil to **MIL-STD-461 (RS101);** incl. cable, 3 m
MGA_LS 133	133 mm coil to **MIL-STD-461 (RE101);** incl. cable, 3 m
MGA_RLS 133	133 mm coil according to **EN 55103**; incl. cable set
MGA_HCS_125/75	Helmholtz coil with centre tap; for tests according to **MIL-STD-461, EN 55103-2, SAE J1113-22 and others**; frame length 125 x 125 cm, distance 75 cm; incl. cable set, 3 m
MGA_HCS_100/60	Helmholtz coil 1 axis 1.00 x 1.00 m, for tests according **to MIL-STD-461, EN 55103-2, SAE J1113-22 and others,** distance 0.60 m, incl. cable set, 3 m
MGA_HCS_50/28	Helmholtz coil with centre tap; for tests according **to MIL-STD-461, EN 55103-2, SAE J1113-22 and others**; frame length 0.5 x 0.5m, distance 0.28 m; incl. cable set, 3 m
MGA_HCR_50/25	Helmholtz coil for direct current, 1-axis, for tests according **to MIL-STD-461, EN 55103-2, SAE J1113-22 and others** int. Ø 0.44 m, distance 0.25 m, incl. cable set, 3 m
MGA_HCST_50/28	Triaxial Helmholtz coil with center tap; for tests according to **MIL-STD-461, EN 55103-2, SAE J1113-22 and others**; continuous current: 16 A;sSize: 50 cm x 46 cm x 42 cm, incl. cable set, 3 m
MGA_CT-50A/C	Coupling transformer for tests according **to MIL-STD-461 / CS101**; in connection with MGA 1033; contains resistance 0.5 Ohm / 100W (actively cooled) and differential amplifier; Incl. power supply and cabling
MGA_ISS-19	Coupling device for tests according to **DO-160**, Section 19 (19.3.1, 19.3.2, 19.3.3) in connection with MGA 1033; incl. power supply and cabling
MGA_B1	Test adapter according to **EN 55103-2**
MGA_B2	Calibration network according to **EN 55103-2**
MGA_B4	Current transformer with matching network according to **EN 55103-2**
MGA_SO_CE101	Software upgrade **MIL-STD-461 / CE101**
MGA_SO_CS101	Software upgrade **MIL-STD-461 / CS101**
MGA_SO_CS109	Software upgrade **MIL-STD-461 / CS109**
MGA_SO_4_16	Software upgrade **EN 61000-4-16**
	Coupling networks & accessories for tests according to **EN 61000-4-16**, please request separate data sheet!