



| 5 | DYNAMOMETERS

innco systems EMC Chassis dynamometer Systems (sometimes referred to as a “rolling road”), used in the development and homologation for automotive industry, are specifically designed to be used in electromagnetic absorption chambers.

EMC measurements are the main aspect of the design and control systems. We have developed over several years unique designs including a “Zero Emissions” system.

We have two main systems, for integration into a turntable or as “Free Standing” design which can be transported into and out of the EMC facility. The systems can be designed for front wheel drive, rear wheel drive, four wheel drive and free wheel drive types. The newly developed DynamPro 4.0 software provides accurate and simple operations for all system functions.

| 5.1 | PRODUCT OVERVIEW

COUPLED FREE ROLLER (FRC)

- Easy to setup in the chamber
- Mechanically coupled rollers
- Up to 2 ton vehicle weight



FREE STANDING (RPS-F)

- Easy to setup in the chamber
- Electrically coupled rollers (active driven)
- Full functionality as integrated dyno



INTEGRATED FOR TURNTABLES (RPS-DT)

- EMC design
- Zero emission execution
- Integrated maintenance area
- Full functionality for all EMC test requirements



EMBEDDED FOR CHAMBER FLOOR (RPS-E)

- Integrated in chamber floor
- Low height needed
- Zero emission execution
- Full functionality for all EMC test requirements



CONTROL SOFTWARE (DYNAM-PRO)

- Installed on standard PC
- Adaptable to customer needs
- Full functionality for all EMC test requirements



DRIVING ROBOTS

- Pneumatic or electric driven
- Controllable by Dynam software
- High resolution
- Fixing adapters for all vehicle brands





| 5.2 | COUPLED FREE ROLLER (FRC)

The coupled free roller FRC 500-1730-F is a free standing testbench as free roller with coupled rollers. The FRC 500-1730-F synchronizes the wheels of the vehicle what is necessary for monitored tires (if ABS or ESP existing).

The FRC 500-1730-F is specially designed to be used in EMC chambers. The low height and the large area grounding minimises the influence on the test to perform. The two modules for the left / right tires were installed separately before they are coupled by an axle to eliminate also eventual speed drop by the vehicle.

Without coupling axle one single module of the FRC 500-1730-F can be used also as basis for testings of motorcycles.

Optionally a speed sensor can be installed for the monitoring of the vehicle or for the connection to a robot system.

COUPLED FREE ROLLER (FRC)

Type	Description	Article No.
FRC 500-1730-F	Axle distance up to 3 m, vehicle weight up to 1.8 ton	80001277

ACCESSORIES

Description	Article No.
Increased payload	On request
Speed sensor (for robot control)	On request
Shorter distance (e.g. for motorcycles)	On request
Calvanised cover plates (instead of GRP) for the space between the roller pairs	On request
Support profiles made of GRP	On request
Support profile rollers for installations on turntables smaller $\varnothing$ 3.8 m	On request

SCOPE OF DELIVERY

Type	Quantity
Ramps for loading/unloading	1 set
Rollers for easy movement	1 set
Fixing belts	4 x
Scale for adjusted distance	1 x
GRP inlays for the constant spaces	3 pairs
Galvanised steel inlays for the adjustable space	1 set
Fixing bolts for support frame	8 x

TECHNICAL DATA

TYPE	FRC 500-1730-F
Axle distance	1750 ... 3000 mm
Vehicle weight / axle load	max. 1800 kg / 900 kg
Total length	up to 3300 mm
Total height	approx. 120 mm
Roller diameter	100 mm
Roller length	500 mm
Inner / outer roller edges	1000 / 2000 mm
Width of supporting profile frame	approx. 2450 mm
Length / circumference of supporting profiles	3030 mm / Ø 3810 mm
Max. speed	above 50 km/h
Motor	–
Total weight / handling weight	approx. 450 kg / 200 kg
Operating voltage	230 V 50 / 60 Hz (optional 400 V)
Temperature range	+8 °C...+40 °C





| 5.3 | FREE STANDING (RPS-F)

The free standing dynamometer RPS-F is designed to be used in an electromagnetic absorption chamber for EMI, EMC & EMS measurements. The free-standing design allows a quick setup and storage either on top of a turntable or on chamber floor. In the execution with two active axles, the dynamometer can be used for cars with front / rear wheel drive as well as 4WD. Each car wheel is driven by a separate motor / generator.

All electronic components are located inside the modules in a shielded and radio interference suppressed cabinet. The typical emission level is below the CISPR 22 class B regulation. The immunity against field strength up to 200 V/m is guaranteed. A noise-free (zero emission) execution is optionally available.

