

Emission, Function and Performance Dynamometers

Models: ASM • FPS • LPS • MSR • MZW

The line of MAHA performance dynamometers. The optimum dynamometer for any application.



Dynamometers, Diagnostic Units, Emission Testers

- Emission, function and performance dynamometers for motorcycles, passenger cars, trucks and tractors
- Digital recording and saving of measurement data
- From one-axle dynamometers to high-tech single roller dynamometers for 4WD vehicles
- Rugged, service-friendly technology
- Precision measurement instrumentation, reliable, reproducible measurement results





The Line of MAHA Performance Dynamometers

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Function and performance dynamometers for any kind of application

From mopeds, motorcycles, passenger vehicles, trucks or tractors, regardless – MAHA offers for all vehicles and applications the right kind of function and performance dynamometer.





The optimum dynamometer for any application. From motorcycles to heavy duty-vehicles

LPS 25, MFP 250

Function dynamometer for small vehicles up to 10 kW

data can be recorded and analysed automatically through the operator software: speed, power, distance and measurement time. When connecting a MTG gas tester, then also emission data can be recorded. The measurement data is analysed automatically. The results of the vehicle test can be saved to the database of the dynamometer.

ASM

The emission dynamometer for passenger vehicles and lightweight trucks

The emission dynamometers of the ASM line are used worldwide for emission measurements under load conditions, and thousands of units have proven their capabilities under sustained operating conditions of the inspection organisations. Whether emission measurements under constant load, emission measurements under variable load conditions or emission measurements during driving cycles, regardless – with the ASM dynamometer you can subject all vehicles (Diesel engine or gasoline engine) to a dynamic emission measurement. The dynamometers of the ASM line are available as under floor and above floor models, as single axle or all-wheel dynamometers.

The dynamometers from the LPS 25 and MFP 250 lines serve the purpose of testing small 2,

3 and 4 wheel vehicles. While the dynamometer simulates the driving resistance, the following

FPS 2700 / 5500

The cost-effective function and performance dynamometer for passenger vehicles and lightweight trucks The function dynamometers of the FPS line are your rolling road in the workshop. Whether test drives, dynamic engine diagnosis, power measurements or components tests, regardless – the FPS is available as above floor¹ and as under floor models, as single axle or all-wheel dynamometer² for any kind of application.

The function and performance dynamometer LPS 3000 does not leave anything to be desired in any areas. When running performance measurements, the LPS 3000 delivers precise, repro-

ducible results for engine power and torque. The projection of these measurement data to stan-

dardised values in accordance with international standards is performed automatically. Moreover,

the LPS 3000 offers through its load simulation programs the ideal basis for vehicle diagnosis

under load conditions. The option of being able to connect external measurement equipment like fuel consumption meters, emission testing units etc. perfect the range of possible applications in industry, workshop or motor sports / tuning. This classic among the performance dynamometers has proven its capabilities over many years regarding its rugged and accurate measurement instrumentation. Depending on the type of version, the LPS 3000 is available for above floor or under floor installation, as single axle or as all-wheel dynamometer for any kind of application.

¹ FPS 2700 only

² "Constant speed" load simulation

LPS 3000

The classic double roller performance dynamometer for passenger vehicles and trucks

Recommended by major vehicle manufacturers

MSR series

The high-tech top roller performance and function dynamometer for passenger vehicles The MSR is the premium dynamometer of the line of function and performance dynamometers from MAHA addressing through its well proven all-wheel technology professionals from the area of industrial test rig installation, who intend to perform in-depth measurements under constant load conditions for the purpose of modifying vehicles. This is pure dynamometer technology. The use of electric motors to drive the rollers in combination with high-performance eddy-current brakes allows the 4WD MSR to perfectly synchronise the front and the rear axle. Thus vehicles with widely different all-wheel drive systems but also vehicles driven by a single axle can be tested without problems and very efficiently. The MSR is available by way of above floor and under floor models as single or all-wheel dynamometer for any kind of application.

MZW / ZW

The function and performance dynamometer for tractors

Special requirements require special technology. The power take-off shaft performance dynamometer MZW 300 / ZW 500 has been adapted precisely to the requirements of modern agricultural vehicles. The wireless link which is unique on the market between operating unit and dynamometer offers in the course of daily work significant benefits compared to the otherwise commonly used wire connection. The MAHA power take-off performance dynamometers supplies precise measurement data and excels through their rugged construction and simple operation. The MZW power take-off shaft dynamometers are the mobile all-rounders amongst the dynamometers for tractors of all performance categories.



Preparations for performance measurement

Before the performance measurement can be started, some inspections should be carried out on the vehicle, for example:



Visual inspection of the oil, water and - particularly important - the fuel lines for leakage







General visual check and choice of suitable points for fixing the vehicle





Check of oil level and cooling water





Check of tyres for damage, foreign particles in the tyre tread and speed index. Check of wheel studs for tight fit, air pressure measurement.





Function Dynamometer for 2, 3 and 4 Wheel Vehicles

Model: LPS 25 / LPS 25-3L / MFP 250

Description

The dynamometers from the LPS 25, MFP 250 lines serve the purpose of testing 2,3 and 4 wheel small vehicles. When the dynamometer simulates the driving resistance, the following data can be recorded and analysed automatically through the operator software: speed, power, distance and measurement time. When connecting a MGT 5 gas tester, also emissions can be recorded. The measurement data is analysed automatically. The results of the vehicle test can be saved to the database of the dynamometer.

Scope of Delivery

- Communication desk
- Dynamometer for small vehicles (with 2 wheels LPS 25, with 3 or 4 wheels LPS 25-3L, MFP 250)
- Painting powder coating RAL 5010 _
- -Simulation of driving resistance through a 10 kW eddy-current brake
- In connection with a 4/5 gas tester, model MGT 5, emission measurements under load conditions are possible _

Software

- Driving resistance simulation _
- Determination of top speed Wheel power at test speed -
- -
- Display of speed
- Display of distance _
- Analysis of the measurement results _
- DIN A 4 printout
- Customer and vehicle database _

External Measurement Data

Connection option for a MAHA 4/5 gas tester MGT 5







Top speed measurement



Test speed measurement



Emission measurement



By measuring the emission levels (O2, CO, CO2, HC, NOx) with the emission tester "MGT 5" it is possible to reliably assess the emission characteristics under road-like conditions.



