PERSEVERE FOR PROGRESS, STRIVE FOR EXCELLENCE!

[Internal use only]

VER：2020-02-03
Hongfa Europe GmbH

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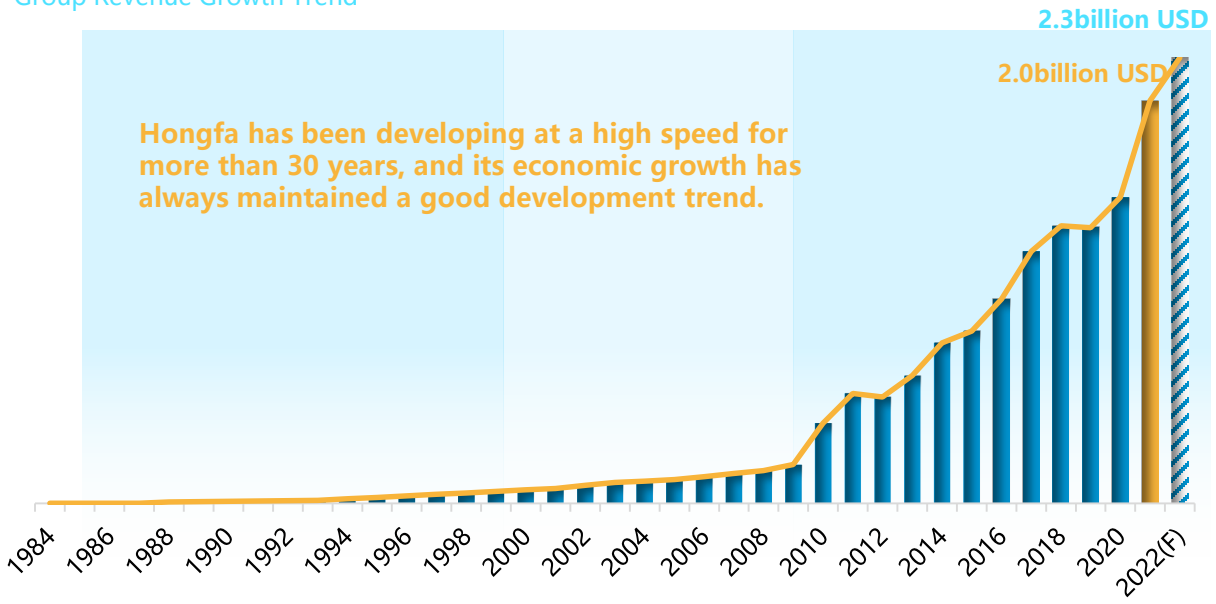
About Hongfa

Hongfa is a leading company in global relay industry, founded in 1984.

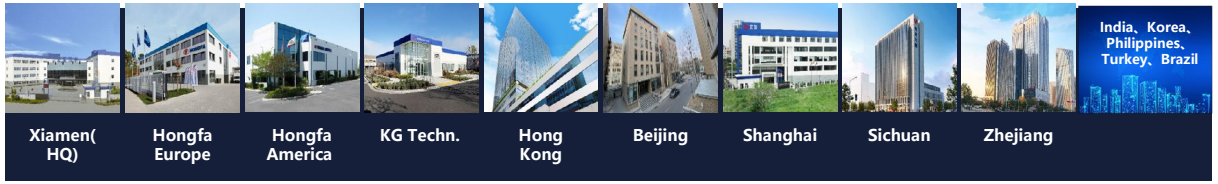
- Hongfa provides multiple products such as relays, low voltage devices, high and low voltage panels, connectors, capacitors, precision parts and automation equipment.

- With more than 30 subsidiaries, it has established three R&D and production bases in Xiamen, Zhangzhou, Eastern and Western China, leveraging the advantages of the entire industrial chain of relays and associated products.

