



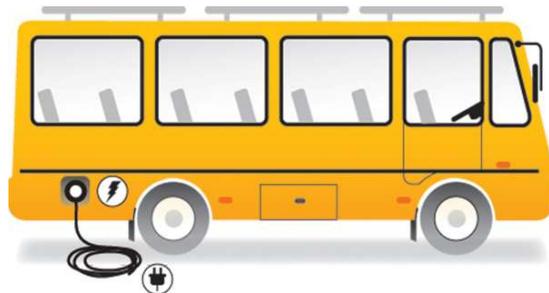
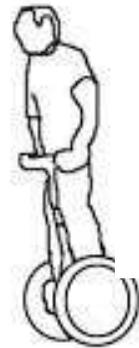
# Arquitetura das Conexões e dos Sensoriamentos nos Veículos Elétricos



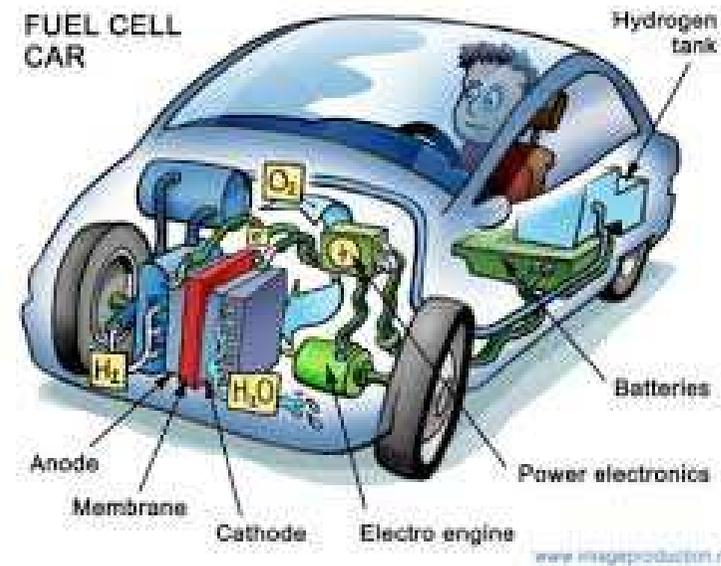
EVERY CONNECTION COUNTS



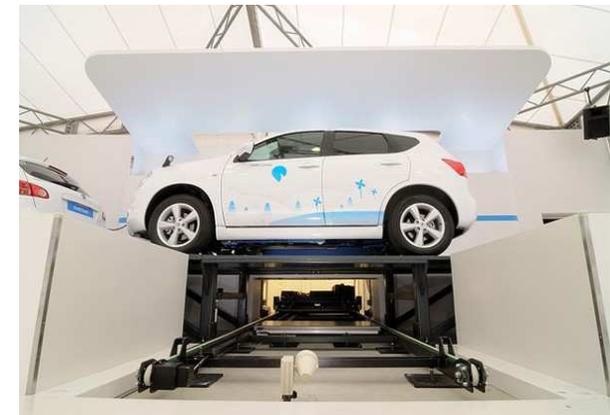
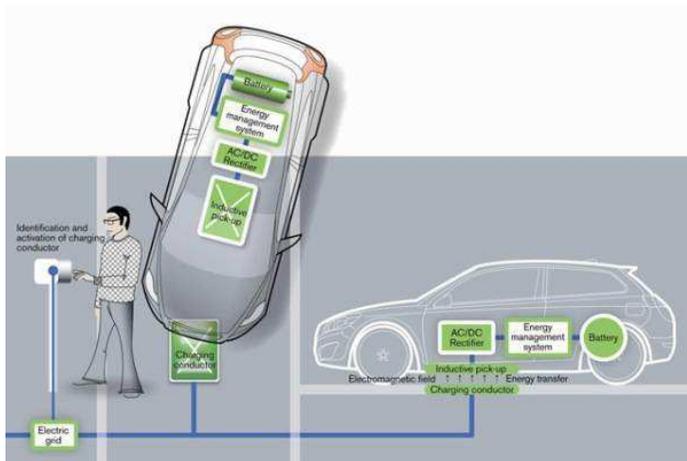
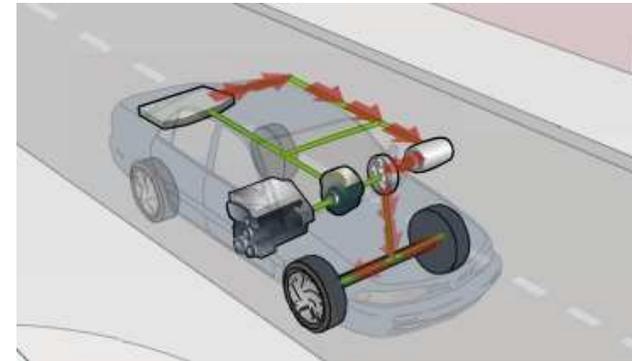
# Exemplos de Veículos Elétricos:



# Exemplos de sistemas p/ Veículos Elétricos:



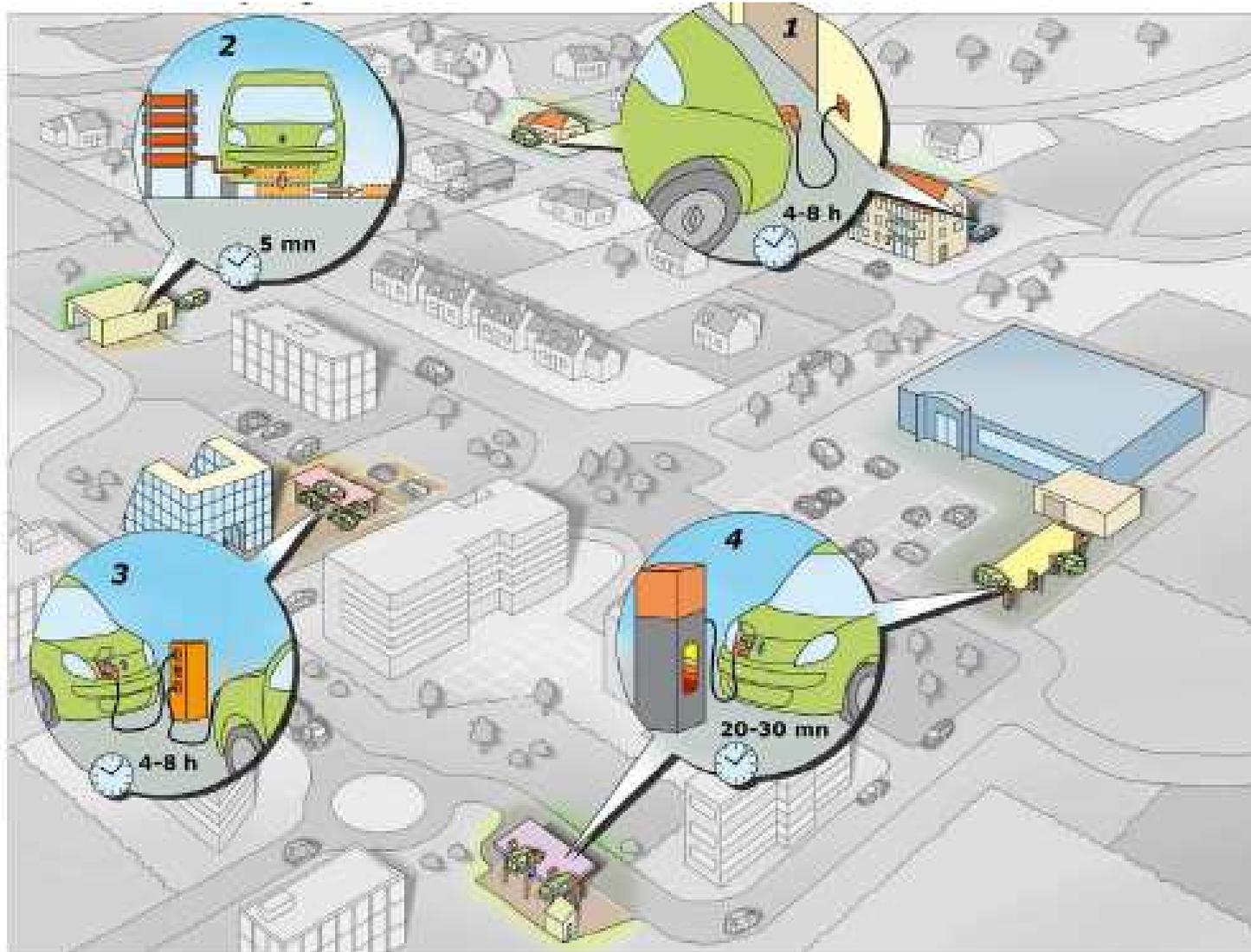
# Exemplos de tecnologias p/ carga de baterias:



