SAFESAV

Frequency Inverter for Photovoltaic Water Pump

Many more

CAUTION:
- High voltage inside.

WARNING:
- Do not connect AC power to output terminals(U.V.W).
- Discharging time is greater than 5 seconds.
- Do not inspect components unless inside "LED" lamp is turned off.

Zhejiang Saikong Electrical Technology Co., Ltd.

SAFESAV

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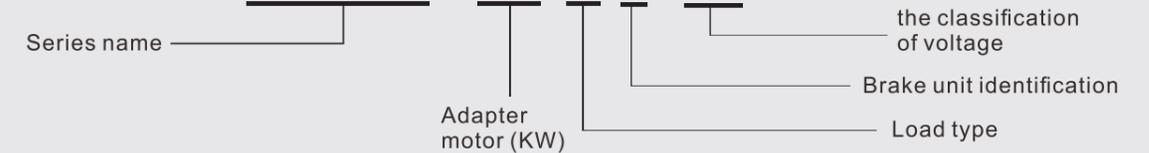
Product overview

SAFESAV Frequency Inverter for Photovoltaic water pump

0.75KW-22KW

- Built in high-precision photovoltaic array maximum power point tracking MPPT algorithm, ensuring solar power tracking efficiency of over 99%.

- Realize full day work. Being able to work from sunrise until sunset greatly improves the effective working time of photovoltaic water pumps in a day.

- Automatically adapt to weather changes. It effectively avoids the phenomenon that the system will stop when the traditional pump is suddenly overcast.

- The system has strong anti-interference ability, and the system can still work reliably in the well depth of 200 meters.

- Suitable for power supply shortage and all kinds of harsh environment.

- The external switching kit is added, and the inverter can automatically switch between the photovoltaic input and the grid input, so as to achieve 24 hours of continuous water supply needs.

- The new general-purpose inverter, which is completely self-developed, can be used to control the asynchronous AC induction motor.

- The product adopts space voltage vector control technology and DSP control system to strengthen the reliability and stability of the product.

- Support for two control modes: V/F control, sensorless vector control(SVC).

- Automatic torque lift and slip compensation.

- Fast acceleration and deceleration performance.

- Starting at 0.5Hz provides150% torque.

- The full speed range runs smoothly, and the speed stability accuracy is <0.5%.

- Adapt to the power grid voltage range of 200V-440V.

- The circuit board is thickened with three layers of anti-paint treatment to adapt to high temperature, high humidity, dust and other sites.

- Built-inRS485 communication.

- Support for external lead keyboard.

Frequency inverter product specifications

SAFESAV SN160PV - 5.5 G B - T4

- Series name
- Adapter motor (KW)
- Load type
- Brake unit identification
- the classification of voltage

Series name	SN160PV:Photovoltaic series pump frequency Inverter Description: The first SN160(box code)the second PV(C photovoltaic product code, empty represents asynchronous machine)
Machine type	Empty: standard version
	M:The MINI version
Adaptation power	0.7KW~22KW
load type	G: general type
Brake unit identification	Empty: not including the brake unit
	C: It contains the braking unit
the classification of voltage	S2: single-phase 220V, range from-15% to 20%
	T4:3-phase 380V, range of-15% to 20%

Product model selection guide

Product rating					
Frequency inverter model	Rated capacity (KVA)	Rated input current(A)	Rated output current (A)	Adapter motor (KW)	Adapter motor (HP)
single-phase 220V 50/60Hz					
SN160PV-0R7G-S2	1.5	8.2	4	0.75	1
SN160PV-1R5G-S2	3	14	7	1.5	2
SN160PV-2R2G-S2	4	23	9.6	2.2	3
three-phase 380V 50/ 60Hz					
SN160PV-0R7G-T4	1.5	3.4	2.1	0.75	1
SN160PV-1R5G-T4	3	5	3.8	1.5	2
SN160PV-2R2G-T4	4	5.8	5.1	2.2	3
SN160PV-3R7G-T4	6	10.5	9	3.7	5
SN160PV-5R5G-T4	11	13.9	13	5.5	7.5
SN160PV-7R5G-T4	15	18.9	17	7.5	10
SN160PV-11G-T4	30	27.8	25	11	15
SN160PV-15G-T4	37	37.9	32	15	20
SN160PV-18R5G-T4	44	46.7	37	18.5	25
SN160PV-22G-T4	60	55.6	45	22	30

Product photovoltaic specifications

Frequency Inverter model	SN160PV-0R7G-S2, SN160PV-1R5G-S2, SN160PV-2R2G-S2	SN160PV-0R7G-T4,SN160PV-1R5G-T4,SN160PV-2R2G-T4, SN160PV-3R7G-4T,SN160PV-5R5G-T4,SN160PV-7R5G-T4, SN160PV-11G-T4,SN160PV-15G-T4, SN160PV-18R5G-T4.SN160PV-22G-T4
DC input specifications		
Maximum input DC voltage DC	450VDC	800 VDC
Recommended VOC, and voltage range	360~430VDC	550~750VDC
Recommended MPPT voltage range	250~350VDC	450~600VDC
Starting voltage range	160-450 VDC (parameters adjustable)	300-800 VDC (parameters adjustable)

