

Terko Tecnologías Agropecuarias
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ABH Solar Pump Inverter Manual



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, debugging, 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; 2. No unauthorized modification to the frequency inverter; Otherwise there is danger of damaged. 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, please pay attention to the installing place to guarantee the effective heat dissipation. 2. When carrying the frequency inverter, please support its bottom. |

●Wiring

| Danger |
|--|
| 1. Wire is connected only when the main circuit is cut off, otherwise there is a danger of shock. 2. Wire is connected by professional person only. Otherwise there is a danger of shock. 3. Earth must be reliable. Otherwise there is a danger of shock. 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.
2. Please don't touch the cooling fan and braking resistance to check the temperature; Otherwise there is a danger of getting burn.
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.
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.
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.
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)

- At over 1,000 meters altitude, the inverter's heat dissipation function worsened due to the thin air, it is necessary to use less.
- 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.
- 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) | | | | | |
| ABH-1 series, DC60-400VDC input, 3 phase 110-230VAC output | | | | | | | |
| 0.75 | 0.75 | 110 | 1.0 | 400 | 175~380 | 7A | 0-600 |
| 1.5 | 1.5 | 110 | 1.95 | 400 | 175~380 | 10A | 0-600 |
| ABH-2 series,DC150V-450V input, 3 phase 220-240VAC output | | | | | | | |
| 0.75 | 0.75 | 220 | 1.0 | 450 | 360~430 | 4A | 0-600 |
| 1.5 | 1.5 | 220 | 1.95 | 450 | 360~430 | 7A | 0-600 |
| 2.2 | 2.2 | 220 | 2.86 | 450 | 360~430 | 10A | 0-600 |
| 4 | 4 | 220 | 5.4 | 450 | 360~430 | 16A | 0-600 |
| ABH-3 series,DC250V to 780VDC input, 3 phase 380~460VAC output | | | | | | | |
| 0.75 | 0.75 | 380 | 1.0 | 780 | 620~750 | 3.0 | 0-600 |
| 1.5 | 1.5 | 380 | 2.2 | 780 | 620~750 | 4.0 | 0-600 |
| 2.2 | 2.2 | 380 | 3.3 | 780 | 620~750 | 6.0 | 0-600 |
| 4 | 4 | 380 | 5.6 | 780 | 620~750 | 10 | 0-600 |
| 5.5 | 5.5 | 380 | 8 | 780 | 620~750 | 13 | 0-600 |
| 7.5 | 7.5 | 380 | 10 | 780 | 620~750 | 17 | 0-600 |
| 11 | 11 | 380 | 14.3 | 780 | 620~750 | 25 | 0-600 |
| 15 | 15 | 380 | 19.5 | 780 | 620~750 | 32 | 0-600 |
| 18.5 | 18.5 | 380 | 23.4 | 780 | 620~750 | 38 | 0-600 |
| 22 | 22 | 380 | 28.6 | 780 | 620~750 | 45 | 0-600 |
| 30 | 30 | 380 | 39 | 780 | 620~750 | 60 | 0-600 |
| | | | | | | | |

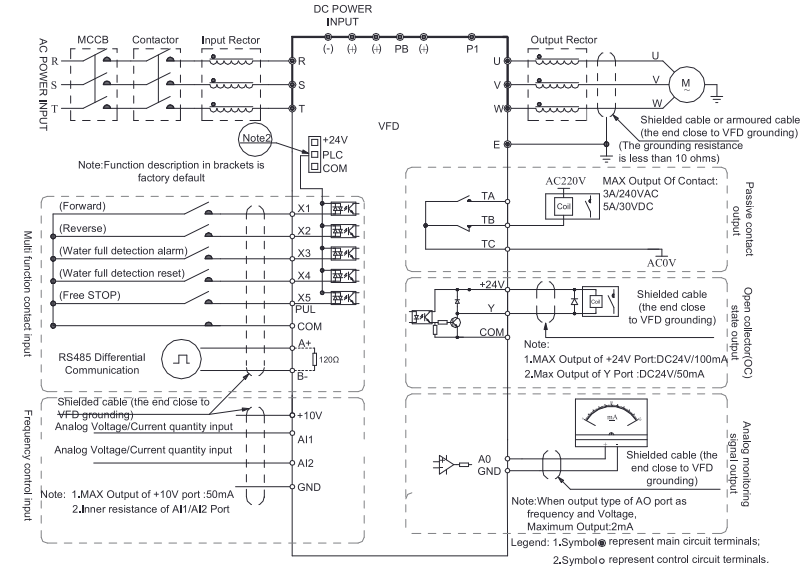
1.5 Cautions in Disposal

When you dispose frequency inverter, please pay attention to:

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

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 | OFF | RS485 Terminal Resistor |
| AO-F | OFF | AO-F Output- frequency |
| AO-I | OFF | AO-I Output- Current |
| AO-U | OFF | AO-U Output- Voltage |
| AI1 | U | AI1 Input- Current/Voltage |
| AI2 | U | AI2 Input- Current/Voltage |

Chapter 3 Keyboard layout and functions specification

• Keyboard Appearance



• Key function

| Key | Name | Function |
|-----|-------------------|--|
| | Menu key | Enter menu while standby or running. Presses this key to return while modify parameter. While standby or running, press for 1 sec to enter condition monitoring |
| | Confirm/Shift key | Press to modify parameter while in menu interface. Press again to confirm after modifying; Press this key for 1 Sec to shift digit, and long press to cycle. Each digit flashes three time to shift to next digit. |
| | Up/down key | Select parameter group in menu interface. Modify parameter in modify state. Modify given frequency, ID given while at standby or monitoring state (While given frequency, PID are set by keyboard and [F4.09] needs to be set. |
| | Run key | While run/stop is controlled by keyboard, press this key, inverter forward runs, and the indicator is always on. While reverse, the indicator sparks. |
| | Stop/reset key | Machine stops if press it while run/stop is controlled by keyboard. Its efficiency range is defined by [F4.08]. Inverter resets if press it in fault state (no reset if fault is not |

Chapter 4 Fault Diagnosis and Solution










This chapter describes the inverter fault, alerts, and operation of the failure on the inverter; the display information on inverter and countermeasures.