FREE STANDING DYNAMOMETER (RPS-F)

Type	Description	Article No.
RPS04-100-F	Axle load: 1800 kg, max. speed 100 km/h Passive type: no motors	80005115
RPS40-55/100-7-F	Axle load: 1800 kg, max. speed 100 km/h Active type: max. acceleration / deceleration 0.7 g	80007078

ACCESSORIES

Description	Article No.
Different axle load	On request
Different motor power	On request
Different max. speed	On request

SCOPE OF DELIVERY

Type	Quantity
Access ramp	1 set
Dyno module connection bridge	1 set
Hydraulic lifting system	1 x
Metal free exhaust tube with stand	1 set
Vehicle fixing elements	1set
Roller protection cover	4 x
Power feedback unit for less heat-load	1set

TECHNICAL DATA

TYPE	RPS04-100-F	RPS40-55/100-7-F
Permissible axle load	max. 1800 kg	1800 kg
Diameter car wheels	min. 400 mm	
Distance between roller edges	in 900 mm	in 900 mm
	out 2400 mm	out 2100 mm
Distance between the axles typical	1200...3200 mm	
Height of roller stand	approx. 325 mm	
Diameter rollers (roller pairs)	240 mm	
Complete weight	approx. 2500 kg	approx. 3000 kg
Operating voltage	400 V 50 / 60 Hz (3phase +PE)	
Temperature range	+8 °C...+40 °C	
Specifications: passive axles		
Max. speed	100 km/h	–
Specifications: active axles		
Max. speed	–	100 km/h
2 drive / brake AC motor/generator	–	each 12 kW
2 frequency inverter	–	each 12 kW
1 regenerating unit needed power supply ¹	–	400 V / 125 A
Wiring	–	3 phase + PE
Acceleration	–	max. 7 m/s ²
Deceleration	–	max. 7 m/s ²
Up to a speed of	–	55 km/h
Speed measurement and control accuracy	–	better ± 0.2 km/h
Emission	–	-15 dB less than the limits of CISPR 22
Frequency range	–	150 kHz...1 GHz
Measuring point – above the floor level	–	1 m
– distance to the system centre	–	5 m
Immunity / field strength	–	200 V/m
Frequency range	–	10 kHz...18 GHz

¹ Filter requirement





| 5.4 | INTEGRATED FOR TURNTABLES (RPS-DT)

The integrated dynamometer RPS-DT are designed to be used in an electromagnetic absorption chamber for EMI, EMC & EMS measurements. The integrated design into a turntable allows easy handling for daily usage. Two active axles are used for cars with front / rear wheel drive as well as 4WD. Each car wheel is driven by a separate motor / generator.

All electronic components are located below the groundplane in shielded and radio interference suppressed cabinets at the maintenance area of the turntable. The typical emission level is below the CISPR 22 class B regulation. The immunity against field strength up to 200 V/m is guaranteed. The noise-free (zero emission) execution is as standard included.

INTEGRATED DYNAMOMETER FOR TURNTABLES (RPS-DT)

Type	Description	Article No.
RPS40-60/120-5-DT	Axle load: 2500 kg, max. speed: 120 km/h, max. acceleration / deceleration: 0.5 g	80005276
RSP40-90/150-10-DT	Axle load: 2500 kg, max. speed: 150 km/h, max. acceleration / deceleration: 1.0 g	80006674
RPS40-90/200-12-DT	Axle load: 2500 kg, max. speed: 200 km/h, max. acceleration / deceleration: 1.2 g	80005776

ACCESSORIES

Description	Article No.
Different axle load	On request
Different axle distances	On request
Different motor power	On request
Different max. speed	On request

SCOPE OF DELIVERY

Type	Quantity
Stainless steel cover plate	1 set
Shutter system for module shifting	1 set
Vehicle cooling fan	1 x
Non-conductive air cowling	1 x
Metal free exhaust tube with stand	2 sets
Vehicle fixing elements with storage boxes	1 set
Roller protection cover	4 x
NSA cover	1 set
Dyno chamber control panel	1 x
Power feedback unit for less heat-load	1 set