Functional specification

Model	0.75KW-22KW	
Output specifications		
Rated output voltage, AC	1PH 220V	3PH 380V
Output frequency range	0~ 500.00HZ	0~ 500.00HZ
Ac input		
Input voltage	AC,1PH,220V(-15%)~240V(+10%)AC,3PH,380V(-15%)~440V(+10%)	
Rated frequency	50/60H z	
Frequency range	±5%(47.5 ~63Hz)	
DC input		
Maximum input DC voltage DC	450VDC for 1PH	
	800VDC for 3PH	
Recommended VOC, and voltage range	360~430VDC for 1PH	
	550~750VDC for 3PH	
Recommended MPPT voltage range	250~350VDC for 1PH	
	450~600VDC for 3PH	
Starting voltage range	160-450 VDC (parameters adjustable) for for 1PH	
	300-800 VDC (parameters adjustable) for for 3PH	
Power output		
Output voltage	0 Input voltage	
Output frequency	0.1HZ~500HZ	
Output power	Refer to the Rated Values	
Output	Refer to the Rated Values	
Basic function		
Maximum frequency	Vector control:0-500Hz	
	V /F control:0-500 Hz	
Carrier frequency	0.8KHz ~ 8KHz; The carrier frequency can be automatically adjusted according to the load characteristics	
Input the frequency resolution	Number setting:0.01Hz	
	Analog setting: maximum frequencyx0.025%	
Control method	V/ F open-loop speed control; SVC open-loop vector control	
Pull-in torque	50Hz /150%(SVC)	
Speed range	1:100(SVC)	
Steady speed accuracy	±0.5%(SVC)	
overload capacity	150%,rated current 60s; 170% rated current 12s; 190% rated current 1.5s	
Recurrent ascension	Automatic torque lift; manual torque lift 0.1%~30.0%	
V/F curve	Three ways: straight; multipoint; N power V/F curve	
	1.2power, 1.4 power, 1.6 power, 1.8 power,2 power)	
V/F separation	2 ways: total separation, half separation	
Acceleration and deceleration curves	Linear or S-curve acceleration and deceleration mode. Two kinds of acceleration and deceleration time, acceleration and deceleration time range 0.0~6500.0s	
DC injection braking	DC brake frequency:0.00Hz~ maximum frequency	
	Brake time: 0.0s~36.0s	
	Brake action current value:0.0%~100.0%	
Electronic control	Point movement frequency range:0.00Hz~ maximum frequency (default 5Hz). Dot-action acceleration and deceleration time is 0.0s ~6500.0s	
Built-in PID	It is convenient to realize the closed-loop control system of process control	
Automatic Voltage Regulation(AVR)	When the grid voltage changes, it can automatically keep the outputvoltage constant	
Stalling control of	Automatic current and voltage limit during operation to prevent frequent	
Over voltage and overcurrent	overvoltage trip	

## Frequency inverter product specifications

Model	0.75KW-22KW
Fast current limiting function	Minimize the overcurrent fault and protect the normal operation of the frequency inverter
Torque limit and control	The "excavator" feature automatically limits the torque during operation to prevent frequent overcurrent tripping
Personalized functions	
Instantly stop	In the case of instantaneous power decrease, using load feedback energy to compensate for voltage drop to control motor deceleration to a stop state to prevent mechanical damage
Fast current limiting	Avoid frequent overcurrent failure of frequency inverter
Timing control	Timing control function: set the time range of0.0Min~6500.0Min
Multi-threaded bus support	Supports one type of fieldbus:Modbus
The MPPT tracking function	Built-in adaptive high-precision photovoltaic array maximumpower pointtracking
Automatic switchover	Suitable for photovoltaic power supply and municipal power automatic switching of water pump application
Input/ output	
Command source	Operation panel given, control terminal given, serial communication port given. It can be switched in various ways
Frequency source	5 frequency sources: digital given, analog voltage given, analog current given, pulse given, serial portgiven. It can be switched in various ways
Auxiliary frequency source	And 5 auxiliary frequency sources. It can flexibly assist frequency fine-tuningand frequency synthesis
Input terminal	5 digital input terminals, one of which supports a high-speed pulse input of up to50kHz (The reduced version has only 4 digital input terminals)
	1 analog input terminal, support 0~ 10V voltage input or 0~20 mA,current input
	1 rotary potentiometer analog quantity input
Leading-out terminal	1 high-speed pulse output terminal, supporting 50kHzsquare wave signal output
	1 relay output terminal
	1 analog output terminal, support 0~20mA current output or 0~10V voltage output

General specifications

Display key	
LED display	Display parameters
Key lock and function selection	To achieve partial or total key lock, define the scope of some keys to prevent misoperation
Protection function	Short-circuit detection, output phase loss protection, overcurrent protection, overvoltage protection, undervoltage protection, overheat protection, overload protection, underload protection, weak light protection, etc
Environment	
Storage environment	-20°C~60°C
Working temperature	-10 ° C to 50 * C (If the temperature exceeds 40 *C, the derating should be reduced by 1% for every 1 *C increase)
Storage humidity	<95% RH
Working humidity	<95% RH
Noise	50dBA max
Else	
Safe	IEC 61800-5-1
Communication	
Communication port	RS -485