Fault Information and Description in Detail

| Keypad display | Fault code | Fault type | Possibility reason | Troubleshooting |
|----------------|------------|----------------------------------|--|--|
| | E.LU2 | Under voltage at runs | <ul style="list-style-type: none"> Power voltage too low DC main contactor don't close | <ul style="list-style-type: none"> Check input power to solve Ask support |
| | E.oU1 | Over voltage at acceleration | <ul style="list-style-type: none"> Power voltage fluctuation over limit Too start rotating motor | <ul style="list-style-type: none"> Check power grid Restart until motor is stop completely, or set [F1.00] set for 1 or 2 |
| | E.oU2 | Over voltage during deceleration | <ul style="list-style-type: none"> Deceleration time too small The driving load too heavy Power voltage fluctuation over limit | <ul style="list-style-type: none"> Prolong deceleration time Reduce the load, or select bigger capacitor drive, or connect braking unit Check input power |
| | E.oU3 | Overvoltage at constant speed | <ul style="list-style-type: none"> The input voltage is too high. An external force drives the motor during deceleration | <ul style="list-style-type: none"> Adjust the voltage to normal range. Cancel the external force or install the braking resistor. |
| | E.oU4 | Over voltage at stop | <ul style="list-style-type: none"> Voltage fluctuate above limit | <ul style="list-style-type: none"> Check the input voltage |
| | E.oC1 | Over current during acceleration | <ul style="list-style-type: none"> Acceleration time is too short To start rotating motor V/F setting not correct or torque boost setting too big Solar drive capacitor is too small | <ul style="list-style-type: none"> Prolong acceleration time Restart motor when it on still, or set F1.00 for 1 or 2. Reset V/f curve or torque boost setting |
| | E.oC2 | Over current during deceleration | <ul style="list-style-type: none"> The output circuit is grounded or short circuited. Motor auto-tuning is not performed. The acceleration time is too short. Manual torque boost or | <ul style="list-style-type: none"> Eliminate external faults. Perform the motor auto tuning. Increase the acceleration time. Adjust the manual torque boost or V/F curve. Adjust the voltage to normal range. |

| | | | | |
|-------|-------|--------------------------------|---|---|
| | | | V/F curve is not appropriate. <ul style="list-style-type: none"> The voltage is too low. The startup operation is performed on the rotating motor. A sudden load is added during acceleration. The AC drive model is of too small power class. | <ul style="list-style-type: none"> Select rotational speed tracking restart or start the motor after it stops. Remove the added load. Select an AC drive of higher power class. |
| E.oC3 | E.oC3 | Over current at constant speed | <ul style="list-style-type: none"> The output circuit is grounded or short circuited. Motor auto-tuning is not performed. The voltage is too low. A sudden load is added during operation. The AC drive model is of too small power class | <ul style="list-style-type: none"> Eliminate external faults. Perform the motor auto tuning. Adjust the voltage to normal range. Remove the added load. Select an AC drive of higher power class. |
| E.oL1 | E.oL1 | Motor overload | <ul style="list-style-type: none"> Boost torque is too big under VF control ACC. and DEC. time is too short Motor parameters setting is improperly Restart motor which in counter rotate The grid voltage is too lower Load is too big or motor block load AC drive selected is too load | <ul style="list-style-type: none"> Reduce boost torque Increase the ACC./DEC. time Reset motor parameters Reduce current limit and adopt speed tracking Check grid voltage Check load condition Change bigger power AC drive |
| E.oL2 | E.oL2 | AC drive overload | <ul style="list-style-type: none"> Boost torque is too big under VF control ACC. and DEC. time is too short Motor parameters setting is improperly Restart motor which in counter rotate The grid voltage is too lower | <ul style="list-style-type: none"> Reduce boost torque increase the ACC./DEC. time reset motor parameters Reduce current limit and adopt speed tracking Too check grid voltage Too check load change bigger power AC drive |

| | | | | |
|-------|-------|--------------------------------|--|--|
| | | | <ul style="list-style-type: none"> Load is too big or motor block load AC drive selected is too load | |
| E.SC | E. SC | System abnormal | <ul style="list-style-type: none"> Deceleration is too short Short circuit of solar drive output or phase output short circuit to ground Module damage EMC interface | <ul style="list-style-type: none"> Prolong acceleration time To check peripheral equipment Ask to support Check the wiring layout, cable ground |
| E.oH1 | E.oH1 | Inverter over-heat | <ul style="list-style-type: none"> Temperature is too high. Air channel is blocked. Fan connection parts is loose. Fan is damaged. Temperature detection circuit fault | <ul style="list-style-type: none"> Make the environment meet the requirement. Clear the air channel. Check and reconnect the wire Change the same new fan. Seek support from factory. |
| E.oH2 | E.oH2 | Rectifier over-heat | <ul style="list-style-type: none"> Temperature is too high. Air channel is blocked. Fan connection parts is loose. Fan is damaged. Temperature detection circuit fault | <ul style="list-style-type: none"> Make the environment meeting the requirement. Clear the air channel. Check and reconnect the wire. Change the same new fan. Seek support from factory. |
| E.TE1 | E.TE1 | Motor static detection fault | <ul style="list-style-type: none"> Detection overtime Start static detection while motor is running. Capacitance difference is too big between motor and inverter. Motor parameter setting mistake. | <ul style="list-style-type: none"> Check motor connection wire. Detect after motor stopping totally. Change inverter model. Reset parameter according to nameplate. |
| E.TE2 | E.TE2 | Motor rotation detection fault | <ul style="list-style-type: none"> Detect while motor is running. Detect with load. Detection overtime Capacitance difference is too big between motor and inverter. Motor parameter setting mistake. | <ul style="list-style-type: none"> Detect after motor stop totally. Re-detect without load. Check motor connection wire. Change inverter model. Reset parameter according to nameplate. |

