VEIKONG

Operation manual

VFD500-PV Series

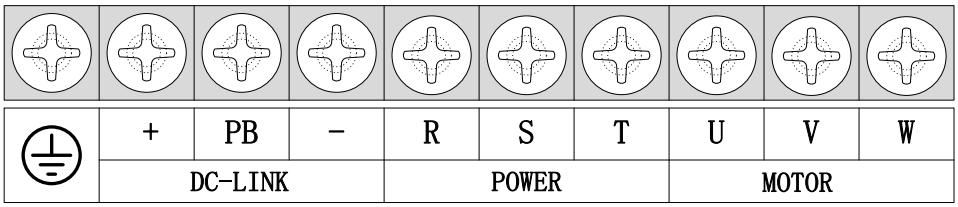
Solar pumping Inverter



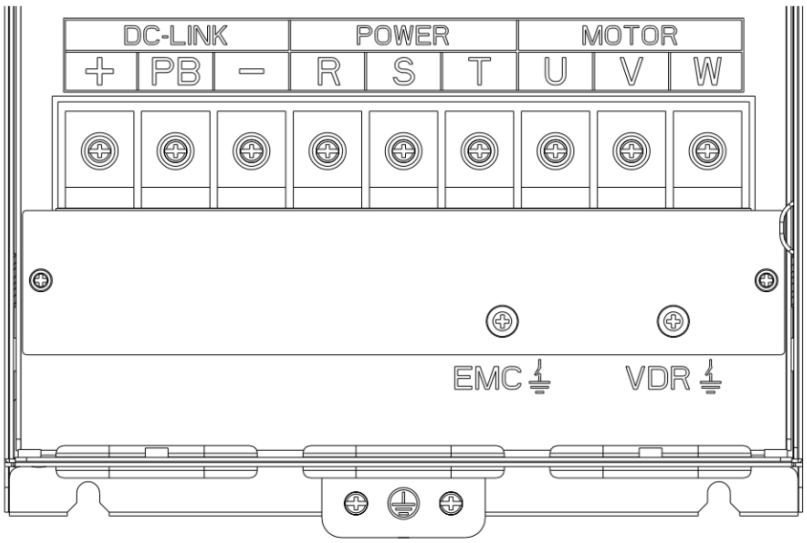
Solar pumping inverter fast user guide

1、Electrical cable Connection

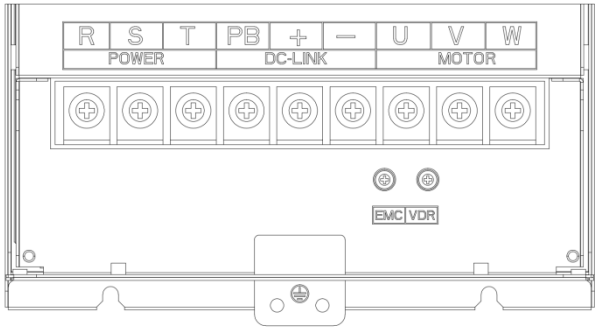
Please follow the diagram below for wiring. And pay attention to the following issues：



