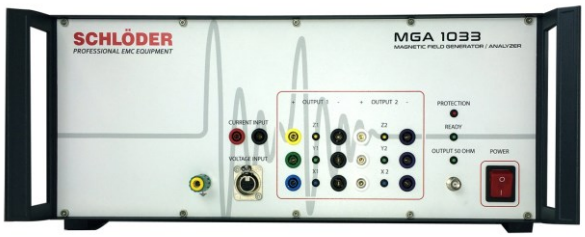
MGA 1033

Magnetic Field Generator - Analyzer

IEC / EN 61000-4-8, ISO 11452-8,
MIL-STD-461, Automotive 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 61000-4-8, SAE J1113-2, SAE J1113-22, Ford ES-XW7T-1A278-AC, PSA B217110, Renault 36-00-808, DC-11224, DC-10614 and similar standards. **Standards are subject to constant adaptations and extensions. Therefore, please ask which requirements are placed on your device and we will check whether and with which additional devices these requirements can be realized.**
- 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 (Analyzer)	
Frequency range	DC - 250 kHz
Input impedance	1 MΩ / 50 Ω switchable
Connector	XLR, unbalanced (1 ground, 2 +, 3-)
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 PC	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
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.
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.

Technical data	Options: loop sensor / radiating loops			
Article	**Loop sensor LS 040**	**Radiating loop RL 120 (RL 120-80)**	**Loop sensor LS 133**	**Loop sensor- / radiating loop RLS 133**
				
Diameter	40 mm	120 mm (200 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	---	16 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

Helmholtz coils MGA	HCS 50-28	HCS 100-60	HCS 125-75	HCST 50-28
				
Number of axes	1	1	1	3
Dimensions [cm]	50 cm	100 cm	125 cm	50 / 46 / 42 cm
Number of turns (per coil)	26 + 4	44 + 10	40 + 10	26 + 4
Coil distance [cm]	28	60	75 cm	28
Coil factor [m^{-1}] (typical)	65.9 / 11.2	62.1/ 13.4	41.49 / 10.46	X-axe: 66.1/11.3 Y- axe: 67.8/11.8 Z- axe: 69.1/12.2
DC resistance (typical)	0.63 / 0.15 Ω	2.27 / 0.43 Ω	2.38 / 0.55 Ω	X- axe: 0.58/0.10 Ω Y- axe:0.53/0.09 Ω Z- axe: 0.48/0.08 Ω
Inductance (typical)	1.73 / 0.07 mH	15.8 / 0.65 mH	13.78 / 1.0 mH	X- axe: 1.73/0.07 mH Y- axe: 1.52/0.06 mH Z- axe: 1.33/0.05 mH
Resonant frequency	> 700 kHz	> 150 kHz	> 150 kHz	> 700 kHz
Continuous/ short-time current	16 / 20 A	16 / 20 A	16 / 20 A	16 / 20 A

** For further data, please refer to the technical data sheet for "Helmholtz coils"*

Technical data Options: adapter, calibration network, current transducer, EN 55103-2

Article	Common mode test adapter MGA B1	Calibration network MGA B2	Current transducer MGA B4
			
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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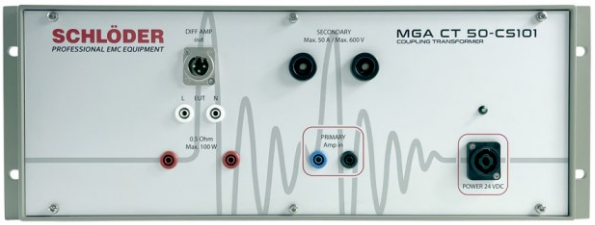
Technical data **Options: Coupling transformer**

Coupling transformer **MGA CT 50-CS101 / MGA CT 100-CS101** (see fig.) with differential amplifier for tests according to **CS101, MIL-STD-461**.

Coupling transformer **MGA CT 50-DO-160-DC** with differential amplifier for tests according to **DO-160, Section 18**.



