



DP3F series closed loop stepping driver

User manual

Wuxi Xinje Electric Co., Ltd.

Data No. D3C05 202001215 1.0

Basic description

- ◆ Thank you for purchasing Xinje DP3F series stepping driver. Please read this product manual carefully before operating.
- ◆ The manual mainly provides the user with relevant guidance and instructions for the correct use and maintenance of the step driver. The manual involves the function, use method, installation and maintenance of the step driver.
- ◆ The contents described in the manual are only applicable to Xinje's DP3F series stepping driver products.

Notice to user

This manual is applicable to the following personnel:

- ◆ The installation personnel of stepper driver
- ◆ Engineering and technical personnel (electrical engineers, electrical operators, etc.)
- ◆ The designer

Before operating or debugging the stepper driver, the above personnel should carefully read the safety precautions section of this manual.

Statement of responsibility

- ◆ Although the contents of the manual have been carefully checked, errors are inevitable and we can not guarantee that they are completely consistent.
- ◆ We will always check the contents of the manual and make corrections in subsequent versions. We welcome your comments.
- ◆ The contents described in the manual are subject to change without prior notice.

Contact us

If you have any questions about the use of this product, please contact the agent and office that purchased the product, or contact Xinje company directly.

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1. Product introduction

1-1. Model naming rule

Take DP3F-705 as an example:

$$\begin{array}{ccc} \text{DP3F} & - & \text{70} & \text{5} \\ \hline \text{①} & & \text{②} & \text{③} \end{array}$$

- ① : DP3F series closed loop stepping driver
- ② : Driver output maximum peak current 7A
- ③ : The maximum supply voltage of the driver is 50VDC

1-2. Performance

- The encoder is used as position feedback, which can compensate the position deviation in real time, and solve the problem of losing step of traditional stepping motor
- The current can be adjusted in real time according to the load and speed, so that the operation is more stable and the motor heating is lower
- Compared with the open-loop stepping, the high-speed performance of the motor is significantly improved
- The pulse and direction input voltage supports 5V and 24V, which can be set by sliding switch
- 4-bit DIP switch, 16 levels subdivision can be set to meet the needs of most customers
- The rotation direction of the motor can be changed by switch
- It has power on auto-tuning function, can be set by switch
- It supports single and double pulse mode, can be set by switch
- Support smoothing time, can be set by switch and convenient for debugging and improves the stability of motor operation
- Two digital input signals: enable signal input and alarm clear signal input
- Three digital output signals: alarm signal output, in place /Z signal output, brake signal output
- It has over-current, over-voltage, rotation blocking detection, out of step compensation and other protection functions

1-3. Application field

It is suitable for all kinds of small and medium-sized automation equipment and instruments, such as engraving machine, stripping machine, marking machine, cutting machine, laser machine, plotter, medical equipment, CNC machine tool, automatic assembly equipment, electronic processing equipment, etc.

1-4. Electric features

Model	DP3F-305	DP3F-705	DP3F-808
Input power supply (VDC)	20~50	20~50	20~80
Output peak current (A)	1~3	1~7	1~8.4
Matched motor (base)	42	57/86	86
Step pulse frequency (KHz)	24V signal 200K, 5V differential signal 500K		
Control signal input voltage (VDC)	5/24 (Sliding switch setting)		

Model		DP3F-305	DP3F-705	DP3F-808
Using environment	Using location	Try to avoid dust, oil mist and corrosive gas		
	Ambient temperature	0°C~50°C		
	Max working temperature	60°C		
	Humidity	40%~90% RH (No condensation or water droplets)		
	Vibration	5.9m/s ² Max		
	Storage temperature	-20°C~65°C		

1-5. Safety precautions

- (1) The drive must be installed and operated by professional technicians!
- (2) The input voltage of the driver must meet the technical requirements!
- (3) It is strictly forbidden to plug the strong current terminal of the driver when the power is on. When the motor stops, there is still a large current flowing through the coil. Plug the strong current terminal will produce a huge instantaneous induced electromotive force, which will burn the driver!
- (4) Before power on, please ensure the correctness and firmness of power cable, motor cable and signal cable connection!
- (5) Avoid electromagnetic interference!

