



Emission Testers for Diesel, Gasoline and Gas Engines

Model: MDO2 Export • MDO2 LON • MGT5 • MPM 4
DISPEED 492 • RPM 100 • RPM VC2 • Raytek



Dynamometer / Emission Tester



- ▶ Emission Testers
- ▶ RPM Counter
- ▶ Temperature Measurement Devices
- ▶ OBD-Scan Tools for Emission Testing

Premium Workshop
Equipment

Diesel Engine Emission Tester (Opacimeter) Model: MDO 2 Export

- ▶ Emission test based on statutory guidelines
- ▶ High-quality stainless steel emission-carrying parts (chamber / probe)
- ▶ Single and/or continuous testing
- ▶ Full throttle suitability for adjustment work on a dynamometer
- ▶ High-powered test chamber heating
- ▶ Menu-driven user-guidance
- ▶ Graphic correlation of RPM to turbidity line
- ▶ Graphic and digital documentation of measurement values
- ▶ Serial interface RS 232 for connection to bar code reader, PC and various external reading devices

Hand terminal with integrated LCD display for test value display and user-guidance through the official diesel emission test cycles and other various programs. Graphical and digital test result print out with the integrated data printer. Keyboard is used for test vehicle data input and calling up target data from the chipcard.

The printout displays test results for a Peugeot vehicle. It includes a table of test results with columns for No., Idle RPM, Peak RPM, k-Val., and tB max. The graphical displays show the correlation between RPM and turbidity over time.

No.	Idle RPM (min ⁻¹)	Peak RPM (min ⁻¹)	k-Val. (s)	tB max. (m ²)
1	850	5000	1.07	0.97
2	840	5000	1.22	1.00
3	840	5000	1.07	0.93

Additional data shown includes: MAHA-CARSHOP, 3 EUROPA HWY, ULSBCH, CAMBRIDGESHIRE PE 15 4TZ, Date: 04.12.00, Time: 13:53, Test program: Diesel, Vehicle chassis ID: X12 MDO, Current mileage: 60253, Manufacturer: PEUGEOT, Model: 406, Vehicle chassis ID: 88740265.

Sample print out:
The measurement values are displayed both numerically and graphically and printed as such.
See print out. (reduced in size) ▶

Accessories



Various emission probes for cars and trucks.



Trolley and test chamber transport case for mobility.



Sturdy accessory case.



Large selection of RPM sensor adapters for various kinds of vehicle types.



Technology



Hand Terminal

- Printer and control unit with LCD display
- 5 m connection cable between opacimeter and hand terminal

Application



The MDO 2 Export diesel emission tester essentially consists of 2 components: opacimeter (testing unit) and the hand terminal with data printer for graphic and digital display of the measurement values. The opacimeter is placed near the exhaust pipe and the remote control is conveniently taken along into the vehicle.



Truck probe 2 (27 mm) with 3.5 m hose (standard length).



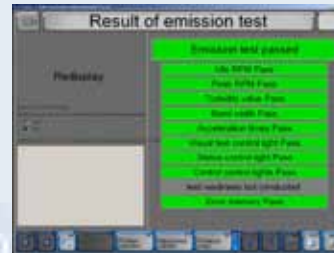
230V / 12V / 24V Power supply via cigarette lighter.

The MDO 2 Export's compact design makes it ideal for mobile use. The testing program design allows for single acceleration testing as well as continuous testing under load. Even under extreme temperature conditions the high-powered test chamber heat-up is fast and efficient and the opacimeter is ready for use in no time flat.

Emission Tester for Diesel Engines (Opacimeter)

