# Chapter 1 Safety Requirement and Cautions

To ensure safety of your health, equipment and property, please read this chapter carefully before using the frequency inverter and act in compliance with the instructions when installing,ebugging, running and overhauling the frequency inverter.

## 1.1 Safety Definition

Danger: it will cause danger of serious injuries and even death while operating against the rules.

Caution: it will cause danger of light injuries or equipment destruction while operating against the rules.

Note: some information is useful while operating and use frequency inverter.

## 1.2 Safety Requirements and Cautions

### ●Before Installation

| Danger |
|---|
| 1. Only qualified personnel can operate the equipment. Before operating, be sure to carefully read the manual about safety, installation, operation and maintenance. The safe operation depends on the proper processes of choosing models, carrying, installation, operation and maintenance. |

| Danger |
|---|
| 1. Don't use the damaged or incomplete frequency inverters; Otherwise, there is risk of injury. |

### ●Installation

| Danger |
|---|
| 1. Please install the frequency inverter on metal or other nonflammable material, and keep it away from the combustible material. Otherwise there is danger of fire;<br>2. No unauthorized modification to the frequency inverter; Otherwise there is danger of damaged.<br>3. Normal frequency inverter, which is not explosion-proof, can not be installed where with explosive gas or dust; Otherwise there is danger of explosion. |

| Attention |
|---|
| 1. When two frequency inverters are installed in the same control cabinet, pleas pay attention to the installing place to guarantee the effective heat dissipation.<br>2. When carrying the frequency inverter, ease support its bottom. |

### ●Wiring

| Danger |
|---|
| 1. Wire is connected only when the main circuit is cut off, otherwise there is a danger of shock.<br>2. Wire is connected by professional person only. Otherwise there is a danger of shock.<br>3. Earth must be reliable. Otherwise there is a danger of shock.<br>4. AC power supply should not be connected with output ports U, V, W, otherwise there is a danger of damage to frequency |

inverter.

5. No drop of bolt, spacer, metal stick, conducting wire or other things into the inner of frequency inverter; Otherwise there is a danger of fire or damage to frequency inverter.

**Attention**

1. If the damage to frequency inverter or other equipment is caused by improper wiring and utilization or unauthorized alteration, the user should shoulder all responsibilities.
2. Please make sure all wirings meet EMC requirement and satisfy safety standard in the local area; Please refer to recommendations in this manual or national standards of wire diameter to avoid accidents.
3. Static electricity on human body would seriously damage internal MOS transistor, etc. No touch the printed circuit boards, IGBT or other internal devices without anti-static measure, otherwise it will cause the malfunction of frequency inverter.
4. Please don't connect phase shifter capacitance or LC/RC noise filter to the output circuit of frequency inverter; Otherwise it will damage the frequency inverter.
5. Please don't connect the magnetic switch or magnetic contactor to the output circuit of frequency inverter; When frequency inverter is in the operation with load, magnetic switch or magnetic contactor can make inverter over-current protection function act. It will damage frequency inverter seriously.
6. Please don't disassemble the panel cover, it only needs to disassemble the terminal cover when wiring.
7. It is forbidden to do any pressure test on frequency inverter, otherwise it will damage the frequency inverter.

## ●Before Electrification

**Danger**

1. Please make sure that voltage grade of power supply is consistent with frequency inverter's voltage and then check whether the wiring is correct and firm, and whether there is short circuit in peripheral equipment's circuit. Otherwise it will damage frequency inverter and other equipment.
2. Before the frequency inverter is connected to the input power supply, make sure that the cover has been well fixed. Otherwise it will cause electric shock.
3. For the frequency inverters whose storage time is over 1 year, when electrification, the voltage should be raised by booster from low to high. Otherwise it will damage the frequency inverter.

**Attention**

1. Check if all periphery fittings are wired properly according to the handbook; Otherwise it will cause accidents.

## ●After Electrification

**Danger**

1. After electrified, it is forbidden to open the cover, make wiring, and check up; Otherwise, it will cause the danger of electric shock.
2. After electrified, it is forbidden to contact internal wiring board and its parts. Otherwise it will cause the danger of electric shock.
3. Do not operate or touch frequency inverter with wet hand. Otherwise there is danger of damage to frequency inverter and electric shock.

