MV810A Series AC Drive for Air Compressors

User Manual

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Shenzhen Megmeet Electrical Co., Ltd. provides comprehensive technical support for our valued customers. Please contact your nearest Megmeet office or service center, or connect directly with Megmeet headquarters if any assistance is needed.

Address: 5th Floor, Block B, Unisplendour Information Harbor, Langshan Road, Nanshan District, Shenzhen, 518057, China
Website: www.megmeet.com
Tel: +86-755-86600500
Fax: +86-755-86600562
Service email: driveservice@megmeet.com

Foreword

Thank you for choosing Megmeet MV810A Series AC Drive for Air Compressors.

MV810A Series AC Drive for Air Compressors is specially engineered for the air compression application based upon the MV800 new-generation general-purpose vector control platform, which integrates the air-compressor-specific control logic, signal interface, power supply phase-sequence detection, and phase loss protection in one model, ensuring the overall safety and reliability of the air compression system operations.

Bearing the MV800 legacy of high vector-control performance and structural design excellence, this industry-specific MV810A series delivers superb compatibility in synchronous/asynchronous compressor control, and provides wide-ranging functionality, such as two-channel temperature detection of the air compression system, two-channel heat dissipation fan current detection via the current transformer, external 24 V DC power supply, electromagnetic valve control, multi-function terminals, and 485 communication signal. This series also provides a built-in air-compressor control logic which simplifies the electrical system design and optimizes the system cost efficiency by eliminating the necessity of PLC units, greatly elevating the robustness and reliability of the air compression system.

MV810A AC drive offers preset logic signal functions, configured before leaving the factory, to facilitate the on-site commissioning. To enable the functions, the user can perform compressor motor parameter tuning via the host device software and the USB Type-C port of the drive.

Unboxing inspection

When unboxing the product, please make sure to check the following:

- whether there is any damage;
- whether the rated values on the nameplate are the same with the requirements of the order.

Our company has implemented strict inspection on the product's manufacturing and packaging. If there is still any error, please contact us or the local distributor.

We are engaged in the continuous improvement of our drive products. The relevant manuals provided by us are subject to changes without notice.

Safety precautions

DANGER	Indicates that failure to comply with the notice can result in death or severe personal injuries.

WARNING Indicates that failure to comply with the notice may result in moderate or minor personal injuries, or property damages.

DANGER

- Install the product on incombustible materials such as metal. Failure to comply will result in a fire
- Do not install the product near combustible objects. Failure to comply will result in a fire.
- Do not install the product in places with explosive gases. Failure to comply will result in explosion.
- The wiring work must be carried out by sufficiently qualified personnel. Otherwise, there is a risk of electric shock.
- Before wiring, make sure that the power supply input is completely cut off. Otherwise, there is a risk of electric shock.
- Make sure to reliably ground the drive. Otherwise, there is a risk of electric shock.
- Properly install the covers of the drive enclosure before power on. Otherwise, there is a risk of electric shock or explosion.
- When powering on a drive product that has been idle/stored for more than 2 years, employ a voltage regulator to gradually turn up the input voltage to the required level. Otherwise, there is a risk of electric shock or explosion.
- Do not touch any terminals with bare hands when the drive is powered on. Otherwise, there is a risk of electric shock.
- Do not operate the drive with wet hands. Otherwise, there is a risk of electric shock.
- Before maintenance, make sure the drive has been powered off for at least 10 minutes, and that the charging indicator is completely off or the bus negative/positive voltage is below 36 V. Failure to comply will result in an electric shock.
- Parts/Components replacement must be carried out by sufficiently qualified personnel. Do not leave any wire residue or foreign metal inside the drive. Failure to comply will result in a fire.
- In case any control board of the drive product is replaced, make sure to reset the parameters properly before restarting the drive. Otherwise, there is a risk of equipment/property damage.
- The bare parts of the terminal lugs in the main circuit must be properly wrapped with insulation tapes. Otherwise, electric shock may occur.

WARNING

- When handling the drive product, protect the operating panel and the covers against any stress to avoid falling off. Failure to comply may result in personal injuries or property damage.

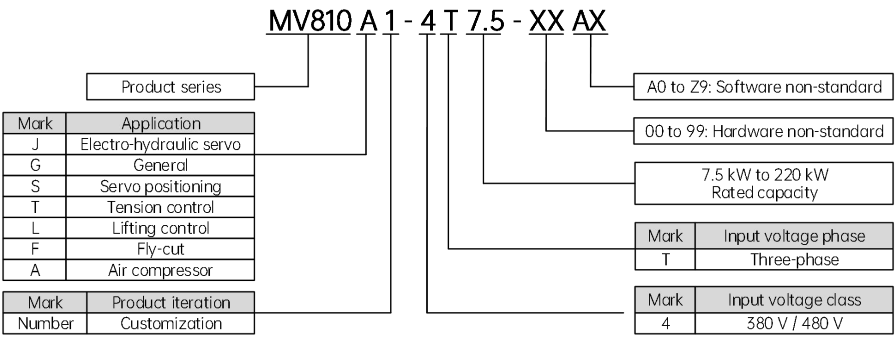
- Install the product on the place that can bear its weight. Failure to comply will result in personal injuries or equipment damage
- Do not install the drive near water pipes or other places capable of water splashing. Otherwise, there is a risk of property damage.
- Do not allow screws, gaskets, metal bars, and the like to fall into the drive. Failure to comply may result in a fire or property damage.
- If the drive is damaged or lack of components, do not install or run the drive. Failure to comply may result in a fire or personal injuries.
- Do not install the product in places with direct sunlight exposure. Otherwise, there is a risk of property damage.
- Do not short +/DC+ and -/DC- terminals. Failure to comply may result in a fire or property damage.
- Cable lugs must be firmly connected to the main circuit terminals. Otherwise, there is risk of property damage.
- Do not connect 220 V AC signal input to the control terminals other than RA/RA2, RB/RB2, and RC/RC2. Otherwise, there is a risk of property damage.

Contents

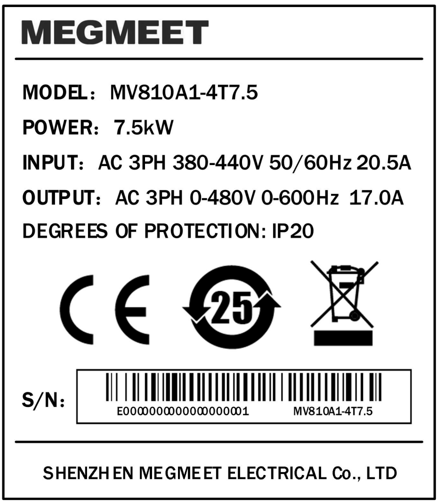
Chapter 1 Introduction of MV810A

1.1 Product model

The model name on the drive nameplate indicates the product series, the voltage class, the power rating, and the product version.



1.2 Product nameplate



1.3 Product series and models

Table 1-1 Product series and models

Enclosure	Model	Rated input current (A)	Rated output current (A)	Rated output power (kW)	Fan air volume (m^3/min)
C	MV810A1-4T7.5	23.0	17.0	7.5	0.8
D	MV810A1-4T11	26.0	25.0	11.0	1.8
	MV810A1-4T15	35.0	32.0	15.0	
E	MV810A1-4T18.5	49.0	37.0	18.5	4.0
	MV810A1-4T22	58.0	45.0	22.0	
F	MV810A1-4T30	62.0	60.0	30.0	5.8
	MV810A1-4T37	76.0	75.0	37.0	
G	MV810A1-4T45	92.0	90.0	45.0	14.42
	MV810A1-4T55	113.0	110.0	55.0	21.48
	MV810A1-4T75	157.0	152.0	75.0	0.8
H	MV810A1-4T90	180.0	176.0	90.0	1.8
	MV810A1-4T110	214.0	210.0	110.0	4.0
I	MV810A1-4T132	256.0	253.0	132.0	5.8
	MV810A1-4T160	307.0	304.0	160.0	14.42
J	MV810A1-4T185	330.0	340.0	185.0	21.48
	MV810A1-4T200	368.0	380.0	200.0	0.8
	MV810A1-4T220	410.0	426.0	220.0	1.8

1.4 Technical specifications

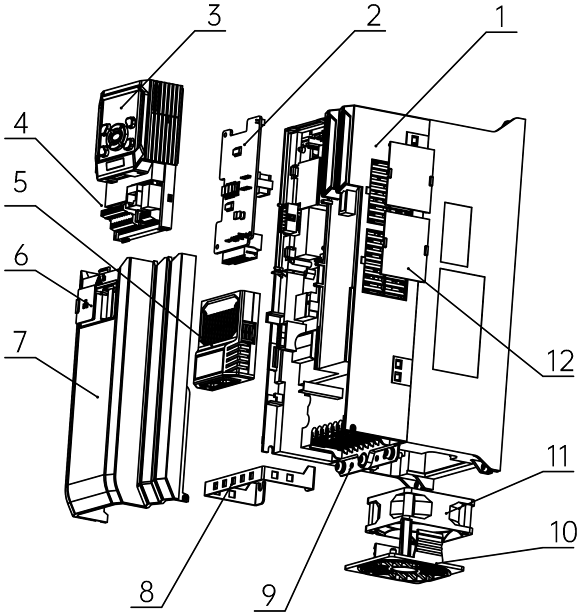
Table 1-2 Technical specifications

Power input	Rated voltage (V)	4T models: Three-phase 380 V to 480 V; continuous voltage fluctuation ±10%, transient voltage fluctuation -15% to +10% (323 V to 528 V); voltage unbalance rate < 3%, distortion rate compliant with IEC 61800-2.

	Rated input current (A)	Refer to Table 1-1.
	Rated frequency (Hz)	50/60 Hz. Fluctuation range: ±2 Hz.
Power output	Rated output Power (kW)	Refer to Table 1-1.
	Rated output current (A)	
	Output voltage (V)	Three-phase output under rated input conditions; 0 to rated input voltage; deviation less than ±3%.
	Output frequency (Hz)	V/F: 0.00 to 599.00 Hz. Unit: 0.01 Hz. Vector control: 0 to 599.00 Hz.
	Overload capacity	1 min for 150% rated current; 3 s for 180% rated current; 1 s for 200% rated current.
Drive control	Control mode	Flux vector control without PG, V/F control
	Maximum output frequency	V/F control: 599 Hz. Other control methods: 599 Hz.
	Speed regulation range	1 : 200 (flux vector control without PG)
	Speed control precision	±0.5% (flux vector control without PG)
	Speed fluctuation	±0.3% (flux vector control without PG)
	Torque response	< 20 ms (flux vector control without PG)
	Torque control	Torque precision ±5% for flux vector control without PG (above 5 Hz for asynchronous motors, above 10 Hz for synchronous motors).
	Startup torque	0.25 Hz 150% (flux vector control without PG)
Function	Key functions	Fast tracking, over-torque/under-torque detection, torque limit, multi-speed reference, multiple acceleration/deceleration time switchover, auto-tuning, S curve acceleration/deceleration, slip compensation, fan speed control, frequency hopping, energy saving operation, PID adjustment, hibernation function, power dip ride-through, Modbus, torque control, torque control and speed control switchover, automatic restart, DC braking, dynamic braking, simple PLC, AVR, switchover between 2 sets of motor parameters;

	Basic frequency	0.01 Hz to 599.00 Hz
	Startup frequency	0.00 Hz to 50.00 Hz
	Frequency setting mode	Analog setting AI1/AI2, terminal pulse HDI setting, simple PLC reference, multiple PLC reference, host device communication setting, PID control reference.
	Acceleration/ Deceleration time	0.1 to 6000.0 (unit: 0.1 s)
	DC braking capacity	Startup frequency: 0.00 Hz to 599.00 Hz; braking time: 0.1 s to 50.0 s Braking current: 0% to 100%, based on the nominal rated current of the drive.
	Terminal functions	Refer to the terminal function section for details.
Protection	Refer to the fault protection section for details.	
Others	Efficiency	≧ 93% for 7.5 kW; ≧ 95% for 15 kW or below.
	Installation method	Wall-mounted, vertically mounted on a solid base indoors, with at least 100 mm spacing for air inlet and outlet, and at least 10 mm spacing for both the left side and the right side, air cooling.
	IP rating	IP20
	Cooling method	Air cooling
Environment	Working conditions	Indoors with no direct sunlight exposure, dust, corrosive gas, combustible gas, oil mist, water vapour/dripping, or salt.
	Altitude	⩽ 1000 m: normal use. 1000 m < altitude < 3000 m: derated by 1% for every 100 m higher. Maximum altitude: 3000 m.
	Ambient temperature	-10℃ to +50℃, air temperature change < 0.5℃/min (derated use required if the ambient temperature is above 40℃).
	Humidity	5% to 95%RH; non-condensing; no rain, snow, or hail; solar radiation < 700 W/m^2; air pressure 70 to 106 kPa.
	Vibration	Displacement 1.5 mm when sine vibration is 2 to 9 Hz; 5.9 m/s^2 (0.6 g) for 9 to 200 Hz.
	Storage temperature	-30℃ to +70℃, air temperature change < 1℃/min; maximum 60℃ for long-time storage, 60℃ to 70℃ for short-time storage only.

1.5 Parts and components



1: Enclosure 2: PG card 3: Keypad 4: Control board 5: Expansion box
6: Rubber plug 7: Upper cover 8: Cable fixation bracket 9: Grounding board
10: Fan cover 11: Fan 12: Dust-proof plate

Figure 1-1 Diagram of parts and components (example based on enclosure C)

1.6 Appearance and dimensions

There are eight enclosure types, as shown in the figures below. The data of the outline dimensions, mounting dimensions, and gross weight are shown in Table 1-3.

(1) Enclosure C (4T7.5 kW)

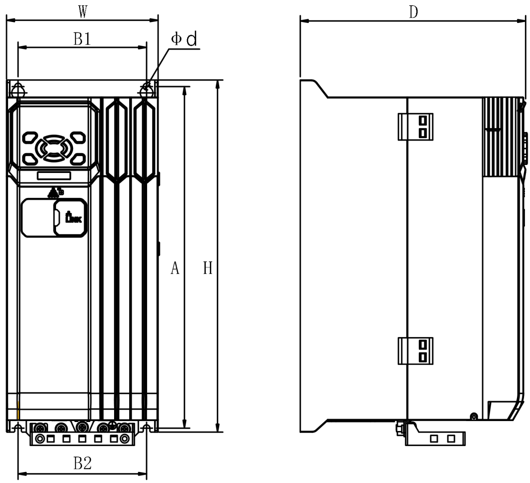


Figure 1-2 Enclosure C

(2) Enclosure D (4T11/15 kW)

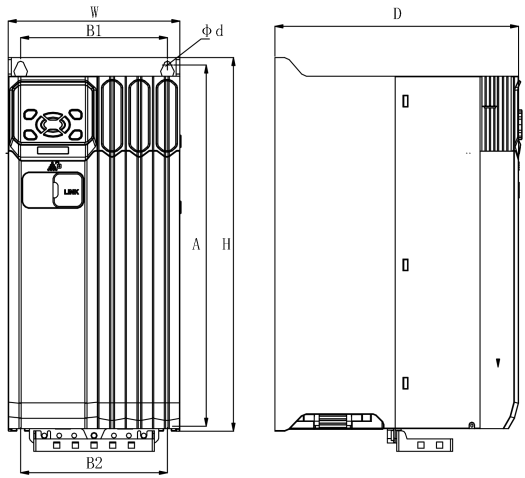


Figure 1-3 Enclosure D

(3) Enclosure E (4T18.5/22 kW)

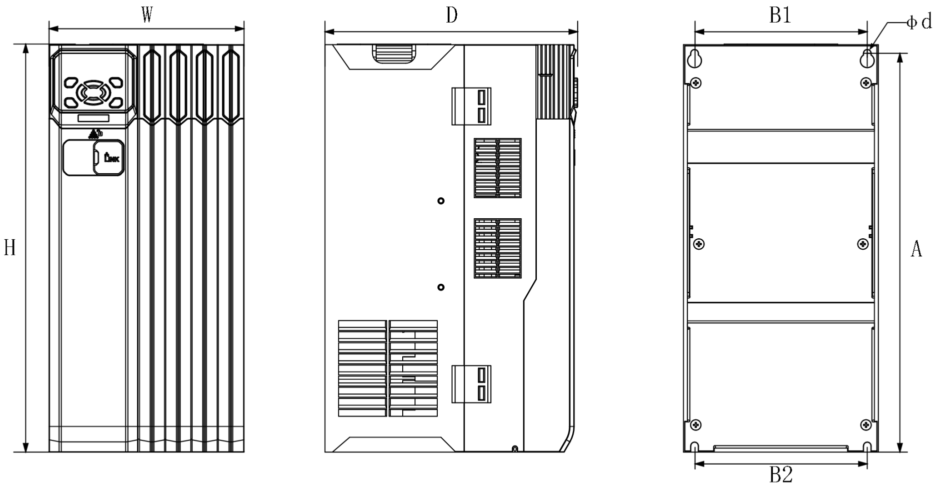


Figure 1-4 Enclosure E

(4) Enclosure F (4T30/37 kW)

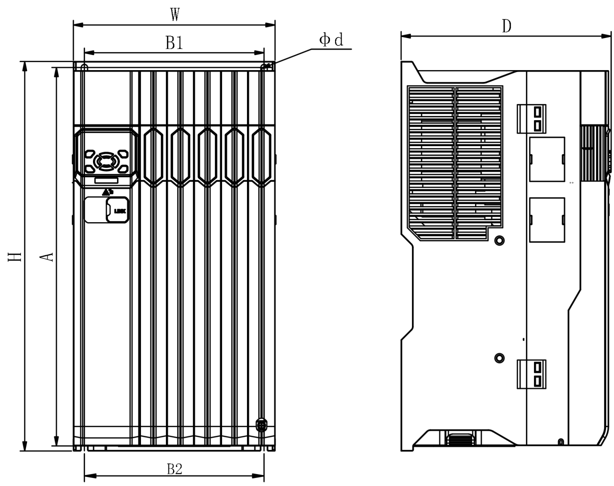


Figure 1-5 Enclosure F

(5) Enclosure G (4T45/55/75 kW)

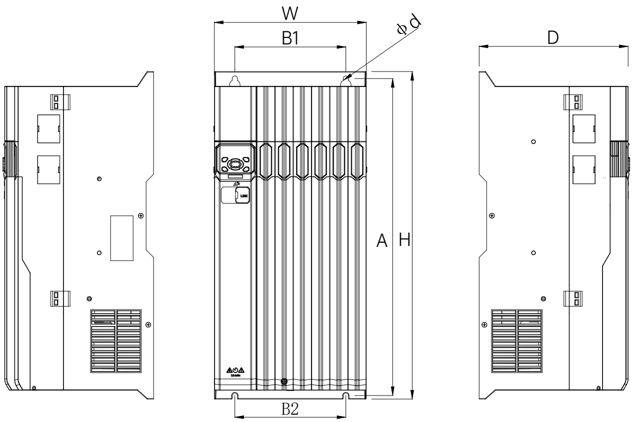


Figure 1-6 Enclosure G

(6) Enclosure H (4T90/110 kW)

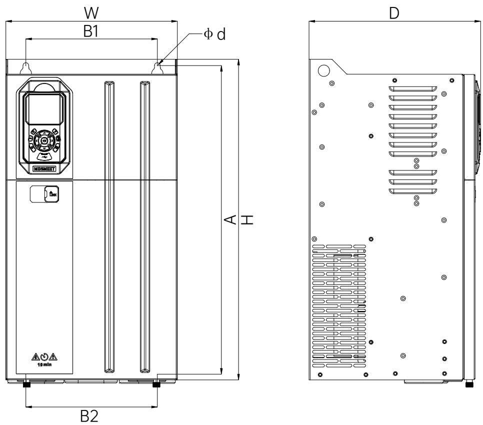


Figure 1-7 Enclosure H

(7) Enclosure I (4T132/160 kW)

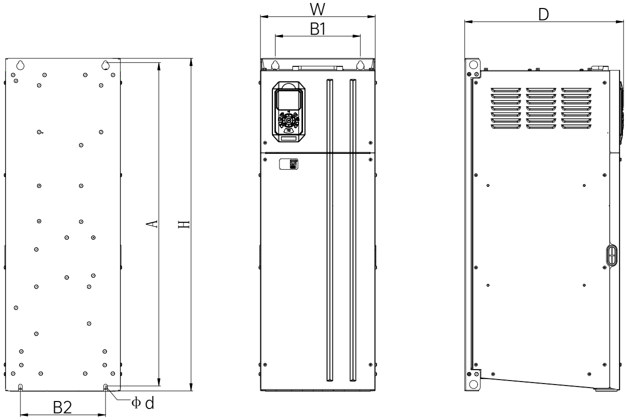


Figure 1-8　Enclosure I

(8) Enclosure J (4T185/200/220 kW)

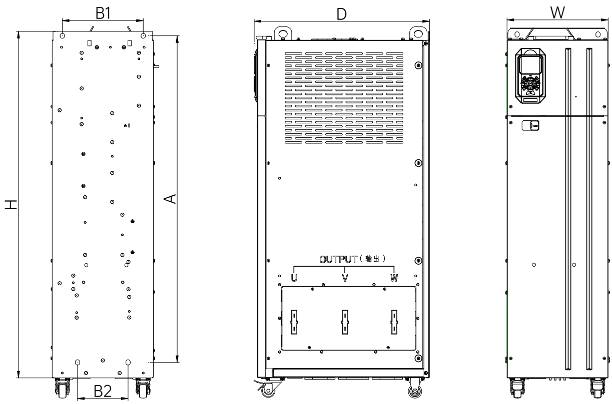


Figure 1-9　Enclosure J

Table 1-3　Outline dimensions, mounting dimensions, and gross weight

Enclosure	Drive	A (mm)	B1 (mm)	B2 (mm)	H (mm)	W (mm)	D (mm)	Mounting hole diameter (mm)	Gross weight ±0.5 (kg)
Enclosure C	MV810A1-4T7.5	259	97.5	97.5	267	115	171	5	2.5
Enclosure	MV810A1-4T11	290	118	118	300	138	195.92	6	4.1

Enclosure	Drive	A (mm)	B1 (mm)	B2 (mm)	H (mm)	W (mm)	D (mm)	Mounting hole diameter (mm)	Gross weight ±0.5 (kg)
D	MV810A1-4T15								
Enclosure E	MV810A1-4T18.5	318	140	140	330	158	204.8	6	6.5
	MV810A1-4T22								
Enclosure F	MV810A1-4T30	412	196	196	424	220	229	7	15
	MV810A1-4T37								
Enclosure G	MV810G1-4T45	542	190	190	560	260	255	9	21.5
	MV810A1-4T55								
	MV810A1-4T75								
Enclosure H	MV810A1-4T90	539	230	230	560	300	300	10	30
	MV810A1-4T110								
Enclosure I	MV810A1-4T132	875	230	230	900	310	429	10	100
	MV810A1-4T160								
Enclosure J	MV810A1-4T185	970	240	150	1029	300	520	-	120
	MV810A1-4T200								
	MV810A1-4T220								

1.7 Operating panel appearance and mounting dimensions

(1) Standard operating panel for models with a power rating ⩽ 75 kW

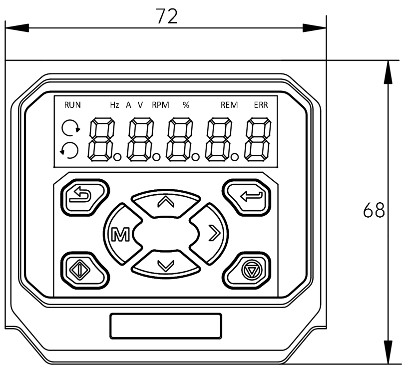


Figure 1-10 Operating panel for models with a power rating ⩽ 75 kW (unit: mm)

(2) Standard operating panel MV820-DP03 for models with a power rating ≥ 90 kW

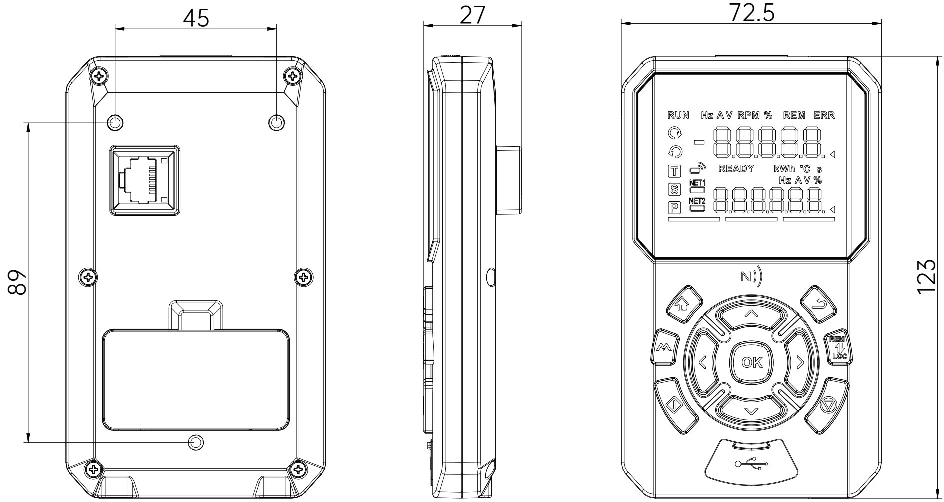


Figure 1-11 Operating panel MV820-DP03 for models with a power rating ≥ 90 kW (unit: mm)

WARNING

① Each AC drive model incorporates a detachable LED operating panel as its standard configuration, and the panel size (being either large or small) is determined by the power rating. The operating panel can be also used as expansion. If additional options of remote LCD operating panels are needed, please refer to section 2.6.