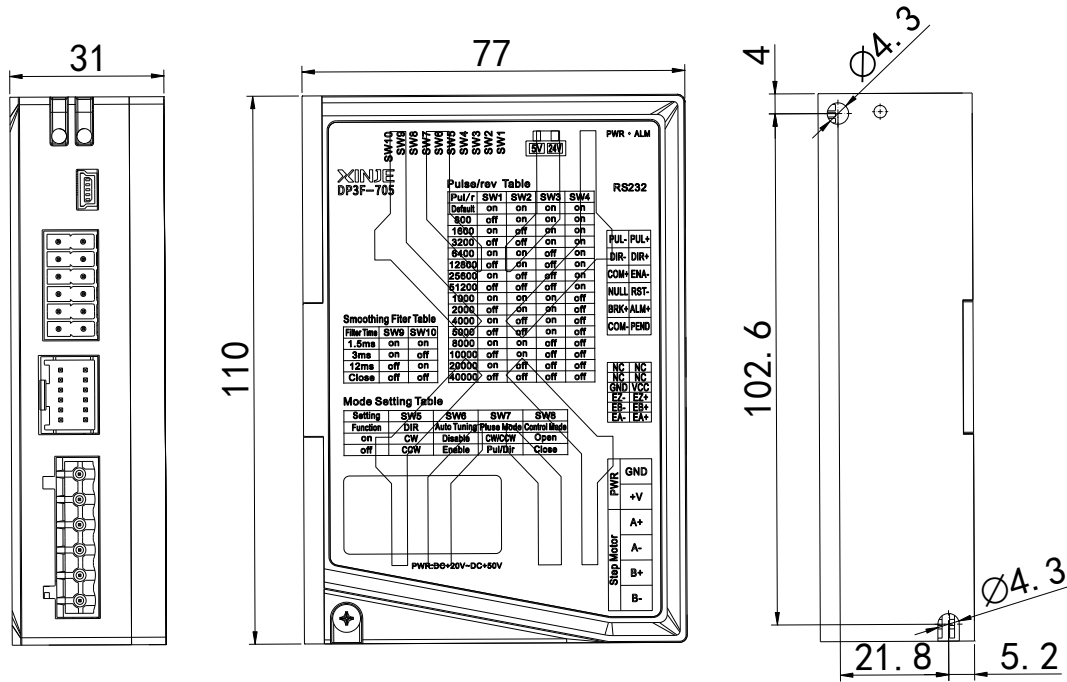
2. Installation and wiring

2-1. Installation

2-1-1. Outline dimension

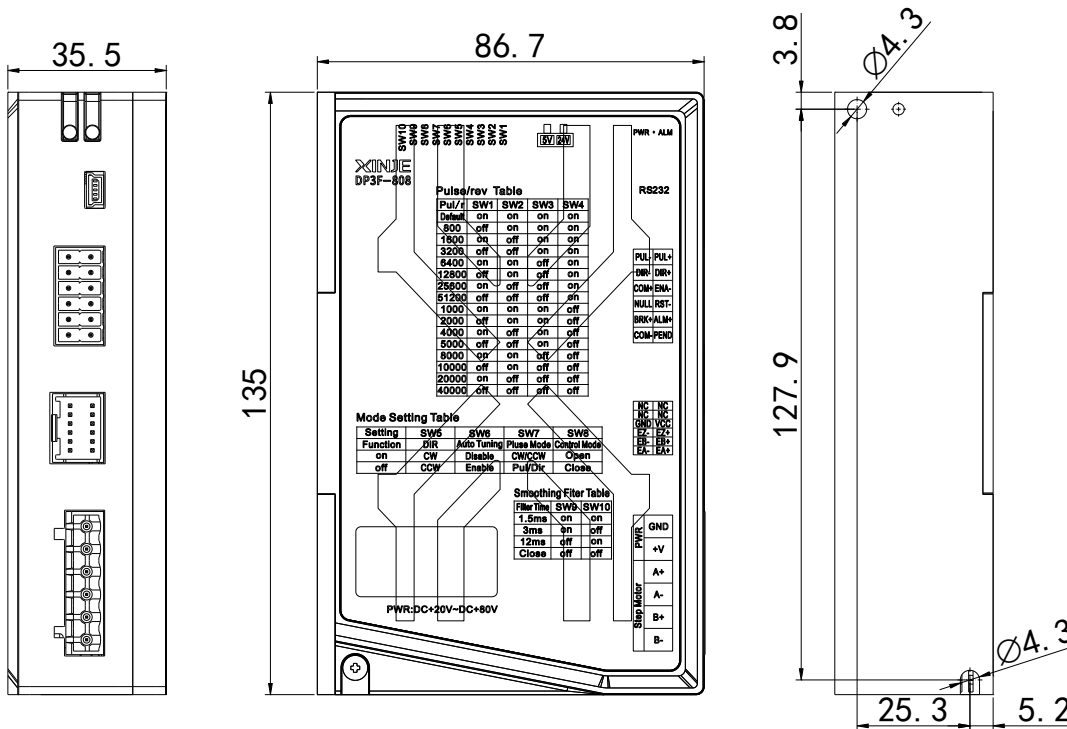
- DP3F-305, DP3F-705

Unit: mm



- DP3F-808

Unit: mm

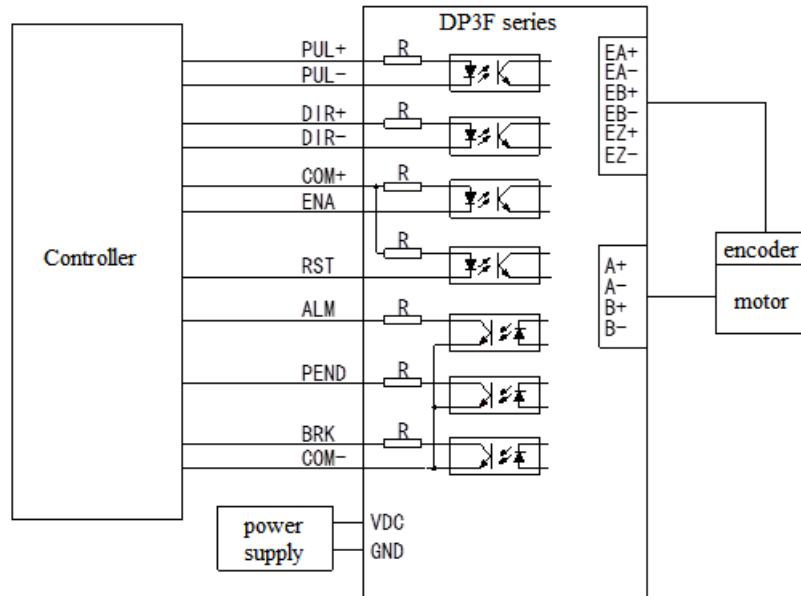


2-1-2. Installation environment

The reliable working temperature of the driver is usually within 60°C and that of the motor is within 80°C. To ensure that the driver works within the reliable working temperature range, the driver should be installed in the electric cabinet with good ventilation and proper protection. If necessary, a fan should be installed near the driver for forced heat dissipation. Avoid being used in dust, oil mist, corrosive gas, high humidity and strong vibration.