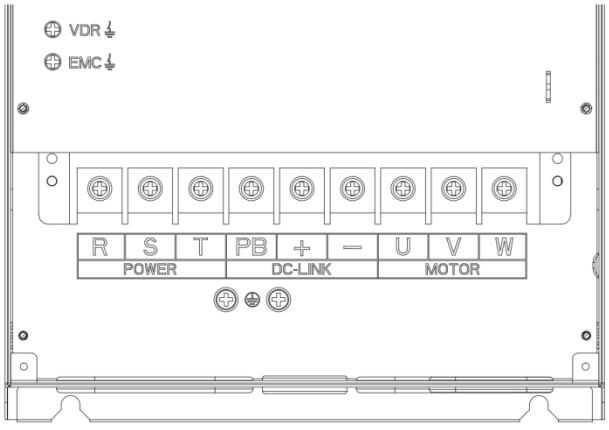
2.2KW-15KW



18.5KW-22KW



30KW-37KW

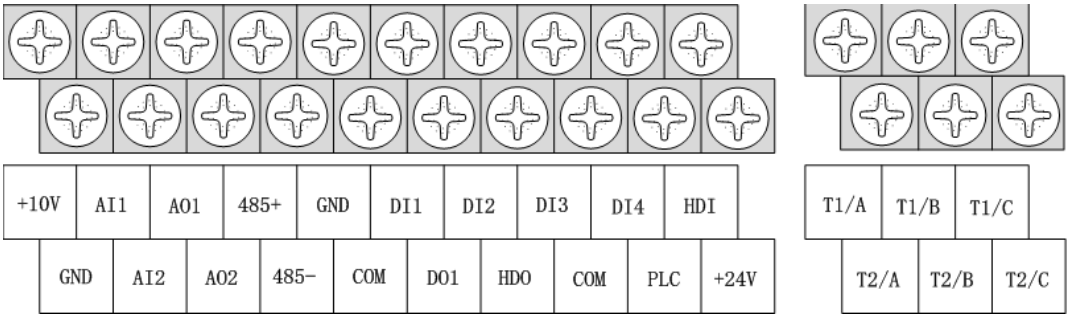


45KW-90KW

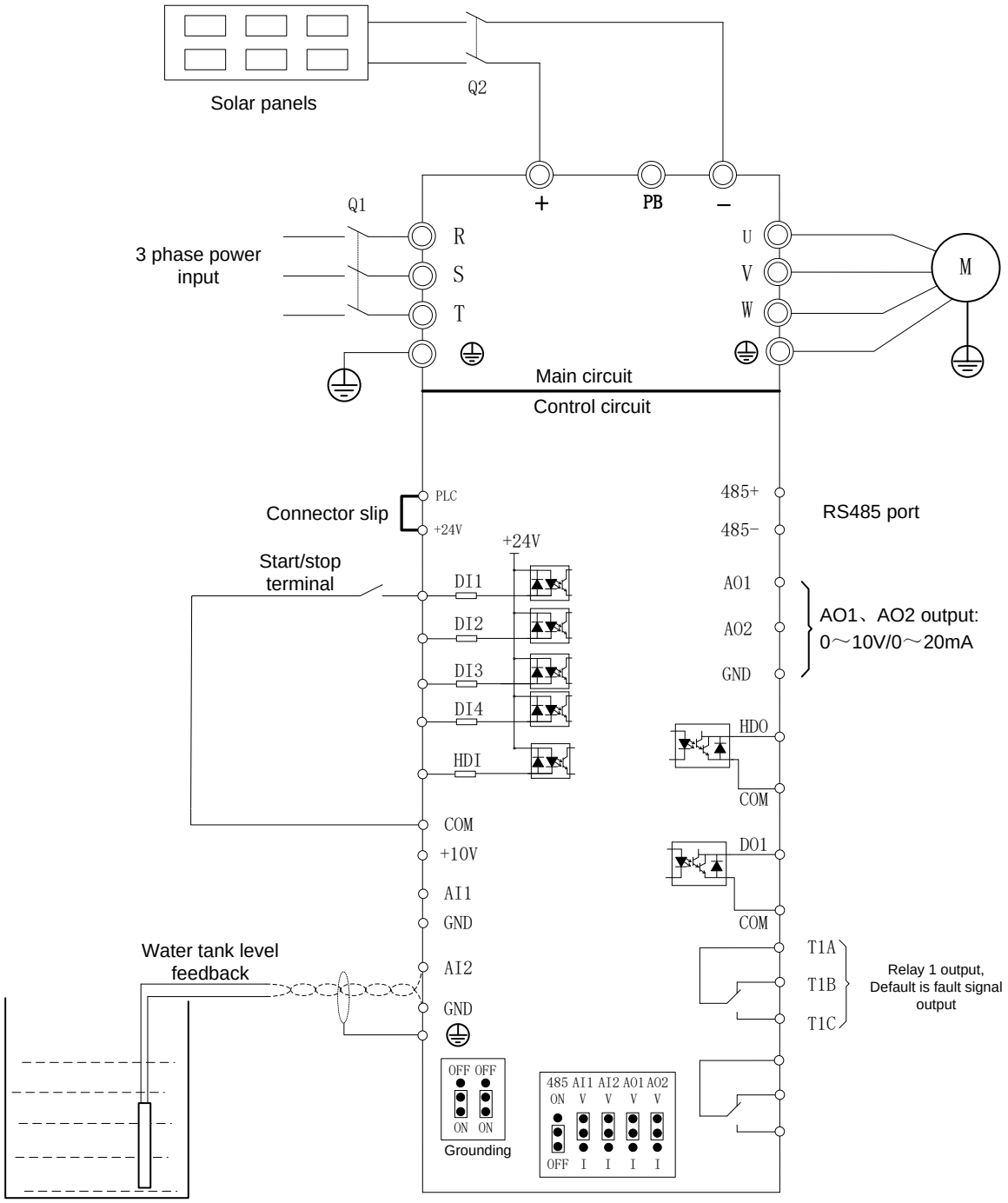
Terminal	Function instruction
R、S、T	AC power input terminal, connect three-phase AC power
U、V、W	AC output terminal, connect three-phase AC motor
+、-	**The positive and negative terminals of the internal DC bus are connected to solar panel**
+、PB	Braking resistor connection terminal when built-in brake unit
⏚	Ground terminal, ground
EMC、VDR	Safety capacitor and varistor grounding selection screw (SIZEA~SIZEC EMC screw on the left side of the fuselage)