Communication desk MCD 2000 with printer shelf



MEP 250
1-001
1500 kg
x 466 mm
1400 mm
200 mm
-
-
75 km/h
2000 mm
4 kW
red value
ain gauge
6 A delay
452 kg



Roller Emission Dynamometer for Passenger Cars and Lightweight Trucks

Model: ASM BF / ASM AF / ASM P / ASM P+

Description

The emission dynamometers of the ASM line are used worldwide for emission measurements under load conditions, and thousands of units have proven their capabilities under sustained operating conditions of the inspection organisations. Whether emission measurements under constant load, emission measurements under variable load conditions or emission measurements during driving cycles, regardless - with the ASM dynamometer you can subject all vehicles (Diesel engine or gasoline engine) to a dynamic emission measurement. The dynamometers of the ASM line are available as under floor and above floor models, as single axle or all-wheel dynamometers.

Scope of Delivery

- Roller emission dynamometer ASM
- Self-supporting enclosed roller set frame.
- Depending on the model, version for under floor (ASM BF, ASM P, ASM P+), or above floor (ASM AF, ASM P) installation Pneumatic lifting bar
- Electric eddy-current brake with integrated flywheel
- Belt connection between rollers and eddy-current brake
- Paintwork powder coating RAL 5010/RAL 7016 _

Software

- Driving resistance simulation for emission testing ASM-5015 and ASM 2525 (Acceleration Simulation Mode) in accordance with specifications BAR `97
- Driving resistance simulation for transient emission tests for all common driving cycles (not available for ASM all-wheel model) (vehicle mass simulation is limited to 900 kg for push operation)
- Determination and compensation of inherent dynamometer losses (parasitic losses) in accordance with BAR '97 specifications. Acceleration of the roller set with built-in electric motor to 50 km/h with subsequent coast down runs
- Power measurement (wheel power in the operating modes constant speed (single axle and all-wheel models constant traction force (single axle model)
- Operating the dynamometer through the serial interface RS232 (for example, emission measurement instrumentation in acc. with BAR '97 specifications, respectively external PC)
- For the ASM P/ASM P+ an optional software module "standard performance measurement" is available
- Clearly arranged DIN-A-4 printout (diagram and table)

External Measurement Data

Connection possibility for MAHA emission testers

ASM 4WD Version:

- Test mode "Constant speed" only
- Axle distance 2.20 m min., 3.20 m max.



Emission tester MET series



Holding in place through side restricting rollers (pluggable)





Easy operation of the emission dynamometer through a clearly arranged, self explanatory menu



Engine powers up to 260 kW can be handled with the software module "Standard performance measurement"



Simulation of road-like conditions including time graphics



Driving cycles Reconstruction of various cycles are possible (NEFZ, ECE ...) with the software module "Standard performance measurement"



Communication desk MCD 2000 with printer shelf (optional)



	ASM-AF	ASM-BF	ASM-P	ASM-P-Plus
Axle load	2700 kg	2700 kg	2700 kg	5500 kg
Roller set dimensions (W x H x D)	3275 x 570 x 720 mm	3275 x 700 x 720 mm	3539 x 725 x 930 mm	3539 x 725 x 930 mm
Roller length	850 mm	850 mm	850 mm	850 mm
Roller diameter	217 mm	217 mm	217 mm	217 mm
Distance of roller axles	444 mm	444 mm	444 mm	444 mm
Testable wheel diameter min.	330 mm	330 mm	330 mm	330 mm
Testing speed max.	160 km/h	160 km/h	200 km/h	200 km/h
Mechanical inertia mass	900 kg	900 kg	900 kg	900 kg
Air pressure for lifting bar	16 - 10 bar	6 - 10 bar	6 - 10 bar	6 - 10 bar
Driving direction	two-way	two-way	one-way	one-way
Wheel power max.	50 kW	50 kW	200 kW	200 kW
Sim. VEH mass, acceleration	900 kg	900 kg	900 kg	900 kg
Sim. VEH mass, coasting mode	2700 kg	2700 kg	2700 kg	2700 kg
Power supply	230 V / 50/60 Hz / 20 A	230 V / 50/60 Hz / 20 A	230 V / 50/60 Hz / 20 A	230 V / 50/60 Hz / 20 A
Total weight	820 kg	850 kg	1100 kg	1120 kg



Roller Function Dynamometer for Passenger Vehicles up to 2.7 t / Trucks up to 5.5 t

Model: FPS 2700 / FPS 5500

Description

The function dynamometers of the FPS line are your rolling road in the workshop. Whether test drives, dynamic engine diagnosis, power measurements or components tests, the FPS is available as one-axle dynamometer in below floor and above floor¹ versions.

Scope of Delivery

- Function dynamometer FPS for passenger vehicles, delivery vans and trucks up to 5.5 t
- Painting powder coating RAL 5010

Software

- Continuous (dynamic) and discrete (static, via speed) performance measurement
- Graphic and numerical display of wheel power, power loss, engine power and torque
- Display of three performance curves in the background
- Projection of engine power in accordance with DIN 70020, EEC 80/1269, ISO 1585, JIS D 1001, SAE J 1349 (manual entry of the environment data)
- Test program for speedometer indication
- Load simulation at constant speed and traction force
- Driving simulation
- Limited possibility of running driving cycles (optional), no electric motor
- Analysis of the performance diagrams through cursor function
- 5x zoom function for assessing the curves
- Graphic display of the measured values
- Stop clock for acceleration measurements between selectable speed marks
- Saving and loading of performance diagrams
- Importing and exporting of data
- Freely programmable load simulation profiles
- Clearly laid out DIN A4 printout (diagram and table))
- Under floor or above floor installation (FPS 2700 only).

