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# HVDC RELAY

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Taking **CHARGE** into alternative energy vehicles, charging devices, PV/wind energy

**Green Solutions**



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# COMPANY PROFILE

Hongfa (Hongfa stock code: SH600885) is the biggest relay research and production center and export base in China, with an annual production capability of 1.5 billion pieces. Hongfa's enterprise spirit is "Persevere for Progress, Strive for Excellence" and the operational philosophy is "Focusing on the market; Winning through quality". Under the instruction of enterprise spirit and operational philosophy, Hongfa has become the first-class base for relay research and production, owning 22 subsidiaries.

Hongfa's core product is electromechanical relays. Hongfa expanded our product portfolio with products including low-voltage devices, high-precision components and automation equipment. We export relays to more than 100 countries and have local sales, customer service and application engineering in many countries. We service customers in the market segments of industry, energy, transportation, communication, household appliances, medical, national defense, etc.

Hongfa "Strives for Excellence" by embracing our technology. Hongfa focuses on product development while adopting the leading technology in this industry. Hongfa has a national level R&D center with the largest testing laboratory in this industry. Our fully equipped facility maintains the most advanced technology. Hongfa developed the first Post-doctoral Research Program in China. Our engineers and scientists push the relay industry and they influence many professional and national standards.

Hongfa recognizes that our Earth has limited resources and embraces the asserted effort from environmental protection, science, technology, and the green industry. The environmental protection industry (alternative energy vehicles, PV and wind power) has tremendous support from many countries. Hongfa understands this trend. Hongfa assembled a professional research team and invested in technology innovation at a very early stage. Hongfa is the first HVDC relay manufacture in China who developed independently that has the capacity to manufacture in volume. The Hongfa HVDC relay can meet the demands of the PV industry, alternative energy vehicles, charging stations, and more.

### Hongfa's Technology Strength:

- ◆ The largest relay research and production center in China.
- ◆ The first class capability of mold design, plastic producing and precision metal fabrication.
- ◆ The first class design and manufacturing of automation assembly equipment.
- ◆ The largest test laboratory with latest test equipment in relay industry.
- ◆ Complete quality-control system.



# HVDC RELAY INTRODUCE

- ◆ Mechanical test according to ISO 16750
- ◆ Safety guarantee, insulation compliance with IEC 60664-1, ISO 6469-3



HV air exhausting machine



Laser welding machine



## HFE18 (Ceramic chamber structure with wide range load)

- ◆ Ceramic chamber structure, no leakage of arc, contacts is waterproof, dustproof and anti-oxidation. Relay has high liability and long service life.
- ◆ Strong structure for arc blowing
- ◆ Wide range in load, current between 10-600A, working voltage between 12-750V, max working voltage is 1000Vdc.



Item	Application
HFE18V	EV, HEV, PEV, PHEV
HFE18	solar power, UPS, wind energy, battery charging and discharging system

## HFE80 (High performance price ratio, epoxy plastic sealed)

- ◆ High performance price ratio, preferred solution for micro EV and low voltage application
- ◆ Strong structure for arc blowing
- ◆ Big contact gap
- ◆ Wide range in load, current between 20-200A, working voltage between 12-150Vdc. Specially the working voltage for 20A can be 450Vdc.



Item	Application
HFE80V	AGV(Automated Guided Vehicle), person-and tourist-transportation shuttles, fork lifts, golf cart, community vehicles.
HFE80	PV, UPS, transformer.

## HFE82 (Small size, high capability for short circuit current, ceramic chamber structure)

- ◆ High short circuit current, up to 3kA-6kA
- ◆ Small size to save mounting space
- ◆ Ceramic chamber structure, no leakage of arc, contacts is waterproof, dustproof and anti-oxidation. Relay has high liability and long service life.
- ◆ Strong structure for arc blowing
- ◆ Wide range in load, current between 60-250A, working voltage between 12-750V.



Item	Application
HFE82V	EV, HEV, PEV, PHEV
HFE82	solar power, UPS, wind energy, battery charging and discharging system

# APPLICATION

## Alternative energy vehicles

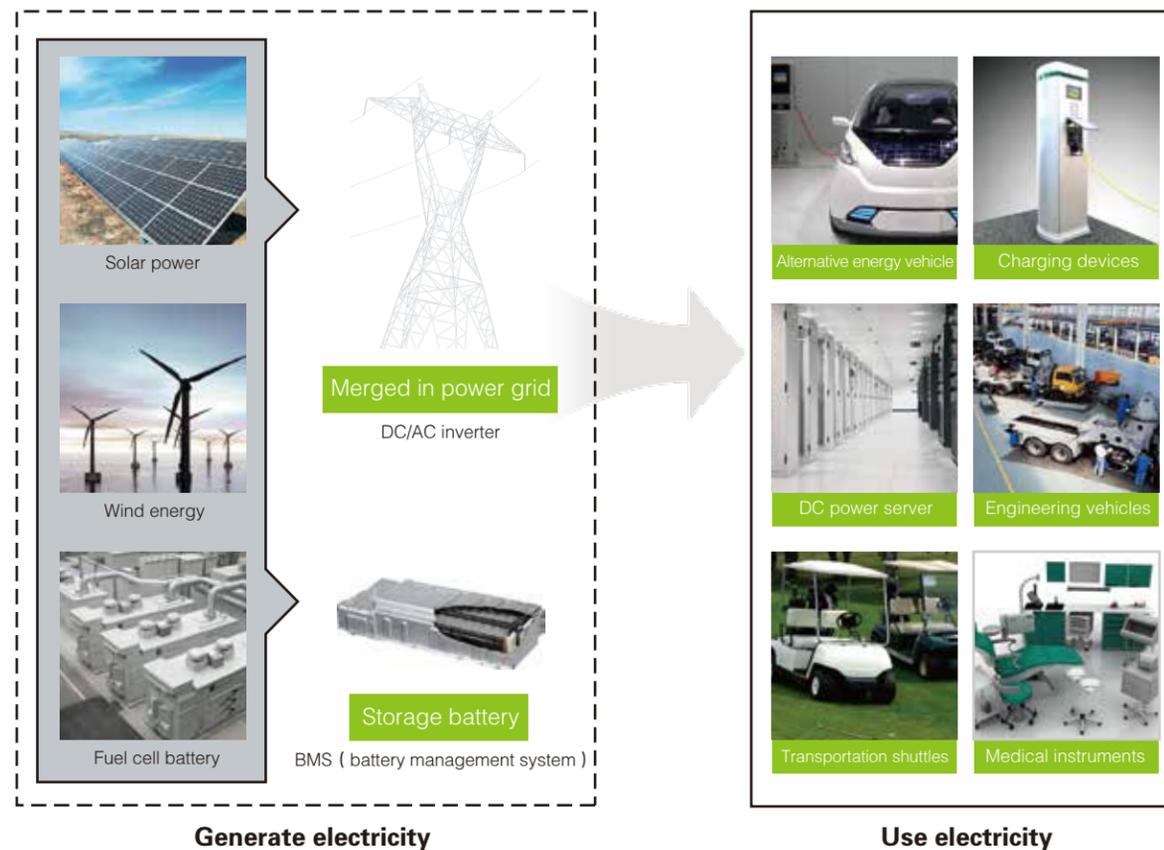
Hongfa's HVDC-relays can be used to switch DC power in a wide range of applications - alternative energy vehicles (E-Mobility), transportation shuttles, power charging devices, PV- and wind-power systems, construction and industry vehicles, DC-Server-Power and UPS, medical apparatus and instruments etc.

Alternative energy vehicles are one of the most important applications of HVDC relay.

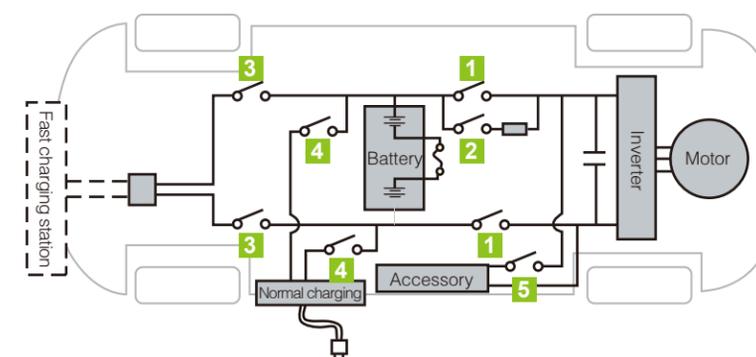
Alternative energy vehicles mainly include HEV (Hybrid Electric Vehicle), PHEV/PEV (Plug-In Hybrid EV), EV (Electric Vehicle) and possibly also in future FCV (fuel cell electrical vehicle) and PV-Vehicle etc.

