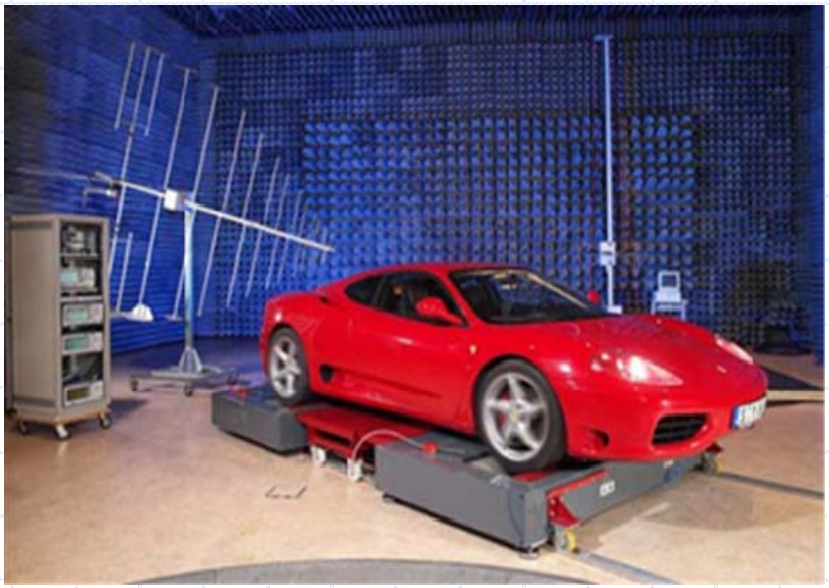
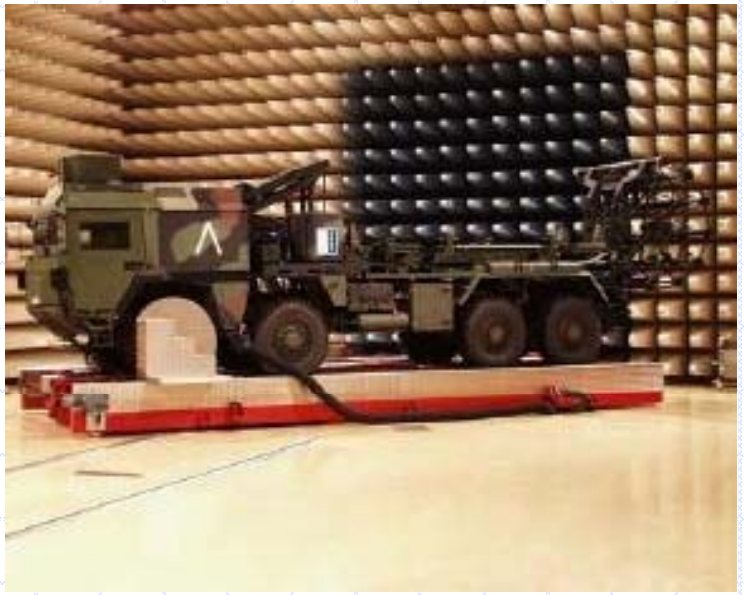
Free-standing Dynamometers

Dynamometer





Dynamometer

Standard Features

- Free-standing versions
- Use in anechoic chambers for EMC & EMI measurements
- 2 active axles for vehicles with rear/front- or 4 wheel drive
- 4 independent controllable roller pairs
- Removable system
- Usually placed on top of the turntable
- Loading ramps and bridges between both axles
- Cooling fan, Robot, Exhaust gas system, etc. available

Mechanical Specification

Dynamometer

Permissible axle load		1.500 kg
Diameter car wheels	min	400 mm
Car wheel distance		1.0 to 2.0 m
Distance between the axles		1.0 m to 3.0 m
Height roller stand	approx.	300 mm
Height of the car wheels over the floor		220 mm
Diameter rollers (4 roller pairs)		240 mm
Complete weight	approx.	2500 kg

Dynamometer

Specification: Active Axle

Max speed		100 km/h
Active axles		
4 Drive/Brake AC motor/generator	each	22 kW (Siemens)
4 Vector frequency inverter	each	37 kVA (Siemens)
Voltage/current consumption	2x	380 V/ 125 A/3phase
4 Break resistors cooled by fan		
Connected to the E.U.T. filtered power socket		1 CEE type
Wiring		4 w 10 mm²
Acceleration	max.	10 m/s² (1g)
Deceleration	max.	10 m/s² (1g)
Speed measurement and control accuracy	+/-	1 km/h
Controlled via fibre optic link		

Dynamometer

- Emission

  Less than 6 dB the limits of CISPR 12

Frequency range	150 kHz – 1 GHz
Measuring point	1 m above the floor level
	5 m distance to the table centre

- Immunity

Field strength	200 V/m
Frequency range	10 kHz – 18 GHz

System Controller:
PC with serial communication to the dynamometer and Dynamo-Software by fibre optic control lines

Brief Description

Dynamometer

General:

The Dynamometer F-DYN 4WD is constructed as a freestanding dynamometer, which can be fixed onto a turntable or a stand-alone system. Two active elements are used for cars with rear/front wheel drive. Each car wheel is driven by a separate motor/generator. It can be used for acceleration/retardation and in an endurance mode.

