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MATURO DYNAMOMETER

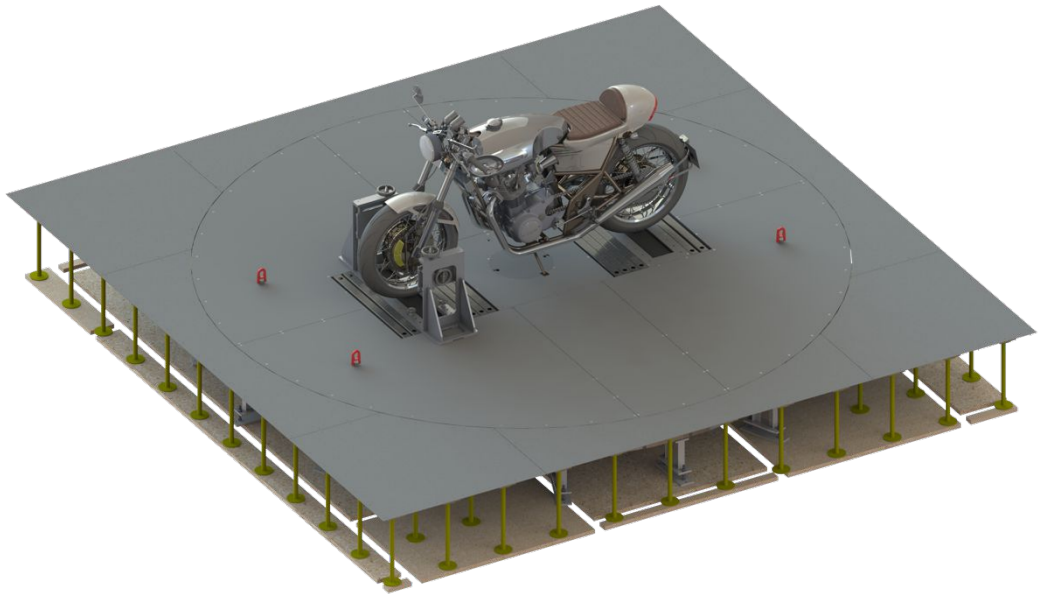
Technical Description

Dynamometer FR-DYN-MOT_I

Integrated into

Turntable TT 3.5-t-DYN

Customer	Project



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2 DYNAMOMETER INTEGRABLE INTO TURNTABLE (TT - DYN)

2.1 Technical Data of the Dynamometer DYN-FR-MOT_I

Axis distance	1000 mm – 2000 mm
Total load / axis load	400 kg / 250 kg
Roller diameter	300 mm
Roller properties	Smooth surface static heaved up to 2000 rpm Balance quality: Q 2.5 according to VDI 2060
Nominal speed	60 km/h
Maximum speed	100 km/h
Speed measurement accuracy	+/- 0.1 km/h

The Dynamometer DYN-TT is constructed as a chassis dynamometer, which can be integrated into a turntable. The active and the passive axis can be linked mechanically or the are separated.

Specifications:

- Integrated into turntable
- For use in anechoic chambers for EMI and EMC measurements
- 2 passive rollers for 2-wheel Motorcycles
- Independent rotation of dynamometer and turntable
- Axle load of max. 250 kg
- Speed up to 100 km/h

2.2 EMC/EMI suitability

The TT–DYN is especially designed not to influence EMC and EMI measurements. Therefore, the electronic components are inside a shielded, radio interference suppressing box which is placed inboard the dynamometer.

EMC Performances Emission Typically 10 dB under the limits of CISPR 12 and CISPR 25	
Frequency range	150 kHz – 1 GHz
Emission, electrical Typically 10 dB under the limits of SAE J551-5: 2004-1, GB/T 18387	
Frequency range	9 kHz – 30 MHz
Measurement distance	3 m
Emission, magnetic Typically 10 dB under the limits of SAE J551-5: 2004-1, GB/T 18387	
Frequency range	9 kHz – 30 MHz
Measurement distance	3 m
Immunity	
Continuous field strength	200 V/m
Frequency range	10 kHz – 18 GHz

All the design and manufacture of vehicle test bench is in accordance with standards below:
Ambient Noise requirements according to standards of CISR12, SAE J551-5
Vehicle velocity, acceleration, load, road simulation requirements and power grids requirements according to standards of CISR12, ISO11451, ECE R10, SAE J551, GB14023, GB18387, IEC61000-4-3, GB/T 14549.

2.3 Brief description

General

The Dynamometer FR-DYN- MOT_I is constructed as a chassis dynamometer, which can be integrated into a turntable. Two passive rollers are used for 2-wheel motorcycle testing.

EMI/EMC

The Dynamometer FR-DYN- MOT_I 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 10 dB under limit “B” on CISPR 12. The immunity against field strength up to 200 V/m is guaranteed.

Structure

The rollers of the dynamometer are integrated into a “self-contained” frame, which minimizes the dynamic energy output to the turntable.
The frame itself is placed into the turntable as pre-assembled assembly group for an easy installation of the system.