- **The power output of the PV panel is connected to the DC link "+" and "-" terminals. Please note that the polarity is not reversed.**
- Make sure that the inverter input AC voltage level is consistent with AC grid voltage before connecting with Input "R", "S" and "T" terminals
- If Grid is single-phase power supply, you can connect to any two terminals of "R", "S" and "T".

2、Control terminal Connection



- **Set parameter P00.06=2 and use a switch to Short DI 1 to com,DI1 defaults to be the running terminal input.**
- **AI2 defaults to be the water tank level detection signal input, which is used to control the inverter sleep and auto start.**
- **Relay 1 output defaults to the fault signal output.**



Solar pump inverter diagram 1-1

3、Trial run(How to use and start solar pump inverter)

Step 1: Keyboard control: Set motor parameter P11.02- P11.05 as per motor pump name plate. If dry run protection is required, measure the unload protection current according to the following method. If dry run protection is not required then move to step 2

Notice: Unload detection current self-learning: disable the PV pump function (P47.00=0), run to 30~40Hz, when the output frequency is stable, enter P24.13, press the keyboard 

and 

simultaneously for more than 2 seconds, then P24.13 value will change automatically. During this process, the pump no need to take out from water

Step 2: Set the MPPT start voltage (P47.04). This value is generally set to about 80% of the open circuit voltage of solar panel. **This value can help the drive track the maximum power point faster if set accurately (Notice: you can also miss this step but if you do this setting it will be faster for automatic Mppt tracking)**

Step 3: Set some other related special solar pump parameters for optimization as per parameter list

Step 4: After finishing trial run, If pump still does not work when inverter is running at more than 40 Hz, Please disconnect the power supply and replace any two-phase wiring of the pump motor.

4、Keypad display

4.1 Monitoring display

According to the running status of the inverter, the digital tube displays different contents in turn. If the button has no operation, the next monitoring amount is automatically displayed every few seconds; of course, you can also switch 

to the next monitoring indicator

- **When the inverter is in the stop state, the digital tube is cyclically scrolling to display：**
  “00000”→DC bus voltage（r27.03）→given frequency（r27.01）→ Distance remaining time（r47.02）→“00000”
- **When the inverter is in running state, the digital tube is cyclically scrolling to display.：**
  “00000”→DC bus voltage（r27.03）→output frequency（r27.00）→output current（r27.06）→output power（r16.02）→“00000”
- **When the inverter is in a fault state, the digital tube is cyclically scrolling to display.：**

Fault code (r25.00) → DC bus voltage at fault (r25.03) → Output frequency at fault (r25.01) → Output current at fault (r25.02) → Output power at fault (r25. 16) → fault code

4.2 Menu mode

After the inverter is power on, the keyboard menu mode is user-defined mode. Most of users only need to pay attention to the parameters displayed in this mode. To check the complete inverter parameters, press the  and  keys while the keyboard is displayed . When the keyboard is displayed , press the key  to enter the basic menu mode.