[https://www.youtube.com/watch?v=H-Azrt\\_wUkc](https://www.youtube.com/watch?v=H-Azrt_wUkc)

Quickdrop system

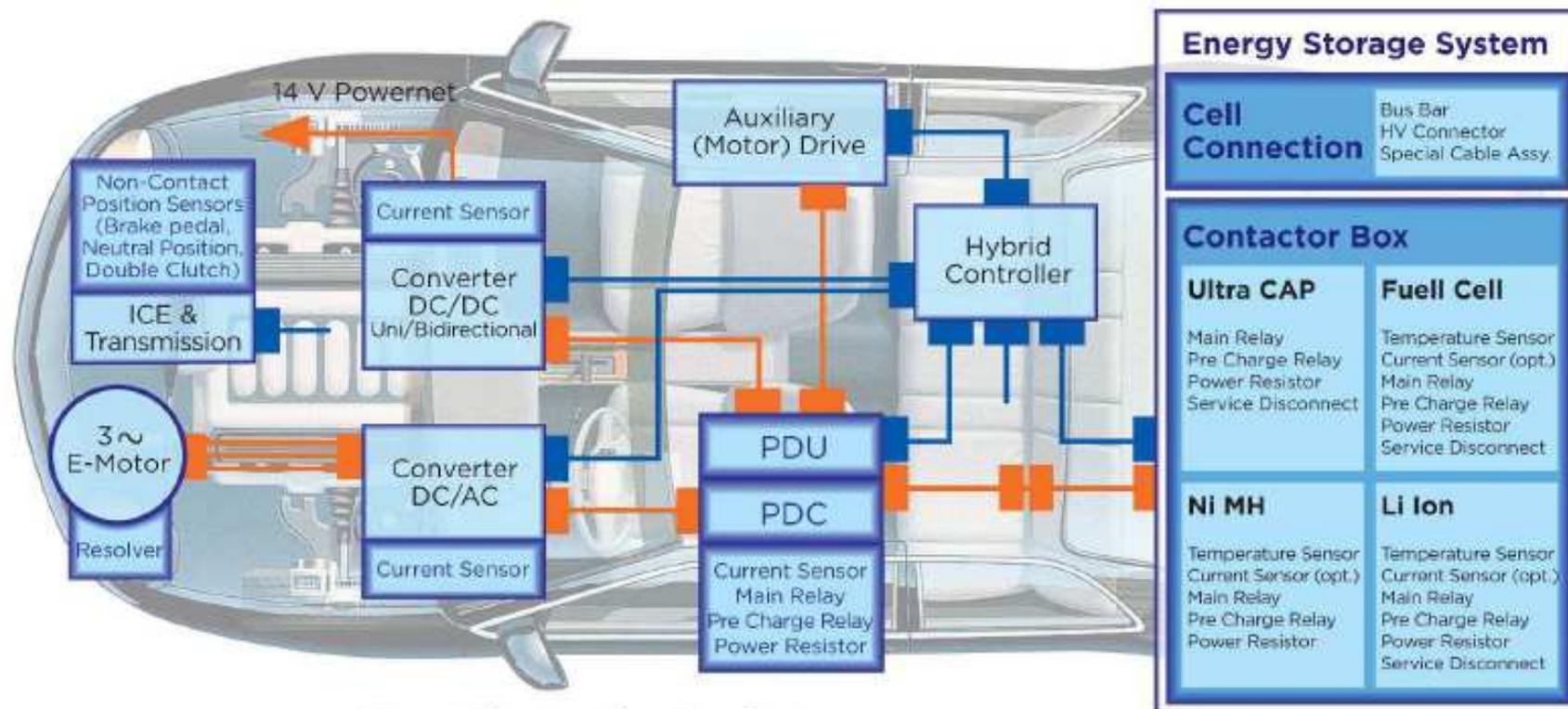
# Exemplos de tecnologias p/ carga de baterias:



# Posto para Quickdrop system:



# Arquitetura Elétrica:



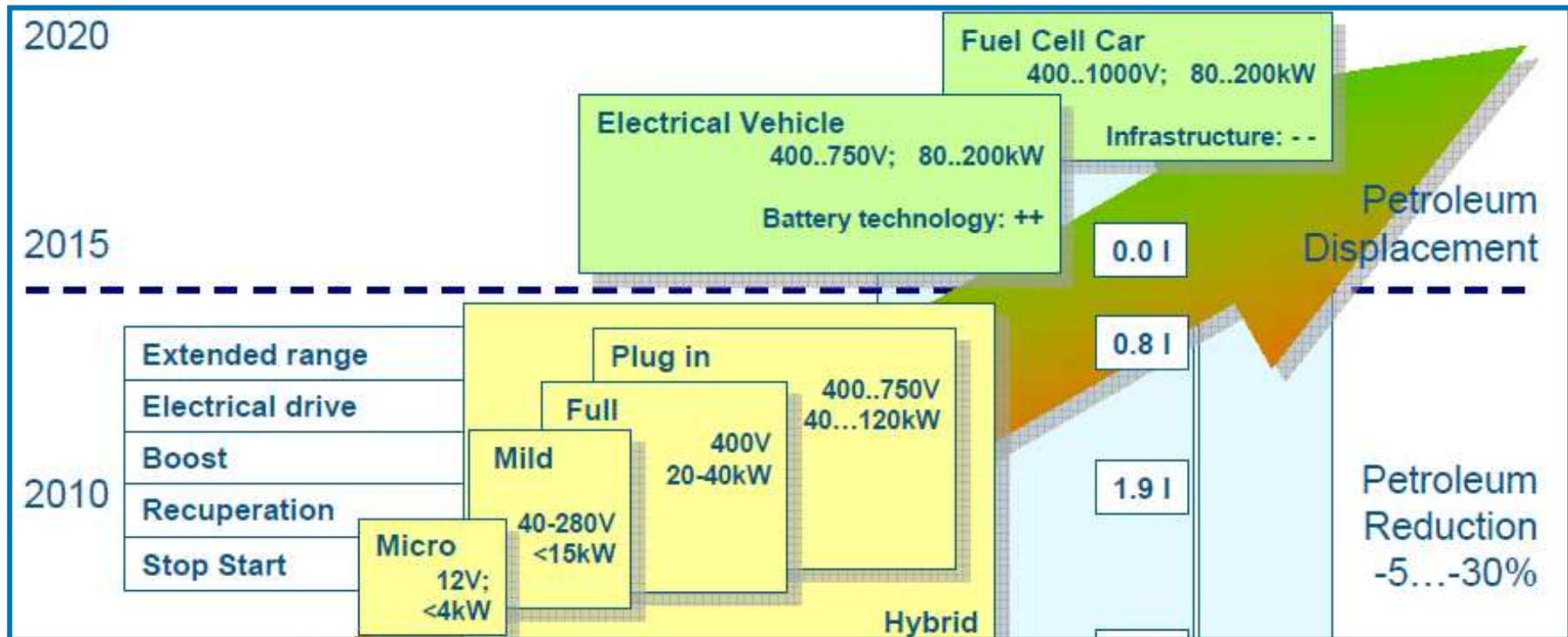
## Tyco Electronics Products



Contactor Box  
 PDU/PDC/PDB  
 Main Relay  
 Pre-Charge Relay  
 Power Resistor  
 Service Disconnect

High Voltage Interlock  
 Cell Connection  
 Current Sensor  
 Non-Contact Position Sensor  
 Temperature Sensor  
 Resolver

# Tensão / Corrente Elétrica:



$$P = I \times U$$

# Desconexão em sistemas de Alta Tensão:

# Desconexão em sistemas de Alta Tensão:



# Alta tensão em instalações industriais:

# Alta tensão em instalações industriais:



- Associação Brasileira de Normas Técnicas - ABNT
- Agência Nacional de Telecomunicações - ANATEL
- concessionária de energia elétrica local.
- *American National Standards Institute - ANSI*
- *Institute Electrical and Eletronics Engineers - IEEE*
- *National Electrical Manufactures Association - NEMA*
- *National Electrical Code - NEC*
- *American Society for Testing and Materials - ASTM*
- *International Electrical Commission - IEC*
- *Insulated Power Cable Engineers Association - IPCEA*



# Alta tensão em veículos:



Veículos Elétricos

Onde está a cabine primária?  
Ela deveria estar fora do veículo e em local de fácil acesso.



## Alta tensão em veículos:

Carros fabricados pelas grandes montadoras de automóveis utilizam componentes especialmente desenvolvidos, que evitam os potenciais acidentes decorrentes da alta tensão.



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O problema é que nem todo veículo elétrico é carro produzido por grandes montadoras de automóveis.

E muitos veículos elétricos aplicam soluções industriais e não automotivas.



## Lições aprendidas e oportunidades futuras:

Global invests for hybrid & Electric vehicles is arriving:

Chinese-Saudi carmaker Amsia Motors has signed a preliminary deal to build the first auto factory in the Brazilian state of Sergipe, where it plans to invest 1 billion Reais (\$457 million) on a plant focused on hybrid and electric vehicles. They are going to manufacture passenger cars, busses and agricultural machines.



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Meta:  
Aplicar 100%  
de soluções  
automotivas.



