1 Summary

DLP 1-0D75 S 2 D

- Inverter series 【1】
- Plant code 【2】
- Inverter capacity 【3】
- 【4】 T: Three phase; S: Single phase
- 【5】 Rated input voltage: 2: 220V 4: 380V 7: 660V/690V
- 【6】 G: general-purpose; D: Solar

【1】 Inverter series

Mark	Specification
DLM	M series
DLB	B series
DLP	P series

【2】 Plant code

Mark	Specification
1	General purpose

【3】 Inverter capacity

Mark	Specification
0D75	750W
01D5	1.5KW
02D2	2.2KW
03D7	3.7KW

【4】 Power phase

Mark	Specification
S	Single phase
T	Three phase

【5】 Input voltage

Mark	Specification
2	220V
4	380V

【6】 Inverter type

Mark	Specification
G	General-purpose
D	Solar

Important:

Please read Appendix VI Safety Instructions carefully before and during using JADEN inverters.

Chapter2. Solar pumping system introduction

2. 1. Solar Pumping System overview

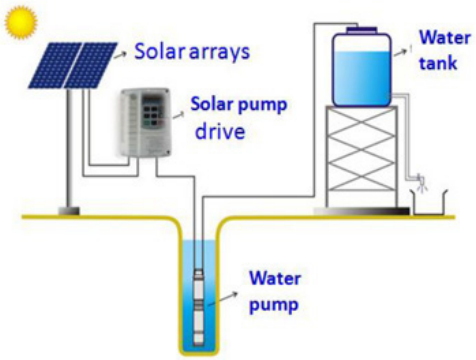
Solar pumping systems can be applied to all forms of daily use, water pumping for drinking water supply for remote villages and farms without connection to the water grid, for agricultural use such as livestock watering, agricultural irrigation, forestry irrigation, pond management, desert control, and industrial use such as wastewater treatment etc.

In recent years, with the promotion of the utilization of renewable energy resources, solar pumping systems are more and more used in municipal engineering, city centre squares, parks, tourist sites, resorts and hotels, and fountain systems in residential areas.

The system is composed of a PV generator, a pump and a solar pump drive. Based on the design philosophy that it is more efficient to store water rather than electricity, there is no energy storing device such as storage battery in the system. The system is prepared to be combined with a elevated water storage, e.g. water tower or an uphill tank installation.

The PV generator, an aggregation of PV modules connected in series and in parallel, absorbs solar irradiation and converts it into electrical energy, providing power for the whole system. The pump drive controls and adjusts the system operation and converts the DC produced by the PV module into AC to drive the pump, and adjusts the output frequency in real-time according to the variation of sunlight intensity to realize the maximum power point tracking (MPPT). The pump, driven by 3-phase AC motor, can draw water from deep wells, rivers and lakes and pour it into storage tanks or reservoirs, or be connected directly to the irrigation system, fountain system, etc. According to the actual system demand and installation condition, different types of pumps such as centrifugal pump, axial flow pump, mixed flow pump or deep well pump can be used.

Solar pump system constitution.



System wiring diagram

2. 2. Solar pump drive features:

Save in energy costs and maximize productivity

Solar pump drives ensure reliable power supply throughout the day with on and off-grid compatibility.

Save environment

Harnessing the power of sun provides an environmentally friendly pumping without producing any CO2 emissions

Easy install and operation and little parameters Configuring.end user ,who never used drive before, can Install and operation it very well.

Reduce maintenance costs

The drives can be equipped with remote monitoring options, reducing maintenance trips to the site.

Reduce operational risk

Embedded pump-specific features such as dry run detection, minimum power input protection, maximum current protection, stop frequency running protection.

Chapter3. Solar pump drive overview

The DLP1 series solar pump drive is a low voltage AC drive of 0.3 to 100KW above rating designed to operate with energy drawn from solar panel or photovoltaic cells (PV). The drive is customized to operate in dual supply mode, so the grid connected supply is used in the absence of energy from PV cells. This drive functions with the latest in technology maximum power point tracking (MPPT) algorithm to derive maximum power from the PV cells at any instant

The drive is specifically designed to meet the requirements of pump manufacturers and the original equipment manufacturers (OEM).

3. 1 Product Features

Control modes

The solar pump drive operates in local control mode and in remote control mode identical to the ordinary DLP1 AC drive.

- Local control—interfaces through the operation pane (keypad)
- Remote control—interfaces through external terminals control.

Note: Ensure that the drive is in local control before starting or stopping the inverter using the control panel.

- ✓ Maximum power point tracking (MPPT) with fast response speed and stable operation
- ✓ Dry run (under load) protection
- ✓ Motor maximum current protection
- ✓ Input power protection
- ✓ Low stop frequency protection
- ✓ The PQ (power/flow) performance curve enables calculating the flow output from the pump
- ✓ Digital control for fully automatic operation, data storage and protective functions
- ✓ Intelligent power module (IPM) for the main circuit
- ✓ LED display operating panel and support remote control
- ✓ Dual mode AC and DC power supply input is available
- ✓ Low water probe sensor, and water level control function
- ✓ ambient temperature for using: -10 to +50°C.

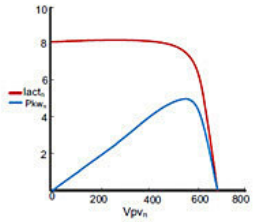
3.2. Solar pump drive operation theory

The solar pump drive uses the maximum power point tracking (MPPT) control program to improve the efficiency of solar energy systems. The output of the photovoltaic (PV) cell is proportional to its area and intensity, while the output voltage is limited by p-n junction from 0.6 to 0.7 V. Therefore when the output voltage is constant, output power is proportional to intensity and surface area. The current and voltage at which the PV cell generates maximum power is known as the maximum power point.

The MPPT controller follows different strategies to derive the maximum power from the PV array. The internal MPPT algorithm is used to derive maximum power from the PV cell at any instant. This is achieved by modifying the operating voltage or current in the PV cell until the maximum power is obtained.

When the output voltage is zero, the PV cells create short circuit current. If the PV cells are not connected to any load, the output voltage is equal to the open circuit voltage. The maximum power point is obtained at the knee of the I-V curve. See the I-V characteristics shown below.

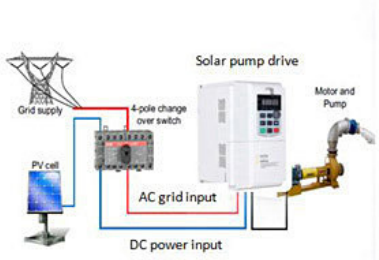
I-V characteristics



The I-V curve is not constant since intensity and temperature changes during day time. Under constant temperature, current changes linearly with intensity and voltage changes logarithmically with intensity. Since the voltage variation is small with respect to intensity changes, maximum power varies proportionally with intensity

3.3. DLP1 series solar pump drive compatible with dual supply mode

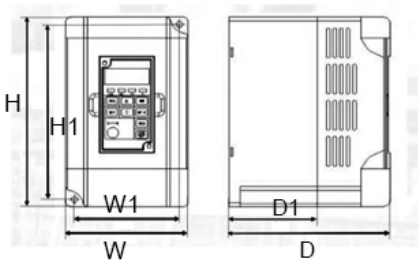
The solar pump drive operates in dual supply mode either with a three phase input supply from the grid or with DC input supply from PV cells. A four-pole changeover switch enables switching between the two supply modes. At a given time only one supply (PV cell or grid) will be connected to the drive.



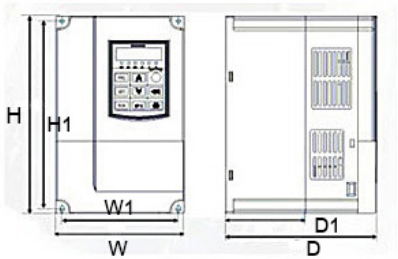
Note: Use two poles of the changeover switch in series to ensure that the voltage applied across each pole is half of the full DC voltage

3.6. DLP1 series solar pump drive technical specification

Recommended MPPT voltage range	90 ~350V DC input for 110V/160V/220V pumps, 0.75kw to 1.5kw 200~400VDC for 220VAC/240V pumps with 0.75 Kw to 4kw. 250~800VDC, for 380VAC pumps with1.5kw to 75kw
Recommended input voltage	170 Vmp DC for 110V AC pumps. 260Vmp DC for 160V AC pumps. 350Vmp DC for 220V AC pumps, 620Vmp DC for 380V AC pumps
Motor type	Control for permanent magnet synchronous motor and asynchronous motor pumps.
Maximum DC power input	1. 400VDC for 220AC output 2. 800VDC for 380V AC output
Rated output voltage	3-phase , 110V/160V/220V. 3-phase, 220V/380V/480V
Output frequency range	0~50/60Hz
MPPT efficiency	97%,
Ambient temperature range	G-type drive with submersible pumps, and P type for general pumps.
Solar pump control special performance	MPPT (maximum power point tracking), CVT (constant voltage tracking), auto/manual operation, dry run protection, low stop frequency protection, minimum power input, motor maximum current protection, flow calculating, energy generated calculating and water tank level detected
Protection function	Phase loss protection, phase short circuit protection , ground to phase circuit protection , input and output short circuit protection. Stall protection
Protection degree	IP20, Air force cooling
Running mode	MPPT or CVT
Altitude	Below 1000m; above 1000m, derated 1% for every additional 100m.
Standard AC input backup circuit	CE, Design based on vector control drive S300 and S3200 series, more specification please refer to S300 or S320 vector control drive operation manual



DLP1 0.75-1.5KW



DLP1 2.2-4KW

DLP1	H	H1	W	W1	D	D1
0.75 -1.5KW	143	132	86	74	114	62
2.2KW	185	173	125	115	159	79
4KW	244	232	150	136	176.5	93

General type: 150 to 400 V DC or 220 to 240 V AC

DLP10D75S2D	4A	150 to 400VDC	220/240VAC	0.75KW	143*86*114	module
DLP101D5S2D	7A	150 to 400VDC	220/240VAC	1.5KW	143*86*114	module
DLP102D2S2D	10A	150 to 400VDC	220/240VAC	2.2KW	185*125*159	module
DLP104D0S2D	16A	150 to 400VDC	220/240VAC	4.0KW	244*150*176.5	module

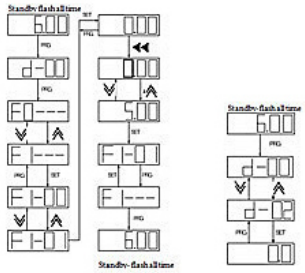
Chapter 4. Operation control panel description

4.1 Press function key description

Key symbol	Name	Function description
PRG	Menu key	Enter menu or exit
SET	Confirm key	Enter to menu step by step and confirm the setting value
⩓	UP increase key	Data and function code increase
⩔	DW reduce key	Data and function code reduce
◀◀	Shift	In the monitor status, press this key can select display monitoring parameter in circulation.
RUN	Running key	Us to start drive in keypad control mode
MF.K	Multiple function key	Programmed by F4-31 setting. Default is reverse running
STOP RESET	Stop and reset	In running status, this key can use to stop operation (F0-02). Reset malfunction in alarm mode.

4.2. Indicator description

Symbol	Indicator description
Hz	Unit of frequency（Hz）
A	Unit of current (Amp)
V	Unit of voltage（V）
FWD	Forward run indicator
REV	Reverse run indicator FWD，REV both flash in stand for DC braking
ALM	Fault indicator (alarm for over current, over voltage but that don't reach the level of fault limit)



4.3. Digital display area

5 digit LED display, it can use to display frequency reference, output frequency and kinds of monitoring data and fault alarm code.