HVDC relay is used in different function modules of the alternative energy vehicle as follows:

- ◆ **Main relay (circuit protection / safety control):**  
This type of products are often rated for large currents (from 80A to 600A), mostly used to disconnect the battery.
- ◆ **Fast charge relay:**  
This type of relays are used to control the fast charging process—the rated currents are from 32A to 600A.
- ◆ **Auxiliary applications:**  
Relays for these applications are mainly used for air conditioners, heating systems, DC/AC-converters, etc. The typical rating is between 20A and 40A.
- ◆ **HV Pre-Charge relay:**  
Relay used in the pre-charge circuit.



### Relay used in application



- 1 Main relay:**  
HFE18V-300, HFE18V-200, HFE18V-150, HFE18V-100, **NEW:** HFE82V-120, HFE82V-150B, HFE82V-250.
- 2 Pre-charge relay:**  
HFE80V-20, HFE18V-40, HFE18V-20, HFE18V-10, **NEW:** HFE80V-20B.
- 3 Fast charge relay:**  
HFE18V-200, HFE18V-150, HFE18V-100, **NEW:** HFE18V-600.
- 4 Normal charge relay:**  
HFE18V-40, HFE18V-20, HFE18V-10
- 5 HV auxiliary relay:**

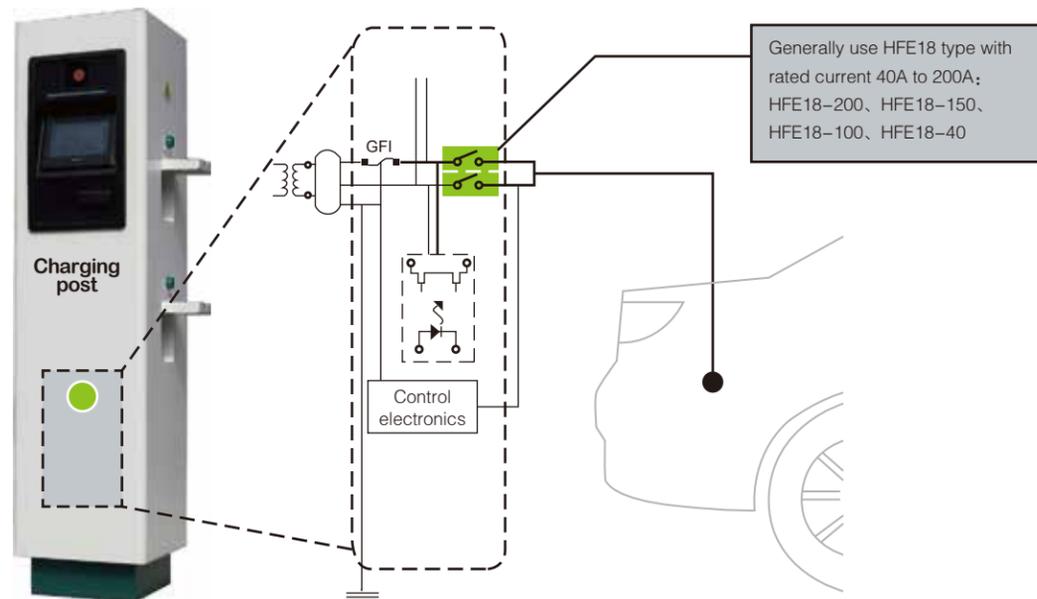
## Power charging devices ❖❖❖

Currently the charging system for alternative energy vehicles are charging stations, wall boxes and charging posts.

- ◆ **The charging stations as centralized charging models can charge a multiple alternative energy vehicles at the same time. This model is mainly used for public alternative energy vehicles and person shuttle buses.**
- ◆ **The charging posts, allocated in residential areas or the parking lot around working areas, are mainly used for private vehicle charging. They are combined with an accounting system for payment.**

The function of HVDC relay in charging devices is to switch DC power. Generally use HFE18 types with rated currents from 40A to 200A.

### Relay used in application



## PV system ❖❖❖

Photovoltaics (PV) is one of the most famous renewable energy systems to create electricity. There are two kinds of power supply systems: one is the DC power supply and the other one is the AC power supply with help of an inverter. Batteries help to store the electrical energy to provide the power later.

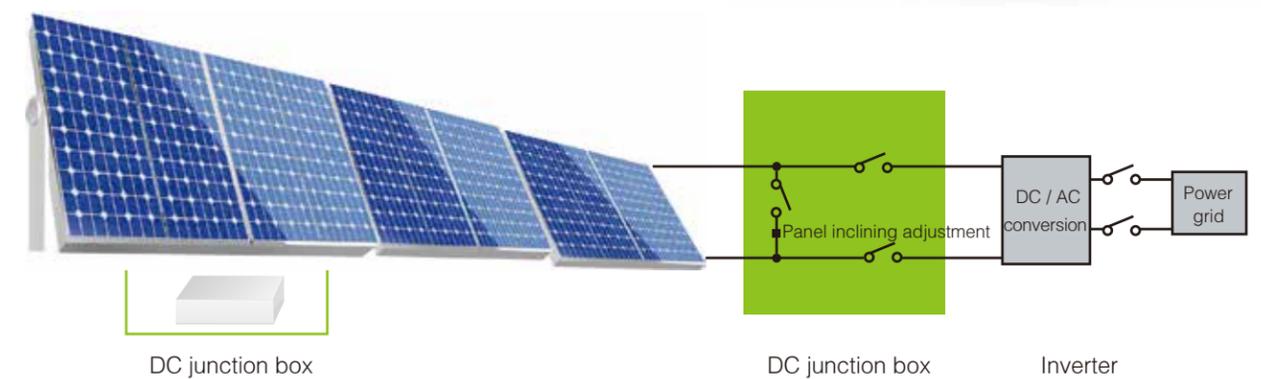
A PV power supply system consists of the PV panels, the solar power controller, the storage battery and the PV inverter (if needed).

HVDC relay is mainly used in DC parts of PV power supply system, generally fixed in the DC terminal box, the storage battery and the inverter. The function of the relay is to switch DC load.

- ◆ **Voltage ranges from 400V to 1000VDC, current ranges from 10A to 120A.**



### Relay used in application



# Cloud server and UPS

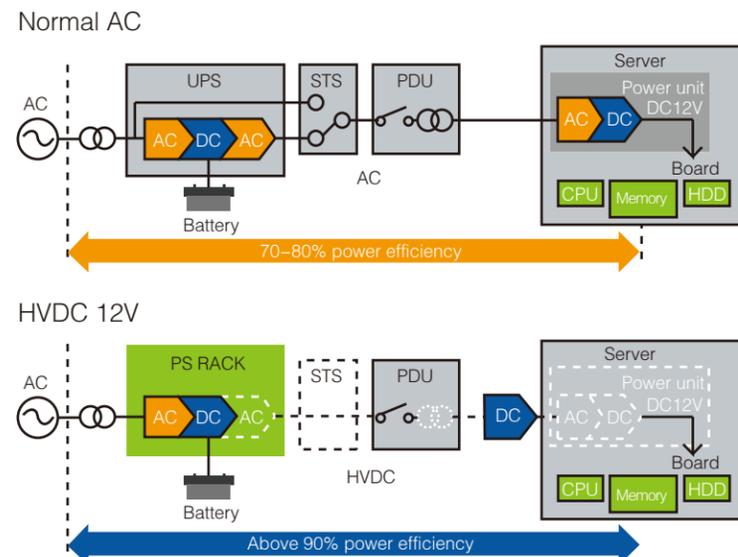
The DC power supply devices of cloud server is a new way to save energy .According to SAKURA Internet (Japan) ,it is estimated that 27million Yen of electrical power can be saved through the DC power supply.

Standard server center converts the commercial electrical power into DC power through UPS, and charge the battery, then supply the power to servers after converting into AC power. This process requires multiple power conversions, which wastes a lot of energy.

### The HVDC power supply system can achieve 90% of energy usage:

UPS DC power supply device in the data center can convert the single-phase 200VAC of commercial power into 380VDC, then supply power for end applications. Supplying the server moved from power unit with 12VDC can ensure more than 97% of the conversion efficiency, and reduce the loss of power conversion, meanwhile it can also reduce the power consumption of air conditioner caused by heating.

### Relay used in application

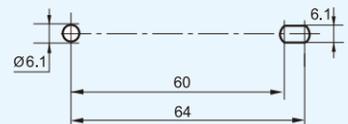


◆ Compared to AC power conversion, DC power supply mode can save 10%–20% of the power.