**Attention**

1. Please set the parameter of frequency inverter cautiously; Otherwise it will damage equipment.

## ●Operation

| Danger |
|---|
| 1. Before running, please check and confirm the application range of the machine and equipment once more; Otherwise it will cause accidents.<br>2. Please don't touch the cooling fan and braking resistance to check the temperature; Otherwise there is a danger of getting burn.<br>3. Unprofessional workers are banned to check the signals in the running stage; Otherwise it will cause injuries and damage the equipment. |

| Attention |
|---|
| 1. Please don't turn off the equipment by switching off power; Please cut off the power supply after the electric machine stops running; Otherwise it will damage the frequency inverter.<br>2. Please avoid anything dropping into the equipment when the frequency inverter is running; Otherwise it will cause electric shock. |

## ●Maintenance

| Danger |
|---|
| 1. Please don't maintain and repair the equipment with electric; Otherwise it will cause electric shock.<br>2. Before maintaining and repairing the frequency inverter, please make sure the indicator lights of power supply have completely turned off; Otherwise it may cause electric shock and damage the frequency inverter.<br>3. Persons who have not passed specialized train are not allowed to conduct the frequency inverter maintenance; Otherwise it may cause electric shock and damage the frequency inverter. |

## 1.3 Cautions in Using

1. In application of this series frequency inverter, you have to confirm all machine insulation to prevent damage to the equipment. Moreover, when the motor working in tough environment, please periodic inspect the electrical insulation to ensure the safety of the system work.
2. If the motor adapter is not consistent with frequency inverter's rating current (The rating current of the motor is far smaller than that of frequency inverter), please adjust the protective value to ensure safe running.
3. In occasions such as load raises, usually there is negative torque and frequency inverter breaks off for over-current or over-voltage. In this case, you should consider choosing the matching brake unit.
4. Frequency inverter, in a certain output frequency range, can meet the mechanical resonance of the load equipment. To avoid it, you can set up jumping frequency.
5. As output voltage of the inverter is pulse-wave type, if there is capacity which can improve power factor or pressure-sensitive resistance which used for thunder-proof in the voltage output side, the frequency inverter will break off or its parts will be damaged, so it is necessary to dismantle them. Moreover, it is proposed not install switch parts like air switch and contactor (if it is necessary to install switch on output side, please make sure the output electricity of frequency inverter is zero when the switch is working)
6. At over 1,000 meters altitude, the inverter’s heat dissipation function worsened due to the thin air, it is necessary to use

less.

7. The inverter output voltage is pulse wave type. If using digital multi-meter measurement, deviation of the reading will be great. And the deviation is different by using different type of digital multi-meter. Under normal circumstances, while RMS 380V, digital multi-meter reading is around 450V.
8. Solar panel can be connected in the series or parallel. For rated voltage 380V controller, we suggest working voltage between 480V and 560V while MPPT. What means the solar panel open circuit voltage should be between 600V and 700V.

