HONGFA

# HVDC RELAY

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

## Green Solutions


www.hongfa.com

# COMPANY PROFILE

Hongfa (Hongfa stock code: SH600885) is ranked 4th globally in relay manufacturing with an annual production capability of 1 billion units. Hongfa has maintained the largest position in China for three decades in relay research, manufacturing and exportation. Hongfa's enterprise spirit "Persevere for Progress, Strive for Excellence" with the operational philosophy "Focusing on the market; Winning through quality" drives our continuous growth. Utilizing our enterprise spirit and operational philosophy, Hongfa became a first-class relay research and manufacturing company with focused 21 subsidiaries located in 6 manufacturing campuses and multiple distribution centers with floor space of more than 330 thousand square meters (~3.5 million square feet).

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.

# INTRODUCTION OF HVDC RELAY

## Main features

- Relay with ceramic chamber.
- Own patented technology and independent intellectual property.
- The products cover a wide range of rated currents from 10A to 300A with rated voltages from 12VDC to 750VDC. The maximum operating voltage can be as high as 1000VDC. It can meet the demand of PV systems, wind power systems, alternative energy vehicles and electric charging systems.
- The chamber for the relay contacts is filled with mixed gas (hydrogen, nitrogen) for high arc distinguishing capacity and high DC voltage cut-off.
- Contacts are protected against environmental influences (oxidation, corrosion).


HV air exhausting machine


Laser welding machine

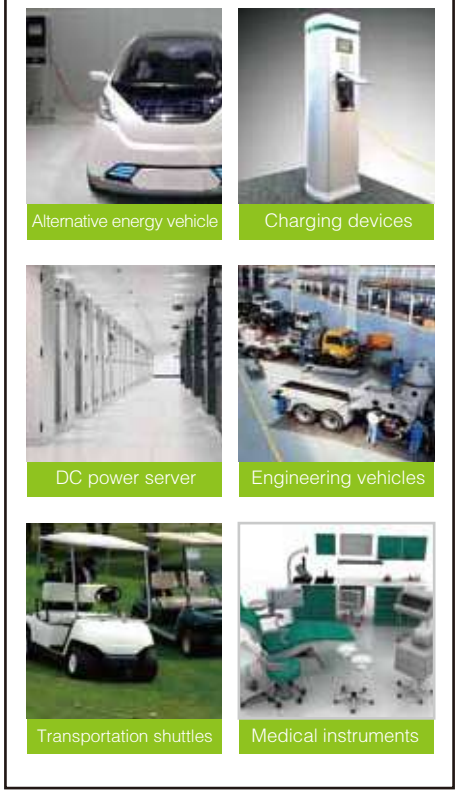

High temperature nickel processing machine


Shock test machine


# APPLICATION

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.


**Generate electricity**




**Use electricity**

# Alternative energy vehicles

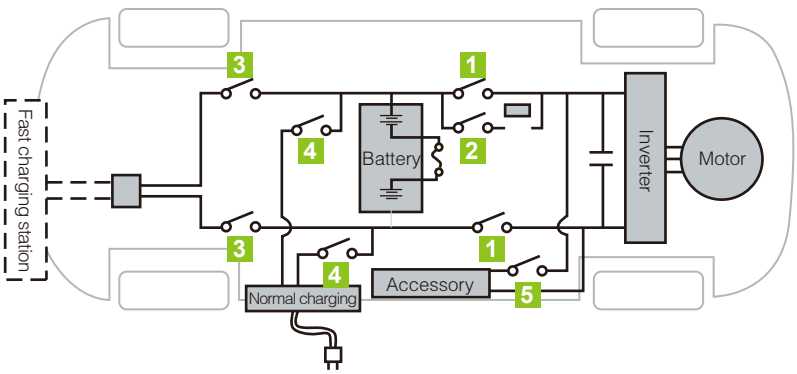
Alternative energy vehicles are one of the most important applications of HVDC relay.