# Exemplos de componentes p/ veículos elétricos:



Conexões p/ Alta Tensão



Reles e Contatores



Sensores

# Exemplo de componente p/ veículo elétrico:

**Fuse Rating:** Up to 630A

**Screw Size:** M5

**Voltage Rating:** 600 VDC

**Temperature Range:** -40° C to 85° C

**Current Rating:** >350A Continuous @70/95mm<sup>2</sup> Wire

**Mating Cycles:** >50

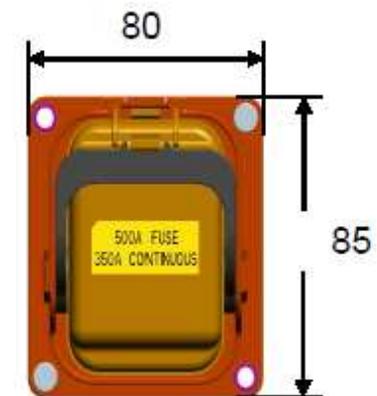
**IP Rating:** Mated: IPx7, IP6k9k

Unmated: IP2xb

**Latching Style:** Finger Actuated - 2 Stage

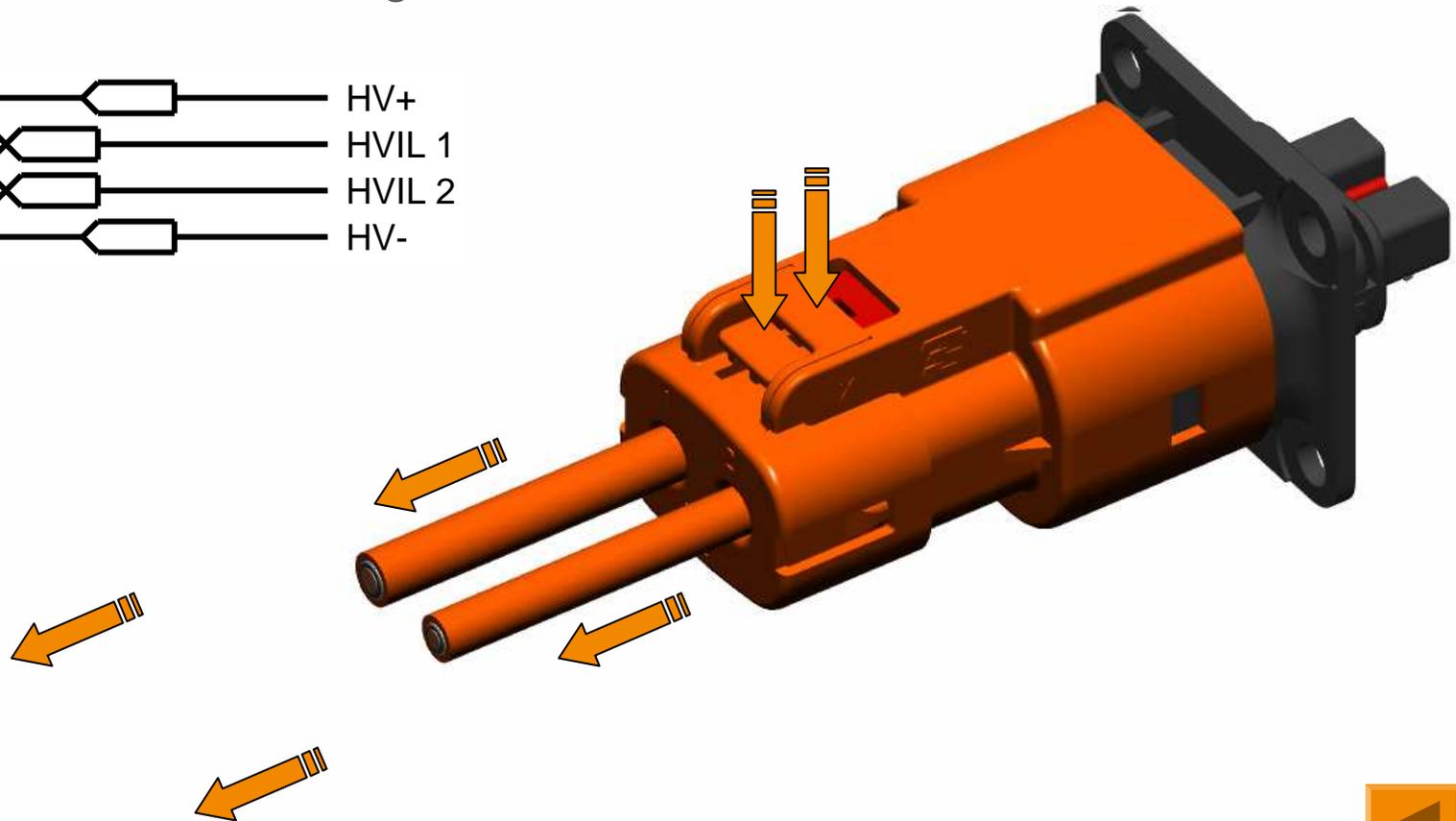
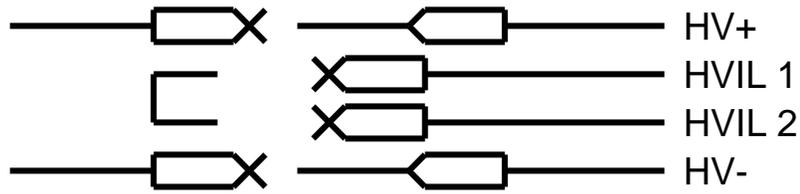
Lever Assist

**HVIL:** 2x Integrated-Internal



# Exemplo de componente p/ veículo elétrico:

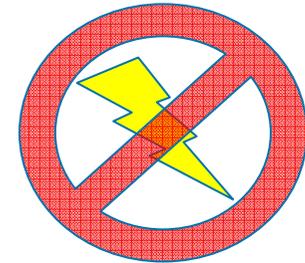
- Circuito de proteção integrado ao conector;
- Desconexão em dois estágios.



# Exemplo de componente p/ veículo elétrico:

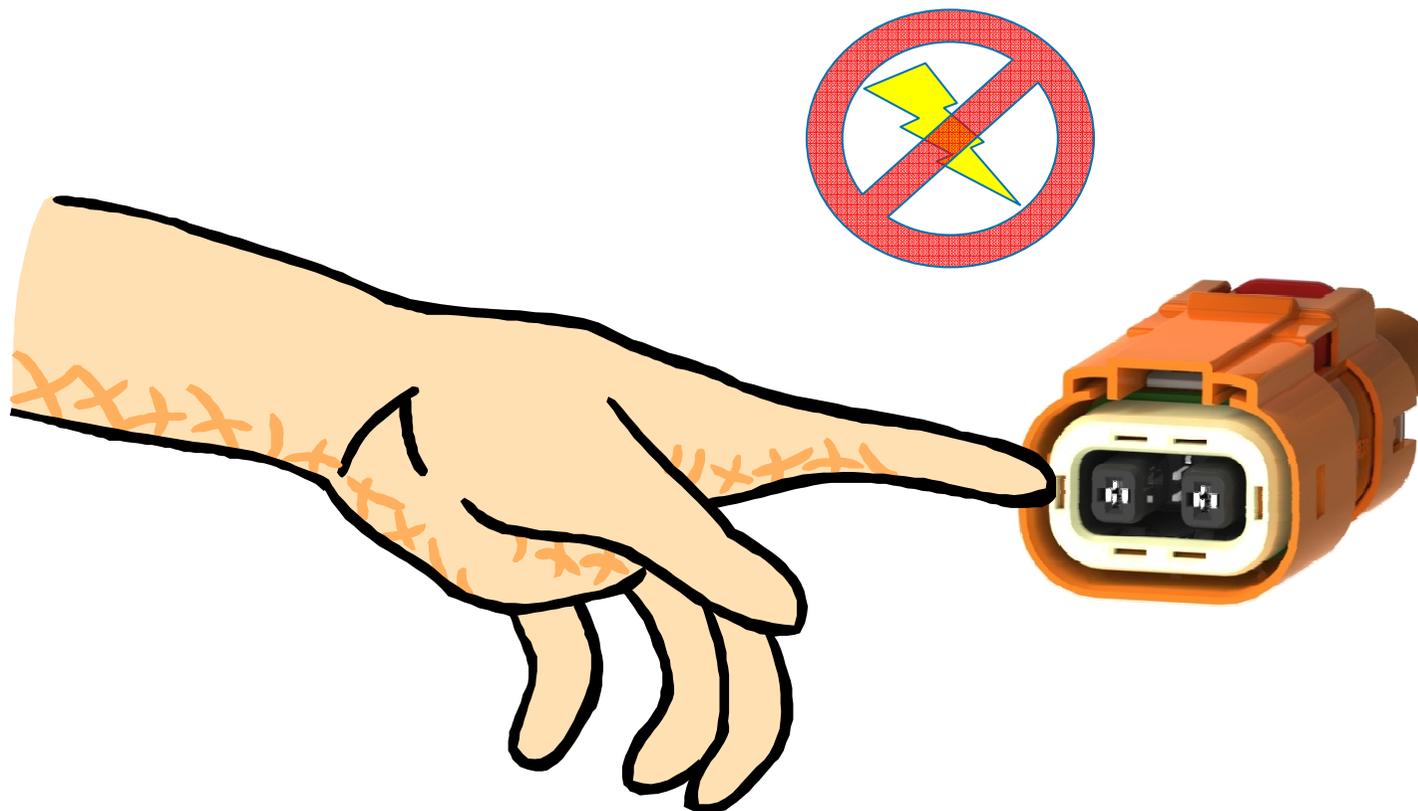
HVIL (High Voltage Interlock Loop)

Circuito de proteção integrado ao conector



# Exemplo de componente p/ veículo elétrico:

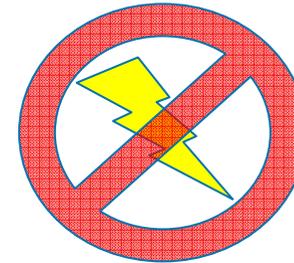
Segurança contra toque involuntário nos condutores de alta tensão:



# Exemplo de componente p/ veículo elétrico:

Segurança contra problemas decorrentes de Interferência Eletromagnética:

**360° Shielding**



# Exemplo de componente p/ veículo elétrico:

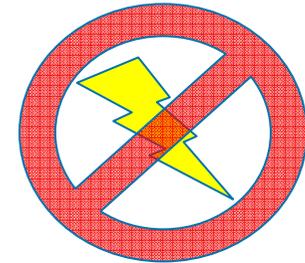
Segurança contra problemas decorrentes da incidência de água, partículas sólidas condutivas e outras substâncias: **IP 67 / IP 6K9K**

IP First number - Protection against solid objects

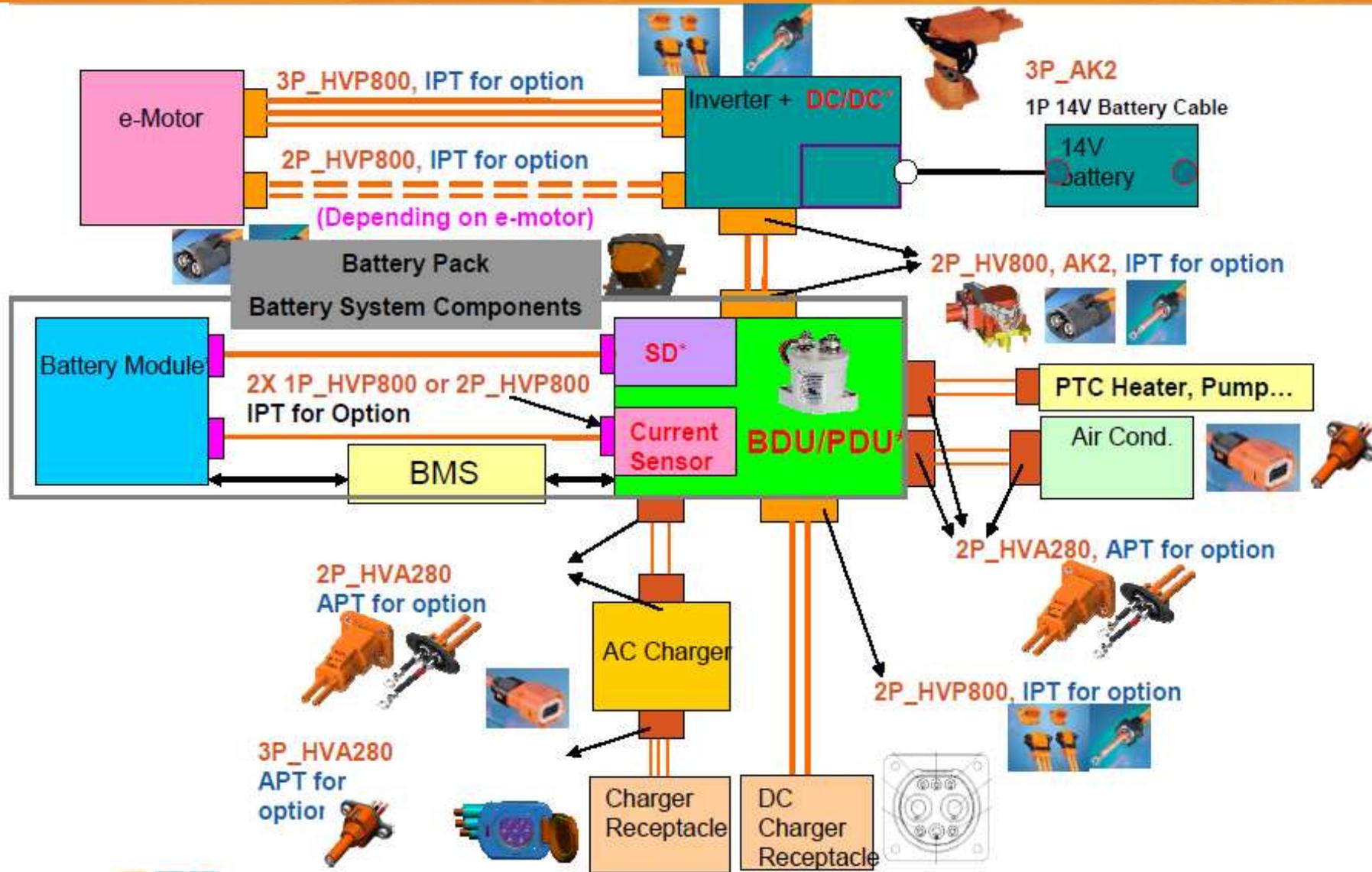
0	No special protection
1	Protection against accidental touch by hands
2	Protection against objects such as fingers
3	Protection against tools and wires
4	Protection against tools, wires, small wires
5	Limited protection against dust
6	Protected from dust

IP Second number - Protection against liquids

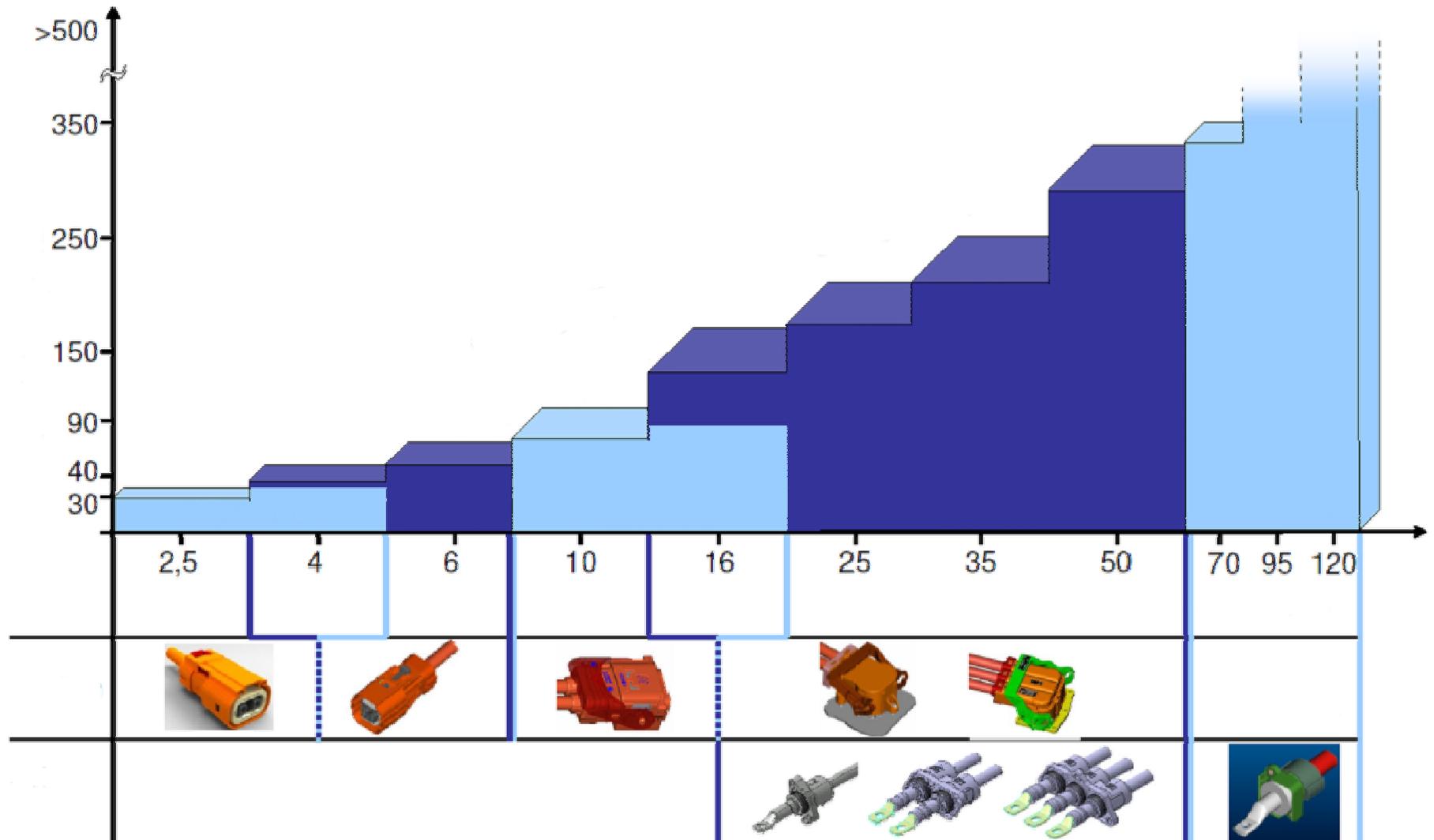
0	No Protection
1	Protection against vertically dropping condensation
2	Protection against direct sprays of water up to 15 degrees from vert.
3	Protection against direct sprays of water up to 60 degrees from vert.
4	Protection from sprays of water in all directions. Limited water ingress permitted
5	Protection from low pressure jets of water in all directions. Limited water ingress permitted
6	Nearly the same as # 5, except for ship decks
7	Protected against the effects of immersion in water to depth between 15 cm and 1 meter



