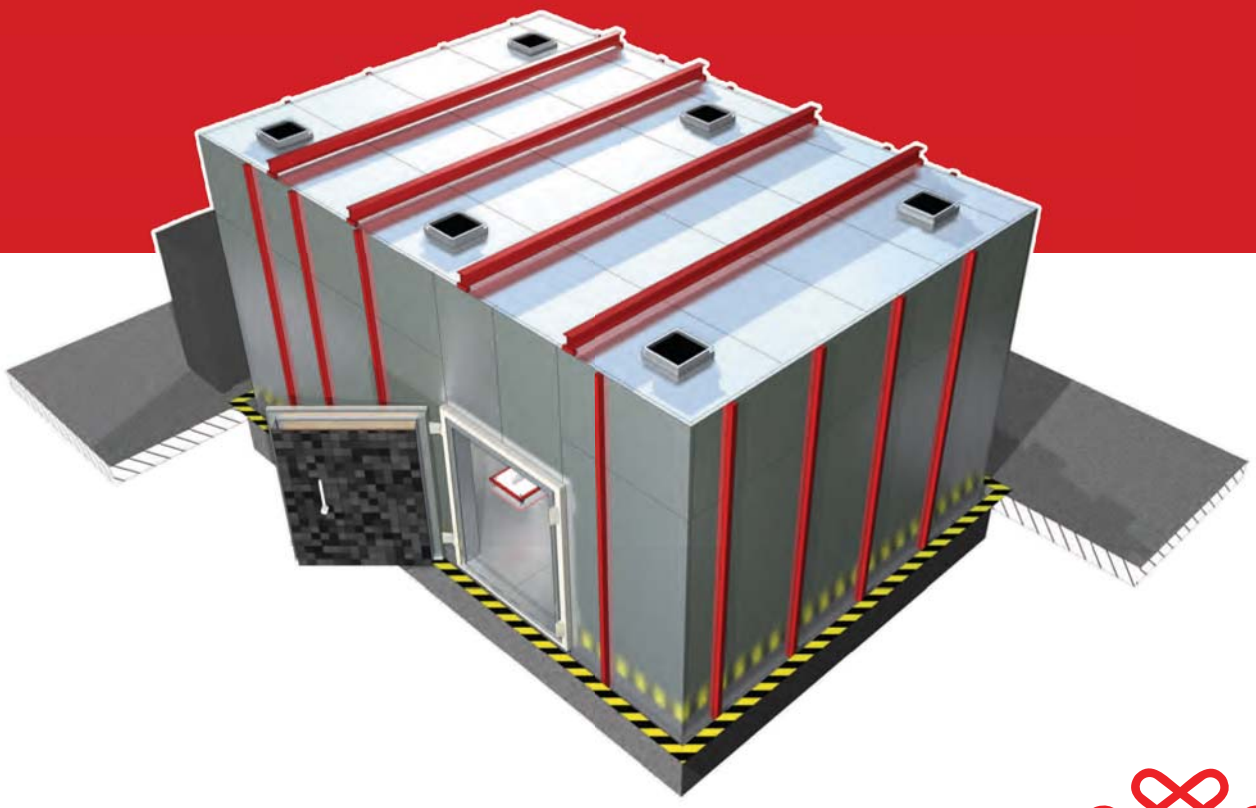
EDTC
E-Drive Testing Chamber



E-Drive Testing Chamber

Frankonia's EMC testing solution for powertrain components and systems relating to hybrid, electric, fuel cell and battery drive systems

FRANKONIA

Frankonia Group

The FRANKONIA GROUP was founded in 1987 as a solution provider for EMC laboratories to meet the increasing demand for highly specialized testing environments for the electronic and automotive industry. With more than 25 years of experience to date, FRANKONIA maintains its leading position in EMC solutions worldwide. Without limitations in capabilities and resources, FRANKONIA develops future-oriented concepts for EMC laboratories, which guarantees an optimal use of resources as well as the best possible customized solutions.

- FRANKONIA demonstrates a global presence in cooperation, with a well-structured network of productions, representations and service units.
- FRANKONIA strives to be the preferred partner for customized and state-of-the-art solutions.
- FRANKONIA provides fundamental knowledge to operate as a complete solution provider.
- FRANKONIA implements innovative technologies to enhance the efficiency and improve the outcomes and quality along with customers' needs.

