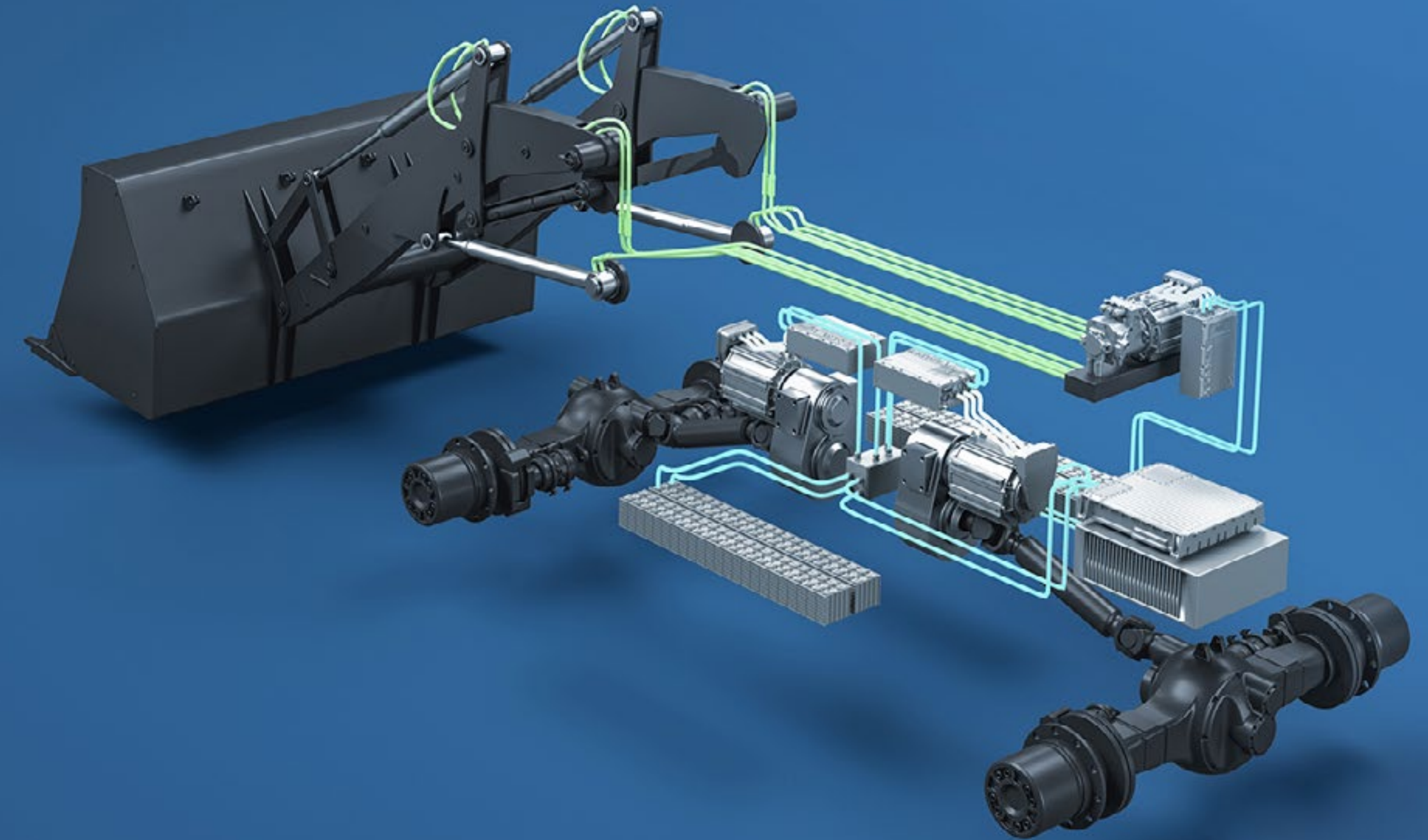


ARADEX portfolio and subsystems

We drive new energy - for a greener future



/ Content

I

INVERTERS AND MOTORS

Hardware for propulsion
and functional drives

II

MULTI-ENERGY-CONCEPT

Battery, fuel cell, diesel-hybrids:
Starting now and future proof

III

EXAMPLES

Components and subsystems:
Our market approach

IV

ENGINEERING SUPPORT

Training, commissioning
and more

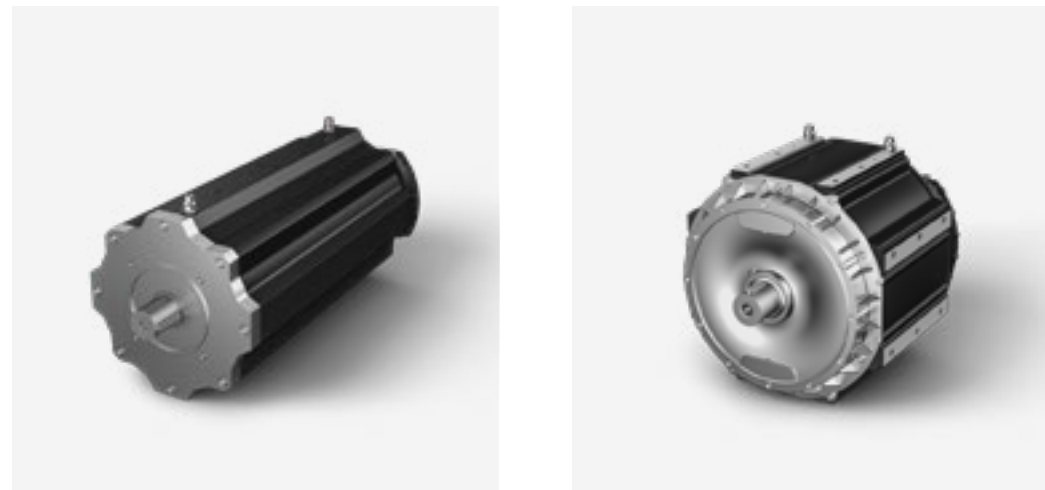


INVERTERS AND MOTORS

Hardware for propulsion
and functional drives

/ Overview

TRACTION MOTORS



& MORE
AVAILABLE
PRODUCTS



- AC-induction
- PM-reluctance
- Motor + gearbox

AUXILIARY MOTORS



& MORE
AVAILABLE
PRODUCTS



- PM

MOBILE INVERTERS



& MORE
AVAILABLE
PRODUCTS



- Double
- Single

/ Motors & inverters combination

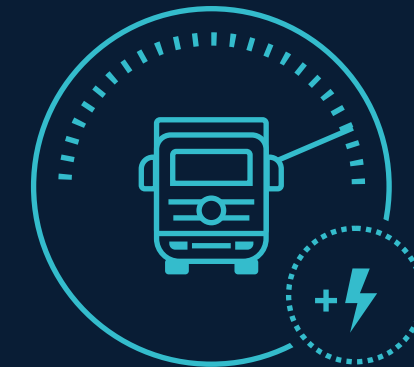
VECTOPOWER can operate up to 4 synchronized motors
for up to 1200kW continuous power