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 500A), mostly used to disconnect the battery. 2 pieces of main relays are used in one EV.
- **Fast charge relay:**
  This type of relays are used to control the fast charging process–the rated currents are from 32A to 300A.
- **Auxiliary applications:**
  Relays for this applications are mainly used for air conditioners, heating systems, DC/AC–converters, etc. The typical rating is between 10A 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

**2 Pre-charge relay:**
HFE18V–40, HFE18V–20, HFE18V–10

**3 Fast charge relay:**
HFE18V–200, HFE18V–150, HFE18V–100

**4 Normal charge relay:**
HFE18V–40, HFE18V–20, HFE18V–10

**5 HV auxiliary relay:**
HFE18V–40, HFE18V–20, HFE18V–10

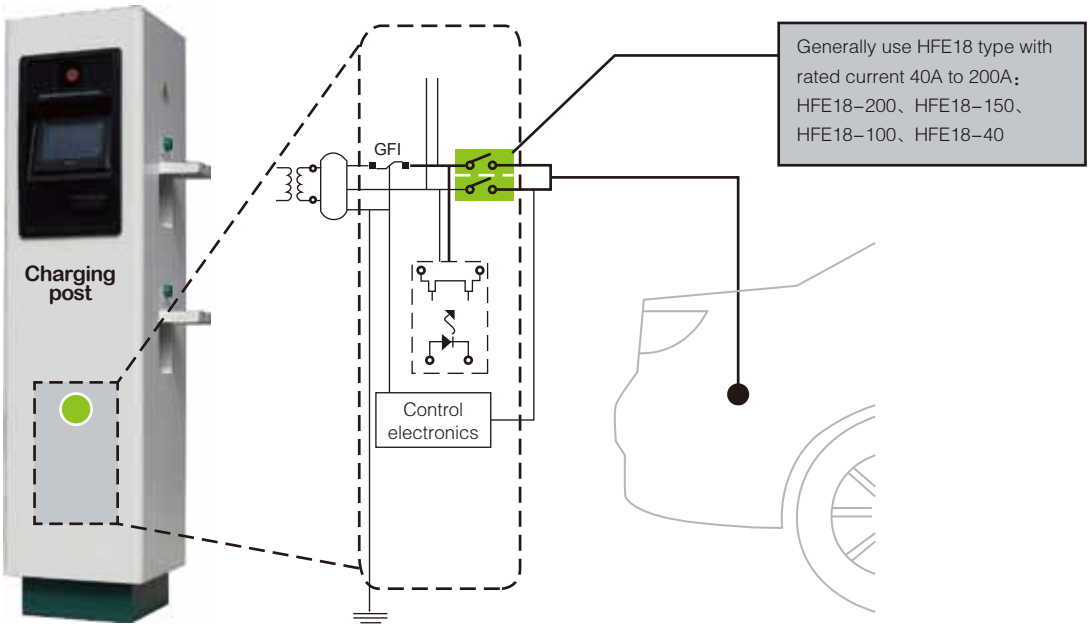
# Power charging devices

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：HFE18–40, HFE18–100, HFE18–150, HFE18–200.

## Relay used in application



# PV system

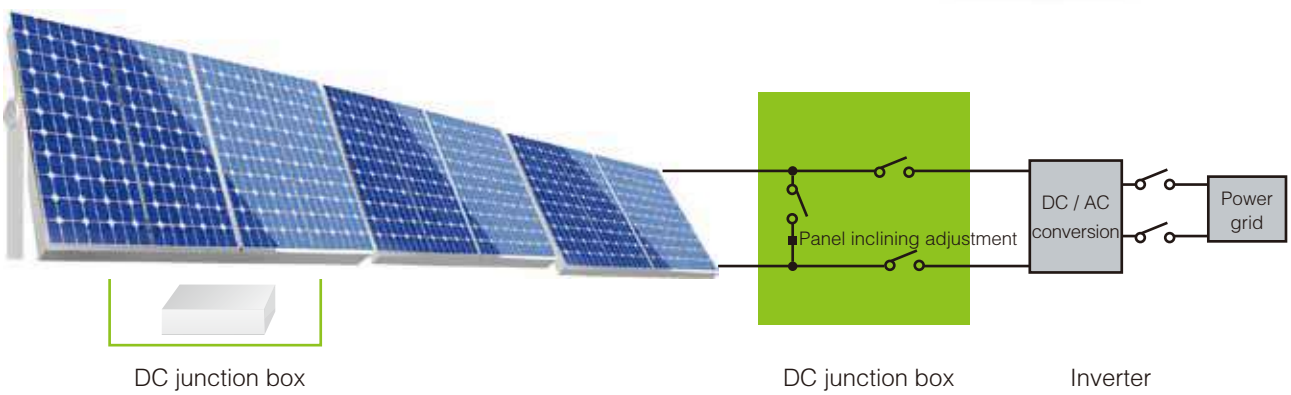
Photovoltaics (PV) is one of the most famous renewable energy systems to create electricity. There are two kinds of power supply systems: one is the DC power supply and the other one is the AC power supply with help of an inverter. Batteries help to store the electrical energy to provide the power later.