2-2. Wiring

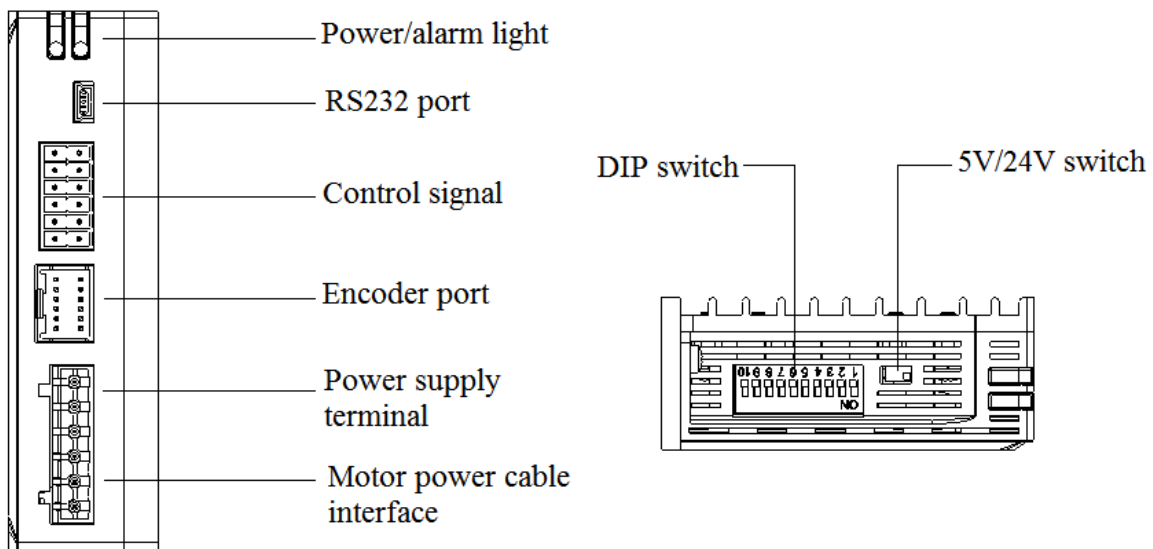
2-2-1. Typical wiring diagram



2-2-2. Wiring notice

- (1) The pulse and direction signal cables and motor cables are not allowed to be bound side by side, and it is better to separate them at least 10cm, otherwise it is easy to interfere with the pulse direction signal, resulting in inaccurate motor positioning, system instability and other problems.
- (2) If a power supply supplies multiple drives, parallel connection should be adopted at the power supply, and chain connection from one to another is not allowed.
- (3) It is strictly forbidden to connect the wire head to the terminal after adding tin, otherwise the terminal may be damaged due to overheating due to increased contact resistance.
- (4) The wiring head should not be exposed outside the terminal to prevent accidental short circuit from damaging the driver.

3. Driver interface



3-1. Status indicator and troubleshooting

The green LED is the power indicator. When the driver is powered on, the LED is always on; When the drive is powered off, the LED goes out.

The red LED is the fault indicator. When there is a fault, the indicator will flash continuously, then stop for one second, and then flash continuously. When the fault is cleared by the user, the red LED is always off.

The continuous flashing times of red LED represent different fault information, and the specific relationship is shown in the table below. The alarm output terminal outputs high level.

Flashing times	Fault	Solution
1	Over current or short circuit	Check the power cable for short circuit
2	Over voltage	Check whether the power supply voltage is too high
3	Under voltage	Check whether the power supply voltage is too low
4	Motor open circuit or poor contact	Check whether the power cable is well installed or broken