Voltage range
300-840 VDC



Continuous power
30-300 kW



Peak torque
360-4000 Nm

Our VECTOPOWER inverters
support different motor topologies:

- AC-induction
- PM
- PM-reluctance

/ Traction motors

PM-reluctance type



High efficiency

VECTOPOWER inverter allows optimum use of reluctance based torque contribution



Compact design

Comparatively small space requirement in the vehicle as well as lower weight



High dynamics

Useful for fast synchronization during operation with switchable gearboxes



Suitable inverters

ARADEX offers perfect matching inverters and control software for pm-reluctance motors

/ Traction motors

AC induction type



Maintenance-friendly

Maintenance work does not have to be carried out in a specialized workshop



Easy integration

No torque and no generated voltage in towing operation



Direct drive solutions

ARADEX offers solutions for propulsion with and without gearboxes



Suitable inverters

ARADEX offers perfect matching inverters and control software for asynchronous motors

/ Traction motors

Motor + gearbox combination



Integrated solution

Inverter + motor + gearbox as subsystem. Options: additional differential, shiftability.



Various models

Optimized to traction application we offer several models with various power.



High efficiency

System efficiency from DC-input of inverter to shaft output of gearbox up to 94,5%



PM & AC-induction

We offer very compact solutions with PMSM motor and as well magnet-free ac-induction motors.

/ Traction motors

Product overview



VM616-18W0040
PM-reluctance



VM600M-18W0073
PM-reluctance



VM616-18W0120
PM-reluctance



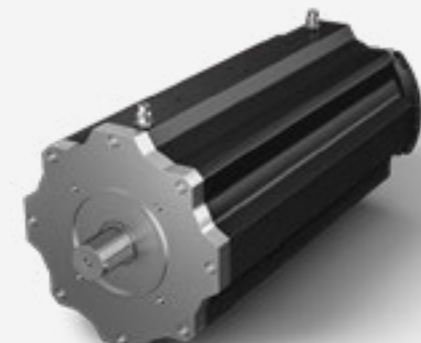
VM600M-28W0350
PM-reluctance



VM616-18W0044
AC-induction



VM620-18W0134
AC-induction



VM625-18W0270
AC-induction



VM630-28W0380
AC-induction

/ Traction motors & inverters

Product data

Motor Name	Combined Inverter	Motor Topology	Peak Torque [Nm]	Cont. Torque [Nm]	Nom. Speed [rpm]	Max. Speed [rpm]	Main Applications, Remarks	Continuous Power Motor + Inverter [kW]
VM616-18W0040	VP600-18W340, VP600-28W344	PM-reluctance	360	175//110	3580//6000	7200//7200	High speed PM	65//69
VM616-18W0044	VP600-18W340, VP600-28W344	AC-induction	440	179	2510//--	5800//--	High speed AC	47//--
VM600M-18W0073	VP600-28W344, VP600-18W360	PM-reluctance	800	410//320	2150//3490	5200//6500	Direct cardan/gearbox	92//116
VM600M-18W0073	VP600-18W340	PM-reluctance	800	334//320	2150//3490	5200//6500	Direct cardan/gearbox	75//116
VM616-18W0120	VP600-18W360	PM-reluctance	1200	615//520	1530//2485	3200//4500	Direct cardan	98//135
VM616-18W0120	VP600-28W344	PM-reluctance	1200	593//520	1530//2485	3200//4500	Direct cardan	94//135

Values for 400VDC // 650VDC

Please contact our sales team for detailed information and data sheets

/ Traction motors & inverters

Product data

Motor Name	Combined Inverter	Motor Topology	Peak Torque [Nm]	Cont. Torque [Nm]	Nom. Speed [rpm]	Max. Speed [rpm]	Main Applications, Remarks	Continuous Power Motor + Inverter [kW]
VM616M-18W0120	VP600-18W340	PM-reluctance	1200	485//485	1530//2485	3200//4500	Direct cardan	77//126
VM620-18W0134	VP600-18W360	AC-induction	1340	600//600	1200//1950	4800//4800	Direct cardan	75//122
VM620-18W0134	VP600-28W344	AC-induction	1257	600//600	1200//1950	4800//4800	Direct cardan	75//122
VM620-18W0134	VP600-18W340	AC-induction	1257	502//502	1200//1950	4800//4800	Direct cardan	62//102
VM625-18W0270	VP600-18W368	AC-induction	2700	804	--//2380	--//4800	Direct cardan	--//200
VM600M-28W0350	VP600-18W368	PM-reluctance	3800	1660	--//1210	--//3600	Direct cardan	--//210
VM630-28W0380	VP600-18W368	AC-induction	4050	1650	--//1385	--//3600	Direct cardan	--//239

