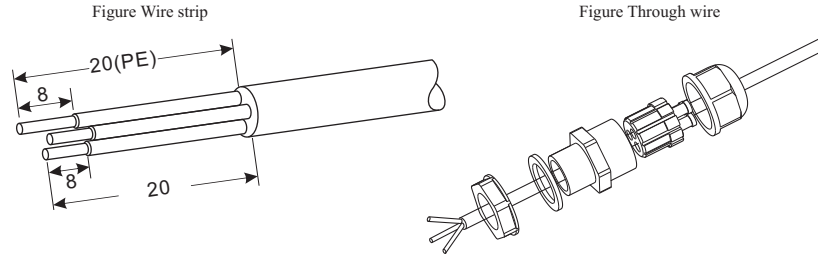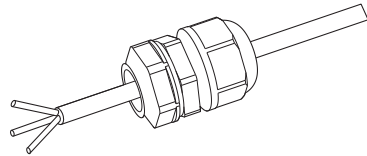## Procedure

Step 1 To prepare the appropriate cable. The front of a wire stripping to will be in accordance with the following picture size, and then through the PG waterproof joint.

Figure 4-19 Relay Connection (1)

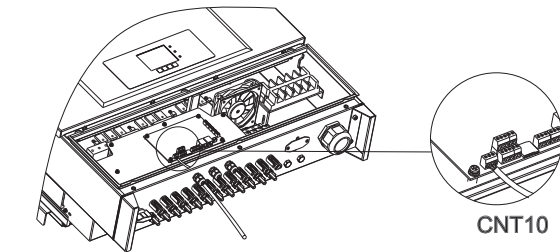Figure Wire strip   Figure Through wire

Step 2 Insert sealing plug into housing, and tighten the screw nut.

Figure 4-20 Relay Connection (2)

Step 3 The cable stripped to the corresponding stem node hole.

Figure 4-21 Relay Connection (3)

CNT10

——— **End**

4.5 Connecting DC Input Power Cables

Connect the sofar 50~70KTL to PV arrays over DC input power cables.

Input mode selection：sofar 50~70KTL has 3 MPPT, The three MPPT can run independently, but also can be operated in parallel, According to the system design, the user can choose the mode of MPPT operation.

Independent mode (default):

If the three MPPT panels is independent, the input mode should be set as "independent mode".
The setting method is introduced at chapter 6.3.

Parallel mode :

If the three MPPT panels is paralleled together by combiner, the input mode should be set as "parallel mode".

The setting method is introduced at chapter 6.3.

⚠️ **Note**

According to the inverter type, choose the inverter accessories (cables, fuse holder, fuse, breaker etc.), Sofar inverter with PV array should be excellent performance, reliable quality. The open circuit voltage of PV must be less than Maximum DC input voltage of Sofar inverter, The output voltage of the solar array must be consistent with the MPPT voltage range.

Table4-5 MPPT voltage range

Type	SOFAR 50000TL	SOFAR 60000TL	SOFAR 70000TL-HV
MPPT voltage range	250~960 Vdc	250~960 Vdc	250~960 Vdc
Max. input voltage	1000 Vdc		

DC inductance should choose PV cable, from the junction box to the inverter, line voltage drop is about 1~2%, The inverter is installed in the PV bracket, which saves the cable and reduce the DC loss.

☞	• **Check polarity of PV array, to ensure the correct wiring of PV array;** • **Please don't put the positive or negative of the PV array connect to earth.**
Note	

⚠ **Danger**	• PV modules generate electric energy when exposed to sunlight and can create an electrical shock hazard. Therefore, when connecting DC input power cable, cover PV modules by using opaque cloth. • Before performing electrical connections, ensure that voltages of the DC cables should be within the safe voltage range, that is, lower than 60 V DC, and the DC SWITCH is OFF. Otherwise, the high voltage may result in fatal danger.
⚠ **Caution**	Ensure that the following conditions are met. Otherwise, fire accident may occur. • PV modules connected in series in each PV array are of the same specifications. • The open-circuit voltage of each PV array is always lower than or equal to 1000 V DC. • The open-circuit voltage of each PV array is always lower than or equal to 18 A DC. • The output power of each PV array is always less than or equal to the maximum input power of the sofar 50~70KTL. • The positive and negative terminals of PV arrays connect to the positive and negative DC input terminals respectively.
☞ **Note**	• If the Sofar 50~70KTL connects to the power grid directly, ensure that the PV arrays are not grounded. • If the DC voltage is a non-zero value between the positive terminal of PV arrays and the ground, the PV arrays are subject to insulation faults. Rectify the fault before connecting cables. • During PV array and Sofar 50~70KTL installation, the positive or negative terminals of PV arrays may be grounded if power cables are not properly installed or routed. In this case, an DC short circuit may occur and damage the Sofar 50~70KTL. • If the PV arrays need to be grounded, install a three-phase four-wire isolation transformer on the output side and disable the ISO detection function by referring to 6.2.10 Setting Isolation Parameters. If an isolation transformer is not installed, the Sofar 50~70KTL may be damaged.

Context

Table 4-6 Recommended DC input cable specifications

Cross-Sectional Area (mm)		External Cable Diameter(mm)
Range	Recommended Value	
4. 0~6. 0	4. 0	4. 5~7. 8

DC input connectors are classified into positive and negative connectors, as shown in Figure 4-24 and Figure 4-25.

Figure 4-23 Positive connector composition
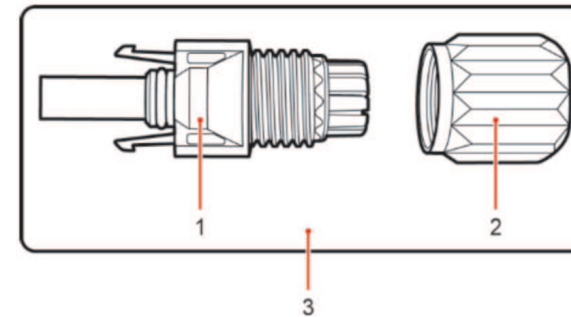
1. Housing   2. Cable gland   3. Positive connector

Figure 4-24 Negative connector composition
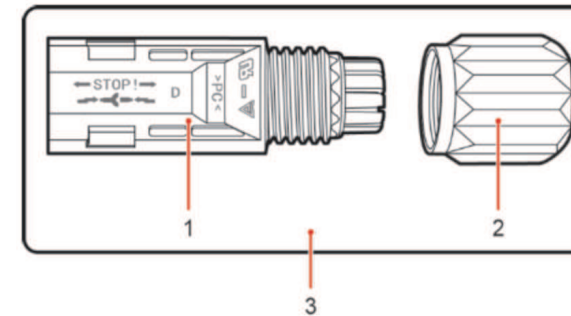
1. Housing   2. Cable gland   3. Negative connector

⚠ **Note**

Positive and negative metal terminals are packed with positive and negative connectors respectively. Separate the positive from negative metal terminals after unpacking the Sofar 50~70KTL to avoid confusing the polarities.

Procedure

Step 1 Remove cable glands from the positive and negative connectors.

Step 2 Remove the insulation layer with an appropriate length from the positive and negative power cables by using a wire stripper as show in Figure 4-26.

Figure 4-25 Connecting DC input power cables

1. Positive power cable   2. Negative power cable

⚠ **Note**

L2 is 2 to 3 mm longer than L1.