| | | | | |
|--|-------------------------------------|---|---|---|
|  | E.EEP | Memory fault | <ul style="list-style-type: none"> Electromagnetic disturb in memory period. EEPROM damage. | <ul style="list-style-type: none"> Resume load and save. Seek support from factory. |
|  | LIFE | Reserved | | |
|  | E.ILF | Input phase loss | <ul style="list-style-type: none"> 3-phase input power open phase. | <ul style="list-style-type: none"> Check 3-phase power supply and the phase. Check 3-phase power supply wiring. |
|  | E.oLF | Output phase loss | <ul style="list-style-type: none"> 3-phase output power open phase | <ul style="list-style-type: none"> Check 3-phase output voltage and current. Check wiring. |
|  | E.Gnd | Output earth terminal short circuit. | <ul style="list-style-type: none"> Check wiring and insulation. | <ul style="list-style-type: none"> Output earth |
|  | E.HAL | Current detection fault | <ul style="list-style-type: none"> Detect circuit fault. Phase imbalance | <ul style="list-style-type: none"> Seek support from factory Check motor and wiring. |
|  | E.PAn | Keyboard connect fault | <ul style="list-style-type: none"> Keyboard wire fault. Keyboard component damage. | <ul style="list-style-type: none"> Check keyboard wire. Seek support from factory. |
|  | Rs485c ommuni cation fault | <ul style="list-style-type: none"> Unsuitable baud rate setting. Communication wire breaks. Communication format does not match upper machine. | <ul style="list-style-type: none"> Set suitable baud rate setting. Check communication wire. Make sure right communication format. | <ul style="list-style-type: none"> RS485communication fault |
|  | E.CPE | Parameter copy fault | <ul style="list-style-type: none"> Parameter copy communication is fault. Copy keyboard does not match the inverter. | <ul style="list-style-type: none"> Check wire. Select the specified external keyboard model. |

Chapter 5 Parameters List

This chapter just provides function parameter table. Specifications refer to AC300 technical manual or inquiry the company.

- “●” : Parameter can be changed in the running state.
“○” : Parameter can't be changed in the running state.
“×” : Parameter can be read only.
“—” : Factory setting parameter, only factory can set.
“※” : Parameter is related to the model.

Basic parameters

| NO. | Function description | Range of settings and definition | | Factory default | Feature | Address |
|--------|--------------------------------------|--|---|-----------------|---------|---------|
| F00.00 | Motor control mode | Asynchronous motor control mode: 0: V/F control Synchronous motor control mode: 6: High-performance VC without PG | | 0 | ○ | 0x000 |
| F00.01 | Reserved | | | | | |
| F00.02 | Run command channel | 0: Keyboard control 1: Terminal control | 2: RS485 communication control 3: Reserved | 0 | ● | 0x002 |
| F00.03 | Frequency given source channel A | 0: Keyboard number given 1: Reserved 2: Voltage/Current analog AI1 given 3: Voltage/Current analog AI2 given 4: Reserved 5: Terminal pulse PUL given 6: RS485 communication given 7: Terminal UP/DW control 8: PID control given 9: Program control (PLC) given 10: Optional card 11: Multi-steps speed given | | 0 | ● | 0x003 |
| F00.04 | Frequency given source channel B | | | 1 | ● | 0x004 |
| F00.05 | Frequency channel B reference source | 0: Max. output frequency as reference source 1: Set frequency of channel A as reference source | | 0 | ● | 0x005 |
| F00.06 | Frequency given source selection | 0: Channel A 1: Channel B 2: Channel A+Channel B 3: Channel A-Channel B 4: Max. value of Channel A and Channel B 5: Min. value of Channel A and Channel B | | 0 | ● | 0x006 |
| F00.07 | Running Command | LED“0”digit: keyboard command instruction binding LED“00”digit: terminal command instruction binding | | 0000 | ● | 0x007 |

| | | | | | |
|--------|--|---|---------|---|-------|
| | Binding | LED“000”digit: communication command instruction binding LED“0000”digit: optional card command instruction binding 0 : no binding 1 : keyboard number given frequency 2 : Reserved 3 : Voltage/Current analog AI1 given 4 : Voltage/Current analog AI2 given 5 : Reserved 6 : Terminal pulse PUL given 7 : RS485 communication given 8 : Terminal UP/DW control 9 : PID control given A : Program control (PLC) given B : Optional card C : Multi-steps speed given | | | |
| F00.08 | Keyboard digital setting frequency | 0~upper limit | 50.00Hz | ● | 0x008 |
| F00.09 | Max frequency | upper limit~600.00Hz | 50.00Hz | ○ | 0x009 |
| F00.10 | Upper limit frequency source selection | 0: Upper limit frequency digital given 1: Reserved 2: Voltage/Current analog AI1 give 3: Voltage/Current analog AI2 given 4: Reserved 5: Terminal pulse PUL given 6: RS485 communication given 7: Optional card | 0 | ● | 0x00A |
| F00.11 | Upper frequency limit digital | Lower limit frequency~max frequency | 50.00Hz | ● | 0x00B |
| F00.12 | Lower limit frequency | 0.00~upper limit frequency | 0.00Hz | ● | 0x00C |
| F00.13 | Lower limit frequency running mode | 0: Stop output, enter into pause running state 1: Run at lower limit frequency | 1 | ○ | 0x00D |
| F00.14 | ACC time 1 | 0.01~650.00s | 20.00s | ※ | 0x00E |
| F00.15 | DEC time 1 | 0.01~650.00s | 20.00s | ※ | 0x00F |
| F00.16 | Rotary direction selection | LED“0”digit: running direction takes the opposite 0: Direction unchanged 1: Direction takes the opposite LED“00”digit: running direction prohibited 0: Forward and reverse commands are allowed 1: Only FWD command allowed 2: Only REV command allowed LED“000”digit: frequency control direction selection | 0000 | ○ | 0x010 |

| | | | | | |
|--------|--------------------------|--|---|---|-------|
| | | 0: Invalid 1: Valid LED“0000”digit: reserved | | | |
| F00.17 | G/P Model Setting | 0:G Type 1:P Type | 0 | ● | 0x011 |
| F00.18 | Reserved | | | | |
| F00.19 | Parameter initialization | 0: No action 1: Restore factory default (not restoring motor parameters) 2: Restore factory default (restoring motor parameters) 3: Clear malfunction records | 0 | ○ | 0x013 |

Operation Control Parameters Group

| NO. | Function description | Range of settings and definition | Factory setting | Feature | Address |
|--------|------------------------------------|---|-----------------|---------|---------|
| F01.10 | Stop mode | 0:DEC stop 1:Free stop | 0 | ● | 0x10A |
| F01.16 | ACC/DEC selection | LED “0” digit: time base selection 0: max frequency 1: fixed frequency 50Hz 2: set frequency LED“00”digit: S ACC/DEC selection 0: Beeline ACC/DEC 1: S Curve ACC/DEC LED “000” digit: reserved LED “0000” digit: reserved | 0000 | ○ | 0x110 |
| F01.35 | Power off restart action selection | 0:Invalid 1:Valid | 0 | ○ | 0x123 |
| F01.36 | Power off restart waiting time | 0.00~60.00s | 0.50s | ○ | 0x124 |