We are proud of our highly specialized team that is putting our customers' demands into practice. It is our philosophy to improve the products, to realize new ideas, and to complete our product range within our broad scope of business. The fact that FRANKONIA is able to offer complete solutions from the first sketch to the final handover makes FRANKONIA a unique and trustworthy partner worldwide.

Frankonia authenticity

FRANKONIA stands for latest technologies, highest quality, innovative concepts and materials, and reliable solutions. Due to its easy and efficient usability along with its time-saving configuration, Frankonia's Anechoic Chambers set new standards for innovative and complete EMC testing solutions and offer a real added value to our customers.

Frankonia solution

FRANKONIA as a turnkey solution provider and manufacturer offers a complete range of test equipment, instruments, software and accessories. Additionally, our broad range of doors, gates, turntables, monitoring equipment, and positioning devices can be easily integrated to meet our customers' needs.

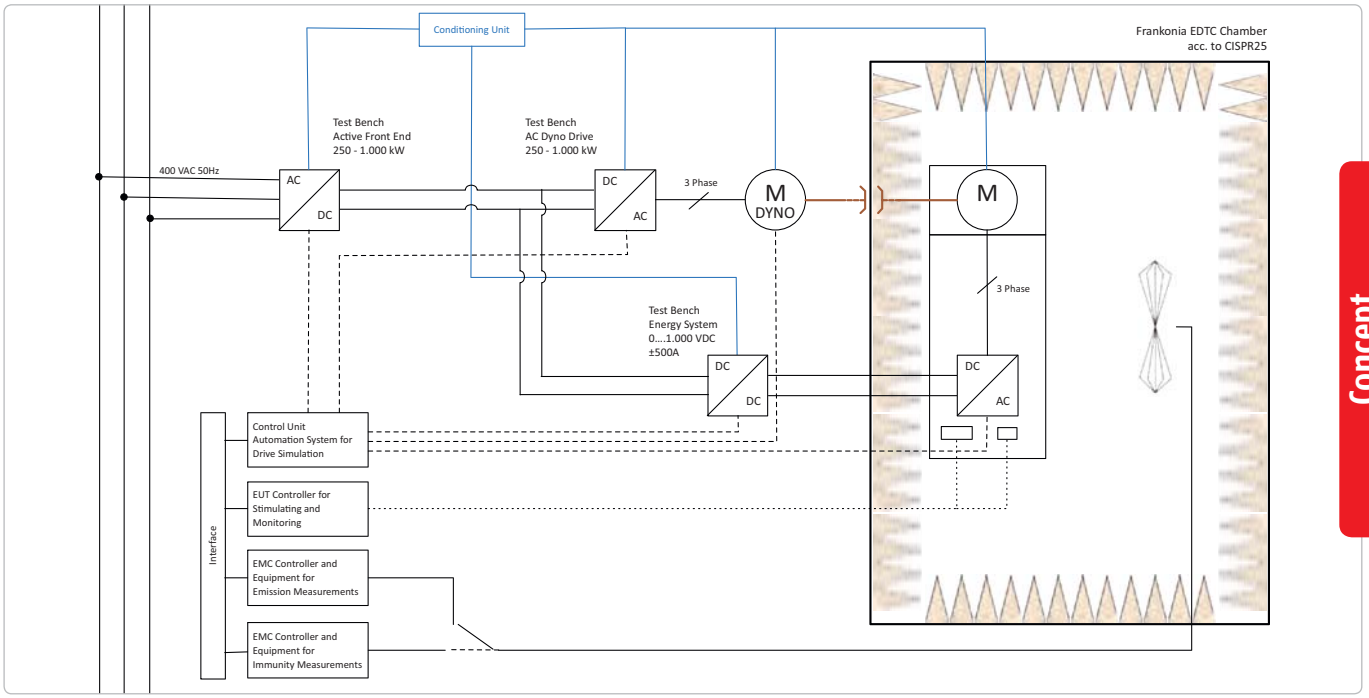
E-Drive Testing Chamber – EDTC

Frankonia's testing solution for powertrain components and systems relating to hybrid, electric, fuel cell and battery drive systems