3.3 Error code： For other alarm codes, please refer to Chapter 6 of the manual or VFD500 Standard frequency inverter User manual

alarm code	meaning
Er.CCC	Light weak fault, please refer to function code P47.05~P47.07

5、Solar pumping special Parameter list

Symbol Description:
"☆" means that the set value of this parameter can be changed no matter the inverter is in the stop state or in running state.
"★" indicates that the set value of this parameter cannot be changed while the inverter is running.
"●" indicates that the value of this parameter is the actual detected record value and cannot be changed.

Function code	Name	Description	Default	Property
47 Group solar pumping special parameter				
P47.00	Solar pump inverter function enable	0: invalid The parameters behind the 47 group cannot be changed! 1: Enable, to enable the special function of the PV pump inverter	1	★
P47.01	Solar pump inverter control mode	Units digit's: Startup mode 0: Manual start, the start mode is determined by P00.06; 1: automatic start, Ten digit's: MPPT function	11	★

Function code	Name	Description	Default	Property
		0: MPPT is disabled; CVT control is used (voltage is given as P47.04). 1: Enable MPPT.		
r47.02	Remaining time for starting	The remaining time of the starting is displayed In auto start mode, Unit: second	--	●
P47.03	Automatic start timing	In auto start mode, set the time from power on to start.	600	★
P47.04	MPPT starting voltage	Set the starting voltage of the MPPT algorithm. ➢ When the MPPT function is disabled, this value is the reference voltage. ➢ When the MPPT function is enabled, the inverter searches up and down from this value for the maximum power point.220V Default DC 330V and 380V Default DC 550V	330V(550V	★
P47.05	Light detection threshold	If the output frequency is lower than this value and exceeds P47.06, it will be reported to Er.CCC.	20.00Hz	☆
P47.06	Light detection time	See P47.05 for explanation.	60s	☆
P47.07	Light weak wake up time	After the Er.CCC fault is reported, if the time when VDC is higher than the undervoltage point is longer than the set value, the fault state will exit and continue to run normally	600s	☆
P47.08	Minimum VDC deviation	When the deviation is less than this value, the regulator stops adjusting; it is used to reduce the jitter of the output frequency.	5V	☆
P47.09	Regulator proportional gain	0.01~1.00	0.10	☆
P47.10	Regulator integral gain	0.001~0.100	0.040	☆
r47.11	Pumping flow	0.1 m3 It shows the amount of water pumping flow today, it will be cleared after power down.	0.0 m^3	●
r47.12	Cumulative pumping flow volume	1 m3, 32 digits It shows the pumping flow volume accumulated by the pump. The power can be saved automatically after power-on, and	0 m^3	●

Function code	Name	Description	Default	Property
		continue to accumulate on the original basis after re-powering. It Can be cleared to zero by P47.14.		
P47.14	Cumulative pumping reset	Set 1 to clear zero for r47.12. This function code automatically changes to 0 after the reset is completed.	0	☆
r47.15	Current traffic	0.1 m3/h	0.0 m³/h	●
P47.16	Pump rated flow	0.1 m3/h	0.0 m³/h	☆
P47.17	Pump water frequency	Set the output frequency of the inverter when the pump can pump water.	20.00Hz	☆
24 Group Pump dry run protection/unload detection parameter				
P24.12	Dry run/Unload protection option	0: No offload detection is performed; 1: Enable offload detection	1	☆
P24.13	Dry run/Unload detection level	0.0 to 100.0% The percentage of motor rated current.	0.0%	☆
P24.14	Dry run Unload detection time	0.000s～60.000s	30.000s	☆
41 Group Pump sleep and wake-up parameter				
P41.00	Sleep/wake source selection	Unit digit's: Sleep source selection 0: no sleep function 2: AI1 sleep 3: AI2 sleep Tens digit's: wake up source selection 1: AI1 wakes up 2: AI2 wakes up Note: If the AI2 is connected to the level detection signal, set this value to "23". If there is no sleep source (one digit is 0), the wake-up function is automatically invalid, and P41.03~P41.06 is invalid.	00	☆
P41.03	Dormant level	0～100.0% Note: The liquid level is higher than this value and the duration exceeds P41.05, and the pump sleeps.	0.0%	☆
P41.04	Wake up level	0～100.0% Note: The liquid level is lower than this value and the duration exceeds P41.06, the pump wakes up。	0.0%	☆
P41.05	Enter sleep delay	0.0s～6000.0s	0.0s	☆