TECHNICAL DATA

TYPE	RPS40-60/120-5-DT	RSP40-90/150-10-DT	RPS40-90/200-12-DT
Max. permissible load per axle	2500 kg		
Diameter car wheels	min 400 mm		
Distance between...			
inner roller edges	1000 mm	700 mm	1000 mm
outer roller edges	2100 mm	2300 mm	2100 mm
Length of roller	550 mm	800 mm	550 mm
Roller pairs	4 pcs		
Diameter of roller	240 mm		
4drive / brake AC motor / generator			
with each nominal power per tire	12 kW	44 kW	44 kW
Temperature range	+8 °C...+40 °C		
To perform:			
Acceleration / deceleration	5 m/s ²	10 m/s ²	12 m/s ² (in overload mode)
Up to	60 km/h	90 km/h	90 km/h
Max. speed	120 km/h	150 km/h	200 km/h
Speed measurement and control accuracy	better ± 0.2 km/h		
Operating voltage	400 V 50 / 60 Hz (3phase +PE)		
Wiring	3 phase + PEN		





| 5.5 | EMBEDDED FOR CHAMBER FLOOR (RPS-E)

The embedded dynamometer RPS-E are designed to be used in an electromagnetic absorption chamber for EMI, EMC & EMS measurements. The integrated design into the chamber floor allows easy handling for daily usage. Two active axles are used for cars with front / rear wheel drive as well as 4WD. Each car wheel is driven by a separate motor / generator.

All electronic components are located below the groundplane in shielded and radio interference suppressed cabinets. The typical emission level is below the CISPR 22 class B regulation. The immunity against field strength up to 200 V/m is guaranteed. The noise-free (zero emission) execution is as standard included.

EMBEDDED DYNAMOMETER FOR CHAMBER FLOOR (RPS-E)

Type	Description	Article No.
RPS40-55/100-6-E	Axle load: 1250 kg, max. speed: 100 km/h, max. acceleration / deceleration: 0.5 g	80006840
RPS40-55/100-10-E	Axle load: 1500 kg, max. speed: 100 km/h max. acceleration / deceleration: 1.0 g	80006783

ACCESSORIES

Description	Article No.
Different axle load	On request
Different axle distances	On request
Different motor power	On request
Different max. speed	On request

SCOPE OF DELIVERY

Type	Quantity
Stainless steel cover plate	1 set
Shutter system for module shifting	1 set
Vehicle cooling fan	1 x
Non-conductive air cowling	1 x
Metal free exhaust tube with stand	1 set
Vehicle fixing elements with storage boxes	1 set
Roller protection cover	4 x
NSA cover	1 set
Dyno chamber control panel	1 x
Power feedback unit for less heat-load	1 set

TECHNICAL DATA

TYPE	RPS40-55/100-6-E	RPS40-55/100-10-E
Max. permissible load per axle	1250 kg	1500 kg
Diameter car wheels	min 400 mm	
Distance between... inner roller edges	900 mm	
outer roller edges	2100 mm	
Length of roller	600 mm	
Diameter of roller	240 mm	
Distance between the axles	2400...3800 mm	1800...3200 mm
Height roller stand	approx. 320 mm	
4drive / brake AC motor / generator		
with each nominal power per tire	12 kW	22 kW
Temperature range	+8 °C...+40 °C	
To perform:		
Acceleration / deceleration	6 m/s ²	10 m/s ²
Up to	55 km/h	
Max. speed	100 km/h	
Speed measurement and control accuracy	better ± 0.2 km/h	
Operating voltage	400 V 50 / 60 Hz (3phase +PE)	
Wiring	3 phase + PEN	





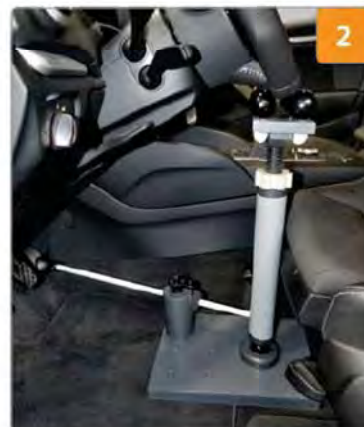
| 5.6 | FEATURES FOR RPS

innco systems dynamometers provide a big number of features in standard delivery scope.

Additionally available are features, which were developed together with our customers to realize their needs and make their everyday work more safe and efficient.

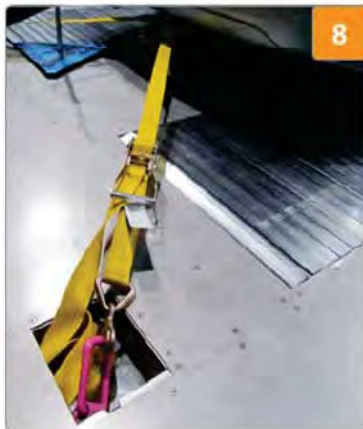
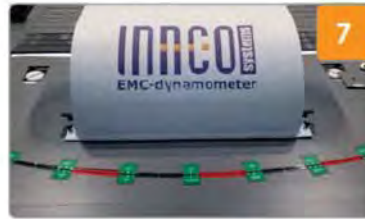
The pictures below show a small overview of the included and additionally available equipment for the dynamometer test system.