Rollers

The rollers are static heaved up to 2900 rpm and flame-coated.
The surface of the rollers is comparable with road surface.
Balance quality: Q 2.5 according to VDI 2060

Figure: Roller system

Wheel Base adjustment

The axle distance of the system can be adjusted manually by hand crank or similar.
Operation of the wheel base adjustment is only possible at a standstill of the dynamometer.
Several sheets plates needs to be placed manually between the rollers depending on the axle distance

Mechanical linking of front and rear axle

The front and rear axle are mechanically linked to each other in order that all rollers of the dynamometer run simultaneously.

Figure: Mechanical link of axles

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.
The fixing elements are integrated into the structure of the system and are adjustable to the specific vehicle sizes.
The straps are made of electrically neutral material.

Fig.: 3D eye bolts at lashing points

Fig.: Removed eye bolts

Clamping device for motorcycles

- to fix the vehicle during tests

Stand-alone cooling fan system MCF-MOT (optional)

- adjustable guide plates for wind direction
- different maximum air flows and maximum wind speeds available, e.g. 10 000 m^3/h and 60 km/h
- The stand-alone option is equipped with four wheels for easy movement and made of plastic and wood.

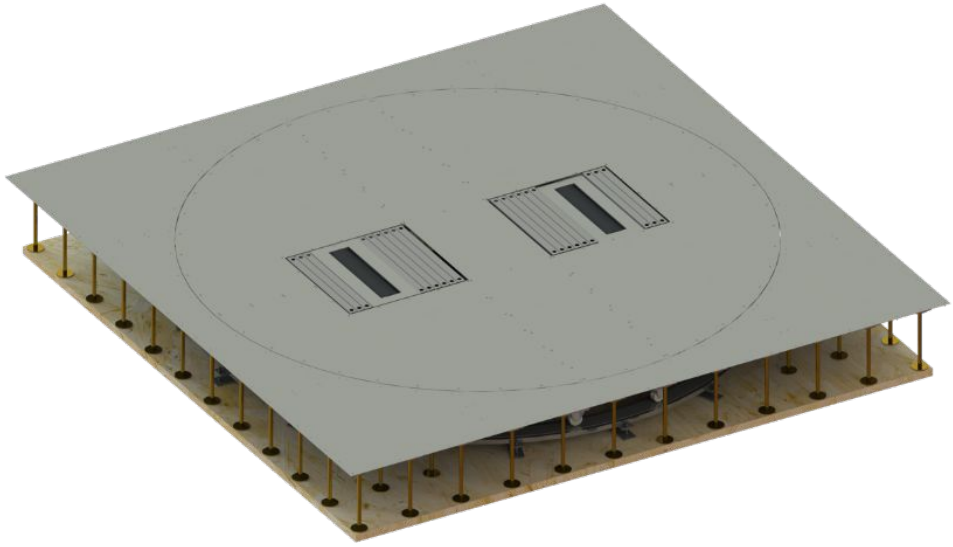
Exhaust system up to 200° C

- Movable soft exhaust pipe (up to 5 m) on turntable made of non-metallic material
- Y-distributor with line provided up to the honeycomb in the shielding wall

Accessories included

- Two emergency switches, one close to the dynamometer and one inside the control room.
- Triggering the switch sets all rollers to torque-free mode to prevent vehicle damage
- Safety cover for tires

3 Turntable TT 3.5 - 1t - DYN



3.1 Technical data of the Turntable

Type	TT 3.5 – 1t
Diameter	3.5 m
Load capability	1.000 kg
Point load	200 kg at area of 30 cm x 30 cm
Height	1000 mm
Material cover plate	stainless steel
Rotating speed adjustable	0.5 rpm – 2.0 rpm
Rotating angle	from – 200° to + 200°
Position accuracy	better +/- 0.5°
Motor	servo motor, frequency inverter
Interference suppression	20 dB under limits EN 55022 class B
Turntable drive	bevel gear
Control cable	Fibre optic lines
Current consumption	max. 16 A
Voltage	380 VAC – 400 VAC, 50 Hz / 60 Hz three phases
Concentricity tolerance	+/- 3mm
Elevation tolerance	< 5 mm
Ground plane connecting	every 50 mm
Square border interface	4.0 m x 4.0 m, stainless steel
Operating temperature	5° C – 40° C
Accessories	Interface to FCU3.0/NCD Controller Service manual

3.2 Brief description

The turntable TT -DYN is especially designed for flush mounted installation at intermediate levels in electromagnetic absorption chambers. The framework design allows the possibility to integrate a chassis dynamometer.

Movement

The rotation of the turntable can also be carried out while the chassis dynamometer is in operation. The angle is measured by a position encoder.