Values for 400VDC // 650VDC

Please contact our sales team for detailed information and data sheets

/ Auxiliary motors

Permanent magnet type



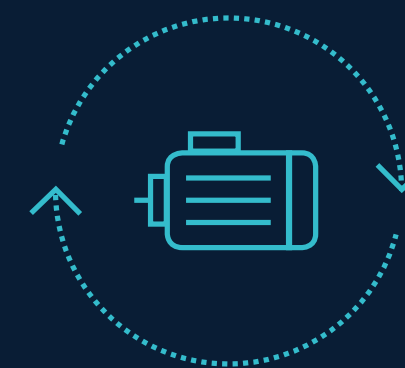
High peak-torques

High peak-torques for best overload-capability



Convection cooling

2 motors with natural convection cooling, easy to integrate



High continuous power

2 motors with higher continuous power by liquid cooling

/ Auxiliary motors

Product overview



VM600M-18W0018
Permanent Magnet



VM600M-18Z0012
Permanent Magnet



VM600M-18Z0027
Permanent Magnet



VM600M-18W0027
Permanent Magnet

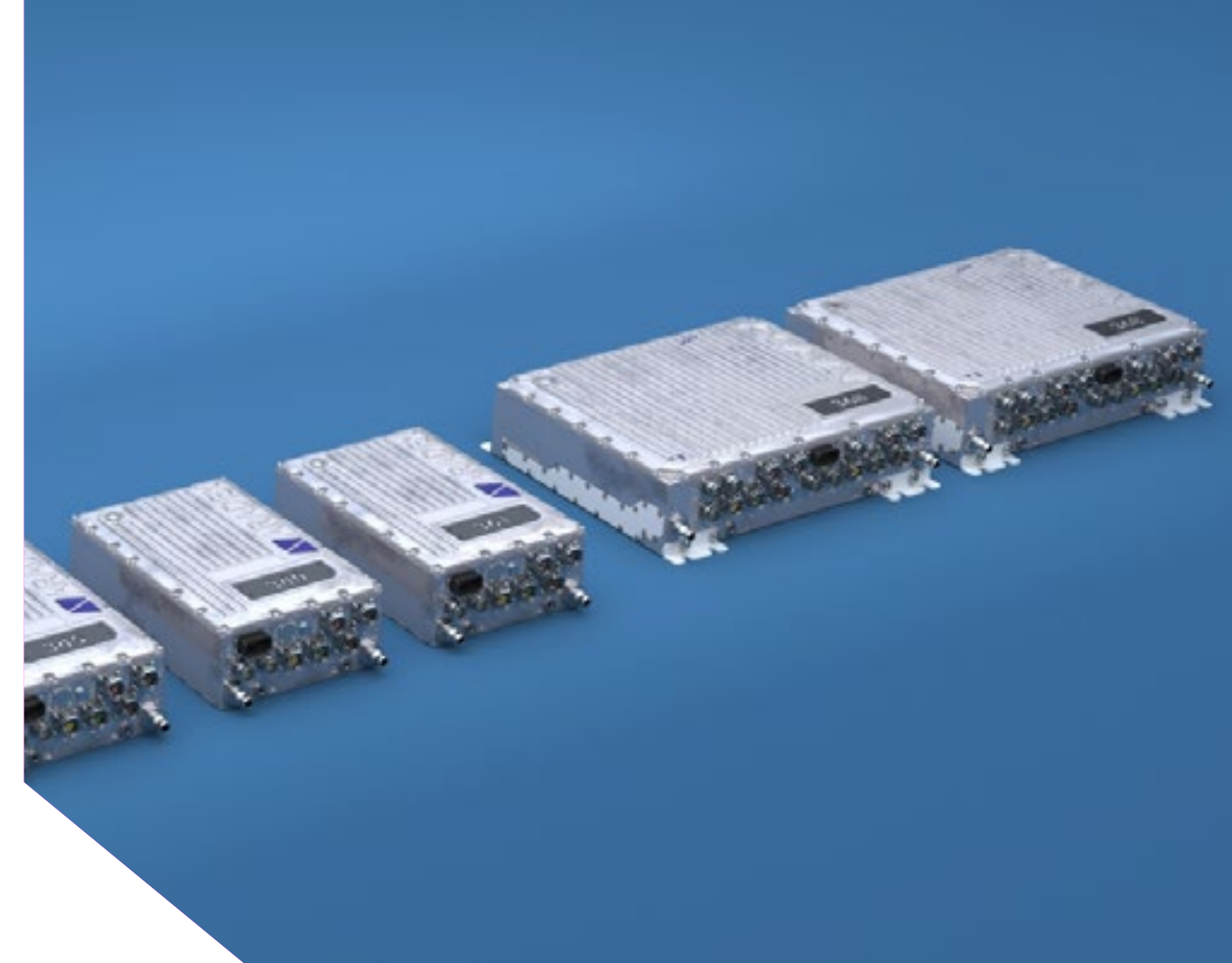
/ Auxiliary motors & inverters

Product data

Motor Name	Combined Inverter	Motor Topology	Peak Torque [Nm]	Cont. Torque [Nm]	Nom. Speed [rpm]	Max. Speed [rpm]	Main Applications, Remarks	Continous Power Motor + Inverter [kW]
VM600M-18W0018	VP600-18W340, VP600-28W344	PM	221	72	2140//3000	2850//4000	Auxiliary, liquid + convection	16//22,6
VM600M-18Z0012	VP600-18W340, VP600-28W344	PM	221	32	2140//3000	2850//4000	Auxiliary, convection cooled	7//10
VM600M-18Z0027	VP600-18W340, VP600-28W344	PM	328	52	2140//3000	2850//4000	Auxiliary, convection cooled	11,6//6,3
VM600M-18W0027	VP600-18W340, VP600-28W344	PM	328	100	2140//3000	2850//4000	Auxiliary, liquid + convection	22,4//31,4

/ Mobile inverters

Reliable and robust inverters for mobile applications:
Single and double versions, up to 900Arms peak.



Robust and reliable

For optimum performance
and long working life even
with demanding cyclic loads



Functional safety

Series 3 integrates STO
as per DIN EN 61800-5-2:2017,
EN ISO 13849-1:2015,
EN 62061:2005/A2:2015



MCU runtime integrated

Free programming with
VECTOSTUDIO or use of ready-
made function modules



Usability

Comes with ready-made
operating modes, diagnostic
and protective functions

/ Mobile single inverters

Product overview



Series 3 - single inverters
3 phases

- VP600-18W340
- VP600-18W360
- VP600-18W361



Series 3 - single inverters
3/6 phases

- VP600-18W368
- VP600-18W369



COMING SOON

EVO Series - single inverter
3 phases

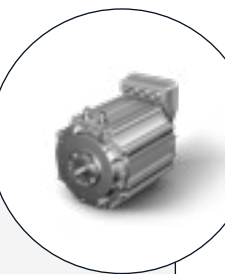
- VP600-18WA78



COMING SOON

WE - single inverter
3 phases

- WE600+VM600M-18W0073
(inverter + motor package)



/ Mobile double inverters

Product overview



Series 3 - double inverters
2*3 phases

- VP600-28W344
- VP600-28W345



COMING SOON

EVO Series - double inverters
2*3 phases

- VP600-28WA44
- VP600-28WA77

/ Mobile single inverters

Product data

Inverter Name	Single / Double	Cont. current	10-min current	60-s current	10-s current	Max PWM	Max electrical frequency
VP600-18W340	Single	180 Arms	300 Arms	400 Arms	450 Arms	8 kHz	599 Hz
VP600-18W360	Single	250 Arms	400 Arms	488 Arms	525 Arms	8 kHz	599 Hz
VP600-18W361	Single	250 Arms	400 Arms	488 Arms	525 Arms	16 kHz	1999 Hz
VP600-18W368	Single	440 Arms	640 Arms	838 Arms	900 Arms	8 kHz	599 Hz
VP600-18W369	Single	440 Arms	640 Arms	838 Arms	900 Arms	16 kHz	1999 Hz
VP600-18WA78	Single	550 Arms	-	900 Arms	1000 Arms	8 kHz	1000 Hz

Please contact our sales team for detailed information and data sheets

/ Mobile double inverters

Product data

Inverter Name	Single / Double	Cont. current	10-min current	60-s current	10-s current	Max PWM	Max electrical frequency
VP600-28W344	Double	2 * 220 Arms	2 * 300 Arms	2 * 400 Arms	2 * 450 Arms	8 kHz	599 Hz
VP600-28W345	Double	2 * 220 Arms	2 * 300 Arms	2 * 400 Arms	2 * 450 Arms	16 kHz	1999 Hz
VP600-28WA44	Double	2 * 160 Arms	-	2 * 320 Arms	3 * 320 Arms	8 kHz	599 Hz
VP600-28WA77	Double	2 * 300 Arms	-	2 * 550 Arms	2 * 600 Arms	8 kHz	1000 Hz

Please contact our sales team for detailed information and data sheets

/ Mobile inverters for marine applications

Product data

Inverter Name	Single / Double	Cont. current	60-s current	10-s current	Max PWM	Max electrical frequency
VP600-18W268	Single	440 Arms	680 Arms	900 Arms	6 kHz	599 Hz
VP600-18W160-HP	Single	275 Arms	400 Arms	520 Arms for 1s	16 kHz	599 Hz
VP600-18W140-HP	Single	250 Arms	340 Arms	450 Arms	6 kHz	599 Hz
VP600-18W130-HP	Single	95 Arms	120 Arms	160 Arms	12 kHz	599 Hz

