



# FRDM 20L

## Flat Road Dynamometer



### Tire Rolling Characteristics



Single Roll Apex

Flat Belt

Within a Drum

For conducting the simulation of realistic, reproducible road trips in a laboratory various test methods are possible (e.g. Single Roll, Flat Belt, Within a Drum).

For testing complete vehicle systems, the options for performing road driving simulations are either on a 'chassis dynamometer' or on a 'flat belt'.

The 'flat belt' simulates the conditions of a real road trip far more accurately compared to other systems.

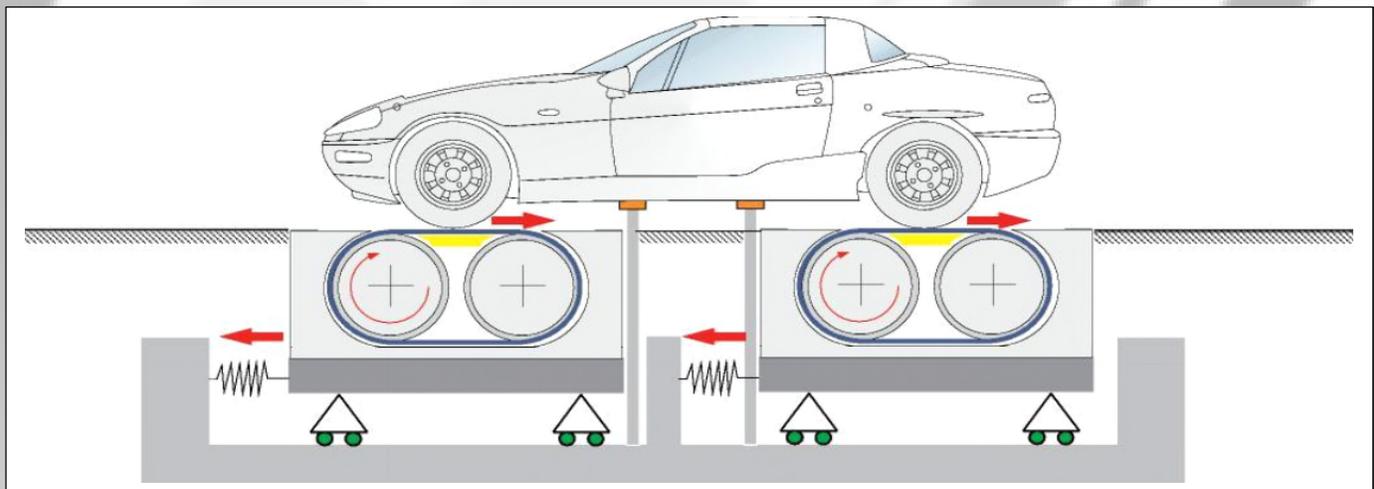
Due to the flat belt surface (no curvature at the wheel contact - surface) the ergonomic conditions for the test vehicle are very realistic to real road driving.

For the precise simulation of road trips in the laboratory for research into small frictionless losses. Providing a new testing method 'NewtonFinder'; this AIP system offers highly accurate measurement of tensile forces (Fx-forces).

- Exact reproducibility of comparison measurements to reduce fuel consumption and CO2 emissions.
- Realistic simulation or real world driving cycles including steering operations.

The Flat belt system – FRDM (Flat Road Dynamometer) is characterized by a flat driving surface with absolutely realistic reproduction of the tire rolling performance. During the design and development of the FRDM, special attention was paid to the following features:

- Very compact, ergonomic design
- Highly dynamic drive unit (motor in roll)
- Precise determination of the drag losses during real driving conditions
- Exact reproducibility in comparison measurements to reduce fuel consumption and CO2 emissions
- Realistic simulation of driving cycles including steering. During steering operations, the lateral deviation of the belt position is a max. 0.4 mm!