EMI / EMC:

The Dynamometer F-DYN 4WD is prepared to be used in an anechoic chamber for EMI and EMC measurements. All electronic components are located in a separate box, which is shielded, and radio interference suppressed. The RF- Emission is less than 6 dB under limit “B” on CISPR 12. The immunity against field strength up to 200 V/m is guaranteed.

Control Unit

Each active element has two micro controller to control the frequency inverters and for the speed measurement system. The element is connected to the system controller via fibre optic links. The system controller PC is equipped with an IEEE interface to be connected to a host computer. Forward/backward turning and acceleration/retardation is programmable, speed profiles can be created. ABS test sequences are possible.

Brief Description

Dynamometer

Safety and Emergency Function:
The maximum speed is limited by inverter function controller and by the internal micro controller. The temperature on the motors and inside the electronic box is being watched. Two emergency switches are located close to the stand and in the control room. In case of an emergency, the main power will be switched off.

Structure:
The 4 independent roller pairs of the dynamometer are integrated into a “self-contained” frame, which minimizes the dynamic energy output to the turntable.

Rollers:
The rollers are static heaved up to 2000 rpm and flame-coated.
Balance quality: Q 2.5 according to VDI 2060

Wheel Base:
The wheelbase is to adjust manually. The base must be adjusted according to the car wheel distance with a +/- 2 mm tolerance.
Operation of the wheel base adjustment is only possible at a standstill of the dynamometer.

Brief Description

Dynamometer

Loading and Unloading:
To drive the car on the stand and into the rollers two free adjustable ramps and two bridges must be used. The ramps and the bridges are removable while the test is running.

Stand and Vehicle restraint system:
The Roller Stand is free standing on the floor on rubber stripes on the bottom side. Each stand element has three fixing rings to fix the vehicle with adjustable belts while operating.

Fixing elements:
The system is equipped with four lashing straps to fixing of the vehicle while running.
Spring hooks allow an easy connection to the four fastening bolts, which need to be integrated into the chamber floor.
The straps are made of electrically neutral material.

Movable Cooling fan system:
A shielded fan provides a sufficient cooling for the tyres and the motor of the vehicle under test.
The fan speed can be set either proportional to the roller speed (up to 60 km/h) or to a constant speed.
Wind speed: 60 km/h
Air flow: 20.000 m^3/h

The dynamometer software includes the following functions:

- Start/Stop cycles
- Independent speed control of the rollers
- Speed control of the ventilator
- Force at the rim
- Distance gone from the start of the cycle (in km)
- Cycle recording (profiles)
- Emergency Stop

Dynamometer

Possible test cycles:

- Constant velocity
- Velocity gradient
- Street simulation
- ABS testing

Included in the software:

- PC with Pentium processor
- Flat screen
- Keyboard, mouse and necessary hardware

Dynamometer Software

Dynamometer

Dynamometer - Test *

Project View Settings Help

Task list

Project settings

Hardware setup

Dynamometer

Measurement results

Dynamometer state

Offline

Project settings | HardwareSetup | Dynamometer

Car settings

vendor Ford

type Focus

model C-Max

axis distance 200

horse power 0

Velocity1 (km/h) 5

Torque1 (Nm) 100

-> propose torque

Velocity2 (km/h) 60

Torque2 (Nm) 600

show torque curve

Program type

constant velocity | velocity gradient | road simulation

Constant velocity settings

velocity (km/h) 30

robot control

name 28

name 19

name 13

Data recorder

start recording

stop recording

save data

delete data

Dynamometer Software

Dynamometer

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horse power 0

-> propose torque

Velocity1 (km/h) 5

Torque1 (Nm) 100

Velocity2 (km/h) 60

Torque2 (Nm) 600

axis distance 200

show torque curve

Program type

constant velocity | velocity gradient | road simulation

Velocity gradient settings

control type free run | ems controlled

edit velocity gradient

velocity gradient

front left | front right | back left | back right

velocity (km/h)

time (sec)

