Didisolar

Bidirectional Energy Storage Inverter 30KTL Product

一、Introduction of product function

- 1、It is specially designed for smart grid and smart microgrid, accepting grid dispatching, cutting peaks and filling valleys.
- 2、It can meet the requirements of lead-acid batteries, lithium batteries, supercapacitors, vanadium batteries and other different energy storage modes, and has a wide application range.
- 3、Bidirectional inverter can meet various battery charging and discharging modes.
- 4、It has the function of setting working mode of the time period and sets up a reasonable working mode, which is based on the characteristics of the local power grid.
- 5、Modes are divided into on-gird (charge and discharge) operation and independent isolated network operation. It can control active power and reactive power output, which is built on the instructions of the power grid dispatching department, and has the capability of full capacity operation in four quadrants.
- 6、Rs485, CAN bus and other communication interfaces are optional and standard communication protocols are used to realize remote monitoring.

二、 Introduction of performance characteristics

（1）Adopt 32 - bit DSP (digital processor TI 2812) + ARM (touch screen master chip) platform, touch screen display and operation. It is convenient operation at the scene and parameter setting. Dsp controls core driver. ARM realizes peripheral functions such as display and communication to improve the reliability of power supply.

（2）It has an all-round power supply protection scheme and perfect self-detection and protection functions.When a system fails, it will stop and protect the safety of the system. The power supply has the protection functions of overheating, overload, overcurrent, short circuit, drive protection, etc. ,which is to ensure the reliable and stable operation of the power supply.

（3）The whole system modular power unit design. It is simple and fast to replace and quickly eliminate faults without affecting the whole system. At the same time, it has excellent electromagnetic compatibility and satisfy with reliable application in various occasions.

（4）Support RS485, ethernet communication, optional CAN meet customer remote monitoring and other functions.It can display AC / DC side voltage, current, operating mode, operating status, fault information, etc. The relevant data can be uploaded to the remote upper computer through the communication interface, and it can start or stop the power supply, set parameters and other operations.

三、技术特点介绍
Third, Introduction of technical characteristics

1)Bidirectional converter has v / f and p / q control modes. When in p / q operation mode, it can control the active power and reactive power output , which is based on instructions of the power grid dispatching department, and has the capability of full capacity operation in four quadrants.

2)Bidirectional converter has high efficiency. PCS is a high frequency topology and the highest efficiency is not less than 95 %.

3)**T**he bidirectional converter has 1 - way Ethernet interface and 1 - way 485 interface, which can communicate with the monitoring system and provide free protocol text.

4)Modbus TCP / 485 is the communication interface between bidirectional converter and BMS.Under the same conditions, the communication protocol gives priority to the use of the mesa energy storage protocol in the United States and provides free text of the communication protocol.

5)According to the instructions of the monitoring system, the bidirectional converter can control its active power output. In order to realize the active power regulation function, the battery energy storage system should be able to receive and track the active power control signals sent by the monitoring system in real time. According to signals of voltage frequency at the on-grid side and control commands of the monitoring system, the active output is automatically adjusted to ensure that the maximum output power does not exceed the given value.

6)Bidirectional converter has certain ability to withstand abnormal system frequency.

7)Island operation
Besides the on-grid operation mode, the bidirectional converter has an isolated island operation mode. According to set conditions to disconnect from the main network, converter provide part of the load with electric energy that meets the power quality requirements of the power grid within the capacity range.
8) Bidirectional converter protection function
The bidirectional converter has the functions of DC overvoltage, undervoltage protection, overcurrent protection, input reverse connection protection, AC undervoltage / overvoltage protection, overload protection, overheating protection, over / under frequency protection, three-phase unbalance protection and alarm, and AC reverse sequence protection and alarm.
9) Power quality requirements for DC side of bidirectional converter
The convert meets that requirement of the battery on the power quality when charging the battery. When charging with constant current, the current stabilizing precision is less than or equal to 1 % fs (when 20 % - 100 % of the rated current is output).
10)Voltage unbalance degree of AC side of bidirectional converter
After the converter is connected to the power grid, the three-phase voltage imbalance in point of common coupling does not exceed the limit specified in GB / t 15543 - 2008 " three - phase voltage imbalance in power quality" and the negative sequence voltage imbalance in point of common coupling does not exceed 2 %.
11)The operation state of the bidirectional converter is highly visualized. The touch screen serves as a man-machine interface. Various real-time running data, real-time fault data and historical fault data can be clearly displayed through touching operation.
12)The bidirectional converter is provided with an AC input manual breaking switch and an emergency stop operation switch. The installation and routing of components in the cabinet are tidy and reliable, and the layout is reasonable. the insulation between electrical appliances conforms to relevant national standards. The incoming and outgoing lines are wall hanging and outgoing lines.