External Measurement Data

- Connection possibility for MAHA emission testers

¹ FPS 2700 only





By connecting an emission tester model MET 6 series and/or MDO2 LON the function dynamometer can also be used as an emission testing dynamometer.







Engine powers up to 260 kW can be handled



Simulation of the road-like conditions, including time graphics



Driving cycles Reconstruction of various cycles are possible (NEFZ, ECE ...) (driving cycle expansion pack option)



Speedometer test



Communication desk MCD 2000 with printer shelf (optional)



	FPS 2700	FPS 5500
Axle load	2700 kg	5500 kg
Roller set dimensions (W x H x D)	3539 x 725 mm x 930 mm	3539 x 725 x 930 mm
Roller length	850 mm	850 mm
Roller diameter	217 mm	217 mm
Distance of roller axles	444 mm	444 mm
Testable wheel diameter min.	330 mm	330 mm
Testing speed max.	200 km/h	200 km/h
Air pressure for lifting bar	6 - 10 bar	6 - 10 bar
Tractive force max.	6000 N	6000 N
Driving mode (acceleration)	2700 kg	2700 kg
Wheel power max.	200 kW	200 kW
Meas. accuracy wheel power +/-	3 % of measured value	3 % of measured value
Driving direction	one-way	one-way
Power supply	230 V / 50/60 Hz / 20 A	230 V / 50/60 Hz / 20 A
Total weight	1100 kg	1120 kg



Roller Performance Dynamometer for Passenger Vehicles

Model: LPS 3000 / R100

Description

The function and performance dynamometer LPS 3000/R100 for passenger vehicles does not leave anything to be desired in any areas. Besides classic performance measurements with recording of engine power, torque, engine speed and speed, the LPS 3000 offers in its load simulation mode comprehensive diagnostic possibilities. The ability to connect external measurement equipment like emission tester MGT 5 or a fuel consumption meter perfects the range of possible applications for this dynamometer. The clearly structured presentation of the measurement data and operation in line with practical requirements is characteristic for the software of the LPS 3000. This classic among the performance dynamometers has proven its capabilities over many years regarding its rugged and accurate measurement instrumentation in industry, workshop and motor sports. The LPS 3000/R100 for passenger vehicles is available as single axle and as all-wheel versions for wheel powers from 260 kW to 1040 kW max. (static). Dynamic measurements of up to 800 kW per axle are possible.

Scope of Delivery

- Performance dynamometer LPS 3000/R100 for passenger vehicles with communication desk and roller set R100
- Wireless remote control
- Painting powder coating RAL 5010
- Ni/Cr coated roller (optional)

Software

- Continuous (dynamic) and discrete (static) performance measurement
- Graphic and numerical display of wheel power, power loss, engine power and torque
- Projection of engine power in accordance with DIN 70020, EEC 80/1269, ISO 1585, JIS D 1001, SAE J 1349 (optional)
- Test program for speedometer indication
- Load simulation at constant RPM, speed and traction force
- Driving simulation
- Limited possibility of running driving cycles (optional), no electric motor
- Motorcycle performance measurements on passenger vehicle roller set (optional)
- Analysis of the performance diagrams through cursor function
- Graphic display of the measured values, comparative measurement in the background
- Stop clock for acceleration measurements between selectable speed marks
- Saving and loading of performance diagrams
- Importing and exporting of data
- Freely programmable load simulation profiles
- Clearly laid out DIN A4 printout (diagram and table)

External Measurement Data

- Comprehensive possibilities for recording external measurement data from vehicles: pressures, temperatures, OBD, voltages / currents...
- Broadband sensor Lambda/AFR
- Connection possibility for MAHA emission testers
- Connection possibility for AIC consumption measurement devices

LPS 3000 4WD version:

- Axle distance 2 m min., 3 m max. (optional: 2.36 m min., 3.36 m max.)





Emission tester MET series



Additional blower for components





Easy operation of the dynamometer through a clearly arranged, self explanatory menu



In the load simulation mode the user himself may define which measured values shall be displayed analogue, numerically or graphically.



Checking the indication of the vehicle's speedometer



The cursor function allows for optimum analysis of the performance diagram. At the cursor position the measured values are shown numerically.



Interface box (option)



	Roller set R100/1	Roller set R100/2
Axle load	2500 kg	2500 kg
Roller set dimensions (L x W x D)	3345 x 1100 x 625 mm	4140 x 1100 x 625 mm
Roller length	750 mm	750 mm
Roller diameter	318 mm	318 mm
Distance of roller axles	540 mm	540 mm
Testable wheel diameter min.	305 mm	305 mm
Testing speed max.	260 km/h	260 km/h
Track width min./max.	800 / 2300 mm	800 / 2300 mm
Wheel power max. (static / dynamic)	260 / 400 kW	520 / 800 kW
Tractive force max.	6000 N	12000 N
Meas. accuracy wheel power +/-	2 % of measured value	2 % of measured value
Measurement system	Strain gauge	Strain gauge
Power supply	230 V / 50 Hz / 16 A delay	230 V / 50 Hz / 35 A delay
Air pressure for lifting bar min.	6-8 bar	6-8 bar
Total weight	1200 kg	1500 kg



Roller Performance Dynamometer for Trucks

Model: LPS 3000 / R200

Description

The function and performance dynamometer LPS 3000/R200 for trucks up to 660 kW wheel power does not leave anything to be desired in any areas. Besides classic performance measurements with recording of engine power, torque, engine speed and speed, the LPS 3000 offers in its load simulation mode comprehensive diagnostic possibilities. The ability to connect external measurement equipment like the Diesel emission tester MDO 2 LON or a fuel consumption meter, perfects the range of possible applications for this dynamometer. The clearly structured presentation of the measurement data and operation in line with practical requirements is characteristic for the software of the LPS 3000. This classic among the performance dynamometers has proven its capabilities over many years regarding its rugged and accurate measurement instrumentation in industry and workshop. The LPS 3000/R200 for trucks is available with closed and split roller set for fitting in installation pits. The optionally available set of idler rollers permits testing of trucks with 2 driven axles. The hydraulic pulldown facility (optional) ensures optimum traction of the wheels on the rollers.