- 1 Optional tire cooling fan outlet integrated in the roller protection cover
- 2 Optional manual throttle jig with clamp unit for steering wheel
- 3 Roller protection cover (metal free)
- 4 Hand Control Unit on tablet PC for full dyno functionality

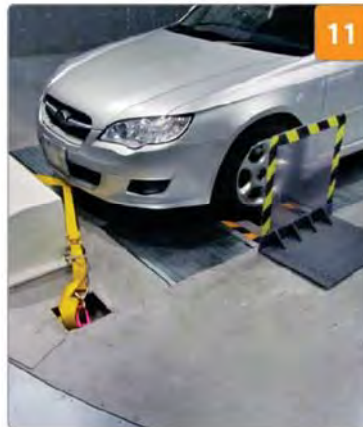


- 5 Twin roller design
- 6 Metal free exhaust tube with metal free tube-stand





- 7 Air cowling (metal free) with integrated lowable rollers for easy movement & setup
- 8 Fixing belts with integrated storage boxes
- 9 Fixed vehicle on dynamometer with exhaust tube and roller protection cover
- 10 Optional integrated connector panels
- 11 Roller protection cover (metal free)
- 12 Metal free exhaust tube up to 200 °C with metal tube-stand
- 13 Horizontal fixing pillar (metal free) storage below turntable surface





| 5.7 | CONTROL SOFTWARE (DYNAM-PRO)

The expandable dynamometer control software Dynam-Pro was developed by SIEMENS & innco systems, based on long experience with dynamometer control and in direct contact with several customers.

The design was focused to enable an intuitive operation of the needed functionality for EMC test requirements.

The SIEMENS engineers take an additional focus on the performance between the used hardware components and software interface.

In combination with the used high speed PLC, quickest control functionality is possible to handle each test requirement, also for future upgrades.

Installed on a Windows PC as human interface, the dynamometer can be connected to the company network structure for storing log files or remote control of the dyno system.

The installed remote maintenance software guarantees a quick check of the system status and allows system modifications, if required.

CONTROL SOFTWARE (DYNAM-PRO)

Type	Description	Article No.
DYNAM-PRO	Installed on PC with 24" monitor and Profinet-Fiber optic interface to dynamometer	80006783

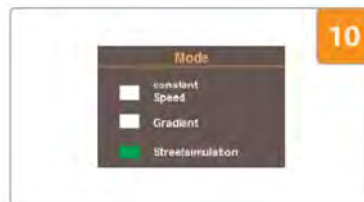
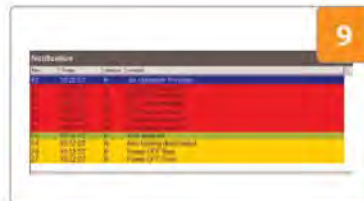
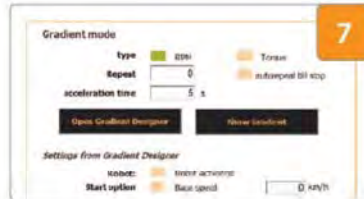
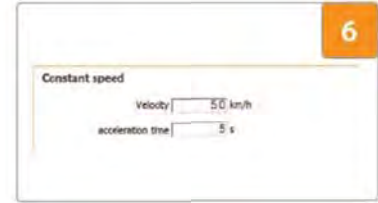
SCOPE OF DELIVERY

Type	Quantity
PC with installed Dynam-Pro software	1 x
24" monitor, mouse & keyboard	1 x
Dynamometer interface controller	1 x
Emergency stop for control room	1 x

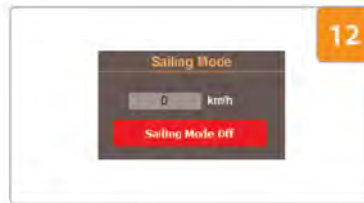
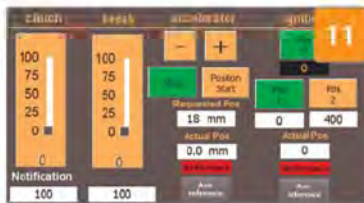


- 1 Dynam-Pro home screen
- 2 Dynam-Pro cooling fan settings
- 3 Dynam-Pro auto axle-adjustment settings
- 4 Dynam-Pro gradient overview screen

- 5 Drive in/out brake activation window. The brake can be activated either by software or by chamber control panel.
- 6 Constant speed settings screen. The speed can be edited at running test.
- 7 Gradient mode settings screen. Created gradients can be stored / loaded with and without base-speed.
- 8 Axle adjustment screen. The axle setup can be done by software or by optionally switches on chamber control panel.
- 9 Notification window provides information about system errors and chosen settings.