Model: MDO 2 LON

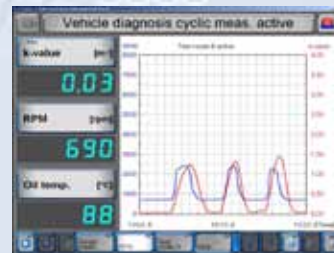
- ▶ Future-oriented basis unit, designed for adaption to user's diversified requirements with special accessories (e.g. measurement under load). Modified emission testing standards can easily be adapted to (e.g. E-OBD).
- ▶ Presents the concept of an individual, compact unit for stationary as well as mobile application. The same conceptual design of the Otto engine emission tester MGT 5 creates a multi-functional combi-unit for emission testing of gasoline and diesel engines.
- ▶ The networking and connection of the MGT 5 to the PC is possible at any time via RS 232 interface. This can be done without damaging calibration or warranty seals.
- ▶ Easy, comfortable operation with clearly structured software.
- ▶ Extremely short warm-up phase at unit switch-on.
- ▶ The proven sturdy and rugged design means very low maintenance.
- ▶ Network capabilities (Eurosystem, ASA, Citrix, Giegnet, NCTC...)
- ▶ Integration of vehicle target databases (country-specific limit values) (Optional)
- ▶ Connection any time to MAHA function and performance dynamometers



Display of measurement results (country-specific).



RPM, engine temperature via OBD.



Measurement value overview. Functional display of all measurement values, numerical and graphical.



Display of a test run through. All important information at one glance.

Accessories



Various emission probes for cars and trucks.



Trolley and test chamber transport case for mobility; with hand terminal.



MDO 2 LON measurement chamber with hand terminal.



Large selection of RPM sensor adapters for various kinds of vehicle types.

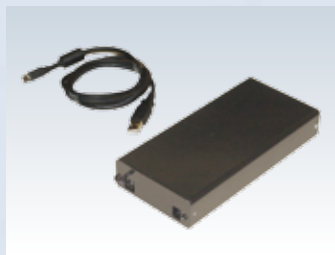


Hand terminal.



Push cart for individual & combi-unit (with gasoline tester MGT 5).

Technology



OBD Scan Tool for operating the measurement chamber with PC.

Chipcard reader for vehicle target data (with hand terminal version).



OBD scan tool for operation with hand version.



The measurement chamber, positioned near the exhaust pipe, can be operated via a hand terminal and a PC/laptop.

Application



Connection to LPS function and performance dynamometer.



MDO LON in data network with Eurosystem test lane.



MDO LON measurement on CAR.



MDO LON measurement on TRUCK.

Emission Tester for Gasoline and Gas Powered Otto Engines

Model: MGT 5

- ▶ The concept of an individual, compact unit for stationary as well as portable usage; the same conceptual design of the diesel emission tester MDO2 LON creates a multi-functional combi-unit for emission testing of gasoline and diesel engines.
- ▶ Wide application range from easy, portable stand alone unit with internal LED display to a sophisticated, networked PC station with simple, self-explanatory software screen
- ▶ Device for measurement of vehicle with liquid gas (LPG) and natural gas (CNG) engines
- ▶ Easy, comfortable operation with clearly structured screen display. Intelligent software provides adequate operation and all necessary information.
- ▶ Future-oriented concept with variable plug-in function module, e.g. multi-RPM recording, E-OBD communication unit
- ▶ Interface module for various connection possibilities to PC and test lane (LON, USB...)
- ▶ Network capabilities (Eurosystem, ASA, Citrix...)
- ▶ NOx measurement optionally available
- ▶ Combi-unit for diesel and gasoline emission testing in connection with the MAHA MDO 2 LON (Diesel Emission Tester)
- ▶ Integration of vehicle target databases (country-specific limit values) (Optional)



Display of a test procedure (country specific) All important information at one glance.



Display of the test readiness tests.



Display of measurement results (country-specific).



Display of error memory.



Measurement value overview. Functional display of all measurement values (here with RPM and oil temperature function/ NOx measurement optionally available).



Kit for OBD retro-fitting.

Accessories



Various possibilities for vehiclespecific RPM and oil temperature measurement.



Mobile MGT 5 standalone solution with hand terminal.



Internal display with 4-digit LED display (8 displays).



Various standard RPM measurement sensors.



Operation of measurement also via PC or Notebook possible.



Hand terminal.



Push cart for individual and combi-unit.

Technology



New kind of main filter unit with activated water separator, condensate is automatically pumped out.



Activated carbon filter, electro-chemical sensors. Front: RPM plug-in module. All components are easily accessible and, if necessary, can be simply replaced.



E OBD Communication module.

Application



Connection to LPS.



MGT 5 measurement on CAR.



MGT 5 measurement on forklift.



MGT 5 ASM connection BAR-conform version (optional).



MGT 5 in data sharing with Eurosys-tem or ASA network.