② This AC drive model incorporates a single net port for expansion connection.

Chapter 2 Options and Accessories

The options and accessories introduced in this chapter are all optional. Users can purchase the items by themselves if needed, or consult the local distributor for the applicable configuration. During installation and use, please follow the corresponding steps to avoid damage to the drive.

The accessories of the MV810A series include various structural fitments designed for installation and maintenance, as described below.

2.1 Embedded mounting bracket kit

MV810-EMBC, MV810-EMBD, MV810-EMBE, MV810-EMBF, MV810-EMBG, and MV810-EMBH are bracket kits for embedded drive mounting, respectively corresponding to different enclosures. They can maintain the air duct, enable independent heat dissipation, and keep the drive interior away from dust, oil mist, and particles. See the following figure (marked in green) for installation instructions.

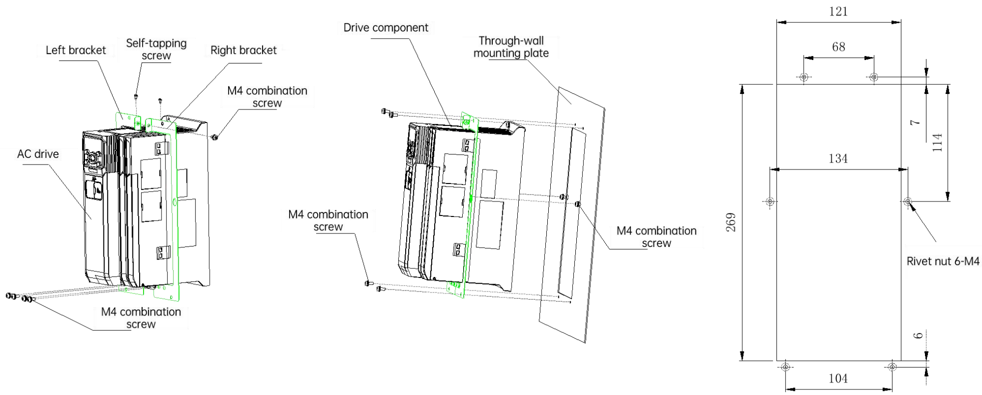


Figure 2-1 MV810-EMBC embedded mounting bracket kit

Similar installation methods and procedures apply to other enclosures, with minor difference in the locations and dimensions of mounting holes on the bracket kit and the base plate which are shown as the following figure:

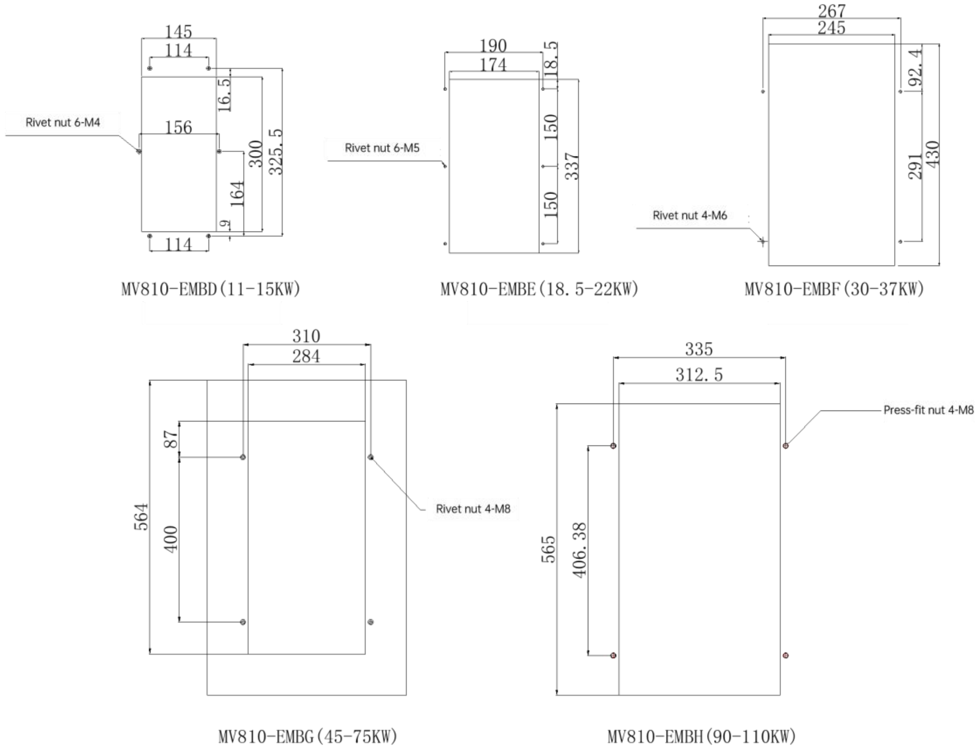


Figure 2-2 Embedded mounting bracket kits of MV810-EMBD, MV810-EMBE, MV810-EMBF, MV810-EMBG, and MV810-EMBH

2.2 Reinforced metal base plate

MV810-METC and MV810-METD are reinforced metal base plates respectively corresponding to enclosure C and D. They are used to improve the stability and reliability of installation in corrosive environments with high temperatures and oil mist. Countersunk head screws are provided in the accessory package for use in installation. See the following figure (marked in green).

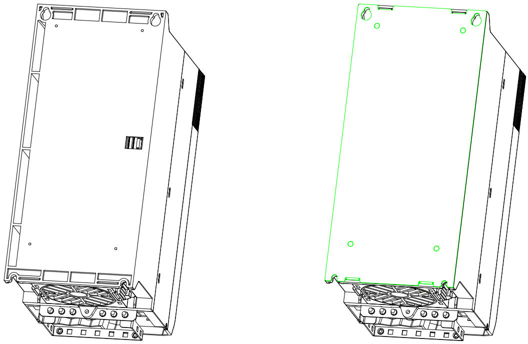


Figure 2-3　Reinforced metal base plate

2.3　Cable fixation bracket

MV810-FIXC and MV810-FIXD are cable fixation brackets respectively corresponding to enclosure C and D. The bracket is used to fix and support the input and output cables in order to protect the terminals from excessive stress and external impact, and also serves for stable grounding of the cable shield. It can be fixed to the screws on the grounding plate (marked in green), as shown in the following figure.

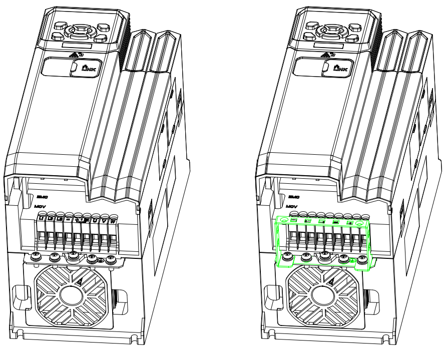


Figure 2-4　Cable fixation bracket

2.4　Operating panel mounting base

The option is operating panel mounting base is available for the whole MV810A series, and includes two sizes (large and small) to match the different operating panels (large and small).

MV820-JPT01 is the small-size mounting base used to install the small-size remote operating panel to the cabinet door, as shown in the following figure.

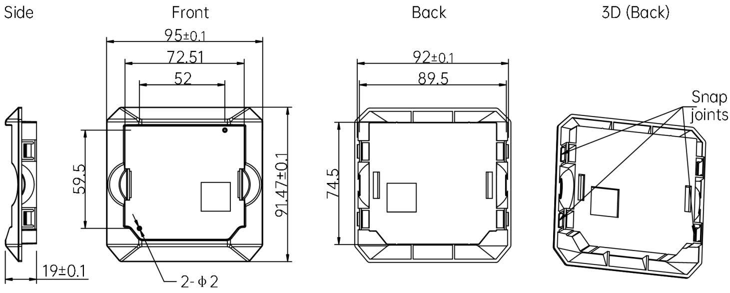


Figure 2-5 Operating panel mounting base

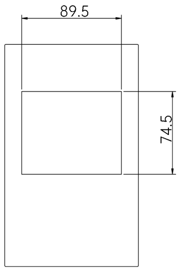


Figure 2-6 Mounting hole dimensions of the operating panel mounting base

MV820-JPT03 is the large-size mounting base for large-size operating panels. In case shielded cables are used, the user can select the large-size mounting base without network port fixing groove to install the operating panel onto the cabinet door, since the cable connector can not go through the mounting base with the network port fixing groove, as shown in the figure below.

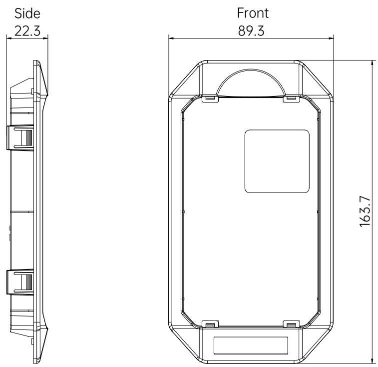


Figure 2-7 Large-size operating panel mounting base (unit: mm)

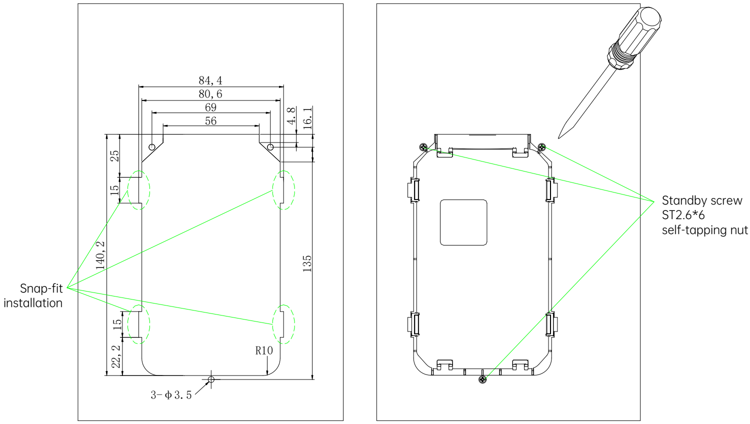


Figure 2-8 Mounting hole dimensions of large-size operating panel mounting base (unit: mm)

2.5 Remote LED operating panel

The MV810A series provides two types of remote operating panel options: the small-size LED operating panel (with shuttle button), and the large-size LED operating panel.

MV820-DP01 is a small-size LED operating panel, detachable and supporting expansion, with a shuttle button and the parameter copy function (refer to P00.07). IP rating is IP23.

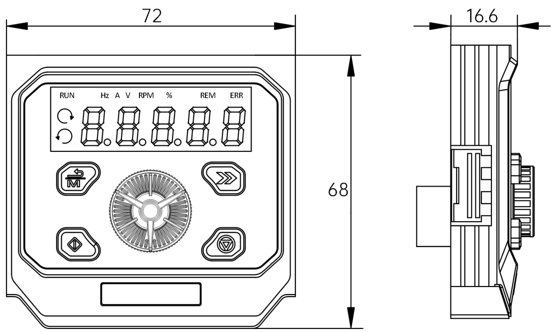


Figure 2-9 Remote LED operating panel

The small-size LED operating panel can be fixed to the cabinet door/plate via a mounting base (see 2.4 for details) or via the two diagonal internal thread holes provided on the back of the operating panel, as shown in the following figure. Hole dimension unit: mm.

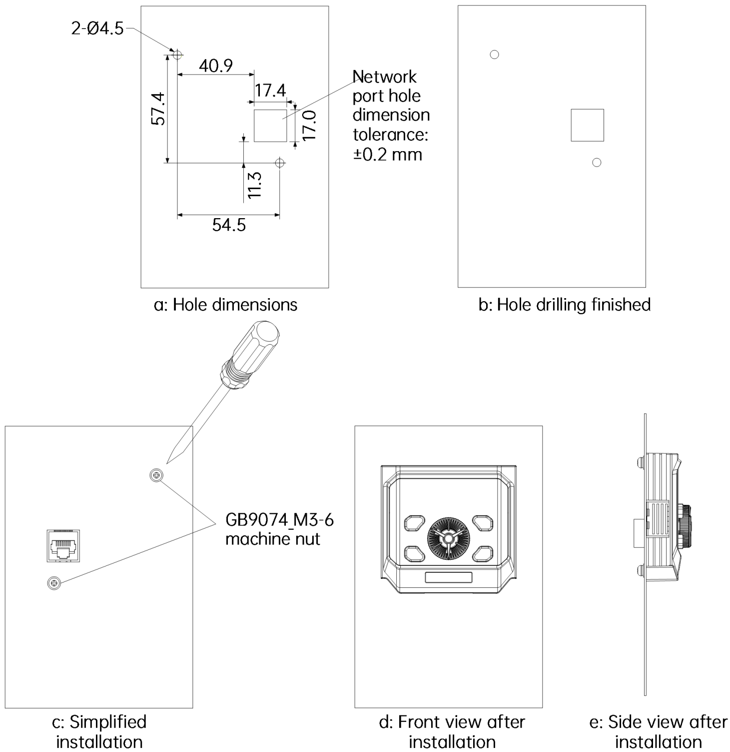


Figure 2-10 Simplified installation of the remote LED operating panel

MV820-DP03 is a large-size LED operating panel, detachable and supporting expansion, with dual-row LED display and increased functions including parameter copy function (refer to P00.07).

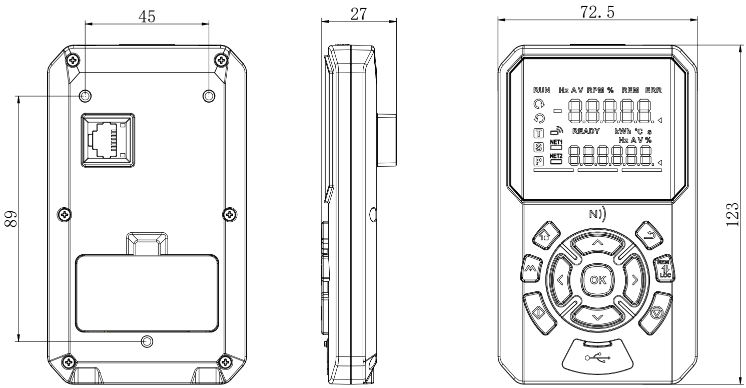
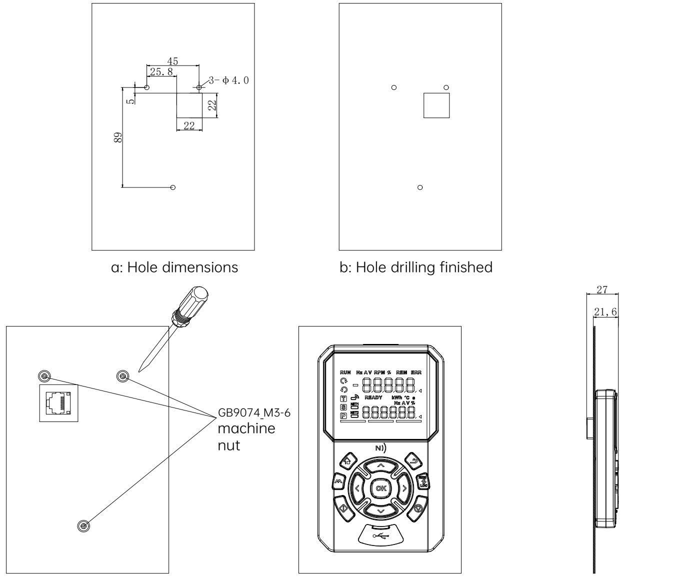


Figure 2-11 Large-size remote LED operating panel (unit: mm)

The large-size remote LED operating panel can be fixed to the cabinet door/plate via a mounting base (see 2.4 for details) or via the three diagonal internal thread holes provided on the back of the operating panel, as shown in the following figure. Hole dimension unit: mm.



a: Hole dimensions
b: Hole drilling finished
c: Simplified installation
d: Front view after installation
e: Side view after installation

Figure 2-12 Simplified installation of the large-size remote LED operating panel

2.6 Remote LCD operating panel

MV820-DP02 is a large-size LCD operating panel, detachable and supporting expansion, with display in Chinese or English. It provides increased functions, including parameter copy function (refer to P00.07).

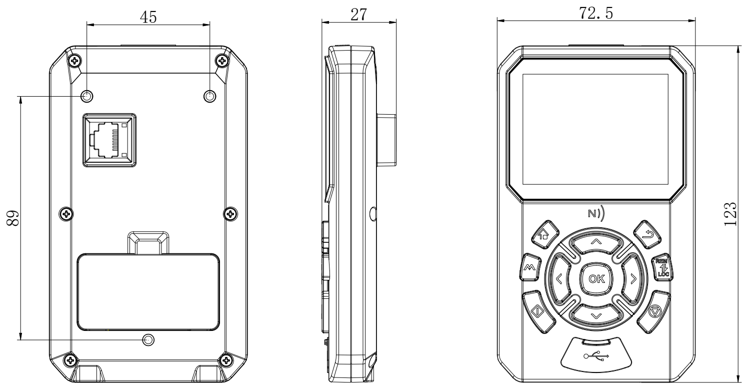


Figure 2-13 Large-size remote LCD operating panel (unit: mm)

The large-size remote LCD operating panel can be fixed to the cabinet door/plate via a mounting base (see 2.4 for details) or via the three diagonal internal thread holes provided on the back of the operating panel, as shown in the following figure. Hole dimension unit: mm.

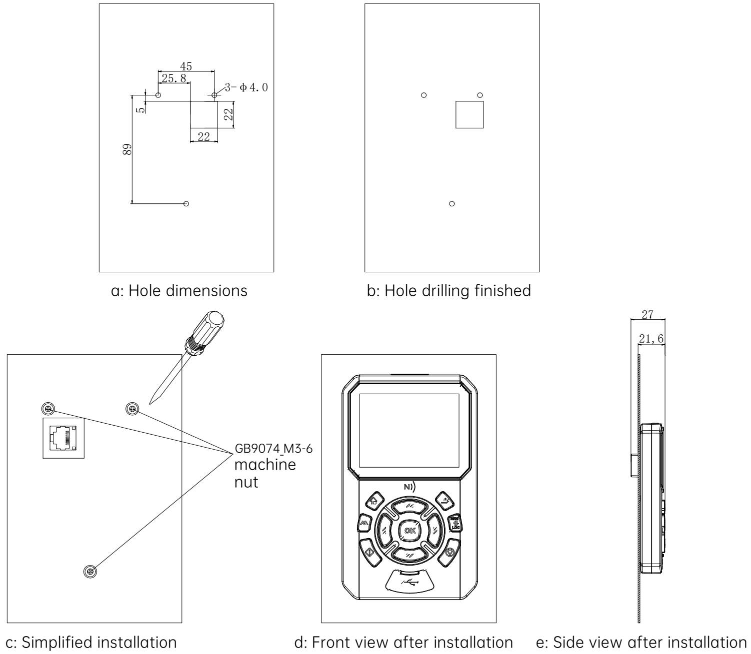
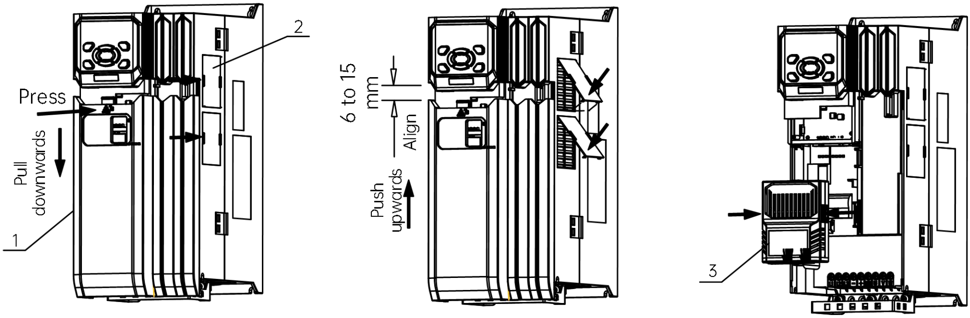


Figure 2-14 Simplified installation of the large-size remote LCD operating panel

Chapter 3 Drive Installation

3.1 Assembly/Disassembly of drive components



1: Cover 2: Dust-proof plate 3: Expansion box

Figure 3-1 Assembly/Disassembly of components (example based on enclosure C)

(1) Assembly/Disassembly of the cover

Disassembly: Press the granulated part of the cover inwards with proper force, pull the cover downwards till the snap-fit joints connecting the cover and the drive are separated, then remove the cover.