Please contact our sales team for detailed information and data sheets



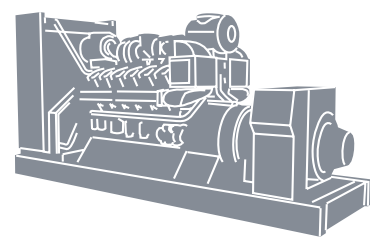
MULTI-ENERGY-CONCEPT

Battery, fuel cell, diesel-hybrids:
Starting now and future proof

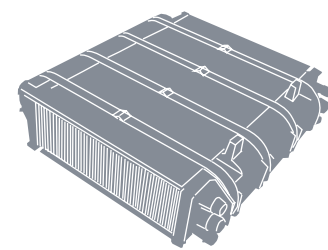
/ Future Proof Solution

Multi-Energy-Concept

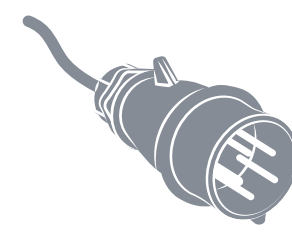
ENERGY SOURCE (Multi-Energy)



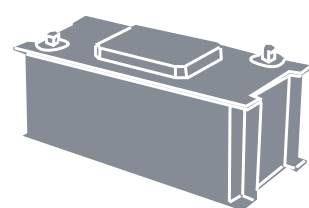
Generator



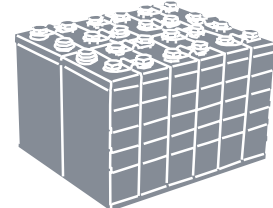
Fuel cell



Cable



SuperCap

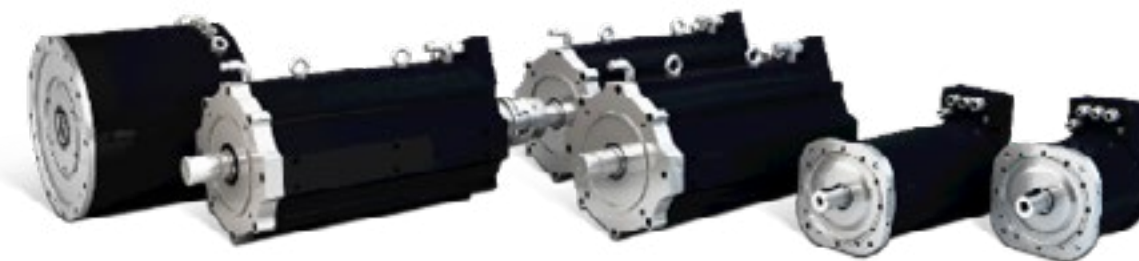


Battery

CONVERSION (Motors & Inverters)



Inverters + DC/DC (e.g. for fuel cell)



Permanent Magnet & Asynchronous

APPLICATION (Application Specific)

Perfect efficiency and power management via software in the inverters and DC/DCs:

 Working machines

 Commercial vehicles

 Ships

 Other applications

/ DC/DC converters

The VP5000 high-voltage DC/DC converters couple two different DC voltages bidirectionally with a high efficiency.



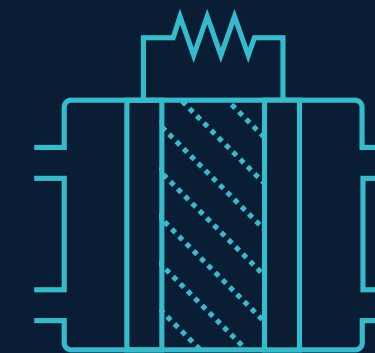
High efficiency

Highly efficiency-optimized, up to 99% depending on the point of of operating



Wide voltage range

Current up to 400 A, voltage up to 770 VDC (higher on demand)



For fuel cells / batteries

Optimized for coupling batteries or fuel cells to existing HV systems



More safety for fuel cells

Reliable protection against voltage ripple, operation always at the optimum operating point

/ DC/DC converters

Product overview



COMING SOON

VP5000-FCDC500
e.g. for fuel cells

- Max DC-voltage: 800 V
- Voltage on LV side: 100-600 VDC
- Cont. current LV side: 500 ADC
- Max. continuous power: 180 kW
- Unidirectional energy flow
- Efficiency under typical condition: 98,7%



VP5000-DCDC60
e.g. for battery systems

- Max DC-voltage: 770 V
- Cont. current LV side: 110 ADC
- Max. continuous power: 60 kW
- Bidirectional energy flow



VP5000-DCDC200
e.g. for fuel cells

- Max DC-voltage: 770 V
- Cont. current LV side: 400 ADC
- Max. continuous power: 200 kW
- Bidirectional energy flow



VP5000-DCDC200-HL
e.g. for fuel cells

- Max DC-voltage: 770 V
- Cont. current LV side: 400 ADC
- Max. continuous power: 200 kW
- Bidirectional energy flow
- Integrated brake chopper with max 200 ADC

/ Local & public grids

Inverter + filter + transformer

To connect to public grids & for creating local grids: Transformer + filters - water cooled housing.

- Similar housing for grid connection and for local grid
- Shown in diagram: 44 kVA solution
- Integrated components are dependent on voltage and function.
- The Inverter is connected externally.



Dimensions 44 kVA:

1000 mm * 800 mm * 460 mm

Dimensions 86 kVA:

1200 mm * 800 mm * 460 mm

Dimensions 22 kVA:

800 mm * 800 mm * 360 mm

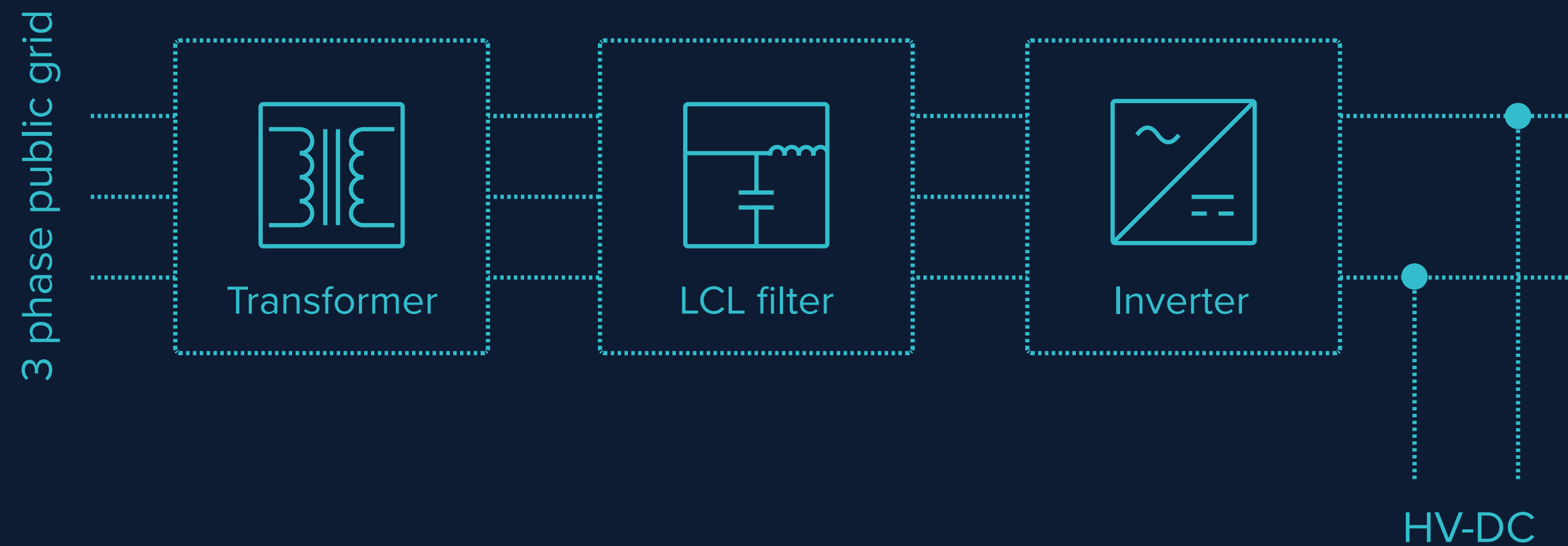
Filter & transformer:

Steel housing IP55



/ To connect to public grids

Cable supplied mobile machines

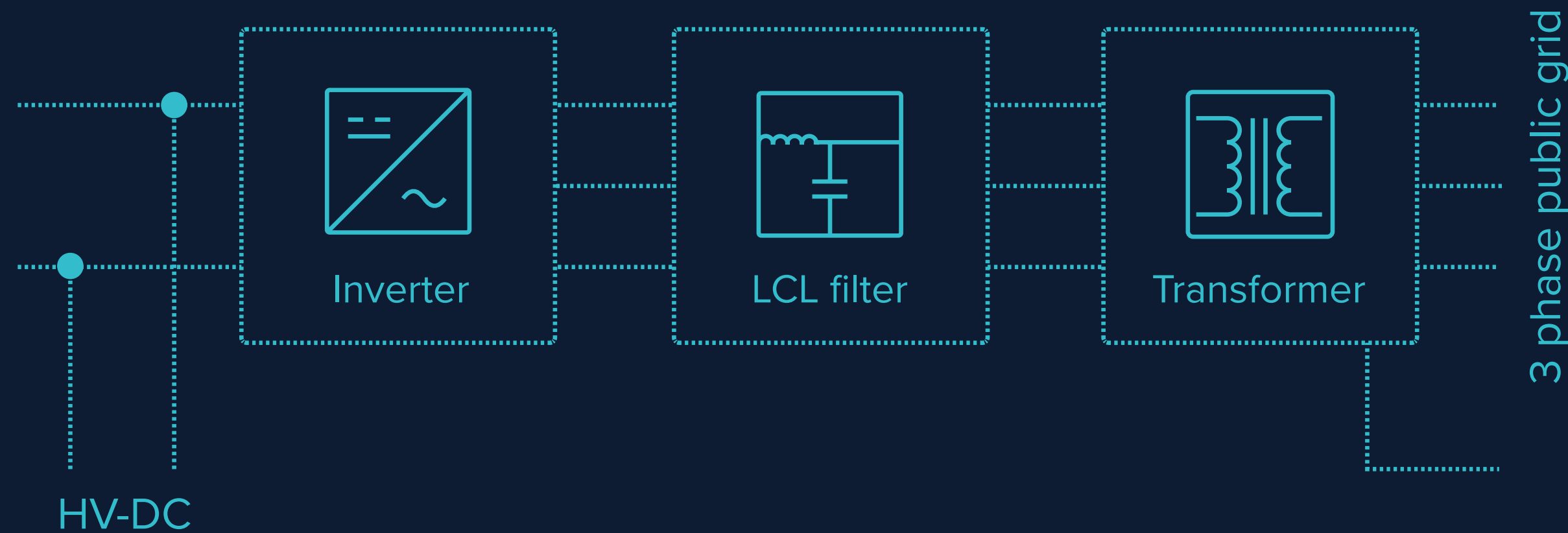


We couple a HV system to a public grid by a transformer and a filter as a package + inverter. Both watercooled and for mobile usage.

- For cable supplied machines or high-power charging.
- Available power versions 11, 22, 44, 86 kVA.
- Higher power by paralleled operation.
- Versions to adapt to HV systems 350 - 840VDC.
- Complete subsystem, including inverter-software.

/ Create local grid

For ships, mobile machines, stationary usage



From a HV system we create a local grid by a transformer and a filter as a package + inverter. Both watercooled and for mobile usage.

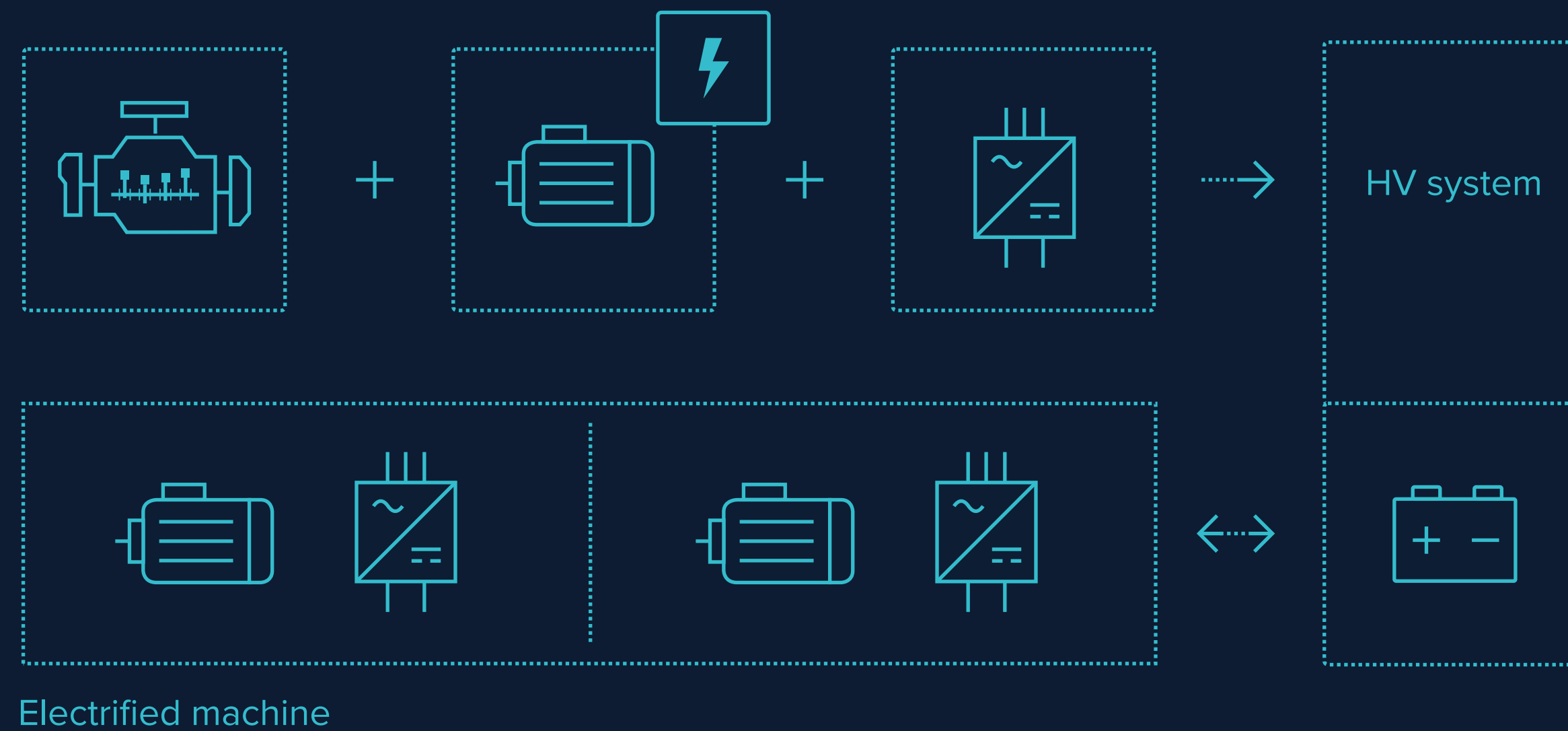
- Local grid is capable for asymmetric load.
- Available power versions 11, 22, 44, 86 kVA.
- Higher power by paralleled operation.
- Versions to adapt to HV systems 350 - 840 VDC.
- Complete subsystem, including inverter-software.