## 1.4 Technical Specification

| Solar pump inverter power(KW) | Pump | | Max solar power input (KW) | Max DC input voltage V | Recommend Voc voltage (V) | Rated output current (A) | Output frequency (Hz) |
|---|---|---|---|---|---|---|---|
| | Rated power (KW) | Rated voltage (V) | | | | | |
| **SI23-D1 series, DC60-400VDC input, 3 phase 110-230VAC output** | | | | | | | |
| 0.75 | 0.75 | 110 | 1.5 | 400 | 175~380 | 7A | 0-600 |
| 1.5 | 1.5 | 110 | 2.25 | 400 | 175~380 | 10A | 0-600 |
| **SI23-D3 series,DC150V-450V input, 3 phase 220-240VAC output** | | | | | | | |
| 0.75 | 0.75 | 220 | 3.0 | 450 | 360~430 | 4A | 0-600 |
| 1.5 | 1.5 | 220 | 3.0 | 450 | 360~430 | 7A | 0-600 |
| 2.2 | 2.2 | 220 | 3.3 | 450 | 360~430 | 10A | 0-600 |
| 4 | 4 | 220 | 6 | 450 | 360~430 | 16A | 0-600 |
| **SI23-D5 series,DC250V to 780VDC input, 3 phase 380-460VAC output** | | | | | | | |
| 0.75 | 0.75 | 380 | 4 | 800 | 620～750 | 3.0 | 0-600 |
| 1.5 | 1.5 | 380 | 4 | 800 | 620～750 | 4.0 | 0-600 |
| 2.2 | 2.2 | 380 | 4 | 800 | 620～750 | 6.0 | 0-600 |
| 4 | 4 | 380 | 6 | 800 | 620～750 | 10 | 0-600 |
| 5.5 | 5.5 | 380 | 8.5 | 800 | 620～750 | 13 | 0-600 |
| 7.5 | 7.5 | 380 | 11 | 800 | 620～750 | 17 | 0-600 |
| 11 | 11 | 380 | 16 | 800 | 620～750 | 25 | 0-600 |
| 15 | 15 | 380 | 22.5 | 800 | 620～750 | 32 | 0-600 |
| 18.5 | 18.5 | 380 | 27.7 | 800 | 620～750 | 38 | 0-600 |
| 22 | 22 | 380 | 33 | 800 | 620～750 | 45 | 0-600 |
| 30 | 30 | 380 | 45 | 800 | 620～750 | 60 | 0-600 |
| **SI23-T3 series,DC350V to 780VDC input,3phase 380-440VAC output** | | | | | | | |
| 37 | 37 | 380 | 57 | 800 | 620～750 | 75 | 0-600 |
| 45 | 45 | 380 | 69 | 800 | 620～750 | 90 | 0-600 |
| 55 | 55 | 380 | 85 | 800 | 620～750 | 110 | 0-600 |
| 75 | 75 | 380 | 115 | 800 | 620～750 | 150 | 0-600 |
| 90 | 90 | 380 | 135 | 800 | 620～750 | 180 | 0-600 |
| 110 | 110 | 380 | 165 | 800 | 620～750 | 210 | 0-600 |
| 132 | 132 | 380 | 198 | 800 | 620～750 | 250 | 0-600 |
| 160 | 160 | 380 | 240 | 800 | 620～750 | 310 | 0-600 |
| 185 | 185 | 380 | 280 | 800 | 620～750 | 340 | 0-600 |
| 200 | 200 | 380 | 300 | 800 | 620～750 | 380 | 0-600 |
| 220 | 220 | 380 | 330 | 800 | 620～750 | 415 | 0-600 |
| 250 | 250 | 380 | 375 | 800 | 620～750 | 470 | 0-600 |
| 280 | 280 | 380 | 420 | 800 | 620～750 | 510 | 0-600 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 315 | 315 | 380 | 473 | 800 | 620～750 | 600 | 0-600 |
| 335 | 335 | 380 | 503 | 800 | 620～750 | 670 | 0-600 |
| 400 | 400 | 380 | 600 | 800 | 620～750 | 750 | 0-600 |
| 450 | 450 | 380 | 675 | 800 | 620～750 | 810 | 0-600 |
| 500 | 500 | 380 | 750 | 800 | 620～750 | 860 | 0-600 |
| 560 | 560 | 380 | 840 | 800 | 620～750 | 990 | 0-600 |