Assembly: Align the cover with the chassis, with the upper end 6-15 mm away from the operating panel and the lower part in contact with the chassis, then push the cover upwards to buckle the snap-fit joints into place.

(2) Assembly/Disassembly of the dust-proof plate

Disassembly: Use a straight screwdriver or a fingernail to pry open the dust-proof plate.

Assembly: Buckle the snap-fit joints of the dust-proof plate into the ventilation hole, and press the plate down.

(3) Assembly/Disassembly of the expansion box

Disassembly: Press down the spring snap at the middle of the expansion box to remove it from the drive.

Assembly: Hold the expansion box with the spring snap pressed down slightly, align the box with the installation position, and release the finger to buckle the spring snap in place.

3.2 Installation environment

Check the following items when selecting the installation place:

- Ambient temperature: -10℃ to 50℃; derated use is required if it is within 40℃ to 50℃;
- Ambient humidity: 5% to 95%RH; non-condensing;
- Vibration in the installation place shall be less than 5.9 m/s^2 (0.6g);
- Do not install the product in a place with direct sunlight exposure;
- Do not install the product in a place with dust or metal powder;
- It is strictly forbidden to install the product in a place with corrosive or explosive gases.

If there should be any special requirements for installation, please consult Megmeet prior to installation.

3.3 Installation direction and spacing

It is recommended to install the product vertically for better ventilation.

The requirements for spacing is illustrated in Figure 3-2 below:

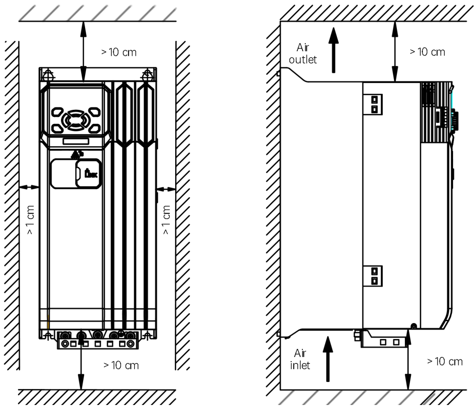


Figure 3-2 Spacing for vertical installation

If two or more drives are installed close to each other in a vertical line, for better heat dissipation, it is recommended to use a baffle plate to redirect the air flow in order to minimize the impact imposed on the upper drive air inlet by the lower drive air outlet, as shown in Figure 3-3.

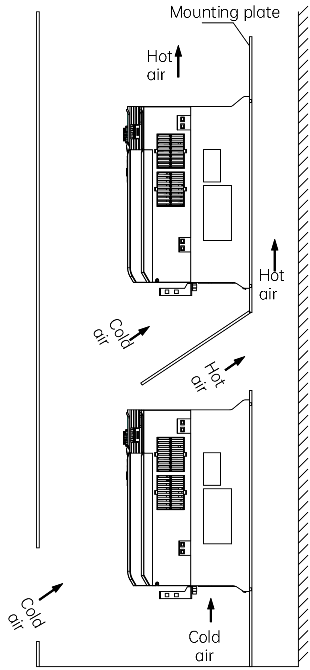


Figure 3-3 Installation of two or more drives

Chapter 4 Drive Wiring & Commissioning

This chapter provides the instructions for the wiring and connection of the drive, and the logic and commissioning of the air compressor.

DANGER
• Before opening the drive cover, make sure to completely cut off the power supply and wait for at least 10 minutes. • Before wiring, make sure that the indicator on the drive panel is completely off, and the voltage between +/DC+ and -/DC- terminals of the main circuit is below 36 V DC. • Only professionals who are sufficiently trained and qualified are allowed to wire the drive product. • When connecting the emergency stop circuit or the safety circuit, check the wiring carefully before and after the operation. • Check the voltage class of the drive before power on. Otherwise, personal injuries and property damage may occur.

WARNING
• Before use, check carefully whether the rated input voltage of the drive is consistent with the voltage of the AC power supply. • The drive has passed the withstand voltage test before leaving the factory. Please do not perform the withstand voltage test again. • Do not connect the power supply cable to U, V and W phases. • The grounding cable generally comprises a copper wire with a diameter no less than 3.5 mm, and the grounding resistance shall be less than 10 Ω. • Leakage current exists inside the drive product, the value of which is determined by actual use. To ensure safety, the drive and the motor must be grounded. A residual current device (RCD) is required. It is recommended to use the B type RCD with a leakage current limit of 300 mA. • To facilitate the input overcurrent protection and the power-off maintenance, it is required to use an air switch or a fuse cutout in the connection between the drive and the power supply.

The electrical diagram in Figure 4-1 below is for the drive trial use.

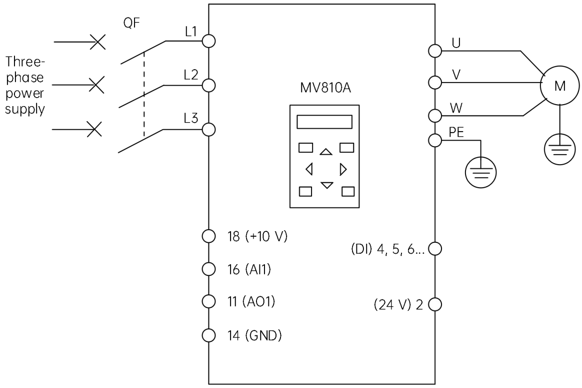
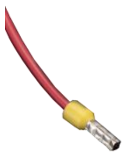
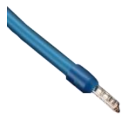


Figure 4-1 Simplified wiring of the main circuit

Recommended cables for the drive using Euroblock are shown in the following table:

Table 4-1 Recommended cables

Type	Cable	Image	Type	Cable	Image
Main circuit cable	Power cable (pipe-type terminal connector)		Control circuit cable	Signal cable (pipe-type terminal connector)	
	Grounding cable (OT terminal connector)			Ethernet cable	

Recommended pipe-type terminal diameters of the drive using Euroblock are shown in the following table:

Table 4-2 Recommended pipe-type terminal diameter

MV810A model	Main circuit (mm^2)		Control circuit (mm^2)	Recommended pipe-type terminal diameter Φ (mm)		
	Input cable	Output cable	Control terminal cable	Input cable	Output cable	Control terminal cable
MV810A1-4T7.5	6	6	0.5	3.9	3.9	1.3
MV810A1-4T11	6	6	0.5	3.9	3.9	1.3
MV810A1-4T15	6	6	0.5	3.9	3.9	1.3

Recommended fastening screw torque values for wiring are shown in the following table:

Table 4-3 Recommended fastening screw torque

Enclosure	MV810A model	Main circuit terminal			Control circuit terminal
		L1, L2, L3, N	U, V, W, ⏚	+, -, BR	1 to 18
C	MV810A1-4T7.5	0.5 N·m	0.5 N·m	0.5 N·m	0.2 N·m
D	MV810A1-4T11	1.5 N·m	1.5 N·m	1.5 N·m	0.2 N·m
	MV810A1-4T15				
E	MV810A1-4T18.5	2.8 N·m	2.8 N·m	2.8 N·m	0.2 N·m
	MV810A1-4T22				
F	MV810A1-4T30	3.5 N·m	3.5 N·m	3.5 N·m	0.2 N·m
	MV810A1-4T37				
G	MV810A1-4T45	4.5 N·m	4.5 N·m	4.5 N·m	0.2 N·m
	MV810A1-4T55				
	MV810A1-4T75				
H	MV810A1-4T90	20 N·m	20 N·m	20 N·m	0.5 N·m
	MV810A1-4T110				
I	MV810A1-4T132	20 N·m	20 N·m	20 N·m	0.5 N·m
	MV810A1-4T160				
J	MV810A1-4T185	35 N·m	35 N·m	35 N·m	0.5 N·m
	MV810A1-4T200				
	MV810A1-4T220				

4.1 Main circuit terminal description and wiring

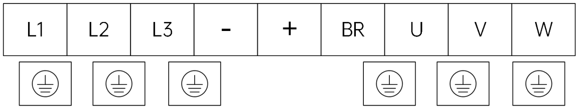
4.1.1 Main circuit input/output terminal types

The main circuit terminals can be divided into different types depending on the enclosure types and drive models.

(1) Terminal type 1

Enclosure type:

Enclosure C (applicable power: 4T7.5); Enclosure D (applicable power: 4T11/15)

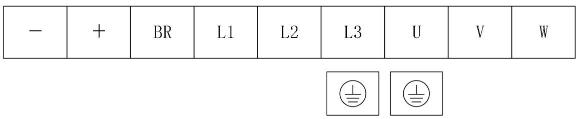


Terminal name	Function
L1, L2, L3	Three-phase 380 V AC input terminal
+, BR	Reserved
+, -	DC bus terminals
U, V, W	Three-phase AC output terminals
⏚	PE connection terminal, screws used to fix the cable fixation bracket

(2) Terminal type 2

Enclosure type:

Enclosure E (applicable power: 4T18.5/22)

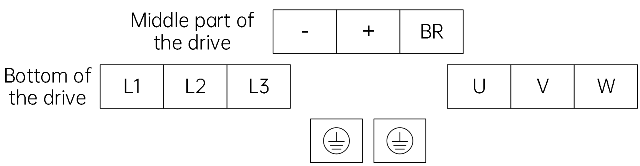


Terminal name	Function
L1, L2, L3	Three-phase 380 V AC input terminal
+, BR	Reserved
+, -	DC bus terminals
U, V, W	Three-phase AC output terminals
⏚	PE connection terminal

(3) Terminal type 3

Enclosure type:

Enclosure F (applicable power: 4T30/37)



Terminal name	Function
L1, L2, L3	Three-phase 380 V AC input terminal
+, BR	Reserved
+, -	DC bus terminals
U, V, W	Three-phase AC output terminals
⏚	PE connection terminal

WARNING

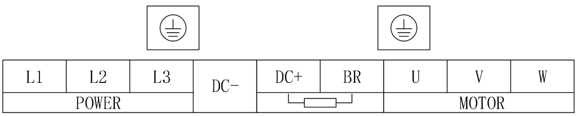
(1) In applications of common DC bus, the positive and negative poles of the DC input should be connected to + and - terminals respectively, which would enable the power-on buffering function for the internal DC bus capacitor of the drive.

(2) Connect the cable fixation bracket to the grounding plate via two PE terminals.

(4) Terminal type 4

Enclosure type:

Enclosure G (applicable power: 4T45/55/75)

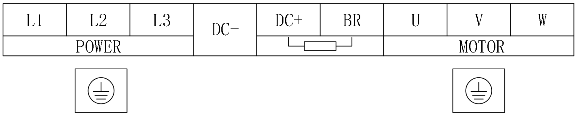


Terminal name	Function
L1, L2, L3	Three-phase 380 V AC input terminal
DC+, BR	External braking resistor terminal
DC+, DC-	DC bus terminals
U, V, W	Three-phase AC output terminals
⏚	PE connection terminal

(5) Terminal type 5

Enclosure type:

Enclosure H (applicable power: 4T90/110)

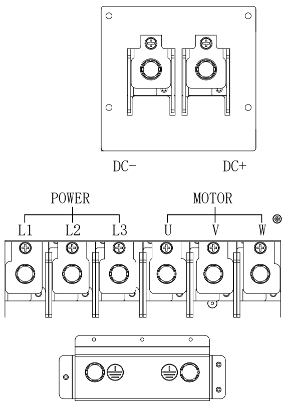


Terminal name	Function
L1, L2, L3	Three-phase 380 V AC input terminal
DC+, BR	External braking resistor terminal
DC+, DC-	DC bus terminals
U, V, W	Three-phase AC output terminals
⏚	PE connection terminal

(6) Terminal type 6

Enclosure type:

Enclosure I (applicable power: 4T132/160)

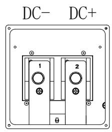


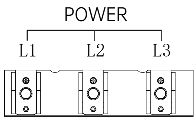
Terminal name	Function
L1, L2, L3	Three-phase 380 V AC input terminal
DC+, DC-	DC bus terminals
U, V, W	Three-phase AC output terminals
⏚	PE connection terminal

(7) Terminal type 7

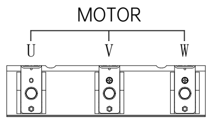
Enclosure type:

Enclosure J (applicable power: 4T185/200/220)





Left of the enclosure



Right of the enclosure

Terminal name	Function
L1, L2, L3	Three-phase 380 V AC input terminal
DC+, DC-	DC bus terminals
U, V, W	Three-phase AC output terminals

WARNING

① In a common DC bus application, the positive and negative terminals of the DC input must be connected to the +/DC+ and -/DC- terminals respectively to enable the power-up buffering function for the internal DC bus capacitor of the AC drive.

② The cable fixation bracket is fixed to the grounding plate through two PE terminals.

4.1.2 Electrical connection between drive and options

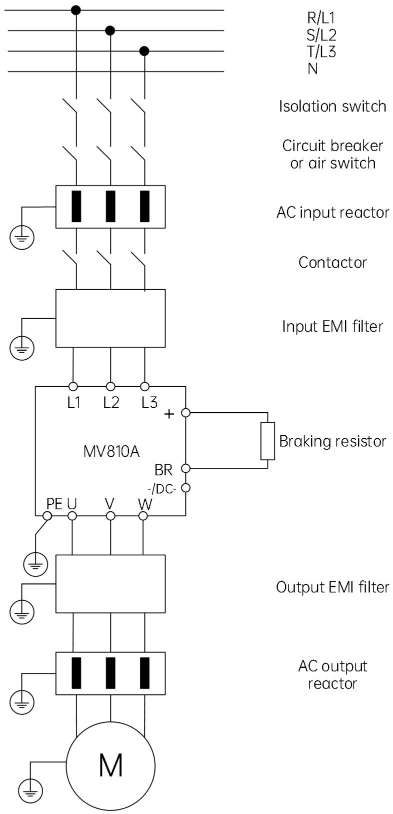


Figure 4-2 Electrical connection between drive and options

(1) A current breaking device, such as an isolation switch, shall be applied between the mains and the drive to ensure safety during maintenance.

(2) When using this drive product in North America, a time-delay fuse shall be applied before the drive (rated fuse current shall be 225% of the maximum full-load output current) to limit the extent of influence in case of a downstream device fault. Refer to the Table 4-4 for fuse selection.

Table 4-4 Recommended fuse capacity and cross section of the insulated copper-core wire

MV810A model	Input line protection	Main circuit (mm^2)		Control circuit (mm^2)
	Fuse (A)	Input cable	Output cable	Control terminal cable
MV810A1-4T7.5	60	6	6	0.5
MV810A1-4T11	70	6	6	0.5

MV810A model	Input line protection	Main circuit (mm^2)		Control circuit (mm^2)
	Fuse (A)	Input cable	Output cable	Control terminal cable
MV810A1-4T15	70	6	6	0.5
MV810A1-4T18.5	100	10	10	0.5
MV810A1-4T22	125	16	16	0.5
MV810A1-4T30	125	25	25	0.5
MV810A1-4T37	150	25	25	0.5
MV810A1-4T45	200	35	35	0.5
MV810A1-4T55	250	35	35	0.5
MV810A1-4T75	275	70	70	0.5
MV810A1-4T90	325	70	70	1.0
MV810A1-4T110	400	95	95	1.0
MV810A1-4T132	500	150	150	1.0
MV810A1-4T160	600	185	185	1.0
MV810A1-4T185	800	240	240	1.0
MV810A1-4T200	800	150×2	150×2	1.0
MV810A1-4T220	800	150×2	150×2	1.0

Note:

Values indicated in the above table are for recommendations only.

(3) When the contactor is used for power supply control, do not use it to control the power on/off of the drive.

(4) AC input reactor

If the power grid waveform distortion is severe, or the interaction of high-order harmonics between the drive and the power supply cannot meet the requirements after the drive is configured with a DC reactor, an AC input reactor can be applied additionally. The AC input reactor can also improve the power factor at the input side of the drive.

(5) AC output reactor

When the length of the cable connecting the drive and the motor exceeds 80 m, it is recommended to use stranded cables and install an AC output reactor that serves to suppress the high-frequency oscillation. Such measures can minimize the risks of motor insulation damage, excessive leakage current, and frequent drive protection.

(6) Input EMI filter

An optional EMI filter can be employed to suppress the high-frequency noise interference from the power cable.

(7) Output EMI filter

An optional EMI filter can be employed to suppress the noise interference and the leakage current generated at the output side of the drive.

(8) Safety grounding cable

There is leakage current in the drive. To ensure safety, the drive and the motor must be grounded, and the grounding resistance shall be less than 10 Ω. The grounding cable shall be as short as possible, and its diameter shall comply with the requirements in Table 4-5.

Note:

The values in the table are applicable only when the same metal is used for both types of conductors. If not, the cross sectional area of the protective conductor shall be determined through calculation using the equivalent conductivity coefficient method.

Table 4-5 Cross sectional area of protective conductors

Cross sectional area S (mm^2) of phase conductors	Minimum cross sectional area Sp (mm^2) of protective conductors
$S \leqslant 16$	S
$16 < S \leqslant 35$	16
$35 < S$	S/2

WARNING

The input/output EMI filter shall be installed as close to the drive as possible.

4.2 Control circuit description and wiring

4.2.1 Control circuit terminal layout

(1) Models with a power rating ⩽ 75 kW

1	3	5	7	9	11	13	15	17
2	4	6	8	10	12	14	16	18

RA	RB	RC

Figure 4-3 Control circuit terminal layout 1

(2) Models with a power rating ⩾ 90 kW

1	3	5	7	9	11	13	15	17
2	4	6	8	10	12	14	16	18

RA	RB	RC	RA2	RB2	RC2

Figure 4-4 Control circuit terminal layout 2

(3) Terminal layout of the phase loss and sequence detection board

R	Not connected	S	Not connected	T

(4) I/O expansion box terminal layout

+24 V	GND	PT1+	PT1-	PT2+	PT2-	1L	1H	2L	2H	TA	TC

Figure 4-5 Control circuit terminal layout

4.2.2 Control circuit terminal wiring

WARNING

It is recommended to employ wires exceeding 0.5 mm^2 for the connection of the control circuit terminals.

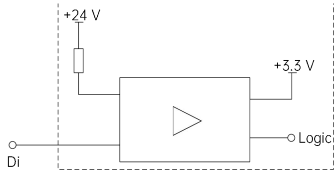
The terminal functions are explained in Table 4-6.

Table 4-6 Control box terminal functions

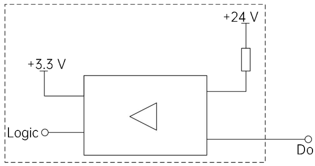
Type	Mark	Name	Function	Specifications
Communication	1	RS485	485 differential signal positive (reference ground: GND)	Standard RS485 communication interface; Use twisted pair cables or shielded cables.
	3		485 differential signal negative (reference ground: GND)	
Power supply	2/9	+24 V power supply	+24 V reference power output	Maximum allowable output current: 200 mA (the total current with all digital outputs included).
	18	+10 V power supply	+10 V reference power output	Maximum allowable output current: 10 mA.
	14/17	+24 V, +10 V	Reference ground of +24 V and +10 V power	Reference 0 V for digital input/output, analog

Type	Mark	Name	Function	Specifications
		power ground	supplies	input/output, and communication signals.
Analog input	16	Analog single-ended input AI1	It receives analog voltage/current single-ended input. Select the input via the setting of function code P09.01 (reference ground: GND).	Input voltage: 0 V to 10 V (input impedance: 100 kΩ). Resolution: 1/4000; Input current: 0 mA to 20 mA (input impedance: 165 Ω). Resolution: 1/4000.
	13	Analog single-ended input AI2 or analog current differential input AI2	It receives analog voltage/current single-ended input, or current differential input. Select the analog voltage/current input via the setting of function code P09.02 (reference ground: GND).	Input voltage: -10 V to 10 V (input impedance: 100 kΩ). Resolution: 1/4000; Input current: 0 mA to 20 mA (input impedance: 10 Ω). Resolution: 1/4000; supporting differential input.
	15	Differential input current return terminal AI2_RE	Used as the current return terminal during analog current differential input. If the analog current input is single-ended, it is required to connect this terminal to GND.	Input current: 0 mA to 20 mA (input impedance: 10 Ω). Resolution: 1/4000; supporting differential input.
Analog output	11	Analog output AO1	It serves as the analog voltage/current output, with 28 types of outputs allowed. Select the analog voltage/current output via the setting of function code P09.02 (reference ground: GND).	Output voltage: 0 to 10 V, ±5% Output current: 0 to 20 mA
Multi-function input terminals	4	Multi-function DI1	Select the terminal function from multi-function DI, HDI, and thermistor signal	For input circuit function selection, refer to the multi-function input/output terminal wiring as shown in the
	5	Multi-function DI2		

<table>
<tr><th>Type</th><th>Mark</th><th>Name</th><th>Function</th><th>Specifications</th></tr>
<tr><td rowspan="6"></td><td></td><td></td><td rowspan="6">input via the setting of function codes P09.00 and P09.01.