MGT 5 ASM backside: 2-point calibration (High-, Low-, and zero gas).

Particle Measurement Device

Model: MPM 4

Technology

Continuous Particle Measurement

- ▶ Measurement of fine particles in the diesel and benzine/ gasoline exhaust
- ▶ Technically advanced with high stability using laser and microprocessor technology
- ▶ Easy, reliable and low cost identification of any irregularities within the engine or particle filter
- ▶ Easy connection to PC and an external system
- ▶ Easy zero point adjustment
- ▶ Reliable and proven measurement technology, handy size, durable design, suitable for workshop application

Application range:

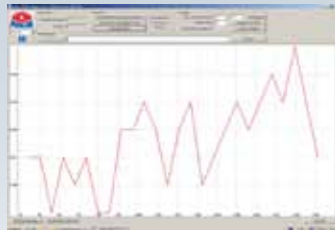
Measurement of the particle concentration is in milligrams per cubic meter [mg/m³]. Function control of particle filter systems in cars, trucks and other commercial vehicles.



Accessories



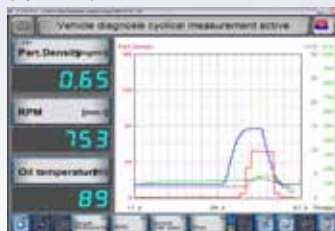
Voltage supply via cigarette lighter. (optional).



Graphic plotting of the measurement values via MPM 4 viewer (optional).



PC-connection cable (optional).



EUROSYSTEM connection (optional).

Application



MPM 4, Measurement of the particle concentration.

RPM Counter for Emission Testers

Model: DISPEED 490

Technology

Universal RPM counter for gasoline and diesel engines

- ▶ No setting of number of cylinders needed
- ▶ Covers most types of gasoline and diesel engines
- ▶ For static and dynamic RPM curves
- ▶ Automatic self-calibration and function monitoring
- ▶ Easy mounting with integrated permanent magnets
- ▶ Universal, connection to any kind of emission tester
- ▶ Unique, direct signal measurement

Application range:
 Universal RPM measurement for gasoline and diesel engines.



Accessories



Connection cable to MAHA Emission Tester.



Digital display (optional) for application without emission tester.



Combi-sensor for RPM determination.



DISPEED 490 standard delivery.

Application



DISPEED 490, practice-oriented RPM measurement via magnet combi-sensor.

RPM Counter for Emission Testers

Model: RPM 100

Technology

RPM Measurement for Otto Engines & modern Diesel Direct-Injection.

- ▶ For RPM measurement in the extremely high RPM ranges
- ▶ Covers most gasoline and diesel engines types
- ▶ For static and dynamic RPM curves
- ▶ Automatic self-calibration and function monitoring
- ▶ Easy mounting with RPM sensor with clamping tongs
- ▶ Universal; connection to any kind of emission tester
- ▶ Unique, direct signal measurement



Application range:
RPM measurement for gasoline and diesel engines for cars, trucks and motorcycles.

Accessories



Connection cable to MAHA emission tester (Optional).



Adapter for trigger clamp for connecting emission testers of various manufacturers.



Voltage supply cable.



Cable with sensor for RPM determination.

Application



Two wheeler.



Trucks.



Cars.

RPM Counter for Emission Testers

Model: RPM VC 2

Technology

- ▶ RPM determination via vibration sensor for cars
- ▶ RPM determination via vibration of the on-board voltage
- ▶ RPM display on the unit
- ▶ RPM transmission using loop for trigger clamp to emission testers from other manufacturers
- ▶ RPM transmission using cable to MAHA emission testers



Application range:
RPM counter for cars with diesel or gasoline engines.

Accessories



Standard delivery RPM VC 2.



Vibration sensor for RPM determination.



Connection cable for MAHA emission tester.



Voltage supply cable for RPM via on-board voltage.

Application



RPM VC 2, RPM measurement via vibration sensor or on-board voltage ripple effect.