5	Position over limit	Check whether the encoder cable is broken, check whether the motor is blocked, and increase the acceleration time appropriately

Note: since the driver does not have the function of reverse connection protection of positive and negative poles of power supply, please confirm that the wiring of positive and negative poles of power supply is correct again before power on. The reverse connection of positive and negative poles will burn out the safety tube in the driver.

3-2. Upper computer communication interface

The definition of RS232 interface pin arrangement is as follows:

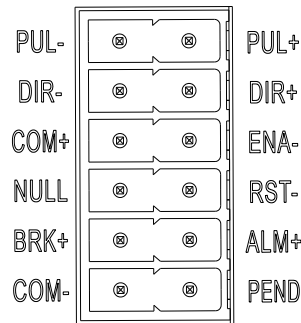
Pin	Function	Note
1	VCC	Power supply +
2	WT	Data write
3	WR	Data read

4	ID	Vacant
5	GND	Power supply ground

Note: the upper computer can set the subdivision and other functions. When SW1-SW4 are all on, the upper computer can set the subdivision, please power on again after setting. Other switch status is subject to dialing setting.

3-3. Control signal interface

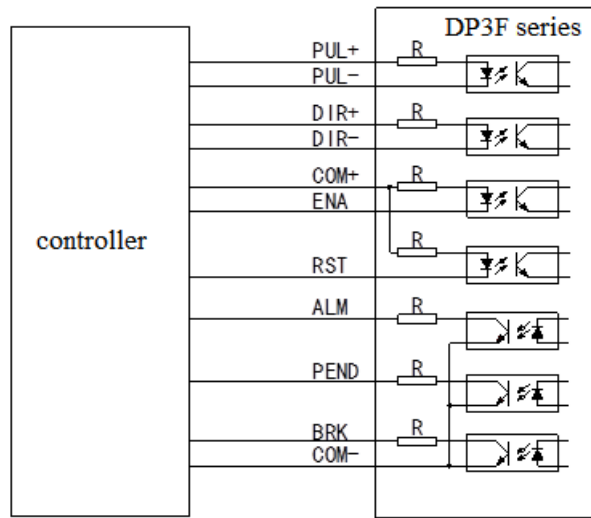
3-3-1. Function



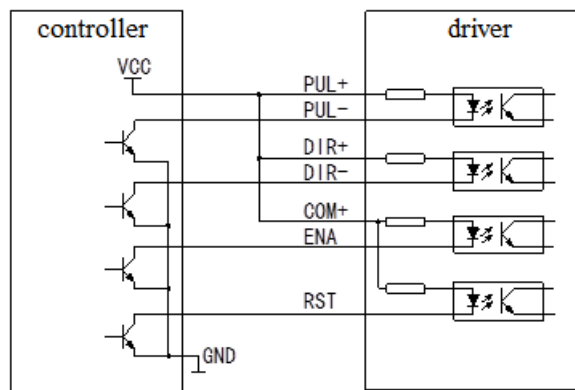
Signal	Function	Explanation
PUL+	Pulse control signal	The 5/24 VDC pulse input signal can be selected by dialing code, and the pulse edge can be changed through the upper computer according to the demand. The rising edge is valid by default. (!!! Note: the input of 24V signal will damage the input terminal when 5 V is selected.)
PUL-		
DIR+	Direction control signal	
DIR-		
ENA-	Enable input signal	Two channels of input signal, support 24V signal
RST-	Alarm clearing input signal	
COM+	Input signal common terminal	
ALM+	Alarm output signal	Three output signals, maximum saturation output 50 mA, maximum 24 VDC. Pend+/Z terminal default is in place signal, the customer can modify the in place signal to Z signal through the upper computer according to the demand.
Pend+/Z	In place/Z signal output	
BRK+	Brake output signal	
COM-	Output signal common terminal	