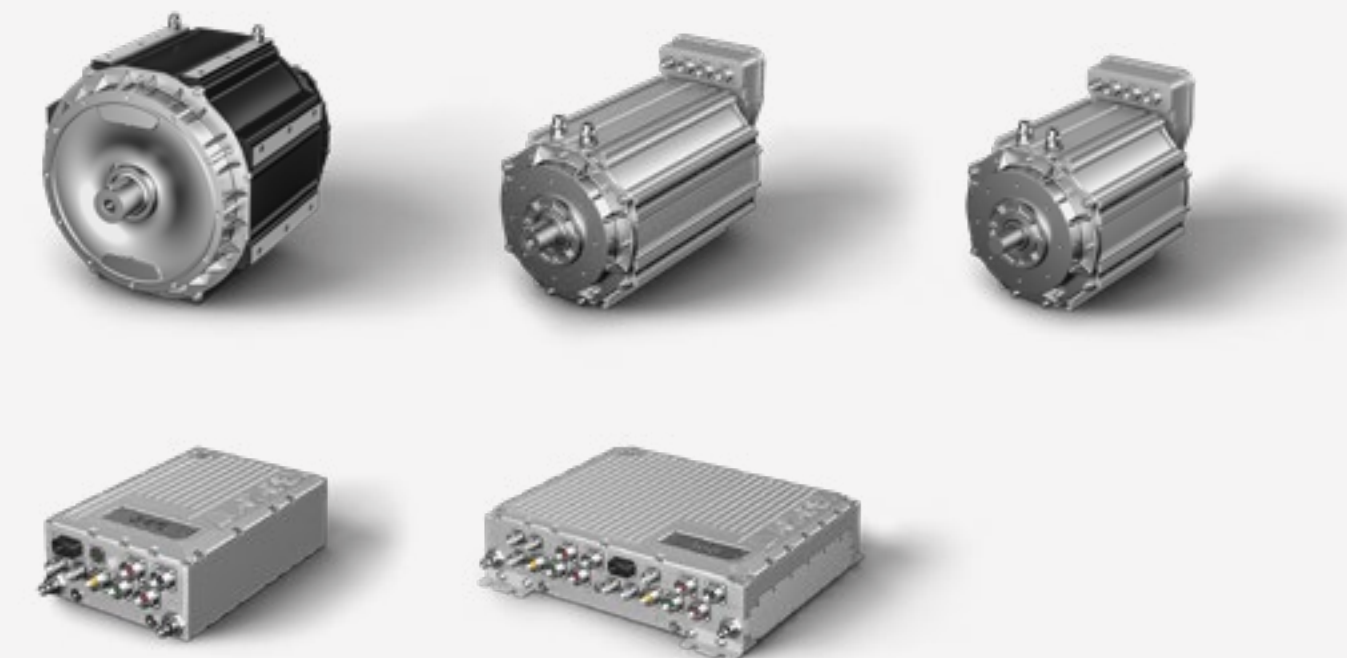
EXAMPLES

Components and subsystems:
Our market approach

/ Serial hybrid “RangeExtender”



Products available from ARADEX:



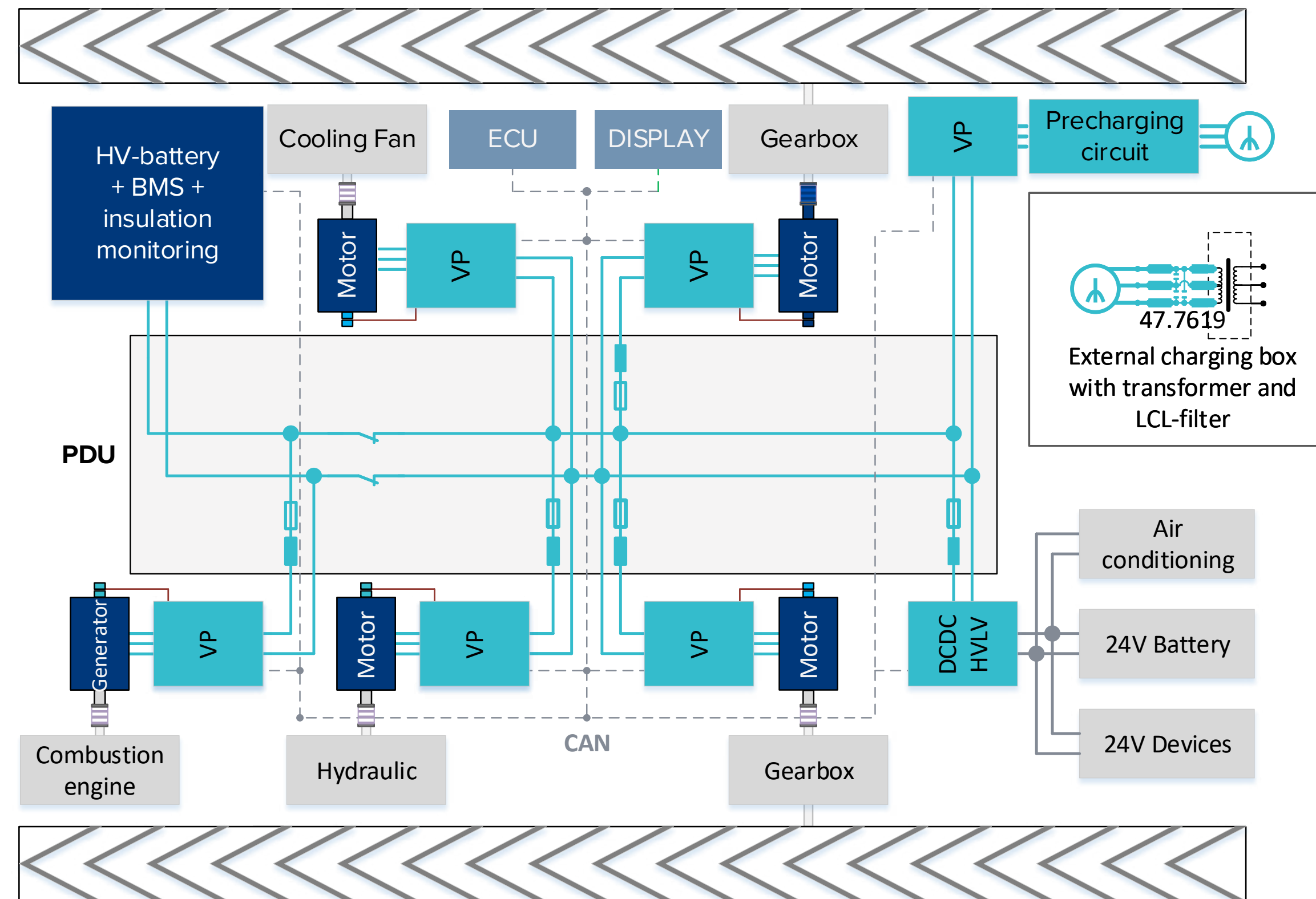
/ Serial hybrid

Electro-mechanical propulsion



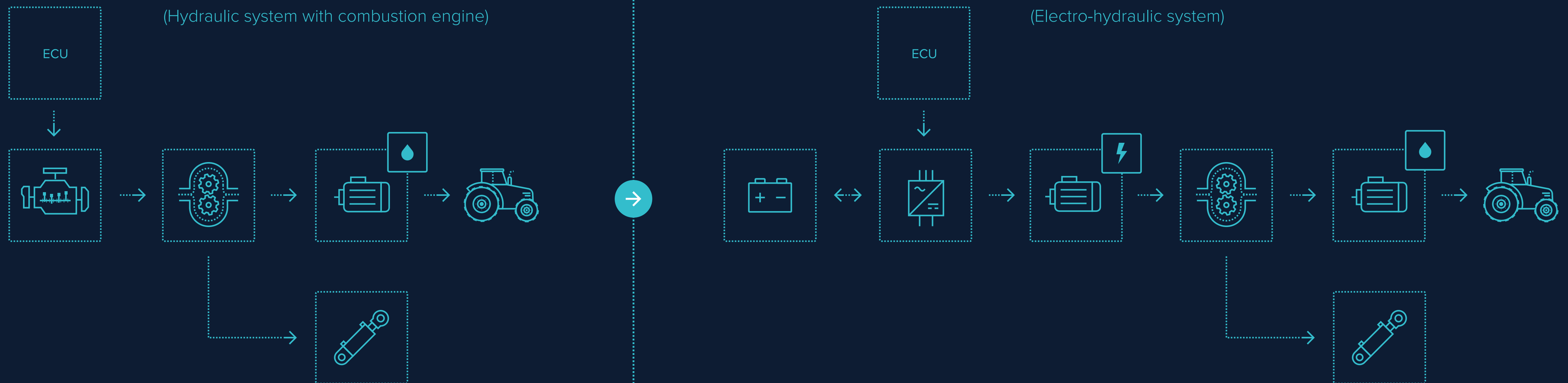
Functional block diagram of an electrified dozer with electromechanical chain propulsion