Group Revenue Growth Trend



Sales & Support Network around the world



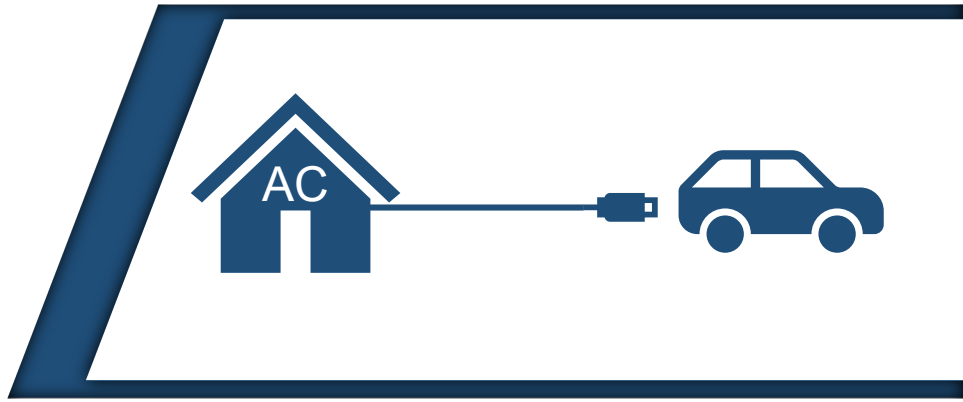
EV charging

EV Charging

Charging Modes

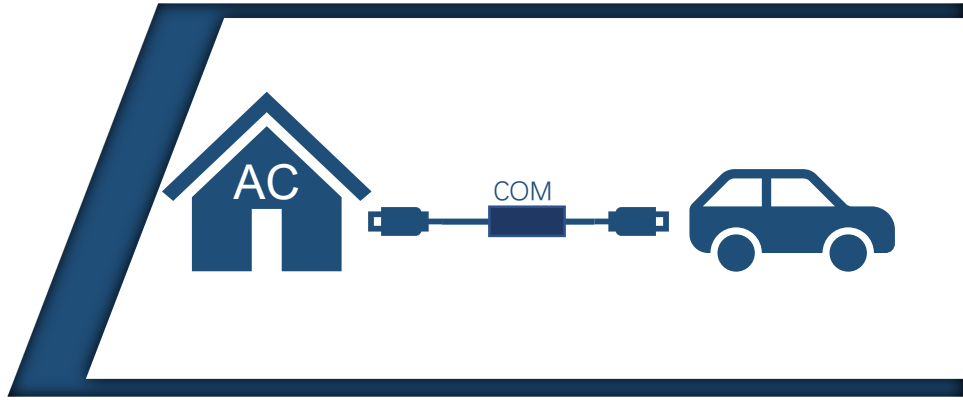
MODE 1

- Standardized plug-in device, eg. a household outlet
- In a 1 or 3-phase network
- The maximum charging current is 16 A
- No communication with vehicle



MODE 2

- The charging cable is protected by IC-CPD (In-Cable Control and protective Device).
- Protect against fault currents
- Communicates with the vehicle.
- The maximum charging current is 1ph 16A, 3ph 32A

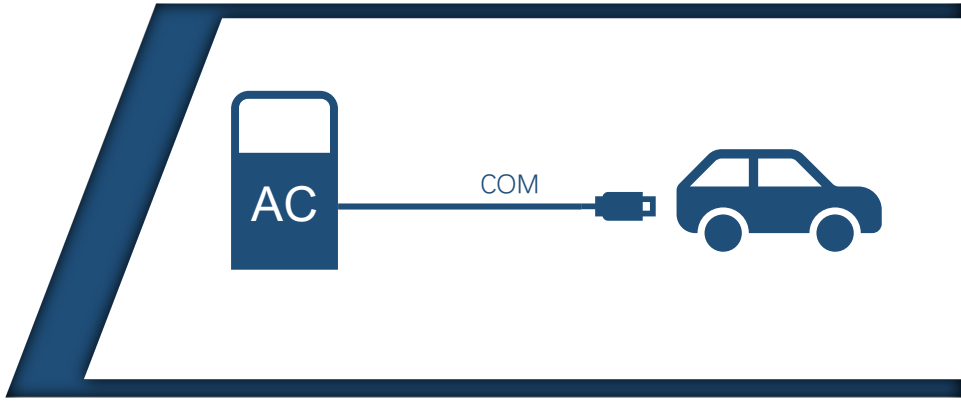


EV Charging

Charging Modes

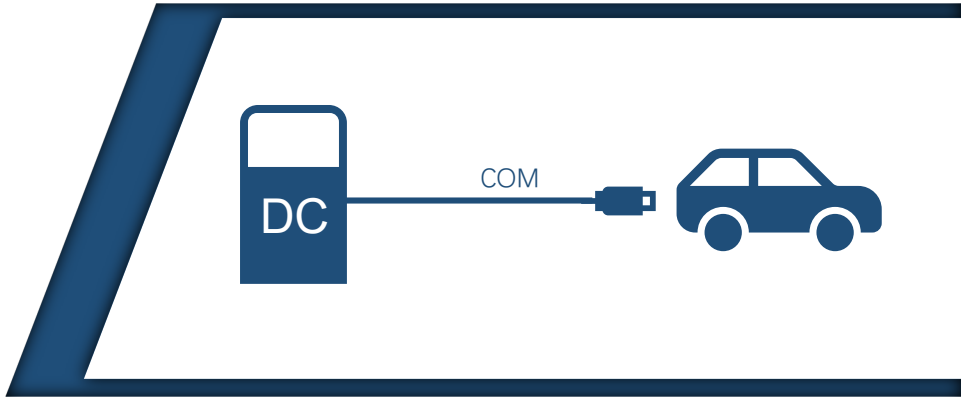
MODE 3 Level 2

- Charge with a charging station or at a wall terminal Communication with the vehicle and Three-phase current up to 63 A
- Type A: A fixed charging cable, connected to the vehicle
- Type B: Movable AC charging cable, with connector at each end
- Type C: cable fixed connection to charging station