3-3-2. Control signal circuit

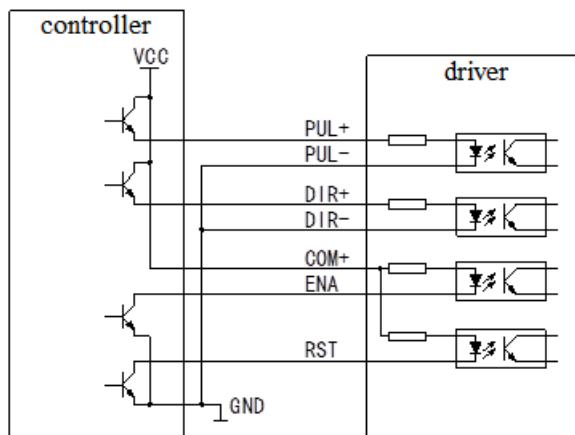
Control signal input and output circuit diagram, as shown in the figure below:



Differential mode input

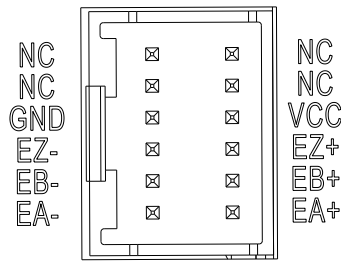


Input single ended common anode connection method



Input single ended common cathode connection

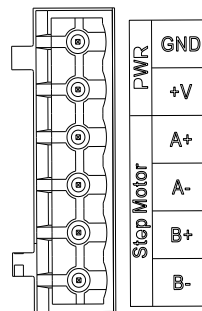
3-4. Encoder signal input terminal



Pin	Name
NC	Reserved
NC	Reserved
NC	Reserved
NC	Reserved
VCC	5V power output, provided by driver, only used for encoder power supply
GND	
EZ+	Encoder Z phase signal +
EZ-	Encoder Z phase signal -
EB+	Encoder B phase signal +
EB-	Encoder B phase signal -
EA+	Encoder A phase signal +
EA-	Encoder A phase signal -

3-5. Motor and power supply interface

3-5-1. Strong current interface function



Interface	Function	Explanation
A+, A-	Motor phase A coil	Cannot change direction by exchanging A+, A-
B+, B-	Motor phase B coil	Cannot change direction by exchanging B+, B-
GND	DC power supply ground	DC power supply ground
+V	DC power supply positive pole	Select the voltage according to the demand

Note:

DP3F-305 range is 20~50VDC: recommended value is 24~36VDC.

DP3F-705 range is 20~50VDC: recommended value of 57 motor is 24 ~ 36VDC, recommended value of 86

motor and high-speed application is 48V.

DP3F-808 range is 20~80VDC: recommended value is above 48V.

3-5-2. Power supply requirements

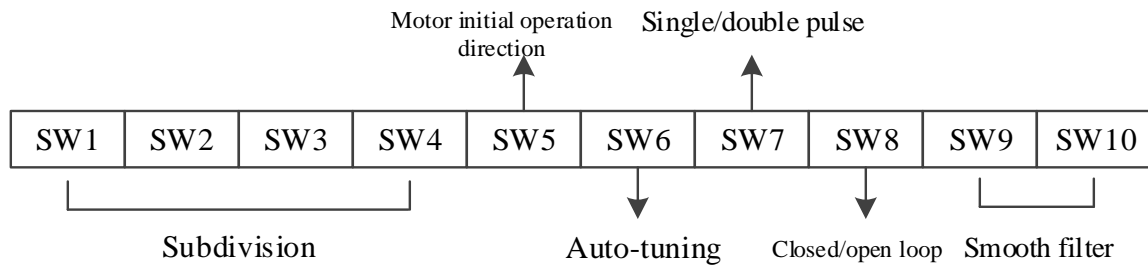
The power supply voltage can work normally within the calibration range. The driver should preferably use non-regulated DC power supply, or use transformer + bridge rectifier + capacitor filter. It is recommended that users use 24V-48VDC power supply to avoid grid fluctuation exceeding the working range of driver voltage. If the regulated switching power supply is used, the switching power supply output current range should be set to the maximum.