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.

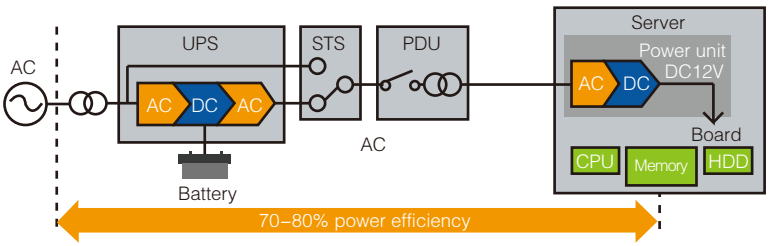
Standard server center converts the commercial electrical power into DC power through UPS, and charge the battery, then supply the power to servers after converting into AC power. This process requires multiple power conversions, which wastes a lot of energy.

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

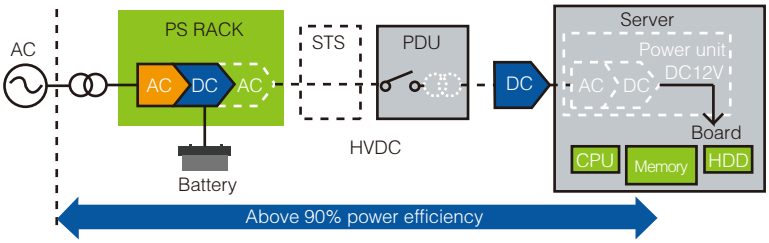
UPS DC power supply device in the data center can convert the single–phase 200VAC of commercial power into 380VDC, then supply power for end applications. Supplying the server moved from power unit with 12VDC can ensure more than 97% of the conversion efficiency, and reduce the loss of power conversion,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

## Relay used in application

Normal AC




HVDC 12V




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

# PARAMETER

## HFE18 (Ceramic chamber sealed type)

- **Break capability of HVDC relay**
  Ceramic chamber filled with mixed gas (hydrogen and nigtrogen) with a high capability of extinguishing the arc.

- **High capability of controlling load**
  Rated current from 10A to 300A, with 2 kinds of rated voltage (450VDC, 750VDC), max switching voltage up to 1000VDC.

- **Safety**
  The Ceramic–Metal–Design, the gas filling and the use of a blowing magnet structure in the HVDC–relay make sure that the load currents can be disconnected safely and securely–this guarantees a voltage insolation to prevent dangerous lighting arcs.

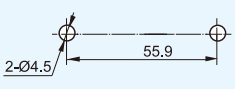
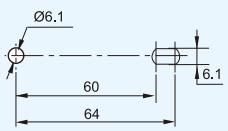
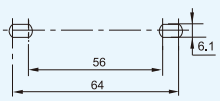
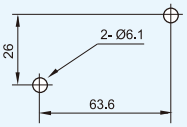
| Item | Application |
|---|---|
| HFE18V | EV, HEV, PEV, PHEV |
| HFE18 | solar power, UPS, wind energy, battery charging and discharging system |

## HFE80 (Epoxy plastic sealed)

Rated current ranges from 10A to 500A, rated voltage ranges from 12VDC to 150VDC. The relay with rated current 100A has been mass production. The relays with rated currents 10A, 80A, 200A, 300A, 400A and 500A are under development now.

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

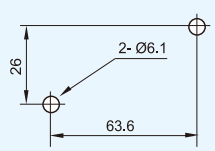
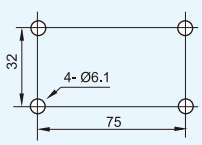
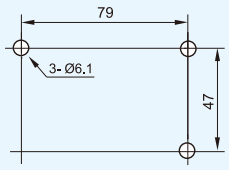
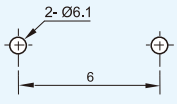
# HFE18V(12VDC-750VDC) Alternative Energy Vehicles