## 1.5 Cautions in Disposal

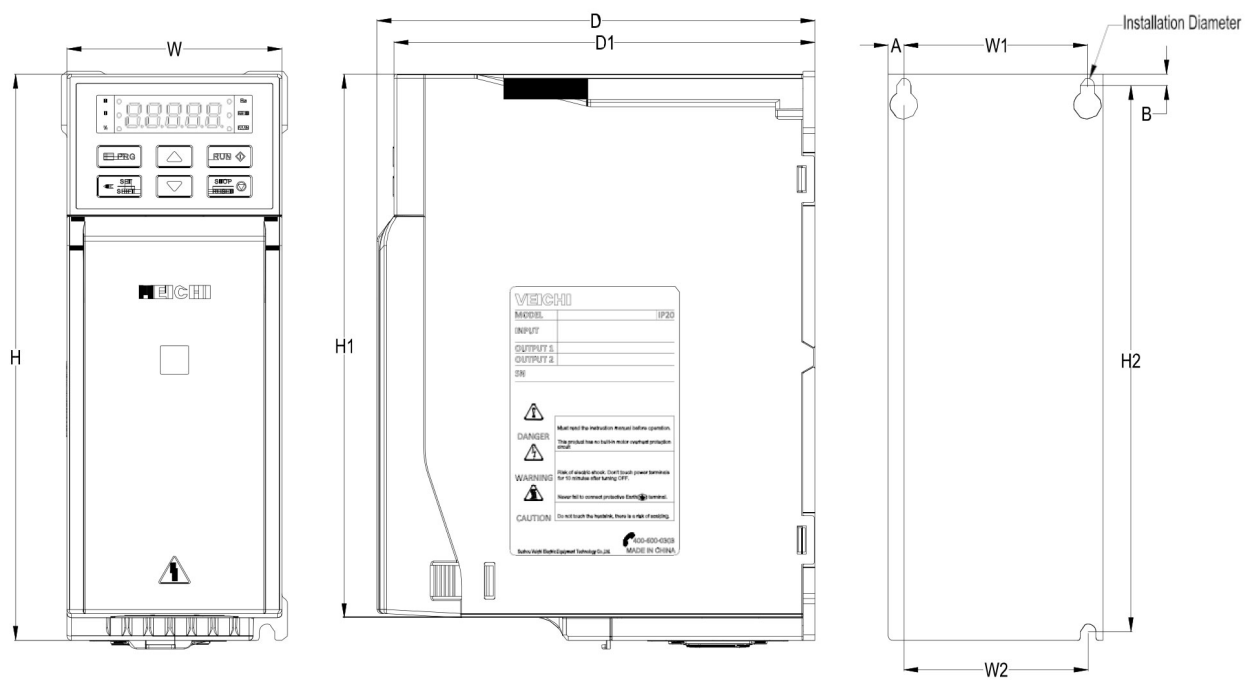
When you dispose frequency inverter please pay attention to:

1. Electrolytic capacitor: the electrolytic capacitor of main circuit or the printing plant may explode when they are burned.
2. Plastic: plastic incineration may generate toxic gases.
3. Dispose method: please dispose as industrial waste.