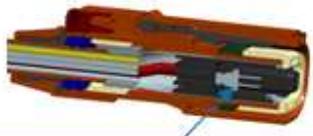
# Arquitetura elétrica:



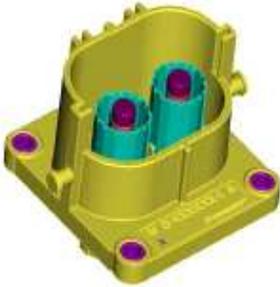
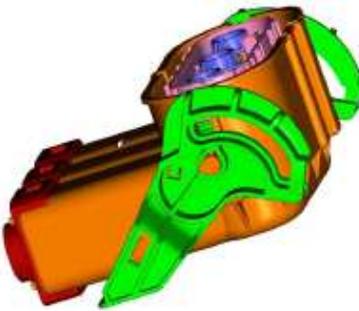
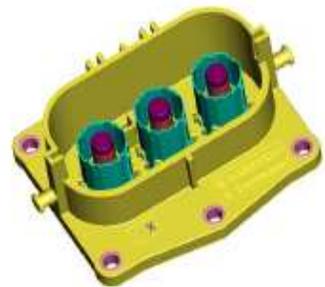
# Diferentes componentes p/ veículos elétricos:



# Diferentes componentes p/ veículos elétricos:

Typical Applications		In-Line	Header & Plug	
Battery Pack Electrical Heater DC/DC Converter On-Board Charger Electric Air Conditioning High Voltage Power Distribution Electric Power Steering	Packaging			
	Cable	Individual		Multi-core
				
	Number of Circuits	2 Pole		3 Pole
				
	HVIL	Shunted		In-Line
				
	Latching	Tool Actuated		Finger Actuated
				

# Diferentes componentes p/ veículos elétricos:

	180°	90°	Header to mate 180° & 90° conn.
2 way			
3 way			

## *Melhoria potencial nos veículos elétricos:*

- Segurança:
- Autonomia:

# Melhoria potencial nos veículos elétricos:

## Autonomia



Baterias

Níquel  
Chumbo  
Lítio  
Sódio  
Etc.

# Melhoria potencial nos veículos elétricos:

## Autonomia

### Baterias

- Densidade energética;
- Controle de carga;
- Sensores;
- etc.

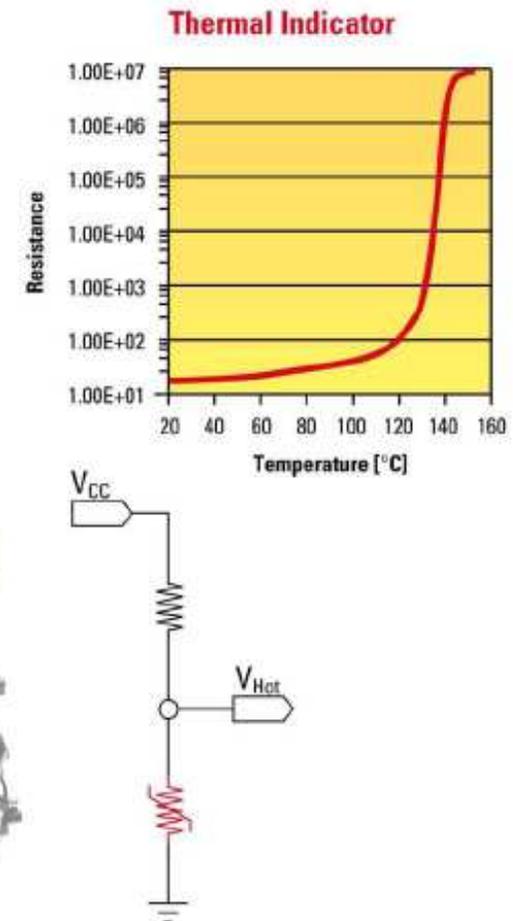
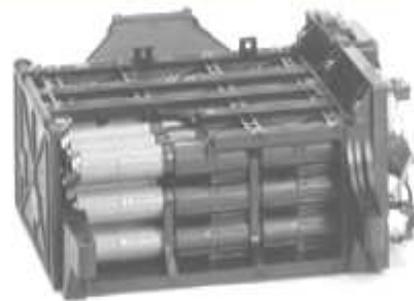
### Eficiência Energética

- Regeneração (cinética / elétrica);
- Motorização independente;
- Redução do atrito;
- Redução de calor;
- Redução de massa do veículo;
- etc.