| Type | | HFE18V-10 | HFE18V-20 | HFE18V-40 | HFE18V-100 |
|---|---|---|---|---|---|
| Appearance | |  |  |  |  |
| Contact Arrangement | | 1A | 1A | 1A | 1A |
| Contact Resistence | | 10mΩ max.(6VDC 10A) | 10mΩ max.(6VDC 20A) | 10mΩ max.(6VDC 20A) | 1.5mΩ max.(6VDC 20A) |
| Contact Rating (Res. Load) | | 10A | 20A | 40A | 100A |
| Pick-up Voltage | | 60%Un max. | 60%Un max. | 60%Un max. | 60%Un max. |
| Max. Switching Current | | 100A 300VDC (1op min.) | 200A 300VDC (1op min.) | 400A 300VDC (1op min.) | 1000A 300VDC (1op min.) |
| Max. Switching Voltage | | 1000VDC | 1000VDC | 1000VDC | 1000VDC |
| Max. Switching Power | | 30kW | 60kW | 120kW | 300kW |
| Dielectric strength | Between coil & contacts | 4000VAC | 4000VAC | 4000VAC | 4000VAC |
| | Between open contacts | 3000VAC | 3000VAC | 3000VAC | 3000VAC |
| Clearance | | 5mm min. | 5mm min. | 10mm min. | 6mm min. |
| Creepage Distance | | 5mm min. | 5mm min. | 10mm min. | 10mm min. |
| Mechanical Endurance | | 2 x $10^5$ops | 2 x $10^5$ops | 2 x $10^5$ops | 2 x $10^5$ops |
| Electrical Endurance | 450VDC | 1x $10^5$ops (10A 450VDC) | 1x $10^5$ops (20A 450VDC) | 2x $10^4$ops (40A 450VDC) | 1x $10^4$ops (100A 450VDC) |
| | 750VDC | 1x $10^5$ops (10A 750VDC) | 2x $10^4$ops (20A 750VDC) | 1x $10^3$ops (40A 750VDC) | 1 x $10^3$ops(100A 750VDC) |
| Coil | Nominal Voltage (DC) | 12,24,48 | 12,24,48 | 12,24,48 | 12,24,48 |
| | Coil Power | 2.6W | 2.6W | 3W | 4.5W |
| Coil Input Terminal | | QC | QC | Wire/ wire+connector | Wire/ wire+connector |
| Load Input Terminal | | QC | QC | Screw terminal male | Screw terminal male |
| Unit Weight | | Approx.150g | Approx.150g | Approx.180g | Approx.400g |
| Sort | | Single side stable | Single side stable | Single side stable | Single side stable |
| Outline Dimensions (mm) | | 66.8 x 39.0 x 48.2 | 78.0 x 39.8 x 46.1 | 78.2 x 32.6 x 50.4 | 78.0 x 40.0 x 76.0 |
| Shock resistance | | 10Hz to 500Hz 49m/s$^2$ | 10Hz to 500Hz 49m/s$^2$ | 10Hz to 500Hz 49m/s$^2$ | 10Hz to 500Hz 49m/s$^2$ |
| Humidity | | 5% to 95% RH | 5% to 95% RH | 5% to 95% RH | 5% to 95% 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) | |  |  |  |  |

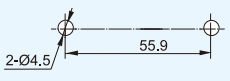
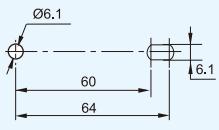
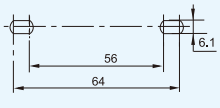
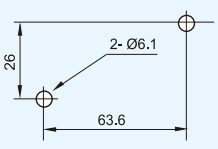
**Note:** The parameter above is the typical specification, and for the customer's reference. All the specifications are subject to change without notice. IF there are any question, please contact Hongfa for technical service.