MODE 4 Level 3

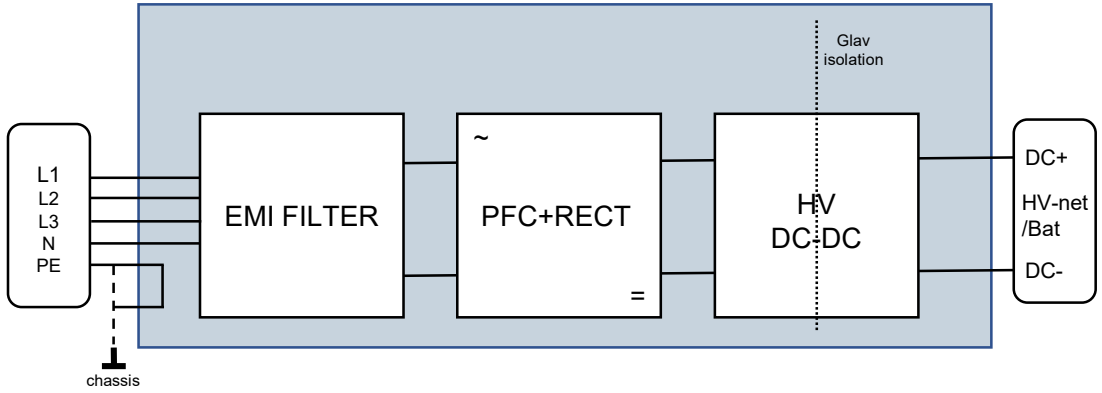
- High-speed, High power, Fast charging
- Communication with vehicle
- AC / DC converter is installed in the charging station (OBC is bypassed)
- Contacts and the cable sections are larger
- Power transmission up to 250 kW



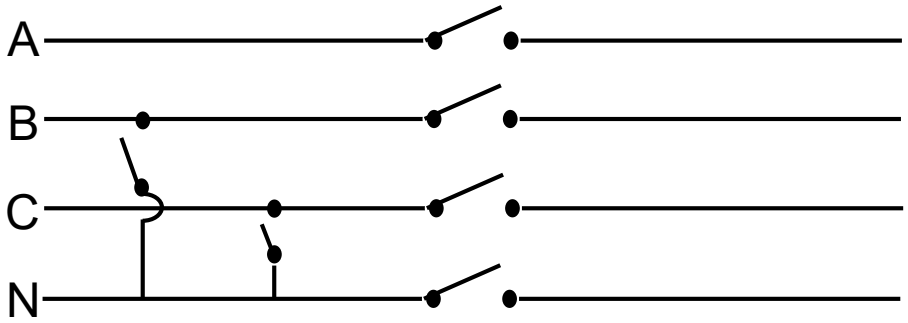
EV Charging

OBC module in EV

- **Block diagram**



- **Switchting Matrix**



EV Charging

Charging Mode 2

Max Power:

- 1 Phase(s): 250Vac 16A → 4kW
- 3 Phase(s): 400Vac 32A → 22kW

Applicable Hongfa Products:

- Power Relays
- Terminal Blocks
- Film Capacitors
- Current Transformer

EV Charging

Charging Mode 3

Design 1

- Use relays and control board
- Rely on existing electric installation of MCB RCBO

Hongfa Products:

- Power Relays (16A to 32A)
- Terminal Blocks
- Capacitor

Design 2

- Use relays and control board
- Rely on existing electric installation of MCB RCBO

Hongfa Products:

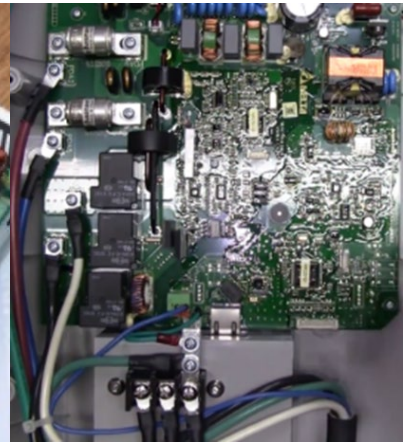
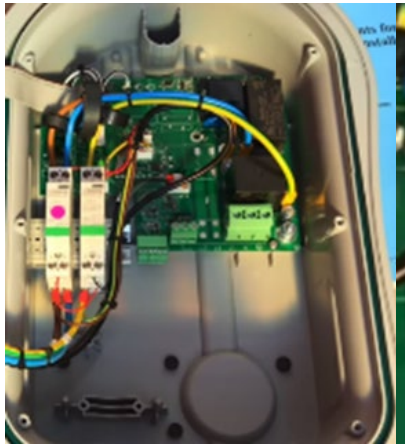
- Relays
- Terminal Blocks
- MCB

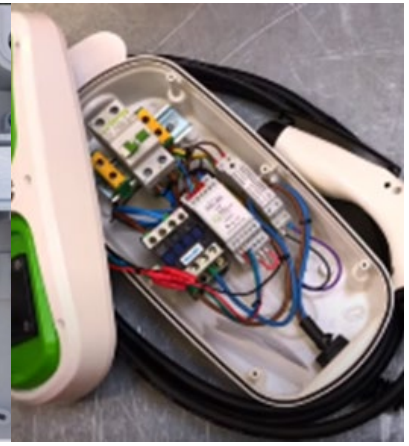
Design 3

- RCBO and contactor
- Integr. DC residual current monitoring module & charging mode 3 controller

Hongfa Products:

- Contactors
- Terminal Blocks



EV Charging

Charging Mode 3 & 4

Mode 3 - Max Power

- 63A / 43.5 kW

Hongfa Products:

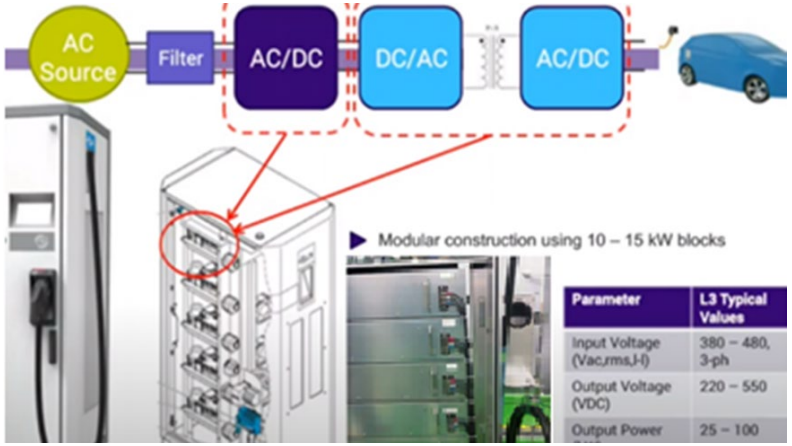
- Contactors
- MCB / MCCB
- Power Relay
- Capacitor

Mode 4

- Include 20 kW subunits and stack them to create a higher power
- Three main power levels:
  - ≤ 50kW for city use
  - 150 kW for highways
  - 350 kW for supercars/Trucks/Buses

Hongfa Products:

- Contactors
- MCCB
- HVDC Relays
- Terminal Blocks
- Power Relays



EV Charging

HONGFA

Standards involved

HD6034-7-722:2018

IEC 61851-1

Electric vehicle conductive charging system

Part 1: General requirements

For all modes

IEC 62752

In-cable control and protection device for mode 2 charging of electric road vehicles (IC-CPD)

For mode 2

IEC 62955

Residual direct current detecting device (RDC-DD) to be used for mode 3 charging of electric vehicles

For mode 3

IEC 61439-1-7:2020

Low-voltage switch- and control gear assemblies

For all modes

IEC 61810-1

IEC 60664-1

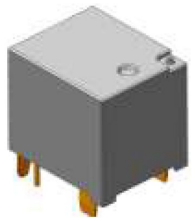
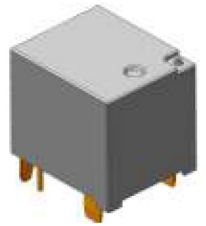
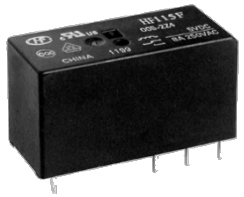
Insulation coordination for equipment within low-voltage systems

Part 1: principles, requirements and tests

Contact gap / Clearance/creepage

EV Charging

Power Relay – Single Pole, Contact form 1A/1C

16A	20A	32A	40A	45A	65A
HF152F 21×16×20.6	**HFK11(-T) C16** 20.5 x 15.9 x 20.6	**HF161F-W** 30.4×15.9×23.3	**HF165F** 32.2×27.4×19.4	**HFK11(-T) C32** 20.5 x 15.9 x 20.6	**HF186F** 30x20x31
		 *1.5mm to 2.3mm	 *1.8mm to 2.0mm		 *3.0mm
HF115F/K 29.0×12.7×15.7	**HFK10(-T) C16** 18.85×15.9×16.5	**HF179F** 21.5×16×20.6	**HF161F-40W** 30.4×15.9×23.3	**HFK10(-T) C32** 18.85×15.9×16.5	**HF176F** 38×33×36.8
		 *1.8mm to 2.4mm	 *2.0mm		 *3.0mm
		HF178F(-T) 21.5×16×20.6			
					

Current

*contact gap

EV Charging

Hongfa Power Relays

- Single pole w/ aux contact
- 2 poles w/ & w/o aux contact
- 4 poles w/ aux contact

HFE39-40/2P 30x20x10.2	HF170F/2P 36 × 30 × 40	HF185F 2P 40x35x38.8
		
*Latching	*3.6mm, aux contact	*3.0mm

HF175F 2P 29.0×19.6×15.7	HF190F 1P 35 x 16 x 28	HF177F 2P 50×25×31	HF187F(955) 4H1D 59 × 35 × 47	HF189F 1P 35x25x28
	3kA SCC			3kA SCC
				
	*2.25mm, aux contact	*for AC load	*3.9mm, aux contact IEC 62955 compliant	*2.25mm, aux contact

16A | **32A** | **40A** | **50A**

*contact gap

EV Charging

HVDC Relays

HFE80V-20 C/D
20A,450VDC
Simple structure, low cost
EV Car PreCharge, Aux. relay

HFE80V-100 B
100A,60VDC
Plastic sealed
48VDC application

HFE82V Series
Current 60A-600A
Ceramic chamber sealed
High SCC capability
EV Car Main relay, DC-Charge、Aux.relay

HFE85P Series
150A/250A/350A 450VDC
Ceramic chamber sealed
Circular structure
PV&Energy storage Main relay

