

EV Pioneer **THINK**

Solved challenges and challenges ahead



Introducing THINK - company overview

- THINK is a leader in electric vehicle technology
- Founded 19 years ago
- The THINK City is the first vehicle of its type to be granted pan-European regulatory safety approval and CE certification.
- In series production at Valmet Automotive, Finland
- Experience from 50 million km driven by customers
- Approx 120 employees + hired consultants (excl. production)
- Locations:
 - Oslo, Norway: Head office and technical center
 - Dearborn, USA: North America headquarters
 - Uusikaupunki, Finland: Production at Valmet
 - Offices abroad: UK, Turkey, Malaysia
- Shareholders
 - Ener1 Inc. (approx. 31%)
 - Investinor (Norwegian government private equity fund)
 - Valmet Automotive
 - Kleiner Perkins Caufield & Byers
 - RockPort Capital Partners
 - Private Norwegian Investors



THINK City: an EV from the ground up

Top Speed: 100 km/h (true speed)
Range: 162 km (NEDC, E-mode)

Elevated seating position

Spacious luggage and passenger compartment

Exterior: coloured through body plastics (ABS/ASA)

94% recyclable

Honoured with several design awards

Strategic partnerships e.g. on axles for economies of scale

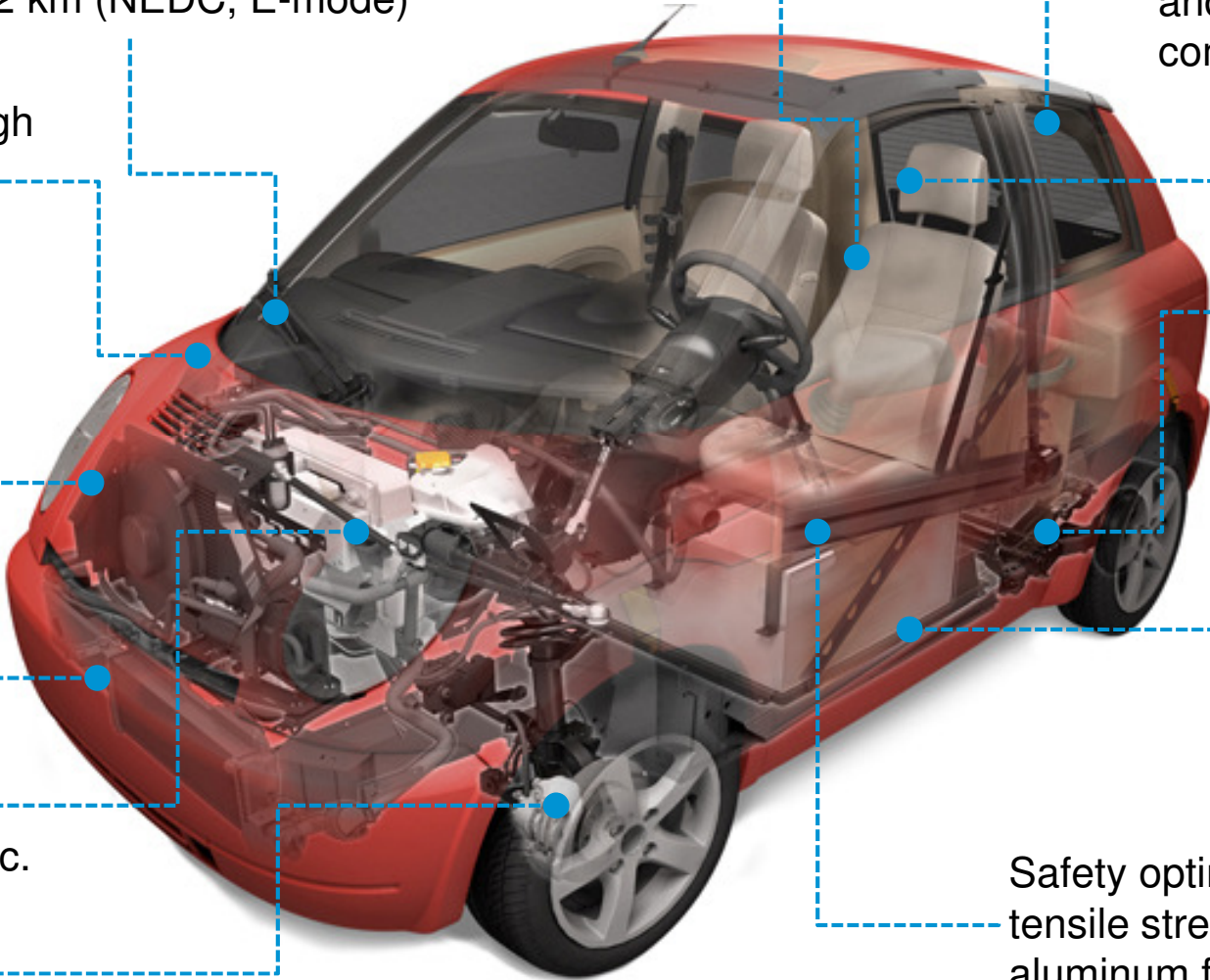
Compact, short overhangs front and rear

Battery location optimized for safety and vehicle dynamics

Dual airbags, inertia switch, assist button etc.