# HFE18V(12VDC-750VDC)

## Alternative Energy Vehicles

| HFE18V-150 | HFE18V-200 | HFE18V-300 | HFE80V-100 |
|---|---|---|---|
|  |  |  |  |
| 1A | 1A | 1A | 1A |
| 0.4mΩ max.(150A) | 0.2mΩ max.(200A) | 0.2mΩ max.(300A) | 0.5mΩ max.(6VDC 20A) |
| 150A | 200A | 300A | 100A 48 to125VDC<br>100A 450VAC |
| 60%Un max. | 60%Un max. | 60%Un max. | 60%Un max. |
| 1500A 300VDC<br>(1op min.) | 2000A 300VDC<br>(1op min.) | 2500A 300VDC<br>(1op min.) | 200A 150VDC<br>(2 x $10^5$ops min.) |
| 1000VDC | 1000VDC | 1000VDC | 150VDC |
| 450kW | 600kW | 750kW | 30kW, 4.5kVA |
| 4000VAC | 4000VAC | 4000VAC | 4000VAC |
| 3000VAC | 3000VAC | 3000VAC | 4000VAC |
| 6mm min. | 8mm min. | 10mm min. | 6mm min. |
| 10mm min. | 10mm min. | 10mm min. | 10mm min. |
| 2 x $10^5$ops | 2 x $10^5$ops | 2 x $10^5$ops | 3 x $10^5$ops |
| 1x $10^4$ops (150A 450VDC) | 1x $10^4$ops (200A 450VDC) | 1 x $10^4$ops (300A 450VDC) | 6 x $10^4$ops (100A 48VDC )<br>4 x $10^4$ops (100A 60VDC)<br>3 x $10^4$ops (100A 125VDC)<br>3 x $10^4$ops (100A 450VAC) |
| 1x $10^3$ops (150A 750VDC) | 3x $10^3$ops (200A 750VDC) | 3 x $10^3$ops (300A 750VDC) | |
| 12,24,48 | 12,24,48 | 12,24,48 | 12,24,48 |
| 6W | 34/4W | 45/3.8W | 5W |
| Connector | Wire/ connector/ wire+connector | Connector | Wire |
| Cu-Bus-Bar terminal | Cu-Bus-Bar terminal | Cu-Bus-Bar terminal | Screw terminal male |
| Approx.430g | Approx.650g | Approx.850g | Approx.330g |
| Single side stable | Single side stable | Single side stable | Single side stable |
| 77.6 x 41.1 x 81.7 | 105.3 x 45.0 x 87.6 | 113.6 x 65.1 x 76.9 | 81.0 x 40.0 x 85.6 |
| 10Hz to 500Hz 49m/s$^2$ | 10Hz to 500Hz 49m/s$^2$ | 10Hz to 500Hz 49m/s$^2$ | 10Hz to 500Hz 49m/s$^2$ |
| 5% to 95% RH | 5% to 95% RH | 5% to 95% RH | 5% to 95% RH |
| -40°C to 85°C | -40°C to 85°C | -40°C to 85°C | -40°C to 85°C |
|  |  |  |  |

# HFE18 Other DC Input And Output Application

| Type | | HFE18-10 | HFE18-20 | HFE18-40 | HFE18-100 |
|---|---|---|---|---|---|
| Appearance | |  |  |  |  |
| Contact Arrangement | | 1A | 1A | 1A | 1A |
| Contact Resistence | | 10mΩ max.<br>(6VDC 10A) | 10mΩ max.<br>(6VDC 20A) | 10mΩ max.<br>(6VDC 20A) | 1.5mΩ max.<br>(6VDC 20A) |
| Contact Rating (Res. Load) | | 10A 450VDC | 20A 450VDC | 40A 450VDC | 100A 450VDC |
| Pick-up Voltage | | 75%Un max. | 75%Un max. | 75%Un max. | 75%Un max. |
| Max. Switching Current | | 100A 300VDC<br>(1op min.) | 200A 300VDC<br>(1op min.) | 400A 300VDC<br>(1op min.) | 1000A 400VDC<br>(1op min.) |
| Max. Switching Voltage | | 1000VDC | 1000VDC | 1000VDC | 1000VDC |
| Max. Switching Power | | 30kW | 60kW | 120kW | 400kW |
| Dielectric strength | Between coil & contacts | 4000VAC | 4000VAC | 4000VAC | 4000VAC |
| | Between open contacts | 3000VAC | 3000VAC | 3000VAC | 3000VAC |
| Clearance | | 5mm min. | 5mm min. | 10mm min. | 6mm min. |
| Creepage Distance | | 5mm min. | 5mm min. | 10mm min. | 10mm min. |
| Mechanical Endurance | | 2 x $10^5$ops | 2 x $10^5$ops | 2 x $10^5$ops | 2 x $10^5$ops |
| Electrical Endurance | | 1 x$10^5$ops (10A 450VDC)<br>1 x$10^5$ops (10A1000VDC) | 1 x$10^5$ops (20A 450VDC)<br>1 x$10^5$ops (10A1000VDC) | 2 x $10^4$ops(40A 450VDC)<br>2 x $10^4$ops(20A 600VDC)<br>1 x $10^5$ops(10A1000VDC) | 1 x $10^4$ops(100A 450VDC)<br>1 x $10^4$ops(50A 600VDC)<br>1 x $10^4$ops(30A 1000VDC) |
| Coil | Nominal Voltage (DC) | 12,24 | 12,24 | 12,24 | 12,24 |
| | Coil Power | 2.6W | 2.6W | 3W | 4.5W |
| Coil Input Terminal | | QC | QC | Wire/ wire+connector | Wire/ wire+connector |
| Load Input Terminal | | QC | QC | Screw terminal male | Screw terminal male |
| Unit Weight | | Approx.150g | Approx.150g | Approx.180g | Approx.400g |
| Sort | | Single side stable | Single side stable | Single side stable | Single side stable |
| Outline Dimensions (mm) | | 66.8 x 39.0 x 48.2 | 78.0 x 39.0 x 46.1 | 76.2 x 32.6 x 50.4 | 78.0 x 40.0 x 76.0 |
| 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 95% RH | 5% to 95% RH | 5% to 95% RH | 5% to 95% RH |
| Ambient Temperature | | -40℃ to 85℃ | -40℃ to 85℃ | -40℃ to 85℃ | -40℃ to 85℃ |
| Layout (Bottom view) | |  |  |  |  |