HFE85V Series
400A 750VDC
Ceramic chamber sealed
Circular structure
With auxiliary contact.
EV Car Main relay, Charge

HFE88P Series
150A/250A/350A 1500VDC
Ceramic chamber sealed
structure, with auxiliary contact.
PV&Energy storage, Main relay

HFE82P-20F
20A,1000-1500VDC
Ceramic g sealed,
PV&Energy
Storage precharge application

EV Charging

Low Voltage Devices (LVD)

MCB
UEB6 series

40A frame: 6-40A. 1P+N. Icu 4,5-6kA
63A frame: 6-63A. 1P, 1P+N, 2P, 3P, 3P+N, 4P. Icu 4,5-6kA

Modular Contactor
UEC1-GC series

32A frame: 16-32A. 63A frame: 40-63A. Up to 4 aux contact

MCCB
UEM5 series

16-800A, AC400-690V, Icu 35-100kA

IEC Contactor
UEC1 series

18A frame: 9-18A. 38A frame: 25-38A. 65A frame: 40-65A. 95A frame: 80-95A. Up to 4 aux contact NO NC configurable

EV Charging

Capacitors

HCBB62 X2
85°C and
85% humidity

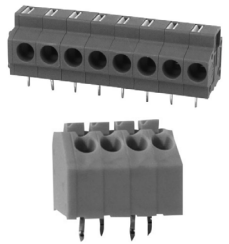
HCBB65
Class A
30k hr Lifetime

HCDZFC
DC-Link
Capacitor

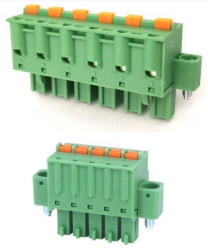
HCDLAE
AC-Filter
Capacitor

HFLS1A

HFLS1B



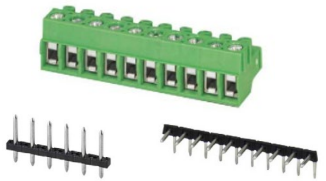
HFLS1C



HFLS1D

HFLS1E

HFLS1H



“EY estimates that the continent (EU) will need 65 million chargers to fuel 130 million EV by 2035”