# Melhoria potencial nos veículos elétricos:

## Key target features

- Temperature Protection with Polyswitch (e.g. 75°C ...)
- Trip temperature as a material constant
- PolySwitches multivalent package-able
- Stripe in parallel to cells
- Battery heats up pPTC indirectly
- pPTC resistance jumps
- easy temperature indication  
e.g. as redundant safety system



## Melhoria potencial nos veículos elétricos:

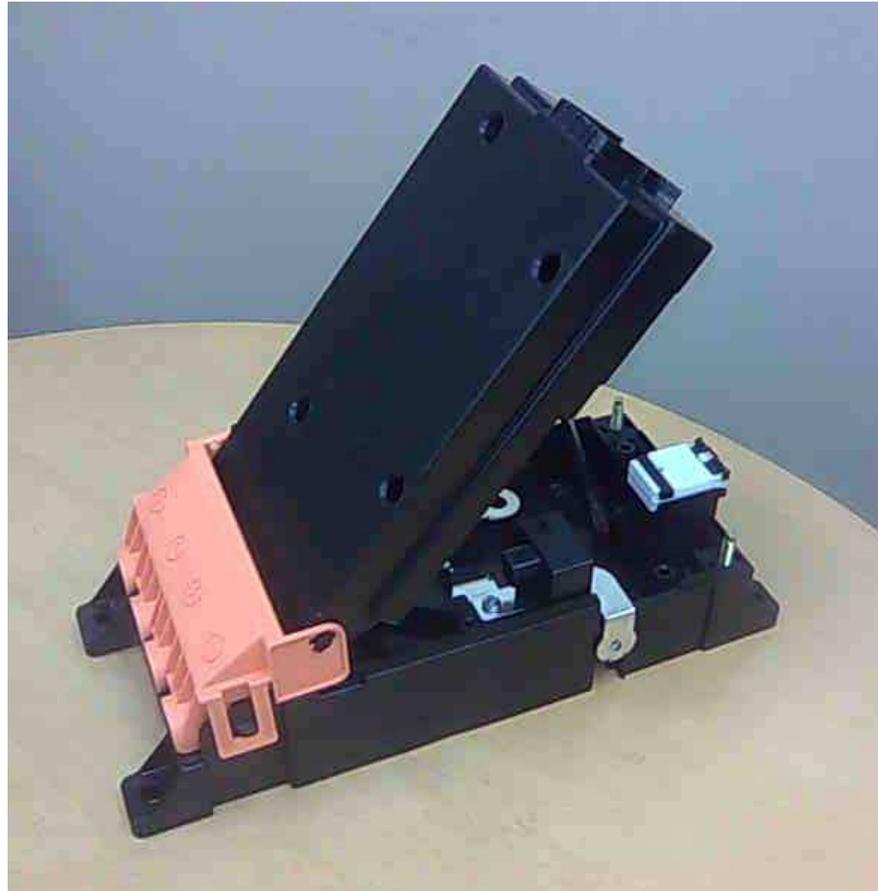
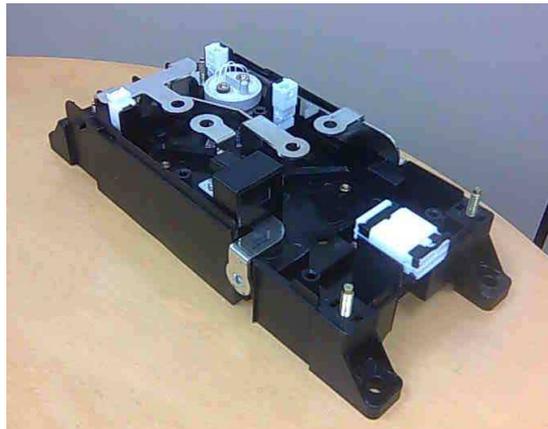
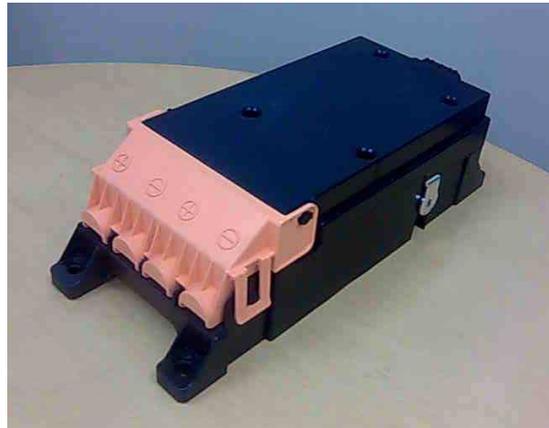
Regeneração X capacidade da bateria:

Sensor de corrente



# Melhoria potencial nos veículos elétricos:

## Battery Disconnect Unit (BDU)

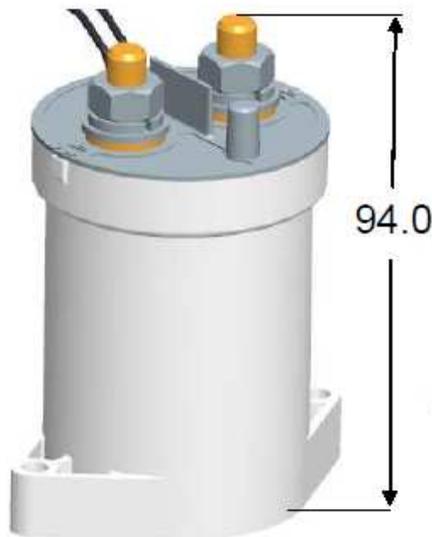


# Melhoria potencial nos veículos elétricos:

- Redução de tamanho;
- Redução de peso;
- Redução de ruído sonoro.

## EVC500L

500 Amps cont. current  
Does NOT require economizer  
to reduce coil power



(Mass: 600g)

## EVC500

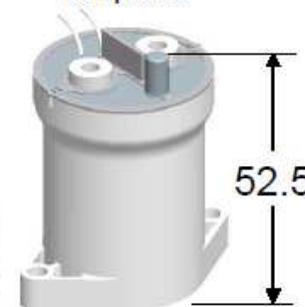
500 Amps cont. current  
Requires economizer to  
reduce coil power



(Mass: 430g)