Product specifications are subject to change without prior notice
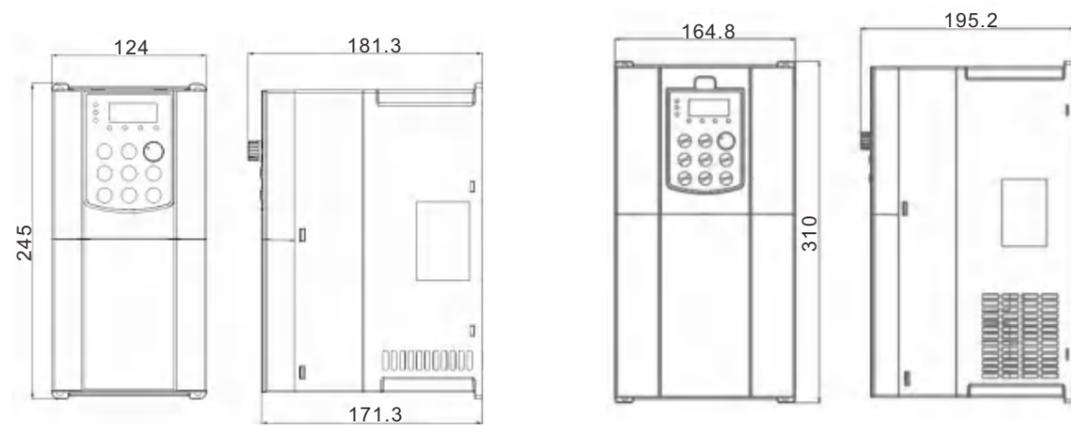
Installation size(mm)
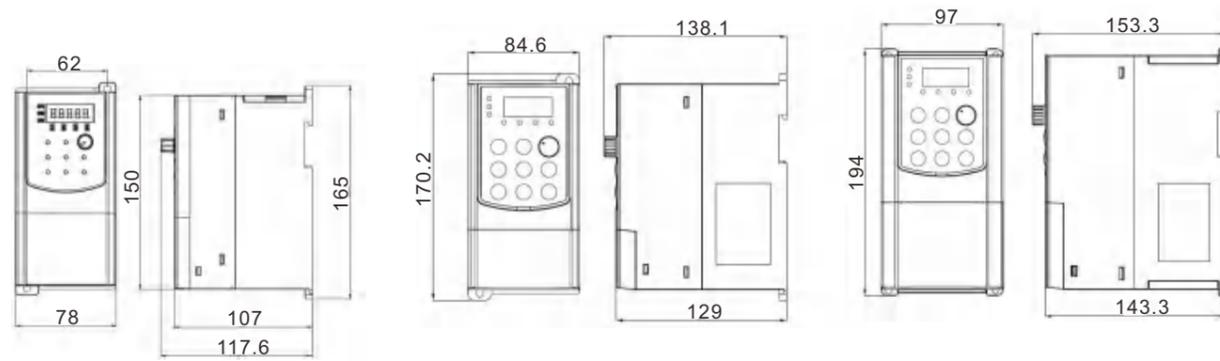
0.75KW-2.2KW
(SN160PVMmachine type)

0.75KW-2.2 KW

3.7KW-5.5KW

7.5KW-11KW

15KW-22KW

0.75KW-22KW installation size

Frequency inverter model	Installation hole position (mm)		Outline dimension (mm)			Installationa perture (mm)	weight kg
	A	B	H	W	D		
SN160PV-0R7G-S2	62	152	165	78	117	5.5	0.7
SN160PV-1R5G-S2							
SN160PV-2R2G-S2	67.3	157.5	170.2	84.6	138.1	5	1
SN160PV-0R7G-T4							
SN160PV-1R5G-T4							
SN160PV-2R2G-T4							
SN160PV-3R7G-T4	85	184	194	97	153.5	4	1.5
SN160PV-5R5G-T4							
SN160PV-7R5G-T4	107	235	245	124	168	5.5	3.5
SN160PV-11G-T4							
SN160PV-15G-T4	147	298	310	164.8	195.2	5.5	5.5
SN160PV-18R5G-T4							
SN160PV-22G-T4							

Control terminal position and function description
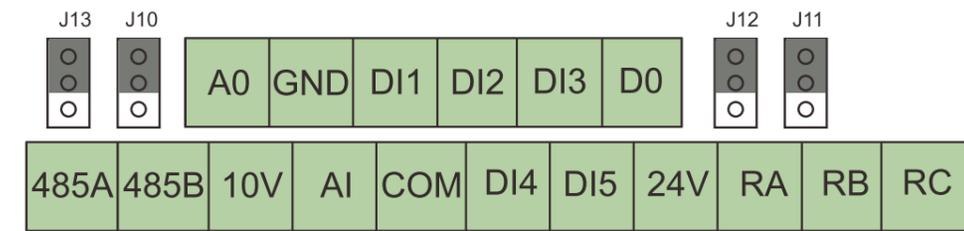
Schematic diagram of control terminals