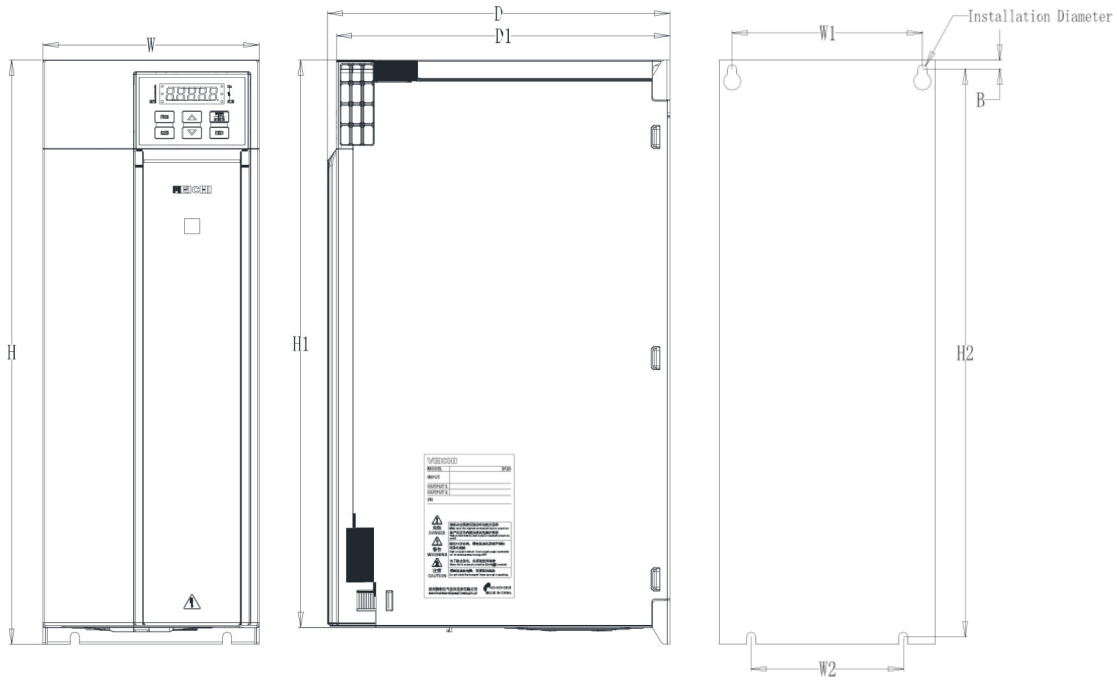
# Chapter 2 Installation and Wiring

## 2.1 Dimension of Inverter

### Overall Dimension of Inverter (Plastic)

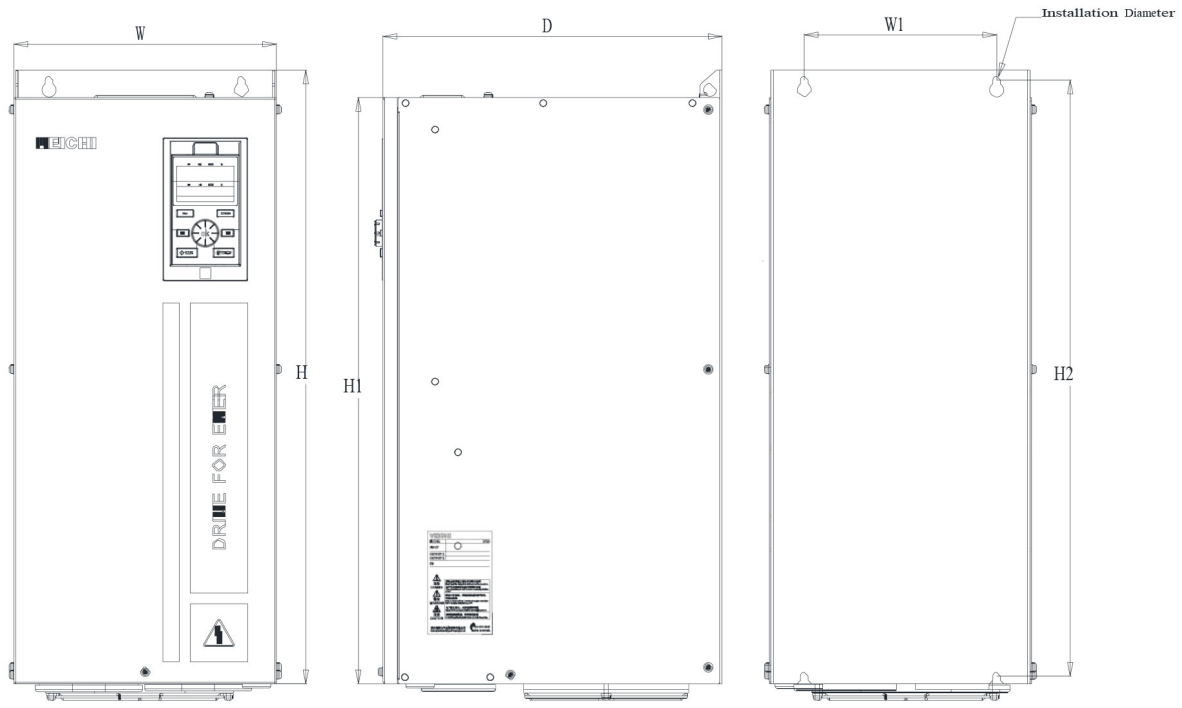



| MODEL | Overall Dimension(mm) | | | | | Installation Dimension(mm) | | | | | Apertu re |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | W | H | H1 | D | D1 | W1 | W2 | H2 | A | B | |
| SI23-D3-R75G | 76 | 200 | 192 | 155 | 149 | 65 | 65 | 193 | 5.5 | 4 | φ3-M4 |
| SI23-D3-1R5G | | | | | | | | | | | |
| SI23-D3-2R2G | 100 | 242 | 231 | 155 | 149 | 84 | 86.5 | 231.5 | 8 | 5.5 | φ3-M4 |
| SI23-D3-004G | | | | | | | | | | | |
| SI23-D5-R75G | 76 | 200 | 192 | 155 | 149 | 65 | 65 | 193 | 5.5 | 4 | φ3-M4 |
| SI23-D5-1R5G | | | | | | | | | | | |
| SI23-D5-2R2G | | | | | | | | | | | |