Step 3 Insert the positive and negative power cables into corresponding cable glands.
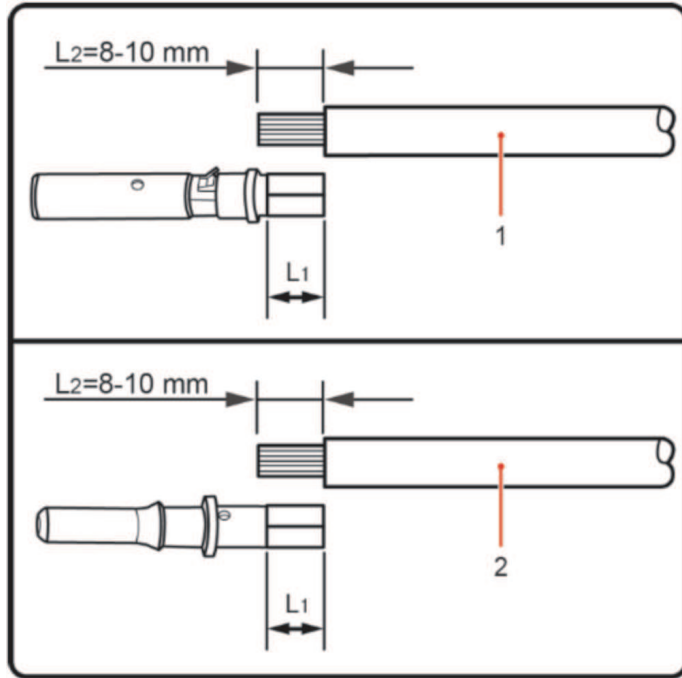
Step 4 Insert the stripped positive and negative power cables into the positive and negative metal terminals respectively and crimp them using a clamping tool. Ensure that the cables arecrimped until they cannot be pulled out by force less than 400 N, as shown in Figure 4-27.

Figure 4-26 Connecting DC input power cables
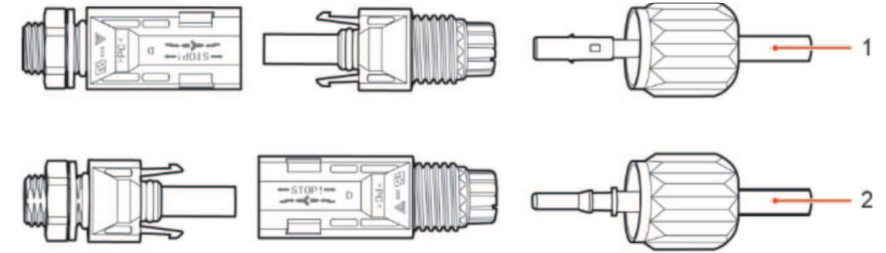
1. Positive power cable   2. Negative power cable

Step 5 Insert crimped power cables into corresponding housings until you hear a "click" sound. The power cables snap into place.

Step 6 Reinstall cable glands on positive and negative connectors and rotate them against the insulation covers.

Step 7 Insert the positive and negative connectors into corresponding DC input terminals of the Sofar 50~70KTL until you hear a "click" sound, as shown in Figure 4-28.

Figure 4-27 Connecting DC input power cables
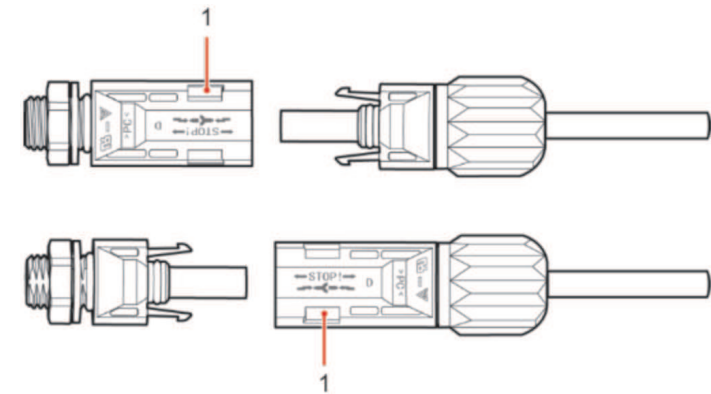
1. Bayonet

——— **End**

Follow-up Procedure

To remove the positive and negative connectors from the Sofar 50~70KTL, insert a removal wrench into the bayonet and press the wrench with an appropriate strength, as shown in Figure 4-29.

⚠ **Caution**	Before removing the positive and negative connectors, ensure that the DC SWITCH is OFF.

Figure 4-28 Removing a DC input connector

4.6 Safety check

- **Photovoltaic array**

Before the inverter operation, need to be examined for the photovoltaic array, Check Open circuit voltage of the each PV array whether accord with the requirements.

–Ensure Open circuit voltage of the each PV array accord with the requirements;

–Ensure that the positive and negative polarity is correct.

- **Sofar 50~70KTL DC connect**

Use the multimeter to check the DC side voltage and current;

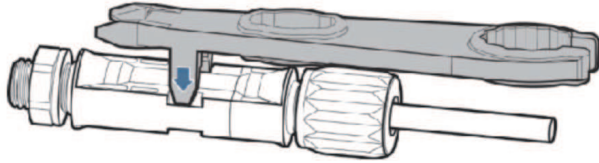Check the DC cable, Note the positive and negative poles cannot be reversed, Consistent with the positive and negative pole of photovoltaic array, measured each input Open circuit voltage

Compare the voltage, if the difference is greater than 3%, PV array line may be a fault

- **Sofar 50~70KTL AC connect**

Ensure the AC breaker of the inverter is off

Check the inverter phase with grid is connected properly, Check the voltage of each phase is within a predetermined range, if possible, Measure the THD, If the distortion is serious, the inverter may not work.

- **Installing cover and Locking screw**.

Figure4-29 NOT allowed: connect loads between inverter and circuit breaker

---
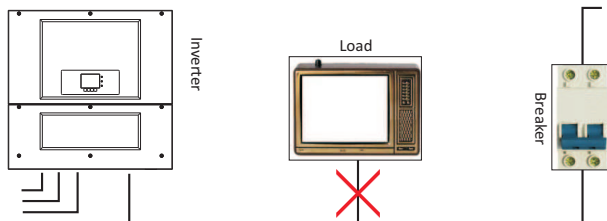
5 Commissioning of inverter

5.1 Safety inspection before commissioning

⚠ **Attention**	Ensure that DC and AC voltages are within the range permitted by the inverter.

5.2 Start inverter

Step 1 Turn on DC switch.

Step 2 Turn on AC switch.

When the solar arrays generate adequate power, the inverter will startup automatically. Display showing "normal" indicates correct operation.

If the inverter indicates any other fault, please refer to part 7——error messages for help.

6 Operation interface

Outlines of this chapter

Introduce the dispaly、operation、 buttons and LED light of Sofar 50~70KTL.