Function code	Name	Description	Default	Property
P41.06	Wake-up delay	0.0s～6000.0s	0.0s	☆
Basic function parameter				
P00.00	User password	0 ~ 65535 ➢ No user password status (P00.01 = 1 after power-on): Entering the same non-zero value twice in succession sets a user password and enters lockout. ➢ password lock state: Enter the password to enter the unlock state. ➢ unlocked state: Enter the original password to enter the lock state; enter the same value twice in a row to change the password (clear the password if you enter 0 twice in a row).	0	☆
P00.03	RESET	0：NO ACTION 11：Restore default parameter except for motor parameter and auto-tune related parameter and factory parameter 12:Restore default to factory parameter 13：Clear tripping record	0	★
P00.04	Motor Control mode	0：VF 1：SVC(sensorless vector control) ➢ Open loop vector and torque control without encoder feedback 2：VC Vector control with sensor ➢ Close loop vector and torque control supporting encoder feedback in high precision or torque control application	0	★
P00.07	Numeric frequency setting	00.00Hz～maximum frequency	50.00Hz	☆
P00.09	Reverse control	0：Enable 1：Disable	0	★
P01.00	Main frequency source selection (A)	0：Digital setting **1：AI1** 2：AI2 3：AI3(reserved) 4：AI4（reserved） 5：HDI 6：multi-step speed 7：communication 8：PID 9：Internal PLC	10	★

Function code	Name	Description	Default	Property
		Notice:DI terminal function code 26-32 superior than this function code		
P01.06	Maximum frequency	10.00～600.00Hz	50.00Hz	★
P02.08	Stop method	0：ramp to stop 1：free coast to stop	0	☆
P03.01	Acceleration time 1	Setting value depend on P03.16 P03.16 = 2, 0.00～600.00s; P03.16 = 1, 0.0s～6000.0s; P03.16 = 0, 0s～60000s	Depend on model	☆
P03.02	Deceleration time 1	Setting value depend on P03.16 P03.16 = 2, 0.00～600.00s; P03.16 = 1, 0.0s～6000.0s; P03.16 = 0, 0s～60000s	Depend on model	☆
P03.16	Accel and Decel time unit selection	0：1s 1：0.1s 2：0.01s	2	☆
P12.00	VF curve	0：linear VF 1：Multi-point VF 2：VF to the 1.3 3：1.7 power 4：2.0 power 5：VF complete separation 6：VF Half separation	0	★
P12.09	Torque boost	0%～200% 0% is automatic torque boost	0%	☆
P22.00	Carrier/Swithcing frequency	Depend on Solar pump inverter power ≤7.5kW: 1kHz～12.0kHz 11kW～45kW: 1kHz～8kHz ≥55kw: 1kHz～4kHz	Depend	☆
P22.14	Cooling method (fan control)	0:effective when running 1:Forced control(effective when power on) 2:adjustable as per drive temperature	0	☆
P23.00	Bus voltage control option	➢ Unit'digit :Overvoltage stall control 0:overvoltage stall disabled 1:overvoltage stall enabled 2:overvoltage stall self-adjustable ➢ The over-voltage stall function limits the amount of power generated by the motor by extending the deceleration time or even increasing the speed, avoiding over-voltage on the DC side and reporting over-voltage	01	★