The term 'powertrain' describes the main components that generate power and deliver it to the road, water or air. The EDTC is Frankonia's fully compliant anechoic chamber that is designed for EMC components and system testing for every kind of hybrid, electric, fuel cell and battery drive system.
With its innovative concept and its optimized layout based on the ACTC (Automotive Components Testing Chamber), the EDTC offers superior conditions for radiation testing in accordance with CISPR 25 and DIN/ISO 11452-2, as well as remarkable minimized reflections. The chamber is lined with ferrite absorbers and partially lined with Frankosorb® hybrid absorbers to cover the frequency range from 150 kHz to 18 GHz (40 GHz option) that offers outstanding performance.

For state-of-the-art automotive test systems, Frankonia and its partner D2T offer a variety of powertrain component and system test solutions that meet EMC testing conditions. The areas of expertise range across conventional powertrain engineering, hybrid and electric powertrain engineering, and test bed solutions and advanced tools. At the centre is a fully integrative and customizable software solution that satisfies any kind of testing needs, both of today and the future, along with EMC characteristic needs.
The EDTC encompasses complete testing for components and systems in a range from 250 kW up to 1,000 kW with a revolution speed up to 8,500 RPM. The test bench energy system is used as, for example, a battery simulator, with up to 1,000 VDC and up to 500 A. The conditioning unit for the system components provides either air or liquid cooling and simulation in an adjustable range from -20 °C to +100 °C. Furthermore, it provides for the e-motor under test a permanent liquid cooling and simulation in the same adjustable range.
The most important advantage of Frankonia and D2T's e-drive testing chamber solution is the common DC-bus between dyno drive and battery simulation that reduces costs, reduces conversion loss, ensures reproducible test conditions, and furthermore increases performance and secures the safety level.

The EDTC is available as a complete turnkey system, but also as a modification kit for existing Frankonia chambers. Moreover, the EDTC solution offers the option to be used for non-EMC testing procedures. Therefore, the EDTC solution strives to be the perfect choice for any powertrain component and system testing under EMC conditions – or even without.