6.1 Operation and Display Panel

- **Buttons and Indicator lights**

GFCI Warning
Inverter States Light
Warning Light

Back | Up | Down | OK
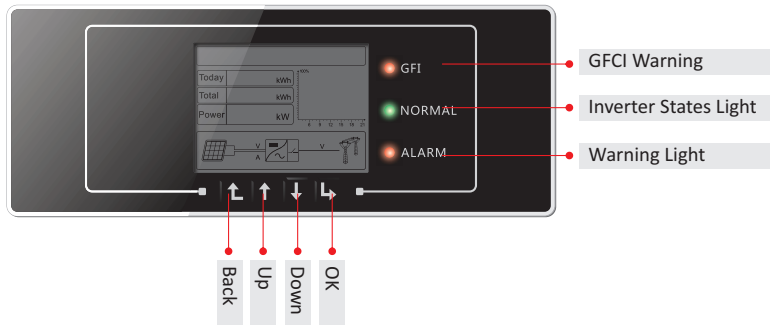
Key-button:

• Back ⬆: to back up or enter into main interface at standard interface states

• Up ⬆: to move up or increase value

• Down ⬇: to move down or decrease value

• Enter ⬇: to confirm selection

Indicator Lights:

• States Light(GREEN)

    Flashing: Waiting or checking state
    ON: Normal operation
    OFF: Fault or permanent state

• Warning Light (RED)

    Flashing: Fans fault
    ON: The inverter is faulty
    OFF: Normal operation

• GFCI Warning Light (RED)

    ON: GFCI fault
    OFF: GFCI normal

6.2 Standard Interface

LCD standard interface is used to display inverter states、 information and parameter setting etc.
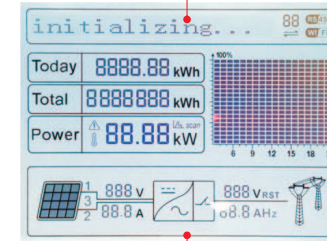
LCD displays the updates of inverter energy、 power、 input information、 warning information etc
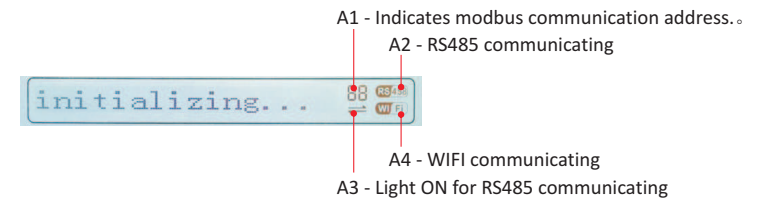
A1 - Indicates modbus communication address.。
A2 - RS485 communicating

A4 - WIFI communicating
A3 - Light ON for RS485 communicating

A5 - Light flashes to warn over frequency and power derating. Light ON to warn remote
A6 - Indicates today's energy
A7 - Indicates the total energy
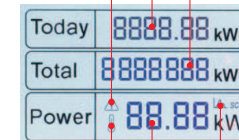
A10 - MPPT SCAN function is activated (not available)
A9 - Indicates real time output power
A8 - Light ON warning for inverter high temperature

A11 - Light ON when input voltage over 350V
A12 - Indicates real time input voltage and current channel
A13 - Indicates the input voltage and current of phase 1&2 and displays in turns in every three seconds
A14 - Light ON when the state is normal
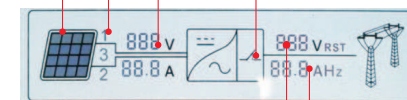
A16 - Indicates R/T/S phase current or frequency and displays in turns in every three seconds
A15 - Indicates R/T/S phase voltage and displays in turns in every three seconds
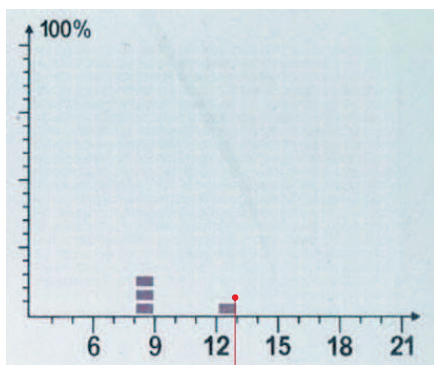
A17 - Indicates the energy from 3:00am-21:00pm in the day

When power-on, LCD interface displays INITIALIZING, refer below picture.

> **Initializing…**

when control board successfully connected with communication board，the LCD display the current state of the inverter，display as shown in the figure below.

| **Wait 10s** | Waiting States，Countdown 10S |

| **Check** | Checking |

| **Normal** | Normal Power Generation |

| **Fault** | Regular error state |

| **Permanent** | Unrecoverable error state |
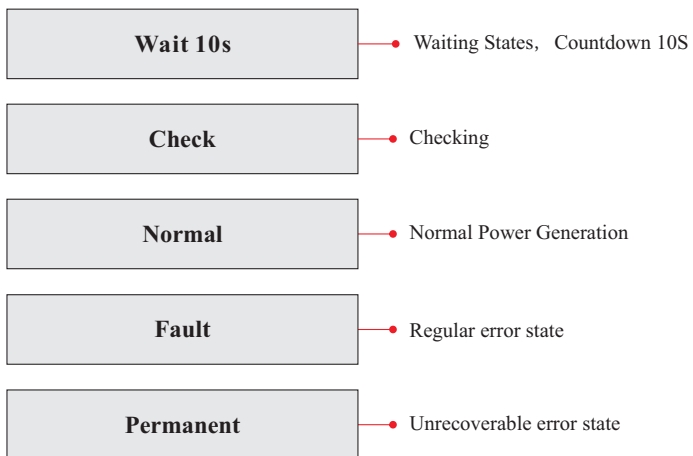
Inverter states includes: wait、check、normal、fault and permanent

Wait：Inverter is waiting to Check State at the end of reconnection time. In this state, the PV voltage is more than 250V, grid voltage value is between the max and min limits and so on; If not, Inverter will go to Fault State or Permanent State.

Check: Inverter is checking isolation resistor, relays, and other safety requirements. It also does self-test to ensure inverter software and hardware are functional. Inverter will go to Fault State or Permanent State if any error or fault occurs.

Normal：Inverter enter to Normal State，it is feeding power to the grid; inverter will go to Fault State or Permanent state if any error or fault occurs.

Fault：Fault State: Inverter has encountered recoverable error. It should recover if the errors disappear. If Fault State continues; please check the inverter according error code.

Permanent：Inverter has encountered unrecoverable error, we need maintainer debug this kind of error according to error code.

When the control board and communication board connection fails, the LCD display interface as shown in the figure below.

> **DSP communicate fail**

6.3 Main Interface

Press "Back" button under standard interface to enter into main interface, including:

| **Normal** | Key"Back" |

| 1. Enter Setting |
| 2. EventList |
| 3. SystemInfo |
| 4. System Time |
| 5. Software Update |
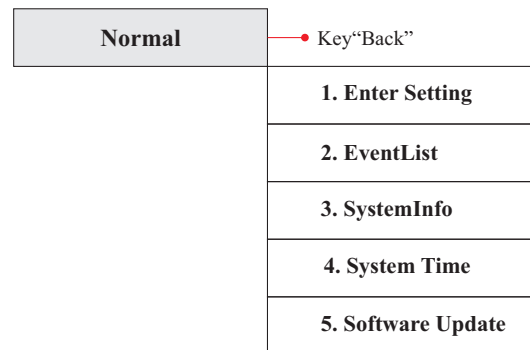
(A) "Enter Setting" Interface as below:

1.Enter Setting

1. Set time	12. Set StartPara
2. Clear Produce	13. Set SafetyVolt
3. Clear Events	14. Set SafetyFreq
4. Set Country Code	15. Set Insulation
5. Remote Control	16. Relay Test
6. Relay Command	17. Set Reactive
7. Enable Set Country	18. Set PowerDerat
8. Set Total Energy	19.Setting P(f)
9. Set Mod-bus Address	20.Setting Q(v)
10. Set Inputmode	21.Control 81.S1
11. Set Language	

◆ **Set Time**

Users press "Back" button to enter "1.Enter Setting" interface, Press "OK" button to enter main setting interface. Enter "1. Set Time" by pressing"Up" button or "Down" button, then press"OK"button and start to set up time.