Infrared Thermometer

Model: Raytek Auto-Pro/Raytek MX 2

Technology

- ▶ Non-contact engine temperature measurement
- ▶ Convenient handling
- ▶ Engine temperature
- ▶ Heating / Air Conditioners
- ▶ Brakes and bearings
- ▶ Catalytic converters
- ▶ Hydraulic systems

Surface temperature measurement provides useful information about operational state or malfunctions such as misfiring, hot engine cycles, and deficient insulation. The infrared thermometer measures the temperature precisely, safely, quickly without interfering with the measurement object. The IR thermometer offers real time temperature values-with non-contact operation. An ideal solution for hot, rotating or inaccessible parts.

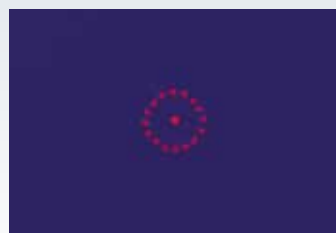


Application



Raytek Auto-Pro

The measurement object is illuminated when pressing the button and two laser points appear. The distance between the laser points is reduced by reducing the distance between the measurement object and pistol. The ideal measurement distance is reached once the laser points merge into one point. (= 200 mm) The measurement value is shown on the display. The device can be securely fixed with an additional magnet holder.



Raytek MX 2

A 16 point laser circle appears when the button is pushed highlighting the target area exactly from all distances. The measurement value is shown on the IR pistol display and can be simultaneously transmitted by cable to the MGT 5 (5 m).

Technical Data

Model: MDO 2 Export / MDO 2 LON

MDO 2 Export

Opacimeter

Measurement principle	Light turbidity procedure (Absorption photometry)
Measurement chamber length	430 mm
Wave length of the reflective light	567 mm
Outside/Inside diameter of measurement chamber	28/25 mm
Heat up time of the measurement chamber	ca. 3 min
Dimensions (L x W x H)	550 x 245 x 240 mm
Weight	ca. 13 kg
Power supply	230 V/50 Hz
Vehicle on-board power supply (cigarette lighter)	12/24 V
Power consumption average/max.	110/130 W
Interface	RS 232 and MF2- keyboard

Hand Terminal

Single chip processor	Hitachi H8/532
LCD display	2 x 16 digits
Measurement range turbidity	0 - 100 %
Absorption coefficient	0 m-1 - ∞
Dimensions (L x H x W)	245 x 65 x 120 mm
Weight	0.85 kg
Power supply via opacimeter	12 V
Power consumption average/max.	250/500 mA
RPM sensor connection possibilities	Piezo clamp/light signal sensor/alternator clamp W RPM microphone, diagnostic plug, TDC sensor vehicle-dependent Vibration RPM sensor RPM VC 2

MDO 2 LON

Opacimeter

Measurement principle	Light turbidity procedure (Absorption photometry)
Measurement chamber length	430 mm
Wave length of reflector light	567 mm
Outside-/Inside diameter of measurement chamber	28/25 mm
Dimensions (L x W x H)	550 x 245 x 240 mm
Weight	ca. 13 kg
Power supply	230 V/50 Hz
Vehicle on-board power supply (cigarette lighter)	12/24 V
Power consumption average/max.	110/130 W
Interface	RS 232

Hand Terminal

Single-chip processor	Hitachi H8/532 with separate Flash-E-Prom
LCD display	2 x 16 digits
Measurement range turbidity	0 - 100 %
Absorption coefficient	0 m-1 - ∞
Dimensions (L x H x W)	245 x 55 x 125 mm
Weight	0.76 kg
Power supply via opacimeter	12 V
Power consumption average/max.	250/900 mA
RPM measurement connection possibilities	Piezo clamp/light signal sensor/alternator clamp W RPM microphone, diagnostic plug, TDC sensor vehicle-dependent