robot control

name 28

name 19

name 13

Data recorder

start recording

stop recording

save data

delete data

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vendor Ford

type Focus

model C-Max

horse power 0

-> propose torque

Velocity1 (km/h) 5

Torque1 (Nm) 100

Velocity2 (km/h) 60

Torque2 (Nm) 600

axis distance 200

show torque curve

Program type

constant velocity | velocity gradient | road simulation

Velocity gradient settings

control type free run | ems controlled

edit velocity gradient

velocity gradient

front left | front right | back left | back right

velocity (km/h)

sequence number

robot control

name name name

Data recorder

start recording

stop recording

save data

delete data

Dynamometer Software

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Measurement results

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Car settings

vendor Ford

type Focus

model C-Max

axis distance 200

horse power 0

-> propose torque

Velocity1 (km/h) 5

Torque1 (Nm) 100

Velocity2 (km/h) 60

Torque2 (Nm) 600

show torque curve

Program type

constant velocity velocity gradient road simulation

Road simulation settings

select master wheel

front

back

robot control

name name name

28 19 13

Data recorder

start recording

stop recording

save data

delete data

Dynamometer Software

Dynamometer

Dynamometer - Test

Project View Settings Help

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Measurement results

Dynamometer state

Offline

Project settings | HardwareSetup

Project Test

test description

Car Settings

Vendor	Ford
Type	Focus
Model	C-Max
Axis distance	200
Horse power	0
Torque	(5,100) - (60,600)

Velocity gradient

Control mode: free run

time span (sec)	front left	front right	back left	back right
5	1	1	1	1
3	2	2	2	2
2	100	66	5	5
25	40	4	5	5
25	40	2	99	5
25	40	4	5	5
25	40	3	5	5
10	40	3	5	5
20	40	3	5	5
30	10	3	5	5
30	22	3	5	5

transfer program adjust axis distance

robot control

name name name

+ 0 − + 0 − + 0 −

Data recorder

start recording

stop recording

save data

delete data

Dynamometer Software

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measured values

Front left		Front right	
Power (kw)	0	Power (kw)	0
Torque (Nm)	0	Torque (Nm)	0
Velocity (km/h)	0	Velocity (km/h)	0
Acceleration (m/s²)	0	Acceleration (m/s²)	0

Back left		Back right	
Power (kw)	0	Power (kw)	0
Torque (Nm)	0	Torque (Nm)	0
Velocity (km/h)	0	Velocity (km/h)	0
Acceleration (m/s²)	0	Acceleration (m/s²)	0

control dynamometer

start program stop reset emergency stop

robot control

name + 28 - | name + 19 - | name + 13 -

Data recorder

start recording

stop recording

save data

delete data

Dynamometer Software

Dynamometer

Dynamometer - Test *

Project View Settings Help

Task list

Project settings

Hardware setup

Dynamometer

Measurement results

Project settings | HardwareSetup | Dynamometer | system setup

Ems system

Ems system is available

vendor: Rhode u. Schwarz

serial connection

baud rate	9600	port name	COM2
data bits	8	read buffer size	4096
discard null	False	read timeout	-1
dtr enable	False	receive bytes treshold	1
hand shake	0	rts enable	False
parity	0	stop bits	0
parity replace	63	write buffer size	2048
		write timeout	-1

Dynamometer state

Offline

robot control

name name name

+ + +

0 0 0

- - -

Data recorder

start recording

stop recording

save data

delete data

Filters:

The following filters have to be provided by the chamber manufacturer:

- 2x 380 V/ 3-phase / 125 Amps (dynamometer)
- 1x 230 V/ single phase/ 16 Amps (optional for the cooling fan)

Control Lines

Fibre optic control lines and feed troughs through the shielded are included

Compressed air (Optional in combination with the robot)

The requirement for compressed air is as follows:

- Air pressure: 6 bars
- Capacity: approx. 0.4 m^3/h

Options

- Robot System

EMC Actuator for accelerator+brake+clutch pedal (PSE-GBK)

Application: Driving of vehicles on chassis dynamometer for EMC tests.
Actuation of pedal positions to external, analog set-points.

Accelerator: Position set-point 0...10V corresponding to 0...100% force
Brake: Position set-point 0...10V corresponding to 0...100% force
Clutch: Position set-point 0...10V corresponding to 0...100% force
Pneumatically operated. Closed loop pressure control

Features: Due to pneumatically operation no EMC emission

Actuator: Emergency-Off button on actuator unit.
Simple mounting to driver seat

Benefits at a glance

- Realisation of customer-specific solutions
- Low Maintenance
- Reliably, solid designs
- Fast response time & high accessibility
- Provide expert service
- Innovative development and research

Dynamometer

Notes

Dynamometer