Time set from year, month, day, minutes, and seconds in turns, "Up" button or "Down"button to choose different value to set each date. Set each value is need to press "OK" button to confirm setting. "success" is displayed if the setting time is correct, "fail" means failure settings.

◆ **Clear Produce**

Users press "Back" button to enter "1.Enter Setting" interface, Press "OK" button to enter main setting interface. Then Enter "2.Clear Produce" by pressing "Up" button or "Down" button, press "OK" button and start to clear produce. "success" is displayed after settings.

◆ **Clear Events**

Users press "Back" button to enter "1.Enter Setting" interface, Press "OK" button to enter main setting interface.Enter "3. Clear Events" by pressing "Up" button or "Down" button. Press "OK "button and start to clear events. "success" is displayed after settings.

◆ **Set Country Code**

Users press "Back" button to enter "1.Enter setting" interface, Press OK button to enter main setting interface. Enter "4.Set Country Code" by pressing "Up" button Or "Down" button, press "OK" button and enter "Input Password" Setting interface. If it's shown "set disable" on the screen, then you can NOT choose the operating country, you should enable country setting through "7. Enable Set Country" interface. If it's shown "set Country code?" on the screen, then press Confirm button to start country setting. "Success" will be shown on the screen after a successful country setting.

Table 6-1 country code setting

Code	Country	Code	Country	Code	Country
00	Germany VDE AR-N4105	09	UK-G59	18	EU EN50438
01	Italy CEI0-21	10	China	19	IEC EN61727
02	Australia	11	France	20	Korea
03	Spain RD1699	12	Poland	21	Sweden
04	Turkey	13	Germany BDEW	22	Europe General
05	Denmark	14	Germany VDE 0126	23	Customer VDE 0126
06	Greece Continent	15	Italy CEI0-16	24	Cyprus
07	Netherland	16	UK-G83	25	India
08	Belgium	17	Greece island	26-49	Reserved

Table 6-2 40KW country code setting

Code	country	Code	country	Code	country
50	VDE4105-MV	60	China-MV	70	Korea-MV
51	Italy CEI0-21-MV	61	France-MV	71	Sweden-MV
52	Australia-MV	62	Poland-MV	72	EuropeGeneral-MV
53	SpainRD1699_MV	63	Germany BDEW-MV	73	Customer-MV
54	Turkey-MV	64	VDE0126-MV	74	Cyprus-MV
55	Denmark-MV	65	taly CEI0-16-MV	75	India-MV
56	Greece-MV	66	UK-G83-MV	76-99	Reserved
57	Netherland-MV	67	Greece-island-MV		
58	Belgium-MV	68	EU-EN50438-MV		
59	UK_G59-MV	69	EU-EN61727-MV		

◆ **Remote Control**

Users press "Back" button to enter "1.Enter Setting" interface, Press "OK" button to enter main setting interface.Enter "5. Remote Control" by pressing "Up" button or "Down" button. Press "OK" button and enter Remote Control Switch On &Off interface. Choose "1.Enable"or "2.Disable" by pressing "Up" button or "Down" button, press "OK" button, then communication board start to transmit control signals to control board. "success" is displayed after setting success ; otherwise it will show "fail".

◆ **Relay Command**

Users press "Back" button to enter "1.Enter Setting" interface, Press "OK" button to enter main setting interface.

Enter "6. Relay Command" by pressing "Up" button or"Down"button, press "OK " button and enter "Relay Command setting "interface. Choose corresponded setting items by pressing "Up" button or "Down" button, then press "OK" button. "success" or "fail" is displayed after setting.

```
6.Relay Command
    ├── 1. Production
    ├── 2. Alarm
    ├── 3. Config Alarm
    └── 4. Relay Disable
```

Relay Command Definition:

Production	the relay switches whenever a connection to (and therefore a disconnection from) the grid occurs. If the relay contractor is in normally open (close) mode, the contact will stay open (or closed) until the inverter is connected to the grid; once the inverter con-nects to the grid and starts to export power, the relay switches state and therefore closes (or opens). When the inverter disconnects from the grid, the relay contact returns to its position of rest, namely open (or closed).
Alarm	The relay switches whenever there is an alarm on the inverter (Error). No switching occurs when there is a Warning. If the relay contractor is in normally open(close)mode, the contact will stay open (or closed) until the inverter reports an error; once the inverter reports an error, the relay switches state and therefore closes (or opens).The contact remains switched from its rest condition until normal opera-tion is restored.
Config Alarm	the relay switches whenever there is an alarm (Error) or a Warning, which have been previously selected by the user through the PC. the contact will stay open (or closed) until the inverter reports an error or a warning out of those selected from the menu; once the inverter displays an error or a warning out of those selected, the relay switches state and therefore closes (or opens) the contact. The relay remains switched from its rest condition until the alarm or warning has disappeared.
Relay Disable	Control function is forbidden

◆ **Enable Set Country**

Users press "Back" button to enter "1.Enter Setting" interface, Press "OK" button to enter main setting interface.Enter "7.Enable Set Country" by pressing "Up" button or"Down"button, press "OK" button and enter "Input Password" Setting interface.

Press "Back" button to set passwords (default: 0001), increase or decrease value though pressing "Up" button or "Down" button, press "OK" button to next value setting. "Error! Try again" will be displayed for wrong passwords. Press "Back" button and rekey in the correct passwords. "success" will be displayed if setting successfully,

Attention: when inverter working for power generation over 24h, country setting is forbidden, it can only be set after LCD setting. Key in passwords for country setting through LCD (default: 0001), country setting can be set in 24h after keying in the correct passwords, over 24h, set through LCD again.

◆ Set Address

Users press "Back" button to enter "1.Enter setting" interface, Press "OK" button to enter main setting interface. Enter "9. Set Address" by pressing "Up" button or "Down" button. Press "OK" button and enter setting interface "Success" or "fail" is displayed after setting.

◆ Set inputmode

Input mode selection：sofar 50~70KTL has 3 MPPT, The three MPPT can run independently, and also can be operated in parallel, According to the system design, the user can choose the mode of MPPT operation.The input mode can be setting by the LCD .

Users press "Back" button to enter "1.Enter setting" interface, Press "OK" button to enter main setting interface. Enter "10. Set inputmode" by pressing "Up" button or "Down" button. Press "OK" button and enter setting interface. Choose corresponded setting items by pressing "Up" button or "Down" button, then press "OK" button. "Success" or "fail" is displayed after setting.

◆ Set Language

Users press "Back" button to enter "1.Enter setting" interface, Press "OK" button to enter main setting interface. Enter "11. Set Language" by pressing "Up" button or "Down" button. Press "OK" button and enter setting interface. Choose corresponded setting items by pressing "Up" button or "Down" button, then press "OK" button. "Success" or "fail" is displayed after setting.

◆ Set StartPara

User can change the start parameter by the LCD. First the User need to copy the. TXT file which is used to change the start parameter to the SD card .