Switching value terminal parameters

| NO. | Function description | Range of setting and definition | Factory setting | Feature | Address |
|--------|-----------------------------|---|-----------------|---------|---------|
| F02.00 | Input terminal 1(X1) | 0: No function 1:Forward 2:Reverse 10: Water fulfilled detect alarm 11:Water fulfilled detect reset | 1 | ○ | 0x200 |
| F02.01 | Input terminal 2(X2) | | 2 | ○ | 0x201 |
| F02.02 | Input terminal 3(X3) | | 10 | ○ | 0x202 |
| F02.03 | Input terminal 4(X4) | | 11 | ○ | 0x203 |
| F02.24 | Terminal operate protection | 0: OFF 1:ON LED “0” digit: Terminal operate protection when abnormal exit LED “00” digit: Jog terminal operate | 0111 | ○ | 0x218 |

| | | | | | |
|--------|---|--|------|---|-------|
| | | protection when abnormal exit LED "000" digit: Operate protection when command channel switch to terminal | | | |
| F02.42 | Output terminal polarity selection | 0: Positive 1: Negative LED "0" digit: Terminal Y LED "00" digit: Relay output 1 LED "000" digit: Extended Y1 terminal LED "0000" digit: Extended Relay output 2 | 0000 | ● | 0x22A |
| F02.60 | Virtual vX1 terminal function selection | 0: No function 1: Forward 2: Reverse 10: Water fulfilled detect alarm 11: Water fulfilled detect reset | 0 | ● | 0x238 |
| F02.61 | Virtual vX2 terminal function selection | | 0 | ● | 0x239 |
| F02.62 | Virtual vX3 terminal function selection | | 0 | ● | 0x23A |
| F02.63 | Virtual vX4 terminal function selection | | 0 | ● | 0x23B |
| F02.64 | vX terminal valid state source | 0: internal connection with virtual vYn 1: Connect with physical terminal Xn 2: function code setting valid or not LED "0" digit: virtual vX1 LED "00" digit: virtual vX2 LED "000" digit: virtual vX3 LED "0000" digit: virtual vX4 | 0 | ● | 0x23C |
| F02.65 | Virtual vX terminal function code setting valid state | 0: invalid 1: valid LED "0" digit: virtual vX1 LED "00" digit: virtual vX2 LED "000" digit: virtual vX3 LED "0000" digit: virtual vX4 | 0 | ● | 0x23D |

System parameters

| NO. | Function description | Range of settings and definition | Factory setting | Feature | Address |
|--------|-----------------------------------|---|-----------------|---------|---------|
| F04.00 | Parameter and key lock selections | 0: Not locked 1: Function parameter locked 2: Function parameter and key locked (except for RUN/STOP/JOG) 3: All function parameter and key locked | 0 | ● | 0x400 |
| F04.01 | User password | 0~65535 | 0 | ● | 0x401 |
| F04.05 | Parameter copy | 0: No function 1: Send inverter parameters to keyboard and save 2: Send keyboard parameters to inverter Remaining value: no operation | 0 | ○ | 0x405 |

| | | | | | |
|--------|---|---|------|---|-------|
| F04.08 | STOP key setting | 0: Non-keyboard control mode is invalid 1: Non-keyboard control mode stops according to stop mode 2: Non-keyboard control mode stop according to free stop mode | 1 | ○ | 0x408 |
| F04.09 | UP/DOWN key selection | LED "0" digit: keyboard UN/DOWN key modify selection 0: Invalid 1: Modify frequency setting by key board numbers F00.08 2: Modify PID give setting by key board numbers F11.01 LED "00" digit: power off storage selection 0: No save frequency after power off 1: Save frequency after power off LED "000" digit: action limit 0: Operation stop for adjusting 1: Adjusting only in operation, stop for holding 2: Adjusting in operation, stop for clearing | 0011 | ○ | 0x409 |
| F04.14 | The display content of the first line in running state | LED "0" and "00" digit: display the first group 00~63 LED "000" and "0000" digit: display the second group 00~63 | 1101 | ● | 0x40E |
| F04.15 | The display content of the first line in running state | Same as above | 0402 | ● | 0x40F |
| F04.16 | The display content of the first line in stop state | Same as above | 1100 | ● | 0x410 |
| F04.17 | The display content of the first line in stop state | Same as above | 0402 | ● | 0x411 |
| F04.18 | The display content of the second line in running state | Same as above | 0402 | ● | 0x412 |
| F04.19 | The display content of the second line in running state | Same as above | 1210 | ● | 0x413 |
| F04.20 | The display content of the second line in stop state | Same as above | 0402 | ● | 0x414 |
| F04.21 | The display content of the second line in stop state | Same as above | 1210 | ● | 0x415 |

| | | | | | |
|--------|----------------------------------|---|-----------|---|-------|
| F04.22 | Keyboard display item setting | LED “0” digit: output frequency selection 0: Aim frequency 1: Running frequency LED “000” digit: power display dimension 0: Power display percentage (%) 1: Power display kilowatt (KW) | 0000 | ● | 0x416 |
| F04.23 | Monitor display selection | LED “0” digit: C00.00-C00.39 0: Normal 1: Debugging LED “00” digit: C00.40-C00.69 0: No display 1: Normal display | 0000 | ● | 0x417 |
| F04.24 | Rotate speed display coefficient | 0.0~500.0% | 0000 | ● | 0x418 |
| F04.25 | Power display coefficient | 0.0~500.0% | 100.0% | ● | 0x419 |
| F04.28 | Fan control | 0: After power on the fan runs 1: Stop associated with temperature, running is rotary 2: Running associated with temperature, stop while the fan stops | 1 | ● | 0x41C |
| F04.32 | PWM carrier frequency | 0.7~16.0kHz | Model set | ※ | 0x420 |
| F04.33 | PWM control mode | LED “0” digit: carrier associated with temperature 0: Temperature independent 1: Temperature dependent LED “00” digit: carrier associated with output frequency 0: not associated 1: associated LED “000” digit: random PWM valid 0: Prohibited 1: Valid LED “0000” digit: PWM modulation mode 0: Only use three-phase modulation 1: Two-phase and three-phase modulation automatically switched | 1111 | ● | 0x421 |