Symbolized absorbers layout and chamber size

Concept

SPECIFICATIONS

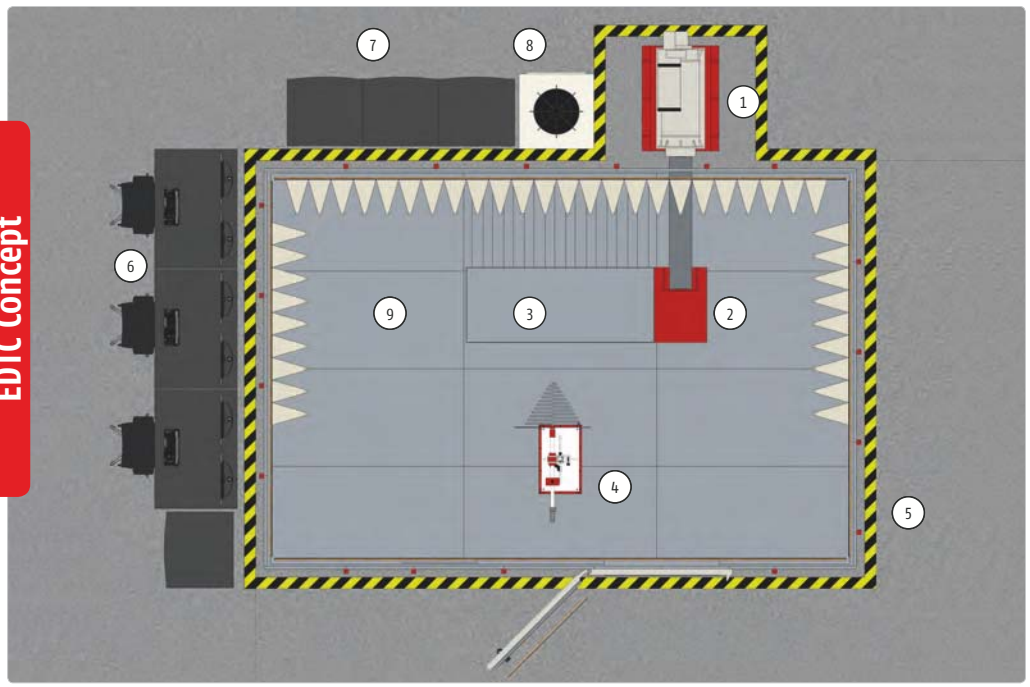
Frankonia's EDTC solutions

Frankonia as a turnkey solution provider and manufacturer offers a complete range of test equipment, powertrain testing equipment, motor test facilities, instruments, software and accessories. The EDTC is available in several configurations that allow for all relevant and expected testing procedures for powertrain components and complete systems. Additionally, our broad range of doors, monitoring equipment, and positioning devices can be easily integrated to meet our customers' needs.

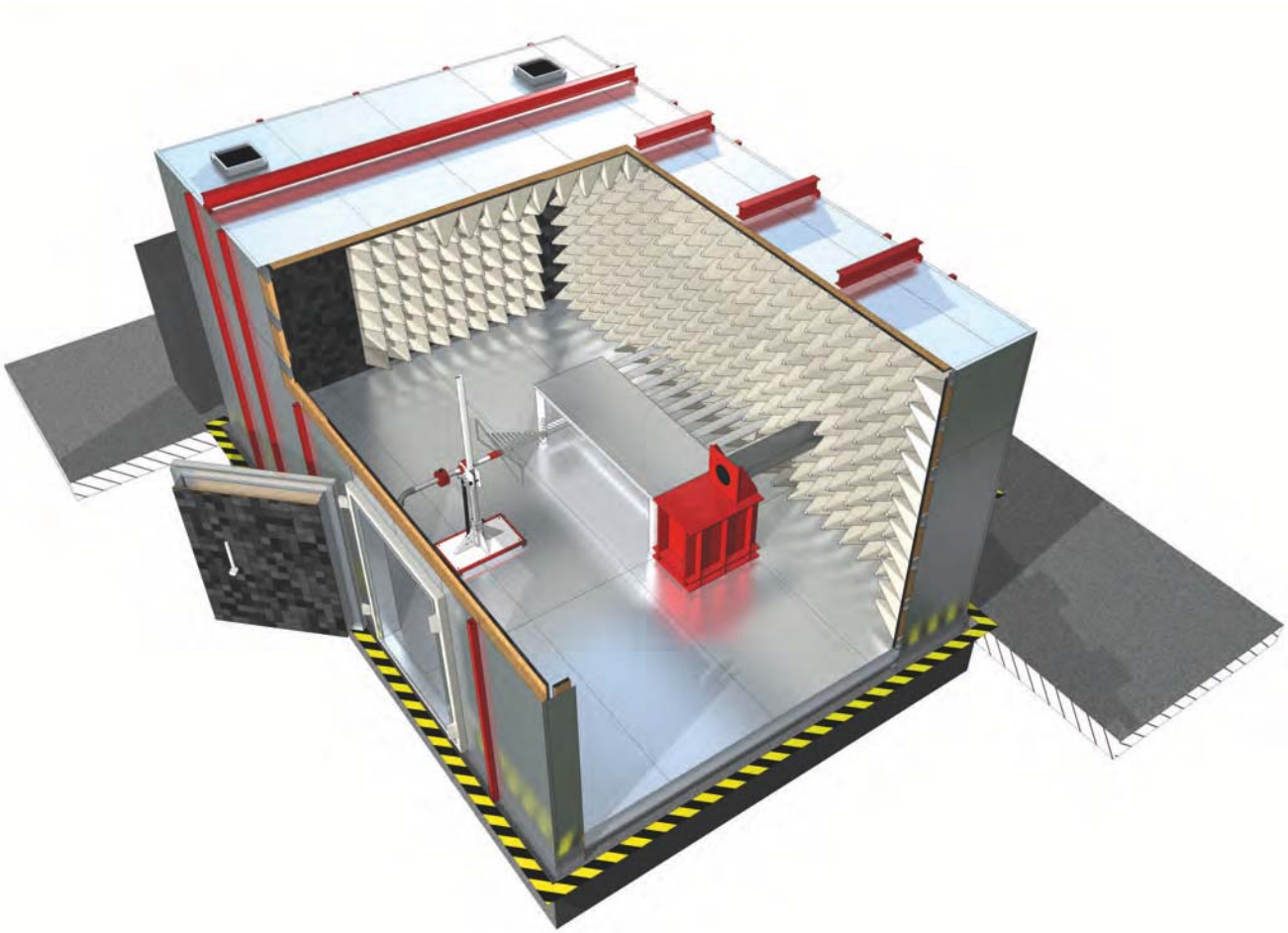
EDTC – EMC testing chamber	
Technical specification	
External dimension (L x W x H)	7.880 m x 5.330 m x 4.050 m (exemplary)
Frequency range	150 kHz to 18 GHz (option 40 GHz)
Measuring distance	1.0 m
Shielding	Pan-type modular shielding; ≥100 dB (1 MHz to 18 GHz), incl. power and data line filters, and cooling solution (air or water)
Basement	Vibration-free and non-interacting solid basement (floating slab)
Absorber lining	
Walls and ceiling	Optimized lining with ferrite absorbers and Frankosorb® hybrid absorbers H600
Floor	Highly conductive floor finish and protection
EUT test table	Compliant with CISPR 25, incl. drive unit bench and fixation set, and optional mobile absorbers
EMC standards	
Emission test (EMI)	Full compliance with CISPR 25 Ed. 4 (performance absorption material min. ≥6 dB)
Immunity test (EMS)	Floor Full compliance with DIN/ISO 11452-2 (reduction of reflection in the test area min. -10 dB)