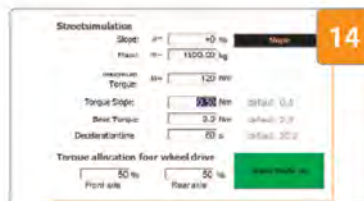
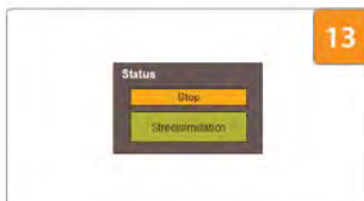


- 10 Operation mode window. Dynam Pro Software provides three main operation modes:
 - Constant speed
 - Gradient profile
 - Street simulation



- 11 Robot control window with teach-in function for ignition key / pushbutton actuator

- 12 New feature for HV and EV: coast down or sailing mode



- 13 Status window provides information about actual test mode and operation status.

- 14 Adjustment screen for street simulation mode



| 5.8 | DRIVING ROBOT

The dynamometer driving robots enable the automated/remote pedal operation of the vehicles under test. The device is built of two handy main units: the compact actuator unit and the control unit. The actuator units could be made optionally metal free, if required for using inside of EMC chambers. The control unit is usually located below the groundplane / carrier plate of the turntable.

The driving robot can be easily connected to the DynamPro-PLC as used in innco systems dynamometer. In this case the operation is embedded in DynamPro software.

The universal analog interface (optional) with 0...10 V input allows further the operation by third party control systems.

DRIVING ROBOT

Type	Description	Article No.
PB08-W	Electric driven pedal actuator, 75 mm moving range, 100 N	80007166
GBK081520-WDD	Robot system with electric driven throttle actuator and pneumatic driven brake & clutch actuator	80005740

ACCESSORIES

Description	Article No.
Additional brake actuator (PB08-W)	On request
Additional clutch actuator (PB08-W)	On request
Footwell placement (instead of seat placement) (GBK081520-WDD)	On request
Cabinet unit for installation on turntable / groundplane (GBK081520-WDD)	On request
Combined unit (GBK081520-WDD)	On request
CCTV camera mount (GBK081520-WDD)	On request
DynamLight-PC for stand-alone setup (GBK081520-WDD)	On request
Ignition key actuator (both)	On request
Different pedal range(s) (both)	On request
Different pedal force(s) (both)	On request

SCOPE OF DELIVERY

Type	Quantity
Optical link module as interface to PLC and DynamPro-PC (PB08-W)	1 x
Connector panel (PB08-W)	1 x
Steering wheel fixture (GBK081520-WDD)	1 x
Fixing elements for vehicle seat rail	1set

TECHNICAL DATA

TYPE	PB08-W	GBK081520-WDD
Actuator unit	for throttle	for throttle + brake + clutch
Throttle actuator: moving range / force	75 mm / 100 N	80 mm / 100 N
Brake actuator: moving range / force / acc.	–	150 mm / 150 N / n.s.
Clutch actuator: moving range / force / acc.	–	200 mm / 200 N / n.s.
Resolution of throttle movement	± 0.15 mm	
Material of actuator unit	mainly aluminium	throttle mainly aluminium brake and clutch 100 % plastics (metal free)
Cabinet unit with pneumatic control	shielded and radio interference sup- pressed for placement in the footwell	shielded and radio interference sup- pressed for installation beneath the groundplane
Length of connection line	standard:	
actuator unit <> control unit	1 m	–
control unit <> connector panel	3 m	–
lines to control panel	5 m	–
cabinet <> actuator	–	5 m
Pneumatic requirement	min. 6 bar	
Operating voltage	24 V DC (optional 230 V AC)	
interface to parent system		
in case of innco dynamometer	bus	
in case of universal input	0...10 V analog	0...10 V analog (each pedal)
in case of basic stand-alone	FO switches for CR to increase / decrease speed	–
Handling weight / total weight	approx. 7 kg / 15 kg	approx. 15 kg / 50 kg
Temperature range	+8 °C...+40 °C	