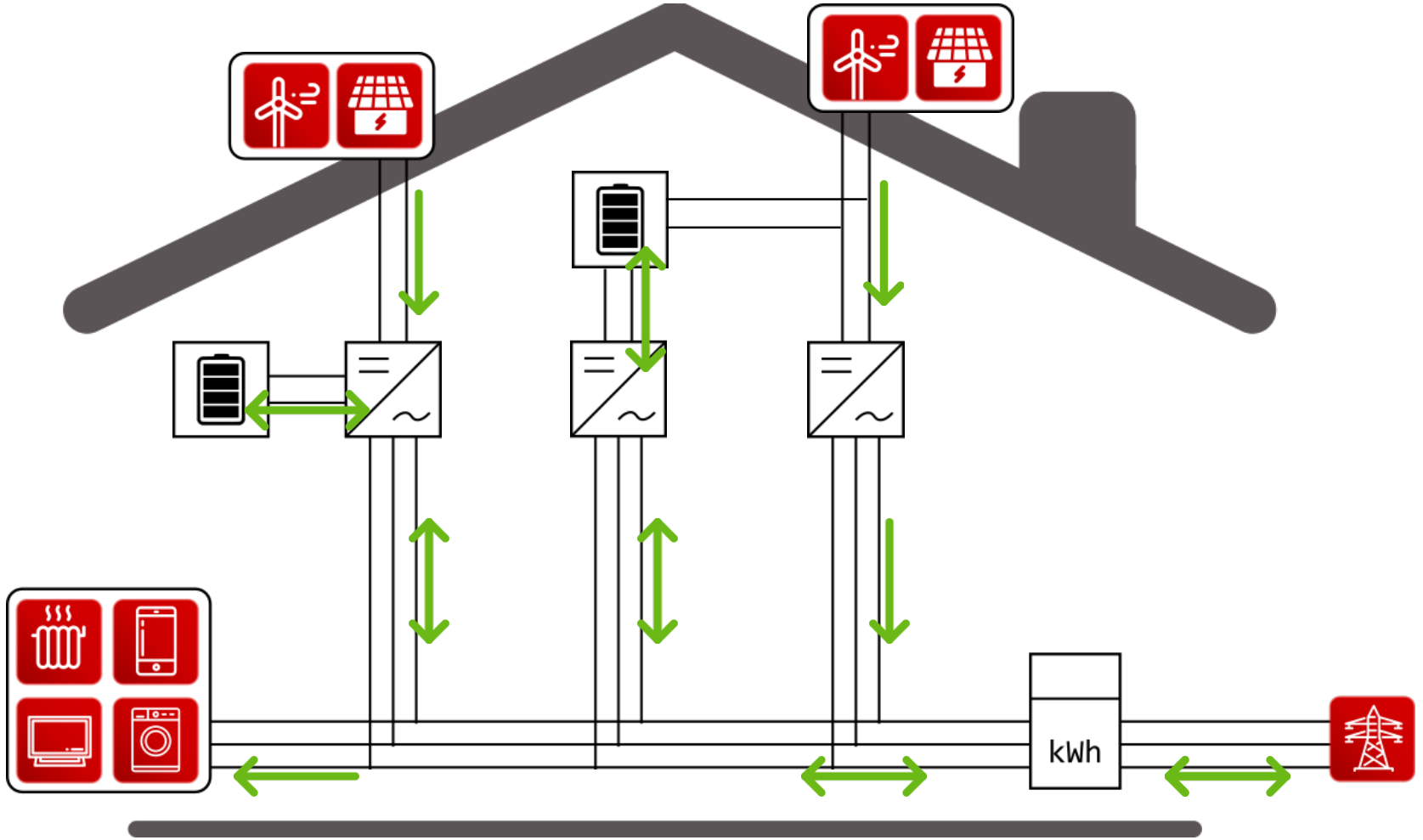
*source: Automotive News Europe

Energy Storage

Energy Storage

Challenges with renewable Energy Sources

- Renewable Energies are an integral part of the **future energy mix**
- They are **not always available** when needed
- **Saving** excess **energy** is important
- Ranges from single family houses to industrial size storage system



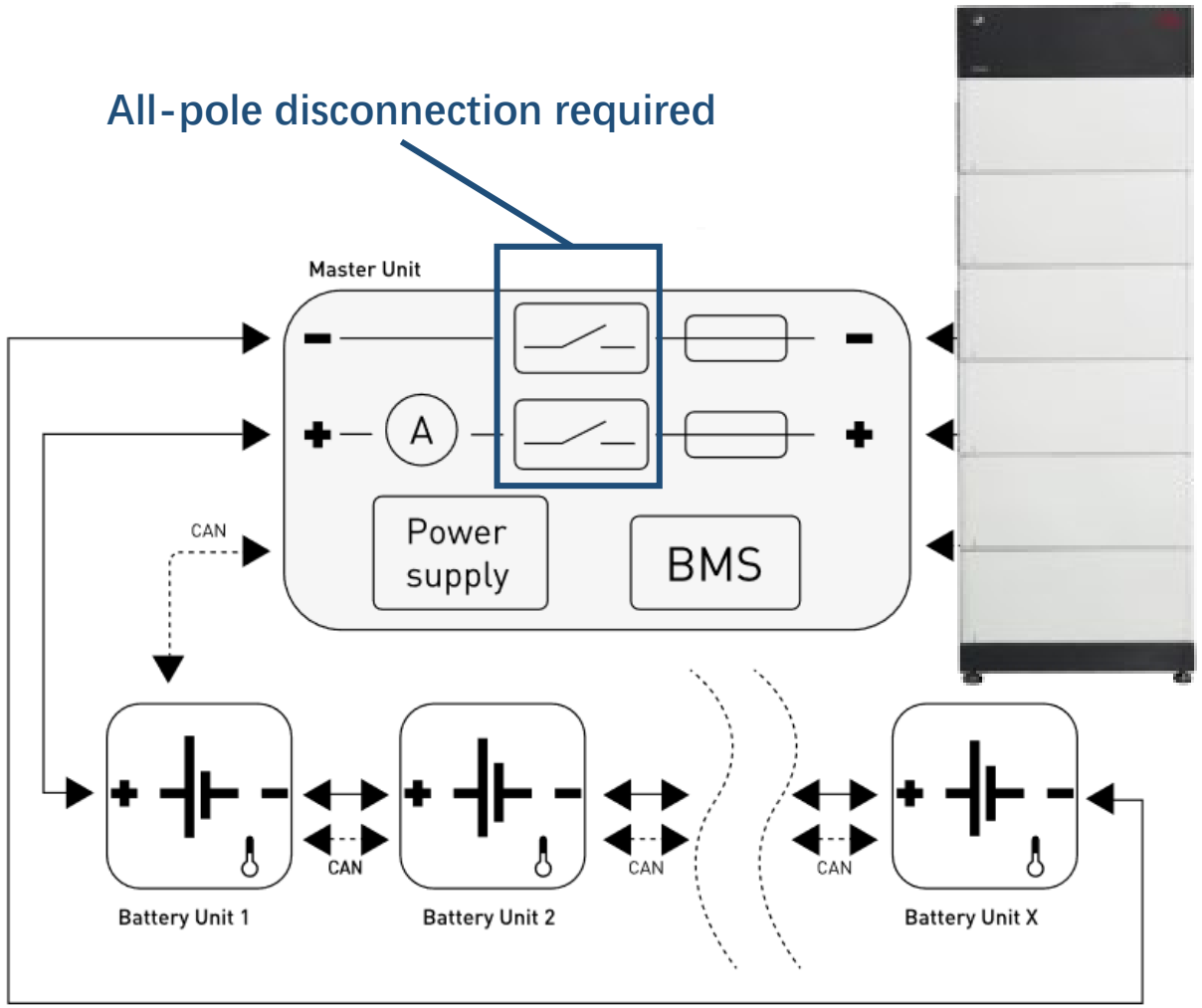
Energy Storage

Design of a Home Battery

- 320-600 VDC
- 10-40A constant current
- Up to 75A peak (5s max)