For details, refer to the input functions of P09.03 to P09.10 and the two/three-wire control functions of P09.14 in 7.10 (Group P09 terminal input parameters).</td><td>diagram below:


Example:
<table><tr><td>P09.00</td><td>Terminal 5</td><td>Terminal 4</td></tr><tr><td>Ox00</td><td>DI2</td><td>DI1</td></tr><tr><td>Ox21</td><td>HDO2</td><td>DO1</td></tr><tr><td>...</td><td>...</td><td>...</td></tr></table></td></tr>
<tr><td>6</td><td>Multi-function DI3</td><td rowspan="2">These two terminals serve respectively as the digital inputs DI3 and DI4 only, and can not be set to other signal input/output functions via the setting of function codes.</td></tr>
<tr><td>8</td><td>Multi-function DI4</td></tr>
<tr><td>7</td><td>Multi-function DI5 or thermistor signal</td><td>This terminal can be used as the digital input DI5 via the setting of function code P09.01; it can also be used as the thermistor signal input (PT1000 and KTY84-130) via the setting of function code P97.26.</td></tr>
<tr><td>10</td><td>Multi-function DI6 or HDI</td><td>This terminal can be used as the digital input DI6 or the digital pulse input HDI (pulse range: 0 to 50 kHz) via the setting of function code P09.01.</td></tr>
<tr><td>12</td><td>Multi-function DI7</td><td>This terminal serves as the digital input DI7 only, and can not be set to other signal input/output functions via the setting of function codes.</td></tr>
</table>

<table>
<tr><th>Type</th><th>Mark</th><th>Name</th><th>Function</th><th>Specifications</th></tr>
<tr><td></td><td>16</td><td>Multi-function AI1</td><td></td><td>This terminal can be used as the digital input DI8 or the analog input AI1 via the setting of function code P09.01.</td></tr>
<tr><td rowspan="4">Multi-function output terminals</td><td>4</td><td>Open-collector output terminal Y1;
DO1 output terminal;
HDO1 pulse output terminal</td><td rowspan="2">Terminals 4 and 5 serve as the general-purpose multi-functional terminals (same as terminals 6, 8, 7, 10, 12, and 16). In addition, these two can also be used as DO/HDO via the setting of function codes (reference ground: GND).
For details, refer to the input functions of P09.00 to P09.02 in 7.10 (Group P09 terminal input parameters).</td><td rowspan="2">For input circuit function selection, refer to the multi-function input/output terminal wiring as shown in the diagram below:


Example:<table><tr><td>P09.00</td><td>Terminal 5</td><td>Terminal 4</td></tr><tr><td>0x21</td><td>HDO2</td><td>DO1</td></tr><tr><td>0x22</td><td>HDO2</td><td>HDO1</td></tr><tr><td>...</td><td>...</td><td>...</td></tr></table>Maximum working voltage: 30 V
Maximum output current: 50 mA</td></tr>
<tr><td>5</td><td>Open-collector output terminal Y2;
DO2 output terminal;
HDO2 pulse output terminal</td></tr>
<tr><td rowspan="2">11</td><td rowspan="2">DO3/RO2 output terminal</td><td rowspan="2">This terminal can be used as multi-function DO/AO via the setting of function codes (reference ground: GND).
For details, refer to the functions of P09.02 in 7.10 (Group P09 terminal input parameters).</td><td>This terminal is set to function DO3 for models of 75 kW or less.
This terminal can be used as DO3 via the setting of function code P09.02.
Maximum output current: 50 mA</td></tr>
<tr><td>This terminal is set to function RO2 for models of 90 kW or above.</td></tr>
<tr><td rowspan="2">Relay output terminal RO1</td><td>RA</td><td rowspan="2">Relay output</td><td rowspan="2">These terminals can be used as multi-function relay outputs via the</td><td rowspan="2">RA - RB: NC. RA - RC: NO
Contact capacity:
250 V AC / 2 A (COSΦ = 1);</td></tr>
<tr><td>RB</td></tr>
</table>

Type	Mark	Name	Function	Specifications
	RC		setting of function codes. Refer to the output functions of P10.03 in 7.11 (Group P10 terminal output parameters).	250 V AC / 1 A (COSΦ = 0.4); 30 V DC / 1 A. Refer to the description of P10 for usage instructions. The overvoltage category of the input voltage of the relay output terminal is category II.
Relay output terminal RO2	RA2	Relay output	These terminals can be used as multi-function relay outputs via the setting of function codes. Refer to the output functions of P10.02 in 7.11 (Group P10 terminal output parameters).	RA - RB: NC. RA - RC: NO Contact capacity: 250 V AC / 2 A (COSΦ = 1); 250 V AC / 1 A (COSΦ = 0.4); 30 V DC / 1 A. Refer to the description of P10 for usage instructions. The overvoltage category of the input voltage of the relay output terminal is category II.
	RB2			
	RC2			

WARNING

(1) Most of the multi-function terminals can be used as input/output of multiple types, including DI, DO, HDI, HDO, AI, AO, and thermocouple input.

(2) The internal circuit of the drive is not illustrated in the multi-function DI/DO wiring diagram, but represented by a symbol (▷) instead.

Terminal functions of the phase loss and sequence detection board are described in Table 4-7.

Table 4-7 Phase loss and sequence detection board terminal functions

Type	Mark	Name	Function	Specifications
Phase loss and sequence detection board	R	Power supply phase A signal	Power supply phase A signal input terminal	Maximum input voltage: 528 V
	S	Power supply phase B signal	Power supply phase B signal input terminal	
	T	Power supply phase C signal	Power supply phase C signal input terminal	

I/O expansion box terminal function are described in Table 4-8.

Table 4-8 I/O expansion box terminal functions

<table>
<tr><th>Type</th><th>Mark</th><th>Name</th><th>Function</th><th>Specifications</th></tr>
<tr><td rowspan="12">I/O expansion box</td><td>+24 V</td><td>24 V DC output terminal</td><td>24 V DC power supply output</td><td rowspan="2">Maximum allowable output current: 400 mA</td></tr>
<tr><td>GND</td><td>24 V DC output terminal GND</td><td>GND of 24 V DC power supply output</td></tr>
<tr><td>PT1+</td><td>Temperature sampling input 1+</td><td>Temperature sampling input 1+</td><td rowspan="4">PT100 temperature detection unit</td></tr>
<tr><td>PT1-</td><td>Temperature sampling input 1-</td><td>Temperature sampling input 1-</td></tr>
<tr><td>PT2+</td><td>Temperature sampling input 2+</td><td>Temperature sampling input 2+</td></tr>
<tr><td>PT2-</td><td>Temperature sampling input 2-</td><td>Temperature sampling input 2-</td></tr>
<tr><td>1L</td><td>Current transformer sampling input 1 common end</td><td rowspan="4">Fan current transformer secondary current detection</td><td rowspan="4">Maximum allowable input current: 4 A</td></tr>
<tr><td>1H</td><td>Current transformer sampling input 1</td></tr>
<tr><td>2L</td><td>Current transformer sampling input 2 common end</td></tr>
<tr><td>2H</td><td>Current transformer sampling input 2</td></tr>
<tr><td>TA</td><td>Electromagnetic valve relay output</td><td rowspan="2">Electromagnetic valve On/Off control</td><td rowspan="2">NO.
Contact capacity:
250 V AC / 2 A ($COS\Phi = 1$);
250 V AC / 1 A ($COS\Phi = 0.4$);
30 V DC / 1 A.</td></tr>
<tr><td>TC</td><td>Electromagnetic valve relay output</td></tr>
</table>

4.2.2.1 AI terminal wiring

(1) Terminal 16 receives the single-ended input of analog voltage or current. The type of input can be selected from voltage or current via the setting of the thousands place of P09.01. The wiring method

is shown in the following figure.

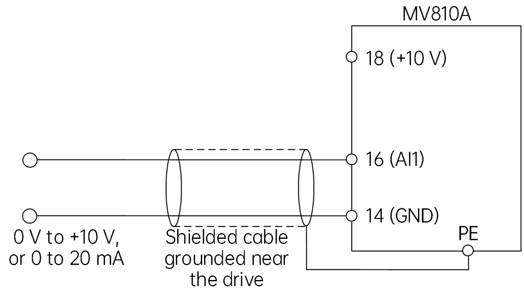


Figure 4-6 Terminal 16 single-ended input wiring

(2) Terminal 13 receives the analog current differential input, or analog voltage/current single-ended input. The type of input can be selected from voltage or current via the setting of the ones place of P09.02. The wiring method is shown in the following figures.

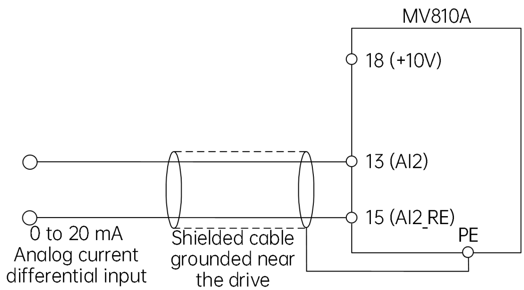


Figure 4-7 Terminal 13 current differential input wiring

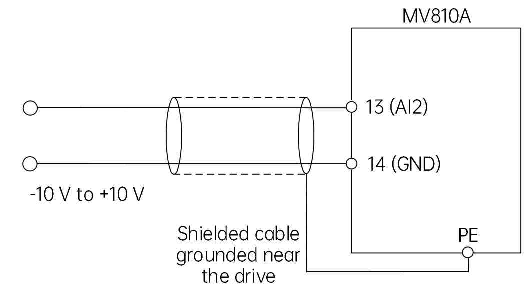


Figure 4-8 Terminal 13 voltage single-ended input wiring

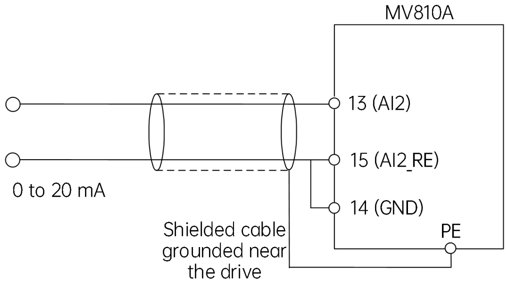


Figure 4-9 Terminal 13 current single-ended input wiring

4.2.2.2 AO terminal wiring

Analog output terminal AO1 is connected to an external analog meter to indicate multiple physical quantities. The type of output can be selected from analog voltage or current via the setting of P09.02. The terminal wiring method is shown in the following figure.

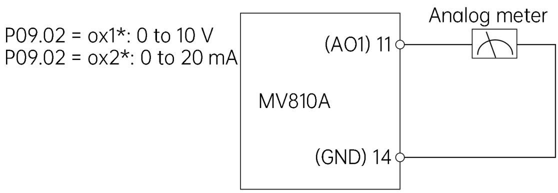


Figure 4-10 AO terminal wiring

WARNING

(1) For analog input, a filter capacitor or common mode inductor can be installed between the input signal and the GND.

(2) The voltage of the analog input signal shall not exceed 12 V.

(3) The analog input/output signal is vulnerable to external interference. Thus, shielded cables shall be employed and reliably grounded, and the length shall be as short as possible.

(4) The analog output terminal can withstand a voltage up to 12 V.

4.2.2.3 Communication interface wiring

MV810A provides a RS485 serial communication interface for users. Using the following wiring methods, a control system of single-host-single-slave or single-host-multi-slave can be created. The software of the host (PC or PLC controller) enables multiple control functions performed to the drive in the system, including real-time monitoring, remote control, auto control, and other complicated operations (for example, infinite multi-stage PLC running).

(1) Communication wiring between the drive and the host with RS485 interface:

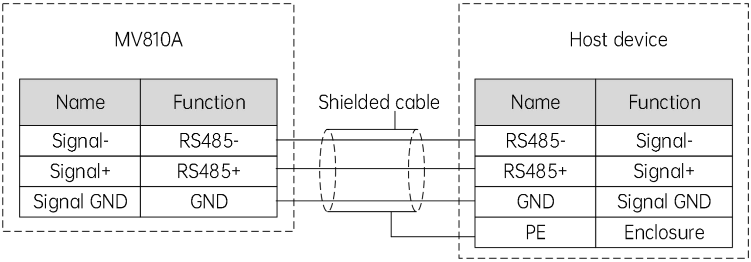


Figure 4-11　485-RS485 communication wiring

(2) Communication wiring between the drive and the host with RS232 interface:

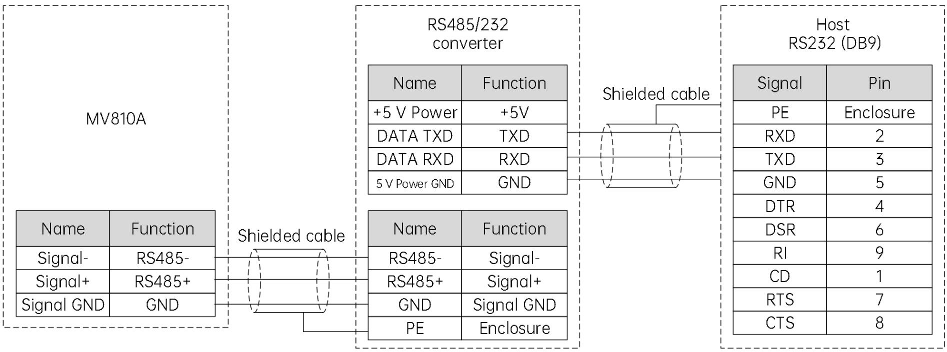


Figure 4-12　485-(RS485/232)-RS232 communication wiring

(3) Wiring of the multi-drive connection in a single RS485 network:

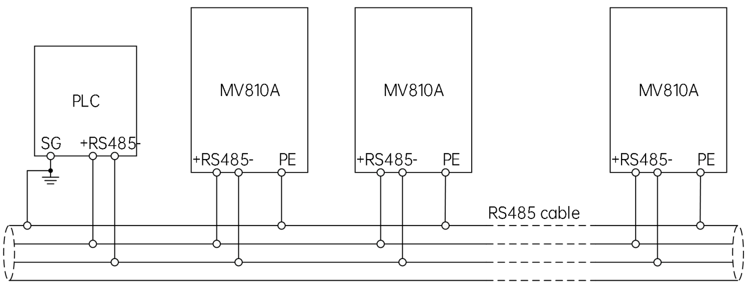


Figure 4-13　Recommended communication wiring between the PLC and multiple drives

(make sure all the drives and motors are reliably grounded)

In case the communication is abnormal when the above recommended wiring method is used, try the following measures:

(1) Provide dedicated power supply for the PLC (or the host device), or isolate its power supply. In case of

significant external interference, isolate its communication cables to protect the PLC (or the host device) from being interfered;

(2) Provide dedicated power supply for any RS485/RS232 converter used;

(3) Use magnetic rings on the communication cables;

(4) Reduce the carrier frequency of the drive properly if the on-site conditions permit.

WARNING

(1) An isolated RS485 converter shall be used in places with significant interference.

(2) The RS485 can not withstand a voltage over 30 V.

4.2.2.4 Multi-function input terminal wiring

MV810A offers multi-function input terminals 4, 5, 6, 7, 8, 10, 12, and 16, which can be set respectively as digital inputs DI1 to DI8 via the setting of P09.00 and P09.01. Multiple wiring methods are available via the setting of terminal open-circuit voltage selection P09.11. Typical wiring methods are illustrated below:

(1) P09.11 = 0 (set the digital terminal open-circuit voltage to 0 V)

① Dry contact mode, as shown in Figure 4-14.

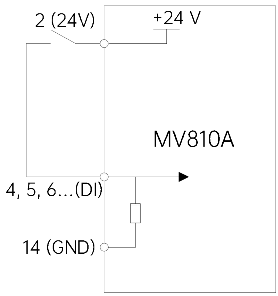


Figure 4-14 Wiring when using the internal +24 V power supply of the drive

② Wiring when the internal power supply of the drive is used and the external controller adopts the PNP common emitter output, as shown in Figure 4-15.

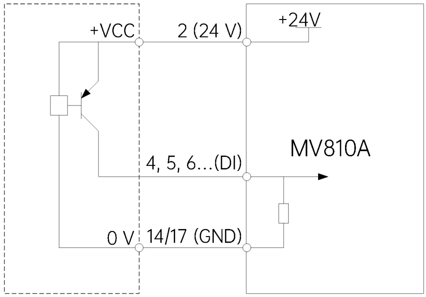


Figure 4-15　Wiring when using the internal power supply and the PNP type external controller

③ Wiring when the external power supply is used and the external controller adopts the PNP common emitter output, as shown in Figure 4-16.

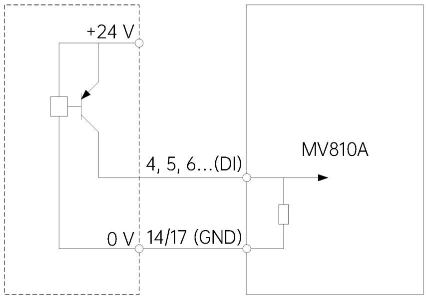


Figure 4-16　Wiring when using the external power supply and the PNP type external controller

(2) P09.11 = 1 (set the digital terminal open-circuit voltage to 24 V)

① Dry contact mode, as shown in Figure 4-17.

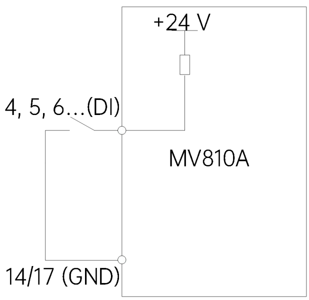


Figure 4-17　Wiring when using the internal +24 V power supply of the drive

② Wiring when the external controller adopts the NPN common emitter output, as shown in Figure 4-18.

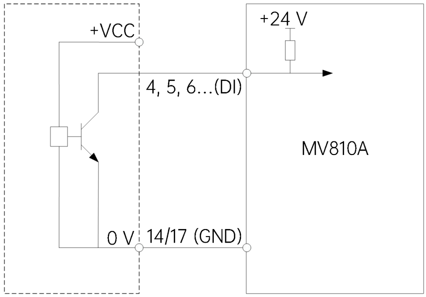


Figure 4-18 Wiring when using the NPN type external controller

4.2.2.5 Multi-function output terminal wiring

The multi-function output terminals 4 (DO1), 5 (DO2), and 11 (DO3) can use the internal +24 V power supply of the drive (load capacity not exceeding 200 mA). The wiring method is shown in Figure 4-19.

WARNING

The inductive load (such as a relay) must be anti-parallel with the fly-wheel diode.

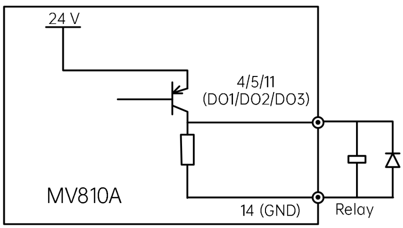


Figure 4-19 Wiring of the multi-function DO

4.2.2.6 Wiring of the relay output terminals

To drive the inductive loads (e.g., electromagnetic relay or contactor), a surge absorption circuit shall be added, such as the RC absorption circuit (whose leakage current shall be less than the holding current of the contactor or relay that it controls), piezoresistor, or fly-wheel diode (it is used in DC electromagnetic circuit; check its polarity carefully during installation). The components of the absorption circuit shall be installed near the two ends of the coil of the relay or contactor.

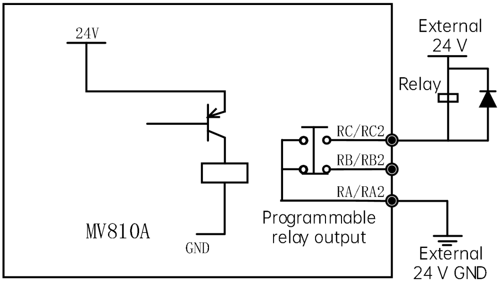


Figure 4-20　Wiring of the relay outputs RA/RB/RC

WARNING

(1) Do not short the 24 V terminal and the GND terminal. Otherwise, there is a risk of control board damage.

(2) For connection of the control terminals, use multi-core shielded cables or twisted cables (1 mm^2 or above).

(3) When a shielded cable is used, the end of the shield which is closer to the drive shall be connected to the grounding terminal PE of the drive.

(4) The control cables shall be kept at least 20 cm away from the main circuit and high-voltage circuit (including the power cable, motor cable, relay cable, contactor connection cable, etc.). Use perpendicular crossing layout and avoid parallel layout in wiring to reduce interference which may cause misoperation of the drive.

(5) For relays other than 24 V, an appropriate resistor shall be selected according to the relay parameters and connected in series to the relay circuit.

(6) The digital output terminals can not withstand a voltage over 30 V.

4.2.3 Control board layout

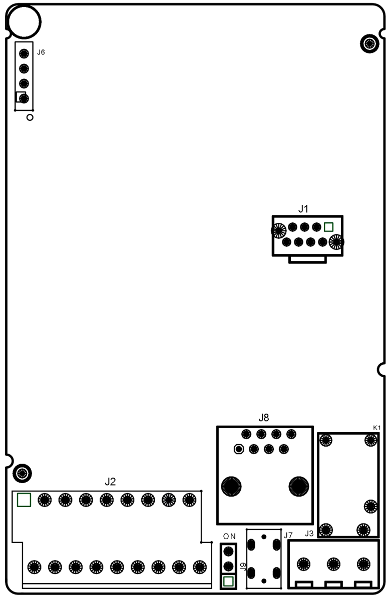


Figure 4-21 Control board layout

4.3 Installation method compliant with EMC requirements

Noise is inevitable during the drive operation, which deviates from the EMC requirements. To reduce the interference of the drive to the environment, detailed installation methods are provided in this section, which complies with the EMC requirements in terms of noise suppression, field wiring, grounding, leakage current, and power filter.

4.3.1 Noise suppression

The noise made by the drive may affect the equipment nearby. The extent of such influence is determined by various factors, including the noise immunity of the drive control system and related devices, the wiring environment, the installation distance, the grounding method, etc.