四、 Introduction to communication features

Energy storage converter mainly exchanges information with monitoring system and battery management system (BMS). The energy storage converter sends its own operating state to the monitoring system, monitoring background can receive commands and fixed values issued by the background. At the same time, it can receive BMS system information and protect the battery (the BMS is required to provide protocols).

The converter shall display at least the following information in local display equipment and remote monitoring system:

Upload quantity. The operation information of the bidirectional converter shall include the following contents:

Batteries charging current

Batteries port voltage

Battery discharge current

Pcs AC side voltage / current / frequency

Control / protection setting value

Protection and fault signals

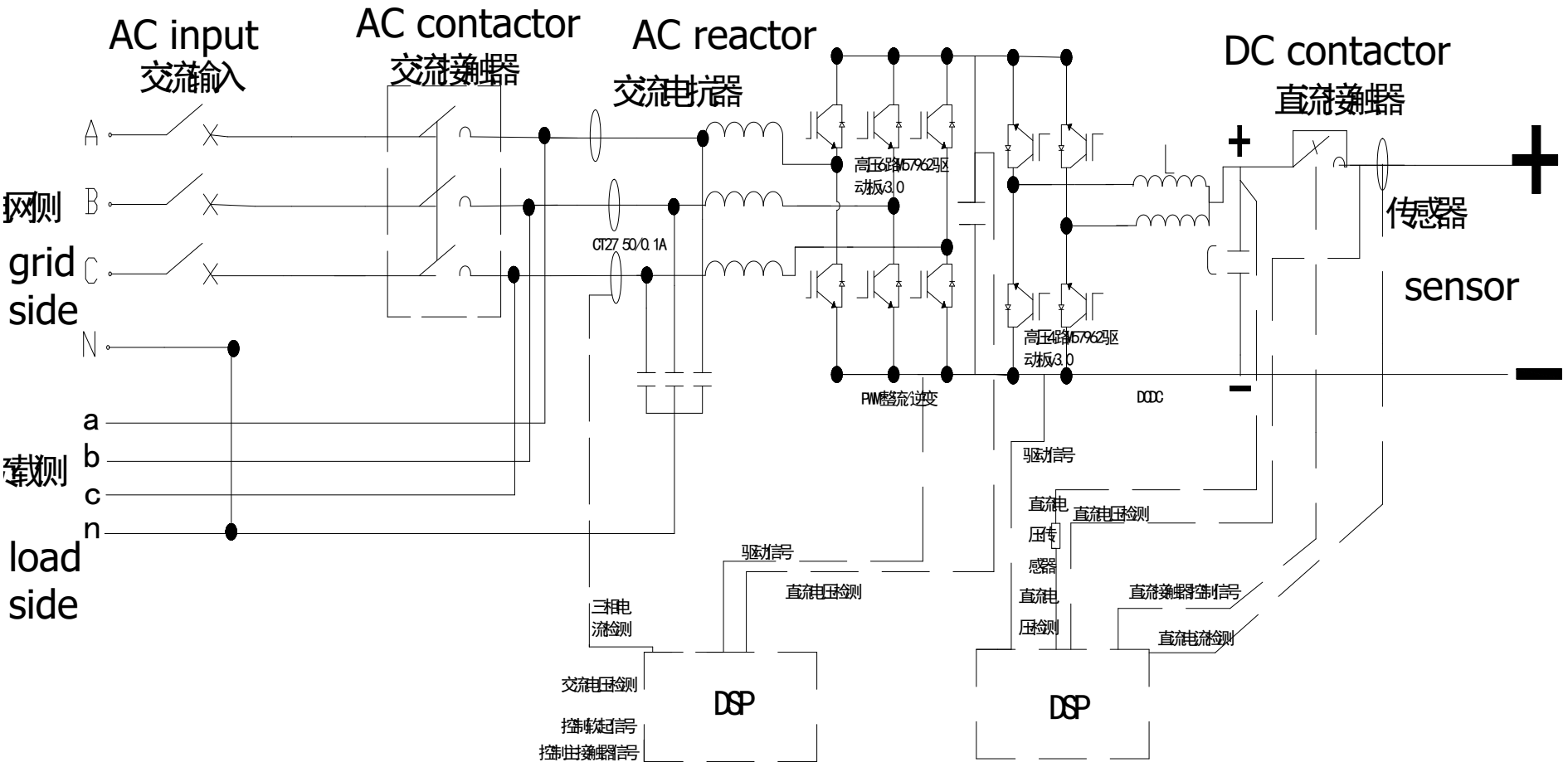
Descending quantity: When the monitoring system issues the following commands to the bidirectional converter, the bidirectional converter shall be able to respond in time.