Scope of Delivery

- Performance dynamometer LPS 3000/R200 for trucks, with communication desk and roller set R200
- Wireless remote control
- Paintwork powder coating RAL 5010

Software

- Continuous (dynamic) and discrete (static) performance measurement
- Graphic and numerical display of wheel power, power loss, engine power and torque
- Projection of engine power in accordance with DIN 70020, EEC 80/1269, ISO 1585, JIS D 1001, SAE J 1349 (optional)
- Test program for speedometer indication
- Load simulation at constant RPM, speed and traction force
- Driving simulation
- Possibility of running driving cycles (on request)
- Passenger vehicle performance measurement on truck roller set is possible with many passenger vehicles
- Analysis of the performance diagrams through cursor function
- 5x zoom function for assessing the curves
- Graphic display of the measured values
- Stop clock for acceleration measurements between selectable speed marks
- Saving and loading of performance diagrams
- Importing and exporting of data
- Freely programmable load simulation profiles
- Clearly laid out DIN A4 printout (diagram and table)

External Measurement Data

- Comprehensive possibilities for recording external measurement data from vehicles: pressures, temperatures, OBD, voltages / currents...
- Connection possibility for MAHA emission testers
- Connection possibility for AIC consumption measurement devices





Emission tester MET series



MDO2 LON, exhaust opacity meter





Easy operation of the dynamometer through a clearly arranged, self explanatory menu.



In the load simulation mode the user himself may define which measured values shall be displayed analogue, numerically or graphically.



The cursor function allows for optimum analysis of the performance diagram. At the cursor position the measured values are shown numerically.

Detail fro performance	m a diagran	n	
Rotierende Masse			
Mittere Verzügerung Auslauf 1 Mittere Bremskraft Auslauf 1 Mittere Verzügerung Auslauf 2 Mittere Bremskraft Auslauf 2	24.22	1,289 63,7 4,648 2533,9	N N N N
Kraft der Roterenden Masse	Factoret	894,2	н
Roterende Gesamt-Masse Roterende Prüfstands-Masse Roterende Fahrzeug Masse	Res Courts	736,4 450,0 285,4	255

Determination of the rotating mass by a second coast down run = very accurate effective power (MAHA patent).



Communication desk MCD 2000 with printer shelf



	Roller set R200/1 undivided	Roller set R200/2 divided
Axle load	15000 kg	15000 kg
Roller set dimensions (L x W x D)	4550 x 1100 x 625 mm	2260 x 1100 x 865 mm
Roller length	900 mm	900 mm
Roller diameter	318 mm	318 mm
Distance of roller axles	565 mm	565 mm
Testable wheel diameter min.	400 mm	400 mm
Testing speed max.	200 km/h	200 km/h
Track width min./max.	820 / 2620 mm	1000 / 2800 mm
Wheel power max. standard / boosted	300 / 660 kW	300 / 660 kW
Tractive force max. standard / boosted	15000 / 25000 N	15000 / 25000 N
Meas. accuracy wheel power +/-	2 % of measured value	2 % of measured value
Measurement system	Strain gauge	Strain gauge
Power supply	400 V / 50 Hz / 63 A delay	400 V / 50 Hz / 63 A delay
Total weight	2350 kg	2500 kg



Single Roller Dynamometer for Motorcycles

Model: MSR 400

Description

In addition to conventional performance measurement with detection of engine power, torque, engine speed and velocity, the MSR 400 also provides extensive diagnostic capabilities. The clearly structured display of measured values and practical operation characterize the MSR 400 software.

The roller set has a large single roller with a diameter of 400 mm. The rear wheel of the motorcycle runs at the highest point (the apex) of the roller on this type of tester. This means that the running performance of the tire on the roller is very similar to its road performance. This minimizes the load on the tire and ensures good power transfer from tire to roller.

The MSR 400 basic version works on the inertia principle. The power is calculated from the roller mass acceleration. As an option, the basic roller set can be equipped with an eddy-current brake and/or an electric motor for starting the motorcycle or for tachometer testing. The optional surface-mounted ramp set allows the MSR 400 to be used without the need for pit working in the workshop. The various restraint systems offered by MAHA provide practical ways to secure the motorcycle to the tester. A pneumatic brake and an extension roller set for testing of two-track vehicles (such as quads) are optionally available.

Scope of Delivery

- Motorcycle Single Roller Dynamometer MSR 400 with communication desk
- Wireless remote control
- Painting powder coating RAL 5010

Software

- Continuous (dynamic) and discrete (static) performance measurement
- Load simulation with constant RPM, speed, traction
- Graphical and numerical display of wheel, loss, motor power and torque
- Projection of the motor performance based on DIN 70020, EEC 80/1269, ISO 1585, JIS D 1001, SAE J 1349 (optional)
- Test program for tachometer display
- Driving cycle drive possible (optional)
- Evaluation of the performance diagram via cursor function
- 5-fold zoom function for evaluation of the curve plotting
- Graphical display of measurement values, comparison measurement in background
- Stop watch for acceleration measurement between selectable speed markers
- Storage and loading of the performance diagram
- Importing and exporting of data
- Freely programmable load simulation profile
- Clearly readable DIN A 4 print out (diagram and table)

External Measurement Data

- Comprehensive possibilities for recording external measurement data from vehicles: pressures, temperatures, OBD, voltages / currents... (optional interface box module)
- Broadband sensor Lambda/AFR
- Connection possibility for MAHA emission testers







Inertia mass single roller set



Inertia mass single roller set with eddy-current brake (optional)



Inertia mass single roller with Ni/Cr coating



Inertia mass single roller set for optimum grip and reduced warming of tyres.