Technical Data

Model: MGT 5 / DISPEED 492

MGT 5

Range of application	Portable or stationary emission test using partial current procedure under partial load with gasoline or gas-driven Otto engines				
Measurable gases	CO	CO₂	HC	O₂	NO_{option}
Measurement range			0 - 2000 ppm Vol. (Hexan)		
	0 - 15,0 Vol. %	0 - 20,0 Vol. %	0 - 4000 ppm Vol. (Propane)	0 - 25,0 Vol. %	0 - 5000 ppm Vol.
Measurement accuracy *	0.03 Vol. %	0.5 Vol. %	10 ppm Vol.	0.1 Vol. %	32 - 120 ppm Vol.**
Meas.value increments (max.)	0.001 Vol. %	0.01 Vol. %	0.1 ppm Vol.	0.01 Vol. %	1 ppm Vol.
Meas. principle	infrared	infrared	infrared	electrochem.	electrochem.
Meas. range drift	smaller ± 0.6 % from meas. range end value				
Lambda value	display range: 0.500 - 9.999 • increment: 0.001 • calcu. according to Brettschneider				
Warm-up phase	min. 30 sec., max. 10 minutes, average 2.5 minutes • temperature-controlled				
Flow through rate total	max. 3.5 l/min. • min. 1.5 l/min.				
Meas.gas volume flow	max. 2.5 l/min. • membrane pump				
Condensate volume flow	max. 1 l/min. • automatic continuous draw-off via separate pump				
Condensate separation	water separation system with water level recognition (integrated in main filter)				
Working pressure	750 - 1100 mbar				
Pressure fluctuations	max. error 0.2 % with fluctuations of 5 kPA				
Power supply	85 V - 280 V • 50 Hz • 65 W /12 V-24 DC				
Operating temperature	+ 5 ° - + 45 °C • deviation ± 2 °C				
Storage temperature	- 10 ° - + 60 °C • deviation ± 2 °C				
Leakage test	menu-guidance • min. 1 a day				
HC residue test	automatic				
Zero adjustment	automatic • via active carbon filter				
Calibration	menu-guidance via PC • special calibration gas needed (country-specific)				
Calibration interval	depends on country-specific requirements (Germany: 12 months)				
Interfaces (Optional)	LON • OBD • USB				
Dimensions	560 x 240 x 300 mm				
Weight	ca. 10 kg				
RPM sensor (Optional)	100 - 10 000 rot/min. • increments ww. 1, 5, 10, 50 rot/min. • various recording sensors				
Oil thermometer (Optional)	+ 0 ° - + 150 °C • increments 1 °C				
Accuracy class	PTB: class 1 • OIML: class 0				

* Absolute, or 5 % of measurement value; the larger value is valid ** dependent upon measurement range

DISPEED 492

Engine	4-stroke-diesel- and gasoline engines
Signal inputs	Combined AVL sensor for air-borne and structure-borne noise
Signal outputs	Charge signal - Simulation of clamp W signal
	Digital impulse - 5 V TTL compatible
	Inductive impulse - Simulation of an ignition signal
Power supply	12 V DC, 350 mA; Integrated power supply when connected to a MAHA emission tester
Operating temperature	5 ... 45 °C
Dimensions (W x H x T)	230 x 50 x 190 mm
Weight	< 2 kp
Measurement values	
Resolution	10 1/min.
RPM gasoline engine	400 ... 8 000 1/min.
RPM diesel engine	400 ... 8 000 1/min.
Accessories	Display

Technical Data

Model: MPM 4 / RPM 100 / RPM VC 2 / Raytek

MPM 4

Weight	3 kg
Power supply	12-24 V (DC) / 110-240 V (AC) / 50-60 Hz
Measurement range	0.01 - 700.00 mg/m ³
Measurement Method	Laser Light-Scattering Photometry (LLSP)
Precision of Measurement (Display)	0.01 mg/m ³
Particle Size Range	100 nm - 10.000 nm
Two Analogue Outputs (continuous)	0 - 5 V
One RS 232	
Measurement Range at the Analogue Output	0.00 - 8.00 mg/m ³ (Low Range) 0.00 - 700.00 mg/m ³ (High Range)

RPM 100

Engine	2- and 4-stroke diesel and Otto engines
Number of cylinders	1...12
RPM measurement range	400...30.000 min ⁻¹ / cylinder
Resolution	1 min. ⁻¹
Power supply	8... 28 V DC, on-board
Power consumption	1 W/12 V
Operating temperature	0... + 50 °C
Storage temperature	-5... + 70 °C
Relative air humidity	95 % not condensed
Dimensions (without cable)	36 x 117 x 100 mm (H x W x D)
Weight (without cable)	ca. 0.3 kg