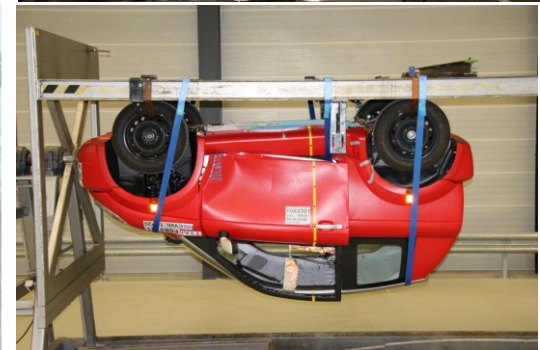
ABS brakes

Safety optimized high tensile strength steel and aluminum frame structure

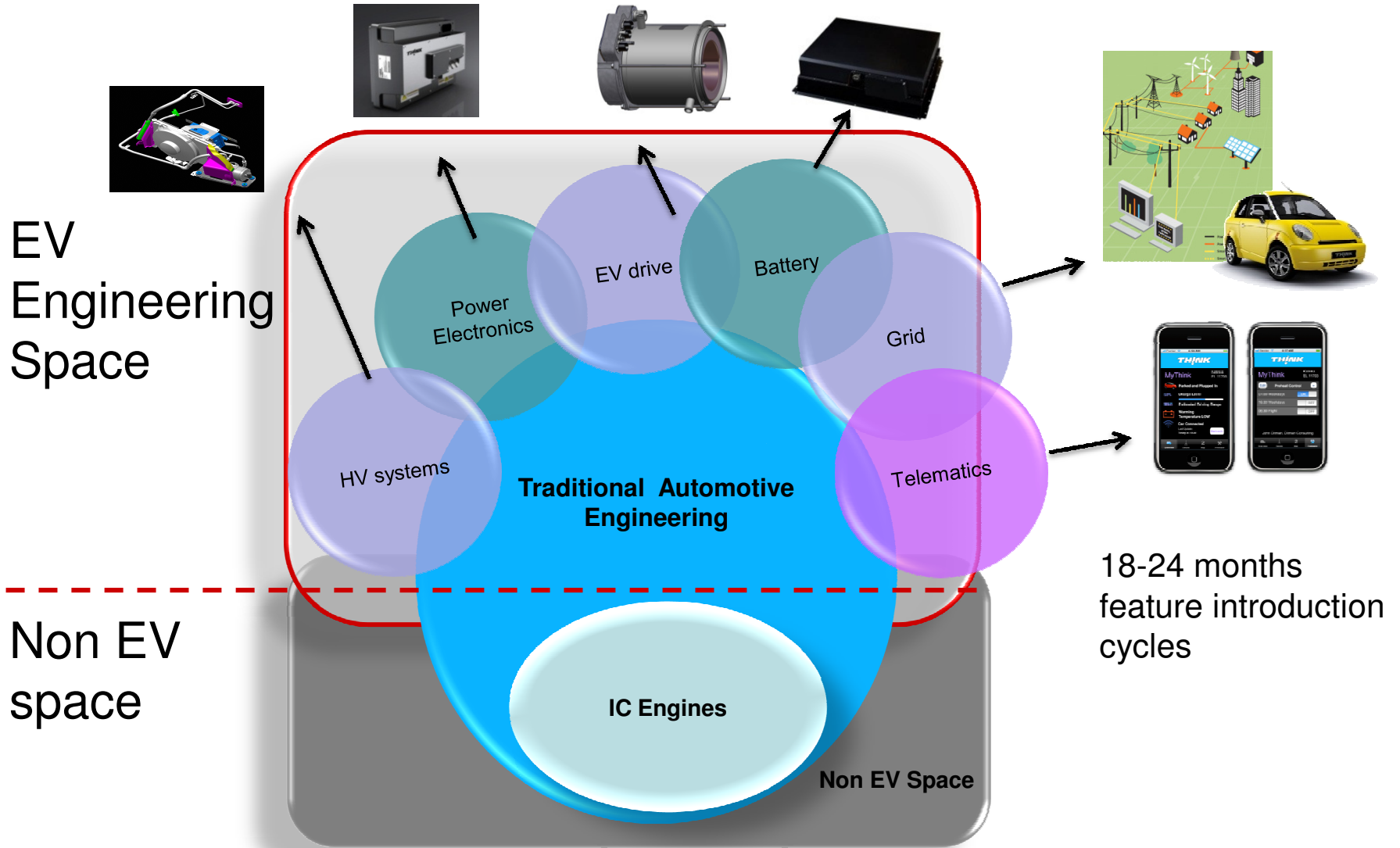


Safety and validation

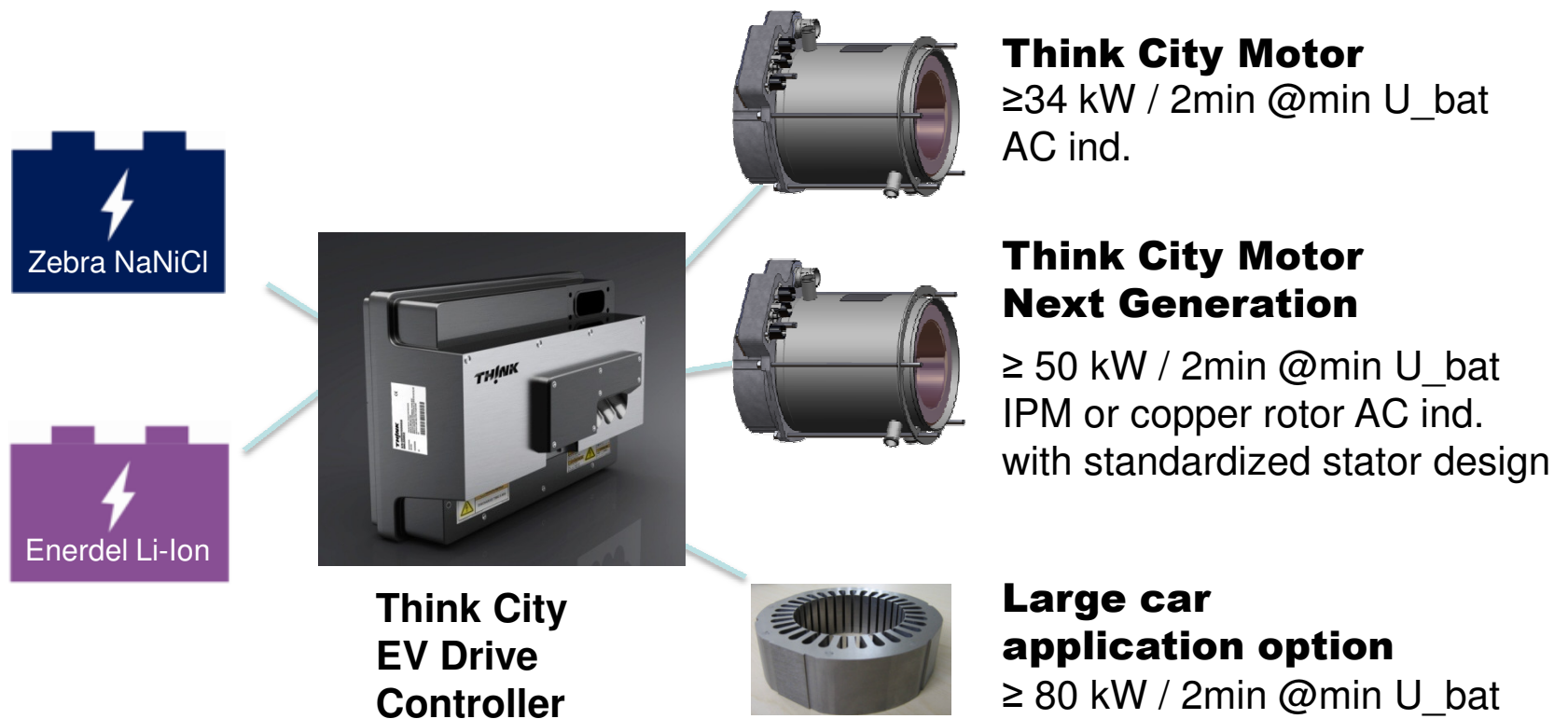
- The first EV ever to be awarded a pan-European homologation certificate
- THINK City has been put through extensive automotive testing and validation, for example:
 - Total submergence in salt water with all electrical systems activated
 - Extensive full car crash program according to US and EU specifications
 - Battery component safety tests
 - Computer simulations and correlations
 - 50 sled tests
 - Deep water wading testing
 - Hot and cold climate as well as structural mileage testing