# HFE18V

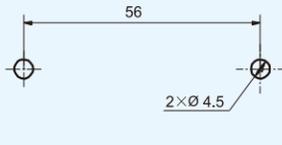
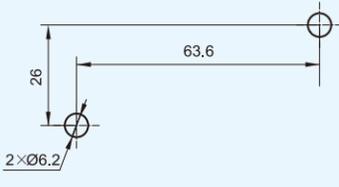
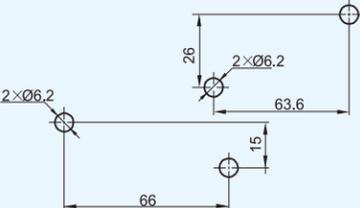
# Alternative Energy Vehicles

Type	HFE18V-10			HFE18V-20		
Appearance						
Contact Arrangement	1A			1A		
Contact Resistance	10mΩ max. (10A)			10mΩ max. (20A)		
Operation Voltage	75% Un max.			75% Un max.		
Rated load current	10A			20A		
Max. Breaking Current	450V Type	750V Type	1000V Type	450VType	750V Type	1000V Type
	100A	100A	100A	200A	200A	200A
	(450VDC, 1op min.)	(750VDC, 1op min.)	(1000VDC, 1op min.)	(450VDC, 1op min.)	(750VDC, 1op min.)	(1000VDC, 1op min.)
Max. Switching Voltage	1000VDC			1000VDC		
Max. Switching Power	4.5kW	7.5kW	10kW	9kW	15kW	20kW
Mechanical Endurance	450V Type	750V Type	1000V Type	450VType	750V Type	1000V Type
	1 x 10 <sup>5</sup> ops	1 x 10 <sup>5</sup> ops	7.5 x 10 <sup>4</sup> ops	1 x 10 <sup>5</sup> ops	7.5 x 10 <sup>4</sup> ops	3 x 10 <sup>4</sup> ops
	(10A 450VDC)	(10A 750VDC)	(10A 1000VDC)	(20A 450VDC)	(20A 750VDC)	(20A 1000VDC)
Dielectric strength	Between coil & contacts			2500VAC 1min		
	Between open contacts			2500VAC 1min		
Electrical Endurance	Between coil & contacts			4000VAC 1min		
	Between open contacts			3000VAC 1min		
Coil	Electrical Endurance			2 x 10 <sup>5</sup> ops		
	Nominal Voltage (DC)			12, 24		
	Coil Power			2.6W		
Coil Input Terminal	QC			QC		
Load Input Terminal	QC			QC		
Unit Weight	Approx.150g			Approx.150g		
Outline Dimensions(mm)	66.8 x 39 x 48.2			78.0 x 39.8 x 46.1		
Shock resistance	10Hz to 500Hz 49mm/s <sup>2</sup>			10Hz to 500Hz 49mm/s <sup>2</sup>		
Humidity	5% to 85% RH			5% to 85% RH		
Ambient Temperature	-40°C to 85°C			-40°C to 85°C		
Layout (Bottom view)						

**Note:** The parameter above is the typical specification, and for the customer's reference All the specifications are subject to change without notice. If there are any question, please contacte Hongfa for techinical service.

# HFE18V

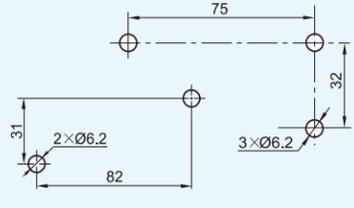
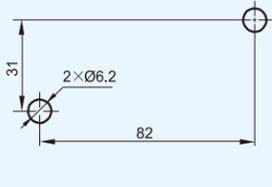
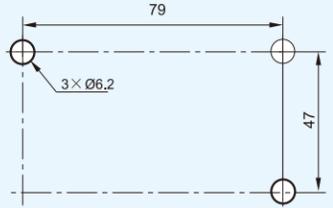
## Alternative Energy Vehicles

Type	HFE18V-40		HFE18V-100		HFE18V-150	
Appearance						
Contact Arrangement	1A		1A		1A	
Contact Resistance	10mΩ max. (20A)		1.5mΩ max. (20A)		1.5mΩ max. (20A)	
Operation Voltage	75% Un max.		75% Un max.		75% Un max.	
Rated load current	40A		100A		150A	
	450V Type	750V Type	450V Type	750V Type	450V Type	750V Type
Max. Breaking Current	400A (300VDC, 1op min.)	400A (300VDC, 1op min.)	1000A (360VDC, 1op min.)	1000A (600VDC, 1op min.)	1500A (300VDC, 1op min.)	1500A (300VDC, 1op min.)
Max. Switching Voltage	750VDC	750VDC	750VDC	750VDC	750VDC	750VDC
Max. Switching Power	18kW	30kW	45kW	75kW	67.5kW	112.5kW
Mechanical Endurance	Switching: 2 x 10 <sup>4</sup> ops (40A 450VDC) Making: 7.5 x 10 <sup>4</sup> ops (40A 450VDC)	Switching: 1 x 10 <sup>3</sup> ops (40A 750VDC) Making: 7.5 x 10 <sup>4</sup> ops (40A 750VDC)	Breaking: 1 x 10 <sup>4</sup> ops (50A 360VDC) Switching: 3 x 10 <sup>3</sup> ops (100A 450VDC)	Breaking: 6 x 10 <sup>3</sup> ops (50A 600VDC) Switching: 1 x 10 <sup>3</sup> ops (100A 750VDC)	Breaking: 1 x 10 <sup>4</sup> ops (60A 450VDC) Switching: 3 x 10 <sup>3</sup> ops (150A 450VDC)	Breaking: 6 x 10 <sup>3</sup> ops (60A 750VDC) Switching: 1 x 10 <sup>3</sup> ops (150A 750VDC)
Dielectric strength	Between coil & contacts	4000VAC 1min		4000VAC 1min		
	Between open contacts	3000VAC 1min		3000VAC 1min		
Electrical Endurance	2 x 10 <sup>5</sup> ops		2 x 10 <sup>5</sup> ops		2 x 10 <sup>5</sup> ops	
Coil	Nominal Voltage (DC)	12, 24		12, 24		
	Coil Power	3W		4.5W		
Coil Input Terminal	Wire / Wire+connector		Wire / Wire+connector		Connector	
Load Input Terminal	Bolt terminal female		Bolt terminal female		Bolt terminal female	
Unit Weight	Approx.180g		Approx.400g		Approx.450g	
Outline Dimensions(mm)	67 x 32.6 x 47		77.6 x 40 x 76.2		77.8 x 48.8 x 79.6(Horizontal) 89.1 x 41.5 x 78.4(Vertical)	
Shock resistance	10Hz to 500Hz 49mm/s <sup>2</sup>		10Hz to 500Hz 49mm/s <sup>2</sup>		10Hz to 500Hz 49mm/s <sup>2</sup>	
Humidity	5% to 85% RH		5% to 85% RH		5% to 85% RH	
Ambient Temperature	-40°C to 85°C		-40°C to 85°C		-40°C to 85°C	
Layout (Bottom view)						

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# HFE18V

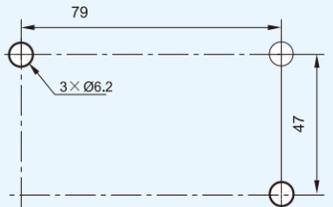
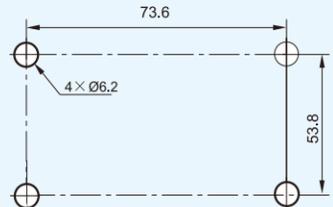
## Alternative Energy Vehicles