Users press Back button to enter "1.Enter setting" interface, Press OK button to enter main setting interface. Enter "12. Set StartPara" by pressing "Up" button Or "Down" button, press "OK" button and enter "Input Password" Setting interface. Press "Back" button to set passwords (default: 0001), increase or decrease value though pressing "Up" button or "Down" button, press "OK" button to next value setting. "Error!" Try again" will be displayed for wrong passwords. Press "Back" button and rekey in the correct passwords. "Success" will be displayed if setting successfully.

◆ Set SafetyVolt

User can change the Voltage protection point by the LCD. First the User need to copy the. TXT file which is used to change the Voltage protection point to the SD card .

Users press Back button to enter "1.Enter setting" interface, Press OK button to enter main setting interface. Enter "13. Set SafetyVolt" by pressing "Up" button Or "Down" button, press "OK" button and enter "Input Password" Setting interface. Press "Back" button to set passwords (default: 0001), increase or decrease value though pressing "Up" button or "Down" button, press "OK" button to next value setting. "Error!" Try again" will be displayed for wrong passwords. Press "Back" button and rekey in the correct passwords. "Success" will be displayed if setting successfully.

◆ Set SafetyFreq

User can change the Frequency protection point by the LCD. First the User need to copy the. TXT file which is used to change the Frequency protection point to the SD card .

Users press Back button to enter "1.Enter setting" interface, Press OK button to enter main setting interface. Enter "14. Set SafetyFreq" by pressing "Up" button Or "Down" button, press "OK" button and enter "Input Password" Setting interface. Press "Back" button to set passwords (default: 0001), increase or decrease value though pressing "Up" button or "Down" button, press "OK" button to next value setting. "Error!" Try again" will be displayed for wrong passwords. Press "Back" button and rekey in the correct passwords. "Success" will be displayed if setting successfully.

◆ Set Insulation

User can change the Insulation protection point by the LCD. First the User need to copy the. TXT file which is used to change the Insulation protection point to the SD card .

Users press Back button to enter "1.Enter setting" interface, Press OK button to enter main setting interface. Enter "15. Set Insulation" by pressing "Up" button Or "Down" button, press "OK" button and enter "Input Password" Setting interface. Press "Back" button to set passwords (default: 0001), increase or decrease value though pressing "Up" button or "Down" button, press "OK" button to next value setting. "Error!" Try again" will be displayed for wrong passwords. Press "Back" button and rekey in the correct passwords. "Success" will be displayed if setting successfully.

◆ Relay Test

Users press Back button to enter "1.Enter setting" interface, Press OK button to enter main setting interface. Enter "16. Relay Test" by pressing "Up" button Or "Down" button, then press "OK" button and start test relay. "Success" will be displayed if setting successfully.

◆ Set Reactive

Users press "Back" button to enter "1.Enter Setting" interface, Press "OK" button to enter main setting interface.Enter "17.Set Reactive" by pressing "Up" button or"Down"button, press "OK" button and enter "Input Password" Setting interface.

Press "Back" button to set passwords (default: 0001), increase or decrease value though pressing "Up" button or "Down" button, press "OK" button to next value setting. "Error! Try again" will be displayed for wrong passwords. Press "Back" button and rekey in the correct passwords. "success" will be displayed if setting successfully,

◆ Set PowerDerat

Users press "Back" button to enter "1.Enter Setting" interface, Press "OK" button to enter main setting interface.Enter "18.Set PowerDerat" by pressing "Up" button or"Down"button, press "OK" button and enter "Input Password" Setting interface.

Press "OK" button to set passwords (default: 0001), increase or decrease value though pressing "Up" button or "Down" button, press "OK" button to next value setting. "Error! Try again" will be displayed for wrong passwords. Press "Back" button and rekey in the correct passwords. "success" will be displayed if setting successfully,

◆ **Setting P(f)**

Users press "Back" button to enter "1.Enter setting" interface, Press OK button to enter main setting interface. Enter "19. Setting P(f)" by pressing "Up" button Or "Down" button, then press "OK" button and enter "Setting P(f)"interface. Then press Confirm button to start to Set P(f). "Success" will be shown on the screen after a successful P(f) setting.

◆ **Setting Q(v)**

Users press "Back" button to enter "1.Enter setting" interface, Press OK button to enter main setting interface. Enter "20. Setting Q(v) by pressing "Up" button Or "Down" button, then press "OK" button . Then press Confirm button to start to set Q(v)."Success" will be shown on the screen after a successful Q(v) setting.

◆ **Control 81.S1**

Users press "Back" button to enter "1.Enter setting" interface, Press OK button to enter main setting interface. Enter "21.Control 81.S1 by pressing "Up" button Or "Down" button, then press "OK" button. Then press Confirm button to start Control 81.S1.
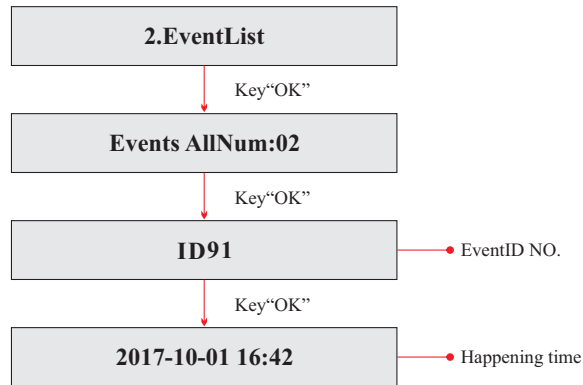
(B) "Event List" Interface as below:

Event List is used to display the real-time event records, including the total number of events and each specific ID No. and happening time. User can enter Event List interface through main interface to check details of real-time event records, Event will be listed by the happening time, and recent events will be listed in the front. Please refer to below picture:

Users press "Back" button and "Down" button in standard interface, then enter into 2.Event List" interface.

Press "OK" button to get the total event numbers, show as below:

```
┌────────────────────────────────┐
│      Events TotalNum:02         │
└────────────────────────────────┘
```

Press "OK" button again; user can check each event ID number and happening time, see below:

```
┌────────────────────────────────┐
│         2.EventList             │
└────────────────────────────────┘
              │ Key"OK"
              ▼
┌────────────────────────────────┐
│       Events AllNum:02          │
└────────────────────────────────┘
              │ Key"OK"
              ▼
┌────────────────────────────────┐
│           ID91                  │──── EventID NO.
└────────────────────────────────┘
              │ Key"OK"
              ▼
┌────────────────────────────────┐
│      2017-10-01 16:42           │──── Happening time
└────────────────────────────────┘
```

(C) "SystemInfo" Interface as below:

3.SystemInfo

1.Inverter Type
2.Serial Number
3.SoftVersion
4.HardVersion
5.Country
6.Input Mode
7.Relay Command
8.Power Factor
9.P(f)
10.Q(v)

◆ **Inverter Type**

Users press "Back" button and "Up" button or "Down" button enter "3. SystemInfo" interface, Press "OK" button to enter enter into system information checking interface,then press "Up" button or "Down" button enter into "1. Inverter Type",then press "OK" button , the Inverter Type will be displayed.

◆ **Serial Number**

Users press "Back" button and "Up" button or "Down" button to enter "3. SystemInfo" interface, Press "OK" button to enter enter into system information checking interface,then press"Up" button or "Down" button enter into "2. Serial Number",then press "OK" button ,the serial number will be displayed.