4.3.1.1 Types of noise

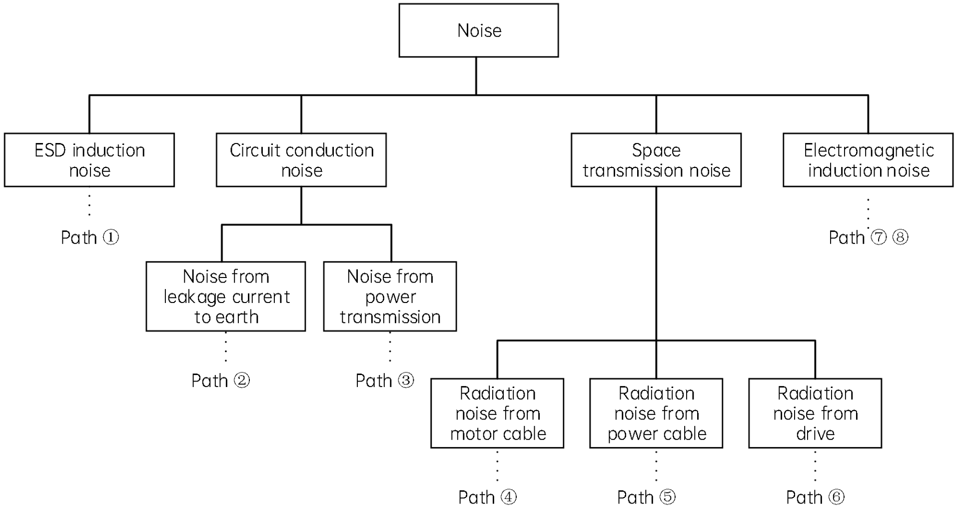


Figure 4-22 Types of noise

4.3.1.2 Noise transmission path

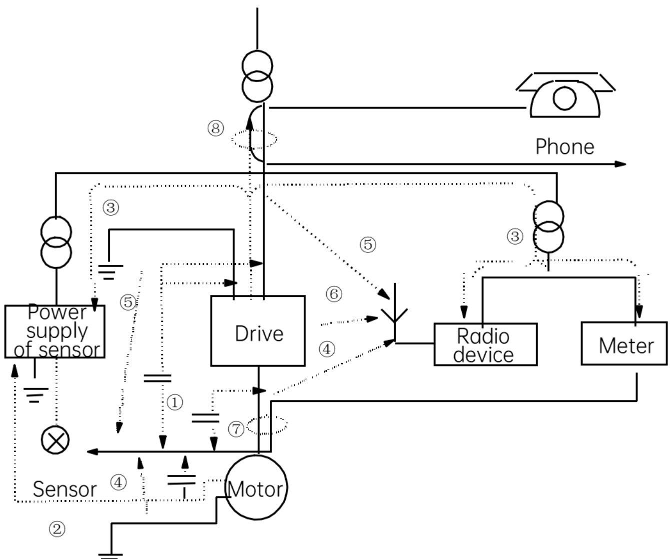


Figure 4-23 Noise transmission path

4.3.1.3 Basic measures for noise suppression

Table 4-9 Measures for noise suppression

Path	Measure
②	If the external devices form a closed loop due to the drive wiring, the leakage current of the drive grounding cable may cause misoperation of relevant devices. The misoperation can be reduced if the grounding is removed.
③	When the external devices and the drive share the same power system, the noise generated by the drive will be transmitted along the power cable in a reverse direction, causing misoperation of other devices in the system. Take the following measures: install a noise filter at the input end of the drive, and use an isolation transformer or power filter to isolate the noise for other devices.
④⑤⑥	If the devices (for processing weak signals, such as measuring instruments, radio devices, and sensors) and their signal cables are installed in the same cabinet with the drive and the wiring is very close, misoperation may occur due to noise in the space. Take the following measures: (1) Devices and signal cables vulnerable to noise should be installed away from the drive. The signal cables should be shielded, with the shield layer grounded. Besides, the signal cable shall be put into a metal tube, and placed away from the drive and its input/output cables. If the signal cable inevitably crosses the power cable, keep them orthogonal. (2) Install a radio noise filter and a linear noise filter (ferrite common mode choke) at the input and output ends of the drive respectively to suppress the radiation noise of the power cable. (3) The motor cable shall be placed in a thick shelter, such as a thick pipe (thickness exceeding 2 mm), or buried into the cement trough. The power cable shall be put into a metal tube, and grounded using a shielded cable (use 4-core cables for the motor cable, with one end grounded at the drive side, and the other end connected to the motor shell)
①⑦⑧	If the signal cables are laid in parallel with the power cables or bundled together with the power cables, electromagnetic induction noise and static induction noise generated will be transmitted along the signal cables to cause misoperation. Thus, such wiring should be avoided. Vulnerable devices shall be kept away from the drive, and vulnerable signal cables shall be kept away from the input/output cables of the drive. Besides, use shielded cables for signal and power cables, and put them into metal tubes separately to create better isolation. The distance between the metal tubes shall be at least 20 cm.

4.3.2 Field wiring requirements

To avoid interference coupling, the installed control cable, power cable and motor cable shall be kept away from each other, especially when the cables are installed parallel and extend for a long distance. If the signal cable inevitably crosses the power cable, ensure it crosses perpendicularly.

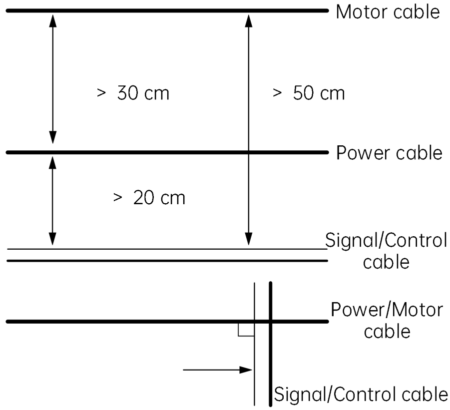


Figure 4-24 System wiring requirements

If the motor cable is too long or its cross sectional area is too large, derated use is required. The larger the cross sectional area is, the larger the ground capacitance and ground leakage current will be. If the cable with larger cross sectional area is used, the output current shall be reduced by about 5% for each level of increase in area.

Shielded/Armored cables: it is recommended to use high-frequency low-impedance shielded cables, such as woven copper mesh, aluminum mesh, or iron mesh.

Generally, the control cable must be a shielded cable, and the shielded metal mesh must be connected to the metal enclosure of the drive using the cable clamps on both ends.

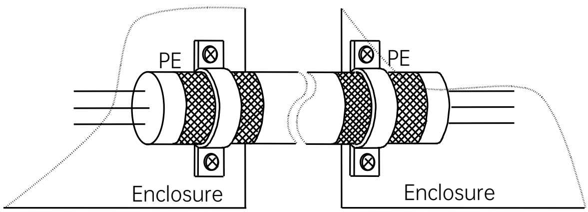


Figure 4-25 Correct shield grounding

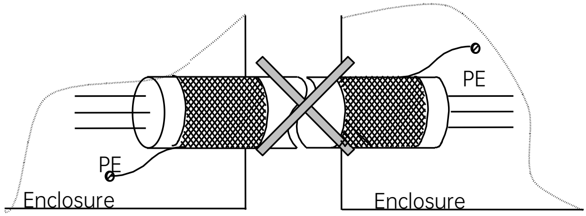


Figure 4-26 Wrong shield grounding

4.3.3 Grounding

Dedicated grounding pole (optimal)

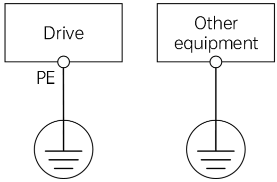


Figure 4-27 Grounding diagram 1

Shared grounding pole (applicable)

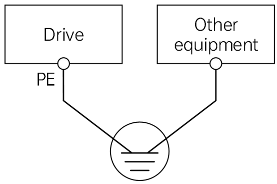


Figure 4-28 Grounding diagram 2

Shared grounding cable (not recommended)

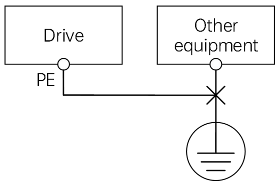


Figure 4-29 Grounding diagram 3

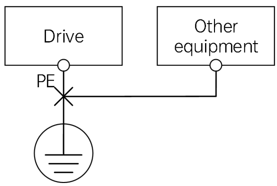


Figure 4-30 Grounding diagram 4

In addition, pay attention to the following notes:

- To minimize the impedance of different grounding systems, a standard grounding cable of the largest size shall be adopted. The flat cable is preferable to other types, because its high-frequency impedance is smaller than that of the round cable with the same cross sectional area.
- One core of the 4-core motor cable shall be grounded at the drive side at one end, and the other end shall be connected to the motor grounding end. It is much better if the motor and drive use the

dedicated grounding pole.

- If the grounding ends of the system are connected together, the leakage current will become a noise source which affects devices in the system. Therefore, the grounding end of the drive should be separate from the grounding ends of audio equipment, sensors, computers, and the like.
- To obtain low impedance with high-frequency, the fixing bolt of the equipment can be used as the high-frequency terminal connected to the back plate of the cabinet. Remember to scratch off the insulation paint of the fixing point.
- The grounding cable should be as short as possible (the grounding point shall be as close to the drive as possible).

The grounding cable should be kept away from the I/O cables of noise-sensitive equipment and be as short as possible.

4.3.4 Installation of relay, contactor, and electromagnetic brake

For devices capable of generating high level noises, such as relays, contactors, and electromagnetic brakes, a surge suppressor shall be installed even these devices are installed outside the drive enclosure.

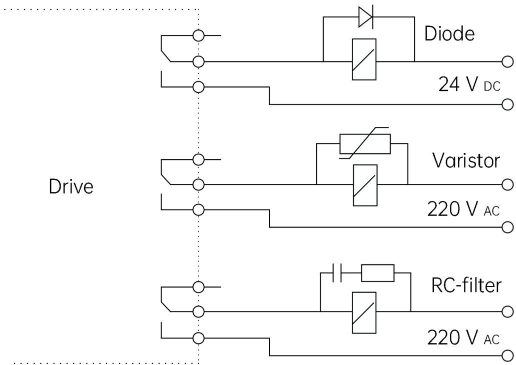


Figure 4-31 Installation method for relay, contactor, and electromagnetic brake

4.3.5 Leakage current and countermeasures

The leakage current flows through the motor capacitor and the line capacitor at the input/output end of the drive. The magnitude of the leakage current depends on the distributed capacitance and the carrier frequency. There are two types of leakage current: grounding leakage current and line-to-line leakage current.

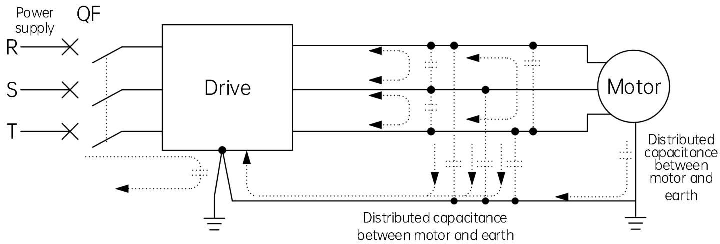


Figure 4-32 Leakage current path

(1) Grounding leakage current

The leakage current not only flows through the drive system, but also invades other equipment and devices through the grounding cables, causing misoperation of the leakage circuit breaker, relay, and other equipment. If the carrier frequency gets higher, or the motor cable gets longer, the leakage current will be larger.

Countermeasures:

- Reduce the carrier frequency (the motor noise will increase);
- Make the motor cable as short as possible;
- Adopt the leakage circuit breaker dedicated for protection against the leakage current of high surge and high-order harmonics in the drive system and other related systems;
- Prevent the leakage protection by disconnecting the EMC capacitor connection screw, as shown in Figure 4-33.

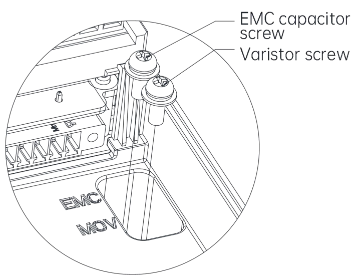


Figure 4-33 Screws for EMC capacitor and varistor

(2) Line-to-line leakage current

When the leakage current flows through the distributed capacitance between the cables at the output ends of the drive, its high-order harmonics may cause misoperation of the external thermal relay. Larger leakage current may be generated by a drive with smaller power capacity (7.5 kW and below) and longer wiring cables (over 50 m), making misoperation more likely to happen.

Countermeasures:

- Reduce the carrier frequency (the motor noise will increase);
- Install a reactor at the output end.

To reliably protect the motor, it is recommended to use a temperature sensor to monitor the motor temperature, and use the overload protection function (electronic thermal relay) of the drive instead of the external thermal relay.

4.3.6 Drive installation compliant with EMC requirements

Partition principle

In the drive system formed by the drive and motor, the drive, control unit, and sensor are installed in the same cabinet. The noise emitted outwards needs to be suppressed at the main connection points. Therefore, the radio noise filter and input reactor shall be installed in the cabinet. The cabinet shall also meet the EMC requirements.

To physically isolate the noise source and the noise receiver in space in the mechanical/system design stage is the most effective yet expensive measure for interference reduction. In the drive system formed by the drive and motor, the noise source could be the drive or contactor, and the noise receiver could be the automation device, encoder, or sensor.

Divide the mechanical/system layout into different EMC areas based on their distinctions in electrical characteristics. It is recommended to place and install the devices in their corresponding areas as shown in Figure 4-34.

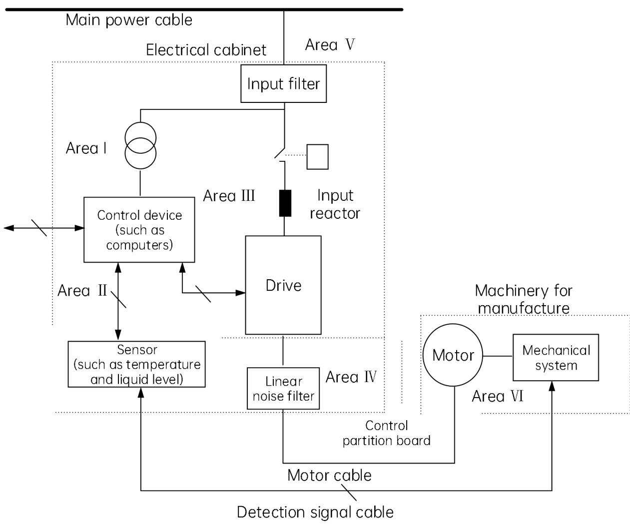


Figure 4-34 Recommended partition for the EMC installation of the drive

Note:

Area Ⅰ: The control power transformer, control system, sensor, etc.

Area Ⅱ: The interface for the signal and control cables, requiring certain degree of anti-interference capabilities.

Area Ⅲ: The input reactor, drive, contactor, and other noise sources.

Area Ⅳ: The output noise filter and its wiring.

Area Ⅴ: The power supply (including the wiring of the radio noise filter).

Area Ⅵ: The motor and its wiring.

- These areas shall be physically isolated from each other for the purpose of electromagnetic decoupling.
- Maintain a minimum spacing of at least 20 mm between areas.
- Each area shall be decoupled via the grounding plate. Cables of different areas shall be placed in separate cable conduits.
- The filters shall be installed at the joints between areas.
- All communication cables (such as RS485) and signal cables extending out from the cabinet shall be shielded.

Electrical installation diagram for the drive

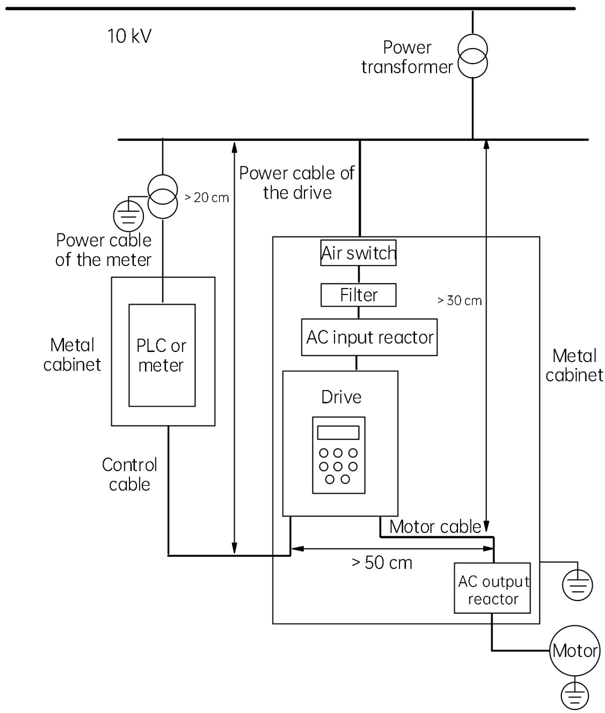


Figure 4-35 Installation diagram for the drive

The motor cable shall be grounded at the drive side. It is recommended to separately ground the motor and the drive.

The motor cable and control cable should be shielded or armored. The shielding metal mesh shall be connected to both ends of the grounding cable through cable clamps to avoid the twisting of the ends of the metal mesh. Otherwise, the shielding effect will be reduced in the high-frequency conditions.

Ensure good conductivity among the mounting plate, mounting screws and the drive's metal enclosure. The tooth-type paint scratching gasket and conductive mounting plate shall be used.

If the number of the sensitive devices on the installation site is limited, it is feasible to only install a separate power filter at the device side, which may reduce the cost.

4.3.7 Operating instructions for power filter

A power filter shall be used for the device either capable of generating strong interference or sensitive to external interference. The power line filter is a two-way low-pass filter, which allows the passage of DC or 50 Hz power line frequency current while rejecting the passage of the current with high-frequency electromagnetic interference.

Role of the power line filter

It enables the device to meet the EMC requirements on conducted emission and conducted susceptibility, and also serves to suppress the radiated emission of the device.

It is able to prevent the electromagnetic interference generated by the device from entering the power line, and the interference generated by the power line from entering the device.

Common mistakes during the installation of the power line filter

(1) Excessively long input cable of the power supply

The filter shall be installed close to the power cable inlet of the cabinet. The in-cabinet part of the filter power input cable shall be as short as possible.

(2) The input and output cables of the power line filter are too close to each other

If the input and output cables of the filter are too close to each other, the high-frequency interference signal will be directly coupled through the input and output cables, and bypass the filter, making the power line filter ineffective.

(3) Poor filter grounding

The filter enclosure must be reliably connected to the metal enclosure. There is usually a dedicated grounding terminal on the filter enclosure. However, it is insufficient to suppress the high-frequency interference signal if only a single-cable connection between the filter and the enclosure is employed, because the impedance of long cables (not the resistance of the resistor) is excessively large at high frequency, making the bypass ineffective. The correct installation method is to directly install the filter enclosure against the conducting surface of the metal enclosure of the device, with the insulating paint removed.

4.3.8 Radiated emission of the drive

Radiated emission is inevitable during the operation of the drive. It has little impact on equipment outside the metal cabinet because the drive is usually installed inside the cabinet. Thus, the main source of radiated emission is the external connection cables. Conduct proper wiring according to the requirements in this section to effectively suppress the radiated emission of the cables.

If the drive and other control devices are installed in the same cabinet, isolate each area and conduct proper wiring, shielding and line crossing based on the partition principles mentioned above.

4.4 Air compressor commissioning

To quickly complete the air compressor drive commissioning, instructions on the wiring for basic operations, control logic, and the commissioning steps of the drive are provided in this section.

4.4.1 Wiring for basic operations

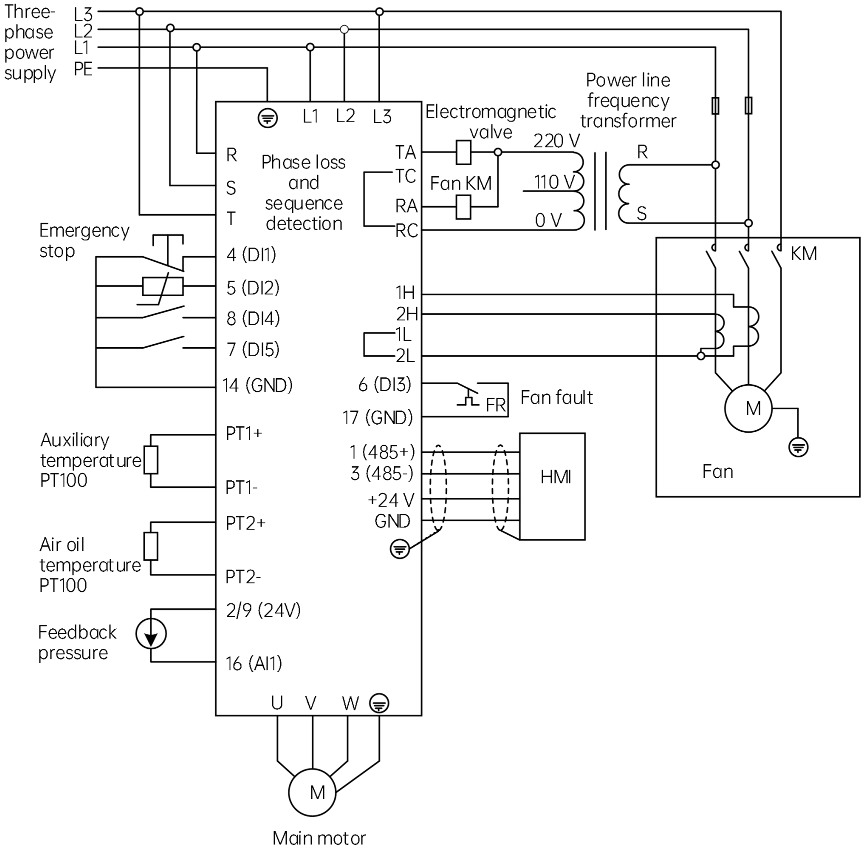


Figure 4-36 Basic wiring diagram 1

WARNING

(1) Terminals AI1 and AI2 can set to voltage signal input or current signal input by function codes P09.01 and P09.02.

(2) Terminal AO1 can be set to voltage signal output or current signal output by function code P09.02.

(3) For instructions on control circuit terminals, refer to Section 4.2.

4.4.2 Air compressor control logic

(1) The control logic of the air compressor is illustrated below:

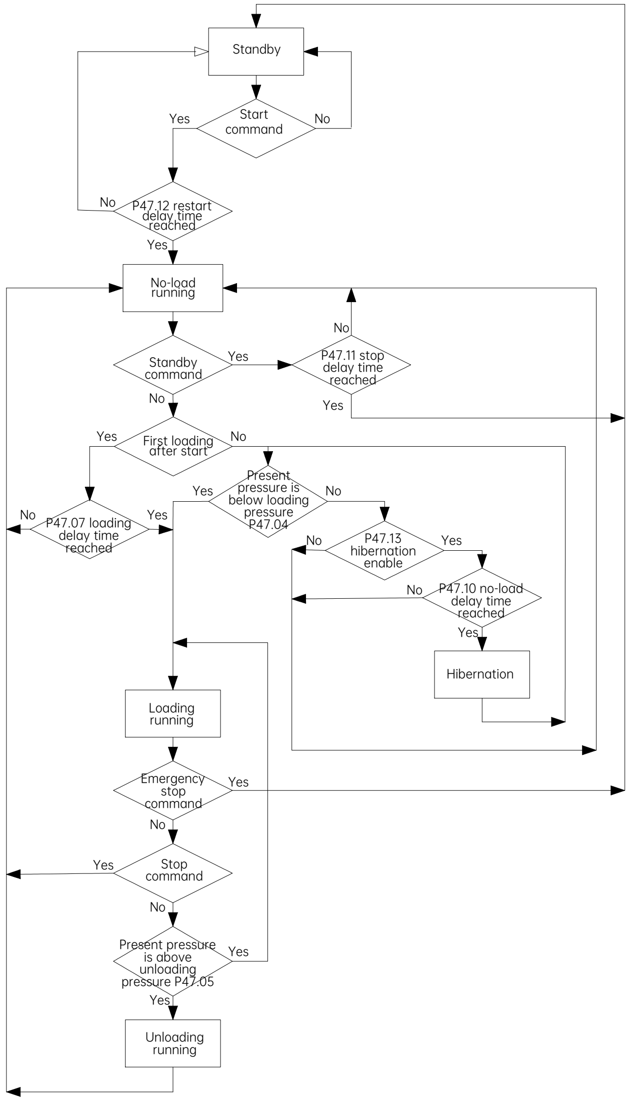


Figure 4-37 Air compressor control logic

(2) Control of the running pressure/frequency during air compressor operations is shown in Figure 4-38:

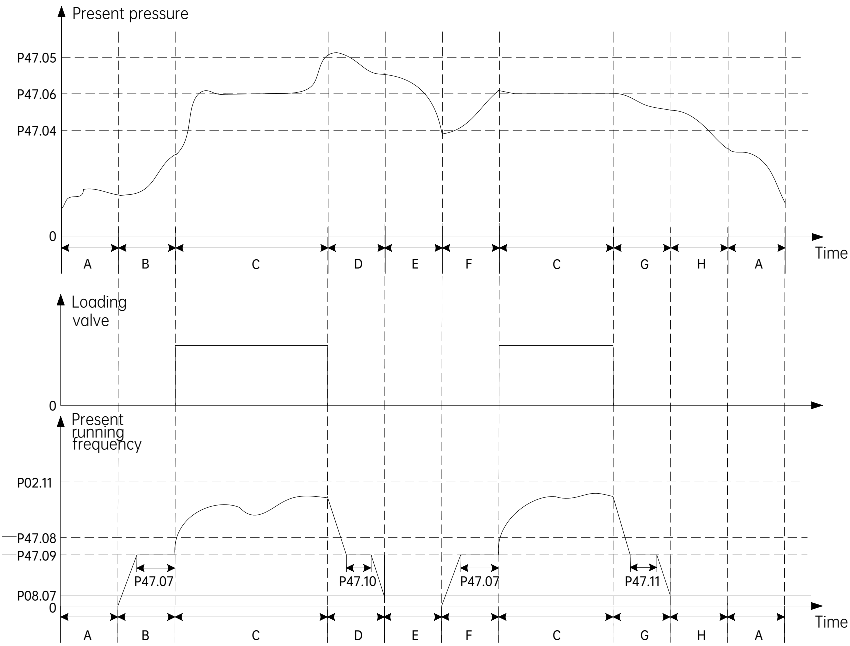


Figure 4-38 Running pressure/frequency control of the air compressor

In the above figure, P47.05 refers to the unloading pressure, P47.04 refers to the loading pressure, P47.06 refers to the pressure reference, P02.11 refers to the frequency upper limit, P47.08 refers to the loading running frequency lower limit, P47.09 refers to the no-load running frequency, and P08.07 refers to the stop frequency.