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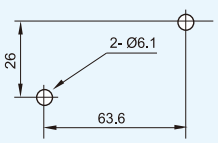
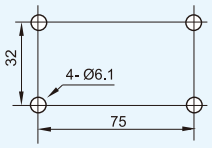
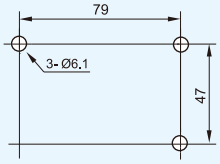
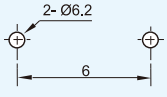
# HFE18 Other DC Input And Output Application

| HFE18-150 | HFE18-200 | HFE18-300 | HFE80-100 |
|---|---|---|---|
|  |  |  |  |
| 1A | 1A | 1A | 1A |
| 1.5mΩ max.(6VDC 20A) | 0.2mΩ max.(200A) | 0.2mΩ max.(300A) | 0.5mΩ max.(6VDC 20A) |
| 150A 450VDC | 200A 450VDC | 300A 450VDC | 100A 48 to125VDC<br>100A 450VAC |
| 75%Un max. | 75%Un max. | 75%Un max. | 75%Un max. |
| 1500A 300VDC<br>(1op min.) | 2000A 300VDC<br>(1op min.) | 2500A 300VDC<br>(1op min.) | 200A 150VDC（20000ops min.） |
| 1000VDC | 1000VDC | 1000VDC | 150VDC |
| 450kW | 600kW | 750kW | 30kW, 4.5kVA |
| 4000VAC | 4000VAC | 4000VAC | 4000VAC |
| 3000VAC | 3000VAC | 3000VAC | 4000VAC |
| 6mm min. | 8mm min. | 10mm min. | 6mm min. |
| 10mm min. | 10mm min. | 10mm min. | 10mm min. |
| 2 x $10^5$ops | 2 x $10^5$ops | 2 x $10^5$ops | 3 x $10^5$ops |
| 1 x $10^4$ops(150A 450VDC)<br>1 x $10^4$ops(60A 600VDC)<br>1 x $10^3$ops(150A 750VDC)<br>1 x $10^4$ops(40A 1000VDC) | 1 x$10^4$ops(200A 450VDC)<br>6 x$10^3$ops(200A 600VDC)<br>3 x$10^3$ops(200A 750VDC)<br>1 x$10^4$ops(50A 1000VDC) | 1 x $10^4$ops(300A 450VDC)<br>3 x $10^3$ops(300A 750VDC)<br>1 x $10^4$ops(75A 1000VDC) | 6 x $10^4$ops（48VDC 100A）<br>4 x $10^4$ops（60VDC 100A）<br>3 x $10^4$ops（125VDC 100A）<br>3 x $10^4$ops（450VAC 100A） |
| 12,24 | 12,24 | 12,24 | 12,24 |
| 4.5W | 34/4W | 45 / 3.8W | 5W(Single side stable) |
| Connector | Wire/ connector/ wire+connector | Wire/ connector/ wire+connector | Connector |
| Screw terminal male | Screw terminal male/<br>Cu-Bus-Bar terminal | Screw terminal male/<br>Cu-Bus-Bar terminal | Screw terminal male |
| Approx.400g | Approx.650g | Approx.850g | Approx.330g |
| Single side stable | Single side stable | Single side stable | Single side stable |
| 77.6 x 41.1 x 81.7 | 89.0 x 45.0 x 87.0<br>105.3 x 45.0 x 87.6 | 93.0 x 59.0 x 80.0<br>113.6 x 65.1 x 76.9 | 81.0 x 40.0 x 85.6 |
| 10Hz to 55Hz 1.5mm DA | 10Hz to 55Hz 1.5mm DA | 10Hz to 55Hz 1.5mm DA | 10Hz to 55Hz 1.5mm DA |
| 5% to 95% RH | 5% to 95% RH | 5% to 95% RH | 5% to 95% RH |
| -40℃ to 85℃ | -40℃ to 85℃ | -40℃ to 85℃ | -40℃ to 85℃ |
|  |  |  |  |