## EVC135

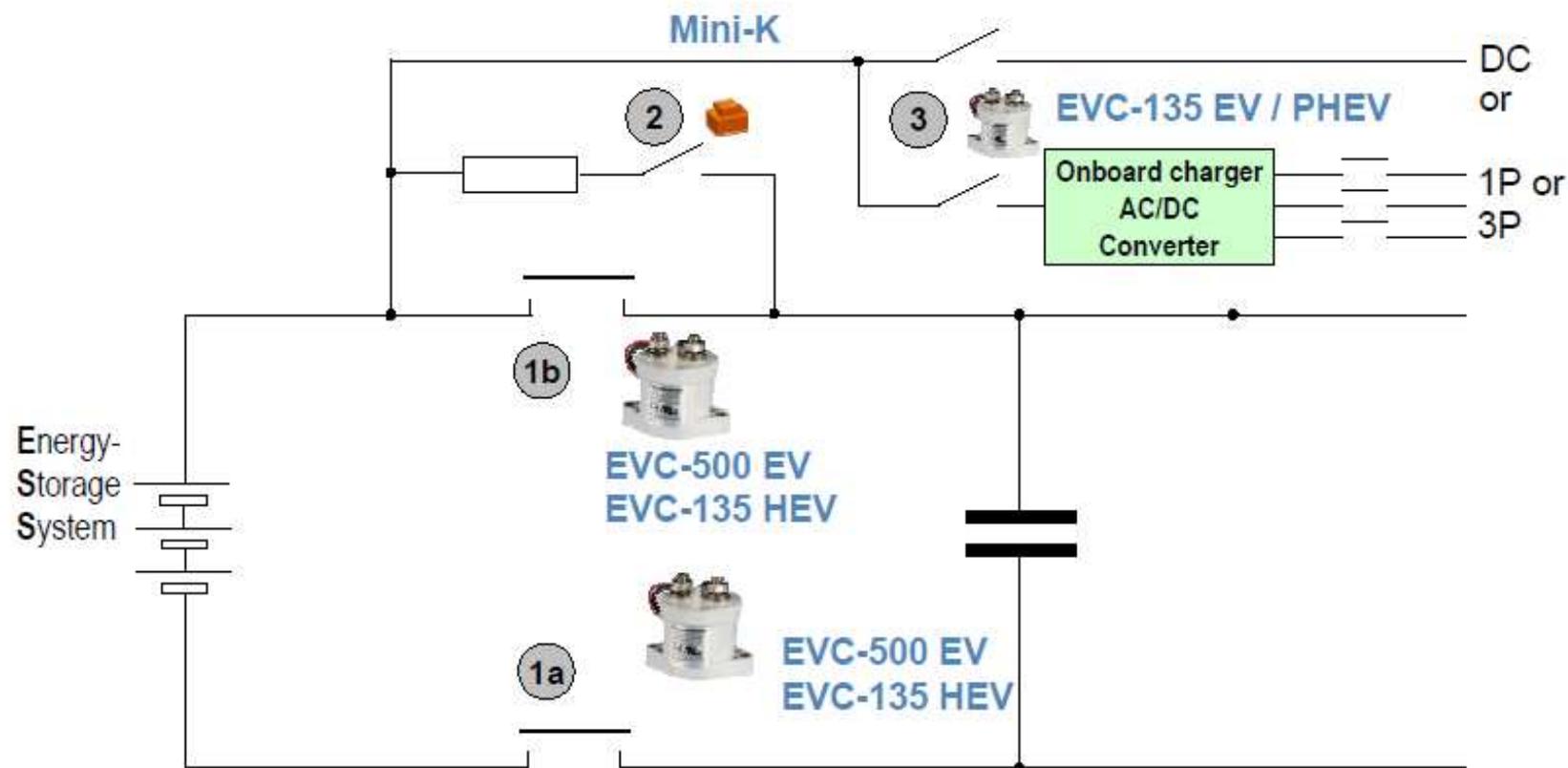
135 Amps cont. current  
Does NOT require  
economizer to reduce  
coil power



(Mass: 190g)



# Melhoria potencial nos veículos elétricos:



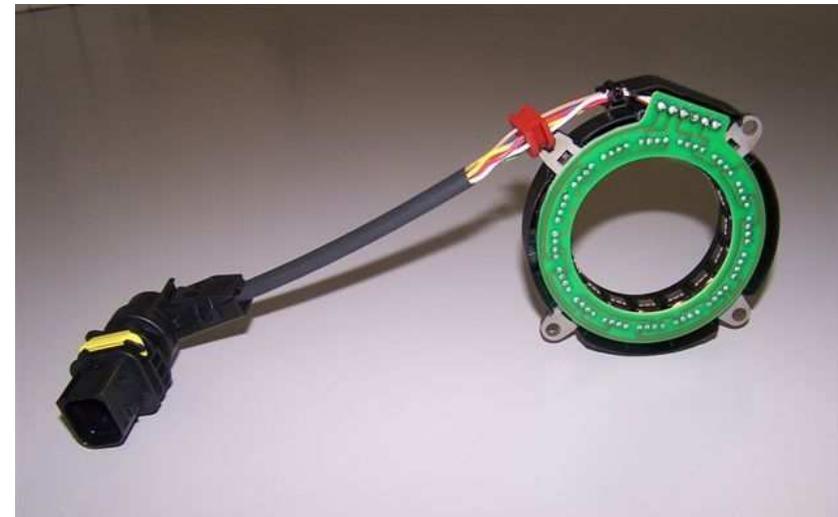
## Key Applications:

- ① Main Contactor
- ② Precharge Relay
- ③ Charger Contactor (DC)

Work with TE Engineering to help design your next robust EV power system

# Melhoria potencial nos veículos elétricos:

Resolver – (encolder extremamente leve)

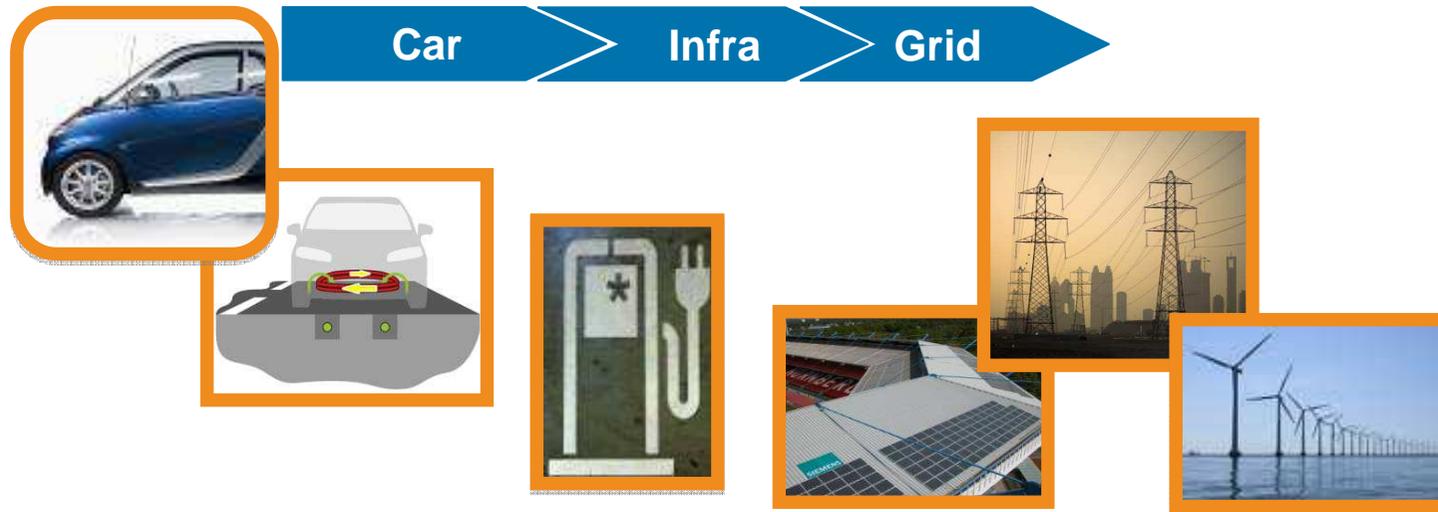


# Definição de Veículo Elétrico

Automotive

Industrial

Energy



Over 50 years of providing safe and reliable solutions around the globe.



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# TE Connectivity Hybrid & Electric Mobility Solutions



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[Infrastructure Solutions Overview](#)



WHEN IT NEEDS TO BE

**SMARTER, FASTER, BETTER**

WE'RE IN IT.

**EVERY CONNECTION COUNTS**



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