RPM VC 2

Display	4-digit LED display
Power supply	0 - 42 V DC (Battery)
Dimensions	200 x 110 x 45 mm
Weight	500 g
RPM measurement range	200 - 9999 rpm
Resolution	10 rpm
Manual entry	Operating procedure/number of cylinders

Raytek

Model	Raytek Auto-Pro	Raytek MX 2
Temperature range	-32 °C till + 535 °C	-30 °C till + 900 °C
Typical distance to object	0.2 m - 0.6 m	up to 10 m
Optical resolution (E : M)	16 : 1	60 : 1
Accuracy	+/-1 %	+/- 0.75 %
Sighting system	Smart Sight	Precision laser circle
Degree of emission	pre-set 0.95	adjustable
Power supply	Battery 9 Vdc	cable to external power supply

Print Out (reduced in size) MGT 5

Total results of official 4 gas meas.

License plate number:	GB-I WOW
Date:	20.07.2005
Time:	15:49
Name of inspection station:	A33 - Prüfungen / Autoservice AG
Inspection station address:	Außerkönig am Platz Berliner Platz 13 30000 Berlin
Inspection station number:	B-1-0815-ABCDEFG
Vehicle manufacturer:	Opel
Vehicle model:	Astra 1.6i
Tachometer:	123432
Initial registration date:	24.12.2000
Version number:	V 0.30.002
Software:	V 1.0.01.01 - IRI.SGB
Measurement cell:	1.13 / 003

PASSED

Visual control:

Test	Target value	Current value	Results
4 Gas value with idle RPM			
with Oil temperature	min. 60 °C	70 °C	-
at RPM	450 - 1500 rpm	690 rpm	OK
CO	0.30 % Vol.	0.15 % Vol.	OK
4 Gas value with raised idle RPM			
with Oil temperature	min. 60 °C	70 °C	-
at RPM	2500 - 3000 rpm	2820 rpm	OK
CO	0.30 % Vol.	0.15 % Vol.	OK
HC	200 ppm	121 ppm	OK
Lambda	0.950 - 1.050	1.015	OK
Comments			

Name of inspector: **Max Mustermann** Stamp and signature

Print Out (reduced in size) MDO 2 LON

test certificate

Date:	20.07.2005
Time:	15:52
AI - Prüfungen / Autoservice AG	
Außerkönig am Platz	
Berliner Platz 13	
30000 Berlin	
Official registration number	B-WW 456
Vehicle (manufacturer / model)	DAVY 750D
Vehicle identification number	HTA13L3E05518RGHT
Current mileage	245650

	Unit	Target val. max.	Actual value	Result
Vehicle target values	m+			
Le-value	l (10 mm)	2.50		
Probe no.				
Actual vehicle data				
Idle RPM	min+		690	
Peak RPM	min+		5330	
Free acceleration		Mean. 1	Mean. 2	Mean. 3
Idle RPM (n-Idle)	min+	690	690	690
Peak RPM (n-Peak)	min+	5010	3800	4700
Le-value (s)	m+	0.59	0.53	0.53
Acceleration time (0-8)	s	0.60	0.28	0.22
Rand width	m+		0.06	OK
Math. mean value	m+		0.53	OK
Evaluation				passed
Emission test				passed
Equipment			MDO2-LON V 6.000.020.GB	

Production Program:

Testing Technology for Cars, Trucks, Motorcycles, Tractors, Forklifts, Aircraft · Roller Brake Testers · Platform Brake Testers · Shock Absorber and Suspension Testers · Side-Slip Testers · Play Detectors · Roller Dynamometers for Performance and Function Testing · Speedometer Testers · Tachograph and Taximeter Testers · Axle and Wheel Load Scales · Scissors Lifts · Two- and Four-Post Lifts · In-Ground Lifts · Pit Jacks · Axle and Transmission Jacks · Mobile Column Lifts · Headlight Testers · Diesel Smoke Meters · Emission Testers for Petrol and Gas Engines · Sound Level Meters · Air Conditioning Service Equipment · Decelerometers · Closing Force Meters · Brake Fluid Testers · Complete Test Lanes for Cars and Trucks · Mobile Test Containers · Wheel Alignment Analysers · Wheel Balancers · Tire Changers.

Additional Services: Workshop Design and Planning · Training Seminars for Users and Service Technicians



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Certification of environmental management system
ISO 14001:2004



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