On-grid charging and discharging command
Isolated network running command
Active power expectation of charging and discharging
Reactive power expectation
Voltage and frequency expectation of isolated network operation network side
Protection setting value

The bidirectional converter can receive the battery state quantity and alarm information sent by BMS, etc. It should include the following information:

The batteries can be charged.
Batteries dischargeable electric quantity
Batteries status: full, empty, normal, alarm and fault.

五、Schematic diagram of equipment



六、Introduction to system application

Line loss is an important factor that cannot be ignored when the power grid supplies power from a long distance. Due to the existence of line loss, equipment investment will need to be increased in the early stage of engineering design. Energy is wasted and the life of cables is shortened when power is supplied from a long distance, which greatly increases the cost of power grid operation and maintenance. Due to the extensively use of refrigerators, air conditioners and led energy-saving lamps, it is too low for the power factor at the user side of the power grid and lead to increase reative power, causing excessive load on the power grid.

The energy storage system can solve the above problems well. Energy storage is a hot topic at home and abroad in nowadays. While the energy storage system is still at the research stage in China, Germany and other countries have published relevant subsidy policies to encourage the development of energy storage systems, optimize power grids and realize smart grids. Our company has made some achievements in the field of smart energy storage power grid. There are many energy storage inverters for energy storage projects that operate stably on site for a long time with good results.

The system is aimed at a three-phase energy storage system and it can realize the functions of on-grid power generation, off-grid inversion and reverse charging of commercial power. If the power grid is cut off, the energy storage system can automatically and seamlessly switch to an off-grid working mode to ensure that it can supply power to load uninterruptedly.

七、 Technical parameter

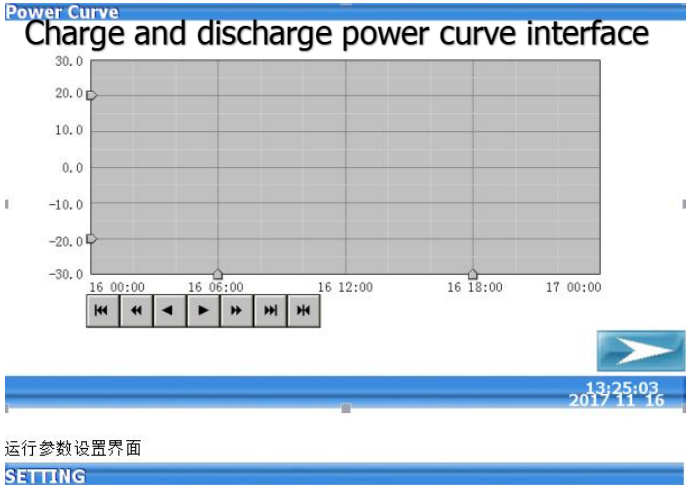
Project	Parameter value	
Model	TY-30KTL	
Rated power	30KW	
DC voltage range	200-800VDC	
Direct current	90A	
Shock resistance	1.2 times/60S 1.5times/10S	
Efficiency	≥95%	
Power factor	≥0.99	
AC phase number	three-phase four wire	
Power factor	≥0.99	
Continuous adjustment range	four quadrant operation	
Grid frequency range	50±2%Hz/	
Grid voltage range	350-450V	
Harmonic	<4%	
Operating parameters of isolated island	rated voltage	400V±1%
	rated frequency	50HZ±0.2%
	voltage distortion	<3%
Noise	＜65dB 1m away from equipment	
On-grid or off-grid switching time	≤20ms	
Protection grade	IP21	
Cooling mode	air cooling	
Weight	55KG	
Size: length*depth*height	770*550*180	