Function code	Name	Description	Default	Property
		faults Ten'unit:Undervoltage stall control 0:undervoltage stall disabled 1:undervoltage stall deceleration(decelerate to zero speed and run at zero speed) 2: undervoltage stall deceleration(decelerate to zero and stop) ➢ The undervoltage stall function reduces the motor power consumption or reduces the power consumption of the motor or turns it into a power generation operation to avoid the undervoltage fault on the DC side. ➢ The undervoltage stall function is used when the input power supply quality is poor (the power supply voltage fluctuates downward or the sporadic short power is suspended), and it is necessary to keep the inverter running as much as possible.		
11 Group Motor Parameter				
P11.00	Motor type	0：AC asynchronous motor 1：Synchronous motor(Special software) See appendix parameter	0	●
P11.02	**Motor rated power**	0.1kW～800.0kW ➢ when power is less than 1kw ,0.75kw set to 0.8 as per round up principle ,0.55kw motor set 0.6 ➢ when change motor rated power,AC drive will automatically set other parameter of motor name plate and motor model parameter **be careful to use**	Depend	★
P11.03	**Motor rated voltage**	10V～2000V	Depend	★
P11.04	**Motor rated current**	P11.02<30kW：0.01A P11.02>=30kW：0.1A	Depend	★
P11.05	**Motor rated frequency**	1.00Hz～600.00Hz	50.00Hz	★
P11.06	**Motor rated RPM**	1～60000rpm	Depend	★
P11.07	Motor rated power factor	0.500～1.000	Depend	★
r11.09	Number of motor 1 pairs of pole	Read only,It will auto calculate as per motor rated frequency and rated rotating speed	-	●
P11.10	Auto-tune/self-learning	0：no auto tuning 1：Stationary auto tuning of Asynchronous motor 2：Rotational auto tuning of Asynchronous motor	0	★

Chapter 6 Fault Diagnosis and Solution

VFD500-PV solar pump inverter has 24 types of warning information and protection function. In case of abnormal fault,the protection function will be invoked, the inverter will stop output, and the faulty relay contact of the inverter will start, and the fault code will be displayed on the display panel of the inverter. Before consulting the service department, the user can perform self-check according to the prompts of this chapter, analyze the fault cause and find out solution. If the fault is caused by the reasons as described in the dotted frame, please consult the agents of inverter or factory directly.

Fault Name	Display	Possible Causes	Solutions
Inverter unit protection	Er. SC	1: The output circuit is grounded or short circuited. 2: The connecting cable of the motor is too long. 3: The IGBT overheat. 4: The internal connections become loose. 5: The main control board is faulty. 6: The drive board is faulty. 7: The inverter IGBT is faulty.	1: Eliminate external faults. 2: Install a reactor or anoutput filter. 3: Check the air filter and the cooling fan. 4: Connect all cables properly. 5: Ask for technical support 6: Ask for technical support 7: Ask for technical support
Ground short circuit	Er.SC1	1. Short circuit of motor to ground 2, the motor and inverter wiring is too long 3, module overheating 4. The internal wiring of the inverter is loose 5. Control board is fault 6, Drive board is fault 7, inverter module is fault	1. Replace cable or motor 2. Install reactor or output filter 3. Check whether the air duct is blocked, the fan is working properly and eliminate the existing problems 4. Plug in all the connections 5. Ask for technical support 6. Ask for technical support 7. Ask for technical support
Over current during acceleration	Er.OC1	1: The output circuit is grounded or short circuited. 2: Motor auto-tuning is not performed. 3: The acceleration time is too short. 4: Manual torque boost or V/F curve is not appropriate. 5: The voltage is too low. 6: The startup operation is performed on the rotating motor. 7: A sudden load is added during acceleration. 8: The frequency inverter model is of too small power class.	1: Eliminate external faults. 2: Perform the motor auto-Tuning in cold state 3: Increase the acceleration time. 4: Adjust the manual torque boost or V/F curve. 5: Adjust the voltage to normal range. 6: Select rotational speed tracking restart or start the motor after it stops. 7: Remove the added load. 8: Select a frequency inverter Of higher power class.