- Significant increased efficiency
- Improved driveability
- Fuel cell ready

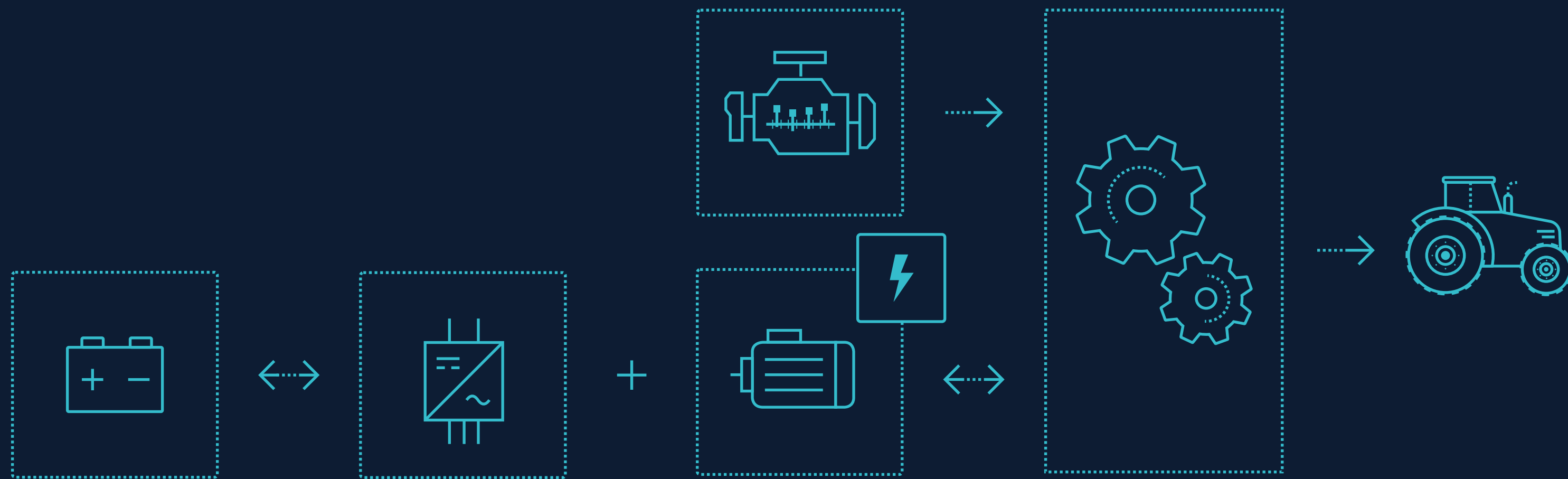


/ Serial hybrid

Electro-hydraulic propulsion



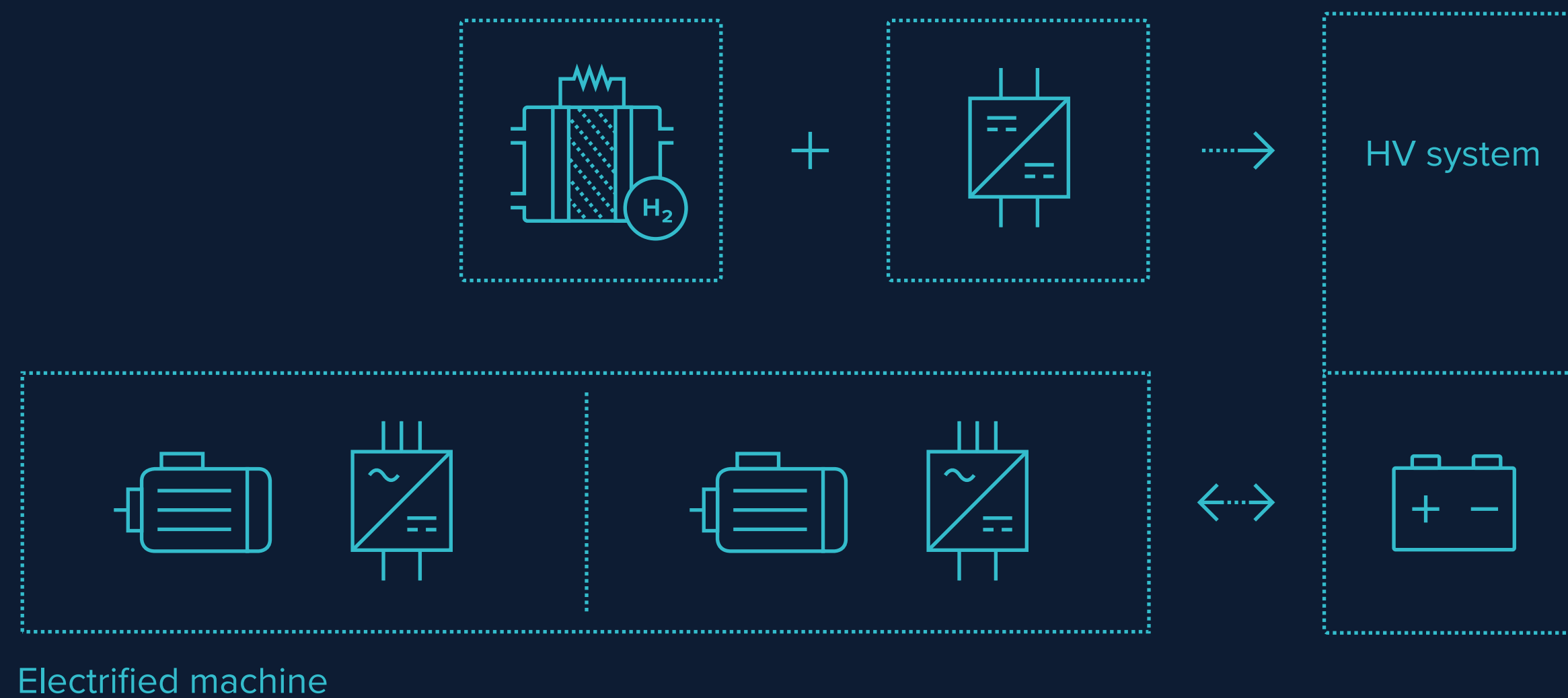
/ Parallel hybrid “E-boost”



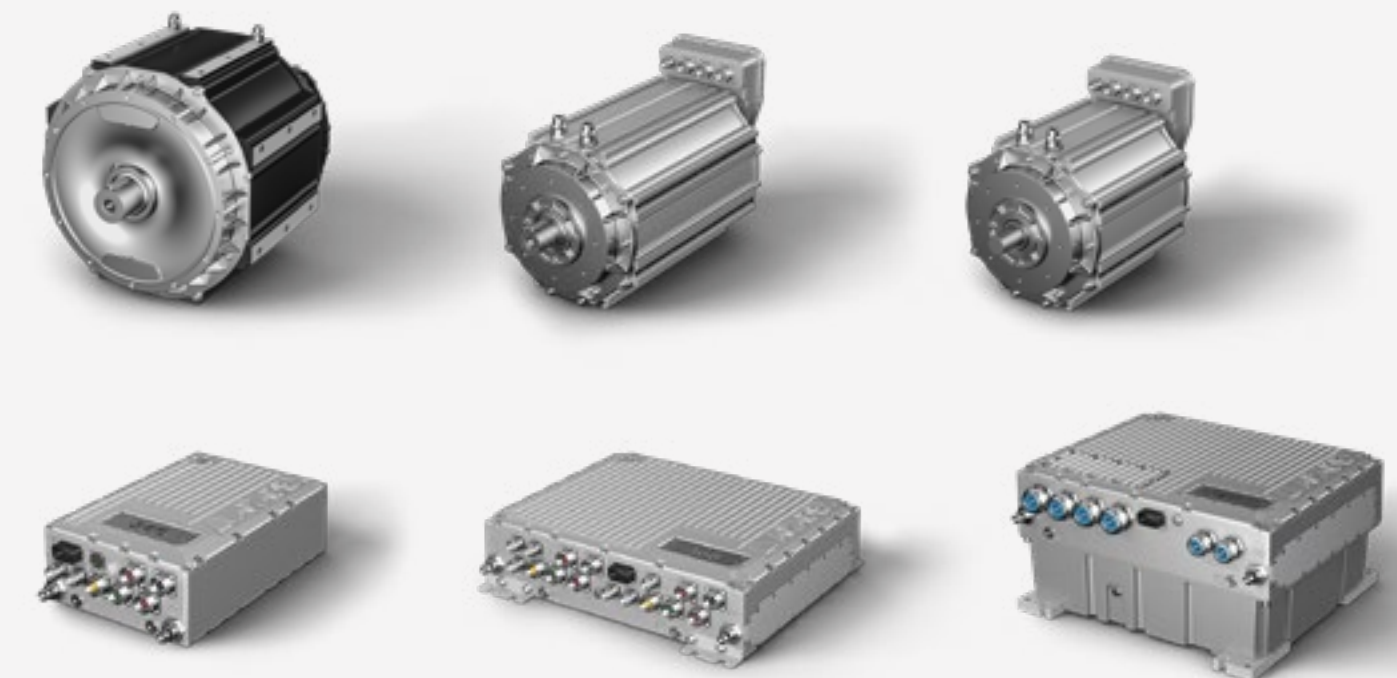
Products available from ARADEX:



/ Hydrogen-based Fuel cell as “RangeExtender”



Products available from ARADEX:



IV

ENGINEERING SUPPORT

Training, commissioning
and more

/ Our claim: Make things work!

Supporting you is our DNA. We create the perfect conditions to provide you comprehensive support in all project phases.



Our services

- + Support in dimensioning, components selection and feasible complete high-voltage solutions.
- + Training for products, programming, commissioning, diagnostics and dimensioning.
- + Creation of customer-specific software and technology modules.
- + Commissioning support both on site and digital, all over the world. Comprehensive diagnostic tools also for your teams.
- + Our after-sales offers service, maintenance and diagnostics, on site and digital.

/ Challenge us

Review of your application

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

- + Our engineers can work out 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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