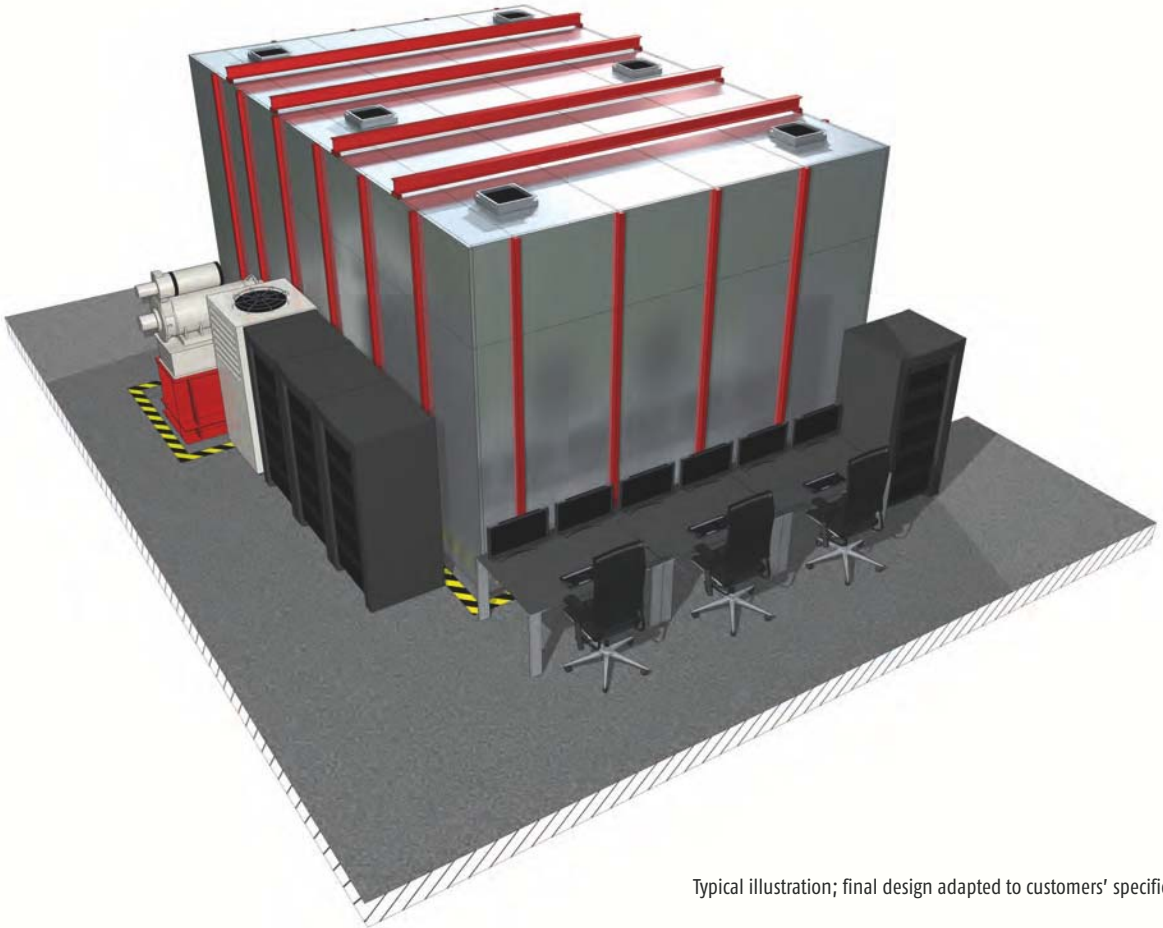
Exemplary concept for EDTC 250 kW version