Safety for EUT

For the safety of the EUT, the turntable is equipped with an acceleration/deceleration function for start and stop ramps to avoid jerky movements

Emergency switch

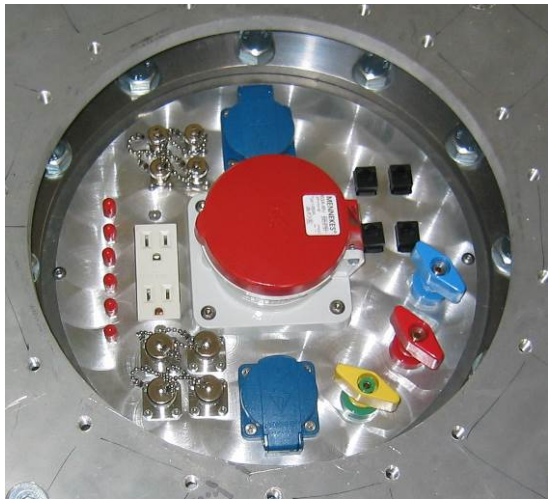
The turntable is equipped with an integrated emergency switch, which can be connected at the turntable perimeter.

Limit switches

The turntable is equipped with a limit switch and positioning switch system to guarantee the exact positioning of the turntable. An “overturning” of the system is prevented by using limit switches.

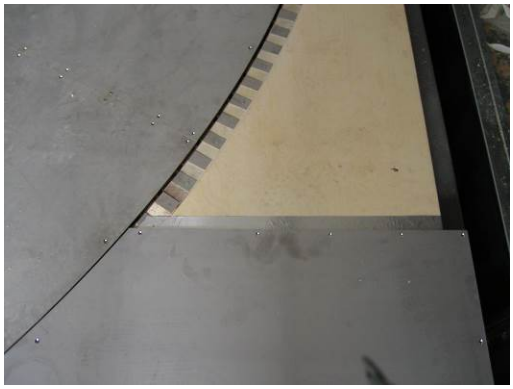
Power supply in the centre of the turntable

It is possible to integrate various types of connectors for the power supply of the EUT



Connection to the ground plane

Systems included a long-lasting, maintenance-free contact:
Material: hollow core copper beryllium tubing

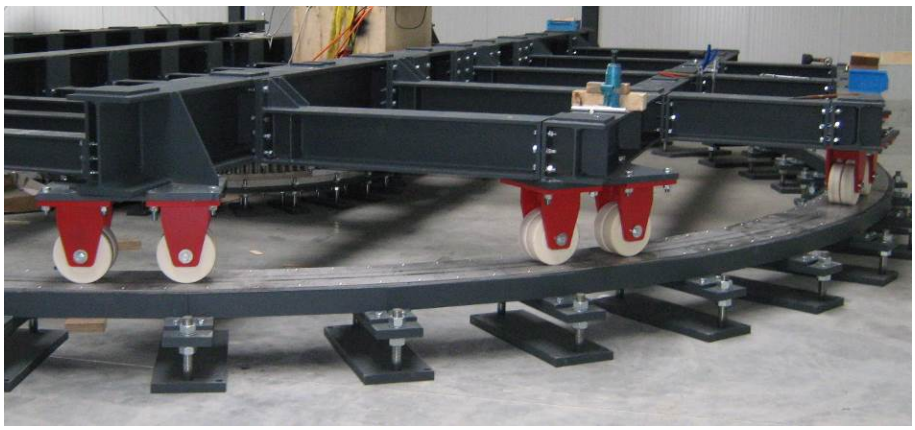


Heavy-duty roller bearing

A heavy-duty roller bearing in the centre of the turntable supports high axial and radial loads.

Heavy-duty castors:

Roller bearing heavy-duty castors at the turntable structure additionally support the high axial forces at the outer diameter of the turntable.



Roller track

The heavy-duty castors run along a height adjustable runway structure at the edge of the turntable. The structure is made of a welded steel structure and a stainless-steel runway for a low noise operation.

Turntable structure

Solid welded steel construction; parts are assembled with screws (for easy transportation).
The complete structure is either pre-coated and painted or galvanised for long-lasting performance of the system.

Service hatch

There is a service hatch at the rim of the turntable, which allows easy access above the turntable for maintenance works. The opening is covered with a removable stainless-steel cover and is equipped with a ladder.
Size: approx. 0.8 m x 0.8 m

4 Utility requirements for the system

Filters

The following filters have to be provided by the chamber manufacturer for the operation of the system.

For the dynamometer	
Voltage	230 V/ single-phase
Current consumption	16 A
For the turntable	
Voltage	1x 380-400 V/ 3-phase
Current consumption	16 A
For the cooling fan system	
Voltage	1x 380-400 V/ 3-phase
Current consumption	16 A

Pit

Pit requirements	
Dimensions in mm (L x W)	3900 x 3900
Depth in mm	1000

Exhaust extraction

Connection tube with honeycomb in the shielded wall for connection of the exhaust hose
Dimension needs to be discussed

Compressed air

For the roller brake system compressed air is required. Optionally, it is also necessary for the robot and when the system is used in combination with a pneumatic Antenna Mast.

Compressed air requirements	
Air pressure	6 bar
Capacity	Approx. 0.4 m^3/h