Motor Parameters

| NO. | Function description | Range of settings and definition | Factory default | Feature | Address |
|--------|-----------------------|--|-----------------|---------|---------|
| F05.00 | Motor mode | 0: Asynchronous motors (AM) 1: Permanent magnet synchronous motors (PM) | 0 | × | 0x500 |
| F05.01 | Number of motor poles | 2~98 | 4 | ○ | 0x501 |

| | | | | | |
|--------|--|---|-----------|---|-------|
| F05.02 | Motor rated power | 0.1~1000.0kW | Model set | ※ | 0x502 |
| F05.03 | Motor rated frequency | 0.01~max frequency | Model set | ※ | 0x503 |
| F05.04 | Motor rated speed | 1~65000rpm | Model | ※ | 0x504 |
| F05.05 | Motor rated voltage | 1~1500V | Model | ※ | 0x505 |
| F05.06 | Motor rated current | 0.1~3000.0A | Model | ※ | 0x506 |
| F05.07 | Asynchronous motor no-load current | 0.1~3000.0A | Model set | ※ | 0x507 |
| F05.08 | Asynchronous motor stator resistance | 0.01~50.00% | Model set | ※ | 0x508 |
| F05.09 | Asynchronous motor rotor resistance | 0.01~50.00% | Model set | ※ | 0x509 |
| F05.10 | Asynchronous motor stator leakage inductance | 0.01~50.00% | Model set | ※ | 0x50A |
| F05.11 | Asynchronous motor stator inductance | 0.1~2000.0% | Model set | ※ | 0x50B |
| F05.12 | synchronous motor stator resistance | 0.01~50.00% | Model set | ※ | 0x50C |
| F05.13 | Synchronous machine d axis inductance | 0.01~200.00% | Model set | ※ | 0x50D |
| F05.14 | Synchronous machine q axis inductance | 0.01~200.00% | Model set | ※ | 0x50E |
| F05.15 | Synchronous machine back EMF | 1~1500V | Model set | ※ | 0x50F |
| F05.16 | Synchronous machine encoder installation angle | 0.0°~360.0° | Model set | ※ | 0x510 |
| F05.20 | Motor parameters self-adjustment selections | 0: No operation 1: Rotary type self-tuning 2: Static type self-tuning 3: Stator resistance self-tuning | 0 | ○ | 0x514 |
| F05.21 | Synchronous machine poles searching function | LED “0” digit: closed-loop vector 0: OFF 1: ON 2: On, only operate firstly when electrify LED “00” digit: open-loop vector 0: OFF 1: ON 2: ON, only operate firstly when electrify | 0010 | ○ | 0x515 |

Motor VC Parameters

| NO. | Function description | Range of settings and definition | Factory default | Feature | Address |
|-----|----------------------|----------------------------------|-----------------|---------|---------|
|-----|----------------------|----------------------------------|-----------------|---------|---------|

| | | | | | |
|--------|---|-------------------------|--------|---|-------|
| F06.00 | ASR(speed loop) proportional gain 1 | 0.01~100.00 | 10.00 | ● | 0x600 |
| F06.01 | ASR integral time 1 | 0.000~6.000s | 0.200s | ● | 0x601 |
| F06.02 | ASR filter time1 | 0.0~100.0ms | 0.0ms | ● | 0x602 |
| F06.03 | ASR switch frequency 1 | 0.00 ~ Max frequency | 0.00Hz | ● | 0x603 |
| F06.04 | ASR (speed loop) proportional gain 2 | 0.01~100.00 | 10.00 | ● | 0x604 |
| F06.05 | ASR (speed loop) integral time 2 | 0.000~6.000s | 0.200s | ● | 0x605 |
| F06.06 | ASR filter time 2 | 0.0~100.0ms | 0.0ms | ● | 0x606 |
| F06.07 | ASR switch frequency 2 | 0.00 ~ Max frequency | 5.00Hz | ● | 0x607 |
| F06.08 | Electric motor torque limit | 0.0~250.0% | 180.0% | ● | 0x608 |
| F06.09 | Power generation torque limit | 0.0~250.0% | 180.0% | ● | 0x609 |
| F06.10 | Current loop D-axis proportional gain | 0.001~4.000 | 1.000 | ● | 0x60A |
| F06.11 | Current loop D-axis integral gain | 0.001~4.000 | 1.000 | ● | 0x60B |
| F06.12 | Current loop Q-axis proportional gain | 0.001~4.000 | 1.000 | ● | 0x60C |
| F06.13 | Current loop Q-axis integral gain | 0.001~4.000 | 1.000 | ● | 0x60D |
| F06.15 | Vector control motor slip compensation | 0.0~250.0% | 100.0% | ● | 0x60F |
| F06.16 | Vector control start torque | 0.0~250.0% | | | |
| F06.17 | Reserved | | | | |
| F06.18 | Position compensation control | 0:OFF 1:ON | 10.0% | ○ | 0x613 |
| F06.19 | compensation gain | 0.0~250.0% | 0.1% | ○ | 0x614 |
| F06.20 | compensation limit | 0.0~100.0% | 10.0% | ○ | 0x615 |
| F06.21 | compensation effective range | 0.0~100.0% | 100.0% | ○ | 0x616 |
| F06.22 | Over excitation braking gain | 0.0~500.0% | 100.0% | ○ | 0x617 |
| F06.23 | Over excitation braking amplitude limit | 0.0~250.0% | 0 | ○ | 0x618 |
| F06.24 | Vector control energy saving function | 0:OFF 1:ON | 50.0% | ● | 0x619 |
| F06.25 | Energy saving control gain | 0.0~80.0% | 0.010s | ● | 0x61A |
| F06.26 | Energy saving control low-pass filter | 0.000~6.000s | 200.0% | ● | 0x61B |
| F06.27 | Motor constant power area power limit | 0.0~250.0% | 60.0% | ○ | 0x61C |
| F06.28 | Motor weak magnetic current upper limit | 0.0~250.0% | 10.0% | ● | 0x61D |

| | | | | | |
|--------|---------------------------------------|-------------|--------|---|-------|
| F06.29 | Motor weak magnetic feed forward gain | 0.0~200.0% | 10.0% | ● | 0x61E |
| F06.30 | Motor weak magnetic gain | 0.0~500.0% | 10.0% | ● | 0x620 |
| F06.32 | MTPA gain | 0.0~500.0% | 100.0% | ● | 0x621 |
| F06.33 | MTPA filter time | 0.0~100.0ms | 1.0ms | ● | 0x621 |
| F06.34 | Reserved | | | | |
| F06.35 | Low frequency pull in current | 0.0~100.0% | 10.0% | ● | 0x623 |
| F06.36 | High frequency pull in current | 0.0~100.0% | 10.0% | ● | 0x624 |
| F06.37 | Frequency of current pulled in | 0.0~100.0% | 10.0% | ● | 0x625 |