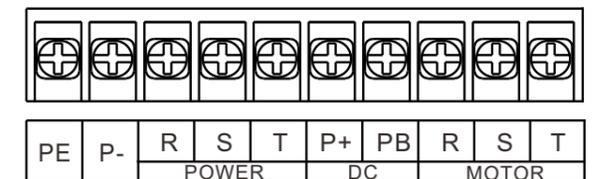| Class	Terminal label	Name	Terminal function description
Communication	485A	Rs485 Communication interface	RS 485 differential signal positive end
	485B		RS 485 differential signal negative end
Analog input	AI	Analog input terminal	Receive the analog voltage / current input
Analog output	AO	Analog output terminal	Provide an analog voltage / current output
Digital input	DI1	Digital input terminal1	Normal digital input
	DI2	Digital input terminal2	Normal digital input
	DI3	Digital input terminal 3	Normal digital input
	DI4	Digital input terminal 4	Normal digital input(SN160PVM: Normal digital input /high-frequency pulse input)
	DI5	Digital input terminal 5	Normal digital input / high-frequencypulse input(SN160PVM: without this terminal)
Numeric output	DO	Digital output terminal	Normal digital output /high-frequencypulse output
Source	10V	External +10V powersupply	Provide a + 10V power supply
	GND	External +10V powersupply ground	
	24V	External +24V powersupply	Provide a + 24V power supply (SN160PVM:COM is shared with GND)
	COM	External+24V powersupply ground	
Relay output	RA/RB	relay output	Often closed terminal
	RA/RC		Often open terminal

Location and function description of 0.75KW~22KW main loop terminals

0.75KW-2.2KW Main loop terminal diagram
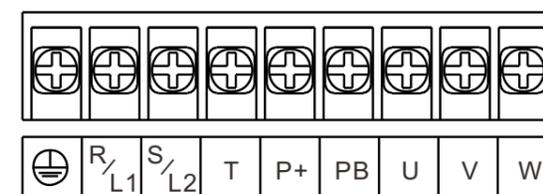
15KW-22KW Main loop terminal diagram
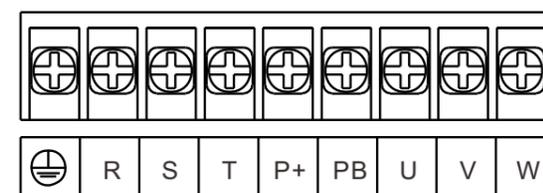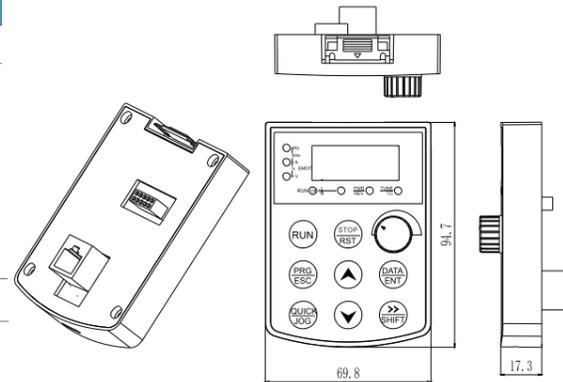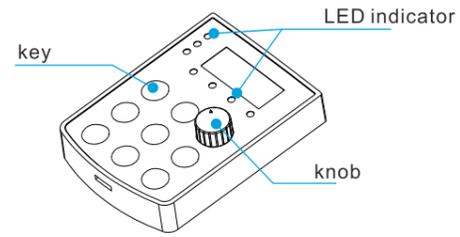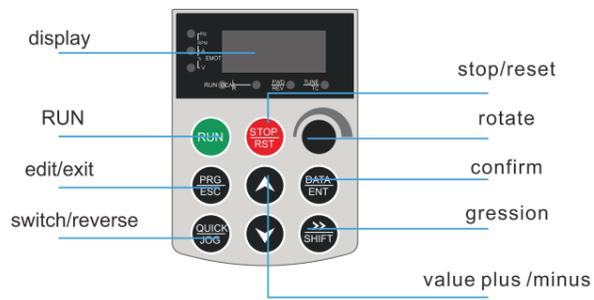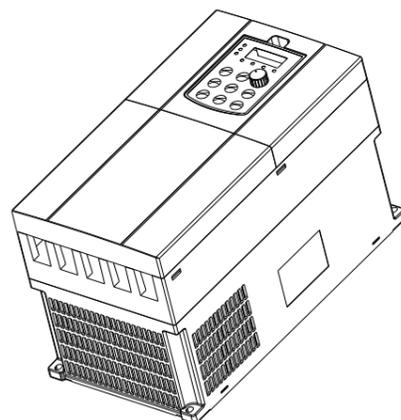