- Mostly current carrying
- Switching only in emergency or failure situations

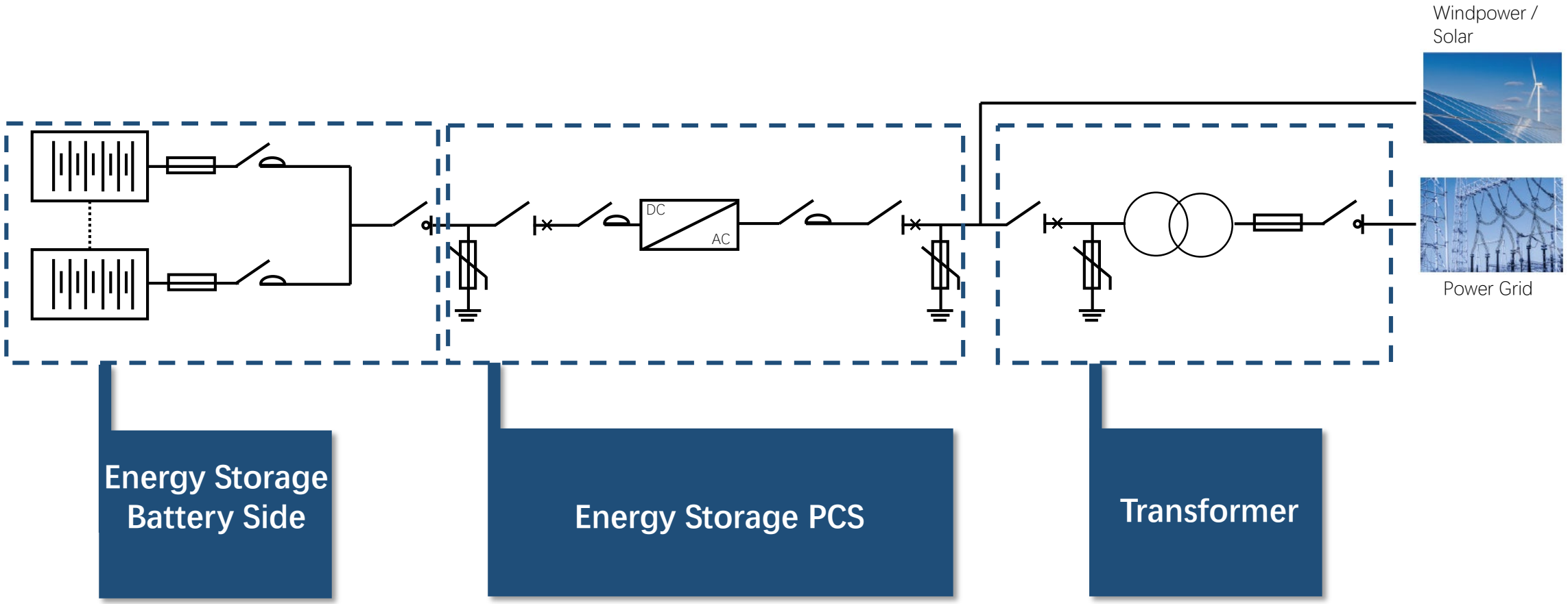
- Small contact resistance
- Small coil power



„Electrical Energy Storages are a key element to a carbon free future and the installed base grows >35% per year. “