Clamping device for secure fixing of front wheel





Interface box (option)

	MSR 400
Roller set	Single roller, self-supporting
Axle load	1000 kg
Dimensions of basic roller set (L x W x H)	770 x 546 x 456 mm
Roller set dimensions with eddy-current brake (L x W x H)	1510 x 800 x 516 mm
Roller length	400 mm
Roller diameter	400 mm
Wheel power max. dynamic	350 kW
Wheel power max. static (eddy-current brake)	250 kW
Meas. accuracy wheel power +/-	2% of measured value
Testing speed max.	320 km/h
Total weight	644 kg
Power supply	230 V / 50 Hz, 16 A



Single Roller Dynamometer for Passenger Vehicles

Model: MSR 500

Description

With its wide scope of measurement and testing possibilities the MAHA single roller dynamometer offers an introduction to MAHA single roller technology at an extremely interesting price. Measurements on vehicles with higher motor performance or long-term tests can be conducted trouble-free on this dynamometer. The use of E-machines to drive the rollers in combination with high-powered eddy-current brakes enables a perfect synchronous run of the front and rear axles with the MSR 500 4WD. Vehicles with various 4-wheel drive systems, but also one-axle driven vehicles can be tested trouble-free and effectively. The non-driven axle of one-axle driven vehicles can be entrained with the same speed as the driven axle by the dyno's electric motor. Beyond this the dynamometer is suitable for test-ing hybrid and electric vehicles. The roller drive is capable of covering the recuperation power (battery charging during braking/driving mode) of modern electric vehicles axle by axle. The MSR as inground version is available as one-axle or 4-wheel drive dynamometer for all applications. The dynamometer is especially suited for long-term tests and high-powered vehicles.

Scope of Delivery

- Single Roller Dynamometer MSR with communication desk and roller set
- Wireless remote control
- Painting powder coating RAL 5010
- Ni/Cr coated roller (optional)

Software

- Continuous (dynamic) and discrete (static) performance measurement
- Load simulation with constant RPM, speed, traction
- Graphical and numerical display of wheel, loss, motor power and torque
- Projection of the motor performance based on DIN 70020, EEC 80/1269, ISO 1585, JIS D 1001, SAE J 1349 (optional)
- Test program for tachometer display
- Driving simulation
- Driving cycle drive possible (optional)
- Evaluation of the performance diagram via cursor function
- 5-fold zoom function for evaluation of the curve plotting
- Graphical display of measurement values, comparison measurement in background
- Stop watch for acceleration measurement between selectable speed markers
- Storage and loading of the performance diagram
- Importing and exporting of data
- Freely programmable load simulation profile
- Clearly readable DIN A 4 print out (diagram and table)

External Measurement Data

- Wide scope of possibilities for recording of external measurement values from the vehicle: pressures, temperatures, OBD, tensions / flows... (optional interface box module)
- Broadband sensor Lambda/AFR
- Connection possibility for MAHA emission testers
- Connection possibility for AIC consumption measurement devices





Emission tester MET series



Interface box





Trouble-free operation of the dynamometer with a clear, self-explanatory menu.



Motor per formance over 750 kW possible (dynamic > 1000 kW).



Driving cycles Reconstruction of various cycles are possible (NEFZ, ECE ...) (driving cycle expansion pack option)



Checking of display of the vehicle tachometer



Communication desk MCD 2000 with printer shelf



Securing the future with upgrade packages

Upgrading from LPS 3000 4WD to MSR 500/2 CAR 4WD Upgrade Package

The LPS 3000 customer can upgrade his double roller dynamometer to the single roller dyno MSR 500 without additional foundation work or cost.

Preparation for Additional Eddy-Current Brakes

All MSR 500 dynamometers can be ordered with preparation for additional eddy-current brakes. In this way, later upgrades up to the maximum configuration are possible at a reasonable price.

Upgrade MSR 500/1 One axle to 4WD Dyno MSR 500/2

Using the upgrade package offered by MAHA it is possible to upgrade a MSR 500 one-axle dyno to a 4-wheel drive dyno.

	one-axle MSR 500/1	4WD MSR 500/2	4WD MSR 500/3
Permissable axle load	2500 kg	2500 kg	2500 kg
Track width min. / max.	700 / 2200 mm	700 / 2200 mm	700 / 2200 mm
Roller set adjustment *	-	2200 – 3200 mm	2200 – 3200 mm
Roller diameter	504 mm	504 mm	504 mm
Roller length	750 mm	750 mm	750 mm
Traction per axle (Peak) max.	7000 N	7000 N	front: 7000 N / rear: 14000 N
Testing speed max.	300 km/h	300 km/h	300 km/h
Wheel power max. dynamic per axle	> 1000 kW	> 1000 kW	> 1000 kW
Wheel power max. static	260 kW	260 kW per axle	front: 260 kW / rear: 520 kW
Meas. accuracy wheel power +/-	2% of measured value	2% of measured value	2% of measured value
Mechanical inertia mass	280 kg	280 kg per axle	front: 280 kg / rear: 330 kg
Electric motor per axle	22 kW (optional)	22 kW	22 kW
Power supply	3 x 400 V (64 A electric motor)	3 x 400 V / 64 A	3 x 400 V / 64 A
Compressed air pneumatic brake	6 – 8 bar	6 – 8 bar	6 – 8 bar
			* Special roller set adjustment on request



Single Roller Dynamometer for Passenger Vehicles

Model: MSR 800 / 830 / 850 / 1000 / 1050

Description

The MSR is the premium dynamometer of line of function and performance dynamometers from MAHA addressing through its well proven all-wheel technology professionals from the area of industrial test rig installation, who intend to perform in-depth measurements under constant load conditions for the purpose of modifying vehicles. This is pure dynamometer technology. The use of electric motors to drive the rollers in combination with highperformance eddy-current brakes allows the MSR 1000/1050 to perfectly synchronise the front and the rear axle. Thus vehicles with widely different all-wheel drive systems but also vehicles driven by a single axle can be tested without problems and very efficiently. The non-driven axle of one-axle driven vehicles can be entrained with the same speed as the driven axle by the dyno's electric motor. Moreover, the dynamometer is suited for testing of hybrid vehicles. This type of dynamometer is especially well-suited for endurance tests and high-power vehicles.