4.4. Function code operation

There are 3 level menu in respectively.

1. Function code parameters（First level menu）
2. Function code name（The second level menu）
3. Setting value of function code (the third level menu ）

Note: If in the third level menu, you can press PRG or SET key to return second menu. The difference is that press SET key will keep set parameter in controller board and then return to second menu, press PRG key an return second menu directly without parameters storing.

Example: Change 0.00Hz of F1-01 for 5.00Hz. see below fig.

4.5. Monitor parameters inquiry.

There two ways to inquiry monitoring parameters.

1. Press "◀◀"to inquiry 6 solar pump control common parameters (It is set by fF4-26,F4-27 , F4-28)(Output frequency, output current, output voltage, DC voltage, Dc current and input power)
2. User also can go to d parameters to inquiry relative parameters.

Example: Inquiry d-02 (output current value of drive), see below fig.

Chapter 5. DLP1 Series solar pump drive installation

5.1 About this chapter

This chapter includes the basic information about the mechanical and electrical installation of solar pump drive and also provides steps to quickly operate the inverter.

For general instructions on installation and maintenance of **DLP1** Drives, see *User's manual*

Safety instructions

WARNING! All electrical installation and maintenance work on the drive must be carried out by qualified electricians only. Follow the safety instructions listed below.

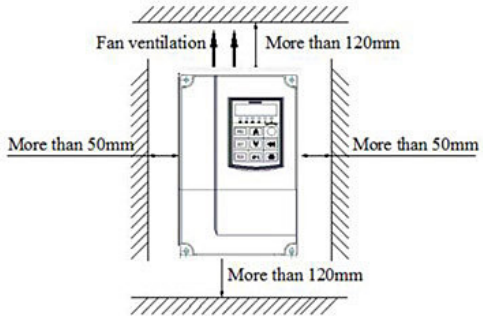
- **Never work on the inverter, the braking chopper circuit, the motor cable or the motor when input power is applied to the inverter.**
- **After disconnecting the input power, always wait for 5 minutes to let the intermediate circuit capacitors discharge. Always ensure by measuring that no voltage is actually present.**
- **A rotating permanent magnet motor generates a dangerous voltage. Always ensure to lock the motor shaft mechanically before connecting a permanent magnet motor to the inverter, and before doing any work on an drive system connected to a permanent magnet motor.**

5.2 Mechanical installation

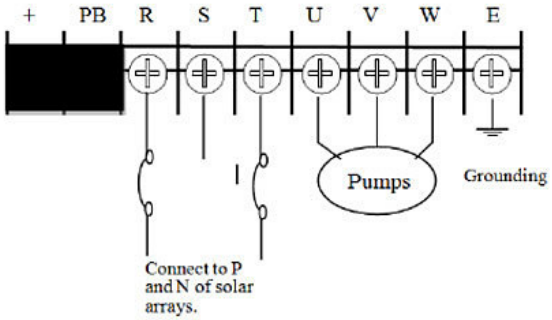
In back mounting, fasten the drive to the wall with screws using four mounting holes.

Note: Installation Environment Requirements

1. Ambient temperature, the surrounding environment temperature take great effect for service life span of solar pump drive, don't allow surrounding temperature over than allowable temperature above (-10° C to +50° C)
2. Heat dissipation, Install the solar drive on the surface of an incombustible object, and ensure that there is sufficient space around for heat dissipation. Install the solar pump drive vertically on the support using screws.
3. vibration, it should be less than 0.6G, far away from the punching machine or the like.
4. Free from direct sunlight, high humidity and condensation
5. Free from corrosive, explosive and combustible gas
6. Free from oil dirt, dust and metal powder



5.3. Installation and wiring



R, T terminals of drive received solar DC power from PV.

Note:

- Do not use an asymmetrically constructed motor cable.
- Route the motor cable, input power cable and control cables separately.
- Make sure that the maximum cable lengths are not exceeded. For detailed information, see the user's manual.

5.4 Main circuit terminals description

Terminals symbol	Function description
+	Positive terminals of DC bus voltage
PB	P, PB connect braking resistor
R, S, T	AC input connecting or DC input connect
U, V, W	Connect to motor
E	Grounding terminals

5.5. Connection procedure

1. Strip the input power cable. Ground the bare shield of the cable (if any) 360 degrees under the grounding clamp. Fasten the grounding conductor (E) of the input power cable under the screw of the grounding clamp. Connect the phase conductors to the R,T terminals from PV solar panel.
2. Strip the motor cable. Ground the bare shield of the cable 360 degrees under the grounding clamp. Twist the shield to form as short a pigtail as possible and fasten it under the screw of the grounding clamp. Connect the phase conductors to the U, V and W terminals.
4. Secure the cables outside the drive mechanically.

Chapter 6. Solar pump drive commissioning guide

6.1 Wiring and commission steps

6.1.1 Commissioning steps

1. Wiring according to the diagram and check the wiring if correct or not

2. Check the solar power input DC voltage if matching rated of drive.(4T Serives need Voc 620VDC) 2S series need Voc 350V)

3. Switchover to solar DC power input if DC voltage is correct.

4. Parameters setting and motor trial starting.

(a). Solar pump control parameters is FA and FB group. Only two parameters need to confirmed by first time using. u

FA-00=2 for MPPT function in default. If FA-00 is 0, it only allow for AC grid input, not solar power input.

FA-01=0 means for operating by manual with keypad in default.

If need runs automatically or control by external switch, please set FA-01 for 1.

(b). Set motor group parameters F2-00 to F2-05 according motor nameplate for asynchronous induction motor. If need performance motor ID auto tuning for permanent magnet synchronous motor (PMSM).

(c), Perform motor trial running with press RUN key to starts pump and observe the running frequency and the water yield. If the sunlight radiation is good, and frequency goes up, but water flow is very small. Might the direction of pumps running is not correct, please to change motor wiring phase.

(d). Set the low stop frequency protection, low voltage sleep protection, dry run (under-load) protection, motor maximum protection and water tank level function if need according user request.

(f). If the output frequency is a little fluctuation, user can set FA-05 (Frequency adjust gain) to bigger, and set FA-06 for smaller value. (Frequency adjusting allowable deviation). Otherwise if E. LU alarm occurs frequently, please set FA-05 smaller, and increase the FA-06 value.

(g). If solar pump drives runs well, and system working is stable, the commissioning is finished. Set FA-01 to 1 for terminals automatically running control. Switch on S1 (X1 and GND short circuit connect), the solar pump system can work with MPPT function according sunlight radiation automatically.

Note: If user need start pumps with AC grid input, please connect AC power supply to R, S,T. and set FA-00 for 0, or switch on S2 (X3 and GND short circuit connection) to disable solar pump control function.

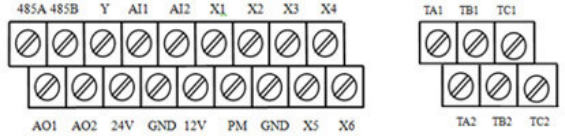
Excluded functions

The following features of DLP1 solar pump drive firmware are not supported in the solar pump inverter.

- Frequency input
- Sequential programming
- Jogging
- Constant speed
- speed slip compensation
- Mechanical brake

5.6 .Control circuit terminals

5.6.1 Control circuit terminals diagram



5.6.2. Control circuit terminals function description

Type	Terminals symbol	Terminals function	Remark
Power supply output	12V	12V/10mA power supply	
	GND	Frequency reference voltage signal common point (12, GND), analog current signal input negative point	
	24V	Output 24V/50mA power supply (24V, GND)	
Analog input	AI1	Analog voltage signal input terminals 1	0～10V
	AI2	Analog voltage signal input terminals 2	0～10V
Digital input terminals	PM	Terminal active level selection	If PM connect with power supply point, the multi-function terminals and GND ON is active, if PM connect with GND, the multi-function terminals and power supply points is active. The function defined by parameter （F5-16～F5-21）
	X1	Multi-function input terminals 1	
	X2	Multi-function input terminals 2	
	X3	Multi-function input terminals 3	
	X4	Multi-function input terminals 4	
	X5	Multi-function input terminals 5	
	X6	Multi-function input terminals 6, also can used for high speed pulse trains input terminals	
Analog output	AO1	Programmable voltage and current signal output terminal (Defined by F5-34 ~ F5-36 parameters)	Output voltage 0～10V, current 0～20mA
	AO2	Programmable frequency, voltage output (defined by F5-39 ~ F5-43 parameter).	Maximum output high frequency is 50Hz, 10V.
Transistor Output	Y	Programmable open collector output, set by parameter F5-27	The maximum load current 50mA, maximum withstand voltage of 24V
Programmable relay output	TA-TB-TC1 TA-TB-TC2	Programmable relay output, set by parameter F5-28 F5-29	Contact capacity: AC250V 1A, Resistive load
RS485 communication	485A 485B	RS485 communication	

5.6.3, Jumper Description

CN1 DIP switch (DIP means slide switch)

DIP switch on 0 ~ 10V, AO1 output 0 ~ 10V.

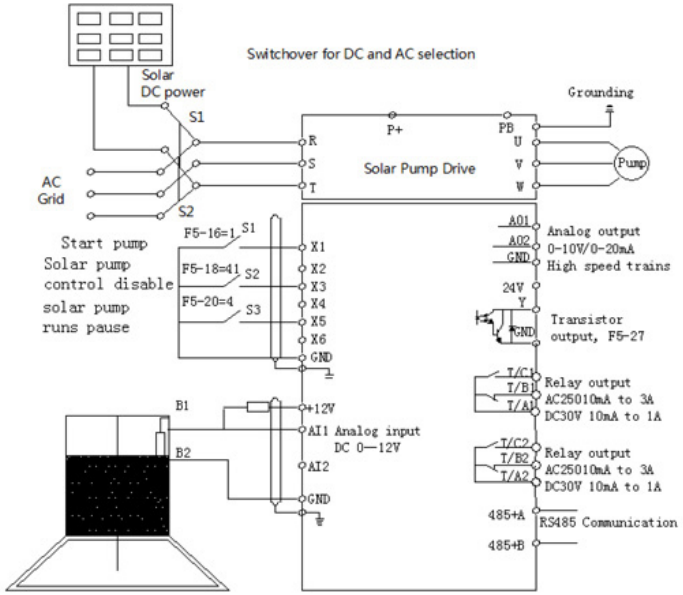
DIP switch on the 4 ~ 20mA, AO1 output 0 ~ 20mA.

CN3 DIP switch

DIP switch in the 0 ~ 10V, while setting [F5-39] = 0, AO2 output 0 ~ 10V.

DIP switch on the PWM, while setting [F5-39] = 1, AO2 output pulse signal.

Solar pump drive wiring with dual mode AC grid and solar DC power input.



Note:

1. Use a switch over to select solar power DC input or AC grid input.
Only allow one power input at the same time.
2. Switch on S1, and F5-16 set for 1, it will use to start pumps.
3. Switch on S2 to disable solar pump control when AC grid input.
4. If external fault or water is enough, user can switch S3 to make system pause.
5.AI and GND analog input ports can receive water level detect analog signal to control water level.

Note.2.

Note: The required input solar panel voltage is 1.15 times of solar drive DC bus voltage.
For example: In 4T series, recommend 540v*1.15=621v;
in 2S series, recommend 311V*1.15=357v.
The required power of solar arrays is 1.3 times of rated power of drives, shouldn't less than 1.2 times of rated power of inverter.