Type	HFE18V-200		HFE18V-250		HFE18V-300	
Appearance						
Contact Arrangement	1A		1A		1A	
Contact Resistance	1mΩ max. (20A)		0.6mΩ max. (20A)		0.5mΩ max. (20A)	
Operation Voltage	75% Un max.		75% Un max.		75% Un max.	
Rated load current	200A		250A		300A	
	450V Type	750V Type	450V Type	750V Type	450V Type	750V Type
Max. Breaking Current	2000A (450VDC, 1op min.)	2000A (750VDC, 1op min.)	2500A (750VDC, 1op min.)	2500A (750VDC, 1op min.)	3000A (360VDC, 1op min.)	2500A (600VDC, 1op min.)
Max. Switching Voltage	750VDC	900VDC	900VDC	900VDC	750VDC	900VDC
Max. Switching Power	90kW	150kW	150kW	150kW	135kW	225kW
Mechanical Endurance	Breaking: 1 x 10 <sup>4</sup> ops (70A 450VDC) Switching: 3 x 10 <sup>3</sup> ops (200A 450VDC)	Breaking: 1 x 10 <sup>4</sup> ops (70A 750VDC) Switching: 1 x 10 <sup>3</sup> ops (200A 750VDC)	Breaking: 1 x 10 <sup>4</sup> ops (70A 450VDC) Switching: 3 x 10 <sup>3</sup> ops (250A 450VDC)	Breaking: 2 x 10 <sup>3</sup> ops (250A 600VDC) Switching: 1 x 10 <sup>3</sup> ops (250A 750VDC)	Breaking: 1 x 10 <sup>4</sup> ops (80A 450VDC) Switching: 3 x 10 <sup>3</sup> ops (300A 450VDC)	Breaking: 1 x 10 <sup>4</sup> ops (80A 750VDC) Switching: 1 x 10 <sup>3</sup> ops (300A 750VDC)
Dielectric strength	Between coil & contacts	4000VAC 1min		4000VAC 1min		
	Between open contacts	3000VAC 1min		3000VAC 1min		
Electrical Endurance	2 x 10 <sup>5</sup> ops		2 x 10 <sup>5</sup> ops		2 x 10 <sup>5</sup> ops	
Coil	Nominal Voltage (DC)	12, 24		12, 24		
	Coil Power	Switch on: 34W (time:0.3s), Carrying: 4W		Switch on: 45W(time:0.3s), Carrying: 6W		
Coil Input Terminal	Connector		Wire		Connector	
Load Input Terminal	Bolt terminal female		Bolt terminal female		Bolt terminal female	
Unit Weight	Approx.650g		Approx.650g		Approx.850g	
Outline Dimensions(mm)	95 x 45 x 85 89 x 45 x 85		95 x 45 x 85		93 x 65.1 x 74.9	
Shock resistance	10Hz to 500Hz 49mm/s <sup>2</sup>		10Hz to 500Hz 49mm/s <sup>2</sup>		10Hz to 500Hz 49mm/s <sup>2</sup>	
Humidity	5% to 85% RH		5% to 85% RH		5% to 85% RH	
Ambient Temperature	-40°C to 85°C		-40°C to 85°C		-40°C to 85°C	
Layout (Bottom view)						

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# HFE18V

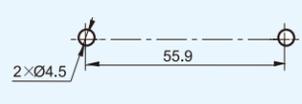
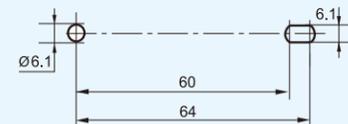
## Alternative Energy Vehicles

Type	HFE18V-400		HFE18V-600	
Appearance				
Contact Arrangement	1A		1A	
Contact Resistance	0.5mΩ max. (20A)		0.6mΩ max. (20A)	
Operation Voltage	75% Un max.		75% Un max.	
Rated load current	400A		600A	
	450V Type	750V Type		
Max. Breaking Current	3000A (360VDC, 1op min.)	2500A (600VDC, 1op min.)	3000A (320VDC, 1op min.)	
Max. Switching Voltage	750VDC	900VDC	900VDC	
Max. Switching Power	180kW	300kW	540kW	
Mechanical Endurance	Breaking: 1 x 10 <sup>4</sup> ops (80A 450VDC) Switching: 2 x 10 <sup>3</sup> ops (400A 450VDC)	Breaking: 1 x 10 <sup>4</sup> ops (80A 750VDC) Switching: 1 x 10 <sup>3</sup> ops (400A 750VDC)	Switching: 20ops (600A 900VDC) Switching: 3 x 10 <sup>3</sup> ops (300A 300VDC)	Switching: 2 x 10 <sup>3</sup> ops (200A 450VDC) Switching: 1 x 10 <sup>4</sup> ops (100A 600VDC)
Dielectric strength	Between coil & contacts	4000VAC 1min		4000VAC 1min
	Between open contacts	3000VAC 1min		3000VAC 1min
Electrical Endurance	2 x 10 <sup>5</sup> ops		2 x 10 <sup>5</sup> ops	
Coil	Nominal Voltage (DC)	12, 24		28
	Coil Power	Switch on: 45W(time:0.3s), Carrying:3.8W		Switch on: 50W(time:0.3s), Carrying: 10W
Coil Input Terminal	Connector		Terminal male wire	
Load Input Terminal	Bolt terminal female		Screw terminal male + Cu-Bus-Bar	
Unit Weight	Approx.850g		Approx.1600g	
Outline Dimensions(mm)	93 x 65.1 x 74.9		144.7 x 86.4 x 119.5	
Shock resistance	10Hz to 500Hz 49mm/s <sup>2</sup>		10Hz to 500Hz 49mm/s <sup>2</sup>	
Humidity	5% to 85% RH		5% to 85% RH	
Ambient Temperature	-40°C to 85°C		-40°C to 85°C	
Layout (Bottom view)				

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# HFE18

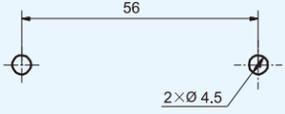
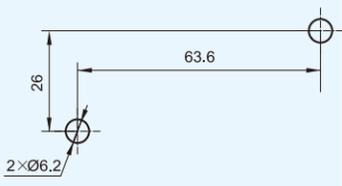
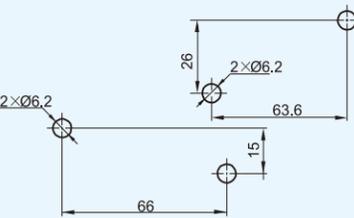
## Other DC Input And Output Application

Type	HFE18-10			HFE18-20		
Appearance						
Contact Arrangement	1A			1A		
Contact Resistance	10mΩ max. (10A)			10mΩ max. (20A)		
Operation Voltage	75% Un max. (at 23°C)			75% Un max. (at 23°C)		
Rated load current	10A			20A		
	450V Type	750V Type	1000V Type	450VType	750V Type	1000V Type
Max. Breaking Current	100A (450VDC, 1op min.)	100A (750VDC, 1op min.)	100A (1000VDC, 1op min.)	200A (450VDC, 1op min.)	200A (750VDC, 1op min.)	200A (1000VDC, 1op min.)
Max. Switching Voltage	1000VDC	1000VDC	1000VDC	1000VDC	1000VDC	1000VDC
Max. Switching Power	4.5kW	7.5kW	10kW	9kW	15kW	20kW
Mechanical Endurance	1 x 10 <sup>5</sup> ops (10A 450VDC)	1 x 10 <sup>5</sup> ops (10A 750VDC)	7.5 x 10 <sup>4</sup> ops (10A 1000VDC)	1 x 10 <sup>5</sup> ops (20A 450VDC)	7.5 x 10 <sup>4</sup> ops (20A 750VDC)	3 x 10 <sup>4</sup> ops (20A 1000VDC)
Dielectric strength	Between coil & contacts	2500VAC 1min			4000VAC 1min	
	Between open contacts	2500VAC 1min			3000VAC 1min	
Electrical Endurance	2 x 10 <sup>5</sup> ops			2 x 10 <sup>5</sup> ops		
Coil	Nominal Voltage (DC)	12, 24			12, 24	
	Coil Power	2.6W			2.6W	
Coil Input Terminal	QC			QC		
Load Input Terminal	QC			QC		
Unit Weight	Approx.150g			Approx.150g		
Outline Dimensions(mm)	66.8 x 39 x 48.2			78.0 x 39.8 x 46.1		
Shock resistance	10Hz to 55Hz 1.5mm DA			10Hz to 55Hz 1.5mm DA		
Humidity	5% to 85% RH			5% to 85% RH		
Ambient Temperature	-40°C to 85°C			-40°C to 85°C		
Layout (Bottom view)						

**Note:** The parameter above is the typical specification, and for the customer's reference All the specifications are subject to change without notice. If there are any question, please contact Hongfa for technical service.

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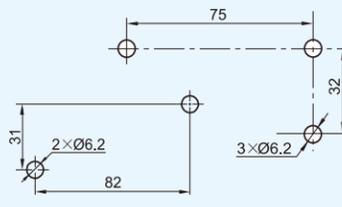
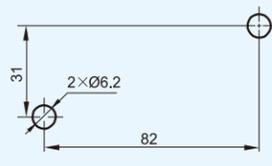
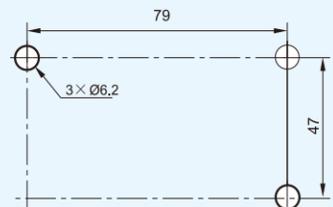
## Other DC Input And Output Application