Focus on EV engineering as core competence

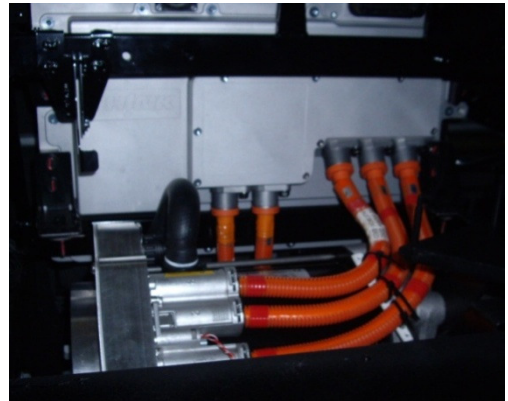
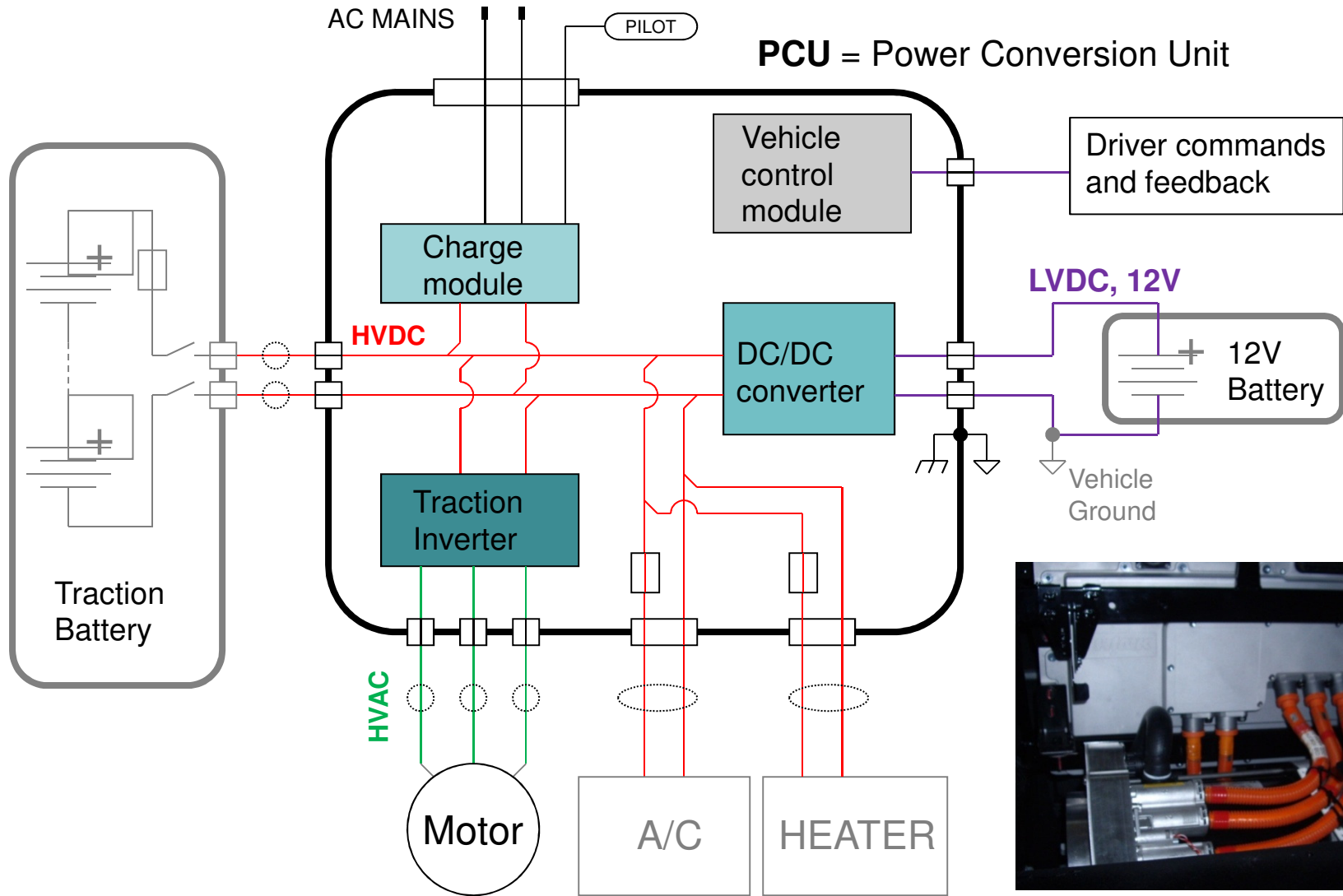