◆ **SoftVersion**

Users press "Back" button and "Up" button or "Down" button to enter "3. SystemInfo" interface, then Press "OK" button to enter enter into system information checking interface,then press "Up" button or "Down" button enter into "3. SoftVersion",then press "OK" button , the SoftVersion will be displayed.

◆ **HardVersion**

Users press "Back" button and "Up" button or "Down" button to enter "3. SystemInfo" interface, then Press "OK" button to enter enter into system information checking interface,then press "Up" button or "Down" button enter into "4. HardVersion",then press "OK" button , the HardVersion will be displayed.

◆ **Country**

Users press "Back" button and "Up" button or "Down" button to enter "3. SystemInfo" interface, then Press "OK" button to enter enter into system information checking interface,then press "Up" button or "Down" button enter into "5. Country",then press "OK" button , the Country will be displayed.

◆ **Input Mode**

Users press "Back" button and "Up" button or "Down" button to enter "3. SystemInfo" interface, then Press "OK" button to enter enter into system information checking interface,then press "Up" button or "Down" button enter into "6. Input Mode",then press "OK" button , the Input Mode will be displayed.

◆ **Relay Command**

Users press "Back" button and "Up" button or "Down" button to enter "3. SystemInfo" interface, then Press "OK" button to enter enter into system information checking interface,then press "Up" button or "Down" button enter into "7. Relay Command",then press "OK" button , the Relay Command will be displayed.

◆ **Power Factor**

Users press "Back" button and "Up" button or "Down" button to enter "3. SystemInfo" interface, then Press "OK" button to enter enter into system information checking interface,then press "Up" button or "Down" button enter into "8. Power Factor",then press "OK" button , the Power Factor will be displayed.

◆ **P(f)**

Users press "Back" button and "Up" button or "Down" button to enter "3. SystemInfo" interface, then Press "OK" button to enter enter into system information checking interface,then press "Up" button or "Down" button enter into "9.P(f)",then press "OK" button , the P(f) will be displayed.

◆ **Q(v)**

Users press "Back" button and "Up" button or "Down" button to enter "3. SystemInfo" interface, then Press "OK" button to enter enter into system information checking interface,then press "Up" button or "Down" button enter into "10.Q(v)",then press "OK" button , the Q(v) will be displayed.

(D) System Time

Press the "Back" button and "Up" button or "Down" key in the standard user interface to enter into "4.System Time",then press "OK " button to display the current system time.

(E) Software Update

Press the "Back" button and "Up" button or "Down" button in the standard user interface to enter into "5. Software Update",then press "OK" button to enter into the"input password" interface,now press the "OK" button to input the password(initial passwords is 0001),Press the"Up" and "Down" button to change the value,then press "OK" button to confirm the current value of input and enter the next set of value .when set over, if the password is wrong, the LCD will display "Error! Try again",at this time ,you should re-enter your password.If the password is correct, then begin the update process.

online update program steps are as follows:

Step 1 First, open sofar 50~70KTL lower cover.

Step 2 After open the lower cover, Press SD card (the SD card as shown in Figure 4-8), Then the SD card will automatically pop up.

Step 3 The SD card reader must be ready by the users, so that SD card so easy to establish the connection with the computer.

Step 4 SOFAR SOLAR will send the Software code to the user who needs to update. After user receive the file, please decompressing file and cover the original file in SD card.

Step 5 Insert the SD card into the SD card slot, there will be a faint clicking sound typically, indicating that has stuck.

Step 6 then enter into the online upgrade to the main menu "5. Software Update" in the LCD display program. The method to enter the menu can refer to operation interface of LCD.

Step 7 Input the password, if password is correct, and then begin the update process, the original password is 0001.

Step 8 System update main DSP、slave DSP、FUSE and ARM in turns. If main DSP update success ,the LCD will display "Update DSP1 OK", otherwise display "Update DSP1 Fail"; If slave DSP update success ,the LCD will display "Update DSP2 OK", otherwise display "Update DSP2 Fail"; If FUSE update success ,the LCD will display "Update FUSE OK", otherwise display "Update FUSE Fail"

Step 9 If Fail , please turn off the DC breaker, wait for the LCD screen extinguish, then turn on the DC breaker again,then Continue to update from step 6.

Step 10 After the update is completed, turn off the DC breaker, wait for the LCD screen extinguish, then install the lower cover, and turn on the DC breaker and AC breaker again, the inverter will enters the running state.

7 Trouble shooting and maintenance

Outlines of this chapter

This topic describes how to perform daily maintenance and troubleshooting to ensure long-term proper operation of the sofar 50~70KTL inverter.

7.1 Trouble shooting

This section contains information and procedures for solving possible problems with the sofar 50~70KTL inverter.

⊙ **In case of problem with inverter, check the following tips.**

- Check the warning fault messages or Fault codes on the inverter information panel. Record it before doing anything further.

- If inverter does not display any Fault, please check the following lists.
  - Is the inverter located in a clean, dry, adequately ventilated place?
  - Is the DC switch turned ON?
  - Are the cables adequately sized and short enough?
  - Are the input and output connections and wiring in good condition?
  - Are the configuration settings correct for the particular installation?
  - Are the display panel and the communications cable properly connected and undamaged?

Follow the steps below to view recorded problems:

Press "ESC" to enter the main menu in the normal interface. In the interface screen select "Event List", then press "OK" to enter events.

⊙ **EventList information**

Table 7-1 Eventlist

EventList NO.	EventList Name	EventList description	solution
ID01	GridOVP	The power grid voltage is too high	• If the alarm occurs occasionally, the possible cause is that the electric grid is abnormal occasionally. SOFAR inverter automatically returns to normal operating status when the electric grid's back to normal.
ID02	GridUVP	The power grid voltage is too low	• If the alarm occurs frequently, check whether the grid voltage/frequency is within the acceptable range. If no, contact SOFAR technical support. If yes, check the AC circuit breaker and AC wiring of the SOFAR inverter.
ID03	GridOFP	The power grid frequency is too high	• If the grid voltage/frequency is within the acceptable range and AC wiring is correct, while the alarm occurs repeatedly, contact SOFAR technical support to change the grid over-voltage, under-voltage, over-frequency, under-frequency protection points after obtaining approval from the local electrical grid operator.
ID04	GridUFP	The power grid frequency is too low	