Type	HFE18-40		HFE18-100		HFE18-150		
Appearance							
Contact Arrangement	1A		1A		1A		
Contact Resistance	10mΩ max. (20A)		1.5mΩ max. (20A)		1.5mΩ max. (20A)		
Operation Voltage	75% Un max. (at 23°C)		75% Un max. (at 23°C)		75% Un max. (at 23°C)		
Rated load current	40A		100A		150A		
	450V Type	750V Type	450V Type	750V Type	450V Type	750V Type	
Max. Breaking Current	400A (300VDC, 1op min.)	400A (300VDC, 1op min.)	1000A (360VDC, 1op min.)	1000A (600VDC, 1op min.)	1500A (300VDC, 1op min.)	1500A (300VDC, 1op min.)	
Max. Switching Voltage	750VDC	750VDC	750VDC	750VDC	750VDC	750VDC	
Max. Switching Power	18kW	30kW	45kW	75kW	67.5kW	112.5kW	
Mechanical Endurance	Switching: 2 x 10 <sup>4</sup> ops (40A 450VDC) Making: 7.5 x 10 <sup>4</sup> ops (40A 450VDC)	Switching: 1 x 10 <sup>3</sup> ops (40A 750VDC) Making: 7.5 x 10 <sup>4</sup> ops (40A 750VDC)	Breaking: 1 x 10 <sup>4</sup> ops (50A 360VDC) Switching: 3 x 10 <sup>3</sup> ops (100A 450VDC)	Breaking: 6 x 10 <sup>3</sup> ops (50A 600VDC) Switching: 1 x 10 <sup>3</sup> ops (100A 750VDC)	Breaking: 1 x 10 <sup>4</sup> ops (60A 450VDC) Switching: 3 x 10 <sup>3</sup> ops (150A 450VDC)	Breaking: 6 x 10 <sup>3</sup> ops (60A 750VDC) Switching: 1 x 10 <sup>3</sup> ops (150A 750VDC)	
Dielectric strength	Between coil & contacts	4000VAC 1min		4000VAC 1min		4000VAC 1min	
	Between open contacts	3000VAC 1min		3000VAC 1min		3000VAC 1min	
Electrical Endurance	2 x 10 <sup>5</sup> ops		2 x 10 <sup>5</sup> ops		2 x 10 <sup>5</sup> ops		
Coil	Nominal Voltage (DC)	12, 24		12, 24		12, 24	
	Coil Power	3W		4.5W		6W	
Coil Input Terminal	Wire / Wire+connector		Wire / Wire+connector		Connector		
Load Input Terminal	Bolt terminal female		Bolt terminal female		Bolt terminal female		
Unit Weight	Approx.180g		Approx.400g		Approx.450g		
Outline Dimensions(mm)	67 x 32.6 x 47		77.6 x 40 x 76.2		77.8 x 48.8 x 79.6(Horizontal) 89.1 x 41.5 x 78.4(Vertical)		
Shock resistance	10Hz to 55Hz 1.5mm DA		10Hz to 55Hz 1.5mm DA		10Hz to 55Hz 1.5mm DA		
Humidity	5% to 85% RH		5% to 85% RH		5% to 85% RH		
Ambient Temperature	-40°C to 85°C		-40°C to 85°C		-40°C to 85°C		
Layout (Bottom view)							

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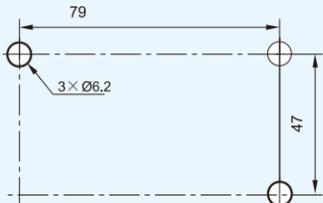
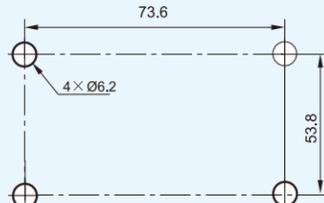
## Other DC Input And Output Application

Type	HFE18-200		HFE18-250		HFE18-300		
Appearance							
Contact Arrangement	1A		1A		1A		
Contact Resistance	1mΩ max. (20A)		0.6mΩ max. (20A)		0.5mΩ max. (20A)		
Operation Voltage	75% Un max. (at 23°C)		75% Un max. (at 23°C)		75% Un max. (at 23°C)		
Rated load current	200A		250A		300A		
	450V Type	750V Type	450V Type	750V Type	450V Type	750V Type	
Max. Breaking Current	2000A (450VDC, 1op min.)	2000A (750VDC, 1op min.)	2500A (750VDC, 1op min.)	2500A (250A 600VDC)	3000A (360VDC, 1op min.)	2500A (600VDC, 1op min.)	
Max. Switching Voltage	750VDC	900VDC	900VDC	900VDC	750VDC	900VDC	
Max. Switching Power	90kW	150kW	150kW	150kW	135kW	225kW	
Mechanical Endurance	Breaking: 1 x 10 <sup>4</sup> ops (70A 450VDC) Switching: 3 x 10 <sup>3</sup> ops (200A 450VDC)	Breaking: 1 x 10 <sup>4</sup> ops (70A 750VDC) Switching: 1 x 10 <sup>3</sup> ops (200A 750VDC)	Breaking: 1 x 10 <sup>4</sup> ops (70A 450VDC) Switching: 3 x 10 <sup>3</sup> ops (250A 450VDC)	Breaking: 2 x 10 <sup>3</sup> ops (250A 600VDC) Switching: 1 x 10 <sup>3</sup> ops (250A 750VDC)	Breaking: 1 x 10 <sup>4</sup> ops (80A 450VDC) Switching: 3 x 10 <sup>3</sup> ops (300A 450VDC)	Breaking: 1 x 10 <sup>4</sup> ops (80A 750VDC) Switching: 1 x 10 <sup>3</sup> ops (300A 750VDC)	
Dielectric strength	Between coil & contacts	4000VAC 1min		4000VAC 1min		4000VAC 1min	
	Between open contacts	3000VAC 1min		3000VAC 1min		3000VAC 1min	
Electrical Endurance	2 x 10 <sup>5</sup> ops		2 x 10 <sup>5</sup> ops		2 x 10 <sup>5</sup> ops		
Coil	Nominal Voltage (DC)	12, 24		12, 24		12, 24	
	Coil Power	Switch on: 34W (time:0.3s), Carrying: 4W		Switch on: 45W(time:0.3s), Carrying: 6W		Switch on: 45W(time:0.3s), Carrying:3.8W	
Coil Input Terminal	Connector		Wire		Connector		
Load Input Terminal	Bolt terminal female		Bolt terminal female		Bolt terminal female		
Unit Weight	Approx.650g		Approx.650g		Approx.850g		
Outline Dimensions(mm)	95 x 45 x 85 89 x 45 x 85		95 x 45 x 85		93 x 65.1 x 74.9		
Shock resistance	10Hz to 55Hz 1.5mm DA		10Hz to 55Hz 1.5mm DA		10Hz to 55Hz 1.5mm DA		
Humidity	5% to 85% RH		5% to 85% RH		5% to 85% RH		
Ambient Temperature	-40°C to 85°C		-40°C to 85°C		-40°C to 85°C		
Layout (Bottom view)							

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# HFE18

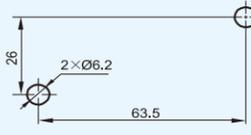
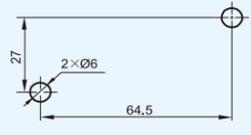
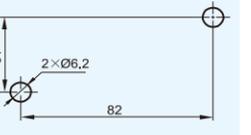
## Other DC Input And Output Application

Type	HFE18-400		HFE18-600	
Appearance				
Contact Arrangement	1A		1A	
Contact Resistance	0.5mΩ max. (20A)		0.6mΩ max. (20A)	
Operation Voltage	75% Un max. (at 23°C)		75% Un max. (at 23°C)	
Rated load current	400A		600A	
	450V Type	750V Type		
Max. Breaking Current	3000A (360VDC, 1op min.)	2500A (600VDC, 1op min.)	3000A (320VDC, 1op min.)	
Max. Switching Voltage	750VDC	900VDC	900VDC	
Max. Switching Power	180kW	300kW	540kW	
Mechanical Endurance	Breaking: 1 x 10 <sup>4</sup> ops (80A 450VDC) Switching: 2 x 10 <sup>3</sup> ops (400A 450VDC)	Breaking: 1 x 10 <sup>4</sup> ops (80A 750VDC) Switching: 1 x 10 <sup>3</sup> ops (400A 750VDC)	Switching: 20ops (600A 900VDC) Switching: 3 x 10 <sup>3</sup> ops (300A 300VDC)	Switching: 2 x 10 <sup>3</sup> ops (200A 450VDC) Switching: 1 x 10 <sup>4</sup> ops (100A 600VDC)
Dielectric strength	Between coil & contacts	4000VAC 1min	4000VAC 1min	
	Between open contacts	3000VAC 1min	3000VAC 1min	
Electrical Endurance	2 x 10 <sup>5</sup> ops		2 x 10 <sup>5</sup> ops	
Coil	Nominal Voltage (DC)	12, 24	28	
	Coil Power	Switch on: 45W(time:0.3s), Carrying:3.8W		Switch on: 50W(time:0.3s), Carrying: 10W
Coil Input Terminal	Connector		Terminal male wire	
Load Input Terminal	Bolt terminal female		Screw terminal male + Cu-Bus-Bar	
Unit Weight	Approx.850g		Approx.1600g	
Outline Dimensions(mm)	93 x 65.1 x 74.9		144.7 x 86.4 x 119.5	
Shock resistance	10Hz to 55Hz 1.5mm DA		10Hz to 55Hz 1.5mm DA	
Humidity	5% to 85% RH		5% to 85% RH	
Ambient Temperature	-40°C to 85°C		-40°C to 85°C	
Layout (Bottom view)				