THINK agnostic battery and motor Interface



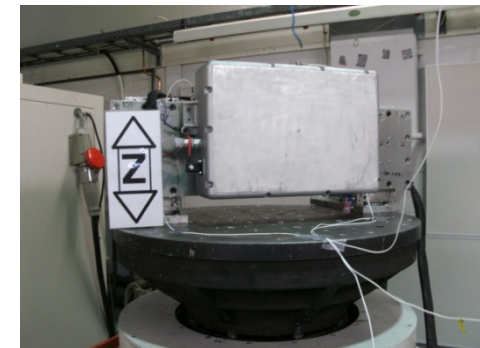
“Plug and play” integration with standardized interfaces.

Modular and scalable power electronics



THINK Power Conversion Unit (PCU)

- **Class leading cost and reliability**
- **Compact all-in-one solution for best integration**
- **Think generic interface design**
- **Scalable performance**
- **Designed with 50 million km of EV field experience**
- **Safe**
 - E-marked -> Ok to use in any homologated vehicle (Q2 2010)
 - Mains connected parts CE compliant
 - Interlock safety circuit for connectors and covers
 - Galvanic isolation between HVDC and ground/12V
 - Galvanic isolation between mains and HVDC
 - Galvanic isolation between mains and ground
- **Automotive usage validated**
 - Tested on component level
 - Car fleet testing program (mileage accumulation, extreme environment)
 - Third party independent test houses involved (SP, NEMKO, HRM)
 - Functional validation program
 - Environmental validation (e.g. vibration, shock, thermal, humidity)
 - Electric safety validation
 - Sealing validation
 - EMC
 - Electric stress validation



Applus⁺
IDIADA *Lapice*

THINK

Charging options

	Phase	Amp	Interface	Power level (kW)	Control	Comments
On-board	1 ph	10/16	230V AC	2.2/3.2	PCU/BMS	Standard on all vehicles
	1ph	16	400 V AC	6.4	PCU/BMS	Option
	1/3 ph	32	400V AC	9.6	PCU/BMS	1 ph in US/ 3 ph in Europe
Off-board	3ph	32	DC	19.2	CHAdeMO	Separate DC plug
	3ph	64	DC	38.4	CHAdeMO	Separate DC plug
	3ph	120	DC	72	CHAdeMO	Separate DC plug

- THINK is a member of CHAdeMO and has an MOU with AeroVironment for fast charging equipment and runs test programs based on the TEPCO protocol
- Li-Ion battery successfully charged from 0-80% in 15min with HV DC interface

THINK EV Telematic System

- Integral part of the THINK EV drive system
- Real-time battery performance monitoring
- “Always connected to your car”.
- Smart Charging user control
- Pre-heat, pre-cool functionality
- Fleet management and car sharing
- Emergency handling
- Etc.



Mindbox

GPS / GSM / GPRS/ BT



Changing the world – one car at a time