The control process of the air compressor comprises the following main stages: A to H.

Each stage is explained below:

A: Standby state.

B: Beginning stage of start; the duration is P47.07 (including part of the P02.13 acceleration time 1).

C: Constant-pressure exhaust stage during loading; pressure PID adjustment is valid.

D: Unloading stage; the duration includes P47.10 and part of the P02.14 deceleration time 1.

E: Hibernation stage; the drive does not run.

F: Wake-up and start stage; the duration is P47.07 (including part of the P02.13 acceleration time 1).

G: Beginning stage of stop; the duration includes P47.11 and part of the P02.14 deceleration time 1.

H: Restart delay stage after stop; the duration is P47.12.

In the automatic loading/unloading mode, when the air compressor control is valid and the air supply of the compressor turns normal after start, if the exhaust pressure is detected to be above P47.05, automatic unloading will be applied. If the hibernation function is enabled, the drive will enter the hibernation state. If the hibernation function is disabled, the drive will run continuously at the no-load running frequency P47.09. When the exhaust pressure is detected to be below P47.04, automatic loading will be applied. During loading running, the rotation speed of the main motor is controlled by the pressure PID. P47.06 is the air supply pressure during the stable running of the air compressor. The drive keeps the exhaust pressure at a constant value by regulating the rotation speed of the main motor. The constant pressure control adopts the PID algorithm, and the frequency reference source of the main motor is set via P02.05 = 6. The reference source of PID is set via P14.00 = 7. The pressure reference is set by P47.06. The feedback source of PID is set via P14.01 = 10, which is acquired by detecting the pressure signal. The PID parameters P14.13, P14.14, and P14.15 adopt the system default values.

WARNING

The stop mode of the drive is set by P08.06, and the default setting is "Decelerate to stop." During the unloading stage or upon a normal stop command, the drive will enter the "Decelerate to stop" mode; during any fault or upon an emergency stop command, the drive will enter the "Coast to stop" mode.

4.4.3 Air compressor commissioning instructions

For the commissioning of the MV810A air compressor drive, it is recommended to use the touch screen HMI. The steps are explained below:

Note:

The parameters displayed in the following images serve as reference only. Refer to the actual displayed data during use.

Figure 4-39 The Login interface

The touch screen displays the Login interface as shown in Figure 4-37 after power on. Click the Enter button at the bottom right to enter the main working interface.

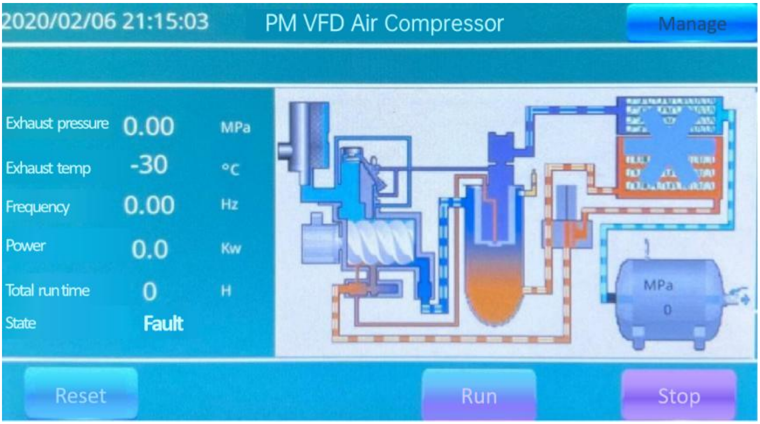


Figure 4-40 Main working interface

The left side of the main working interface displays the present data, such as the exhaust pressure and the exhaust temperature; the right side displays the dynamic diagram of the air compressor system. At the bottom of the interface sit three buttons, respectively used for fault reset, system run, and stop. Click the Manage button at the top right to enter the Manage interface.

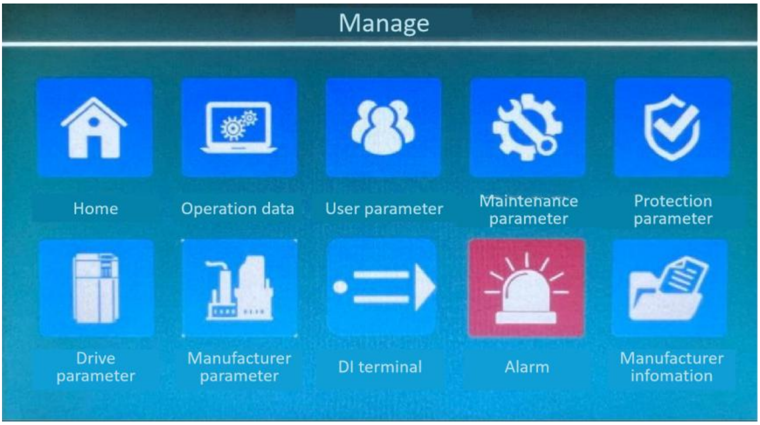


Figure 4-41 The Manage interface

The user can check system parameter when needed in the Manage interface. Each parameter group is explained below.

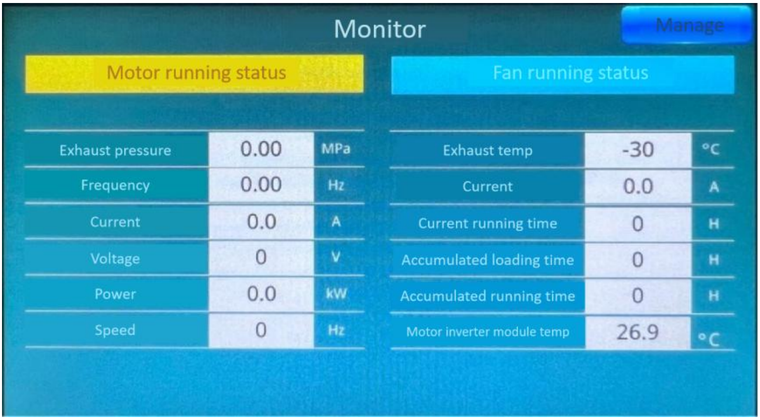


Figure 4-42 The Monitor interface

The user can check the parameters of the main motor and the fan motor in the Monitor interface, such as the exhaust pressure, the present running frequency, and the current. The displayed parameters are read-only.

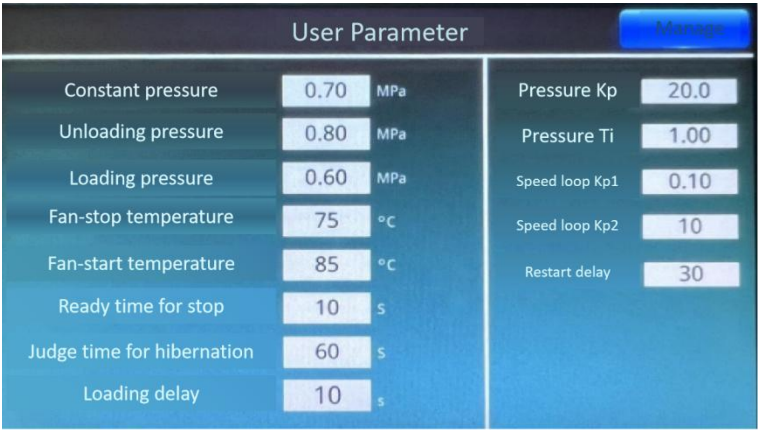


Figure 4-43 The User Parameter interface

The user can set the parameters related to the compressor loading and the constant-pressure control in the User Parameter interface.

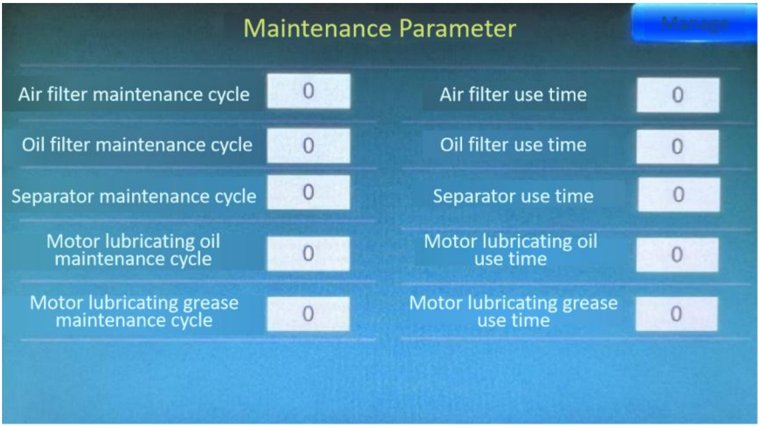


Figure 4-44 The Maintenance Parameter interface

The user can set the maintenance time and the use time of five components in the Maintenance Parameter interface. When the use time exceeds the maintenance time, the system will report to the user via an alarm (bit0 to bit4 of P48.16).

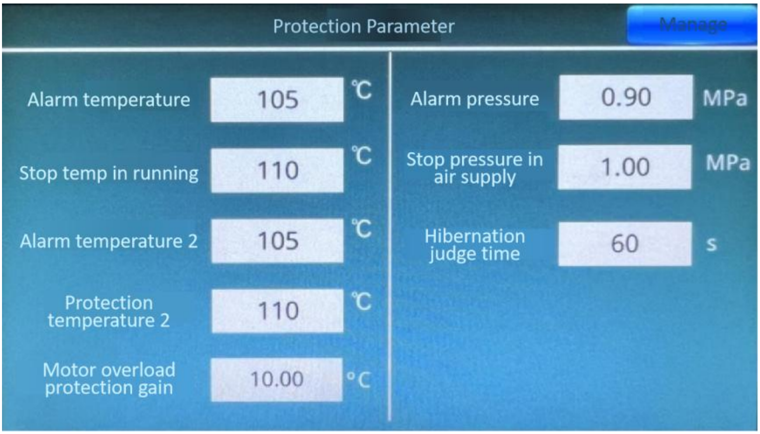


Figure 4-45 The Protection Parameter interface

The user can set the parameters related to the pressure/temperature pre-alarm and its threshold in the Protection Parameter interface.

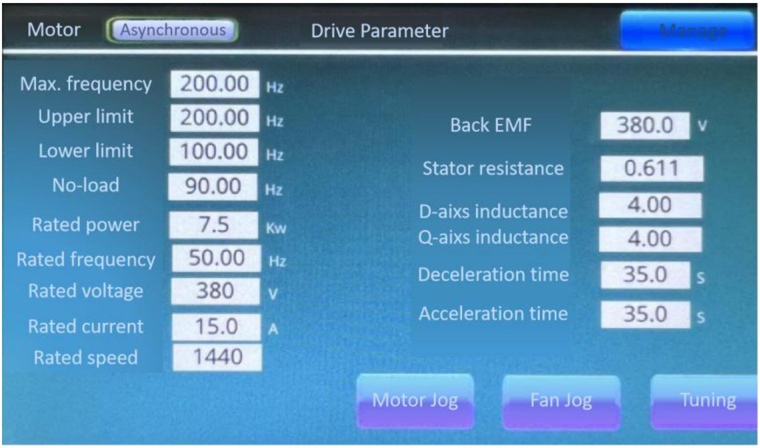


Figure 4-46 The Drive Parameter interface

The user can set the drive parameters in the Drive Parameter interface. For the first commissioning of a new drive, it is required to set the maximum frequency, the frequency upper limit, and the motor rated parameters according to the motor nameplate before clicking the Tuning button to start the static auto-tuning.. This auto-tuning is capable of learning the resistance and inductance of the motor only, while the back EMF shall be set manually. After the auto-tuning, check the rotation direction by clicking the Motor Jog button and the Fan Jog button; if the direction is not correct, interchange any two phases of the motor

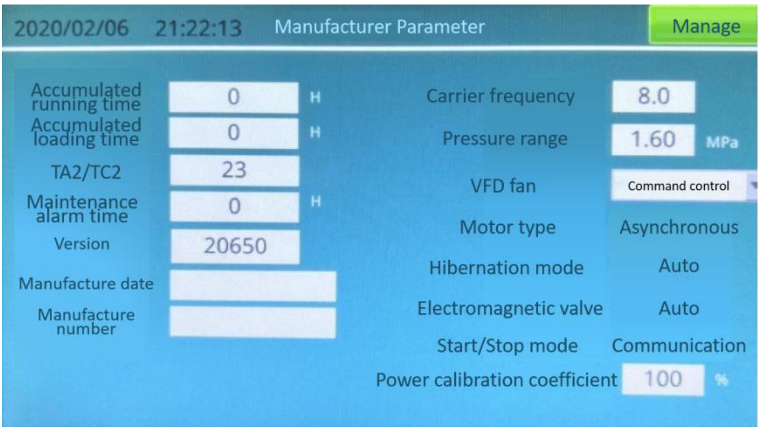


Figure 4-47 The Manufacturer Parameter

The user can set the parameters including the carrier frequency and the hibernation mode, etc., in the Manufacturer Parameter interface.

Figure 4-48 The Current Fault interface

The user can check fault information in the Current Fault interface. Click the Record button to view the fault record.

Figure 4-49 The Fault Record interface

The user can view the previous fault type and its variables in the Fault Record interface. The variables include the current, frequency, and voltage. Click the Clear Record button to remove the record off the table, and click the Clear Data button to remove the data of the corresponding variables off the table.

Chapter 5 Quick Operation Guide

5.1 Operating panel

5.1.1 Introduction of operating panel

The MV810A Series provides two types of operating panels: one is the small-size operating panel as standard configuration for models with a power rating of 75 kW or less, and the other is the multi-functional large-size operating panel (model MV820-DP03) as standard configuration for models with a power rating of 90 kW or above. The large-size operating panel can also be used as the option for other models (refer to Section 2.5 for installation dimensions). The small-size operating panel is illustrated below.

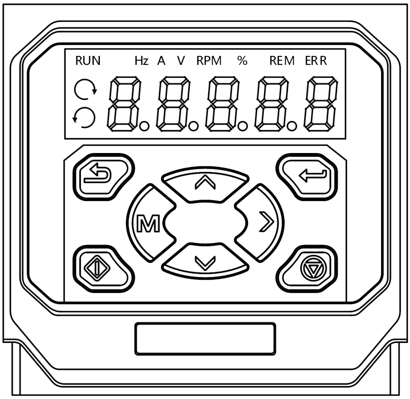


Figure 5-1 Small-size operating panel

5.1.1.1 LED indicator description of small-size operating panel

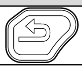
Table 5-1 LED description of small-size operating panel

LED		Name	Description	Color
Unit	Hz	Frequency indicator	Blinking: Currently on display is the running frequency; ON: Currently on display is the frequency reference.	Yellow
	A	Current indicator	ON: Currently on display is the current.	Yellow
	V	Voltage indicator	ON: Currently on display is the voltage.	Yellow

LED		Name	Description	Color
	RPM	Speed indicator	ON: Currently on display is the rotating speed.	Yellow
	%	Percentage indicator	ON: Currently on display is the percentage.	Yellow
Status	↻	FWD rotation indicator	ON in stop state: There is a FWD run command from the drive; ON in the running state: The drive is in the FWD running state. Blinking: The drive is switching from FWD run to REV run.	Green
	↺	REV rotation indicator	ON in stop state: There is a REV run command from the drive; ON in the running state: The drive is in the REV running state. Blinking: The drive is switching from REV run to FWD run.	Green
	ERR	Alarm indicator	ON: The drive is in the alarm state.	Red
	RUN	RUN indicator	ON: Running; Blinking: Stopping; OFF: Stopped	Green
	REM	Channel indicator	OFF: Local; Blinking: Communication; ON: Terminal.	Yellow

5.1.1.2 Button/Key instructions of small-size operating panel

Table 5-2 Button functions of small-size operating panel

Key	Name	Function
	Return	Press to exit from the programming state.
	Program/Confirm	Press to enter a menu or confirm setting.
	Increase	Press to increase the data value or function code number.
	Decrease	Press to decrease the data value or function code number.

Key	Name	Function
	Shift	When in the editing mode, press the key to shift the data digit for modification; When in other state, press the key to shift the display of status parameters.
	Multi-functional key	Refer to Table 5-3 for multi-functional key usage.
	RUN	When in the operating panel channel mode, press the key to run the system.
	Stop/Reset	Press to stop running or reset the fault.

5.1.1.3 Large-size operating panel

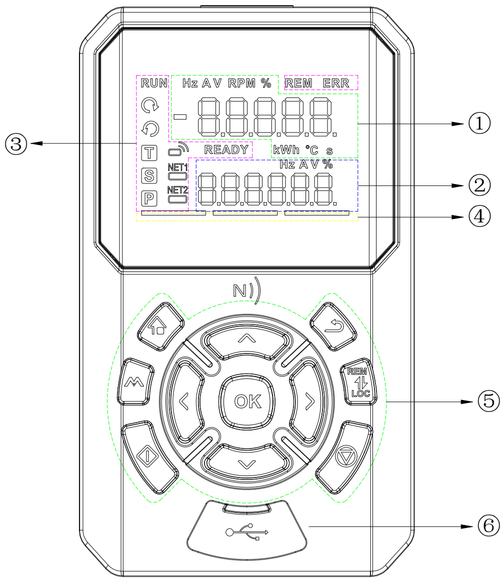


Figure 5-2 Large-size operating panel

Number	Name	Description
①	Main display zone	It displays the drive parameters, their units and positive/negative properties.
②	Auxiliary display zone	It displays the drive monitoring parameter values and their unit.

Number	Name	Description
③	Status indication zone	It indicates the following statuses of the drive: 1. Power-on status (normal or abnormal); 2. Operational status (running or stopped); 3. Rotation direction (FWD or REV); 4. Control mode (local or remote); 5. Fault/alarm status; 6. Operating mode (speed/torque/position); 7. Communication status; 8. Wireless NFC status.
④	Menu mode indication zone	It indicates the present mode of the menu (quick-commissioning menu, basic menu, modification record menu, etc.).
⑤	Key zone	It is used to input the function code and data information of the drive.
⑥	USB-Type C port	It connects the drive to the PC host device.

5.1.1.4 LED indicator description of large-size operating panel

Table 5-3 LED description of large-size operating panel

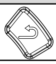
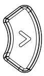
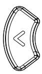
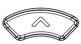
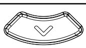
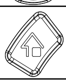
LED		Name	Description	Color
Unit	Hz	Frequency indicator	Blinking: Currently on display is the running frequency; ON: Currently on display is the frequency reference.	White
	A	Current indicator	ON: Currently on display is the current.	White
	V	Voltage indicator	ON: Currently on display is the voltage.	White
	r/min	Speed indicator	ON: Currently on display is the rotating speed.	White
	%	Percentage indicator	ON: Currently on display is the percentage.	White
	℃	Temperature indicator	ON: Currently on display is the temperature in Celsius.	White
	s	Time indicator	ON: Currently on display is the time in seconds.	White

LED		Name	Description	Color
	kWh	Power indicator	ON: Currently on display is the power.	White
Status	↻	FWD rotation indicator	ON in stop state: There is a FWD run command from the drive; ON in the running state: The drive is in the FWD running state. Blinking: The drive is switching from FWD run to REV run.	Green
	↺	REV rotation indicator	ON in stop state: There is a REV run command from the drive; ON in the running state: The drive is in the REV running state. Blinking: The drive is switching from REV run to FWD run.	Green
	ERR	Alarm indicator	ON: The drive is in the alarm state.	Red
	RUN	RUN indicator	ON: Running; Blinking: Stopping; OFF: Stopped	Green
	REM	Channel indicator	OFF: Local; Blinking: Communication; ON: Terminal.	White
	T	Torque control indicator	ON: The drive is in the torque control mode.	White
	S	Speed control indicator	ON: The drive is in the speed control mode.	White
	P	Position control indicator	ON: The drive is the position control mode.	White
		Wireless communication indicator	Blinking: Waiting to be connected; ON: Successful connection; OFF: Function disabled	White
	NET1	Communication indicator 1	Reserved	-
	NET2	Communication	Reserved	-

LED		Name	Description	Color
		indicator 2		
	READY	Standby indicator	Steady ON: In stop state	White
		Menu mode indicator	ON: It displays the present menu mode (from left to right: quick-commissioning menu, full menu, and modification record menu).	White
		Negative sign indicator	ON: Currently on display is a negative value; OFF: Currently on display is a positive value.	White
		Main/Auxiliary zone indicator	ON: Currently in operation is the (main/auxiliary) display zone.	White

5.1.1.5 Button/Key instructions of large-size operating panel

Table 5-4 Button functions of large-size operating panel

Key	Name	Function
	Return	Press to exit from the programming state.
	Right shift	It is used to shift the data digit for modification or to switch the display of status parameters. Press to right shift the monitored variable; Press to shift the blinking digit to the right.
	Left shift	It is used to shift the data digit for modification or to switch the display of status parameters. Press to left shift the monitored variable; Press to shift the blinking digit to the left.
	RUN	When in the operating panel channel mode, press the key to run the system.
	Stop/Reset	Press to stop running or reset the fault.
	Up	Press to increase the data value or function code number.
	Down	Press to decrease the data value or function code number.
	Confirm	Press to enter the next level menu or confirm setting.
	Menu switchover	Short press to switch between menu modes (including quick-commissioning menu, full menu, and modification

Key	Name	Function
		record menu) which follow the setting of parameter P00.00. Press and hold the key to switch between the main display zone and the auxiliary display zone.
	Multi-functional key	Set the button function through the setting of parameter P00.04 (including jogging, FWD/REV switchover, etc.).
	Channel switchover	Press to switch between channels (local, terminal, and communication).