EDTC Concept



Explanation:
1) Dyno by D2T
2) Test bench
3) CISPR25 table and setup
4) EMI/EMS test system
5) EDTC chamber and outline slab
6) Control center
7) Automation system and conditioning unit
8) Air conditioning
9) Free space for, e.g., battery load system



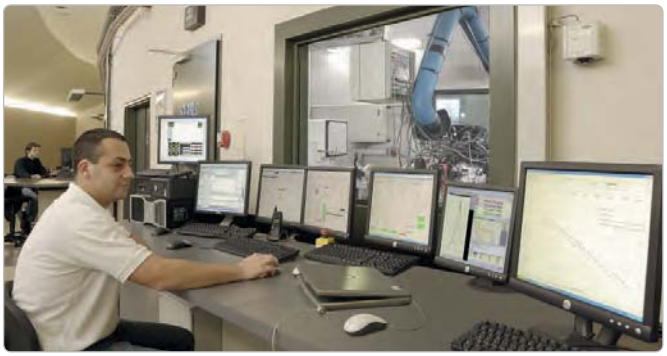


Typical illustration; final design adapted to customers' specification

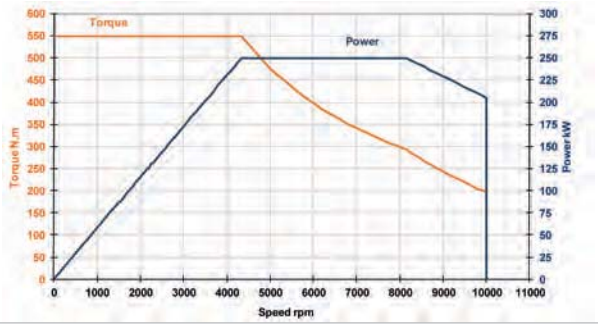
PERFORMANCE

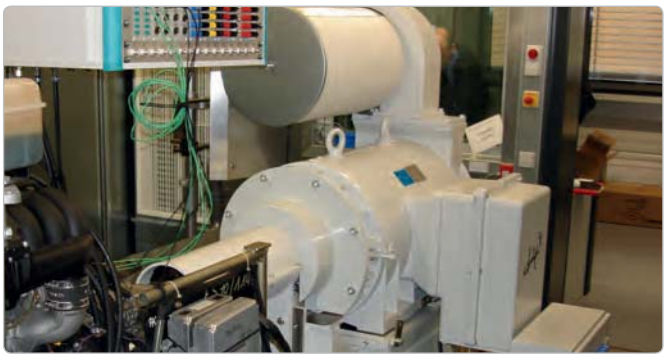
EDTC – Powertrain components and systems testing system			
Technical specification			
Version*	EDTC-250	EDTC-500	EDTC-800
Power range	250 kW	500 kW	800 kW
Torque	550 Nm	1,100 Nm	5,100 Nm
Revolution speed	up to 8,500 RPM		up to 3,500 RPM
Energy system	Dynamic DC-source/DC-sink; up to 1,000 VDC and up to 500 A; common DC-bus with dynamometer drive		
Conditioning unit	Liquid or air cooling and simulation for dynamometer drive and battery simulation from -20 °C up to +100 °C; Liquid cooling and simulation for e-motor (EUT) under test from -20 °C up to +100 °C		
Test solution	Powertrain components and system tests related to hybrid, electric, fuel cell, and battery drive systems		

*Other configurations available on request.