Protection and Malfunction Parameter Group

| NO. | Function description | Range of settings and definition | Factory default | Feature | Address |
|--------|---|---|-----------------|---------|---------|
| F10.06 | Bus over voltage suppression function | LED"0" digit: Over voltage suppression 0: Invalid 1: Valid in DEC LED"00" digit: Over-excitation control 0: off 1: on LED"000"/"0000": Reserved | 0012 | ○ | 0xA06 |
| F10.07 | Bus over voltage suppression point | 110.0~150.0% | 128.0% | ※ | 0xA07 |
| F10.08 | Bus over voltage suppression gain | 0.0~500.0% | 100.0% | ● | 0xA08 |
| F10.14 | Short-circuit detection after power on | LED "0" digit: Earth short-circuit detection after power on 0: off 1: on LED"00" digit: Fan short-circuit detection after power 0: off 1: on | 11 | ○ | 0xA0E |
| F10.15 | phase missing protection | LED"0" digit: Output phase missing protection 0: off 1: on LED"00" digit: Input phase missing protection 0: off 1: Open Alarm 2: Open Fault(STOP VFD) LED"000"/"0000" digit: Reserved | 0021 | ○ | 0xA0F |
| F10.16 | Motor overload protection curve coefficient | 0.0~250.0% | 100.0% | ○ | 0xA10 |
| F10.38 | Malfunction self-recovery times | 0~5 | 0 | ○ | 0xA26 |
| F10.39 | Malfunction self-recovery interval time | 0.1~100.0s | 1.0s | ○ | 0xA27 |

Communication Control Function Parameter Group

| NO. | Function description | Range of setting and definition | Factory default | Feature | Address |
|-----|----------------------|---------------------------------|-----------------|---------|---------|
|-----|----------------------|---------------------------------|-----------------|---------|---------|

| | | | | | |
|--------|--|---|------|---|-------|
| F13.00 | Main-slave machine selection | LED "0" digit: Modbus main-slave selection 0: Slave machine 1: Main machine LED "00" /"000"/"0000" digit: reserved | 0000 | ○ | 0xD00 |
| F13.01 | 485 communication address | 1~247 | 1 | ○ | 0xD01 |
| F13.02 | Communication baud rate selection | LED"0" digit:485 communication 0:1200 bps 1:2400 bps 2:4800 bps 3:9600 bps 4:19200 bps 5:38400 bps LED "00" /"000"/"0000" digit: reserved | 0003 | ○ | 0xD02 |
| F13.03 | Modbus data format | 0: (N,8,1)format 1: (E,8,1) format 2: (O,8,1) format 3: (N,8,2) format 4: (E,8,2) format 5: (O,8,2) format | 0 | ○ | 0xD03 |
| F13.10 | RS485 Communication port configuration | 0: Modbus communication 1: serial port communication | 0 | ● | 0xD0A |

★ Photovoltaic Pump Special Parameters

| Function code | Function name | Setting range and definition | Default setting | property | Comm. Add |
|---------------|-------------------------------|---|-----------------|----------|-----------|
| F14.00 | Solar pump drive control mode | 0 : Variable frequency control mode 1 : CVT mode for solar 2 : MPPT mode for solar | 2 | ○ | 0xE00 |
| F14.01 | Running control mode | 0 : Stop 1 : Running 2 : Sleep 3 : Low speed protection 4 : Dry run protection 5 : Over current protection 6 : Minimum power protection | Read only | | 0xE01 |
| F14.02 | VOC voltage (display) | 0.0 ~ 999.9V | Read only | | 0xE02 |
| F14.03 | CVT target voltage | 70.0 ~ 95.0% | 81.0% | ● | 0xE03 |
| F14.04 | MPPT upper limit voltage | 20.0 ~ 200.0% | 100.0% | ● | 0xE04 |
| F14.05 | MPPT lower limit voltage | 20.0 ~ 200.0% | 50.0% | ● | 0xE05 |

| | | | | | |
|--------|---|-----------------|----------------------------|---|-------|
| F14.06 | Frequency adjusting gain | 0.1 ~ 500.0% | 10.0% (AM) 40.0% (PMSM) | ● | 0xE06 |
| F14.07 | MPPT search interval | 0.1 ~ 100.0 | 1.0s | ● | 0xE07 |
| F14.08 | MPPT regulating gain | 0 ~ 9999 | 100 | ● | 0xE08 |
| F14.09 | Quick-drop frequency gain | 0 ~ 20 | 2 | ● | 0xE09 |
| F14.10 | Frequency adjusting filter time | 0.001 ~ 2.000 s | 0.001 | ● | 0xE0A |
| F14.11 | Go to sleep mode voltage | 0 ~ 1000V | 0V | ● | 0xE0B |
| F14.12 | Wake up restore voltage | 0 ~ 1000V | 400V | ● | 0xE0C |
| F14.13 | Sleeping stop restore waiting time | 0.0 ~ 3000.0s | 10.0s | ● | 0xE0D |
| F14.14 | Low speed protection detect frequency | 0.00 ~ 300.00Hz | 10.00Hz | ● | 0xE0E |
| F14.15 | Low speed protection detect time | 0.0 ~ 3000.0s | 10.0s | ● | 0xE0F |
| F14.16 | Low speed protection restore working time | 0.0 ~ 3000.0s | 10.0s | ● | 0xE10 |
| F14.17 | Dry run protection detect current | 0.0 ~ 999.9A | 0.0A | ● | 0xE11 |
| F14.18 | Dry run protection detect time | 0.0 ~ 3000.0s | 10.0s | ● | 0xE12 |
| F14.19 | Dry run auto restore working time | 0.0 ~ 3000.0s | 10.0s | ● | 0xE13 |
| F14.20 | Over current point setting | 0.0 ~ 999.9A | 0.0A | ● | 0xE14 |
| F14.21 | Over current protection detect time | 0.0 ~ 3000.0s | 10.0s | ● | 0xE15 |
| F14.22 | Over current protection auto restore working time | 0.0 ~ 3000.0s | 10.0s | ● | 0xE16 |