| SI23-D5-004G | 100 | 242 | 231 | 155 | 149 | 84 | 86.5 | 231.5 | 8 | 5.5 | φ3-M4 |
| SI23-D5-5R5G | | | | | | | | | | | |
| SI23-D5-7R5G | 116 | 320 | 307.5 | 175 | 169 | 98 | 100 | 307.5 | 9 | 6 | φ3-M5 |
| SI23-D5-011G | | | | | | | | | | | |




| MODEL | Overall Dimension(mm) | | | | | Installation Dimension(mm) | | | | Aperture |
|---|---|---|---|---|---|---|---|---|---|---|
| | W | H | H1 | D | D1 | W1 | W2 | H2 | B | |
| SI23-D5-015G | 142 | 383 | 372 | 225 | 219 | 125 | 100 | 372 | 6 | ф4-M5 |
| SI23-D5-018G | | | | | | | | | | |
| SI23-D5-022G | | | | | | | | | | |
| SI23-D5-030G | 172 | 430 | / | 255 | 219 | 150 | 150 | 416.5 | 7.5 | ф4-M5 |
| SI23-T3-037G | | | | | | | | | | |

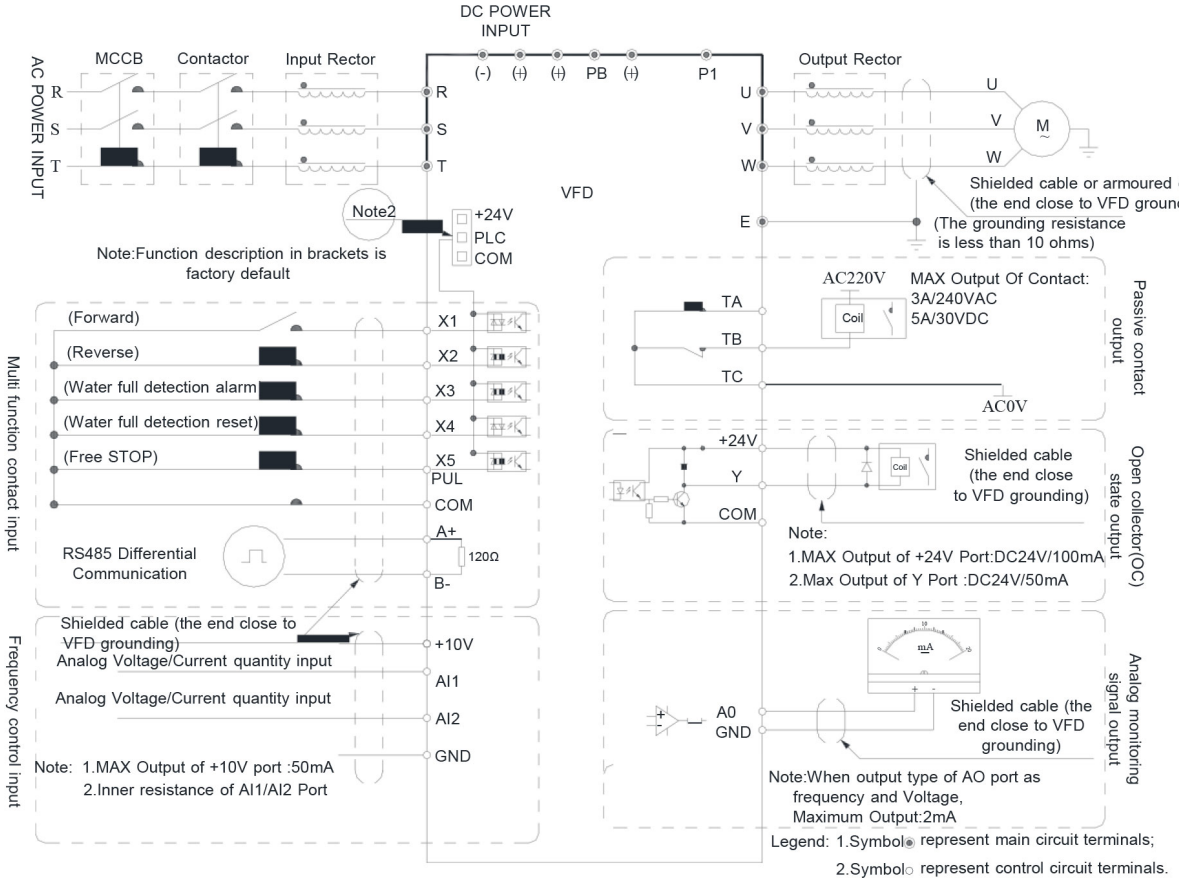
**Overall Dimension of Inverter (Steel)**