3.7KW-18.5KW Main loop terminal diagram
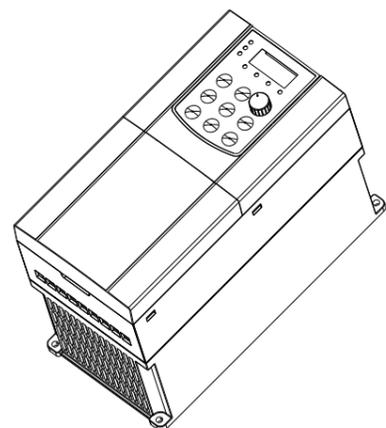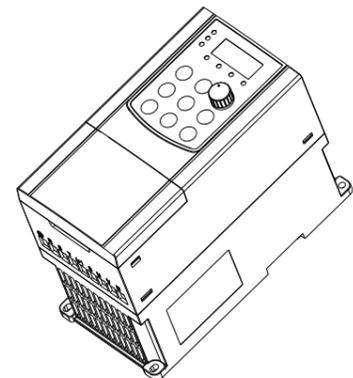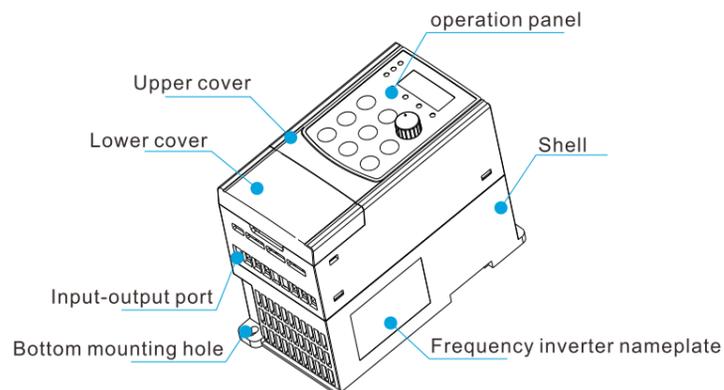
Terminal symbol	Terminal name and function description
⏚	Safety ground terminal
R、S、T L1、L2	Three-phase AC input terminal Single-phase AC input terminal
P+、PB	PV input terminal
U、V、W	Three-phase AC output terminal

Operation panel

display
RUN
edit/exit
switch/reverse
stop/reset
rotate
confirm
gression
value plus /minus

key
LED indicator
knob

Name	Function Description
Edit/ exit	Level 1 menu in or out
Confirm	Enter the menu screen, set parameters to confirm
Value plus /minus	Increment/decrement of data or function code
Gression	In the stop display interface and the running interface, you can rotate left to select the display parameter. When modifying the parameter, you can select the parameter modification bit
Run	It is used to run operations in keyboard mode
Stop / reset	In the running state, press this key to stop the running operation. When the fault alarm state is restricted by the function code P.04, all control modes can be used for this key to recover the operation
Revolve	Adjust the rate, adjust the frequency

94.7
69.8
17.3

operation panel
Upper cover
Lower cover
Shell
Input-output port
Bottom mounting hole
Frequency inverter nameplate

Advantageous characteristics

Flexible use of space

Provides high configuration flexibility to improve installation efficiency .

Wall-mounted
Installation of guide rail

Lows peed and high torque

150% starting torque and 0.5Hz low speed control improve equipment low speed control performance

Torque (Nm)
Frequency (Hz)
A brand torque (Nm)
F mode
Voltronic Power torque (Nm)

SVC mode
Torque (Nm)
Frequency (Hz)
A brand torque (Nm
Voltronic Power torque (Nm)
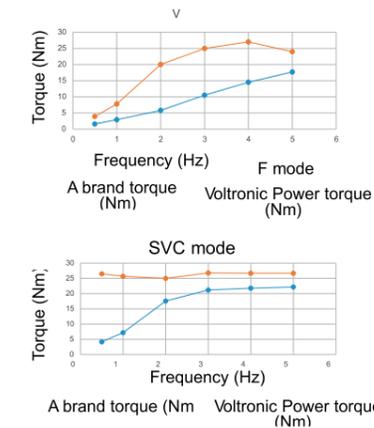
## Control current to exte motor life

After installing a frequency converter, the instantaneous current of the motor does not increase during startup, which not only saves costs but also prolongs the lifespan of the motor
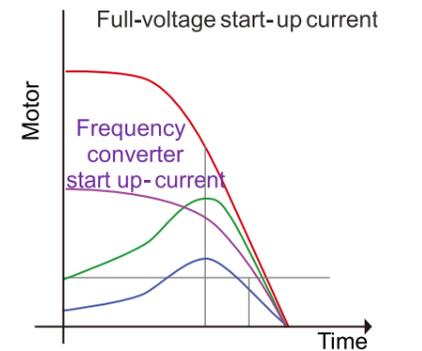

Full-voltage start-up current
Motor
Frequency converter start up- current
Time
Current change chart from start to stop

Three layer sof thick anti-paint treatment

Ensure stability and safety incriticalenvironments .

Anti-corrosion coating
Dampproof coating
Dustproof coating
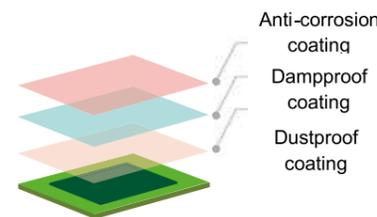
Built-in sensor assisted power supply

It is equipped with 10V and 24V auxiliary power supply, which is convenient for different voltage level sensors

Power supply
Sensor
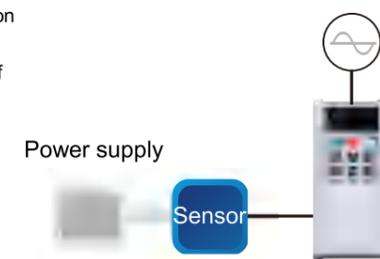
Multiple programmable I/O terminals

Safsav offers multiple programmable digital and analog input and output terminals to suit different applications
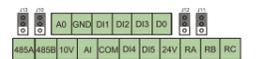
Seamless side by side installation