Scope of Delivery

- Single Roller Dynamometer MSR with communication desk and roller set
- Wireless remote control
- One, respectively two roller sets with 762 mm Ni/Cr coated top rollers depending on the model
- Hydraulic roller set adjustment through set of adjustment panels (for all-wheel dynamometer)
- Painting powder coating RAL 5010

Software

- Continuous (dynamic) and discrete (static) performance measurement (not static with MSR 800)
- Load simulation for constant RPM, speed and traction force (not with MSR 800)
- Graphic and numerical display of wheel power, power loss, engine power and torque
- Projection of engine power in accordance with DIN 70020, EEC 80/1269, ISO 1585, JIS D 1001, SAE J 1349 (optional)
- Test program for speedometer indication
- Driving simulation (not with MSR 800)
- Possibility of running driving cycles (optional) (not with MSR 800)
- Analysis of the performance diagrams through cursor function
- 5x zoom function for assessing the curves
- Graphic display of the measured values, comparative measurements in the background
- Stop clock for acceleration measurements between selectable speed marks (not with MSR 800)
- Saving and loading of performance diagrams
- Importing and exporting of data
- Freely programmable load simulation profiles
- Clearly laid out DIN A4 printout (diagram and table)

External Measurement Data

- Wide scope of possibilities for recording of external measurement values from the vehicle: pressures, temperatures, OBD, tensions / flows...
- Broadband sensor Lambda/AFR
- Connection possibility for MAHA emission testers
- Connection possibility for AIC consumption measurement devices





Emission tester MET series



Interface box





Engine powers over 1000 kW can be handled



kW Simulation of the road-like conditions, including time graphics



Driving cycles Reconstruction of various cycles are possible (NEFZ, ECE ...) (driving cycle expansion pack option)



Speedometer test



Communication desk MCD 2000 with printer shelf

Ausstattung der Ausführungen	MSR 800	MSR 830	MSR 850	MSR 1000	MSR 1050
Eddy-current brakes	no	1	2	2	3
Electric motor	no	no	no	2	2
All-wheel dynamometer	no	no	no	yes	yes



	MSR 800	MSR 830	MSR 850	MSR 1000	MSR 1050
Axle load	2400 kg	2400 kg	2400 kg	2400 kg	2400 kg
Roller set dimensions (L x W x D)	4100 x 875 x 1040 mm	4100 x 875 x 1075 mm	4100 x 875 x 1075 mm	4100 x 875 x 1075 mm	4100 x 875 x 1075 mm
Roller length	700 mm	700 mm	700 mm	700 mm	700 mm
Roller diameter	762 mm	782 mm	762 mm	762 mm	762 mm
Compressed air max.	7 bar	7 bar	7 bar	7 bar	7 bar
Testing speed max.	320 km/h	320 km/h	320 km/h	320 km/h	320 km/h
Track width min./max.	900 / 2200 mm	900 / 2200 mm	900 / 2200 mm	900 / 2200 mm	900 / 2200 mm
Measurable wheelbase	-	-	-	2000 - 3400 mm	2000 - 3400 mm
Wheel power max. dynamic	> 1000 kW	> 1000 kW	> 1000 kW	> 2000 kW	> 2000 kW
Wheel power max. static	-	550 kW	1100 kW	550 / 550 kW	550 / 1100 kW
Meas. accuracy wheel power +/-	3 % of meas. value	2 % of meas. value	2 % of meas. value	2 % of meas. value	2 % of meas. value
Mechanical inertia mass	670 kg	700 kg	730 kg	1400 kg	1430 kg
Measurement system	Inertia mass	Strain gauge	Strain gauge	Strain gauge	Strain gauge
Power supply	3 x 400V / 50/60 Hz / 16 A	3 x 400 V / 50/60 Hz / 20 A	3 x 400 V / 50/60 Hz / 40 A	3 x 400 V / 50/60 Hz / 63 A	3 x 400 V / 50/60 Hz / 63 A
Total weight	1800 kg	2200 kg	2600 kg	4500 kg	4900 kg



Power Take-Off Performance Dynamometer

Model: MZW 300

Description

Special requirements require special technology. The power take-off performance dynamometer MZW 300 has been adapted precisely to the requirements of modern agricultural vehicles. The wireless link which is unique on the market between operating unit and dynamometer offers in the course of daily work significant benefits compared to the otherwise commonly used wire connection. The MAHA power take-off performance dynamometer supplies precise measurement data and excels through its rugged construction and simple operation. The MZW 300 is the mobile all-rounder amongst the power take-off performance dynamometers for tractors of the medium performance category.

Scope of Delivery

- Power take-off dynamometer on passenger vehicle trailer
- Radio hand-held terminal for operating the dynamometer
- Paintwork powder coating RAL 7040

Software (with manual desk)

- Measurement of engine power, torque and RPM at the power take-off shaft
- Load simulation for vehicle diagnosis
- Program controlled operation through radio hand-held desk with strip printer
- Optional PC analysis software for performance diagram and DIN A4 printout with database administration
- Stationary (discrete) performance measurement: starting/final RPM, step width and holding time are freely selectable Fully automatic measurements
- Measurements in the power take-off mode are possible (determination of power demanded by additional units)
- Two directions of rotation (front/rear shaft)

External Measurement Data

- Connecting a fuel consumption meter is possible









Radio hand-held terminal with LCD display and a strip printer

Total weight

Connection to LAPTOP



Fuel consumption meter



MAHA MZW 300 MANA TEL. 08374-585-0 11:25 Clock 21.10.2009 Vehicle Data Make UNIMOG Model U-110 Operating hours 2008 Customer Méléa Result (Urmin) [Nm] CKH1 1002 554.7 58.1 958 657.4 65.3 900 685.6 64.6 850 701.9 62.4 881 721.3 68.4 749 728.9 57.1 714.2 52.4 701 649 645.9 43.8 37.7 602 598.2 549 559.5 32.1 500 526.1 27.5 Signaturel Stampi