# NOTES

- For those relays with rated current 10A, 20A or 40A, the load terminals are not polarized. The relay with rated current 100A & 150A has the polarity request on the load terminal, while the relays with rated current 200A & 300A have polarity request on load terminal and coil terminal. Follow the connection schematic when connecting the coils and contacts. Reverse polarity can not guarantee the parameter we promise on data sheet.

- The rated parameters of contact are the values under resistive load. Under the L/R > 1ms inductive load (L load). Hongfa recommends to connect the inductive load in parallel together with the surge absorber component, otherwise, it may cause the reduction of electrical life and bad connection.

- The HVDC relay is considered as a high voltage direct current switch and can't switch possibly in its final failure mode .Therefore Hongfa highly advise against using the relay beyond the life cycle we promise on data sheet. Exceeding the indicated switching capacity and life may cause relay burning spreading to surrounding parts. Under this situation, you need to configure the layout which can cut off the current. In order to ensure safety, relay should be replaced periodically.

- For those relays with rated current 10A, 20A, 40A, 100A and 150A, 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 of relay increase, which may lead to the degradation of cutting–off capability. There are circuits used to curb reverse electromotive force in the relay with rated 200A and 300A, so it's not necessary to have devices for curbing reverse electromotive force.

- When testing the pick–up voltage of relays with rated current 200A and 300A, it's recommended to use step type power to energize the coil instead of a ramp voltage supply. The coil current will automatically switchover after 0.1s when the coil is energized. Repeated switching within 0.1s will cause fault.

- It's forbidden to put the relay in the temperature beyond the range of –40℃ ~ 85℃ for a long time.

- Please avoid to place relays near to the strong magnetic areas (such as transformer, magnetic–iron) and the heating–producer.

- Please make sure that the power wire is close to the relay terminals and then fix flat washer, spring washer and the 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 (exclude the relay with a leading structure).Additionally, the installation direction is not restricted.

  The fixing part of load terminal:
  M5 nut (relay with rated current 40A):2Nm ~ 3Nm
  M6 nut（relay with rated current 100A、150A）：5Nm ~ 6Nm
  M8 nut（relay with rated current 200A、300A）：9Nm ~ 11Nm

  Relay fixing:
  M4 screw（relay with rated current 10A）：2Nm ~ 3Nm
  M5 screw（relay with rated current 20A、40A、100A、150A、200A、300A）：3Nm ~ 4Nm
  M6 screw（relay with rated current 20A、40A、100A、150A、200A、300A）：5Nm ~ 6Nm

- Please assure that no grease nor other foreign matter sticks to relay terminals. Please use below wire for connecting, otherwise may cause abnormal heat on terminals:
  Relay with rated current 10A: nominal cross–sectional area at least 2mm$^2$
  Relay with rated current 20A: nominal cross–sectional area at least 3mm$^2$
  Relay with rated current 40A: nominal cross–sectional area at least 10mm$^2$
  Relay with rated current 100A: nominal cross–sectional area at least 40mm$^2$
  Relay with rated current 150A: nominal cross–sectional area at least 50mm$^2$
  Relay with rated current 200A: nominal cross–sectional area at least 60mm$^2$
  Relay with rated current 300A: nominal cross–sectional area at least 100mm$^2$

- The insertion strength of the plug–in terminal into the relay tab terminal should be 40N–70N. Please select a plug–in terminal as following:
  10A type: for plate thickness 0.5mm and #187 tab terminal
  20A type: for plate thickness 0.8mm and #250 tab terminal

- Relay may not function properly after drop.

For more information, please access our web site:

**www.hongfa.com**

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HONGFA

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