Supports seamless side-by-side installation, saving installation space .
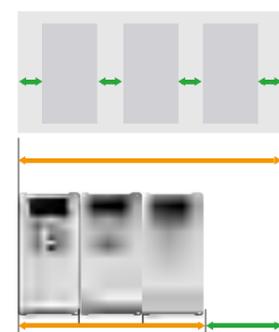
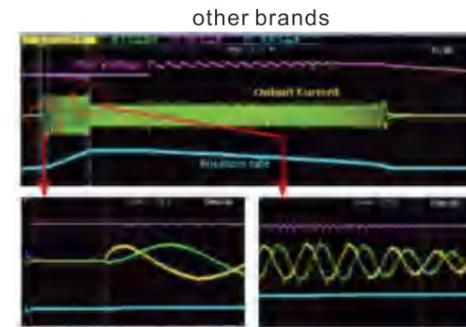Installation space is saved!

External digit operation panel

Support one-click setting of industry parameters, can be pulled out as a remote operation

Comparison of capabilities with other brands

Same motor, same setting parameters(acceleration 0.1 seconds, deceleration 1 second), performance comparison results:
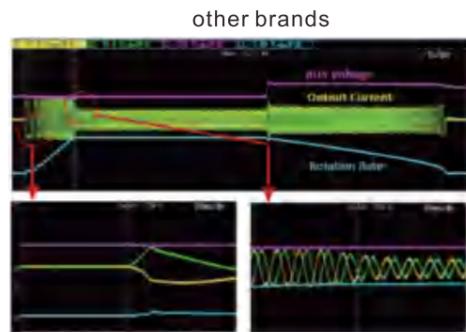
Accelerated waveform

SAFESAV

other brands

Acceleration time measured1.06s
Short acceleration time and accurate current control

Acceleration time measured1.06s
Short acceleration time
and accurate current control

Deceleration waveform

SAFESAV

other brands

Deceleration time measured 3.94s
The bus voltage control is stable and straight, and the current waveform is smooth

Deceleration time measured 5.25sBus voltage oscillation, large fluctuation in output current, and abnormal noise from the motor
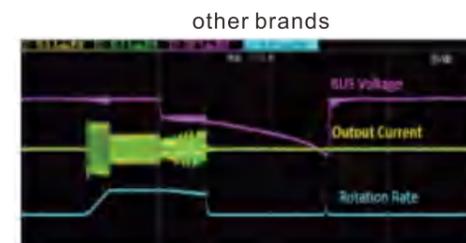
load wave form Sudden loading and unloading 150%

SAFESAV

other brands
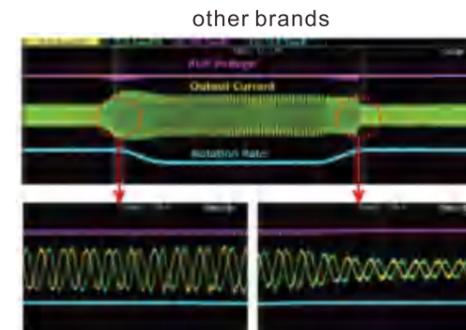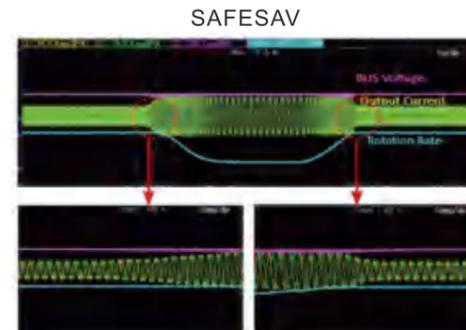
Fast dynamic response , and the current limit is smooth and perfect

Slow dynamic response, oscillation of current waveform, and large fluctuation of current limiting point

Instantaneous stopwaveform

SAFESAV

other brands

After the power failure, the power failure time is 10s, and the motor stops stably

After the power failure, the power failure time is 3s, the undervoltage alarm is reported, and the motor is free to stop