ID05	PVUVP	The input voltage is too low	Check whether too few PV modules are series connected in a PV string, thus the voltage(Vmp) of the PV string is lower than the minimum operating voltage of SOFAR inverter. If yes, adjust the number of series connected PV modules to increase the voltage of the PV string to fit the input voltage range of SOFAR inverter. SOFAR inverter automatically returns to normal operating status after correct adjustments.
ID06	Vlvrtlow	Low voltage across	Check the AC wiring connection to the electric grid, if it's correct, please contact SOFAR technical support.
ID07-ID08	Reserved	Reserved	Reserved
ID09	PvOVP	The input voltage is too high	Check whether too many PV modules are series connected in a PV string, thus the voltage(Voc) of the PV string is higher than the maximum input voltage of SOFAR inverter. If yes, adjust the number of series connected PV modules to decrease the voltage of the PV string to fit the input voltage range of SOFAR inverter. SOFAR inverter automatically returns to normal operating status after correct adjustments.
ID10	IpvUnbalance	Input current is not balanced	Check the input mode(parallel mode/ independent mode) setting of SOFAR inverter according to Section 4.5 of this user manual.
ID11	PvConfigSetWrong	Incorrect input mode	
ID12	GFCIFault	GFCI Fault	• If the fault occurs occasionally, the possible cause is that the external circuits are abnormal occasionally. SOFAR inverter automatically returns to normal operating status after the fault is rectified. • If the fault occurs frequently and lasts a long time, check whether the insulation resistance between the PV array and earth(ground) is too low, then check the insulation conditions of PV cables.
ID13	Reserved	Phase sequence errors	Reserved
ID14	HwBoostOCP	Ihe input current is too high,and has happen hardware protection	Check whether the input current is higher than the maximum input current of SOFAR inverters, then check the input wiring, if both are correct, please contact SOFAR technical support.
ID15	HwAcOCP	The grid current is too high,and has happen hardware protection	ID15-ID24 are internal faults of SOFAR inverter, turn OFF the "DC switch", wait for 5 minutes, then turn ON the "DC switch". Check whether the fault is rectified. If no, please contact SOFAR technical support.
ID16	AcRmsOCP	The grid current is too high	
ID17	HwADFaultIGrid	The grid current sampling error	
ID18	HwADFaultDCI	The DCI sampling error	
ID19	HwADFaultVGrid	The grid voltage sampling error	
ID20	GFCIDeviceFault	The GFCI sampling error	
ID21	MChip_Fault	The master chip fault	
ID22	HwAuxPowerFault	The auxiliary voltage error	
ID23	BusVoltZeroFault	The bus voltage sampling error	
ID24	IacRmsUnbalance	The Output current is not balanced	

ID25	BusUVP	The bus voltage Is too low	If the PV array configuration is correct (no ID5 fault), the possible cause is that the solar irradiance is too low. SOFAR inverter automatically returns to normal operating status after the solar irradiance returns to normal level.
ID26	BusOVP	The bus voltage Is too high	ID26-ID27 are internal faults of SOFAR inverter, turn OFF the "DC switch", wait for 5 minutes, then turn ON the "DC switch". Check whether the fault is rectified. If no, please contact SOFAR technical support.
ID27	VbusUnbalance	The bus voltage is not balanced	
ID28	DciOCP	The Dci is too high	• Check the input mode(parallel mode/ independent mode) setting of SOFAR inverter according to Section 4.5 of this user manual. • If the input mode is correct, turn OFF the "DC switch", wait for 5 minutes, then turn ON the "DC switch". Check whether the fault is rectified. If no, please contact SOFAR technical support.
ID29	SwOCPInstant	The grid current is too high	Internal faults of SOFAR inverter, turn OFF the "DC switch", wait for 5 minutes, then turn ON the "DC switch". Check whether the fault is rectified. If no, please contact SOFAR technical support.
ID30	SwBOCPInstant	Ihe input current is too high	Check whether the input current is higher than the maximum input current of SOFAR inverters, then check the input wiring, if both are correct, please contact SOFAR technical support.
ID31- ID48	Reserved	Reserved	Reserved
ID49	ConsistentFault_VGrid	The grid voltage sampling value between the master DSP and slave DSP is not consistent	ID49-ID55 are internal faults of SOFAR inverter, turn OFF the "DC switch", wait for 5 minutes, then turn ON the "DC switch". Check whether the fault is rectified. If no, please contact SOFAR technical support.
ID50	ConsistentFault_FGrid	The grid frequency sampling value between the master DSP and slave DSP is not consistent	
ID51	ConsistentFault_DCI	The DCI sampling value between the master DSP and slave DSP is not consistent	
ID52	ConsistentFault_GFCI	The GFCI sampling value between the master DSP and slave DSP is not consistent	
ID53	SpiCommLose	The spi communication between the master DSP and slave DSP is fault	
ID54	SciCommLose	The Sci communication between the control board communication board is fault	
ID55	RelayTestFail	The relays fault	
ID56	PvIsoFault	The insulation resistance is too low	Check the insulation resistance between the PV array and earth(ground), if a short circuit occurs, rectify the fault.
ID57	OverTempFault_Inv	The inverter temp is too high	• Ensure the installation position and installation method meet the requirements of Section 3.4 of this user manual. • Check whether the ambient temperature of the installation position exceeds the upper limit. If yes, improve ventilation to decrease the temperature. • Check whether the ID90~ID92 fault (fan fault) exist, if yes, please replace the corresponding fan.
ID58	OverTempFault_Boost	The Boost temp is too high	
ID59	OverTempFault_Env	The environment temp is too high	
ID60- ID64	Reserved	Reserved	Reserved

ID65	UnrecoverHwAcOCP	The grid current is too high,and has cause unrecoverable hardware fault	ID65-ID70 are internal faults of SOFAR inverter, turn OFF the "DC switch", wait for 5 minutes, then turn ON the "DC switch". Check whether the fault is rectified. If no, please contact SOFAR technical support.
ID66	UnrecoverBusOVP	The bus voltage is too high,and has cause unrecoverable fault	
ID67	UnrecoverIacRmsUnbalance	The grid current is unbalance,and has cause unrecoverable fault	
ID68	UnrecoverIpvUnbalance	The input current is unbalance,and has cause unrecoverable fault	
ID69	UnrecoverVbusUnbalance	The bus voltage Is unbalance,and has cause unrecoverable fault	
ID70	UnrecoverOCPInstant	The grid current is too high,and has cause unrecoverable fault	
ID71	UnrecoverPvConfigSetWrong	Incorrect input mode	Check the input mode(parallel mode/ independent mode) setting of SOFAR inverter according to Section 4.5 of this user manual.
ID71- ID73	Reserved	Reserved	Reserved
ID74	UnrecoverIPVInstant	The input current is too high,and has happen unrecoverable fault	ID74-ID77 are internal faults of SOFAR inverter, turn OFF the "DC switch", wait for 5 minutes, then turn ON the "DC switch". Check whether the fault is rectified. If no, please contact SOFAR technical support.
ID75	UnrecoverWRITEEEPROM	The EEPROM is unrecoverable	
ID76	UnrecoverREADEEPROM	The EEPROM is unrecoverable	
ID77	UnrecoverRelayFail	Relay has happen permanent fault	
ID78- ID80	Reserved	Reserved	Reserved
ID81	OverTempDerating	the inverter has derated because of the temperature is too high	• Ensure the installation position and installation method meet the requirements of Section 3.4 of this user manual. • Check whether the ambient temperature of the installation position exceeds the upper limit. If yes, improve ventilation to decrease the temperature. • Check whether the ID90~ID92 fault (fan fault) exist, if yes, please replace the corresponding fan.
ID82	OverFreqDerating	the inverter has derated because of the grid frequency too hig	SOFAR inverter automatically reduce the output power when the frequency of electrical grid is too high.
ID83	RemoteDerating	The inverter has derated by the Remote control	SOFAR inverter records ID83 in case of remote power derating operation. Check the wiring of remote input and output control signal port on the communication board according to Section 4.4 of this user manual.
ID84	RemoteOff	The inverter has shut down because by the Remote control	SOFAR inverter records ID84 in case of remote shutdown operation. Check the wiring of remote input and output control signal port on the communication board according to Section 4.4 of this user manual.
ID85	Reserved	Reserved	Reserved

