

INGETRAC

Power Converters

High Power | **Medium Power** | Low Power

Traction Technology applied in Ad-hoc Client Solution

Ingeteam

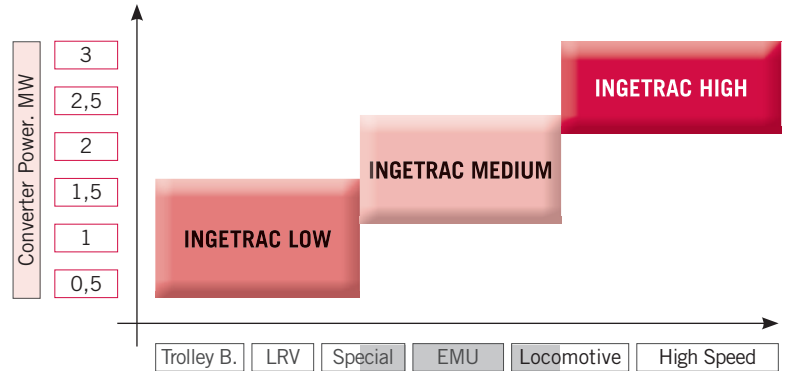
READY FOR YOUR CHALLENGES



Traction Converter Concept

Our concept is based on setting up the traction converters INGETRAC as an smart integration of extensively proved Power Modules. INGETRAC Medium Power traction converter, thanks to its modularity and compact design, can be fitted on roof, under-frame or machine room cabinets to assure integration in different vehicles designs and requirements.

- INGETRAC highlights:**
- State of the art technology (2 & 3 - level topology)
 - Ad-hoc hardware & software module-based
 - Compact & robust design
 - Lightweight & customized mechanical design
 - Low maintenance



Example of possible converter configuration based on modules

EMU, On-roof configuration (TF0610.2)

Voltage line: 3,000 V DC
 Power: up to 2,6 MW
 Auxiliary Power: 250 kVA
 Dimensions: 3,330 x 1,760 x 512 mm
 Weight: 730 kgs
 Cooling: Liquid
 Temp. Range: -35° / 40°C

EMU, Under-frame configuration (AN 9500)

Voltage line: 3,000 V DC
 Power: 1 MW
 Auxiliary Power: 124 kVA
 Dimensions: 1,600 x 655 x 1,800 mm
 Weight: 1,500 kgs
 Cooling: Forced Air
 Temp. Range: -30° / 45°C

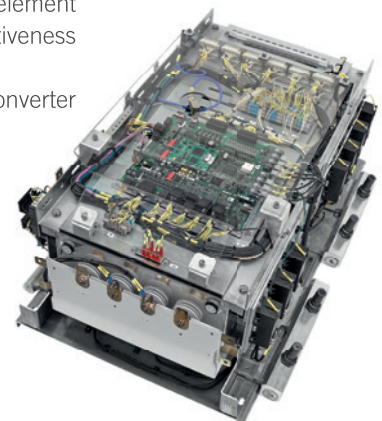
- Battery charger & Precharge
- Traction/Braking Modules
- Switching Elements
- Auxiliary Module
- Control Module
- Cooling System

Basic Power Module

This Basic Power Module for Medium Power INGETRAC is prepared as almost independent element [including ELECTRA, traction capacitor, IGBTs, etc...], which assures higher reliability, cost effectiveness and lower maintenance once integrated.

This BPM could be placed in parallel [e.g. TF610 includes 2x BPM] into more complex traction converter INGETRAC. Includes INGEMASTER diagnosis tools for preventive and corrective maintenance.