八、Introduction to touch screen interface

Display interface

Real - time alarm page

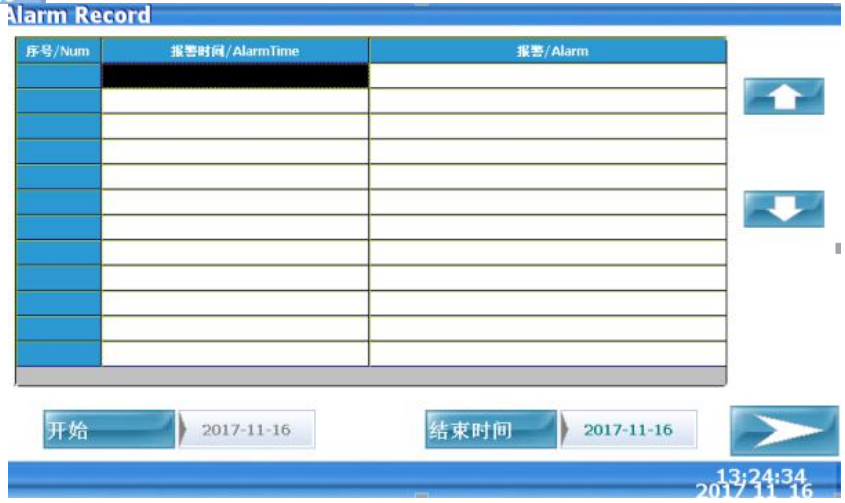
Charge and discharge power curve interface



Operation parameter setting interface

Protection parameter setting interface

Historical failure



九、 Measured data

Current harmonics are measured by using a power analyzer.

并网功率（KW） on-grid power	Ithd(%)		
	A	B	C
30	2.91	2.82	3.19

Conclusion: When measuring the current harmonics, the voltage harmonics of the power grid are about 3 %. The voltage harmonics of the power grid disturb the current, and the current harmonic wave meets the requirements.

on-grid power	Power factor
15	0.983
20	0.989
30	0.991

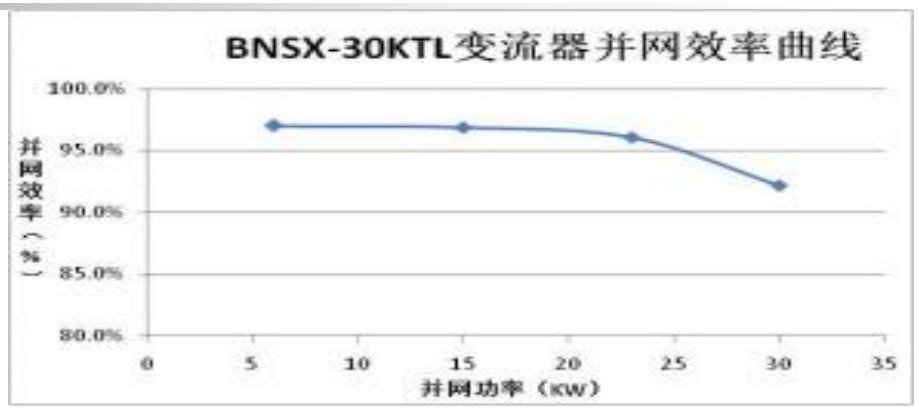
Conclusion: the power factor MIN of the equipment above 20kw is 0.989, which meets the requirements.