Table 5-5 Usage of multi-functional key

Multi-functional key	Function	Description
0	No function	The key serves no purpose.
1	FWD jog	The key functions as FWD jog key. The function is valid in three command channels. Press and hold to key to start FWD jogging. Release the key to stop FWD jogging.
2	REV jog	The key functions as REV jog key. The function is valid in three command channels. Press and hold to key to start REV jogging. Release the key to stop REV jogging.
3	FWD/REV switchover	The key functions as RWD/REV switchover key. The function is valid only in the operating panel command channel. The function is valid in both stop and running state.
4	Command channel switchover 1	The key functions as command channel switchover key. The function is valid only in the stop state. The switchover is in a cyclic mode, and the sequence is local, terminal, and remote.

5.1.1.6 Status of operating panel display

The display of the MV810A Series can be set to the stop state display, the running state display, the parameter editing state display, and the fault state display.

(1) Stop state display

When the drive is in the stop state, the operating panel displays the related statuses as shown in Figure 5-3a. The unit indicator shows the unit of the displayed parameter value.

If verification mode is selected, only the number of parameters whose settings differ from the default values will be displayed. Press ∨ and ∧ keys to scan over those parameters, so the user will know which parameter has been modified.

Press key to cyclically shift the display of different status parameters in the stop state (determined by P16.03).

(2) Running state display

The drive starts running after a valid RUN command is received, and the operating panel displays the related running statuses. The RUN indicator will be ON. The FWD/REV indicator will ON/OFF according to the actual running direction. As shown in Figure 5-3b, the unit indicator shows the unit of the displayed parameter value.

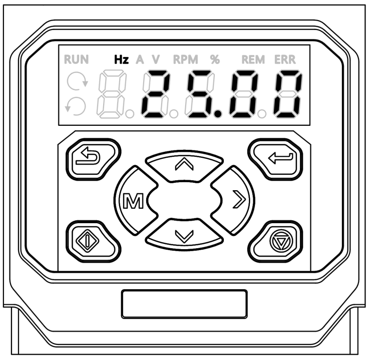
Press key to cyclically shift the display of all status parameters available in the running state (determined by P16.00 and P16.01).

(3) Fault state display

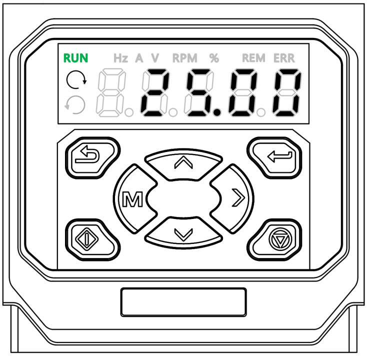
The operating panel enters the fault state display once the drive receives a fault signal. As shown in Figure 5-3c, the fault code will be on display.

Press key to cyclically shift the display of fault codes and the status parameters in the stop state. Reset the fault via the key on the operating panel, the control terminal, or the communication command. If the fault persists, so will its display.

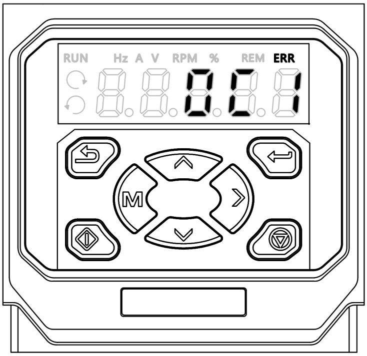
When a fault is detected, set the stop mode or determine whether to continue running through the setting of the corresponding fault protection property (P97.15 to P97.19).



a Stop state display



b Running state display



c Fault state display

Figure 5-3 Large-size operating panel

(4) Parameter editing state display

When the drive is in the stop, running, or fault state, press key to enter the editing state (if a password is required, please refer to parameter P00.01). The editing menu display is structured in three levels, respectively the function code group or function code number → function code parameter → parameter value. Press to enter the value display mode where the user can press to save the parameter value or press to exit and re-enter the previous-level menu.

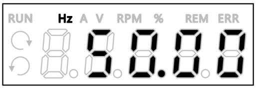
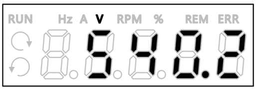
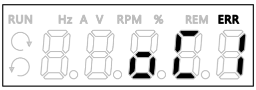
5.1.2 LED display symbols

The corresponding relationship between the display symbols and the letters/numbers is as follows.

Symbol	Meaning	Symbol	Meaning	Symbol	Meaning	Symbol	Meaning
0	0	A	A	I	I	S	S
1	1	b	b	J	J	T	T

Symbol	Meaning	Symbol	Meaning	Symbol	Meaning	Symbol	Meaning
	2		C		L		t
	3		c		N		U
	4		d		n		V
	5		E		O		y
	6		F		o		-
	7		G		P		.
	8		H		q		
	9		h		r		

Examples of LED display:

LED display zone	Unit indicator	Data/Code on display	Data/Code meaning
	Steady ON	Blinking	Frequency reference
	Blinking	Steady ON	Output frequency
	Steady ON	Blinking	Bus voltage
	Steady ON	Steady ON	Bus voltage
	Steady ON	Steady ON	Fault of acceleration over-current

WARNING

The data is blinking when the drive is the stop or standby state, and steady on when the drive is in the running or fault state. Refer to P16 (Keypad display setting parameters) in Section 7.17 for details of the parameters available for display setting in the standby or running state.

5.1.3 Examples of operation

The following example is based on frequency reference setting in the stop state. The default value is 50.00 Hz. The bold number in the figures indicates an editing state.

The example is based on small-size operating panel. Same methods shall apply for large-size operating panels.

5.1.3.1 Setting of password

The password function is provided to protect the parameters. When set, the user shall enter the correct password before editing parameters. Additionally, a correct manufacturer password shall be input before entering the manufacturer parameters and the AI/AO correction group.

WARNING

Do not modify the manufacturer parameters. Incorrect modification may result in drive malfunction or even damage.

Function code P00.01 is used to set the user password.

If the user password is set to 1368 and the setting is confirmed, the drive will be locked out at the time, and all operation is denied. The user can unlock the drive by entering the password through the following processes.

(1) When the drive is locked out, press , and the LED will enter the password verification state 00000;

(2) Change 00000 to 01368;

(3) Press to confirm the setting, and the password is verified with the LED displaying P00.

The above processes are illustrated in Figure 5-4.

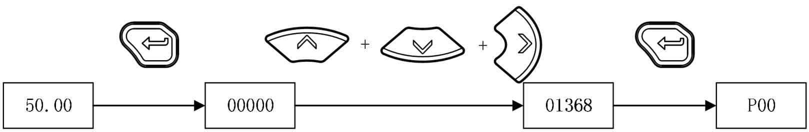


Figure 5-4 Example of password unlocking

After the password is verified, the drive is ready for further operation.

WARNING

If no operation is performed via the keys during 30 seconds after the password is verified, the drive will be locked out by password again.

5.1.3.2 Restoration to default setting

If P00.05=2, restoration to factory default setting is enabled. Such restoration operation shall restore the parameters to default values.

(1) When in the stop state display mode, press to enter the level-1 menu P00;

(2) Press to enter the level-2 menu P00.00;

(3) Press to change P00.00 to P00.05;

(4) Press to enter the level-3 menu;

(5) Press to change 0 to 2;

(6) Press to confirm the setting and re-enter the level-2 menu; modification is completed.

The above processes are illustrated in Figure 5-5.

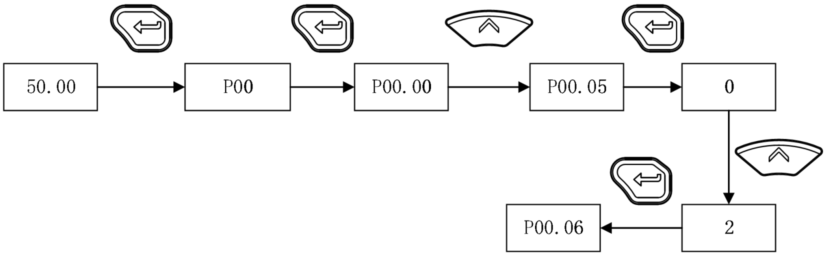


Figure 5-5 Example of restoration to factory default settings

5.1.3.3 Set the frequency reference

The following example is based on the frequency reference modification P02.09=25.00 Hz.

The processes of changing P02.09 from 50.00 Hz to 25.00 Hz.

(1) When in the stop state display mode, press to enter the level-1 menu P00;

(2) Double press ∧ to enter the level-1 menu P02;

(3) Press to enter the level-2 menu P02.00;

(4) Press nine times to enter the level-2 menu P02.09;

(5) Press to enter the level-3 menu 50.00;

(6) Press to select the thousands place or the hundreds place;

(7) Press to change 50.00 to 25.00;

(8) Press to confirm the setting and re-enter the level-2 menu; modification is completed;

(9) Double press to enter the main display view where 25.00 is displayed.

The above processes are illustrated in Figure 5-6.

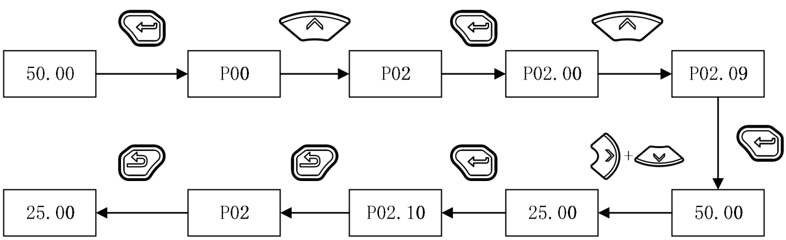


Figure 5-6 Example of frequency reference setting

5.1.3.4 Parameter monitoring

Through function codes P16.00, P16.01, and P16.02, the user can select the parameters to be displayed in the running state, including frequency reference, input frequency, bus voltage DI, Do, and AI, etc. For details, please refer to P16. When parameters are selected, the user can view them in order by pressing on the operating panel. The example in Figure 5-7 illustrates the status parameter display switchover in the running state when P16.00=0xF0, P16.01=0xF, and P16.02=4.

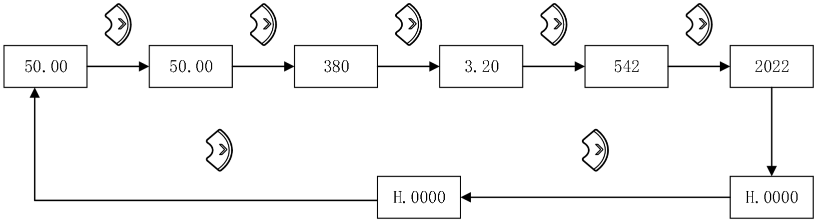


Figure 5-7 Example of status parameter monitoring

5.1.3.5 Status parameter display switchover in the stop state

Through function codes P16.03 and P16.04, the user can select the parameters to be displayed in the stop state, including frequency reference, bus voltage DI, Do, and AI, etc. For details, please refer to P16. When parameters are selected, the user can view them in order by pressing on the operating panel. The example in Figure 5-8 illustrates the status parameter display switchover in the stop state when P16.03=0xFF.

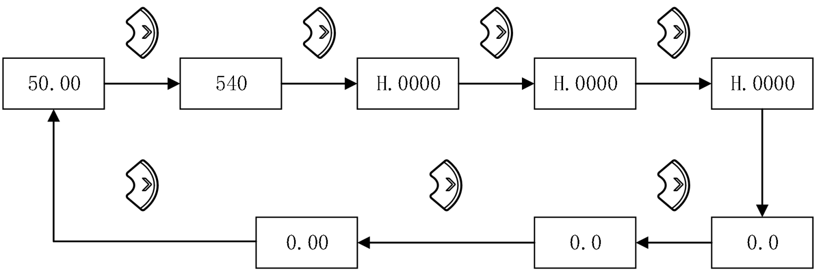


Figure 5-8 Example of status parameter display switchover in the stop state

5.2 Operation mode

In the following chapters, terms related to the control, operation and status of the drive will be frequently mentioned. Please read this section carefully, which would help to understand and use the functions.

5.2.1 Operation command channel

The drive operation command channel refers to the physical channel for the drive to receive the operation command: start, stop, jog, and so on. There are four operation command channels:

(1) Operating panel: To control the system via , , and multi-functional key (when set to jog function) on the operating panel;

(2) Control terminals: To control the system via the multi-function terminals (4, 5, 6, 8, 7, 10, 12, and 16, set to digital input FWD or REV) and the terminals of two-wire GND or three-wire DIi as determined by P09.14;

(3) Serial port: To control the start and stop via the communication interface;

(4) Field bus: To control the start and stop via the field bus (such as PROFINET).

The command channel can be selected via the function code P02.02, the multi-functional key , or the multi-function input terminal (select functions 38, 39, and 40 of the function codes P09.03 to P09.10).

WARNING

Before switching the channels, make sure to perform necessary commissioning. Otherwise, there is risk of equipment damage and personal injuries.

5.2.2 Operation state

The operation state of MV810A includes the stop state, the running state, and the motor parameter auto-tuning state.

(1) Stop state: When the drive is powered on and initialized, if there is no operation command input or a stop command is executed during running, the drive will enter the stop state;

(2) Running state: The drive enters the running state once receiving a running command;

(3) Motor parameter auto-tuning state: Set P03.27 to 1 or 2, after which there will be a running command, and the drive enters the motor parameter auto-tuning state. When the parameter auto-tuning is completed, the drive will enter the stop state.

5.2.3 Control mode and operation mode

Control mode

There are three control modes for MV810A, which are set by P02.00.

(1) Vector control without PG: It refers to the vector control without a speed sensor. In this mode, although no PG is installed, the drive can perform desirable torque and speed control, achieving high

torque on low frequencies and high precision at constant speed. The mode is usually used in scenarios requiring high robustness which the V/F control mode can not satisfy.

(2) V/F control: it is used in ordinary scenarios requiring moderate performance, for example, using a single drive to control multiple motors.

(3) Vector control with PG: it is required to install PG on the corresponding motor axis for optimal control performance. This control mode is applicable in scenarios with higher requirements on torque response and torque/speed precision.

Running mode

There are two vector-control operation modes for MV810A:

(1) Speed control: To control the motor speed with high precision. Set relative function codes in Group P05 and Group P22 to enable the speed control;

(2) Torque control: To control the motor torque with high precision. Set relative function codes in Group P06 and Group P23 to enable the torque control.

MV810A supports the online switchover of the operation modes.

5.2.4 Frequency/Torque channel

(1) Frequency reference channel in the speed control mode

There are five running modes for MV810A in the speed control mode, including jog running, process closed-loop running, PLC running, multi-speed running, and common running. The running mode is selected via the setting of P02.05. The priority is shown in Figure 5-9.

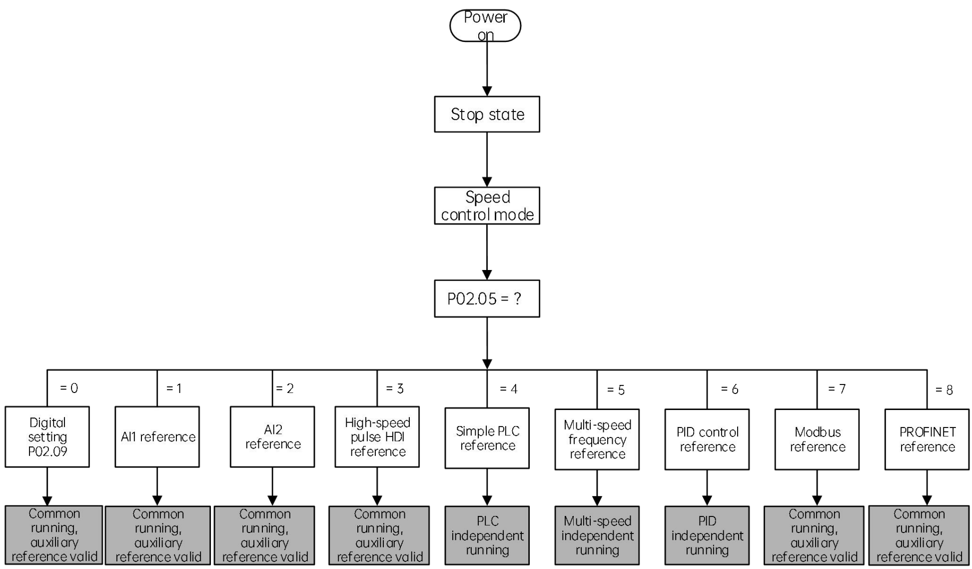


Figure 5-9 Running mode selection in the speed control mode

The five running modes indicate five basic frequency sources. The common running frequency source can be processed with auxiliary frequency superposition and frequency adjustment, while each of "Jog running", "PLC running", "multi-speed running", and "process closed-loop running" serves as an independent running channel of the main frequency, among which "PLC running" has various frequency source reference channels. For details, refer to the function codes for "PLC running" frequency reference selection. The running modes are described below:

① Jog running: When the drive receives a jog running command in the stop state, it will run according to the jog frequency (refer to function codes P11.10 to P11.12);

② Process closed-loop running: When the process closed-loop function is enabled (P02.05 = 6), the drive will adopt the process closed-loop running mode which performs closed-loop adjustment according to the reference and feedback (refer to Group P14). Via the multi-function terminal (function 29), the process closed-loop running mode can be disabled. If there is a running command, the drive will run at 0 Hz;

③ PLC running: When the PLC function is enabled (P02.05 = 4), the drive will adopt the PLC running mode, and run in a preset mode (refer to the description of the groups P13.00 to P13.36);

④ Multi-speed running: When the multi-speed function is enabled (P02.05 = 5), the drive can perform multi-speed running with multi-frequency 1 to 15 (P13.01 to P13.16), via the on/off settings of the multi-function terminals (functions 6, 7, 8, and 9). **Note:** the multi-frequency setting value is its percentage relative to the maximum frequency, and if it is negative, the drive will run reversely.

WARNING

For the specific frequency reference channels of each running mode in the speed control mode, refer to Chapter 7.

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(2) Torque reference channel in the torque control mode

There are six torque reference channels for the MV810A torque control mode, including:

① Digital setting;

② AI1 analog reference;

③ AI2 analog reference;

④ Terminal HDI reference;

⑤ Serial port communication reference;

⑥ PROFINET bus reference.

For details, refer to the descriptions of the groups P06 and P23.

5.3 Initial power-on

5.3.1 Inspection before power-on

Properly wire the drive according to the technical requirements indicated in Chapter 4.

5.3.2 Operation of initial power-on

When the drive passes the wiring and power supply inspection, turn on the air switch of the AC power supply at the drive input side to power on the drive. If the POWER indicator on the local operating panel turns on, the contactor engages normally, and the FAULT indicator stays off, it indicates that the drive initialization is completed.