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# HFE82V

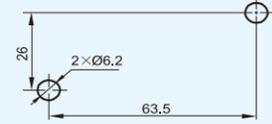
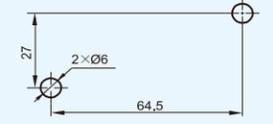
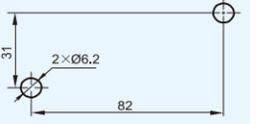
## Alternative Energy Vehicles

Type	HFE82V-60	HFE82V-120	HFE82V-150B	HFE82V-250	
Appearance					
Contact Arrangement	1A	1A	1A	1A	
Contact Resistance	2.5mΩ max. (20A)	2mΩ max. (20A)	2mΩ max. (20A)	1mΩ max. (20A)	
Operation Voltage	75% Un max.	75% Un max.	75% Un max.	75% Un max.	
Rated load current	60A	120A	150A	250A	
Max. Breaking Current	600A (450VDC, 1op min.)	1200A (450VDC, 1op min.)	1500A (450VDC, 1op min.)	2500A (750VDC, 1op min.)	
Max. Switching Voltage	450VDC	900VDC	750VDC	900VDC	
Max. Switching Power	27kW			150kW	
Mechanical Endurance	6 x 10 <sup>3</sup> ops (60A 450VDC) 100ops (200A 450VDC) 5ops (400A 360VDC)	Switching: 5 x 10 <sup>4</sup> ops (12A 450VDC, On: 0.3s Off: 2.7s) Switching: 1.5 x 10 <sup>3</sup> ops (120A 450VDC)	Breaking: 500ops (-120A 450VDC) Breaking: 1ops (1200A 450VDC)	Switching: 5 x 10 <sup>4</sup> ops (15A 450VDC, On: 0.3s Off: 2.7s) Switching: 1.5 x 10 <sup>3</sup> ops (150A 450VDC)	Breaking: 1 x 10 <sup>4</sup> ops (70A 450VDC) Switching: 2 x 10 <sup>3</sup> ops (250A 600VDC) Switching: 3 x 10 <sup>3</sup> ops (250A 450VDC) Switching: 1 x 10 <sup>3</sup> ops (250A 750VDC)
Dielectric strength	Between coil & contacts	2500VAC 1min	4000VAC 1min	4000VAC 1min	
	Between open contacts	2500VAC 1min	3000VAC 1min	3000VAC 1min	
Electrical Endurance	2 x 10 <sup>5</sup> ops	3 x 10 <sup>5</sup> ops	3 x 10 <sup>5</sup> ops	2 x 10 <sup>5</sup> ops	
Coil	Nominal Voltage (DC)	12, 24	12, 24	12, 24	
	Coil Power	4.5W	6W	6W	6W
Coil Input Terminal	QC	Connector	Connector	Connector	
Load Input Terminal	QC	Bolt terminal female	Bolt terminal female	Bolt terminal female	
Unit Weight	Approx.170g	Approx.330g	Approx.310g	Approx.650g	
Outline Dimensions(mm)	55 x 40 x 37	75.5 x 40.0 x 75.0	76.5 x 39 x 71.5	95 x 45 x 85	
Shock resistance	10Hz to 500Hz 49mm/s <sup>2</sup>	10Hz to 500Hz 49mm/s <sup>2</sup>	10Hz to 500Hz 49mm/s <sup>2</sup>	10Hz to 500Hz 49mm/s <sup>2</sup>	
Humidity	5% to 85% RH	5% to 85% RH	5% to 85% RH	5% to 85% RH	
Ambient Temperature	-40°C to 85°C	-40°C to 85°C	-40°C to 85°C	-40°C to 85°C	
Layout (Bottom view)					

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# HFE82

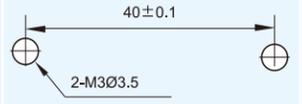
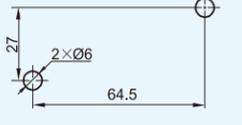
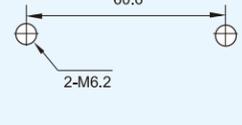
## Other DC Input And Output Application

Type	HFE82-60	HFE82-120	HFE82-150B	HFE82-250
Appearance				
Contact Arrangement	1A	1A	1A	1A
Contact Resistance	2.5mΩ max. (20A)	2mΩ max. (20A)	2mΩ max. (20A)	1mΩ max. (20A)
Operation Voltage	75% Un max. (at 23°C)	75% Un max. (at 23°C)	75% Un max. (at 23°C)	75% Un max. (at 23°C)
Rated load current	60A	120A	150A	250A
Max. Breaking Current	600A (450VDC, 1op min.)	1200A (450VDC, 1op min.)	1500A (450VDC, 1op min.)	2500A (750VDC, 1op min.)
Max. Switching Voltage	450VDC	900VDC	750VDC	900VDC
Max. Switching Power	27kW			150kW
Mechanical Endurance	6 x 10 <sup>3</sup> ops (60A 450VDC) 100ops (200A 450VDC) 5ops (400A 360VDC)	Switching: 5 x 10 <sup>3</sup> ops (12A 450VDC, On: 0.3s Off: 2.7s) Breaking: 500ops (-120A 450VDC) Switching: 1.5 x 10 <sup>3</sup> ops (120A 450VDC)	Switching: 5 x 10 <sup>3</sup> ops (15A 450VDC, On: 0.3s Off: 2.7s) Breaking: 500ops (-150A 450VDC) Switching: 1.5 x 10 <sup>3</sup> ops (150A 450VDC)	Breaking: 1 x 10 <sup>4</sup> ops (70A 450VDC) Switching: 3 x 10 <sup>3</sup> ops (250A 450VDC)
Dielectric strength	Between coil & contacts	2500VAC 1min	4000VAC 1min	4000VAC 1min
	Between open contacts	2500VAC 1min	3000VAC 1min	3000VAC 1min
Electrical Endurance	2 x 10 <sup>5</sup> ops	3 x 10 <sup>5</sup> ops	3 x 10 <sup>5</sup> ops	2 x 10 <sup>5</sup> ops
Coil	Nominal Voltage (DC)	12, 24	12, 24	12, 24
	Coil Power	4.5W	6W	6W
Coil Input Terminal	QC	Connector	Connector	Connector
Load Input Terminal	QC	Bolt terminal female	Bolt terminal female	Bolt terminal female
Unit Weight	Approx.170g	Approx.330g	Approx.310g	Approx.650g
Outline Dimensions(mm)	55 x 40 x 37	75.5 x 40.0 x 75.0	76.5 x 39 x 71.5	95 x 45 x 85
Shock resistance	10Hz to 55Hz 1.5mm DA	10Hz to 55Hz 1.5mm DA	10Hz to 55Hz 1.5mm DA	10Hz to 55Hz 1.5mm DA
Humidity	5% to 85% RH	5% to 85% RH	5% to 85% RH	5% to 85% RH
Ambient Temperature	-40°C to 85°C	-40°C to 85°C	-40°C to 85°C	-40°C to 85°C
Layout (Bottom view)				

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# HFE80V

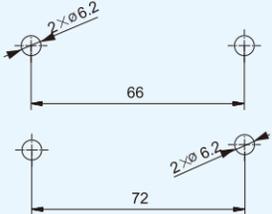
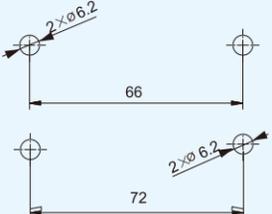
## Alternative Energy Vehicles