Performance table hand-held

Technical Data Dyno			
Measurement system	Strain gauge		
Measurement accuracy		+/- 2 %	
Power take-off shaft profile		1 ^{3/4} 6-part	
RPM max		2500 rpm	
Max. performance input of the eddy-current brake		300 kW	
Torque max.		3200 Nm	
Power supply	230V, 50 Hz, 16 A		
Performance Table			
Measurement time		n power take off shaft = 1000 rpm	
	direct	gear	
up to 1 minute	225 kW	300 kW *	
up to 3 minutes	190 kW	250 kW *	
up to 6 minutes	150 kW	200 kW *	
up to 9 minutes	130 kW	170 kW *	
up to 129 minutes	130 kW *		
Technical Data Trailer			
Dimensions (W x H x L)		1570 x 1185 x 3425 mm	
Support load		75 kg	

850 kg

* with 1000 rpm and temperature > 20°C



Power Take-Off Performance Dynamometer

Model: ZW 500

Description

Special requirements require special technology. The power take-off performance dynamometer ZW 500 has been adapted precisely to the requirements of modern agricultural vehicles. The wireless link which is unique on the market between operating unit and dynamometer offers in the course of daily work significant benefits compared to the otherwise commonly used wire connection. The MAHA power take-off performance dynamometer supplies precise measurement data and excels through its rugged construction and simple operation. The ZW 500 is the mobile all-rounder amongst the power take-off dynamometers for tractors of the top performance category.

Scope of Delivery

- Power take-off dynamometer on passenger vehicle trailer
- Radio hand-held terminal for operating the dynamometer
- Paintwork powder coating RAL 7040

Software with Hand-held Terminal

- Measurement of engine power, torque and RPM at the power take-off shaft
- Load simulation for vehicle diagnostics
- Program controlled operation through radio hand-held terminal with strip printout
- Optional PC analysis software for performance diagram and DIN A4 printout with database administration
- Stationary (discrete) performance measurement: starting/final RPM, step width and holding time freely selectable Fully automatic measurements
- Measurements can be taken in locked differential mode (front and rear PTO, power consumption of additional drive systems is identified)

Software with PC

- Measurement of engine power, torque and RPM at the power take-off shaft
- Load simulation for vehicle diagnostics
- Program controlled operation through PC with control software
- Performance diagram and DIN A4 printout
- Database administration
- Stationary (discrete) performance measurement: starting/final RPM, step width and holding time freely selectable Fully automatic measurements
- Measurements can be taken in locked differential mode (front and rear PTO, power consumption of additional drive systems is identified)
- Measurement values can be transferred via CAN bus (optional)

External Measurement Data

- Connecting a fuel consumption meter is possible
- Connecting an opacity meter is possible

Diagnostics

 Dynamometer control via RS232, TCP-IP or standardised diagnostic protocol (with control, settings and querying of measurement results), UDS-ODX (on request)









Radio hand-held terminal with Connection to LAPTOP LCD display and a strip printer



Diesel exhaust opacity meter Fuel consumption meter MDO2 LON



Ol	FOKUS TEST
09/09	Messgenauigkeit Drehmoment

LPS	ZW 5	00
19969		
TEL. 0037	4-585-0	0.2003
Vehi	cle Data	
Rode1		
Operating	hours	
Customer		
Re	Ma Na	P
(Urain)	CHe-3	CKH3
1002	554.7	58.1
950	657.4	65.3
900	685.6	64.6
650	201.9	62.4
001	721.0	60.4
749	720.9	57.1
785	714.2	52.4
649	645.9	43.8
602	590.2	37.7
549	559.5	32.1
500	526.1	27.5
Signature	1	
Stampi		
********		*****

Performance table hand-held

Technical Data Dyno	
Measurement system	Strain gauge
Measurement accuracy	+/- 2 %
Power take-off shaft profile	1 ^{3/4} 6-part
RPM max	2500 rpm
Max. performance input of the eddy-current brake	650 kW
Torque max.	6600 Nm
Power supply	400V, 50 Hz, 16 A
Performance Table	
Measurement time	n power take off shaft = 1000 rpm
up to 1 minute	650 kW *
up to 2 minutes	560 kW *
up to 3 minutes	510 kW *
up to 4 minutes	460 kW *
up to 7 minutes	350 kW *
up to 9 minutes	300 kW *
Technical Data Trailer	
Dimensions (W x H x L)	2110 x 1420 x 3580 mm
Support load	75 kg
Total weight	1350 kg
	* with 1000 rpm and temperature > 20°C



Performance Diagrams

Reduced (DIN A4) Printouts











MAHA Reference Systems

LPS 3000



MAHA dynamometer for trucks, model "LPS 3000" with divided roller set for pit installation.

Kirchberger GmbH, Rastatt







LPS 3000



MAHA 4WD dynamometer for passenger cars, model "LPS 3000", with sound-proof cabin, ventilation system including air cooling fan and customised extraction system.

G-TECH Engineering GmbH, Stetten







MAHA Reference Systems

MSR 1000



MAHA single roller dynamometer, model "MSR 1000" (maximum configuration) with sound-proof cabin, ventilation system including air cooling fan and customised extraction system.

Abt Sportsline GmbH, Kempten (Allgäu)





MSR 500



MAHA single roller dynamometer, model "MSR 500" (maximum configuration) with test room, ventlation system including air cooling fan and customised extraction system.

DTE-Systems GmbH, Recklinghausen





LPS 3000



MAHA 4WD dynamometer for passenger cars, model "LPS 3000", with sound-proof cabin, ventilation system including air cooling fan and customised extraction system.