Chapter 7. Simple parameter list

Table Symbol Description:

☆ - indicates that the parameter can be changed in the process of stopping and running.
× - indicates that the parameter can be changed in stop mode, can not be changed during running;
* - Indicates that the initial parameters related to the drives model
Below list all parameters for AC drives, not only for solar pump control but also for motor speed and torque control. Blue and bold words stands for parameters which may relative to solar pump control function.

1. F0. parameters for basic running control

Code	Name	Description	Unit	Default setting	Property
F0-00	**Model selection**	**0: General purpose** **1: P type (variable torque load)**	**1**	**0**	×
F0-01	**Control mode**	**0: VF control** **1: Vectorized VF control** **2: Open loop vector control 1** **3: High performance open loop vector control 2**	**1**	**0**	×
F0-02	**Running command channel selection**	**0: Operation panel (keypad)** **1: External terminals** **2: RS485terminals**	**1**	**1**	☆
F0-03	Main frequency reference source A	0: Potentiometer of keypad 1: UP, DOWN of keypad. 2: AI1 (0-10V) 3: AI2 (0-10V/0-20mA) 5: PID close loop reference 6: Multi-segment speed control 7: Simple PLC 8: UP/DW of terminals 9: Communication 11: High speed pulse trains	1	0	☆
F0-04	Auxiliary frequency reference source B	0: Potentiometer of keypad 1: AI1 (0- 10V) 2: AI2 （0-10V） 3: F0-07 4: High speed pulse trains reference 5: Multi-segment speed	1	1	☆
F0-05	The reference source selection of auxiliary frequency source B	0: Upper limit frequency 1: Main frequency source A	1	0	☆

F0-06	The operation of frequency source A and B combination setting	0: Main frequency source A 1: Auxiliary frequency source B 2：A+B 3：MAX（A，B） 4：MIN（A，B） 5：A-B	1	0	☆
F0-07	UP and Down key of keypad setting	0~Upper limit frequency	0.01	50.00	☆
F0-08	**Upper limit frequency**	**5.00~650.00 Hz**	**0.01**	**50.00**	×
F0-09	**Lower limit frequency**	**0.00Hz ~ F0-08**	**0.01**	**0.50**	×
F0-10	**Running mode under low limit frequency**	**0: Running with lower limit frequency 1: Stop 2: Sleep mode in stand by**	**1**	**0**	×
F0-11	Wake up time in sleep mode	0.0~6000.0 S	0.1	0.0	×
F0-12	**Acceleration mode 1**	**0.1~6000.0 s**	**0.1**	*	☆
F0-13	**Deceleration mode 1**	**0.1~6000.0s**	**0.1**	*	☆
F0-14	Carrier frequency	1 ~ 10KHz	1	*	☆
F0-15	Ac drive running direction	0: Runs as forward direction 1: Runs as reverse direction 2: Reverse direction is forbidden	1	0	☆
F0-16	**Parameters display in standby mode**	**0~39 （corresponding with d parameters）**	**1**	**3**	☆
F0-17	**Factory restore to factory setting**	**0: No operation 11: Parameters initialization 22: Clear fault record**	**1**	**0**	×
F0-18	**Parameters modify protection**	**0: No protection 1: Disable modify**	**1**	**0**	×
F0-19	**STOP operation range**	**0: Enable on keypad operation mode 1: Enable on all command mode**	**1**	**0**	×

2. F1 parameters for start and stop parameters

Code	Name	Description	Unit	Default setting	Property
F1-00	Start up mode	0: Start up with starting frequency 1: Start up after DC braking 2: Start up with speed tracking	1	0	×
F1-01	**Starting frequency**	**0.00~10.00Hz**	**0.01**	**0.50**	×
F1-02	Starting frequency holding time	0.0~20.0s	0.1	0.0	×
F1-03	DC braking current when starting	0~150.0%	1	50.0	×
F1-04	DC braking time when starting	0.0~30.0s	0.1	0.0	×
F1-05	**Stop mode**	**0: Deceleration to stop 1: Free stop**	**1**	**1**	☆
F1-06	Dc braking start frequency when stop	0.00~50.00Hz	0.01	3.00	×
F1-07	Dc braking current when stop	0~150.0%	1	50.0	×
F1-08	DC braking holding time when stop	0.0~60.0s	0.1	0.0	×
F1-09	Speed tacking arithmetic Selection	0: Minimum current arithmetic 1: Voltage/frequency arithmetic.	1	0	×
F1-10	Waiting time of speed tacking	0.0 ~ 10.0s	0.1	1.0	×
F1-11	Speed tacking search time	3.0 ～ 100.0s	0.1	6.0	×
F1-12	Current setting of speed tacking finished	1.00～50.00%	0.01	15.00	×
F1-13	Starting voltage when braking	105.0~140.0%	0.1	123.0	☆
F1-14	Final voltage when braking	105.0~150.0%	0.1	128.0	☆
F1-15	Terminals running command detect when power on	0: Running command is disable when power on 1: Running command enable when power on	1	0	×
F1-16	Stop speed	0.00~100.00%	0.01	1.00	☆
F1-17	Stop speed detect mode	0: Detect as speed reference 1: Detect as actual speed (for vector control)	1	1	☆

3. F2 motor parameters group

Code	Name	Description	Unit	Default setting	Property
F2-00	**Motor type**	**0: Asynchronous motor 1: Permanent magnet synchronous motor**	**1**	**0**	×
F2-01	**Motor rated voltage**	**1~700V**	**1**	*	×
F2-02	**Motor rated frequency**	**5.00~600.00Hz**	**0.01**	**50.00**	×
F2-03	**Motor rated current**	**0.1~3000.0A**	**0.1**	*	×
F2-04	**Rated slip frequency**	**0.00~5.00Hz**	**0.01**	*	×
F2-05	**Poles pair**	**1~50**	**1**	**2**	×
F2-06	**No load current**	**10.0~ 80.0%**	**0.1**	*	×
F2-07	**Stator resistor**	**0.00~50.00%**	**0.01**	*	×
F2-08	**Rotor resistance**	**0.00~50.00%**	**0.01**	*	×
F2-09	**Leakage inductance**	**0.00~50.00%**	**0.01**	*	×
F2-10	**Motor parameter auto-tuning**	**0: No operation 1: static auto tuning 2: Completely auto tuning**	**1**	**0**	×

F2-11	**Rated frequency of PMSM**	**5.00~600.00Hz**	**0.01**	**50.00**	×
F2-12	**Rated voltage of PMSM**	**1~700V**	**1**	*	×
F2-13	**Rated current of PMSM**	**0.1~3000.0A**	**0.1**	*	×
F2-14	**Rated back EMF of PMSM**	**1~700V**	**1**	*	×
F2-15	**Stator resistance of PMSM**	**0.00~50.00%**	**0.01**	*	×
F2-16	**Active damping detection time**	**2~100**	**1**	**10**	×
F2-17	**Active damping 1**	**0~1000**	**1**	**100**	×
F2-18	**Active damping 2**	**0~1000**	**1**	**100**	×
F2-19	**Active damping switching frequency**	**0.00~100.00Hz**	**0.01**	**100.00**	×
F2-20	**Active damping limiter**	**0.00~3.00Hz**	**0.01**	**1.00**	×

PMSM stands for Permanent magnet synchronous motor

4. F3 group parameters for Vector control and V/f control

Code	Name	Description	Unit	Default setting	Property
F3-00	ASR low speed proportional coefficient	0.01 ~ 30.00	0.01	0.60	☆
F3-01	Low ASR integral coefficient	0.01 ~ 10.00	0.01	1.00	☆
F3-02	ASR switching frequency 1	1.00~7.50Hz	0.01	5.00	☆
F3-03	ASR high speed proportional coefficient	0.01 ~ 30.00	0.01	0.60	☆
F3-04	High ASR integral coefficient	0.01 ~ 10.00	0.01	1.00	☆
F3-05	ASR switching frequency 2	8.00~50.00Hz	0.01	10.00	☆
F3-06	Current loop proportional coefficient	0.01~10.00	0.01	0.20	×
F3-07	Current loop integral coefficient	1~100	1	10	×
F3-08	Slip compensation coefficient	50~200%	1	100	×
F3-09	Speed feedback filter time constant	1~100 millisecond	1	6	×
F3-10	Torque limit	0~200%	1	150	×
F3-11	Cross compensation coefficient	0.00 ~ 0.50	0.01	0.20	×
F3-12	Closed-loop voltage proportional coefficient	0~ 1.00	0.01	0.20	×
F3-13	Voltage closed-loop integral coefficient	0~ 1.00	0.01	0.20	×
F3-14	Magnetic field control proportional coefficient	10~1000	1	50	×
F3-15	Magnetic field control integral coefficient	1~500	1	50	×
F3-16	Current reference filter time constant	1~100millisecond	1	10	×
F3-17	Whether torque control	0: Torque control disable 1: Torque control enable	1	0	☆
F3-18	Torque reference	0: Torque reference set by F3-19 1: AI1 2: AI2 3: Multi-segment speed 4：RS485 5：HDI	1	0	☆
F3-19	Torque reference by keypad setting	0.0～200.0%	0.1	50.0	☆
F3-20	Torque reference direction	0: Forward direction 1: Reverse direction	1	0	☆
F3-21	**Upper limit frequency reference source set selection**	**0: Upper limit frequency 1: AI1 2: AI2 3: Multi-segment speed 4: RS485 5: HDI 6: Potentiometer of keypad**	**1**	**0**	☆
F3-22	V/F curve selection	0: Standard V/F curve，V/F=constant 1: Square V/f curve 2: User defined V/f curve	1	0	×
F3-23	Custom curve F1	0.0 ～100.0%	0.1	0.0	×
F3-24	Custom curve V1	0.0 ～100.0%	0.1	0.0	×
F3-25	Custom curve F2	0.0 ～100.0%	0.1	0.0	×
F3-26	Custom curve V2	0.0 ～100.0%	0.1	0.0	×
F3-27	Custom curve F3	0.0 ～100.0%	0.1	0.0	×
F3-28	Custom curve V3	0.0 ～100.0%	0.1	0.0	×
F3-29	**Torque boost**	**0.0~20.0%**	**0.1**	**2.0**	×
F3-30	Low frequency oscillation suppression strength	0~1000	1	100	×
F3-31	High frequency oscillation suppression strength	0~1000	1	0	×
F3-32	High and low frequency turning point	5.00～50.00 Hz	0.01	20.00	×
F3-33	V / F control slip compensation coefficient	0~200%	1	0	×

5. F4 group parameters for auxiliary running control

Code	Name	Description	Unit	Default setting	Property
F4-00	Forward /reverse dead time	0.0~5.0s	0.1	0.1	☆
F4-01	Skip frequency 1	0.00 ~Upper limit frequency	0.01	0.00	☆
F4-02	Skip frequency 1 range	0.00 ~5.00Hz	0.01	0.00	☆
F4-03	Skip frequency 2	0.00 ~ Upper limit frequency	0.01	0.00	☆
F4-04	Skip frequency 2 range	0.00 ~5.00Hz	0.01	0.00	☆
F4-05	Skip frequency 3	0.00 ~ Upper limit frequency	0.01	0.00	☆

