High power e-drivetrains: Solutions for 300 kW and more continuous power

We drive new energy for a greener future

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/ Content

/ We are ARADEX

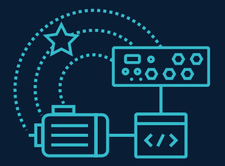
Smart electrical and hybrid solutions for commercial vehicles, mobile working machines, and ships. We offer HV-DCDC, inverters, e-motors and accessories

Multi energy supply

Modular subsystems which can be adapted to future demands. Battery, hybrids, hydrogen, cable.

Matching e-motors

According to your application and requirements: direct drives, gearbox drives. PMSM or magnet-free motors.



Mastering HV systems

Mastering interactions in high voltage systems. With our devices, matching accessories, and system knowledge.

ARADEX

/ ARADEX AG, Germany
Application center(ed)

ARADEX is part of WEICHAI Power. At our headquarters in Lorch near Stuttgart, Germany, we focus completely on mobile high voltage products and their usage in your application:

- Development & Application
- Visitors & Training Center
- Test benches
- Service-Center, Production Warehouse

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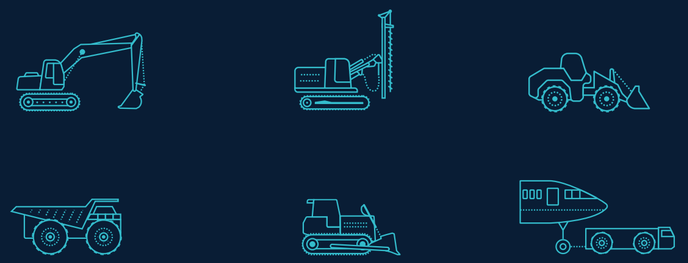
/ Application fields

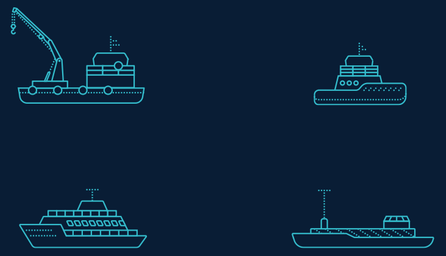
Our main target markets are commercial vehicles, mobile working machines and marine applications. And in addition: stationary applications.