Standard wiring diagram
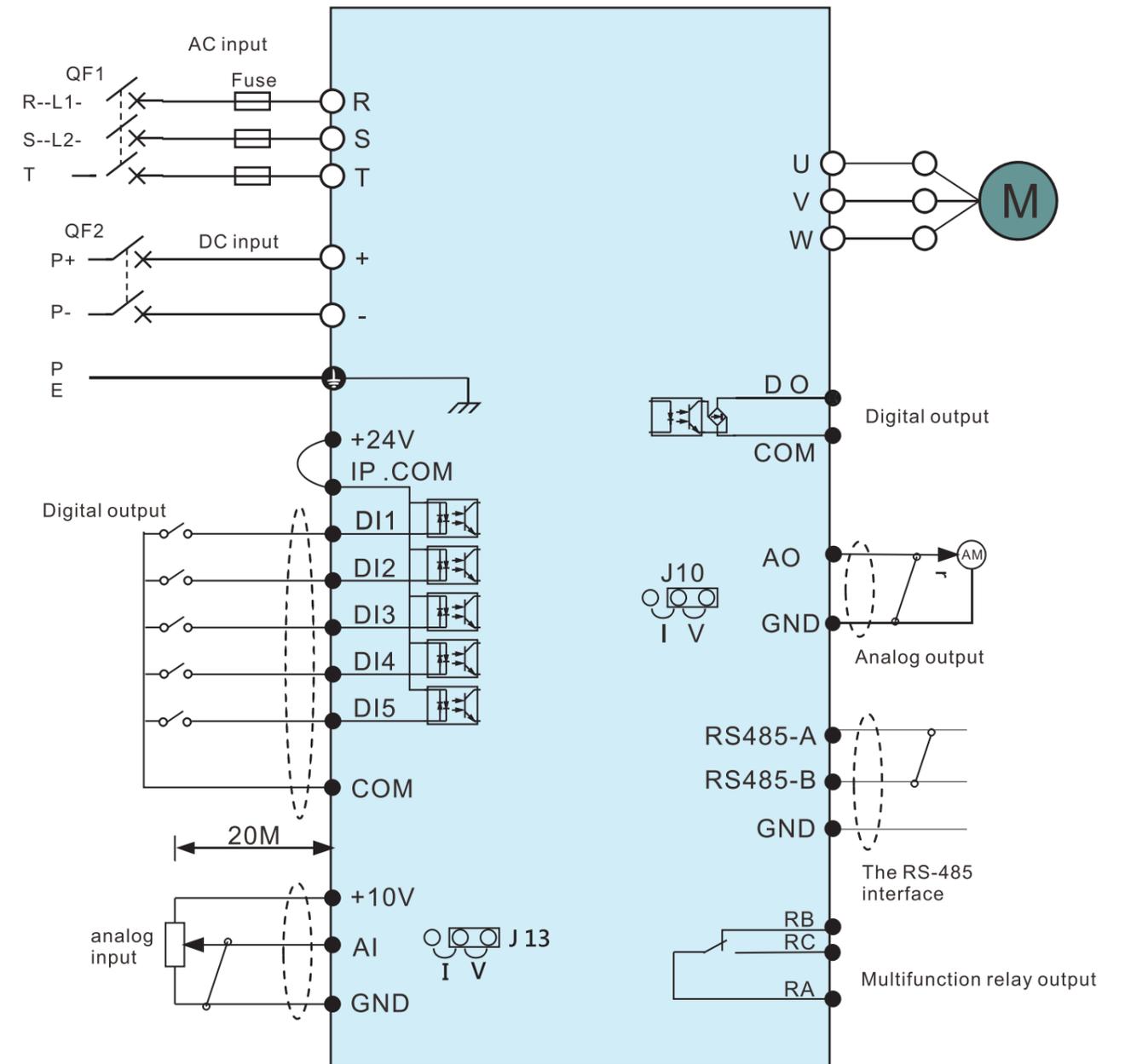
Pay attention to:
1.SN160 PVM without Di5, its high-speed pulse is Di4.
2.SN160 PVM without COM, COM is shared with GND.

Wiring standard

Frequency inverter model	Recommended cable size (mm ^{2})				fix screw	
	R S T	PE	P1(+)	PB(+)	Terminal screw specifications	Tightening torque(Nm)
	U V W			(-)		
SN160PV-0R7G-S2	2.5	2.5	2.5	2.5	M3	0.8
SN160PV-1R5G-S2	2.5	2.5	2.5	2.5	M3	0.8
SN160PV-2R2G-S2	4	4	4	4	M4	1.2~1.5
SN160PV-0R7G-T4	1.5	1.5	1.5	1.5	M4	1.2~1.5
SN160PV-1R5G-T4	1.5	1.5	1.5	1.5	M4	1.2~1.5
SN160PV-2R2G-T4	2.5	2.5	2.5	2.5	M4	1.2~1.5
SN160PV-3R7G-T4	2.5	2.5	2.5	2.5	M4	2~2.5
SN160PV-5R5G-T4	2.5	2.5	2.5	2.5	M4	1.3-1.5
SN160PV-7R5G-T4	4	4	4	4	M4	1.3-1.5
SN160PV-11G-T4	6	6	6	6	M4	M1.3-1.54
SN160PV-15G-T4	10	10	10	10	M5	2~2.5
SN160PV-18R5G-T4	10	10	10	10	M5	2~2.5
SN160PV-22G-T4	10	10	10	10	M5	2~2.5

Product quality assurance

Professional R&D team

- More than 300 experienced R&D engineers in the power electronics industr

- Promote intellectual property rights, encourage patent applications, advocate and educate all employees about intellectual property rights

- Professional laboratory, strict verification of products to ensure product quality

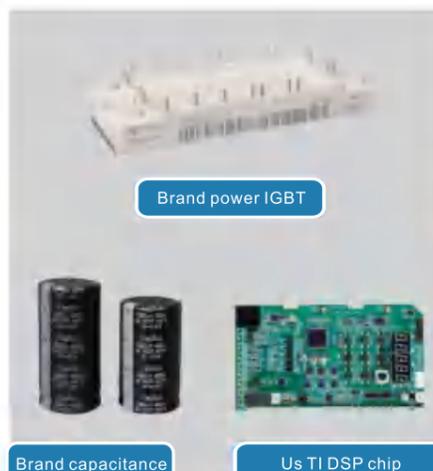## Important parts choose the international top brans

- All important parts are made of international leading brands to ensure product quality and life cycle