F4-06	Skip frequency 3 range	0.00 ~5.00Hz	0.01	0.00	☆
F4-07	Jog frequency	0.00~ Upper limit frequency	0.01	5.00	☆
F4-08	Jog acceleration time	0.1~6000.0s	0.1	10.0	☆
F4-09	Jog deceleration time	0.1~6000.0s	0.1	10.0	☆
F4-10	Acceleration time 2	0.1~ 6000.0S	0.1	*	☆
F4-11	Deceleration time 2	0.1~ 6000.0S	0.1	*	☆
F4-12	Acceleration time 3	0.1~ 6000.0S	0.1	*	☆
F4-13	Deceleration time 3	0.1~ 6000.0S	0.1	*	☆
F4-14	Acceleration time 4	0.1~ 6000.0S	0.1	*	☆
F4-15	Deceleration time 4	0.1~ 6000.0S	0.1	*	☆
F4-16	Acceleration /deceleration mode	0: Linear, 1: S curve	1	0	×
F4-17	Terminal UP/DW rate	0.01~100.00Hz/s	0.01	1.00	☆
F4-18	FDT 1（frequency detect level ）setting	0.00~upper limit frequency	0.01	50.00	☆
F4-19	FDT 1 lag detection value	0.0~100.0%	0.1	5.0	☆
F4-20	FDT 2（frequency detect level ）setting	0.00~upper limit frequency	0.01	50.00	☆
F4-21	FDT 2 lag detection value	0.0~100.0%	0.1	5.0	☆
F4-22	Frequency arrival detection range	0 0.00~20.00Hz	0.01	1.00	☆
F4-23	PWM modulation	Unit 's digit: if over modulation 0: Not modulation 1: Modulation Ten's digit: Modulation mode 0: 3 phase modulation at low speed, 2 phase modulation at high speed Hundred's digit: Low speed deal with 0: when the low carrier frequency large than 3Khz, runs with within 3Khz. 1: Carrier frequency runs with previous setting	1	0	×
F4-24	**AVR (auto voltage regulation)**	**0: no operation 1: Enable 2: Disable in deceleration**	**1**	**0**	×
F4-25	Drop control	0.0~10.00Hz	0.01	0.0	×
F4-26	**Operation monitoring items selection**	**0～3939: Low bit and high bit each stands for one d parameters. 3 parameters can determined 6 monitor parameters, press Shift key to circulation display in running.**	**1**	**0100**	☆
F4-27	**Operation monitoring items selection 2**		**1**	**0502**	☆
F4-28	**Operation monitoring items selection 3**		**1**	**3226**	☆
F4-29	**Speed display coefficient**	**0.1~999.9%**	**0.1**	**100.0**	☆
F4-301	**Linear speed display coefficient**	**0.01~99.99**	**0.01**	**1.00**	☆

F4-31	**Multifunction key MF.K set**	**0: REV 1: Jog forward 2: Jog Reverse 3: Running command switchover**	**1**	**0**	×

6. F5 group parameters for external terminals input and output

Code	Name	Description	Unit	Default setting	Property
F5-00	AI1minimum input	0.00~10.00V	0.01	0.00	☆
F5-01	AI1 minimum input corresponding value	-100.00~100.0%	0.1	0.0	☆
F5-02	AI1 maximum input	0.00~10.00V	0.01	10.00	☆
F5-03	AI1 maximum input corresponding value	-100.00~100.0%	0.1	100.0	☆
F5-04	AI1filter time constant value	0.01~50.00s	0.01	0.10	☆
F5-05	AI2 minimum input	0.00~10.00V	0.01	0.00	☆
F5-06	AI2 minimum input corresponding value	-100.00~100.0%	0.1	0.0	☆
F5-07	AI2 maximum input	0.00~10.00V	0.01	10.00	☆
F5-08	AI1 maximum input corresponding value	-100.00~100.0%	0.1	100.0	☆
F5-09	AI2 filter time constant value	0.01~50.00s	0.01	0.10	☆
F5-10	PLUSE minimum input	0.00~50.00KHz	0.01	0.00	☆
F5-11	PLUSE minimum input corresponding value	-100.00~100.0%	0.1	0.0	☆
F5-12	PLUSE maximum value	0.00~50.00KHz	0.01	50.00	☆
F5-13	PLUSE Maximum value corresponding value	-100.00~100.0%	0.1	100.0	☆
F5-14	PULSE filter time constant value	0.01~50.00s	0.01	0.10	☆
F5-15	**External terminal command control mode**	**0: Two lines control mode 1 1: Two lines control mode 2 2: Three lines control mode 1 3: Threes lines control mode 2**	**1**	**1**	×
F5-16	**X1terminals function selection（0~39）**	0: No function **1: FWD Forward command** 2: REV Reverse command 3: External fault input (normally open) 4: DC braking **5: Emergency stop input (solar pump pause)** 6: Fault reset input 7: Multi-speed input 1 8: Multi-speed input 2 9: multispeed input 3 10: Multi-speed input 4		1	×
F5-17	X2 terminals function selection（0~50）			2	×
F5-18	X3 terminals function selection（0~50）			7	×
F5-19	X4 terminals function selection（0~50）			8	×
F5-20	**X5 terminals function selection（0~50）**			1	×
F5-21	X6 terminals function selection（0~50）			10	×

		11: three-line control 12: Terminal UP 13: Terminal DOWN 14: Terminal reset 15: Acceleration and deceleration selection terminal 1 16: Acceleration and deceleration selection terminal 2 17: PLC Pause running 18: PLC state reset (modes 1, 2) 19: Forward jog 20: reverse jog 21: Traverse suspend operation 22: Traverse reset 23: PID suspend operation 24: Interior timer enable 25: The internal timer is cleared 26: Counter trigger input 27: Counter Reset (reset to 0) 28: Frequency reference given A and B switchover 29: Frequency reference given A and A + B switchover 30: Frequency reference given B and A + B switchover 31: deceleration to stop 32: Torque control prohibition 33: Length counter input 34: The length of the counter is cleared 35: Command given source is forcibly set by keypad 36: Command given source is forcibly set by terminal 37: Command given source is forcibly set by the communication. 38: PID parameters 39: External fault normally closed input 40: Pulse input (only valid for X6) **41: Solar control prohibition**			
F5-27	Y transistor output selection	0: No function	1	1	☆
F5-28	Relay 1 output selection	1: Run state	1	1	☆
F5-29	Relay 2 output selection	2: Fault output 3: Frequency arrival 4: detection frequency FDT1 arrival 5: detection frequency FDT2	1	1	☆

		arrival 6: Zero speed running 7: Lower limit frequency arrival 8: Upper limit frequency arrival 9: Counter reaches the specified value (greater than the specified value, output ON) 10: Counter reach final value (equal to the final value, output a ON clock cycle counter signal) 11: Internal timer reaches (Output a ON timer unit signal) 12: Running time is reached (greater than the set time Output ON) 13: PLC a segment operation is completed (Output a 0.5s ON signal) 14: PLC run cycle is complete (Output a 0.5s ON signal) 15: Over-torque warning 16: Drive standby 17: Length arrive 18: Place in sleep mode 19: AI1 input over limit 20: Module temperature reaches			
F5-34	AO1 output selection	0: Frequency reference 1: Run Frequency 2: Output current 3: DC bus voltage 4: Output voltage 5: output power (100% corresponds to 200% of rated power) 6: Torque current 7: AI1 8: AI2 9: Reserved 10: High-speed pulse input 11: RS485 set 12: Length 13: count value 14 to 20 Reserved	1	0	☆
F5-35	AO1 analog output corresponding to 0%	0.0~100.0%, output 0~10V, 100.00% corresponding to 10V, output 0~20mA, 100.00% corresponding to 20mA.	0.1	0.0	☆

F5-36	AO1 analog output corresponding to 100.00%	0.0~100.0%	0.1	100.0	☆
F5-39	AO2 output type selection	0: Analog 1: HDO pulse trains output	1	0	☆
F5-40	HDO pulse train upper limit	0.10~50.00KHz	0.01	50.00	☆
F5-41	AO2 output selection	As same as AO1 selection	1	1	☆
F5-42	AO2 analog output corresponding to 0%	0.0~100.0%, when output 0~10V, 100.0% corresponding to 10V; when output is high speed pulse train , 100.0% correspond to 50.00KHz	0.1	0.0	☆
F5-43	AO2 analog output corresponding to 100.00%	0.0~100.0%	0.1	100.0	☆

7. F6 group parameters for PID control

Code	Name	Description	Unit	Default setting	Property
F6-00	Select PID reference command source	0: Potentiometer of keypad 1: Fb.0 reference 2: F6.01 reference 3: AI1 4: AI2 5: RS485 6: PLUSE trains 7: multi-speed	1	0	☆
F6-01	PID reference	0~100.0%	0.1	50.0	☆
F6-02	PID feedback channel selection	0: AI1 1: AI2 2: HDI 3: RS485	1	0	☆
F6-03	Regulation characteristics	0: Positive 1: Negative	1	0	☆
F6-04	Proportional gain	0.0~50.0	0.1	5.0	☆
F6-05	Integration time constant	0.1~100.0s	0.1	10.0	☆
F6-06	Differential Gain	0.0~5.0	0.1	0.0	☆
F6-08	Preset frequency	0.0～100.0% upper limit frequency	0.1	50.0	☆
F6-09	Preset frequency holding time	0.0 ~ 3000.0S	0.1	0.0	☆
F6-10	Feedback disconnection detection threshold	0.0～100.0%	0.1	5.0	☆
F6-11	Feedback disconnection judgment time	0.0~3000.0s, 0.0 means not perform disconnect judge.	0.1	0.0	☆
F6-12	PID limited negative output	0~100.0%	0.1	0.0	☆
F6-13	Twice the maximum output deviation	0.00~100.00%	0.01	1.00	☆

8. F7 group parameters for multi-speed and simple PLC control

Code	Name	Description	Unit	Default setting	Property
F7-00	Programmable multi segment speed running setting	Unit' digit: 0: Single segment running finished stop 1: Single segment running finished and keep the finial setting 2: cycle running continue Ten' s digit 0: Running time unit is second 1: Running time unit is minute Hundred's digit: Reserve Thousand's digit: restart selection 0: Every restart from 0 segment point 1: Every restart from break off point frequency.	1	2	×
F7-01	Multi-speed frequency 0	0.0 ~ 100.0%	0.1	10.0	☆
F7-02	Multi-speed frequency 1	0.0 ~ 100.0%	0.1	20.0	☆
F7-03	Multi-speed frequency 2	0.0 ~ 100.0%	0.1	30.0	☆
F7-04	Multi-speed frequency 3	0.0 ~ 100.0%	0.1	40.0	☆
F7-05	Multi-speed frequency 4	0.0 ~ 100.0%	0.1	50.0	☆
F7-06	Multi-speed frequency 5	0.0 ~ 100.0%	0.1	70.0	☆
F7-07	Multi-speed frequency 6	0.0 ~ 100.0%	0.1	80.0	☆
F7-08	Multi-speed frequency 7	0.0 ~ 100.0%	0.1	100.0	☆
F7-09	Multi-speed frequency 8	0.0 ~ 100.0%	0.1	10.0	☆
F7-10	Multi-speed frequency 9	0.0 ~ 100.0%	0.1	20.0	☆
F7-11	Multi-speed frequency 10	0.0 ~ 100.0%	0.1	30.0	☆
F7-12	Multi-speed frequency 11	0.0 ~ 100.0%	0.1	40.0	☆
F7-13	Multi-speed frequency 12	0.0 ~ 100.0%	0.1	50.0	☆
F7-14	Multi-speed frequency 13	0.0 ~ 100.0%	0.1	70.0	☆
F7-15	Multi-speed frequency 14	0.0 ~ 100.0%	0.1	80.0	☆
F7-16	Multi-speed frequency 15	0.0 ~ 100.0%	0.1	100.0	☆
F7-17	Speed 0 running time	0.0~3000.0	0.1	10.0	☆
F7-18	Speed 0 running direction and acceleration/deceleration	Unit's digit: 0: Forward 1: Reverse Ten' s digit: 0: Acceleration/deceleration 1 1: Acceleration/deceleration 2 2: Acceleration/deceleration 3 3: Acceleration/deceleration 4	1	0	☆
F7-19	Speed 1 running time	0.0~3000.0	0.1	10.0	☆
F7-20	Speed 1 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-21	Speed 2 running time	0.0~3000.0	0.1	10.0	☆
F7-22	Speed 2 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-23	Speed 3 running time	0.0~3000.0	0.1	10.0	☆