MGA CT 50/100-CS101	
Transformator	
Frequency range	10 Hz - 150 kHz
Turns ratio	2 : 1 (step down)
Inductance Primary: Secondary:	 ~ 4 mH (unloaded) ~ 1 mH (unloaded)
Current carrying capacity Primary: Secondary: **MGA CT 50-CS101** **MGA CT 100-CS101**	 16 A **50 A (AC or DC)** **100 A (AC or DC)**
Input voltage (saturation) Primary:	15 Hz: > 12.5 Vrms 30 Hz: > 25 Vrms
Connector Primary: Secondary:	 safety socket Ø 4 mm safety socket Ø 6 mm (> 32 A), with integrated jack Ø 4 mm (< 32 A)
Resistor	
Precision resistor	0.5 Ω, 1%, 100 W permanent, actively cooled
Connector	safety sockets, Ø 4 mm

Differential amplifier	
Frequency range	10 Hz - 150 kHz
Gain	0.01 (DC and low frequencies) increasing with frequency (see graph), individually calibrated
Common-mode negative-pressure	> 60 dB (400 Hz)
Output noise	< 1 mV (DC - 2 MHz)
Output voltage	max. ±10 V, ±10 mA
Connector	Input: 4 mm safety sockets Output: 3 pole XLR connectors

General data	
Power supply	ext. 24 V/1 A power supply unit
Dimensions (W x H x D)	480 mm x 180 mm x 315 mm
Weight	appr. 13 kg

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Options	
MGA Hall sensor	Hall effect sensor with fixed connection cable for MGA RL 120 and MGA RL 120-80
MGA 1032	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 acc. to **MIL-STD-461 (RE101);** incl. cable, 3 m
MGA RL 120	120 mm coil acc. to **MIL-STD-461 (RS101);** incl. cable, 3 m
MGA RL 120-80	200 mm coil acc. to **MIL-STD-461 (RS101);** incl. cable, 3 m
MGA LS 133	133 mm coil acc. to **MIL-STD-461 (RE101);** incl. cable, 3 m
MGA RLS 133	133 mm coil; incl. cable set
MGA BC 500	Field coil 50 cm for large EUTs (Helmholtz coil 100-60 or larger)
MGA HCS 125-75	Helmholtz coil (1 axis) with centre tap; for tests acc. to **MIL-STD-461, SAE J1113-22 and others;** incl. cable set, 3 m
MGA HCS 100-60	Helmholtz coil (1 axis), for tests according to **MIL-STD-461, SAE J1113-22 and others**, incl. cable set, 3 m
MGA HCS 50-28	Helmholtz coil (1 axis) with centre tap; for tests according to **MIL-STD-461, SAE J1113-22 and others**; incl. cable set, 3 m
MGA HCR 50-25	Helmholtz coil (1 axis) for direct current, for tests according to **MIL-STD-461, SAE J1113-22 and others**, incl. cable set, 3 m
MGA HCST 50-28	Triaxial Helmholtz coil with center tap; for tests according to **MIL-STD-461, SAE J1113-22 and others**, incl. cable set, 3 m
MGA CT 50-CS101 MGA CT 100-CS101	Coupling transformers for tests according to **MIL-STD-461 CS101**; in connection with MGA 1033, 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 / -B2 / -B4	Test adapter / Calibration network / Current transformer with matching network
MGA SO_CE / CS 101	Software upgrades **MIL-STD-461 CE101 / MIL-STD-461 CS101**
MGA SO_CS109	Software upgrade **MIL-STD-461 CS109**
MGA SO_4_16	Software upgrade **EN 61000-4-16**
MGA VT 20	Variable transformer for short time field acc. **IEC/EN 61000-4-8**, 0 - 260 VAC, 20 A.
MGA IT – 06/-16/-20	Isolation transformers 6 /16/20 A, **MIL STD 461**
Coupling networks & accessories for tests according to **EN 61000-4-16**, please request separate data sheet!	

Scope of delivery	
MGA 1033	Generator/Analyzer incl. power cable, USB stick with software, XLR/BNC cable, USB cable, 100 Ohm/2 W resistor, 2 cables with MC connectors, user manual

All information regarding appearance and technical data correspond to the current state of development at the time of release of this data sheet. We reserve the right to make technical changes. 272307