Fault Name	Display	Possible Causes	Solutions
Over current during deceleration	Er.OC2	1: The output circuit is grounded or short circuited. 2: Motor auto-tuning is not performed. 3: The deceleration time is too short. 4: The voltage is too low. 5: A sudden load is added during deceleration. 6: The braking unit and braking resistor are not installed	1: Eliminate external faults. 2: Perform the motor auto-tuning. 3: Increase the deceleration time. 4: Adjust the voltage to normal range. 5: Remove the added load. 6: Install the braking unit And braking resistor.
Over current at constant speed	Er.OC3	1: The output circuit is grounded or short circuited. 2: Motor auto-tuning is not performed. 3: The voltage is too low. 4: A sudden load is added during operation. 5: The frequency inverter model is of too small power class.	1:Eliminate external faults. 2: Perform the motor auto-tuning. 3:Adjust The voltage to normal range. 4: Remove the added load. 5: Select a frequency Inverter of higher power class.
Overvoltage during acceleration	Er.OU1	1: The input voltage is too high. 2: An external force drives the motor during acceleration. 3: The acceleration time is too short. 4: The braking unit and braking resistor are not installed.	1:Adjust The voltage to normal range. 2: Cancel the external forceor install a braking resistor. 3: Increase the acceleration time. 4: Install the braking unit And braking resistor.
Overvoltage during deceleration	Er.OU2	1: The input voltage is too high. 2: An external force drives the motor during deceleration. 3: The deceleration time is too short. 4: The braking unit and braking resistor are not installed.	1:Adjust The voltage to normal Range. 2: Cancel the external force or install the braking resistor. 3: Increase the deceleration time. 4: Install the braking unit And braking resistor
Overvoltage at constant speed	Er.OU3	1: The input voltage is too high. 2: An external force drives the motor during deceleration.	1:Adjust The voltage to normal range. 2: Cancel the external force or install the braking resistor.

Fault Name	Display	Possible Causes	Solutions
Low voltage	Er.LU1	1: Instantaneous power failure occurs on the input power supply. 2: The frequency inverter's input voltage is not within the allowable range. 3: The DC bus voltage is abnormal. 4: The rectifier bridge and buffer resistor are faulty. 5: The drive board is faulty. 6: The main control board is faulty.	1: Reset the fault. 2:Adjust The voltage to normal range. 3: Ask for technical support 4: Ask for technical support 5: Ask for technical support 6: Ask for technical support
Contactor open	Er.LU2	1. Instantaneous power cut 2, the inverter input voltage is not in the scope of the specification requirements 3. Abnormal bus voltage 4,rectifier bridge and buffer resistance is not normal 5, drive board is fault 6. control board is fault	1. Reset failure 2. Adjust the voltage to the normal range 3. Ask for technical support 4. Ask for technical support 5. Ask for technical support 6.Ask for technical support
Frequency inverter overload	Er. oL	1: The load is too heavy or locked-rotor occurs on the motor. 2: The frequency inverter model is of too small power class.	1: Reduce the load and check the motor and mechanical condition. 2: Select a frequency Inverter of higher power level.
Motor overload	Er.oL1	1: F8-02 is set improperly. 2: The load is too heavy or locked-rotor occurs on the motor. 3: The frequency inverter model is of too small power class.	1: Set F8-02 correctly. 2: Reduce the load and check the Motor and the mechanical condition. 3: Select a motor of higher power level
Motor overheat	Er. oH3	1: The cabling of the temperature sensor becomes loose. 2: The motor temperature is too high	1: Check the temperature sensor cabling and eliminate the cabling fault. 2: Lower the carrier frequency or adopt other heat radiation
Power input phase loss	Er.iLP	1: The three-phase power input is abnormal. 2: The drive board is faulty. 3: The lightning proof board is faulty. 4: The main control board is faulty.	1:Eliminate external faults. 2: Ask for technical support. 3: Ask for technical support. 4: Ask for technical support.