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# FRDM 20L (Flat Track Dynamometer)

## System Structure 'NewtonFinder':

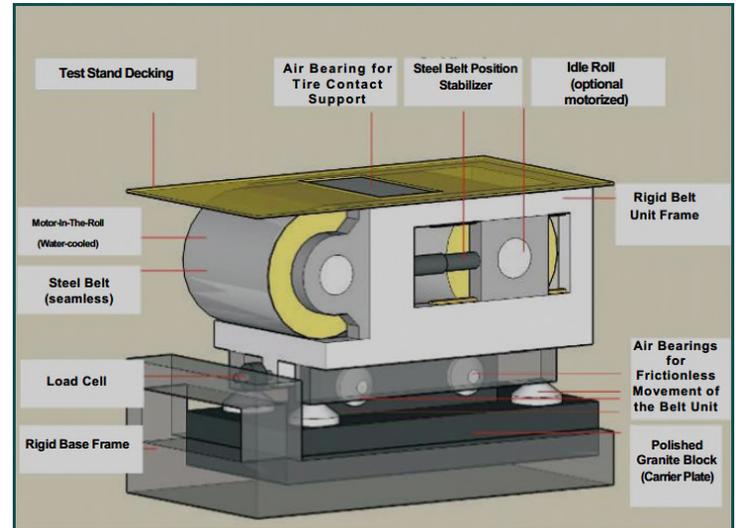
### Belt Unit (WDU)

The belt unit (wheel drive unit) is comprised of two barrel drums (rolls), which are connected with a steel belt. The front drum is equipped with an integrated drive unit, the rear drum is used for belt tensioning and belt stabilization in combination with a hydraulic operated control unit.

The test system was specially designed for easy and fast belt changes (service / maintenance).

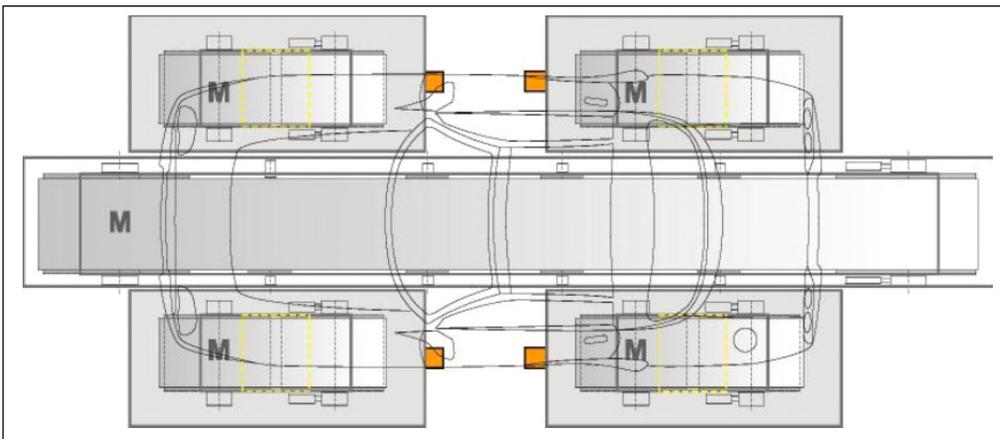
A pneumatic air bearing, mounted below the belt between the rolls, creates an air buffer underneath the steel belt at the tire contact area. The required compressed air (approx. 25 bar) is supplied by a high pressure air compressor.

In the situation when the integrated pressure monitoring system detects a drop in air pressure or failure, the belt units is controlled to a standstill to avoid any damage to the equipment or vehicle.



In the 'NewtonFinder' system, the belt unit is mounted on floating air bearings on a special base plate. A highly precise load cell at each belt unit measures the forces created by the test vehicle during a test drive.

Evaluation software is used to record and display the determined measurement data.



### Option - 4-Belt System with 'Center Belt' (5-Belt System)

A driven center belt is used for additional simulation of the road underneath the vehicle between the wheels. -> Optimization of air supply to vehicle components at the vehicle underbody, e.g. catalyst, differential, etc.

Implementation of a center belt with a pressure and suction bearing to avoid 'lifting of the belt'.

Optional heating, to simulate the road surface.

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