TY-30KTL converter on-grid efficiency curve

On - grid power	efficiency
15	96.90%
20	96.14%
30	95.23%

结论：设备效率MIN＝**95.23%**，符合要求。

on-grid efficiency



on-grid efficiency

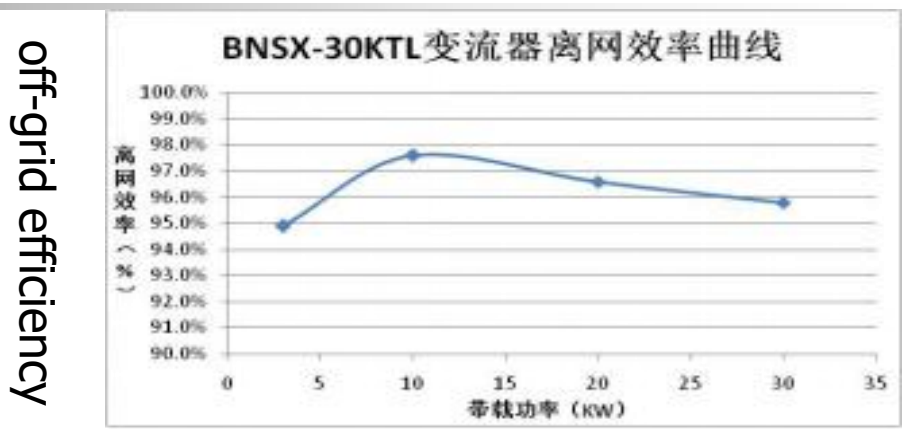
off-grid testing

On - load power	Uthd(%)		
	A	B	C
10	0.90	0.82	1.02
20	1.28	1.31	1.33
30	1.62	1.54	1.65

Conclusion: equipment voltage harmonic test result MAX = 1.1 %, which meets the requirements

BNSX-30KTL converter off-grid efficiency curve

On - load power	efficiency
10	97.6%
20	96.6%
30	95.8%



off-grid efficiency

On - load power

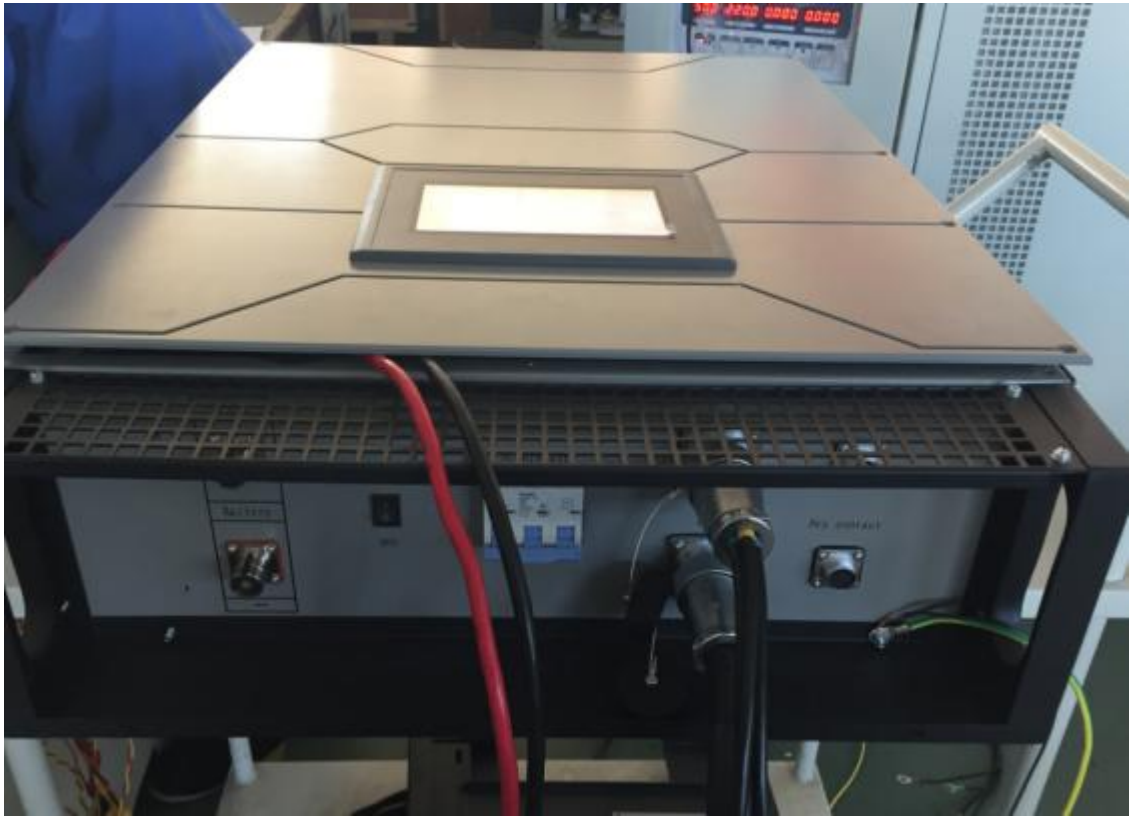
Conclusion: the off-grid efficiency MIN = 95.8 %, which meets the requirements.