| | | | | | |
|--------|--|--|-----------|---|-------|
| F14.23 | Input minimum power protection power point setting | 0.00 ~ 650.00kw | 0.00kw | ● | 0xE17 |
| F14.24 | Minimum power protection detect time | 0.0 ~ 3000.0s | 10.0s | ● | 0xE18 |
| F14.25 | Minimum power protection auto restore working time | 0.0 ~ 3000.0s | 10.0s | ● | 0xE19 |
| F14.26 | Fault alarm restore mode | 0 : Auto reset; 1 : Reset by manual LED0 : Low speed protection LED1 : Dry run LED2 : Over current protection LED3: Minimum power protection | 0000 | ● | 0xE1A |
| F14.27 | Water fulfilled detect time | 0.0s ~ 3000.0s | 10.0s | ● | 0xE1B |
| F14.28 | Water fulfilled restore time | 0.0s ~ 3000.0s | 10.0s | ● | 0xE1C |
| F14.29 | reserve | | | ● | 0xE1D |
| F14.30 | DC current revise offset | 0.00 ~ 99.99A | 0.01A | ● | 0xE1E |
| F14.31 | DC current revise proportion gain | 0.0 ~ 999.9% | 100.0% | ● | 0xE1F |
| F14.32 | Power curve point 0 | 0.00 ~ 99.99kw | 0.50kw | ● | 0xE20 |
| F14.33 | Power curve point 1 | 0.00 ~ 99.99kw | 1.00kw | ● | 0xE21 |
| F14.34 | Power curve point 2 | 0.00 ~ 99.99kw | 1.50kw | ● | 0xE22 |
| F14.35 | Power curve point 3 | 0.00 ~ 99.99kw | 2.00kw | ● | 0xE23 |
| F14.36 | Power curve point 4 | 0.00 ~ 99.99kw | 2.50kw | ● | 0xE24 |
| F14.37 | Flow curve point 0 | 0.0 ~ 999.9m3/h | 0.0 m3/h | ● | 0xE25 |
| F14.38 | Flow curve point 1 | 0.0 ~ 999.9m3/h | 5.0 m3/h | ● | 0xE26 |
| F14.39 | Flow curve point 2 | 0.0 ~ 999.9m3/h | 10.0 m3/h | ● | 0xE27 |
| F14.40 | Flow curve point 3 | 0.0 ~ 999.9m3/h | 15.0 m3/h | ● | 0xE28 |
| F14.41 | Flow curve point 4 | 0.0 ~ 999.9m3/h | 20.0 m3/h | ● | 0xE29 |
| F14.42 | Flow calculating revise offset | 0.0 ~ 999.9m3 | 0.0m3 | ● | 0xE30 |
| F14.43 | Flow calculating revise gain | 0.0 ~ 999.9% | 100.0% | ● | 0xE31 |

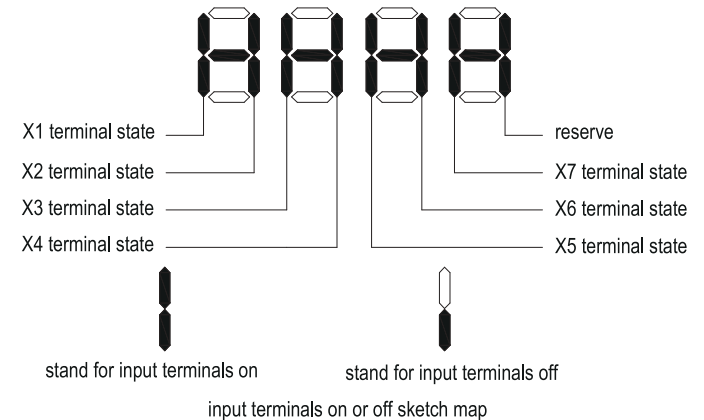
| | | | | | |
|--------|--|--|--------|---|-------|
| F14.44 | Power per day/ generated power per day reset period | 0.0 ~ 24.0h | 7.0h | ● | 0xE32 |
| F14.45 | Reserved | | | | |
| F14.46 | Photovoltaic pump function selection 1 | 0 : Invalid 1 : Valid LED0 : Constant torque frequency limit selection LED1 : Reserved LED2 : Voltage rising update Voc voltage LED3: Fast frequency falling function | 1100H | ● | 0xE34 |
| F14.47 | Fast frequency falling threshold | 3.0% ~ 15.0% | 5.0% | ● | 0xE35 |
| F14.48 | Constant torque frequency limit coefficient | 80.0% ~ 150.0% | 100.0% | ● | 0xE36 |
| F14.49 | Sudden voltage increase threshold | 0.0% ~ 20.0% | 5.0% | ● | 0xE37 |
| F14.50 | Reserved | | | | |

★ Photovoltaic Pump Special Monitor Parameters

| Function code | Function name | Setting range and definition | Default setting | property | Comm. Add |
|------------------|-------------------------|------------------------------|--------------------|----------|-----------|
| C02.00 | Frequency reference | 0.01Hz | Read only | | 2300H |
| C02.01 | Output frequency | 0.01Hz | Read only | | 2301H |
| C02.02 | Output current | 0.1A | Read only | | 2302H |
| C02.04 | Output voltage | 0.1V | Read only | | 2304H |
| C02.10 | Output power | 0.01kw | Read only | | 230AH |
| C02.11 | DC bus voltage | 0.1V | Read only | | 230BH |
| C02.12 | Module temperature 1 | 0. 1℃ | Read only | | 230CH |
| C02.30 | DC current | 0.01A | Read only | | 231EH |
| C02.31 | Flow speed | 0.1 m3/h | Read only | | 231FH |

| | | | | | |
|--------|--|---------|--------------|--|-------|
| C02.32 | Voc voltage | 0.1 V | Read only | | 2320H |
| C02.33 | Flow per day | 0.1 m3 | Read only | | 2321H |
| C02.34 | Cumulative total flow(low position) | 0.1m3 | Read only | | 2322H |
| C02.35 | Cumulative total flow(high position) | 0.1km3 | Read only | | 2323H |
| C02.36 | Generated power per day | 0.01kwh | Read only | | 2324H |
| C02.37 | Cumulative total generated power (low position) | 0.01kwh | Read only | | 2325H |
| C02.38 | Cumulative total generated power (high position) | 0.1Mwh | Read only | | 2326H |

Input terminals ON/OFF status illustration



Chapter 6 Operation Guidance

6.1 Asynchronous Motor Pump Drive Operation Guidance

1) Wiring:

- Confirmed the solar pump drive if mating with motor.
- Correctly connecting “+”“-” of solar panel to corresponding “+”“-” pole of inverter or R, T wiring terminals. Otherwise it will cause inverter damage.
- Connect motor wire and ground wire to corresponding U, V, W, E terminals.