F7-24	Speed 3 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-25	Speed 4 running time	0.0~3000.0	0.1	10.0	☆
F7-26	Speed 4 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-27	Speed 5 running time	0.0~3000.0	0.1	10.0	☆
F7-28	Speed 5 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-29	Speed 6 running time	0.0~3000.0	0.1	10.0	☆
F7-30	Speed 6 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-31	Speed 7 running time	0.0~3000.0	0.1	10.0	☆
F7-32	Speed 7 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-33	Speed 8 running time	0.0~3000.0	0.1	10.0	☆
F7-34	Speed 8 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-35	Speed 9 running time	0.0~3000.0	0.1	10.0	☆
F7-36	Speed 9 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-37	Speed 10 running time	0.0~3000.0	0.1	10.0	☆
F7-38	Speed 10 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-39	Speed 11 running time	0.0~3000.0	0.1	10.0	☆
F7-40	Speed 11 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-41	Speed 12 running time	0.0~3000.0	0.1	10.0	☆
F7-42	Speed 12 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-43	Speed 13 running time	0.0~3000.0	0.1	10.0	☆
F7-44	Speed 13 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-45、	Speed 14 running time	0.0~3000.0	0.1	10.0	☆
F7-46	Speed 14 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-47	Speed 15 running time	0.0~3000.0	0.1	10.0	☆
F7-48	Speed 15 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆

9. F8 group parameters for communication

Code	Name	Description	Unit	Default setting	Property
F8-00	Baud selection	0：300bps 1：600bps 2：1200bps 3：2400bps 4：4800bps 5：9600bps 6：19200bps 7：38400bps	1	5	☆
F8-01	Data format	0: No parity 1: Odd	1	0	☆
		2: Even parity			
F8-02	Address	0~247 0: Broadcast address does not return data	1	1	☆
F8-03	The machine response delay	0~100ms	1	5	☆
F8-04	Timeout judgment time	0.0~100.0s：0.0 means time out	0.1	0.0	☆
F8-05	Master-Slave Select	0: Slave port 1: Master port	1	0	☆
F8-06	RS485 frequency reference scale factor	0~999.9%	0.1	100.0	☆
F8-07	Writing operation if return data	0: Return 1: No reture	1	0	☆

10. Advanced F9 group parameters

Code	Name	Description	Unit	Default setting	Property
F9-00	Swing frequency amplitude	0.0~100.0%	0.1	0.0	☆
F9-01	Kick frequency amplitude	0.0~50.0%	0.1	0.0	☆
F9-02	Triangular wave rise time	0.1~3600.0s	0.1	5.0	☆
F9-03	Triangular wave fall time	0.1~3600.0s	0.1	5.0	☆
F9-04	Specify the value of the counter	0~65535	1	1000	☆
F9-05	Counter final value	0~65535	1	2000	☆
F9-06	Setting length	0~65535meter	1	1000	☆
F9-07	The number of pulses per meter	0.1~6553.5	0.1	100.0	☆
F9-08	Internal timer timer unit	0.01~99.99s	0.01	1.00	☆
F9-09	internal timer cycle period	1~65535	1	10	☆
F9-10	Setting the running time	0~65535hour	1	65535	☆
F9-101	**X1 switch-on delay time**	**0.0~3600.0S**	**0.1**	**0.0**	**☆**
F9-12	**X1 off delay time**	**0.0~3600.0S**	**0.1**	**0.0**	**☆**
F9-13	X2 switch-on delay time	0.0~3600.0S	0.1	0.0	☆
F9-14	X2 off delay time	0.0~3600.0S	0.1	0.0	☆
F9-15	**X3 switch-on delay time**	**0.0~3600.0S**	**0.1**	**0.0**	**☆**
F9-16	**X3 off delay time**	**0.0~3600.0S**	**0.1**	**0.0**	**☆**
F9-17	Y1 output delay time	0.0~3600.0S	0.1	0.0	☆
F9-18	Relay 1 output delay time	0.0~3600.0S	0.1	0.0	☆
F9-19	Relay 2 output delay time	Relay 1 output delay time	0.1	0.0	☆

11. FA group parameters for solar pump control

Code	Name	Description	Unit	Default setting	Property
FA-00	Select solar pump control mode	0: Variable frequency drive control (AC grid input) 1:CVT (constant voltage tracking) 2: MPPT (maximum power point tracking)	1	2	×
FA-01	Auto/ manual switch over	0: Manual by keypad control 1: Automatically running with terminals control 2: RS485 communication	1	0	☆
FA-02	CVT object voltage	0.0~100.0% of Voc	0.1	80.0	☆

FA-03	MPPT upper limit voltage	0.0~100.0% of Voc	0.1	90.0	☆
FA-04	MPPT lower limit voltage	0.0~100.0% of Voc	0.1	75.0	☆
FA-05	Frequency adjust gain	1~1000	1	40	☆
FA-06	Frequency adjusting allowable deviation	1~5	1	3	☆
FA-07	MPPT Control period	0.01~10.00S	0.01	0.30	×
FA-08	Dc current correction offset	0.00~50.00A	0.01	0.00	☆
FA-09	Dc current correction gain	0.0~100.0%	0.1	100.0	☆
FA-10	Water level detect control	0: Disable 1: AI1 takes as water level detect signal 2: AI2 takes as water level detect signal Only FA-10 not 0 set, the FA-11 to FA-14 is enable	1	0	☆
FA-11	Water level threshold	0.0~100.0%	0.1	25.0	☆
FA-12	Full water delay	0.0~3000.0S If the detected water level less than FA-11, and lasting for FA-12 delay time. it will give out water full alarm and display A.Ful, and go to sleep. If the time is not reached, the signal is bigger than water level threshold, the time will be reset automatically.	0.1	60.0	☆
FA-13	Empty water delay	0.0~3000.0S After full water level alarmed, if the detected valued greater than FA-11, and lasting more than FA-13 delay time, system restore to running state from sleep mode.	0.1	600.0	☆
FA-14	Hydraulic detection probe damage threshold	0.0~100.0% 0.0: No detected If the detected water level signal large than FA-14, the solar pump drive consider water probe is damaged and sent alarm directly and go to sleep.	0.1	0.0	☆

12. Fb group parameters for solar pump protection and monitoring

Code	Name	Description	Unit	Default setting	Property
Fb-00	Sleep voltage threshold	0~1000V	1	*	☆
Fb-01	Restore running state voltage threshold	0~1000V	1	*	☆
Fb-02	Awake waiting time	0.0~3000.0S	0.1	120.0	☆
Fb-03	Stop frequency when low speed	0.00~300.00Hz	0.01	20.00	☆
Fb-04	stop delay time when reach stop frequency	0.0~3000.0S	0.1	30.0	☆
Fb-05	Automatic recovery time in stop frequency protection mode	0.0~3000.0S	0.1	120.0	☆
Fb-06	Dry run protection current threshold (under-load protection)	0.0~100.0A	0.1	1.0	☆
Fb-07	Dry run detect delay time	0.0~3000.0S	0.1	60.0	☆
Fb-08	Automatic recover time in dry run protection mode	0.0~3000.0S	0.1	120.0	☆
Fb-09	Motor over current protection threshold	0~3000.0A	0.1	*	☆
Fb-10	Over current detect delay time	0.0~3000.0S	0.1	30.0	☆
Fb-11	Automatic recovery time in over current protection mode	0.0~3000.0S	0.1	30.0	☆
Fb-12	Minimum power input protection threshold	0.00~100.00KW	0.01	0.00	☆
Fb-13	Minimum power input detect delay time	0.0~3000.0S	0.1	10.0	☆
Fb-14	Automatic recovery time in minimum power input protection mode	0.0~3000.0S	0.1	10.0	☆
Fb-15	Alarm action mode	0: Sending alarm and automatically rest 1: Reset by manual Unit's digit: Low stop frequency Ten's digit: Dry run (under load) Hundred's digit: Motor over current protection Thousand's digit: Minimum power input protection	1	0000	☆
Fb-16	PQ CURVE P0 (Input power of pump at point 0)	0.00~100.00KW	0.01	0.50	☆
Fb-17	PQ CURVE P1 (Input power of pump at point 1)	0.00~100.00KW	0.01	1.00	☆
Fb-18	PQ CURVE P2 (Input power of pump at point 2)	0.00~100.00KW	0.01	1.50	☆
Fb-19	PQ CURVE P3 (Input power of pump at point 3)	0.00~100.00KW	0.01	2.00	☆
Fb-20	PQ CURVE P4 (Input power of pump at point 4)	0.00~100.00KW	0.01	2.50	☆
Fb-21	PQ CURVE Q 0 (Flow rate at point 0)	0.0~1000.0m^3/h	0.1	0.0	☆
Fb-22	PQ CURVE Q 1 (Flow rate at point 1)	0.0~1000.0m^3/h	0.1	5.0	☆

Fb-23	PQ CURVE Q 2 (Flow rate at points 2)	0.0~1000.0m^3/h	0.1	10.0	☆
Fb-24	PQ CURVE Q 3 (Flow rate at point 3)	0.0~1000.0m^3/h	0.1	15.0	☆
Fb-25	PQ CURVE Q 4 (Flow rate at point 4)	0.0~1000.0m^3/h	0.1	20.0	☆
Fb-26	Today flow / generated energy day reset period	0.0~24.0hour	0.1	8.0	☆
Fb-27	Flow measured offset	0.00~1000.0m^3/h	0.1	0.0	☆
Fb-28	Flow measured gain	0.0~100.0%	0.1	100.0	☆
Fb-29	Cumulative flow/ generated energy reset setting	0: No operation 1: Flow reset 2: Generated energy reset 3: Both flow and generated energy reset	0	0	×

13. Fd group parameters for protection

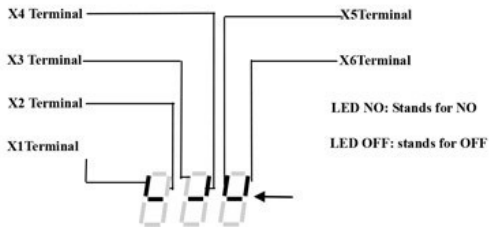
Code	Name	Description	Unit	Default setting	Property
Fd-00	Current limit value	100.0~200.0%	0.1	*	☆
Fd-01	Frequency drop time when over current	1.0~200.0s	0.1	5.0	☆
Fd-02	Over voltage limit	110.0~145.0%	1	130.0	☆
Fd-03	Overvoltage suppression gain	0~10	1	2	☆
Fd-04	**Phase loss protection**	**Unit's digit: Input phase limit 0: No protection 1: Protection Ten's digit: Output phase limit 0: No protection 1: Protection**	**1**	**11**	☆
Fd-05	**Motor overload protection**	**20.0~100.0%**	**0.1**	**100.0%**	☆
Fd-06	Pre-alarm value of over torque	20.0~200.0%	0.1	*	☆
Fd-07	Over torque detect delay time	0.0~60.0s	0.1	0.1	☆
Fd-08	**Fault auto reset times**	**0~5**	**1**	**0**	☆
Fd-09	**Failure self-reset interval time**	**0.1~600.0s**	**0.1**	**1.0**	☆
Fd-10	**Fault relay output during reset**	**0: No output 1: Output**	**1**	**0**	☆
Fd-11	AI1 input voltage low limit	0.00~10.00V	0.01	2.00	☆
Fd-12	AI1input voltage upper limit	0.00~11.00V	0.01	8.00	☆
Fd-13	Module temperature reaches	25.0~90.0℃	0.1	70.0	☆
Fd-14	Previous two faults	0~30	1	0	×
Fd-15	Previous faults	0~30	1	0	×
Fd-16	Current fault	0~30	1	0	×
Fd-17	Output frequency at current fault	0 ~Upper limit frequency	0.01	0.00	×
Fd-18	Output current at current fault	0 ~ 3000.0A	0.1	0.0	×
Fd-19	DC bus voltage at current fault	0 ~ 800V	1	0	×

D Group parameters for working status monitor

Note: Press shift button of keypad can display output current, output frequency, output voltage, DC bus voltage, DC bus current and input power 6 parameters in circulation in monitor status.