Noise: when the grid is full of power, the noise of measuring equipment is 60db at 1m away from the equipment.

Unbalanced load condition								
Carrying capacity		display			Measurement			Three - phase voltage difference
		A	B	C	A	B	C	
A:3K B:0K C:0K	output voltage	216.1	221	222.4	210.5	221.4	227.3	16.80
	output current	13.1	0	0	13.2	0	0	0.76%
	degree of unbalancedness	2.0%						
A:5K B:0K C:0K	output voltage	215.6	220.6	223.1	209.4	219.9	229.8	20.40
	output current	21.8	0	0	22	0	0	-0.92%
	degree of unbalancedness	2.3%						
A:10K B:0K C:0K	output voltage	214.4	220.1	225	206.6	216.4	235.9	29.30
	output current	43.5	0	0	43.8	0	0	0.68%
	degree of unbalancedness	3.1%						

十、Wiring terminals and switch positions

十一、Eleventh, Appearance of equipment

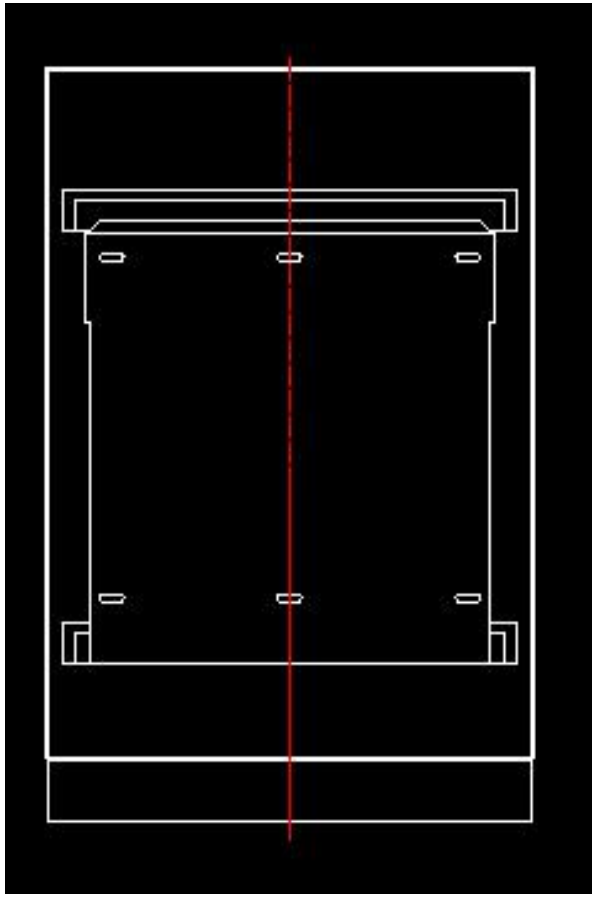


Product size
550*180*770

Installation method:
Wall hanging type

Weight:50Kg

十二、 Installation and fixing method



Fixed position and hole spacing: 6 fixed hole locations with a diameter of 8 mm.
The expansion bolt is recommended to be 8 mm.