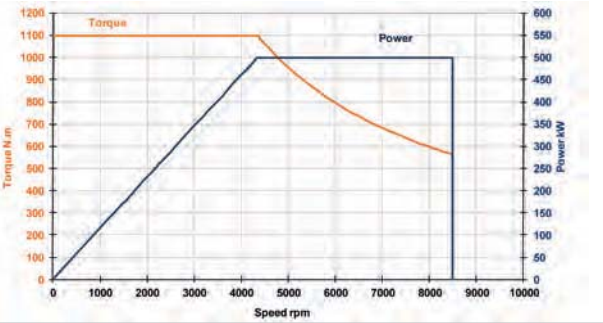


EDTC-250 kW Version

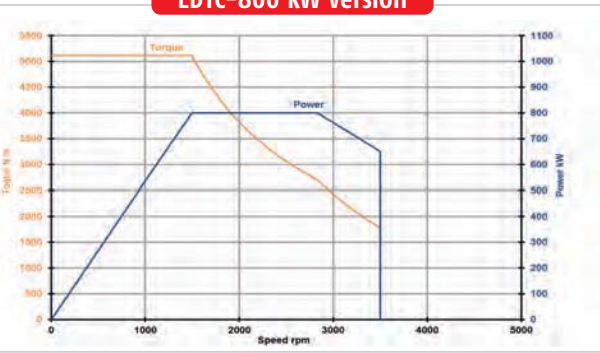




EDTC-500 kW Version



EDTC-800 kW Version



BENEFITS

Key facts and benefits

Frankonia's EDTC solution for EMC testing of powertrain components as well as complete systems shifts the focus to simplifying the testing procedures for engineers and institutes in this highly specialized industry. This solution allows efficient use, reduces costs and time, generates reproducible test conditions, ensures a stable quality level, and guarantees a future-proofed and adjustable solution at the highest performance level.

Performance and quality

- Outstanding performance
- Comprehensive and high-performance test chamber setup
- Cutting-edge test equipment for powertrain components and complete systems
- Automatized and customizable software solutions
- Highest quality and performance level up to 1,000 kW at 8,500 RPM
- Battery simulator up to 1,000 VDC and up to 500 A
- Conditioning unit for permanent temperature control and simulation from -20 °C up to +100 °C
- Compact chamber solution
- Frankosorb® long-lasting performance absorbers

Efficiency and costs

- Complete range of powertrain components and complete systems combined in one chamber
- Quality and performance level of testing remain at a constant high level
- Easy and efficient use for test engineers
- Common DC-bus with battery simulation (reduction of conversion loss)
- Highest European safety standards
- Upgradeable due to future tasks
- Modification kit for existing chambers

Frankonia's absorber technology (Frankosorb®)

- Long-lasting absorber performance and stability
- Non-combustible in accordance with DIN 4102 Class A2, or
- Non-inflammable in accordance with DIN 4102 Class B1 and B2
- High power handling absorbers
  A2 absorbers: 2 kW/m² or 850 V/m (continuous duty) 3.5 kW/m² or 1.150 V/m (intermediate power)
  B1/B2 absorbers: 1 kW/m² or 600 V/m (continuous duty) 2.6 kW/m² or 1.000 V/m (intermediate power)
- High absorption capability
- Humidity proof
- Damage proof
- No dirt, carbon smell or dust
- Easy to clean
- Clean room classification in accordance with ISO 14644-1 class 5
- No aging or drooping
- Easily removable, fixation by screw or hanging

Frankonia's EDTC authenticity

Frankonia stands for the latest technologies, the highest quality, innovative concepts and materials, and reliable solutions. Due to the easy and efficient solution it offers, which includes a complete range of required components, Frankonia's EDTC sets new standards in its class for innovative EMC testing solutions for powertrain components and systems and offers a real added value to our customers.

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