Fault Name	Display	Possible Causes	Solutions
Power output phase loss	Er.oLP	1: The cable connecting the frequency inverter and the motor is faulty. 2: The frequency inverter's three-phase outputs are unbalanced when the motor is running. 3: The drive board is faulty. 4: The IGBT module is faulty.	1:Eliminate external faults. 2: Check whether the Motor three phase winding is normal. 3: Ask for technical support. 4: Ask for technical support.
IGBT Module overheat	Er. oH	1: The ambient temperature is too high. 2: The air filter is blocked. 3: The fan is damaged. 4: The thermally sensitive resistor of the IGBT module is damaged. 5: The inverter IGBT module is damaged	1:Lower the ambient temperature. 2: Clean the air filter. 3: Replace the damaged fan. 4: Replace the damaged thermally sensitive resistor. 5: Replace the inverter module.
module temperature detection fault	Er.tCK	1, temperature detection line broken 2, drive board is faulty 3. Main control board is faulty 4, the environmental temperature is too low	1. Check the thermistor wiring 2. Ask for technical support 3. Ask for technical support 4, manual intervention to drive the temperature rise
485Communication fault	Er.485	1, the work of the host computer is not normal 2, the communication line is not normal 3, the communication parameter set is incorrect	1. Check the connection of upper computer 2. Check the communication connection line 3. Set communication parameters correctly
Current detection fault	Er.CUr	1: The HALL device is faulty. 2: The drive board is faulty. 3: The control board is faulty	1: Replace the faulty HALL device. 2: Replace the faulty drive board. 3: Ask for technical support.
Motor auto-tuning fault 1	Er.TU1	1: The motor parameters are not set according to the nameplate. 2: The motor auto-tuning times out.	1: Set the motor parameters according to the name plate properly. 2: Check the cable connecting between the Frequency inverter and the motor.
Motor auto-tuning fault2	Er.TU2	1: The motor parameters are not set according to the nameplate. 2: The motor auto-tuning times out.	1: Set the motor parameters according to the nameplate properly. 2: Check the cable connecting between the Frequency inverter and the motor.

Fault Name	Display	Possible Causes	Solutions
EEPROM read- write fault	Er.EEP	1、 Eeprom Operate too frequent 2、 The EEPROM chip is damaged.	1、 Operate Eeprom suitable 2、 Replace the main control board
Dry run/unload	**Er. LL**	**1、The frequency inverter running current is lower than the setting value.**	**1、Confirm whether the load is off 2、Check that the load is disconnected or the parameter setting is correct**
PID feedback lost during running	Er.FbL	1、 PID feedback<P40.35 setting value and P40.36 not zero,PID feedback>P40.37 setting value and P40.38 not zero	1、 check PID feedback signal 2、 P40.35 and P40.37 set correct parameter
User-defined fault 1	Er.Ud1	1: The signal of user-defined fault 1 is input via DI. 2:The signal of user-defined fault 1 is input via virtual I/O.	1: Reset the operation. 2: Reset the operation
User-defined fault 2	Er.Ud2	1: The signal of user-defined fault 2 is input via DI. 2:The signal of user-defined fault 2 is input via virtual I/O.	1: Reset the operation. 2: Reset the operation
By wave current limitingfault	Er.CbC	1: The load is too heavy or locked-rotor occurs on the motor. 2: The frequency inverter model is of too small power class	1: Reduce the load and check the motor and mechanical condition. 2: Select a frequency inverter of higher power class.
Too large speed deviation	Er.DEV	1: The encoder parameters are set incorrectly. 2: The motor auto-tuning is not performed. 3: The detection parameters of too large speed deviation are set incorrectly.	1: Set the encoder parameters properly. 2: Perform the motor auto-tuning. 3: Set the detection parameters correctly based on the actual situation.
Motor over-speed	Er. oS	1: The encoder parameters are set incorrectly. 2: The motor auto-tuning is not performed. 3: The over-speed detection parameters are set incorrectly	1: Set the encoder parameters properly. 2: Perform the motor auto-tuning. 3: Set the over-speed detection parameter correctly based on the actual situation.
Encoder offline	Er.PGL	1. motor locked 2. encoder pulse setting wrong 3. encoder offline	1 check motor and mechanical condition 2 set correct parameter for encoder 3 check encoder connecting line

ShenZhen VEIKONG Electric CO., Ltd.

Factory Address:
Block E01,first industrical park lingbei 5 road ,phoenix community,f uyong street , Bao'anDistrict, Shenzhen ,China

R&D Center: Jin yu cheng building A,Bu Long Rd Bantian Town ,Longgang district Shenzhen City,China
Technical Support Hotline: +86-0755-89587650
Web Site: www.veikong-electric.com
Whatsapp +8615989436541