Note:

- (1) Do not reverse the power supply voltage!
- (2) Do not exceed the working range of the power supply to ensure the normal operation of the driver.
- (3) The power supply should be non-regulated DC power supply, and the output capacity of the power supply should be greater than 60% of the set current of the driver.
- (4) If the stabilized voltage switching power supply is used for power supply, the output current range of the power supply should be greater than the working current of the motor.
- (5) In order to save space, two or three drives can share one power supply, but the power supply should be large enough.

4. DIP switch

DP3F series drivers adopt 10 digit DIP switch to set subdivision precision and driver related function settings. Detailed description is as follows:

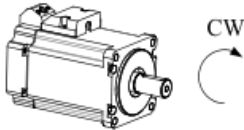
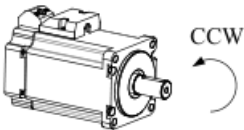


4-1. DIP switch functions

SW1-SW4 is used for subdivision setting, as shown in the following table:

Step	SW1	SW2	SW3	SW4
Default, set by upper computer (4000)	On	On	On	On
800	Off	On	On	On
1600	On	Off	On	On
3200	Off	Off	On	On
6400	On	On	Off	On
12800	Off	On	Off	On
25600	On	Off	Off	On
51200	Off	Off	Off	On
1000	On	On	On	Off
2000	Off	On	On	Off
4000	On	Off	On	Off
5000	Off	Off	On	Off
8000	On	On	Off	Off
10000	Off	On	Off	Off
20000	On	Off	Off	Off
40000	Off	Off	Off	Off

The specific functions of SW5-SW10 are as follows:

Switch	Function	ON	OFF
SW5	Initial direction selection of motor	CW (face the shaft end) 	CCW (face the shaft end) 
SW6	Power on auto-tuning	The driver parameters are not automatically set when the power is on	When the power is on, the driver parameters are automatically set

Switch	Function	ON	OFF
SW7	Control signal pulse mode	Double pulse (CW/CCW)	Pulse+ direction
SW8	Open/closed loop	Open loop	Closed loop
SW9 SW10	Smooth filter	1.5ms, 3ms, 12ms instruction filtering time can be set in combination	
		Smooth time	SW9 SW10
		Set by the upper computer (default 1.5ms)	ON ON
		3ms	ON OFF
		12ms	OFF ON
		Shut down the filter	OFF OFF

4-2. 5V/24V switch

DP3F can select the 5V/24V pulse and the direction input level through this switch. The default is 24V.

Function	Description
5V	The input level of pulse direction is 5V
24V	The input level of pulse direction is 24V

Note: according to the actual needs, the state of the slide switch should be set correctly to avoid the damage of the port.

5. Driver parameters

DP3F series driver parameters can be set by PC. The driver has a set of best default configuration parameters corresponding to the motor, which does not need to be adjusted normally. Refer to the table below for specific parameters and functions.

Group P0: basic function

Parameter	Address	Function	Range	Default	Note
P0-01	0x0001	Subdivision	200~51200	4000	Subdivision switch takes effect when all on, and the rest of the switch status is subdivision setting
P0-02	0x0002	Pulse filter	1~240	30	Filter switch takes effect when all on, and the rest of the switch status is filter setting
P0-03	0x0003	Closed loop current percentage	1~100	100	Maximum current percentage in closed loop mode Maximum current in closed loop mode= Percentage of closed loop current % × peak current
P0-04	0x0004	Internal pulse	0~1	0	Internal pulse operation mode: 0: external pulse; 1: internal pulse
P0-05	0x0005	Open loop current percentage	1~100	50	Operating current in open loop mode = Percentage of open loop current % × peak current
P0-06	0x0006	Open/closed loop mode	0~1	1	0: open loop mode; 1: closed loop mode
P0-07	0x0007	Pulse edge	0~1	0	0: rising edge; 1: falling edge
P0-08	0x0008	Pulse mode	0~1	1	0: double pulse; 1: pulse + direction
P0-09	0x0009	Closed loop holding current percentage	1~100	50	Percentage of holding current in closed loop mode Closed loop holding current = Percentage of closed loop holding current % × Maximum current in closed loop mode