Sofar 50K~70KTL
User manual

Trouble shooting and maintenance

Sofar 50K~70KTL
User manual

Decommissioning

ID86	Fan4 alarm	The fan4 is fault	Check whether the external fan with blue heat-shrink tubing is not working, if so, replace the fan, if the alarm still exits after the replacement, please contact SOFAR technical support.
ID87	Fan5 alarm	The fan5 is fault	Check whether the external fan with blue heat-shrink tubing is not working, if so, replace the fan, if the alarm still exits after the replacement, please contact SOFAR technical support.
ID88-89	Reserved	Reserved	Reserved
ID90	Fan3 alarm	The fan3 is fault	Check whether the internal fan is not working, if so, replace the fan, if the alarm still exits after the replacement, please contact SOFAR technical support.
ID91	Fan1 alarm	The fan1 is fault	Check whether the external fan with blue heat-shrink tubing is not working, if so, replace the fan, if the alarm still exits after the replacement, please contact SOFAR technical support.
ID92	Fan2 alarm	The fan2 is fault	Check whether the external fan with red heat-shrink tubing is not working, if so, replace the fan, if the alarm still exits after the replacement, please contact SOFAR technical support.
ID93	Lightning protection alarm	There has Lightning happen	Check the lightning protection module, if it's undamaged, please contact SOFAR technical support.
ID94	Software version is not consistent	The Software between the control board and the communication board is not consistent	Contact SOFAR technical support to upgrade software.
ID95	Communication board EEPROM fault	The Communication board EEPROM is fault	ID95~ID96 are internal faults of SOFAR inverter, turn OFF the "DC switch", wait for 5 minutes, then turn ON the "DC switch". Check whether the fault is rectified. If no, please contact SOFAR technical support.
ID96	RTC clock chip anomaly	RTC clock chip is fault	
ID97	Invalid Country	The Country is InValid	Check the country setting according to Section 4.4 of this user manual.
ID98	SD fault	The SD card is fault	Please replace the SD card.
ID99- ID100	Reserved		Reserved

7.2 Maintenance

Inverters generally do not need any daily or routine maintenance. Cooling fan should not be blocked by dust or any other items.

◎ **Inverter cleaning**

Please use hand blower, soft dry cloth or brush to clean inverters. Water, corrosive chemical substances or intense cleaning agent should not be used for cleaning the cooling fan or inverter. Switch off AC and DC power supply to inverter before undertaking any cleaning activity.

◎ **Cooling fin cleaning**

For the long-term proper operation of SOFAR inverters, ensure there is enough space around the heat sink for ventilation, check the heat sink for blockage (dust, snow, etc.) and clean them if they exist. Please clean the heat sink with an air blower, a dry & soft cloth or a soft bristle brush. Do NOT clean the heat sink with water, corrosive chemicals, detergent, etc.

8 Decommissioning

Outlines of this chapter

This topic describes how to remove, pack, and dispose the Sofar 50~70KTL inverter.

8.1 Decommissioning steps

- Switch off the AC grid
- Switch Off the DC switch
- Wait for 5 minutes
- Release the DC connectors
- Release the AC terminals using screw drivers.

Remove inverter from the mounting carefully to avoid injury. Please note that the Sofar 50~70KTLs inverter's weight over 45 kgs.

8.2 Package

If possible, please pack the inverter in the original packaging. If original packing it is not available, use an equivalent carton suitable for loads more than 80 kg, has handle and can be closed fully.

8.3 Storage

Store the inverter in a dry place where ambient temperature is between -25 and - +70 °C.

8.4 Disposal

At the end of its life, dispose inverters and packing materials at locations that can handle and or recycle electric equipment safely.

9 Technical data

Outlines of this chapter

This topic lists the technical specifications for all Sofar 50~70KTL inverters.

9.1 Input parameter (DC)

Parameter	SOFAR 50000TL	SOFAR 60000TL	SOFAR 70000TL-HV
Max. input voltage	1000V		
Start-up input voltage	350V (+/-1v)		
Number of independent MPPT	3		
Number of DC inputs	4/3/3	4/4/4	
Input range with Full power operation with 2 MPPT parallel	500V-800V	530V-800V	660V-800V
Max DC power for single MPPT	16000(500V-800V) 16000(500V-800V) 22000(500V-800V)	22000(530V-800V) 22000(530V-800V) 22000(530V-800V)	26000(660V-800V) 26000(660V-800V) 26000(660V-800V)
Operating input volt range	250V-960V		
Max. input MPPT current	40A/30A/30A	40A/40A/40A	
Input short circuit current for each MPPT	48A/36A/36A	48A/48A/48A	
Overvoltage category of input	III(II-S1,S2 version)		

9.2 Output parameter (AC)

Parameter	SOFAR 50000TL	SOFAR 60000TL	SOFAR 70000TL-HV
Rated power	50000W	60000W	70000W
Max. AC power	50000VA	60000VA	75000VA
Rated AC voltage	3/N/PE,230/400Vac		3/N/PE,277/480Vac或 3/PE,480Vac
Grid voltage range	310-480Vac(adjustable)		422-528Vac
Grid frequency range	44~55Hz/54~66Hz(adjustable, must meet local grid requirements)		
Active power adjustable range	0~100%		
Max. output current	80A	90A	
THDI	<3%		
Power factor	1 (adjustable +/-0.8)		
Overvoltage category of output	III(II-S2version)		

9.3 Efficiency, Safety and Protection

Parameter	SOFAR 50000TL	SOFAR 60000TL	SOFAR 70000TL-HV
Max efficiency	98.5%		98.6%
Weighted eff. (EU/CEC)	98.3%		98.4%
Self-consumption at night	<1W		
Feed in start power	45W		
MPPT efficiency	>99.9%		
DC reverse polarity protection	Yes		
DC switch	Yes		
Input/output SPD(II)	Input SPD(II): (S1, S2 version) Output SPD(II): (S2 version)		
Safety protection	Anti islanding, RCMU, Ground fault monitoring		
Certification	CE,CGC,AS4777,AS3100,VDE4105,C10-C11, G59(more available on request)		
Communication	RS485, Wifi(optional), Multi-function relay		
Power management unit	According to certification and request		

9.4 General Data

Parameter	SOFAR 50000TL	SOFAR 60000TL	SOFAR 70000TL-HV
Ambient temperature range	-25℃...+60℃		
Allowable relative humidity range	0…95% no condensing		
Topology	Transformerless		
Degree of protection	IP65		
Max. operating altitude	4000m		
Noise	<60dB		
Weight	68kg	70kg	
Cooling	Fan		
Dimension	737*713*297mm		
Warranty	5 years		

10 Quality Assurance

Shenzhen SOFARSOLAR Co., Ltd offers 5 years product warranty for Sofar 50~70KTL inverters from date of installation. However the warranty period can't exceed 66 months from the date of delivery of the inverter. During the warranty period, Shenzhen SOFARSOLAR Co., Ltd guarantees normal operation of the inverter.

If during the warranty period, the inverter develops fault, please contact your installation contractor or supplier. In case of faults falling within manufacturers' responsibility, Shenzhen SOFARSOLAR Co., Ltd will provide service and maintenance free of any charge.

Disclaimer:

- Use of Sofar 50~70KTL inverters for any other purpose than intended;
- Faulty system design or installation;
- Improper operation;
- Use wrong protection settings on the inverter;
- Carry out unauthorized modification on the inverter.
- Damage because of external factors or the majeure force (such as lightning, over-voltage, bad weather, fire, earthquake, tsunami etc);