Monitor code	Contents	Mini. Unit
d-00	**Current output frequency**	**0.01Hz**
d-01	**Current output voltage**	**1V**
d-02	**Current output current**	**0.1A**
d-03	Current frequency reference	0.01Hz
d-04	Current output frequency 2	0.01Hz
d-05	**DC bus voltage value**	**1V**
d-06	Module temperature	0.1℃
d-07	PID reference value	0.1%
d-08	PID feedback	0.1%
d-09	**Speed**	**rmp**
d-10	Running liner frequency	0.01*
d-11	External pulse train input	0.01KHz
d-12	RS485 reference	
d-13	Reserve	
d-14	AI1	0.1V
d-15	AI2	0.1V
d-16	DI terminals status	
d-17	DO terminals status	
d-18	Single continuous run time	1H
d-19	Total running time	1H
d-20	External pulse count value	
d-21	Internal timer count	
d-22	Actual length	m
d-23	Pressure reference	MPa
d-24	Actual pressure	MPa
d-25	**Open circuit voltage**	**1V**
d-26	**DC bus current**	**0.01A**
d-27	**MPPT tracking voltage**	**0.1%**
d-28	**Calculate flow rate**	**0.1m3/h**
d-29	**Today flow**	**0.1m3**
d-30	**Cumulative flow 1**	**0.1m3**
d-31	**Cumulative flow 2**	**1Km3**
d-32	**Input power**	**0.01KW**
d-33	**Today generated energy**	**0.1KWH**
d-34	**Cumulative generated energy 1**	**0.1KWH**
d-35	**Cumulative generated energy 2**	**1MWH**
d-36	**Working status**	**1**
d-37	**Rated voltage of Drive**	**1V**
d-38	**Rated current of Drive**	**0.1A**
d-39	**Software version**	

XI input terminals status description: The last three to five digital display digital input status



2）DO Terminals status：Th e lowest bit stands for Y, the second bit stands for relay output 1, the high bit stands for relay output 2.

Y is the lowest position, the output relay 1 followed by 2 relay outputs as a binary number consisting of the highest level, is converted into a decimal display.

3）d-36 working status display introduction:

0：Stop mode

1: Running

2: **A.Lvo** means on low voltage sleep mode ,

3: **A.LFr** means on low stop frequency sleep mode,

4:**A.LCr** means on dry run protection

5: **A.OCr** means on motor over current mode,

6: **A.Lpr** means on minimum power input mode,

7: **A.FuL** water full sleep mode.

Chapter 8. Parameters description in detail

Some parameters description which may relative with solar pump control.

F0-00	Model selection	0：General purpose 1：P type (variable torque load)	1	0	×

0: Suitable for driving general purpose constant torque heavy load w

For solar submersible pump need select G type models because large torque in deep well.

1: suitable fr driving fans pumps, etc variable torque light load

The power of P type mode for fans, pumps light load lower than G constant torque model one range.

Note: This value can't change after factory leaving.

For some fans pumps application, such as boost fans, deep well pump, which load is heavy. Select the AC Drive should according to the actual current.

The tolerance capacitors of G type: 150% rated current for 1 minutes, 180% rated current for 2 seconds.

The tolerance capacitors of Ptype: 120% rated current for 1 minutes, 150% rated current for 2 seconds.

F0-01	Control mode	0: VF control 1: Vectorized VF control 2：Open loop vector control 1 3: High performance open loop vector control 2	1	0	×

0: V/F control

No need install encoder, good compatibility and stable running. Suits for the applications, which no high request for loads, and one drive for more than one motors, and motor auto-tuning cannot be performed or the motor's parameters can be acquired through other methods, such as fans, pumps load.

Always select VF control for solar pump control application for asynchronous motor.

1: Vectorized VF control,

Do vectorized for V/F control to enhanced control accuracy, stability of control and improved the torque output at low speed. Not sensitive to motor parameters.

2: Open loop sensorless vector control 1:

Unique method vector control, vector control versatility relatively strong, has steady performance, but the dynamic indicators worse than the high performance open loop vector control 2, insensitive to motor parameters.

3: High performance sensorless vector control 2

It uses a rotor field oriented vector control, with high static and dynamic performance control, sensitive to motor parameters. This control mode suits for high performance general purpose application without encoder, such as machine, centrifugal machine, drawbench, injection mold machine, etc. one drive only allow to control one motor.

Please configure motor group parameters carefully, and performance ID auto tuning when apply this control mode.

F0-02	Running command channel selection	0: Operation panel (keypad) 1: External terminals 2: RS485terminals	1	1	☆

Selects AC Drive running command input channel,
The AC Drive control command includes starting, stop, forward, reverse, jog function.
0: Keypad (operation panel); The running command is controlled by RUN, STOP, JOG (through F4-13) by keypad.
1: External terminals The running command controlled by multiple function terminals. It can achieved to forward, reverse, Jog, reverse running with two lines or three lines control, see P0.18, F5-16～F5-21 function code in detail.
2: communication command
The running command is given by communication, see the communication protocol F8 group description.

F0-03	Main frequency reference source A	0： Potentiometer of keypad 1: UP, DOWN of keypad. 2: AI1 (0-10V) 3: AI2 (0-10V/0-20mA) 5: PID close loop reference 6: Multi-speed control 7: Simple PLC 8: UP/DW of terminals 9: Communication 11: High speed pulse trains	1	0	☆
F0-04	Auxiliary frequency reference source B	0: Potentiometer of keypad 1: AI1 (0- 10V) 2: AI2 （0-10V） 3: F0-07 (UP and Down of keypad reference setting) 4: High speed pulse trains reference 5: Multi-segment speed	1	1	☆
F0-05	The reference source selection of auxiliary frequency source B	0： Upper limit frequency 1： Main frequency source A	1	0	☆
F0-06	The operation of frequency source A and B combination setting	0: Main frequency source A 1: Auxiliary frequency source B 2: A+B 3: MAX （A，B） 4: MIN （A，B） 5: A-B	1	0	☆

There are two frequency reference source of main and auxiliary reference (A and B). The user can select frequency reference according actual application request.
These parameters is disable in solar pump control mode, because the output frequency is controlled by inner MPPT algorithm.

F0-08	Upper limit frequency	5.00~650.00 Hz	0.01	50.00	×
F0-09	Lower limit frequency	0.00Hz ~ F0-08	0.01	0.50	×
F0-10	Running mode under low limit frequency	0: Running with lower limit frequency 1: Stop 2: Sleep mode in stand by	1	0	×

F3-21	Upper limit frequency reference source set selection	0: Upper limit frequency 1: AI1 2: AI2 3: Multi-segment speed 4: RS485 5: HDI 6: Potentiometer of keypad	1	0	☆

The upper limit frequency is upper limit value of output frequency of AC Drive.
When frequency reference is set by the external analog reference, multiple speed and simple PLC, the given value is percent %, their reference value is upper limit frequency.

Uses F3-21 to set the value of upper limit frequency source.
In solar pump control, if sunlight radiation is good, output is 50Hz. The user can limit frequency output according application request with this F0-08 and F3-21 parameters configuration.
F0-09, lower limit frequency used to defined lower limit output frequency of AC drive.
F0-10 running mode selection used to select stop, running and go to sleep mode when output frequency is lower than F0-09.

Note: If F0-10 set for 1, Ac drive stop when output frequency lower than F0-09. It request confirm STOP command again to start Ac drive when control by terminals or RS485 mode, when starting command is open.
If control by keypad or pulse terminals control, it need trigger starting signal again to start AC drive. In terminals control mode, only terminals signal is disable, and enable again to make AC drive start again.

F0-12	Acceleration mode 1	0.1~6000.0 s	0.1	*	☆
F0-13	Deceleration mode 1	0.1~6000.0s	0.1	*	☆

Acceleration time is the output frequency from 0Hz to rated frequency ramp up time.
Deceleration time is the output frequency reduce from rated frequency to 0Hz ramp down time.

F0-14	Carrier frequency	1 ~ 10KHz	1	*	☆

Carrier frequency mainly affects the operation of the audio noise and thermal effects.
When the ambient temperature is high, the motor load is heavy, it should be appropriate to reduce the carrier frequency in order to improve the thermal characteristics of the Ac drive.

F0-15	Ac drive running direction	0: Runs as forward direction 1: Runs as reverse direction 2: Reverse direction is forbidden	1	0	☆

This parameters used to changed the AC drive output phase, thereby to check the motor running direction as well.
0: Running direction as same as setting
1: Running direction is reverse as setting.
2: Reverse running direction is forbidden.
If the output frequency is big, but output water yield is low in good sunlight condition, please used this parameters to change pump running direction or change motor wiring phase.

F0-17	Factory restore to factory setting	0: No operation 11: Parameters initialization 22: Clear fault record	1	0	×

To modify the parameters of the AC drive to factory default.
0: No operation

11: Parameters initialization, restore all parameters setting back to default setting.

22: Clear fault records

Note: Set F0-00 (AC drive modes G/P type selection properly) according to the actual situation before initialization. This parameters can't be restore.

F0-18	Parameters modify protection	0: No protection 1: Disable modify	1	0	×

0: No protection

1: All parameters under protection, can't modify. But F0-07 in monitor status can changed by UP and DOWN button of keypad.

F1-00	Start up mode	0: Start up with starting frequency 1: Start up after DC braking 2: Start up with speed tracking	1	0	×

0: Start up with starting frequency F1-01 setting.
1: Performance DC braking first, and then start from starting frequency for application which need starting from still.
2: Start up with speed tracking for fans application.

F1-15	Terminals running command detect when power on	0: Running command is disable when power on	1	0	×

0: Start running command is disable when power on.
If the running command selection source is terminal control when AC drive power on. even if terminals command is enable, the AC drive will not response to start, to avoid bring damaged when AC drive staring suddenly. If need start system, user have to disable terminals first and then start it.
1: Starting running command is enable.
Ac drive starts immediately when power on if terminals command is enable.