Group P1: gain control parameters

Parameter	Address	Function	Range	Default	Note
P1-00	0x0100	Auto-tuning	0~1	1	0: off; 1: on
P1-01	0x0101	Current Kp	1~65535	1500	
P1-02	0x0102	Current Ki	1~65535	400	
P1-03	0x0103	Current kd	0~65535	0	
P1-04	0x0104	Current Kc	0~65535	0	
P1-05	0x0105	Speed Kp	1~65535	60	
P1-06	0x0106	Speed Ki	0~65535	0	
P1-07	0x0107	Position Kp	1~65535	2200	

P1-08	0x0108	Position Ki	0~65535	500	
P1-09	0x0109	Back EMF	1~300	50	
P1-10	0x010A	Weak magnetic coefficient	1~100	20	
P1-11	0x010B	Inductance	1~10000	1000	
P1-12	0x010C	Startup delay	1~10	1	
P1-13	0x010D	In place delay	0~100	3	
P1-14	0x010E	In place error	0~100	4	

Group P2: IO configuration parameters

Parameter	Address	Function	Range	Default	Note
P2-00	0x0200	Motor enable	0~1	0	0: not enable 1: enable
P2-01	0x0201	Z phase output	0~1	0	0: high level 1: low level
P2-02	0x0202	Alarm output	0~1	0	0: high level 1: low level
P2-03	0x0203	Brake output	0~1	0	0: high level 1: low level
P2-04	0x0204	In place output	0~1	0	0: high level 1: low level
P2-05	0x0205	Alarm clear	0~1	0	0: high level 1: low level

Group P3: protection function parameters

Parameter	Address	Function	Range	Default	Note
P3-00	0x0300	Tracking error limit	1~65535	4000 (1 turn)	
P3-01	0x0301	Fault detection selection	0~65535	255	
P3-02	0x0302	Under voltage alarm threshold	0~20	0	When the default value is 0, the alarm is shielded

Group P4: motor parameters

Parameter	Address	Function	Range	Default	Note
P4-00	0x0400	peak current	305: 1~30 705: 1~70 808: 1~84	305: 25 705: 60 808: 74	0.1A
P4-01	0x0401	Encoder resolution	200~20000	4000	Quadruple frequency, modification not supported
P4-02	0x0402	Operation direction	0~1	0	0: counter clockwise; 1: clockwise

Group P5: self-operation parameters

Parameter	Address	Function	Range	Default	Note
P5-00	0x0500	Self-operation mode	0~1	0	0: infinite pulse 1: set pulse
P5-01	0x0501	Pulse high byte	0~65535	0	
P5-02	0x0502	Pulse low byte	0~65535	4000	Pulse number = pulse high byte×65535+pulse low byte
P5-03	0x0503	Speed	0~2000	200	rpm
P5-04	0x0504	Acceleration	1~2000	200	rpm/s

		speed			
P5-05	0x0505	Direction	0~1	0	0: counter clockwise; 1: clockwise
P5-06	0x0506	shuttle run	0~1	0	0: single direction 1: double direction
P5-07	0x0507	Repeat	0~2	0	0: not repeat 1: repeat times 2: always repeat
P5-08	0x0508	Repeat times	0~65535	0	
P5-09	0x0509	Repetition interval	0~65535	1000	ms
P5-10	0x050A	Startup speed	0~2000	200	rpm
P5-11	0x050B	Stop speed	0~2000	200	rpm
P5-12	0x050C	Operation status	0~3	0	0: idle 1: run 2: deceleration stop 3: emergency stop

Group P7: communication parameters

Parameter	Address	Function	Range	Default	Note
P7-00	0x0700	Driver station no.	1~100	1	
P7-01.0	0x0701.0~1	Baud rate	03: 2400 04: 4800 05: 9600 06: 19200 07: 38400 08: 57600 09: 115200 0A: 192000 0B: 256000 0C: 288000	06	Default 19200bps, 1 stop bit, even parity
P7-01.2	0x0701.2	Stop bit	0: 2 bits 2: 1 bit	2	
P7-01.3	0x0701.3	Parity bit	0: no parity 1: odd parity 2: even parity	2	
P7-02	0x0702	Communication protocol	0~1	1	1: Modbus, 0: others
P7-03	0x0703	Reserved	1~65535	1	
P7-04	0x0704	Reserved	1~65535	1	