Type	HFE80V-20	HFE80V-20B	HFE80V-60	HFE80V-80
Appearance				
Contact Arrangement	1A	1A	1A	1A
Contact Resistance	10mΩ max. (20A)	50mΩ max. (1A)	1.5mΩ max. (20A)	1.5mΩ max. (20A)
Operation Voltage	75% Un max.		75% Un max.	75% Un max.
Rated load current	20A		60A	80A
Max. Breaking Current	60V Type	450V Type	60V Type	450V Type
	30A (72VDC, 1op min.)	35A (450VDC, 1op min.)	30A	30A (450VDC, 1op min.)
Max. Switching Voltage	72VDC	450VDC	60VDC	450VDC
Max. Switching Power	1.44kW	9kW	1.2kW	9kW
Mechanical Endurance	Switching: 1 x 10 <sup>5</sup> ops (20A 72VDC)	Switching: 3 x 10 <sup>3</sup> ops (20A 450VDC) Switching: 3 x 10 <sup>3</sup> ops (10A 450VDC) Making: 1 x 10 <sup>5</sup> ops (20A 450VDC)	1 x 10 <sup>5</sup> ops (20A 60VDC)	Making: 1 x 10 <sup>5</sup> ops (20A 450VDC) Switching: 500 ops (20A 750VDC)
Dielectric strength	Between coil & contacts	3000VAC 1min	2500VAC 1min	3000VAC 1min
	Between open contacts	2000VAC 1min	2500VAC 1min	2000VAC 1min
Electrical Endurance	2 x 10 <sup>5</sup> ops	2 x 10 <sup>5</sup> ops	2 x 10 <sup>5</sup> ops	2 x 10 <sup>5</sup> ops
Coil	Nominal Voltage (DC)	12, 24	12, 24	12, 24
	Coil Power	3W	2W	3W
Coil Input Terminal	QC, PCB	QC	QC	QC
Load Input Terminal	QC, PCB	QC	QC	QC
Unit Weight	Approx.55g	Approx.65g	Approx.200g	Approx.200g
Outline Dimensions(mm)	30.1 x 30 x 29.2	40 x 30 x 42.7	76.6 x 55.1 x 49.6	55.1 x 42.6 x 49.1 55.1 x 76.6 x 49.6
Shock resistance	10Hz to 500Hz 49mm/s <sup>2</sup>	10Hz to 500Hz 49mm/s <sup>2</sup>	10Hz to 500Hz 49mm/s <sup>2</sup>	10Hz to 500Hz 49mm/s <sup>2</sup>
Humidity	5% to 85% RH	5% to 85% RH	5% to 85% RH	5% to 85% RH
Ambient Temperature	-40°C to 85°C	-40°C to 85°C	-40°C to 85°C	-40°C to 85°C
Layout (Bottom view)				

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# HFE80V

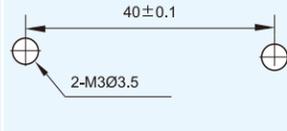
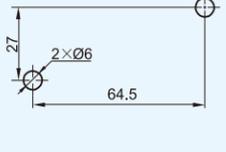
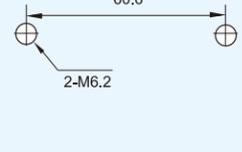
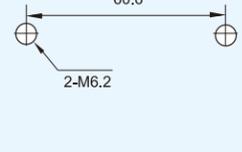
## Alternative Energy Vehicles

Type	HFE80V-100		HFE80V-200	
Appearance				
Contact Arrangement	1A		1A	
Contact Resistance	0.8mΩ max. (20A)		0.8mΩ max. (20A)	
Operation Voltage	75% Un max.		75% Un max.	
Rated load current	100A		200A	
	60V Type	450V Type		
Max. Breaking Current	200A	200A	250A	
Max. Switching Voltage	60VDC	150VDC	150VDC	
Max. Switching Power	6kW	15kW	30kW	
Mechanical Endurance	Breaking: 1 x10 <sup>4</sup> ops (40A 60VDC) Breaking: 3 x10 <sup>3</sup> ops (100A 60VDC) Breaking: 50ops (200A 60VDC)	Breaking:1 x10 <sup>4</sup> ops (40A 150VDC) Breaking:3 x10 <sup>3</sup> ops (100A 150VDC) Breaking:50ops (200A 150VDC)	Breaking: 1 x10 <sup>4</sup> ops (40A 150VDC) Breaking: 3 x10 <sup>3</sup> ops (200A 150VDC) Breaking: 50ops (400A 150VDC)	
	4000VAC 1min		4000VAC 1min	
Dielectric strength	Between coil & contacts	3000VAC 1min		3000VAC 1min
	Between open contacts	3000VAC 1min		3000VAC 1min
Electrical Endurance	2 x 10 <sup>5</sup> ops		2 x 10 <sup>5</sup> ops	
Coil	Nominal Voltage (DC)	12, 24		12, 24
	Coil Power	5W		6W
Coil Input Terminal	Connector		Connector	
Load Input Terminal	Bolt terminal female		Bolt terminal female	
Unit Weight	Approx.400g		Approx.370g	
Outline Dimensions(mm)	81 x 47.7 x 82.4(Horizontal) 88 x 47.4 x 82.9(Vertical)		81 x 47.7 x 87.4(Horizontal) 88 x 47.7 x 87.9(Vertical)	
Shock resistance	10Hz to 500Hz 49mm/s <sup>2</sup>		10Hz to 500Hz 49mm/s <sup>2</sup>	
Humidity	5% to 85% RH		5% to 85% RH	
Ambient Temperature	-40°C to 85°C		-40°C to 85°C	
Layout (Bottom view)				

**Note:** The parameter above is the typical specification, and for the customer's reference All the specifications are subject to change without notice. If there are any question, please contact Hongfa for technical service.

# HFE80

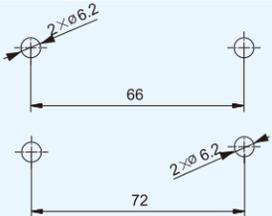
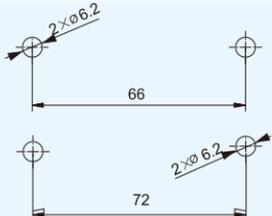
## Other DC Input And Output Application

Type	HFE80-20		HFE80-20B		HFE80-60		HFE80-80	
Appearance								
Contact Arrangement	1A		1A		1A		1A	
Contact Resistance	10mΩ max. (20A)		50mΩ max. (1A)		1.5mΩ max. (20A)		1.5mΩ max. (20A)	
Operation Voltage	75% Un max. (at 23°C)		75% Un max. (at 23°C)		75% Un max. (at 23°C)		75% Un max. (at 23°C)	
Rated load current	20A		20A		60A		80A	
	60V Type	450V Type	60V Type	450V Type				
Max. Breaking Current	30A (72VDC, 1op min.)	35A (450VDC, 1op min.)	30A	30A (450VDC, 1op min.)	80A		100A	
Max. Switching Voltage	72VDC	450VDC	60VDC	450VDC	150VDC		150VDC	
Max. Switching Power	1.44kW	9kW	1.2kW	9kW	9kW		12kW	
Mechanical Endurance	Switching: 1 x10 <sup>5</sup> ops (20A 72VDC)	Switching: 3 x10 <sup>3</sup> ops (20A 450VDC) Switching: 3 x10 <sup>3</sup> ops (10A 450VDC) Making: 1 x10 <sup>5</sup> ops (20A 450VDC)	1 x10 <sup>5</sup> ops (20A 60VDC)	Making: 1 x10 <sup>5</sup> ops (20A 450VDC) Switching: 500 ops (20A 750VDC)	Switching: 1 x10 <sup>5</sup> ops (60A 24VDC) Switching: 4 x10 <sup>3</sup> ops (60A 48VDC)	Switching:2 x10 <sup>4</sup> ops (60A 72VDC) Switching:1 x10 <sup>4</sup> ops (60A 150VDC)	Switching: 1 x10 <sup>5</sup> ops (80A 24VDC) Switching: 5 x10 <sup>3</sup> ops (80A 48VDC)	Switching:3 x10 <sup>4</sup> ops (80A 72VDC) Switching:1 x10 <sup>4</sup> ops (80A 150VDC)
	Between coil & contacts	3000VAC 1min		2500VAC 1min	3000VAC 1min		3000VAC 1min	
Dielectric strength	Between open contacts	2000VAC 1min		2500VAC 1min	2000VAC 1min		2000VAC 1min	
	Electrical Endurance	2 x 10 <sup>5</sup> ops		2 x 10 <sup>5</sup> ops	2 x 10 <sup>5</sup> ops		2 x 10 <sup>5</sup> ops	
Coil	Nominal Voltage (DC)	12, 24		12, 24	12, 24		12, 24	
	Coil Power	3W		2W	3W		3W	
Coil Input Terminal	QC, PCB		QC		QC		QC	
Load Input Terminal	QC, PCB		QC		QC		QC	
Unit Weight	Approx.55g		Approx.65g		Approx.200g		Approx.200g	
Outline Dimensions(mm)	30.1 x 30 x 29.2		40 x 30 x 42.7		76.6 x 55.1 x 49.6		55.1 x 42.6 x 49.1 55.1 x 76.6 x 49.6	
Shock resistance	10Hz to 55Hz 1.5mm DA		10Hz to 55Hz 1.5mm DA		10Hz to 55Hz 1.5mm DA		10Hz to 55Hz 1.5mm DA	
Humidity	5% to 85% RH		5% to 85% RH		5% to 85% RH		5% to 85% RH	
Ambient Temperature	-40°C to 85°C		-40°C to 85°C		-40°C to 85°C		-40°C to 85°C	
Layout (Bottom view)								

**Note:** The parameter above is the typical specification, and for the customer's reference All the specifications are subject to change without notice. If there are any question, please contact Hongfa for technical service.