(On-highway)
COMMERCIAL VEHICLES

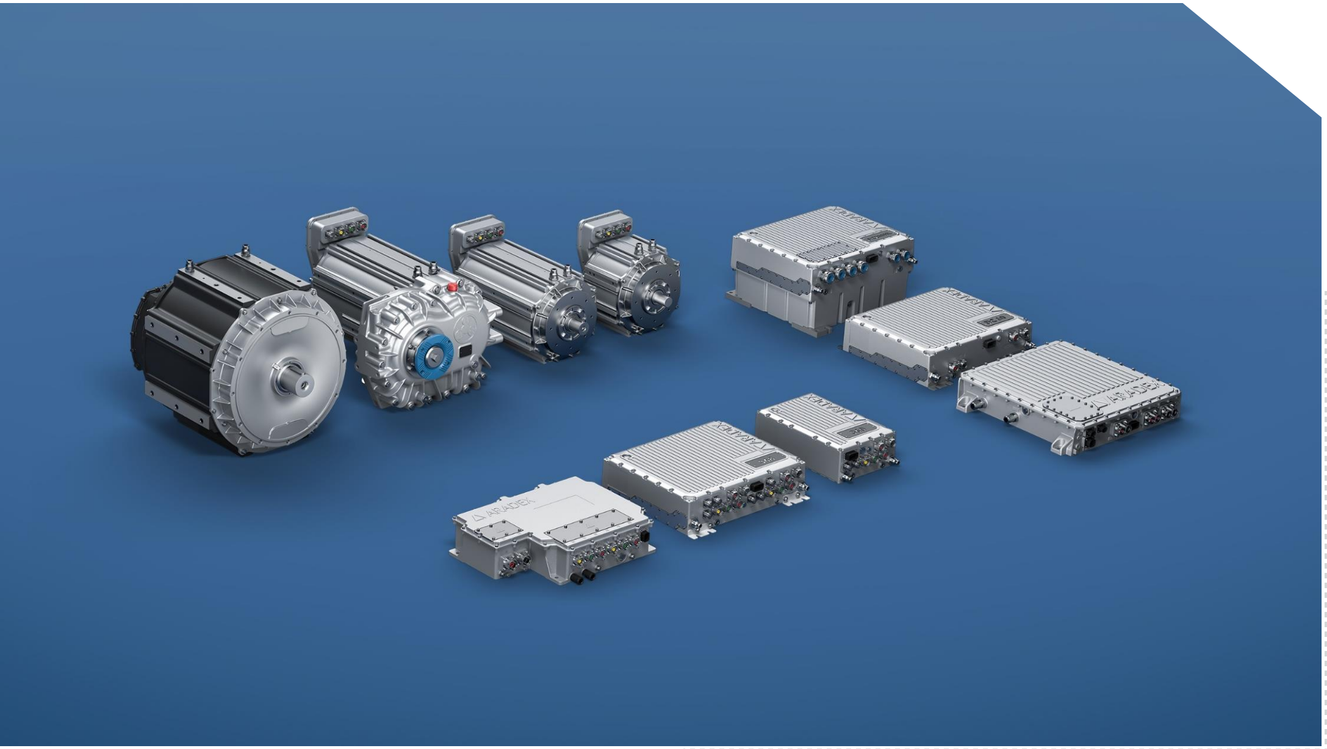
(Off-highway)
WORKING MACHINES



(Marine)
SHIPS



/ What we offer
HV hardware



HV DC/DCs, inverters, motors, motors with gearboxes

We cover voltage from **300 to 840 VDC** and power range from **30 to 1200 kW** (with cascaded solutions).

/ 1200 kW cont. power in mobile applications

The general market situation

- Electric motors with cont. power of more than 300kW and mobile usage are not usually available and are often customized special solutions. The same situation applies to inverters.
- Wiring in any case must be solved by several paralleled cables because large diameters are difficult to install.
- High-power drivetrains often belong to heavy vehicles. And such vehicles are difficult to tow and to repair -> redundant solutions are beneficial.

/ 1200 kW cont. power in mobile applications

3 feasible & proven solutions by ARADEX

SOLUTION 1

Large motor with partial windings

For pm or pm-reluctance motors we offer the possibility to feed with 2, 3 or even 4 inverters into one large motor. This motor must be constructed with “partial windings”.

SOLUTION 2

2 shaft-coupled motors

For AC induction motors we already couple two motors in series-connection to double the torque and power. This is also possible for pm or pm-reluctance.

SOLUTION 3

2-4 coupled higher speed motors

With a summation gearbox we can couple and synchronize 2, 3 or 4 motors. Advantage: we use motors with medium or higher speed to reduce size and weight.

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/ Solution 1

One large motor with 4 partial windings

Description:

2, 3, or 4 inverters feed into one large motor.

The power distribution is done by the VECTOPOWER inverters

- Because of existing NDAs we may not show real motors but only a general approach.
- Example: Motor is split internally into 4 partial windings to connect 4 VECTOPOWER inverters. 4 very compact resolvers are mounted at the motor shaft.
- Such motors are normally a customer-specific manufacture. ARADEX can support the motor manufacturer to find the most suitable solution.
- This solution is available for pure pm or pm-reluctance motors but not for AC induction motors.

EXEMPLARY VALUES

Combined inverter
4 * VP600-18W368

Motor diameter
~ 750 mm

Motor length
~ 1600 mm

Motor weight
~ 2000 kg

Total peak torque
1500 Nm

Cont. power
700 Kw

Max. speed
1500 rpm

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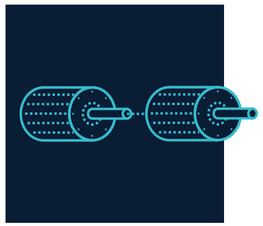
/ Solution 2
2 shaft-coupled motors



Description:
2 mechanically coupled motors with double shaft motor

- Currently we offer 2 motor sizes as shaft-coupled combination.
- Both solutions are AC induction motors for perfect redundancy.
- This solution is beneficial if length is not an issue and at the same time low diameter is required.

Motor type
VM620-18W0134 / VM620-18W0134-S

Combined inverter
VP600-18W360

Motor diameter
440 mm

Total length
~ 1700 mm

Total cont. power
292 kW

Total peak torque
2680 Nm

Max. speed
4800 rpm

Motor type
VM625-18W0270 / VM625-18W0270-S

Combined inverter
VP600-18W368

Motor diameter
500 mm

Total length
~ 2500 mm

Total cont. power
400 kW

Total peak torque
5400 Nm

Max. speed
4800 rpm

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/ Solution 3
2-4 motors with gearbox

Description:
2-4 motors connected to a summation gearbox with 2-4 inverters and internal synchronization of speed.