Main Characteristics	Details
	ELECTRA control board integrated
	Maximum Power: 1,3 MW Input
	Voltage: 3 kV
	Output Voltage: 0-2340 Vrms
	2-level topology [IGBT 6,5kV]
	Weight: 170 kg
	Dimensions: 1005 x 718 x 460 mm
	Liquid Cooled

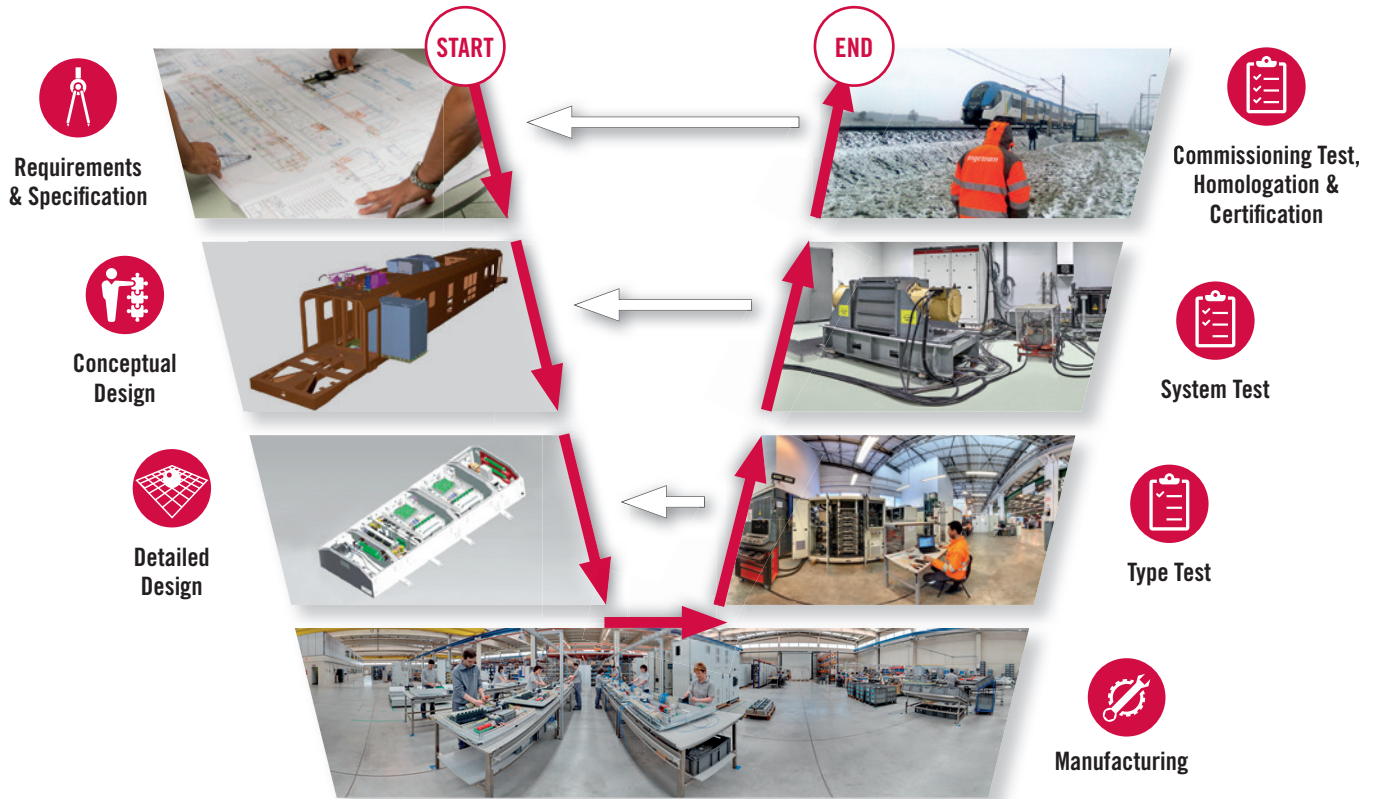




Approach to Projects

Our vocation is to work side-by-side with our customers, developing the complete and optimal system solution.

Throughout this process, we carry out all the simulations & tests required to guarantee the correct specification of all embedded electrical systems. This will assure a successful integration into the vehicle's engineering.