F2-00	Motor type	0: Asynchronous motor 1: Permanent magnet synchronous motor	1	0	×
F2-01	Motor rated voltage	1~700V	1	*	×
F2-02	Motor rated frequency	5.00~600.00Hz	0.01	50.00	×
F2-03	Motor rated current	0.1~3000.0A	0.1	*	×
F2-04	Rated slip frequency	0.00~5.00Hz	0.01	*	×
F2-05	Poles pair	1~50	1	2	×
F2-06	No load current	10.0~ 80.0%	0.1	*	×

When the asynchronous motor is first time using, the user need to configuration these motor parameters according to nameplate of motor.
Performance sensorless vector control with selecting F0-01 for 2 or3. It must performance motor auto tuning first.
If driving solar PMSM (permanent magnet synchronous motor) pumps, it must perform motor ID auto tuning first. Select F2-10 for 1 or 2 to performance auto tuning.
Before performance auto tuning need configuring F2-11 to F2-15 PMSM parameters.

F2-10	Motor parameter auto-tuning	0: No operation 1: Static auto tuning 2: Completely auto tuning	1	0	×
F2-11	Rated frequency of PMSM	5.00~600.00Hz	0.01	50.00	×
F2-12	Rated voltage of PMSM	1~700V	1	*	×
F2-13	Rated current of PMSM	0.1~3000.0A	0.1	*	×
F2-14	Rated back EMF of PMSM	1~700V	1	*	×
F2-15	Stator resistance of PMSM	0.00~50.00%	0.01	*	×

F2.07～F2.09 these parameters in generally can't find in nameplate of motor. Please perform motor auto tuning to get these parameters. only get f2.07～f2.09 from static auto-tuning.
If the load can easy disconnect from motor, please to performance completely auto tuning to get accuracy motor parameters.
If the load can't disconnect from motor, set F2-10 for 1 to performance auto tuning.

F3-29	Torque boost	0.0~20.0%	0.1	2.0	×

To compensate the low frequency torque characteristics of V/F control, you can boost the output voltage of AC drive at low frequency by modifying F3-29. If the torque boost is set to too large, the motor may overheat, and the AC drive may suffer over current.
If set it for 0, it will performance auto torque boost.

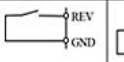
F4-29	Speed display coefficient	0.1~999.9%	0.1	100.0	☆
F4-301	Linear speed display coefficient	0.01~99.99	0.01	1.00	☆
F4-31	Multifunction key MF.K set	0: REV 1: Jog forward 2: Jog Reverse 3: Running command switchover	1	0	×

F4-29 Speed display coefficient that used for correct the speed display.
F4-31 used to define the function of multiple function key on keypad.

F5-15	External terminal command control mode	0: Two lines control mode 1 1: Two lines control mode 2 2: Three lines control mode 1 3: Threes lines control mode 2	1	1	×
F5-16 To F5-21	X1 to X6 terminals function selection（0~39）	1: FWD Forward command 5: Emergency stop input (solar pump pause) 41: Solar control prohibition			

The F5-15 parameter used to select terminals control mode, there are 4 control modes in drives.
FWD stands for running in forward direction control by external terminal, and marks for FWD.
REV stands for running in reverse direction control by external terminal, and marks for REV.

0: Two line control mode 1

Construction	Stop	Running	Forward	Reverse
Terminals status				

FA group parameters for solar pump control

FA-00	Select solar pump control mode	0: variable frequency drive control (AC grid input) 1:CVT (constant voltage tracking) 2: MPPT (maximum power point tracking)	1	2	×
FA-01	Auto/ manual selection	0: Manual by keypad control 1: Automatically running with terminals control 2: RS485 communication	1	0	☆
FA-02	CVT object voltage	0.0~100.0% of Voc	0.1	80.0	☆

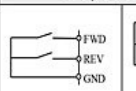
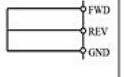
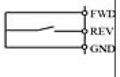
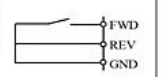
FA-00 parameter uses to select AC drive variable frequency control mode or solar pump control. There are two solar pump control modes, which are constant voltage tracking (CVT) and maximum power point tracking (MPPT). MPPT solar pump control mode is default setting.
In very good sunlight radiation area, user can select CVT mode for better frequency stable output, because the DC bus voltage is control target in this mode. FA-02 (CVT object voltage) is used to set target control voltage of DC bus. The suggest value setting is 75% to 90%.

FA-01 Auto/manual switchover selection is use to set control by manual or by auto terminals control. In the first time using after installation, suggesting select FA-01 for 0, drive control by manual with keypad. Once the commissioning is finished and tested well, we can switchover for auto terminal control.
In the auto terminal control mode, one programmable digital terminal from X1 to X6 should set for 1 (forward running control).
Compare to F0-02 parameter setting, this parameter has priority level, and make F5-16 and F5-20 set for 1 (FWD running control) as the same time.
Once X1 short circuit to GND (X1 and GND is ON) or X5 short circuit GND (X5 and GND is ON), the drive system will be work automatically.

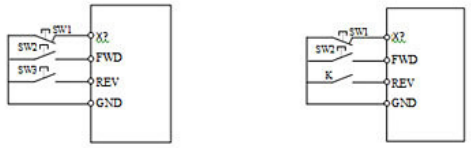
FA-03	MPPT control upper limit voltage	0.0~100.0% open loop circuit voltage	0.1	90.0	×
FA-04	MPPT control lower limit voltage	0.0~100.0% open loop circuit voltage	0.1	75.0	×
FA-05	Frequency adjusting gain	1~5000	1	40	×
FA-06	Frequency adjusting allowable deviation	1~5	1	3	×
FA-07	MPPT Control period	0.01~10.00S	0.01	0.30	×

Uses FA-03 and FA-04 to define MPPT upper limit and lower limit voltage. in generally, the default setting 75% to 90% is OK. For 3 phase 380V output control, the MPPT voltage Vmp is 540V, for 3 phase 220V output control, the MPPT voltage Vmp is 310V. the Vmp should be stay during with FA04 to FA03.
FA-05 (Frequency adjusting gain) parameter uses to reflect MPPT performance is quick or slow during operation. If this value is big, the MPPT performance is quickly, and might cause LU fault in bad sunlight condition, if this value set too small, the output frequency might seems a little fluctuation. User can set this value bigger, but not large than 100% in good sunlight condition area. In generally, the default 40% setting is OK.
FA-06 (Frequency adjusting allowable deviation), change this parameters will effect output frequency stability with MPPT function. if change it bigger, the output frequency might seems a little fluctuation. In generally, no need change this parameters.
We suggest user modify FA-05 parameter first, and don't changed FA-06 setting in generally case.

1: Two lines control mode 2

Construction	Stop command		Forward	Reverse
Terminals status				

2: Three lines control mode 1
It is must defined one input terminal for 3 lines control mode (one of terminals of F5-16～F5-21 set for 11). Refer to the 3 lines control mode as following wiring.

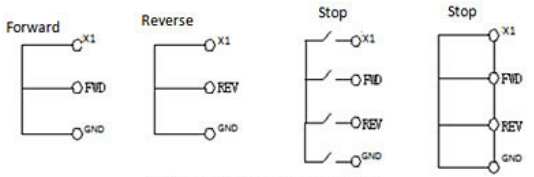


a) 3 lines control mode 1 b) 3 lines control mode 2

3 lines control mode wiring

X? is programmed for 3 line control, we can take one terminals of X1～X6 (F5-16～F5-21) set for 11. Sw1 is drive stop trigger switch. SW2 is forward trigger switch, and SW3 is reverse trigger switch.

3: 3 lines control mode 2.
X? is programmed for 3 line control, we can take one terminals of X1～X6 (F5-16～F5-21) set for 11. SW1 is stop trigger switch, SW2 is forward trigger switch, K is reverse selection switch.
If selection X1 for 3 lines control mode, see below wiring diagram.



3 lines control mode description

There are X1 to X6 programmable digital input terminals in this drive, used F5-16 to F5-21 parameters to express it. Each terminal can be define 41 functions.
In solar pump control mode, 1: FWD Forward command, 5: Emergency stop input (solar pump pause) and 41: Solar control prohibition are popular in using.
When one of X1 to X6 is set for 41 (solar control prohibition), the solar pump control function is disable, and AC drive variable frequency mode is activated, as same as FA.00 set for 0.

FA group parameters for solar pump control

FA-00	Select solar pump control mode	0: variable frequency drive control (AC grid input) 1:CVT (constant voltage tracking) 2: MPPT (maximum power point tracking)	1	2	×
FA-01	Auto/ manual selection	0: Manual by keypad control 1: Automatically running with terminals control 2: RS485 communication	1	0	☆
FA-02	CVT object voltage	0.0~100.0% of Voc	0.1	80.0	☆

FA-00 parameter uses to select AC drive variable frequency control mode or solar pump control. There are two solar pump control modes, which are constant voltage tracking (CVT) and maximum power point tracking (MPPT). MPPT solar pump control mode is default setting.
In very good sunlight radiation area, user can select CVT mode for better frequency stable output, because the DC bus voltage is control target in this mode. FA-02 (CVT object voltage) is used to set target control voltage of DC bus. The suggest value setting is 75% to 90%.

FA-01 Auto/manual switchover selection is use to set control by manual or by auto terminals control. In the first time using after installation, suggesting select FA-01 for 0, drive control by manual with keypad. Once the commissioning is finished and tested well, we can switchover for auto terminal control.
In the auto terminal control mode, one programmable digital terminal from X1 to X6 should set for 1 (forward running control).
Compare to F0-02 parameter setting, this parameter has priority level, and make F5-16 and F5-20 set for 1 (FWD running control) as the same time.
Once X1 short circuit to GND (X1 and GND is ON) or X5 short circuit GND (X5 and GND is ON), the drive system will be work automatically.

FA-03	MPPT control upper limit voltage	0.0~100.0% open loop circuit voltage	0.1	90.0	×
FA-04	MPPT control lower limit voltage	0.0~100.0% open loop circuit voltage	0.1	75.0	×
FA-05	Frequency adjusting gain	1~5000	1	40	×
FA-06	Frequency adjusting allowable deviation	1~5	1	3	×
FA-07	MPPT Control period	0.01~10.00S	0.01	0.30	×

Uses FA-03 and FA-04 to define MPPT upper limit and lower limit voltage. in generally, the default setting 75% to 90% is OK. For 3 phase 380V output control, the MPPT voltage Vmp is 540V, for 3 phase 220V output control, the MPPT voltage Vmp is 310V. the Vmp should be stay during with FA04 to FA03.
FA-05 (Frequency adjusting gain) parameter uses to reflect MPPT performance is quick or slow during operation. If this value is big, the MPPT performance is quickly, and might cause LU fault in bad sunlight condition, if this value set too small, the output frequency might seems a little fluctuation. User can set this value bigger, but not large than 100% in good sunlight condition area. In generally, the default 40% setting is OK.
FA-06 (Frequency adjusting allowable deviation), change this parameters will effect output frequency stability with MPPT function. if change it bigger, the output frequency might seems a little fluctuation. In generally, no need change this parameters.
We suggest user modify FA-05 parameter first, and don't changed FA-06 setting in generally case.

FA-07 parameter uses to limit MPPT searching period. No need to modify in generally case.

FA-08	Dc current correction offset	0.00~50.00A	0.01	0.00	☆
FA-09	Dc current correction gain	0.0~100.0%	0.1	100.0	☆

FA-08 and FA-09 both parameters uses to correct DC output current display.
Because the output DC current is calculating by software, it need parameters to correct it when it not correct.
FA-10 to FA-14 parameters use to set water tank level detecting, it compatible analog signal input.