| MODEL | Overall Dimension(mm) | | | | Installation | | Aperture |
|---|---|---|---|---|---|---|---|
| | W | H | H1 | D | W1 | H2 | |
| SI23-T3-045G | 240 | 560 | 535 | 310 | 176 | 544 | φ4-M6 |
| SI23-T3-055G | | | | | | | |
| SI23-T3-075G | | | | | | | |
| SI23-T3-090G | 270 | 638 | 580 | 350 | 195 | 615 | φ4-M8 |
| SI23-T3-110G | | | | | | | |
| SI23-T3-132G | 350 | 738 | 680 | 405 | 220 | 715 | φ4-M8 |
| SI23-T3-160G | | | | | | | |
| SI23-T3-185G | 360 | 940 | 850 | 480 | 200 | 910 | φ4-M16 |
| SI23-T3-200G | | | | | | | |
| SI23-T3-220G | | | | | | | |
| SI23-T3-250G | 370 | 1140 | 1050 | 545 | 200 | 1110 | φ4-M16 |
| SI23-T3-280G | | | | | | | |
| SI23-T3-310G | 400 | 1250 | 1140 | 545 | 240 | 1213 | φ4-M16 |
| SI23-T3-355G | | | | | | | |
| SI23-T3-400G | | | | | | | |
| SI23-T3-450G | 460 | 1400 | 1293 | 545 | 300 | 1363 | φ4-M16 |
| SI23-T3-500G | | | | | | | |
| SI23-T3-560G | | | | | | | |

## 2.2 Solar Pump Controller Wiring

● **Standard Connection Diagram**

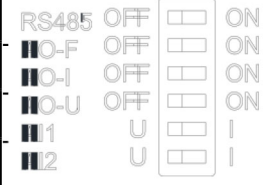



Note: When connect solar panel, both AC input (R, T) and DC input (+, -) is okay, AC input is prefer.

• Auxiliary Terminal Output Capacity

| Terminal | Function Definition | Max Output |
|---|---|---|
| +10V | 10V auxiliary power supply output, constitutes loop with GND. | 50mA |
| A0 | Analog monitor output, constitutes loop with GND. | Max output 2mA as frequency, voltage signal |
| +24V | 24V auxiliary power supply output, constitutes loop with COM. | 100mA |
| Y | Collector open circuit output; can set the action-object by program. | DC24V/50mA |
| TA/TB/TC | Passive connector output; can set the action-object by program. | 3A/240VAC |

• Function Specification of Switch Terminals

| Switch Terminal | Selecting Position | Function Specification |
|---|---|---|
|  | RS485 Terminal Resistor | RS485 Communication :connect with 120Ω terminal resistor |
| | AO-F Output- frequency | 0～100kHz frequency output |
| | AO-I Output- Current | 0～20mA current output or 4～20mA current output |
| | AO-U Output- Voltage | 0～10V voltage output |
| | AI1 Input- Current/Voltage | AI1: Input 0～20mA or 0～10V |
| | AI2 Input- Current/Voltage | AI2: Input 0～20mA or 0～10V |