- Beneficial version: 2 or 4 motors. Some examples with 4 motors are shown here.
- It´s beneficial to couple the summation gearbox with a shiftable gearbox. For example, with 2 gears.
- We offer solutions with pm-reluctance motors (light weight) or AC induction type motors for extreme redundancy

Motor type
4 * VM620-18W0134

Combined inverter
VP600-18W360

Motor topology
AC induction

Weight of all motors
1440 kg

Total cont. power
488 kW

Total peak torque
5360 Nm

Max. speed
4800 rpm

Motor type
4 * VM600M-18W0073

Combined inverter
VP600-18W360

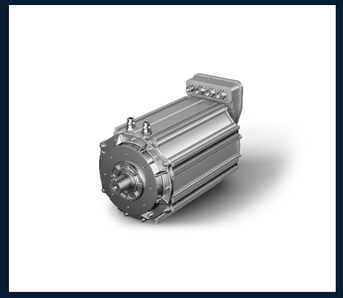
Motor topology
PM reluctance

Weight of all motors
420 kg

Total cont. power
464 kW

Total peak torque
3280 Nm

Max. speed
6500 rpm



Motor type
4 * VM616-18W0120

Combined inverter
VP600-18W360

Motor topology
PM reluctance

Weight of all motors
588 kg

Total cont. power
540 kW

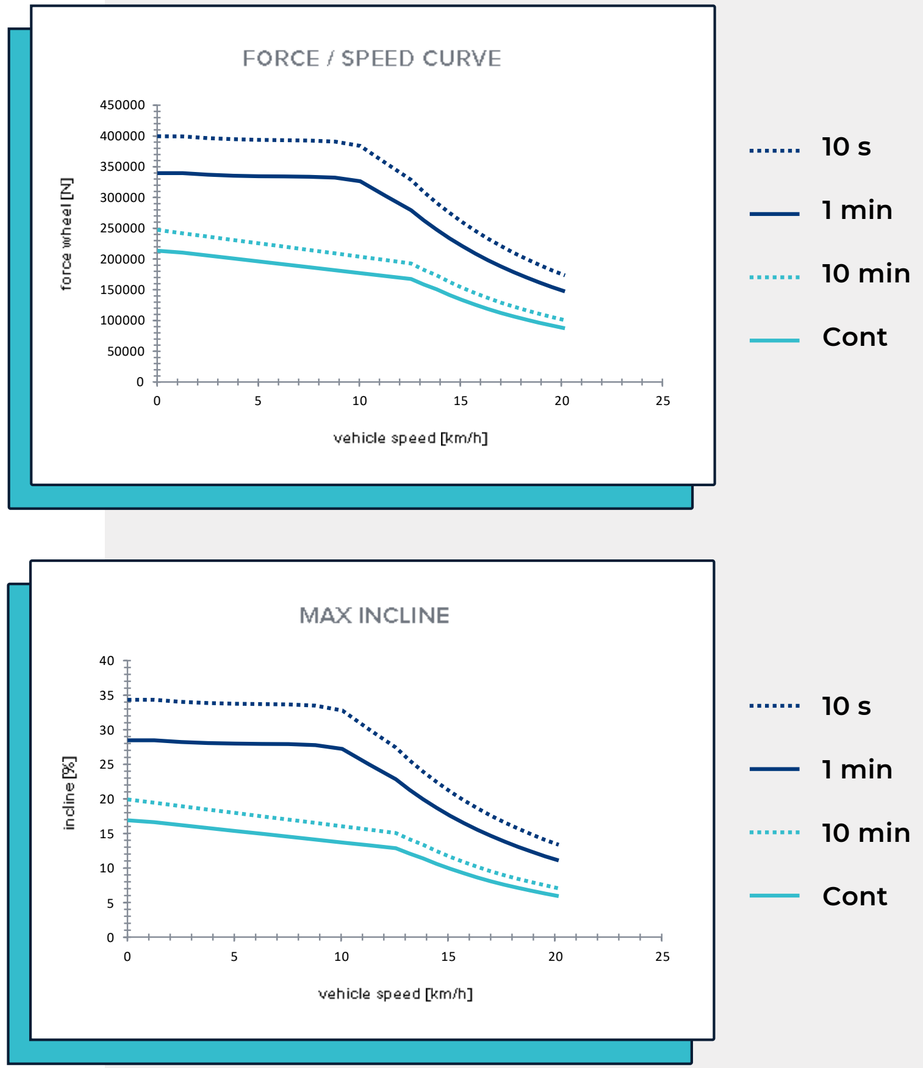
Total peak torque
4800 Nm

Max. speed
4500 rpm

/ Solution 3
2-4 motors with gearbox

Example and possible application:

- 4 pm-reluctance motors of type VM616-18W0120, gearbox with 2 gears
- Application: for example dumpers in the 80...120 ton range



/ Challenge us
Review of your application

Challenge us with your application, your demands and your ideas!

- Our engineers can calculate or support the project planning for your application.
- You receive the result as an electronic document: cornerstones of your project regarding electrification or hybridization including dimensioning done by our experienced project engineers.
- Contact our sales team for more information.

Thanks for your attention!

Optimized usability and performance for the best e-mobility

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