Fb group parameters for solar pump protection and monitoring

Fb-00	Sleep voltage threshold	0~1000V	1	*	☆
Fb-01	Restore running state voltage threshold	0~1000V	1	*	☆
Fb-02	Awake waiting time	0.0~3000.0S	0.1	120.0	☆

Fb-00~Fb-02 uses to programmed solar pump drive go to dormant state when input DC voltage is low, and wake up automatically when DC bus voltage is raise again.
When the DC voltage lower than Fb-00 set value for a system default time, it will go to stop sleep mode and sent out an alarm with A.Lvo code display in keypad.
When DC bus voltage raises again and higher than Fb-01 value for a Fb-02 setting time, the drive will recover to running state.

Fb-03	Stop frequency when low speed	0.00~300.00Hz	0.01	20.00	☆
Fb-04	stop delay time when reach stop frequency	0.0~3000.0S	0.1	30.0	☆
Fb-05	Automatic recovery time in stop frequency protection mode	0.0~3000.0S	0.1	120.0	☆

If the output frequency is lower than Fb-03 (stop frequency when low speed) for Fb-04 (stop frequency delay time), the solar pump drive will go into stop mode to protection pumps.

Once the output frequency is greater than Fb-03 (stop frequency) for Fb-05(automatic recover time), the drive will recover to running status again If Fb-15 (Alarm action mode) unit's digit is 0 in default setting. If Fb-15 unit's digit is set for 1, need to reset it by press STOP/RESET button by manual.

Fb-06	Dry run protection current threshold (under-load protection)	0.0~100.0A	0.1	1.0	☆
Fb-07	Dry run detect delay time	0.0~3000.0S	0.1	60.0	☆
Fb-08	Automatic recover time in dry run protection mode	0.0~3000.0S	0.1	120.0	☆

If the output current is lower than Fb-05 (Dry run current) for Fb-07 (dry run detect delay time), the drive will go to dry run protection mode.
Once the current is bigger than Fb-07 again for Fb-08 (recover time of dry run), the drive will restore to running status if Fb-15 (Alarm action mode) ten's digit is 0 in default setting.
If Fb-15 ten's digit is set for 1, need to reset it by press STOP/RESET button by manual.

Fb-09	Motor over current protection threshold	0~3000.0A	0.1	*	☆
Fb-10	Over current detect delay time	0.0~3000.0S	0.1	30.0	☆
Fb-11	Automatic recovery time in over current protection mode	0.0~3000.0S	0.1	30.0	☆

Fb-09 to Fb-11 parameters used to set motor over current protection.
If the over current is bigger than Fb-09 for Fb-10 time, the drive will go to stop mode for providing motor protection.
Once the current is lower than Fb-09 for Fb-11 recover time, the drive will recover to work again if the hundred's digit of Fb-15 set for 0 in default.
If Fb-15 hundred 's digit is set for 1, need to reset it by press STOP/RESET button by manual.

Fb-12	Minimum power input protection threshold	0.00~100.00KW	0.01	0.00	☆
Fb-13	Minimum power input detect delay time	0.0~3000.0S	0.1	10.0	☆
Fb-14	Automatic recovery time in minimum power input protection mode	0.0~3000.0S	0.1	10.0	☆

Fb-12 to Fb-15 parameters used to set minimum power input power protection.
When the input power from solar panel is lower than Fb-13 (minimum power input) for Fb-13 time, the drive will be stop.
Once the input power larger than Fb-12 for Fb-14 time, the drive will start working again if thousand's digit of Fb-15 set for 0 in default.
If Fb-15 thousand 's digit is set for 1, need to reset it by press STOP/RESET button by manual.

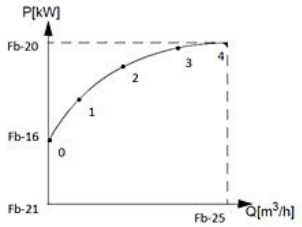
Fb-15	Alarm action mode	0: Sending alarm and automatically rest 1: Reset by manual Unit's digit: Low frequency stop mode Ten's digit: Dry run (under load) Hundred's digit: Motor over current protection Thousand's digit: Minimum power input protection	1	0000

Fb-15 uses to set low frequency stop mode, dry run mode, motor over current and minimum input power protection, etc 4 kinds protection mode if set by automatically or manual.
Fb-16 to Fb-29 parameters provide flow calculation from PQ curve programming.

Flow calculation

The flow calculation function provides a reasonably accurate calculation of the flow without the installation of a separate flow meter. The function defines the flow estimate using the pump performance curve and drive actual load. The PQ (power/flow) performance curve enables calculating the flow output from the pump. The performance curve is provided by the pump manufacturer. The user saves five operating points (P,Q) of the performance curve to drive parameters.

PQ curve



The solar pump drive records and stores the flow rate on each day and provides the required data for current day and current year.

Note:

- Do not use the flow calculation function outside the normal operating range of the pump.
- Do not use the flow calculation function for invoicing purposes.
- Ensure that power and flow points are in incremental order with non-zero values.

Fb-16 to Fb-20 use to define input power of pump at points 1...5 on the PQ performance curve.
Fb-21 to Fb-25 use to define flow rate at points 1...5 on the PQ curve respectively.

Fb-27	Flow measured offset	0.00~1000.0m³/h	0.1	0.0	☆
Fb-28	Flow measured gain	0.0~100.0%	0.1	100.0	☆
Fb-29	Cumulative flow/ generated energy reset setting	0: No operation 1: Flow reset 2: Generated energy reset 3: Both flow and generated energy reset	0	0	×

Fb-27 and Fb-28 use to correct flow calculating for difference pumps.
Fb-29 used to cumulative low and generated energy reset.

d-00	Current output frequency	0.01Hz
d-01	Current output voltage	1V
d-02	Current output current	0.1A
d-05	DC bus voltage value	1V
d-26	DC bus current	0.01A
d-32	Input power	0.01KW

Note. Press the Shift button of keypad can display d-00, d-01,d-02, d-05, d-26, d-32, etc 6 common monitoring parameters in circulation.

d-25	Open circuit voltage	1V
d-27	MPPT tracking voltage	0.1%
d-28	Calculate flow rate	0.1m3/h
d-29	Today flow	0.1m3
d-30	Cumulative flow 1	0.1m3
d-31	Cumulative flow 2	1Km3
d-32	Input power	0.01KW
d-33	Today generated energy	0.1KWH
d-34	Cumulative generated energy 1	0.1KWH
d-35	Cumulative generated energy 2	1MWH
d-36	Working status	1
d-37	Rated voltage of Drive	1V
d-38	Rated current of Drive	0.1A
d-39	Software version	

User also can learn solar drive working status from above list. See the flow calculating from d-28 to d31 parameters, see the generated energy from d33 to d35.
User also can check the solar drive working status from D-36. 0: Stop, 1: Running, 2: low voltage sleep mode, 3: stop mode under low frequency, 4: Dry run protection function, 5: motor over current protection, 6: Minimum power input protection.

Chapter9. Troubleshooting and Countermeasures

The below table listed DLP1 sereis solar pump drive all types of faults possibly occurs. Before contacting manufacturer for technical support, you can first determine the fault type through following table description and records your done treating process and phenomena. if the fault can not be resolved, please seek for the manufacturer service support.

Troubleshooting table

Fault code	Fault description	Possible reason	Countermeasures	Address
E. SC	Output short circuit	1:Output short circuit or grounding short circuit 2: The load too heavy	1.Check the output connection 2. seek for service support	01H
E. OC1	Over current in acceleration	1. Acceleration time is too short 2. too high torque boost or VF curve setting is not correct	1. Extend the acceleration time 2. low the torque boost voltage, and adjust the V/F curve.	02H
E. OC2	Over current in deceleration	The deceleration time is too short	Extend the deceleration time	03H
E.OC3	Over current in running	The load changed suddenly or fluctuation is too big	Reduce the load fluctuation	04H
E.OC4	Soft ware over current	As same as E.OC1，E.OC2，E.OC3 description	As same as E.OC1，E.OC2，E.OC3	05H
E.232.	Inner communication fault	Hardware problem	Seek for manufacturer support	06H
E.Gnd	Grounding fault	1: Output grounding of motor or drive, 2: Input and output connection of drive	1. Check the connection 2. check the motor if aging or insulation is not good	07H
E.OU1	Over voltage in acceleration	1.Input voltage is too high 2. Power supply open and close frequently	Check the Dc input voltage or AC grid condition	08H
E. OU2	Over voltage in deceleration	1.Deceleration time is too short 2. Input voltage is abnormal	1.Extend deceleration time 2. Check the input voltage 3. Install braking unit or resistor	09H
E.OU3	Over voltage in running	1. Power supply is abnormal 2. load feedback energy	1. Check the voltage of power supply 2. Install braking unit or resistor	0AH
E. UL	Under voltage	1. Output connection is loss 2. Load suddenly missing	1. Check the output wiring 2. Check the drive load	0EH
E.OL1	Over load of drive	1. Load is too big 2. Acceleration is too short 3.Torque boost voltage is high, and VF curve is not properly 4.Input voltage is too low	1. reduce the load or change bigger power drive for instead 2. Extend the acceleration time 3. Low the torque boost voltage, and adjust the V/F curve. 4. Check the grid voltage	0FH
E.OL2	Motor overload	1. The load is too big 2. Acceleration time is too short 3. Protection coefficient setting is is too small 4. Torque boost voltage is high, and VF curve is not properly	1. reduce the load 2. Extend the acceleration time 3. Low the torque boost voltage, and adjust the V/F curve. 4.set the motor protection coefficient bigger	10H
E.CUr	Current detect is correct	1. Current detect parts or circuit is problem 2. Auxiliary power supply has problem	Seek for manufacturer support	11H
E. LU	Under voltage	1. Power supply voltage is abnormal 2. power supply is fluctuation	1. check the power supply 2. separate power supply 3. added the solar panel to increase Dc voltage input.	12H
E.EF1	External equipment normal open terminal fault	External fault input terminal of the drive signal input	Check the signal source and related equipment	13H
E.EF2	External equipment normal close terminal fault	External fault input terminal of the drive signal input	Check the signal source and related equipment	14H
E.OH	Drive over heat	1. duct obstruction 2. The ambient temperature is too high 3. Fan damage	1. Clean the duct or improved ventilation 2. Reduce the carrier frequency 3. Replace the fan	15H
E.SP1	Input phase loss	1. Input voltage phase loss 2. Input voltage is too low	1. Check the connection 2. Check power supply of phase loss	16H
E.SP0	Output phase loss	The connection between drive and motor is broken	Check the wiring	17H
E.EEP	Memory fault	Hard ware problem	See for support	18H
E.End	Running time is reached	The allowable running time setting is reach	Contact vendor	19H
E. PID	PID feedback fault	1. PID feedback single is broken 2. sensor has problem 3. feedback signal parameters setting is not correct	1. Check the feedback channel 2. Check whether the fault sensor 3. Verify the feedback signal meets the set requirements	1AH
E.485	RS485 communication fault	Send and receive data error occurs in serial communication	1. Check the connection 2. Seek for support	1BH
E.doG	EMC interference	Since the ambient electromagnetic interference caused by malfunction	Install the absorb circuit	1CH
E.232	Inner upper communication fault	Hardware problem	Seek for support from vendor	1DH

Note:

The series drive records the latest three times fault occurs code and output parameters of drive when latest fault occurs. Query information to help find the cause of the fault.