Scale and efficient manufacturing

- A total of four production sites: Shenzhen, Zhongshan, Vietnam and Taiwan, with a total of more than 123,000 square meters

- With economies of scale, semi-automated production and processes to meet customer needs for real-time and production to order.
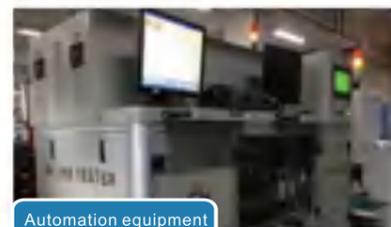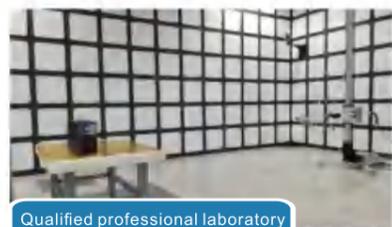
Strong R&D team

Qualified professional laboratory

Brand power IGBT

Brand capacitance

Us TI DSP chip

Production line

Automation equipment

Product application

Product application

photovoltaic module

frequency inverter

power grid

Lift is between 0-200 meters

The well is 200 meters deep

water pump

frequency inverter
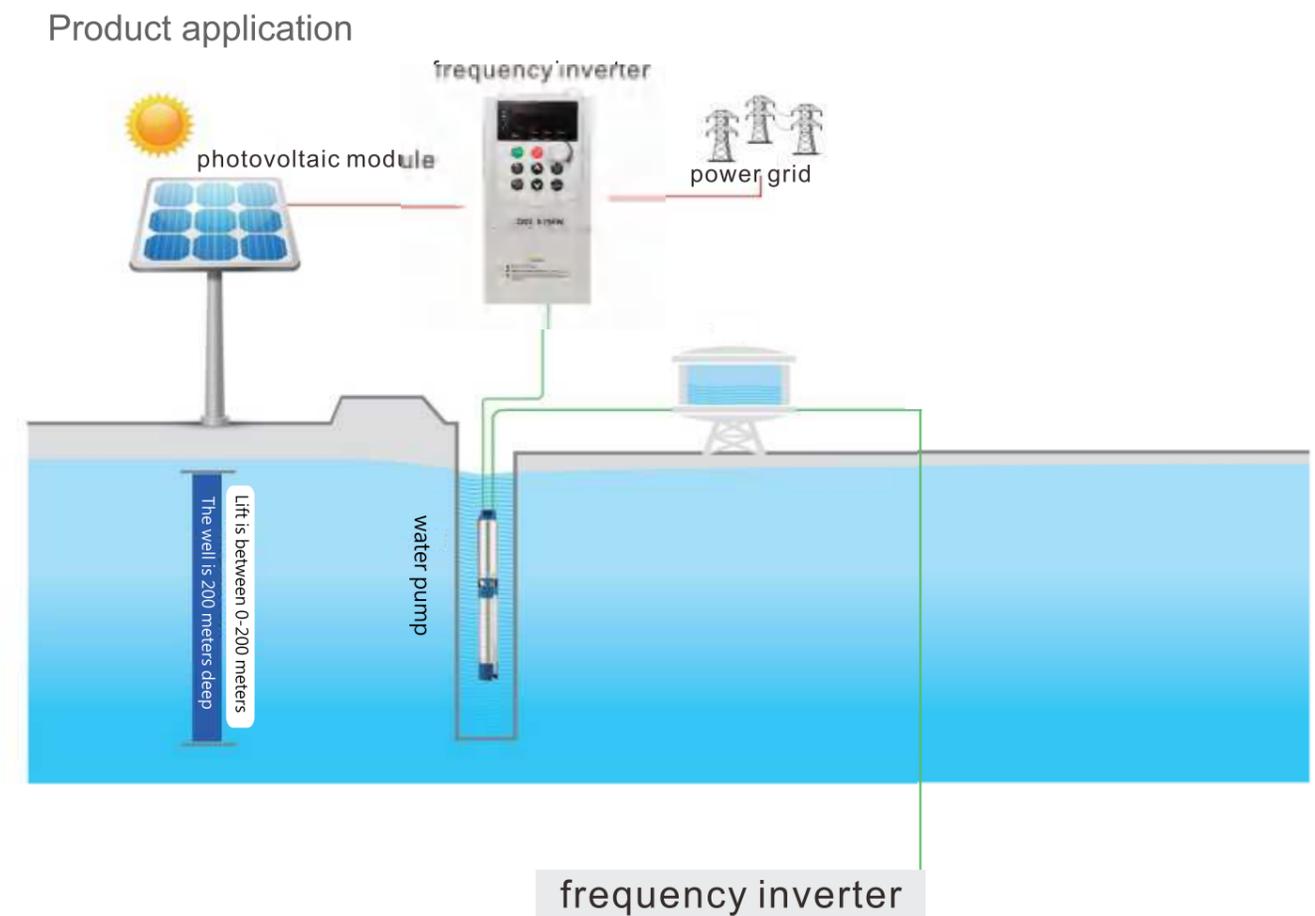
Apply to industry

Abandoned mountain management

ecological management

irrigation system

Protection against soil and water loss

Sewage purification system

Protection against soil and water loss