Benefits for your projects:

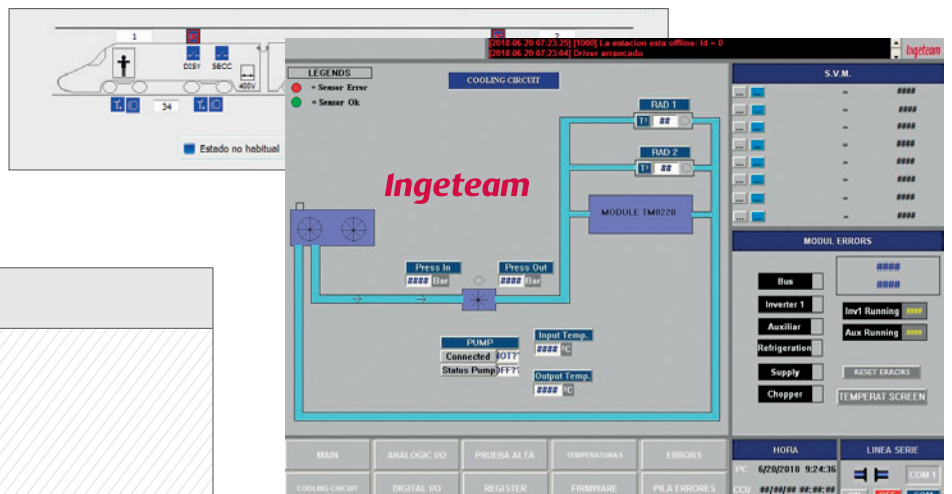
- Quality: ISO/TS 22163 + ISO 9001:2015
- Possibility of full traction chain specification
- GATES project management methodology
- Engineering capacity, incl. TCMS



Maintenance

INGETRAC modular solutions and their integration guarantee an easy performance of all preventive and corrective maintenance tasks without the need for special tools.

Our INGETEAM licensed software allows free access to traction system parameters for diagnosis and data analysis providing a comprehensive maintenance solution.



Key factors:

- Low operating Life Cycle Cost (LCC)
- Predictive Maintenance (PdM)
- Maximum availability
- Focused on safety and reliability



Main References: INGETRAC Medium Power



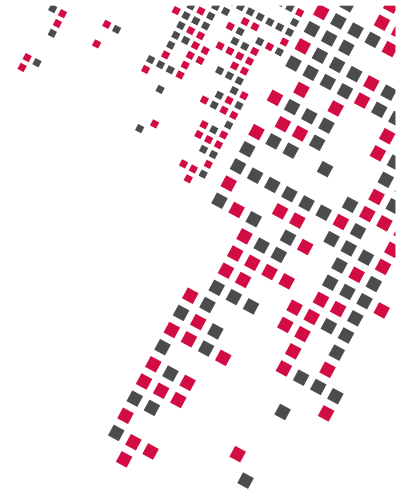
**EMUs (On-roof)
Poland**

Power: From 1.9 MW



**EMUs (Under frame)
Spain**

Power: 1 MW



**EMUs (On-Board)
Poland**

Power: 2.1 MW



**DIESEL-ELECTRIC LOCOMOTIVE
Spain**

Power: 1.5 MW



Key Technology Assets

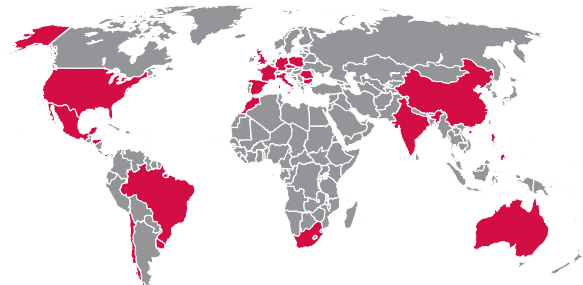
- INGETEAM Group in-house R&D resources
- One of most advanced power laboratories in Europe (up to 13 MW)
- Test facilities for the complete traction chain system test validation (EN61377)



Worldwide Presence

Internationalization is a vehicle for future progress.

At present we have production, commercial and service establishments in more than 22 countries.



Ingeteam

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