Hamann GmbH, Laupheim





ZW 500



Power take-off dynamometer, model "ZW 500" CLAAS Württemberg GmbH, Langenau







Accessory Matrix

Accessory Matrix															
Roller Emission, Function and Performance Dynamometers															ï
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			22	, щ	ΨĽ	Д	å	27	550	e G G	30	40,4	50	80	200
Description	Article No.		o	\sum_{n}	\sum_{n}	$\sum_{n \in \mathcal{N}} $	\sum_{n}	o	$ \sigma $	20	$ \sigma $	Ц С	E de	d i	$\frac{1}{2}$
Description	Article No.	_		Ā	Ā	A	Ë	Ë L			ĪŻ	Ś	Ś	Ś	\sim
Industry PC "All-in-one" WIN 7	VZ 910176	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC-Keyboard	VZ 910052	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ink Jet Colour Printer	VZ 910091	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interface Box 1	VZ 990274	-	-	-	-	-	-	-	0	0	0	Х	Х	-	-
Pressure Temperature Module	VZ 911145	-	-	-	-	-	-	-	0	0	0	0	0	-	-
OBD Module	VZ 911146	-	-	-	-	-	-	-	0	0	-	0	0	-	-
Analogue Input Module	VZ 911240	-	-	-	-	-	-	-	0	0	0	0	0	-	-
RPM Light Signal Sensor	VZ 990221	-	-	-	-	-	-	-	0	0	-	0	0	-	-
RPM Trigger Clamp	VZ 990211	-	-	-	-	-	-	-	0	-	0	0	0	-	-
Oil Temperature Sensor	VZ 990225	-		-	-	-	-	-	0	0	0	0	0	-	-
Software Module Standard Eng. Power Projection for Cars	VZ 911148	-	-	-	-	-	-	-	0	-	0	0	0	-	-
Software Module Standard Eng. Power Projection for Trucks	VZ 911149	-		-	-	-	-	-	0	0	-	-	-	-	_
Thermostat-Controlled Fan	VZ 935054	-			-	-	-	-	0	0	-	-	-	-	_
Restraining Strans with Tie Plates	VZ 935041	-	0	0	0	0	0	0	0	0		-	-	-	_
Standard Vehicle Fixing Device MSR	VZ 935191	-	-	-	-	-	-	-	-	-	-	0	0		_
Side Restraining Rollers for Front Wheel Drive	VZ 935042	_			-	-	-	-	0	0		-	-	-	_
Reinforced Eddy-Current Brakes for Trucks	VZ 935111	-		-	-	-	-	-	-	0		-	-	-	-
Hydraulic Load Simulator for Trucks P200/2	VZ 035051								_	0		-	_		
Vehicle Fixing Device for Trucks VZ 035102	VZ 935031				-	-	-	-	-	0	-	-	-		
Idlo Bollor Set for Trucks with Twin Aylo Drivo	VZ 933102	-	-	-	-	-	-	-	-	0	-	-	-	-	-
Matercycle Power Measurement via Poller Set for Care	VZ 930021	-	-	-	-	-	-	-	-	0	-	-	-	-	-
Mochanical Holding Davido for Materavelo	VZ 990277	-	-	-	-	-	-	-	0	-	-	-	-	-	-
Relier Cover Distan D 100 Meterovale	VZ 975011	0	-	-	-	-	-	-	0	-	0	-	-	-	-
Avial Casting Fan AID 2	VZ 975134	-	-	-	-	-	-	-	0	-	-	-	-	-	-
Axial Cooling Fan AIR 2	VP 160002	0	-	-	-	-	-	-	-	0	0	-	-	-	-
Radial Cooling Fan AIR 7/2	VP 160006	-	0	0	0	0	0	0	0	0	-	0	0	-	-
Additional Cooling Fan AIR //2 for Trucks	VP 160011	-	-	-	-	-	-	-	-	0	-	-	-	-	-
Additional Cooling Fan	VP 160009	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Broadband Sensor Lambda/AFR Kit	VZ 990427	-	-	-	-	-	-	-	0	-	0	0	0	-	-
	VP 994013	-	-	-	-	-	-	-	0	-	-	0	0	-	-
Fuel Consumption Meter for Trucks	VP 994010	-	-	-	-	-	-	-	-	0	-	-	-	-	-
"Agricultural" Fuel Consumption	VP 994015	-	-	-	-	-	-	-	-	-	-	-	-	0	0
Connection Package PC/Laptop ZW	VZ 911256	-	-	-	-	-	-	-	-	-	-	-	-	0	0
Connection Package PC/Laptop ZW	VZ 911257	-	•	-	-	-	-	-	-	-	-	-	-	-	0
USB/RS 232 Converter	VZ 910140	-	0	0	0	0	0	0	-	-	-	-	-	-	-
Communikation Desk MCD 2000	VZ 950061	0	0	0	0	0	0	0	X	X	X	X	Х	-	-
Printer Shelf	VZ 955273	0	0	0	0	0	0	0	Х	Х	Х	Х	Х	-	-
Wireless Remote Control		-	-	-	-	-	-	-	Х	Х	Х	Х	Х	-	-
ASM-P Software Module Standard Power Measurement	VZ 911224	-	-	-	0	0	-	-	-	-	-	-	-	-	-
Driving Cycle Expansion Kit FPS	VZ 935166	-	-	-	-	-	0	0	-	-	-	-	-	-	-
Side-Restraining Rollers FPS/ASM	VZ 975081	-	0	0	0	0	0	0	-	-	-	-	-	-	-
Set of Sliding Side-Restraining Rollers ASM	VZ 975156	-	0	0	0	0	0	0	-	-	-	-	-	-	-
Set of Approach Ramps 2.3 m	VZ 975218	-	-	0	0	-	0	-	-	-	-	-	-	-	-
Drive-over Ramps	VZ 975155	-	-	0	0	-	0	-	-	-	-	-	-	-	-
Weighing Cells Static ASM	VZ 975139	-	0	0	0	0	-	-	-	-	-	-	-	-	-
Mobility Kit ASM	VZ 975140	-	-	0	0	0	-	-	-	-	-	-	-	-	-
Set of Drive-on Ramps 1.5 m ASM	VZ 975141	-	0	-	-	-	-	-	-	-	-	-	-	-	-
Hot-Dip Coated Load Rollers R100/R200	VZ 935181	-	-	-	-	-	-	-	0	0	-	-	-	-	-
Ni/Cr Coating for Running Rollers	VZ 935215	-	-	-	-	-	-	-	-	-	Х	0	Х	-	-
Official Approval for Road Service (Germany)	VM 996016	-	-	-	-	-	-	-	-	-	-	-	-	0	0
Special Coating on request															
Vehicle Fixing Device on request															
			X = s	tanda	rd eq	uipm	ent	() = op	otion		- = no	ot ava	ilable	,









MAHA Performance Dynamometer Concepts



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