2). Parameters setting and trial run:

- Set F0.00 to 0, F0.02 for 0, and F0.09, F0.11, F0.14, F0.15 parameters setting according to application site.
- Set motor(pump) parameters according to nameplate of pump.
- Set solar pump MPPT mode F14.001 for 1 or 2.
- Press FWD button for trial running, and confirm the motor running direction.

3) Common problems

- Q : Well-lit conditions, the pump is running, but the water is very small.
A : Check if the pump motor direction is reversed.
- Q : Well-lit conditions, the drive is in standby mode 0.00Hz.
A : Check F14.01, observe what protection status is the drive in currently, check whether the parameters set is reasonable.
- Q : DC current is incorrectly displayed.
A : Adjust F14.30, F14.31 for calibration.
- Q : Well-lit conditions, frequency severe beating during operation.
A : Reasonably adjust F14.06 value, the adjustment is recommended to be in the vicinity of the default, too big or too small will cause frequency oscillation.

6.2 Synchronous Motor Pump Drive Operation Guidance

1) Wiring:

- Confirm if the solar pump drive matches with the motor.
- Connecting “+”“-” of solar panel to corresponding “+”“-” of inverter or R, T wiring terminals. Otherwise it will cause inverter damage.
- Connect motor wire and ground wire to corresponding U, V, W, E terminals.

2) Parameters setting and trial run:

- Set F0.00 to 6, F0.02 for 0, and F0.09=100.00, F0.11=100.00; F0.14, F0.15 can be set according to demand.
 - Set motor (pump) parameters according to nameplate of pump. Then Set F5.20 for 1, the keypad will show T-00, press FWD to start motor auto tuning. This process takes about three minutes;
- Note: 1. If you can disconnect the motor and load, self-learning would be better;
- The self-learning need to be done with enough sunshine and when the solar panels can provide enough energy.
- Set solar pump MPPT mode F14.001 for 1 or 2.
 - Press FWD button for trial running, and confirm the motor running direction.

3) Common problems and solutions

- Q : Well-lit conditions, the pump is running, but the water is very small.
A : Check if the pump motor direction is reversed.
- Q : Well-lit conditions, the drive is in standby mode 0.00Hz.
A : Check F14.01, observe what protection status is the drive in currently, check whether the parameters set is reasonable.
- Q : DC current is incorrectly displayed.
A : Adjust F14.30, F14.31 for calibration.
- Q : Well-lit conditions, frequency severe beating during operation.
A : Reasonably adjust F14.06 value, the adjustment is recommended to be in the vicinity of the default, too big or too small will cause frequency oscillation.
- Q : The current fluctuation is huge when the pump is running.
A : Check C02.39, adjusting the value of F5.15, so the C02.39 displays the value from 0-10.

6.3 PV Water Pump Features

A. Sleep Function

During the photovoltaic pump operation, the inverter will go into sleep state when the DC voltage provided by solar panels is lower than FE.11 (sleep voltage threshold) due to objective factors, while the keyboard warning "A.LPn"; when DC voltage provided by solar panels rises back to F14.12 (sleep recovery voltage) point, start timing and after FE.13 (sleep shutdown waiting time), the drive starts running.

B. Low-frequency Protection Function

During the operation of the photovoltaic pump, for some reason, the output frequency is lower than F14.14 (low frequency detection frequency), and after F14.15 (under frequency detection time) time, enters into the standby protection state, while the keyboard warning "A.LFr"; after entering into the standby protection state and after F14.16 (frequency protection automatic recovery) time, automatically resume to running state.

C. Dry Run Protection

During the operation of the photovoltaic pump, for some reason, the output current is less than F14.17 (dry protection current detection), and after F14.18 (dry protection detection time) time, enters into standby protection state, while the keyboard warning "A.LuT"; after entering into the standby protection state and after F14.19 (dry protection automatic recovery)time, automatically resume to running state.

D. Over-current Protection

During the operation of the photovoltaic pump, for some reason, the output current is greater than F14.20(dry protection current detection), and after F14.21 (dry protection detection time) time, enters into standby protection state, while the keyboard warning "A.oLd "; after entering into the standby protection state and after F14.22 (dry protection automatic recovery)time, automatically resume to running state.

E. Minimum Power Protection

During the operation of the photovoltaic pump, for some reason, the output power is less than F14.23(minimum power protection value), and after F14.24 (minimum power protection detection time) time, enters into standby protection state, while the keyboard warning "A.LPr"; after entering into the standby protection state and after F14.25 (minimum power automatic

recovery)time, automatically resume to running state.

F. Full Water Protection

Detect the water full alarm and low water level through two X terminals, realizing automatic level control. Wherein F14.27 is the water overflow protection detection time and F14.28 is full water protection exit time, and X 3 terminal is defined as full solar water detection alarm, and X4 terminal is defined as full solar water detection alarm reset, the warning signal is shown as "A.Ful".

G. Alarm Recovery Mode: 0: automatic recovery; 1: manual recovery

This option is for low frequency protection, dry protection, over-current protection, minimum power function; you can select the alarm restoration by F14.26. When you select 0 for automatic recovery, during fault warning displaying, you can also press the "RESET" button to stop operation; during fault warning displaying, you can press the "RESET" button to manually clear, you can also press "RESET" button to achieve stop operation.

H. PQ Curve Function

This model provides a self-defined PQ curve for users to set up five groups of PQ corresponding points according to the pump cases, to achieve real-time traffic speed, daily flow, cumulative flow, generating capacity, cumulative electricity consumption; of which by default, daily flow and generating capacity are calculated based on 7h in a day.

I. Status Check

When the photovoltaic pump is running, you can check F14.01 to confirm the current operating status.