Group U0

Parameter	Address	Content		Note
U0-00	0x1000	Set speed		rpm
U0-01	0x1001	Feedback speed		rpm
U0-02	0x1002	Encoder quantity	0~15 bits	Encoder pulse
U0-03	0x1003		16~31 bits	
U0-04	0x1004		32~47 bits	
U0-05	0x1005		48~62 bits, 63: direction bit	
U0-06	0x1006	Feedback pulse numbers	0~15 bits	Command pulse

Parameter	Address	Content		Note
U0-07	0x1007		16~31 bits	
U0-08	0x1008		32~47 bits	
U0-09	0x1009		48~62 bits, 63: direction bit	
U0-10	0x100A	Pulse numbers	0~15 bits	Command pulse
U0-11	0x100B		16~31 bits	
U0-12	0x100C		32~47 bits	
U0-13	0x100D		48~62 bits, 63: direction bit	
U0-14	0x100E	Position offset	0~15 bits	Command pulse
U0-15	0x100F		16~31 bits	
U0-16	0x1010	Single turn encoder counting value	0~15 bits	Encoder pulse
U0-17	0x1011		16~31 bits	
U0-18	0x1012	Single turn pulse counting value	0~15 bits	Command pulse
U0-19	0x1013		16~31 bits	
U0-20	0x1014	Pulse turns	0~15 bits	
U0-21	0x1015		16~31 bits	
U0-22	0x1016	Encoder turns	0~15 bits	
U0-23	0x1017		16~31 bits	
U0-24	0x1018	Feedback electric angle		
U0-25	0x1019	Set electric angle		
U0-26	0x101A	A phase feedback current		mA
U0-27	0x101B	B phase feedback current		mA
U0-28	0x101C	Reference feedback current		mA
U0-29	0x101D	A phase set current		mA
U0-30	0x101E	B phase set current		mA
U0-31	0x101F	Reference set current		mA
U0-32	0x1020	Bus voltage		V

Group U1 monitor parameters

Parameter	Address	Content	Note
U1-00	0x1100	Present alarm code	
U1-01	0x1101	Phase A current when alarm occurs	
U1-02	0x1102	Phase B current when alarm occurs	
U1-03	0x1103	Reference current when alarm occurs	
U1-04	0x1104	Bus voltage when alarm occurs	
U1-05	0x1105	Position offset when alarm occurs	
U1-06	0x1106	Speed when alarm occurs	
U1-07	0x1107	The time when alarm occurs	0~15 bits
U1-08	0x1108	The time when alarm occurs	16~31 bits
U1-09	0x1109	Error numbers for this time operation	
U1-10	0x110A	Latest 2nd alarm code	
U1-11	0x110B	Latest 3rd alarm code	
U1-12	0x110C	Latest 4th alarm code	
U1-13	0x110D	Latest 5th alarm code	
U1-14	0x110E	Latest 6th alarm code	

Group U2 monitor parameters

Parameter	Address	Content	Note
U2-00	0x1200	Power on times	
U2-01	0x1201	Machine type	
U2-02	0x1202	Series	
U2-03	0x1203	Model	
U2-04	0x1204	Firmware generation date	Year
U2-05	0x1205	Firmware generation date	Month
U2-06	0x1206	Firmware generation date	Day
U2-07	0x1207	Software version	
U2-08	0x1208	Hardware version	
U2-09	0x1209	Power on operation time	Hour
U2-10	0x120A	Power on operation time	Minute
U2-11	0x120B	Power on operation time	Second
U2-12	0x120C	Device serial number	0~15 bits
U2-13	0x120D	Device serial number	16~31 bits
U2-14	0x120E	Firmware generation date	Year
U2-15	0x120F	Firmware generation date	Month /day
U2-16	0x1210	Firmware generation date	Hour /minute

6. Common troubleshooting

Fault	Reason	Solution
The power light doesn't work	Power supply system error	Check the power supply circuit
	Low supply voltage	Increase the power supply voltage
The motor doesn't work	The current setting is too small	Set suitable current
	The subdivision is too large	Set suitable subdivision
	Protection circuit action	Power on again
	Release signal is low	Do not connect this signal
	Not power on	Power on again
	Motor wiring error	Check the wiring
	No pulse signal input	Check the pulse cable and signal voltage
Motor direction is error	Line failure	Check the circuit
Alarm light is on	Motor cable connection error	Wiring again
	Voltage too high or too low	Adjust the power supply voltage
	Motor or driver damaged	Check the motor and driver
Motor torque is small	Acceleration is too fast	Decrease the acceleration value
	The model selection is not suitable	Select the model again

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