# HFE80

## Other DC Input And Output Application

Type	HFE80-100	HFE80-200
Appearance		
Contact Arrangement	1A	1A
Contact Resistance	0.8mΩ max. (20A)	0.8mΩ max. (20A)
Operation Voltage	75% Un max. (at 23°C)	75% Un max. (at 23°C)
Rated load current	100A	200A
	60V Type	450V Type
Max. Breaking Current	200A	200A
Max. Switching Voltage	60VDC	150VDC
Max. Switching Power	6kW	30kW
Mechanical Endurance	Breaking: 1 x 10 <sup>4</sup> ops (40A 60VDC) Breaking: 3 x 10 <sup>3</sup> ops (100A 60VDC) Breaking: 50ops (200A 60VDC)	Breaking: 1 x 10 <sup>4</sup> ops (40A 150VDC) Breaking: 3 x 10 <sup>3</sup> ops (100A 150VDC) Breaking: 50ops (200A 150VDC)
Dielectric strength	Between coil & contacts	4000VAC 1min
	Between open contacts	3000VAC 1min
Electrical Endurance	2 x 10 <sup>5</sup> ops	2 x 10 <sup>5</sup> ops
Coil	Nominal Voltage (DC)	12, 24
	Coil Power	5W
Coil Input Terminal	Connector	Connector
Load Input Terminal	Bolt terminal female	Bolt terminal female
Unit Weight	Approx.400g	Approx.370g
Outline Dimensions(mm)	81 x 47.7 x 82.4(Horizontal) 88 x 47.4 x 82.9(Vertical)	81 x 47.7 x 87.4(Horizontal) 88 x 47.7 x 87.9(Vertical)
Shock resistance	10Hz to 55Hz 1.5mm DA	10Hz to 55Hz 1.5mm DA
Humidity	5% to 85% RH	5% to 85% RH
Ambient Temperature	-40°C to 85°C	-40°C to 85°C
Layout (Bottom view)		

**Note:** The parameter above is the typical specification, and for the customer's reference All the specifications are subject to change without notice. If there are any question, please contact Hongfa for technical service.

# NOTES

- For those polarized relays, please follow the connection indication when connecting the coil and contacts. Reversing the polarity will result in performance parameter deviating from the data sheet.

Product	Coil terminal polarity	Load terminal polarity
HFE18 series	Only 200A, 250A, 300A, 400A type are polarized	Only 100A, 150A, 200A, 250A, 300A, 400A, type are polarized
HFE80 series	No polarized for all types	Only 20A type are polarized
HFE82 series	No polarized for all types	120A, 150A, 250A type are polarized, 60A type is not polarized

- For HFE18 series (with rated current 10A, 20A, 40A, 100A, 150A) and HFE80 series, in order to curb the reverse electromotive force of coil, a nonlinear resistor is recommended to use, such as variable resistance. Please be noted that a diode will make the release time increase, which may lead to degradation of cutting-off capability. There are circuits used to curb reverse electromotive force in relays which are rated 200A and 300A, therefore it's not necessary to have devices for curbing reverse electromotive force.
- The nominal parameters of contact are values under resistive load. When L/R > 1ms, Hongfa recommends to connect the inductive load in parallel with a surge absorber component, otherwise, it may cause reduction of electrical life and bad connection.
- HVDC relay is considered as a high voltage direct current switch, and Hongfa highly advises against using relay beyond the life cycle guaranteed on data sheet. Exceeding the indicated switching capacity and load capability may cause relay fail. Under this situation, customers need to configure a layout which can cut off current. In order to ensure safety, relay should be replaced periodically.
- When testing the pick-up voltage for relays with rated current 200A, 250A, 300A, 400A, it's recommended to use step type power to energize coil instead of a ramp voltage supply, otherwise, relay could not operate.
- For those relays with rated current 200A, 250A, 300A, 400A, the coil current will automatically switchover after 0.2s when the coil is energized. Repeated switching within 0.2s will cause fault.
- The ceramic chamber of relay is filled with gas. The leakage rate of gas is proportional to the temperature, so please guarantee the ambient temperature is between -40°C ~ +85°C.
- Please avoid using relay near to the strong magnetic areas (such as transformer, magnet) and the heat generation objects.
- Please make sure that the power wire is close to the relay terminals and then fix flat washer, spring and nut sequentially, otherwise heat will be produced by fixing out of sequence, further causing the insulation layer of cable melt.
- The torque should be controlled under below range when fixing the screws, otherwise may damage the ceramic chamber and screw thread. Additionally, the installation direction is not restricted.
  - ①Load terminal torque specification
    - HFE18 series:
      - M4 nut (relay with rated current 40A): 2Nm ~ 3Nm
      - M5 nut (relay with rated current 100A, 150A): 3Nm ~ 4Nm
      - M6 nut (relay with rated current 200A, 250A, 300A, 400A): 9Nm ~ 11Nm
    - HFE80 series:
      - M6 nut (relay with rated current 100A, 200A): 6Nm ~ 8Nm
  - ②Relay installation torque spec
    - HFE18 series:
      - M4 nut (relay with rated current 10A): 2Nm ~ 3Nm
      - M5 nut (relay with rated current 20A, 40A, 100A, 150A, 200A, 250A, 300A, 400A): 3Nm ~ 4Nm
    - HFE82 series:
      - M5 nut (relay with rated current 150A, 250A): 3Nm ~ 4Nm
      - M6 nut (relay with rated current 120A): 5Nm ~ 6Nm
  - ③Copper bus-bar thickness(applicable to female thread without bus-bar )
    - HFE18-40: 0.5mm ~ 2mm HFE18-100: 1.5mm ~ 2mm HFE18-150/HFE18-200/HFE18-250/HFE18-300/HFE18-400: 3mm
    - HFE80-100/HFE80-200: 2mm ~ 3mm HFE82-120: 0.5mm ~ 2mm HFE82-150/HFE82-250: 3mm

- Please ensure no grease or foreign matter on the surface of the terminal. To prevent abnormal heating at the terminal, please use the following connecting cable:
  - HFE18 series:
    - Relay with rated current 10A: nominal cross-sectional area at least 2mm<sup>2</sup>
    - Relay with rated current 20A: nominal cross-sectional area at least 3mm<sup>2</sup>
    - Relay with rated current 40A: nominal cross-sectional area at least 10mm<sup>2</sup>
    - Relay with rated current 100A: nominal cross-sectional area at least 40mm<sup>2</sup>
    - Relay with rated current 150A: nominal cross-sectional area at least 50mm<sup>2</sup>
    - Relay with rated current 200A: nominal cross-sectional area at least 60mm<sup>2</sup>
    - Relay with rated current 250A: nominal cross-sectional area at least 75mm<sup>2</sup>
    - Relay with rated current 300A: nominal cross-sectional area at least 100mm<sup>2</sup>
    - Relay with rated current 400A: nominal cross-sectional area at least 120mm<sup>2</sup>
  - HFE80 series:
    - Relay with rated current 20A: nominal cross-sectional area at least 2.5mm<sup>2</sup>
    - Relay with rated current 60A: nominal cross-sectional area at least 15mm<sup>2</sup>
    - Relay with rated current 80A: nominal cross-sectional area at least 20mm<sup>2</sup>
    - Relay with rated current 100A: nominal cross-sectional area at least 40mm<sup>2</sup>
    - Relay with rated current 200A: nominal cross-sectional area at least 60mm<sup>2</sup>
  - HFE82 series:
    - Relay with rated current 60A: nominal cross-sectional area at least 15mm<sup>2</sup>
    - Relay with rated current 120A: nominal cross-sectional area at least 50mm<sup>2</sup>
    - Relay with rated current 150A: nominal cross-sectional area at least 50mm<sup>2</sup>
    - Relay with rated current 250A: nominal cross-sectional area at least 75mm<sup>2</sup>

- The insertion strength of the plug-in terminal into the relay tab terminal should be 40-70N. Please select a plug-in terminal as following:
  - HFE18-10: for plate thickness 0.5mm and #187 tab terminal, Load terminal: for plate thickness 1.2 mm and #375 tab terminal
  - HFE18-20: for plate thickness 0.8mm and #250 tab terminal, Load terminal: for plate thickness 1.2 mm and #375 tab terminal
  - HFE18-40: Coil: for plate thickness 0.8mm and #250 tab terminal, Load terminal: for plate thickness 1.2 mm and #375 tab terminal
  - HFE80-20: for plate thickness 0.8mm and #250 tab terminal, Load terminal: for plate thickness 1.2 mm and #375 tab terminal
  - HFE80-60 & HFE80-80: Coil: for plate thickness 0.8mm and #250 tab terminal, Load terminal: for plate thickness 1.2 mm and #375 tab terminal

- Suggest not to use relay after the relay drops.