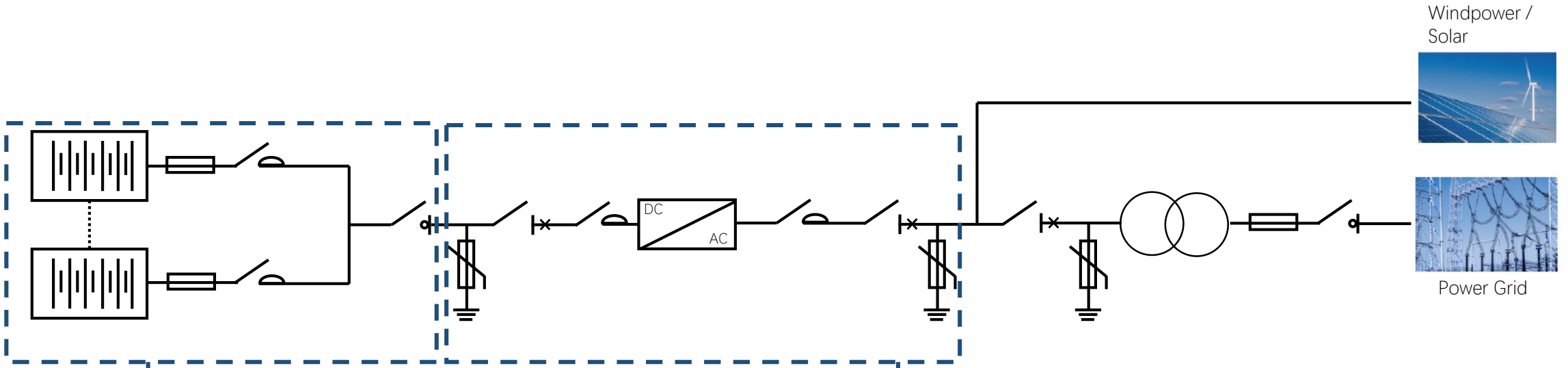
Energy Storage

The Application



Energy Storage

HVDC- & Power Relays



DC Relay
1500V


HFE82P-20


HFE82V


HFE85P


HFE88P


HFZ16


HFZ21

Power Relay
1500V


HF161F-W


HF170F


HF186F

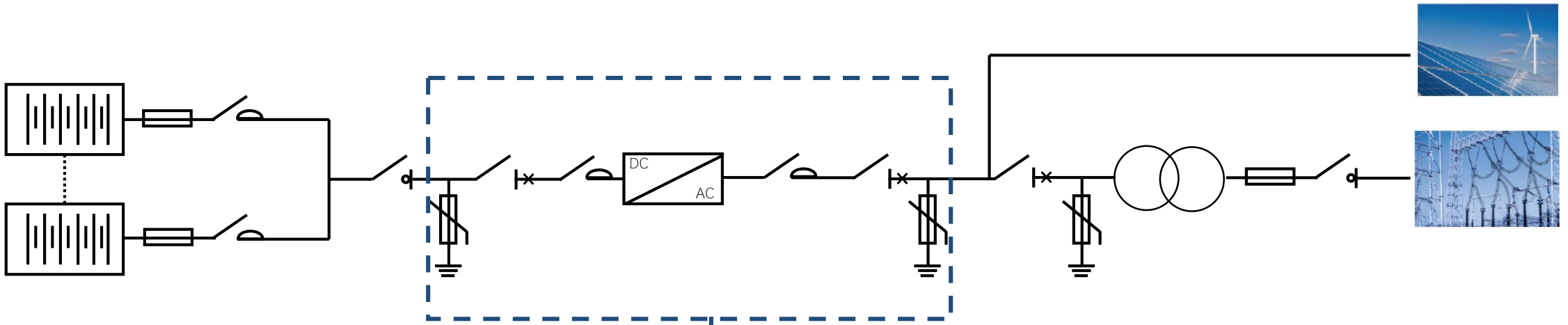

HF176F


HF172


HF167

Energy Storage

Capacitors & Signal Relay



Capacitor

HCDA

HCSC

HCBB62-X2T

HCDB

HMMKP82

HMKP21

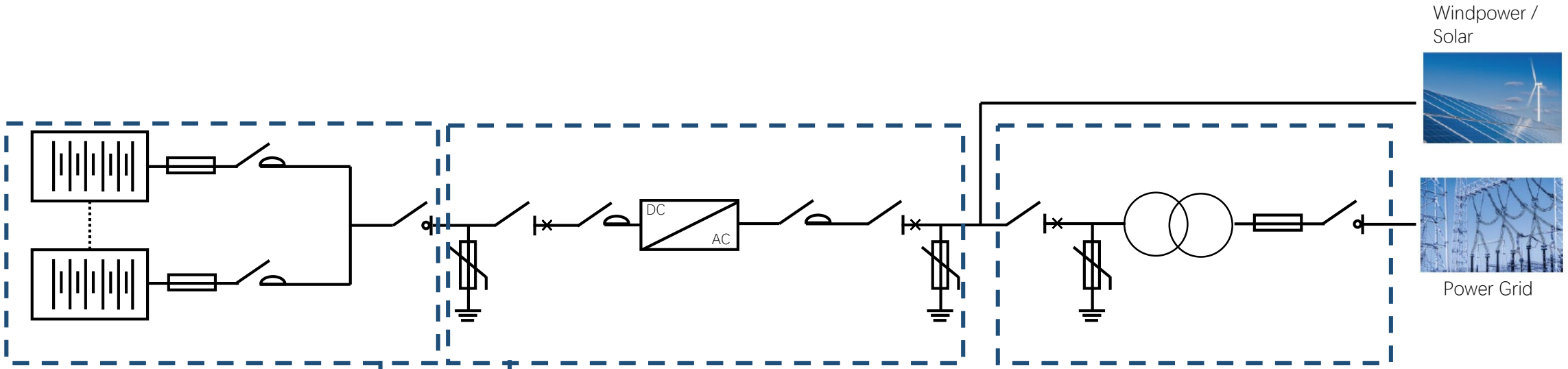
HCAB

HCAA

Signal Relay – HFD3

Energy Storage

Current Transformer



Current Transformer

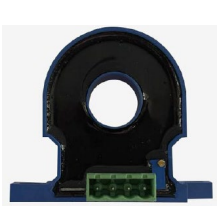
Hall effect type
Flux gate type


HCA001


HCA002


HCF2


HKC2T


HKCD001


HKCV003

Key Take-aways

- We have **experience** in Electric Vehicle Charging- and Energy Storage System

- Our **Portfolio** covers the entire range needed for **EVC and ES Systems** to:
  - Secure Switching
  - Protecting
  - Measuring
  - Filtering

- We are working with the **leading manufacturers** of Charging and Energy Storage Systems

THANK YOU FOR YOUR ATTENTION

Hongfa technology, for a better life!