The initial power-on process is shown in Figure 5-10:

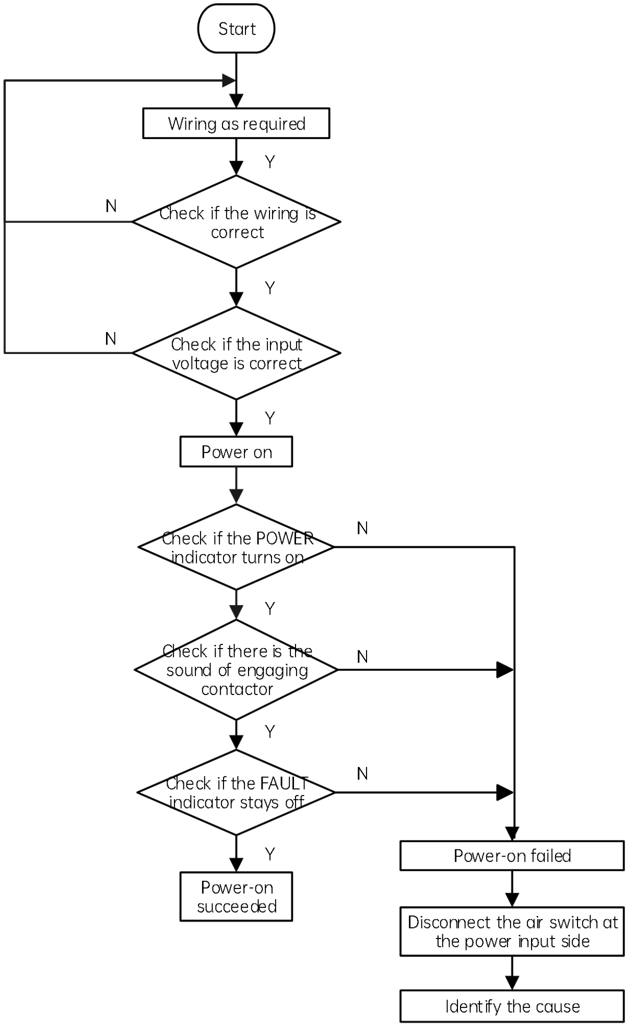


Figure 5-10 Initial power-on process

Chapter 6 Parameter List

6.1 Description of table headers

<table>
<tr><td>Item</td><td colspan="3">Explanation</td></tr>
<tr><td>Function code</td><td colspan="3">Indicates the designation of a function code, such as P00.00;</td></tr>
<tr><td>Name</td><td colspan="3">Indicates the full name of the function code, which explains its main function;</td></tr>
<tr><td>Default</td><td colspan="3">Indicates the default value of the function code after restoration to the factory setting;</td></tr>
<tr><td>Range</td><td colspan="3">Indicates the maximum and the minimum values of the function code;</td></tr>
<tr><td rowspan="4">Unit</td><td>V: Voltage</td><td>A: Current</td><td>℃: Temperature</td></tr>
<tr><td>Ω: Resistance</td><td>mH: Inductance</td><td>%: Percentage</td></tr>
<tr><td>rpm: Rotating speed</td><td>bps: Baud rate</td><td>Hz, kHz: Frequency</td></tr>
<tr><td>ms, s, min, h, kh: Time</td><td>kW: Power</td><td>/: No unit</td></tr>
<tr><td>Modify</td><td colspan="3">○: Indicates that the function code can be modified in the running state;
×: Indicates that the function code can be modified in the stop state;
*: Indicates that the function code is read-only and can not be modified;</td></tr>
<tr><td>Selection</td><td colspan="3">Indicates the parameter setting list of the function code;</td></tr>
<tr><td>User setting</td><td colspan="3">Indicates the parameter setting by the user.</td></tr>
</table>

6.2 Function code list of the basic menu

Function code	Name	Description	Range	Default	Modify
P00: System management parameters					
P00.00	Menu mode selection	0: Quick-commissioning menu mode (it displays parameters related to quick initiation of the drive) 1: Full menu mode (it displays all the function codes)	0 to 2	1	○

Function code	Name	Description	Range	Default	Modify
		2: Modification record menu mode (it displays the parameters whose setting values differ from default values)			
P00.01	User password	0: No password Others: Password protection	0 to 65535	0	○
P00.02	Reversed	-	-	-	-
P00.03	Parameter protection setting	0: Modification available for all data 1: Modification available for this function code and P02.09 (main frequency reference digital setting) only 2: Modification available for this function code only	0 to 2	0	○
P00.04	Button function selection	Ones place: Reserved; Tens place: when the stop key is valid; 0: Valid only in the operating panel control mode; 1: Valid in all control modes; Hundreds place: for multi-functional key 0: No function; 1: FWD jog; 2: REV jog; 3: FWD/REV switchover 4: Command channel switchover (cyclic) Thousands place: Reserved.	0 to 0x0410	0	○
P00.05	Parameter initialization	0: All parameters can be modified 1: Clear fault records 2: Restore to factory settings 3: Restore partial parameters to	0 to 3	0	×

Function code	Name	Description	Range	Default	Modify
		factory settings (motor parameters not restored)			
P00.06	Power board upgrading command	0: Disabled 1: Enabled	0 to 1	0	×
P00.07	Parameter copy	0: No function 1: Upload local parameters to keypad; 2: Download keypad parameters to local (all parameters); 3: Download keypad parameters to local (excluding motor parameters); 4: Download keypad parameters to local (motor parameters only).	0 to 4	0	×
P01: Status display parameters					
P01.00	Main frequency channel	Refer to P02.05	0 to 8	0	*
P01.01	Main frequency reference	Displays the present main frequency reference	0.00 to P02.10	0	*
P01.02	Auxiliary frequency reference	Displays the present auxiliary frequency reference	0.00 to P02.10	0	*
P01.03	Frequency reference	Displays the frequency reference after frequency source calculation	0.00 to P02.10	0	*
P01.04	Ramp frequency reference	Displays the present ramp frequency reference	0.00 to P02.10	0	*
P01.05	Output frequency	Displays the actual output frequency	0.00 to P02.10	0	*
P01.06	Output voltage	Displays the present output voltage	0 to 65535 V	0	*
P01.07	Output current	Displays the present output current	0.0 to 6553.5 A	0	*
P01.08	Torque current	It monitors the present torque current of the drive, indicated as	-300.0 to	0	*

Function code	Name	Description	Range	Default	Modify
		its percentage relative to the rated current of the motor.	300.0%		
P01.09	Exciting current	It monitors the present exciting current of the drive, indicated as its percentage relative to the rated current of the motor.	-300.0 to 300.0%	0	*
P01.10	Keypad version number	0.00 to 2.55	0.00 to 2.55	0	*
P01.11	Output power	Displays the present output power of the drive.	0.0 to 6553.5 kW	0	*
P01.12	Estimated motor frequency	Estimated rotor frequency in open-loop vector conditions	0.00 to P02.10	0	*
P01.13	Actual motor frequency	Displays the actual output frequency of the motor	-P02.10 to P02.10	0	*
P01.14	Accumulated power consumption H of the drive	0 to 65535 kWh	0 to 65535 kWh	0	*
P01.15	Accumulated power consumption L of the drive	0 to 3600 Another 1 kWh is added to the value of P01.14 when the number of the accumulation times reaches 3600.	0 to 3600	0	*
P01.16	Bus voltage	Displays the present bus voltage	0.0 to 6553.5 V	0	*
P01.17	Operation state of the drive	Bit0: 0: Stop 1: Run Bit1: 0: FWD 1: REV Bit2: Zero speed running Bit3: Accelerating Bit4: Decelerating	0 to 0xFFFF	0	*

Function code	Name	Description	Range	Default	Modify
		Bit5: Running at constant speed Bit6: Pre-excitating Bit7: Tuning Bit8: Overcurrent limited Bit9: Bus overvoltage limited Bit10: Torque limited Bit11: Speed reached (speed mode) / Speed limited (torque mode) Bit12: Drive in fault Bit13: Speed control Bit14: Torque control Bit15: Reserved			
P01.18	DI1 to DI4 status	0: Disabled 1: Enabled	0 to 0x1111	0	*
P01.19	DI5 to DI8 status	0: Disabled 1: Enabled	0 to 0x1111	0	*
P01.20	DO status	0: Disabled 1: Enabled	0 to 0x1111	0	*
P01.21	AI1 input voltage	Displays the AI1 input voltage.	0.00 to 10.00 V	0	*
P01.22	AI2 input voltage	Displays the AI2 input voltage.	-10.00 to 10.00 V	0	*
P01.23	AI1 input current	Displays the AI1 input current.	0.00 to 20.00 mA	0	*
P01.24	AI2 input current	Displays the AI2 input current.	0.00 to 20.00 mA	0	*
P01.25	AO1 output	0.00 to 100.00%	0.00 to 100.00%	0	*
P01.26	HDI input frequency	Display the HDI input frequency	0.000 to 50.000 kHz	0	*
P01.27	HDO1 frequency	Display the HDO1 frequency	0.000 to	0	*

Function code	Name	Description	Range	Default	Modify
			50.000 kHz		
P01.28	HDO2 frequency	Displays the HDO2 frequency	0.000 to 50.000 kHz	0	*
P01.29	PID reference	-100.0% to 100.0%	-100.0% to 100.0%	0	*
P01.30	PID feedback	-100.0% to 100.0%	-100.0% to 100.0%	0	*
P01.31	PID deviation	-100.0% to 100.0%	-100.0% to 100.0%	0	*
P01.32	PID output	-100.0% to 100.0%	-100.0% to 100.0%	0	*
P01.33	PID proportional output	-100.0% to 100.0%	-100.0% to 100.0%	0	*
P01.34	PID integral output	-100.0% to 100.0%	-100.0% to 100.0%	0	*
P01.35	PID derivative output	-100.0% to 100.0%	-100.0% to 100.0%	0	*
P01.36	Present AD of AI1	0 to 4095	0 to 4095	0	*
P01.37	Present AD of AI2	0 to 4095	0 to 4095	0	*
P01.38	Present AD value of motor temperature	0 to 4095	0 to 4095	0	*
P01.39	Motor temperature	-40 to 200℃	-40 to 200℃	0	*
P01.40	Encoder count	0 to 65535	0 to 65535	0	*
P01.41	Speed loop output	-300.0% to 300.0%	-300.0% to 300.0%	0	*
P01.42	Torque reference	Displays the present torque reference of the drive, indicated as its percentage relative to the rated current of the motor.	-300.0% to 300.0%	0	*
P01.43	Rotation speed of the motor	Displays the present rotation speed of the motor	0 to 65535 rpm	0	*

Function code	Name	Description	Range	Default	Modify
P01.44	Line speed	Displays the present line speed of the motor	0 to 65535 m/min	0	*
P01.45	Output power	Displays the present output power of the drive	0.0 to 6553.5 kW	0	*
P01.46	Inverter bridge temperature	-40.0 to 150.0℃	-40.0 to 150.0℃	0	*
P01.47	Accumulated running time of the drive (min)	0 to 65535 min	0 to 65535 min	0	*
P01.48	Accumulated running time of the drive (hour)	0 to 65535 h	0 to 65535 h	0	*
P01.49	Drive running time of this run (min)	0 to 65535 min	0 to 65535 min	0	*
P01.50	Accumulated running time of the fan	0 to 65535 h	0 to 65535 h	0	*
P01.51	PLC present step	Displays the present step of the simple PLC	0 to 15	0	*
P01.52	High bits of the running time of the present PLC step	Displays the high 16 bits of the present step running time of the simple PLC. Note: Actual time = P01.52 << 16 + P01.53	0 to 65535	0	*
P01.53	Low bits of the running time of the present PLC step	Displays the low 16 bits of the running time of the present PLC step	0.0 to 6553.5 s	0	*
P01.54	Counter input	0 to 65535	0 to 65535	0	*
P01.55	Length counter remainder	0 to 65535	0 to 65535	0	*
P01.56	Rectifier bridge temperature	-40.0 to 200.0℃	-40.0 to 200.0℃	0	*
P01.57	User-defined frequency display	0.00 to P02.10 (the keypad does not display unit)	0.00 to P02.10	0	*

Function code	Name	Description	Range	Default	Modify
P02: Basic function parameters					
P02.00	Control mode selection	0: Vector control 1 without PG 1: Vector control 2 without PG (only for asynchronous motors) 2: V/F control (only for asynchronous motors) 3: Closed-loop vector control	0 to 3	2	×
P02.01	Motor selection	0: Motor 1 1: Motor 2	0 to 1	0	×
P02.02	Running command channel selection	0: Panel control (reserved) 1: Terminal control 2: Communication control	0 to 2	0	×
P02.03	Communication command channel selection	0: Modbus channel 1 to 2: Reserved 3: EtherCAT channel / PROFINET channel / CANopen channel / Ethernet IP channel	0 to 3	0	×
P02.04	Running direction	0: Same direction 1: Opposite direction	0 to 1	0	○
P02.05	Main frequency source selection	0: Digital setting P02.09 1: AI1 setting 2: AI2 setting 3: High-speed pulse HDI reference 4: Simple PLC programming reference 5: Multi-speed running reference 6: PID control 7: Modbus 8: EtherCAT/Profinet/CANopen/ EtherNet IP setting	0 to 8	6	×
P02.06	Auxiliary frequency source selection		0 to 8	4	×
P02.07	Auxiliary frequency reference range	0: Maximum output frequency	0 to 1	0	×

Function code	Name	Description	Range	Default	Modify
	selection	1: Main frequency reference			
P02.08	Frequency reference source calculation	0: Main frequency 1: Auxiliary frequency 2: Main + Auxiliary 3: Main - Auxiliary 4: MAX (main, auxiliary) 5: MIN (main, auxiliary)	0 to 5	0	×
P02.09	Frequency digital setting	0.00 Hz to P02.11	0.00 Hz to P02.11	50.00 Hz	○
P02.10	Maximum output frequency	P02.11 to 599.00 Hz Note: The maximum frequency is at least 50.00 Hz.	P02.11 to 599.00 Hz	200.00 Hz	×
P02.11	Frequency upper limit	P02.12 to P02.10	P02.12 to P02.10	200.00 Hz	×
P02.12	Frequency lower limit	0.00 Hz to P02.11	0.00 Hz to P02.11	0.00 Hz	×
P02.13	Acceleration time 1	0.0 to 6000.0 s Note: After being restored to the default settings, the system will do auto matching based on the actual model (applicable for acceleration/deceleration time 1, 2, 3, and 4) 5.5 kW and below: 10 s 5.5 to 30 kW (included): 20 s Above 30 kW: 40 s	0.0 to 6000.0 s	Depend on model	○
P02.14	Deceleration time 1	0.0 to 6000.0 s	0.0 to 6000.0 s	Depend on model	○
P02.15	GP type	0: G type 1: P type	0 to 1	0	×

Function code	Name	Description	Range	Default	Modify
P02.16	Carrier frequency	2.0 to 12.0 kHz	2.0 to 12.0 kHz	4.0 kHz	○
P02.17	Customized parameter	0: No function 1: Customer 1	0 to 1	0	×
P03: Motor 1 parameters					
P03.00	Motor type selection	0: Asynchronous motor 1: Synchronous motor	0 to 1	0	×
P03.01	Asynchronous motor rated power	0.1 to 3000.0 kW	0.1 to 3000.0 kW	Depend on model	×
P03.02	Asynchronous motor rated voltage	0 to 1200 V	0 to 1200 V	Depend on model	×
P03.03	Asynchronous motor rated current	0.8 to 6000.0 A	0.8 to 6000.0 A	Depend on model	×
P03.04	Asynchronous motor rated frequency	0.01 Hz to P02.10	0.01 Hz to P02.10	50.00 Hz	×
P03.05	Asynchronous motor rated speed	1 to 36000 rpm	1 to 36000 rpm	Depend on model	×
P03.06	Asynchronous motor stator resistance	0.001 to 65.535 Ω	0.001 to 65.535 Ω	Depend on model	×
P03.07	Asynchronous motor rotor resistance	0.001 to 65.535 Ω	0.001 to 65.535 Ω	Depend on model	×
P03.08	Asynchronous motor leakage inductance	0.01 mH to 655.35 mH (drive power ≤ 55 kW) 0.001 mH to 65.535 mH (drive power > 55 kW)	Depend on model	Depend on model	×
P03.09	Asynchronous motor mutual inductance	0.1 mH to 6553.5 mH (drive power ≤ 55kW)	Depend on model	Depend on	×

Function code	Name	Description	Range	Default	Modify
		0.01 mH to 655.35 mH (drive power > 55 kW)		model	
P03.10	Asynchronous motor no-load current	0.1 to 6553.5 A	0.1 to 6553.5 A	Depend on model	×
P03.11	Asynchronous motor iron core magnetic saturation coefficient 1	0.0 to 100.0%	0.0 to 100.0%	80.0%	×
P03.12	Asynchronous motor iron core magnetic saturation coefficient 2	0.0 to 100.0%	0.0 to 100.0%	68.0%	×
P03.13	Asynchronous motor iron core magnetic saturation coefficient 3	0.0 to 100.0%	0.0 to 100.0%	57.0%	×
P03.14	Asynchronous motor iron core magnetic saturation coefficient 4	0.0 to 100.0%	0.0 to 100.0%	40.0%	×
P03.15	Synchronous motor rated power	0.1 to 3000.0 kW	0.1 to 3000.0 kW	Depend on model	×
P03.16	Synchronous motor rated voltage	0 to 1200 V	0 to 1200 V	Depend on model	×
P03.17	Synchronous motor rated current	0.8 to 6553.5 A	0.8 to 6553.5 A	Depend on model	×
P03.18	Synchronous motor rated frequency	0.01 Hz to P02.10	0.01 Hz to P02.10	Depend on model	×
P03.19	Number of synchronous motor	1 to 128	1 to 128	2	×

Function code	Name	Description	Range	Default	Modify
	pole pairs				
P03.20	Synchronous motor stator resistance	0.001 to 65.535 Ω (drive power ⩽ 55 kW) 0.0001 to 6.5535 Ω (drive power > 55 kW)	Depend on model	Depend on model	×
P03.21	Synchronous motor D-aixs inductance	0.01 to 655.35 mH (drive power ⩽ 55 kW) 0.001 to 65.535 mH (drive power > 55 kW)	Depend on model	Depend on model	×
P03.22	Synchronous motor Q-aixs inductance	0.01 to 655.35 mH (drive power ⩽ 55 kW) 0.001 to 65.535 mH (drive power > 55 kW)	Depend on model	Depend on model	×
P03.23	Synchronous motor back EMF	0.0 to 6553.5 V	0.0 to 6553.5 V	Depend on model	×
P03.24	Reserved				
P03.25	Reserved				
P03.26	Reserved				
P03.27	Motor auto-tuning	0: No action 1: Partial parameter auto-tuning in the static state 2: Full parameter auto-tuning in the rotating state 3: Full parameter auto-tuning in the static state	0 to 3	0	×
P03.28	Motor overload protection coefficient	0.0 to 300.0%	0.0 to 300.0%	100.0%	×
P03.29	Motor overload protection enable	0: Disabled 1: Enabled	0 to 1	1	×
P04: Motor 1 encoder parameters					
P04.00	Encoder PPR	1 to 65535	1 to 65535	1024	×

Function code	Name	Description	Range	Default	Modify
P04.01	Encoder type	0: No encoder 1: ABZ encoder 2: Resolver 3: ABZ encoder + STO 4: STO card 5: Resolver + STO	0 to 5	0	*
P04.02	A/B phase sequence of the ABZ incremental encoder	0: FWD 1: REV Note: The phase sequence will be automatically identified after the auto-tuning in the rotating state.	0 to 1	0	×
P04.03	ABZ encoder disconnection detection time	0.0 to 10.0 s No detection when set to 0.0 s	0.0 to 10.0	0.0 s	○
P04.04	PG card voltage class selection	0: 5 V 1: 12 V	0 to 1	0	×
P04.05	Z signal enable	0: Disable 1: Enable	0 to 1	0	×
P04.06	Synchronous motor angle compensation	0.0 to 360.0	0.0 to 360.0	0.0	○
P04.07	Synchronous motor initial position	0.0 to 360.0	0.0 to 360.0	0.0	○
P04.08	Resolver angle correction enable	0: Disable 1: Enable the correction mode 1 2: Enable the correction mode 2	0 to 2	2	○
P04.09	Enable the maximum ratio between torque and current	0: Disable 1: Enable	0 to 1	1	○
P04.10	ABX synchronous closed-loop quick start mode	0: Disable 1: Enable	0 to 1	1	○

Function code	Name	Description	Range	Default	Modify
P04.11	Cyclic value of position identification	Obtained through auto-tuning	3400 to 65535	3400	×
P04.12	Frequency-division value of position identification	Obtained through auto-tuning	0 to 9	0	×
P04.13	PG card version number	0 to 65535	0 to 65535	0	*
P04.14	PG card disconnection enable	0: Disconnection fault invalid 1: Disconnection fault enabled	0 to 1	1	×
P04.15	Initial position auto-tuning before synchronous motor running	Ones place: In open-loop mode 0: No auto-tuning 1: Auto-tuning before first running upon power-on 2: Auto-tuning before each running Tens place: In ABZ encoder closed-loop mode 0: Auto-tuning before first running upon power-on 1: Auto-tuning before each running	0x00 to 0x21	0	×
P04.16 to P04.22	Reversed				
P04.23	Synchronous open-loop Q-axis correction coefficient	0 to 100	0 to 100	40	○
P04.24	Synchronous open-loop D-axis correction coefficient	0 to 100	0 to 100	30	○
P04.25	Synchronous open-loop speed filter coefficient	0 to 1000	0 to 1000	100	○
P04.26	Synchronous	0% to 100%	0 to 100	10	○

Function code	Name	Description	Range	Default	Modify
	open-loop D-axis injection current				
P04.27	Synchronous open-loop low-frequency carrier frequency	1.0 to 8.0	1.0 to 8.0	4.0	○
P04.28	Speed tracking Kp adjustment	10 to 1000	10 to 1000	10	○
P04.29	Speed tracking Ki adjustment	10 to 1000	10 to 1000	10	○
P04.30	Speed tracking target current	30% to 200%	30% to 200%	100%	○
P05: Motor 1 vector control parameters					
P05.00	Speed loop proportional gain 1	1 to 100	1 to 100	10	○
P05.01	Speed loop integral time 1	0.01 to 10.00 s	0.01 to 10.00 s	0.50 s	○
P05.02	Switchover frequency 1	0.00 Hz to P02.11	0.00 Hz to P02.11	5.00 Hz	○
P05.03	Speed loop proportional gain 2	1 to 100	1 to 100	10	○
P05.04	Speed loop integral time 2	0.01 to 10.00 s	0.01 to 10.00 s	1.00 s	○
P05.05	Switchover frequency 2	0.00 Hz to P02.11	0.00 Hz to P02.11	10.00 Hz	○
P05.06	Slip compensation coefficient	50 to 200%	50 to 200%	100%	○
P05.07	Speed loop filter time constant	0.00 to 20.00 s	0.00 to 20.00 s	0.02 s	○
P05.08	Vector control over-excitation gain	50 to 200%	50 to 200%	100%	○
P05.09	Drive torque upper	0: Digital setting (P05.10)	0 to 5	0	○

Function code	Name	Description	Range	Default	Modify
	limit source	1: AI1 2: AI2 3: HDI 4: Modbus/Modbus TCP setting 5: EtherCAT/Profinet/CANopen/ EtherNet IP setting			
P05.10	Drive torque upper limit digital setting	0.0 to 300.0%	0.0 to 300.0%	180.0%	○
P05.11	Braking torque upper limit source	0: Digital setting (P05.10) 1: AI1 2: AI2 3: HDI 4: Modbus/Modbus TCP setting 5: EtherCAT/Profinet/CANopen/ EtherNet IP setting	0 to 5	0	○
P05.12	Braking torque upper limit digital setting	0.0 to 300.0%	0.0 to 300.0%	150.0%	○
P05.13	Excitation regulation Kp	0 to 60000	0 to 60000	2000	○
P05.14	Excitation regulation Ki	0 to 60000	0 to 60000	1300	○
P05.15	Torque regulation Kp	0 to 60000	0 to 60000	2000	○
P05.16	Torque regulation Ki	0 to 60000	0 to 60000	1300	○
P05.17	Integral separation	0: Disabled 1: Enabled	0 to 1	0	○
P05.18	Synchronous motor field weakening coefficient	0 to 100	0 to 100	5	○
P05.19	Maximum field weakening current	0.0 to 120.0%	0.0 to 120.0%	100.0%	○
P05.20	Field weakening	0.0 to 120.0%	0.0 to	100.0%	○

Function code	Name	Description	Range	Default	Modify
	auto-tuning coefficient		120.0%		
P05.21	Field weakening integral multiple	0.000 to 1.200	0.000 to 1.200	0	○
P06: Motor 1 torque control parameters					
P06.00	Torque control enable	0: Disabled 1: Enabled	0 to 1	0	○
P06.01	Torque reference channel	0: Digital setting (P05.12) 1: AI1 2: AI2 3: HDI 4: Modbus/Modbus TCP setting 5: EtherCAT/Profinet/CANopen/ EtherNet IP setting	0 to 5	0	○
P06.02	Torque digital setting	-300.0 to 300.0% (rated current of the motor)	-300.0 to 300.0%	0.0%	○
P06.03	Torque reference acceleration/deceleration time	0.0 to 6000.0 s	0.0 to 6000.0 s	6.0 s	○
P06.04	FWD speed limit channel	0: Digital setting (P05.12) 1: AI1 2: AI2 3: HDI 4: Modbus/Modbus TCP setting 5: EtherCAT/Profinet/CANopen/ EtherNet IP setting	0 to 5	0	○
P06.05	FWD speed limit digital setting	0.00 Hz to P02.11	0.00 Hz to P02.11	0.00 Hz	○
P06.06	REV speed limit channel	0: Digital setting (P05.12) 1: AI1 2: AI2	0 to 5	0	○

Function code	Name	Description	Range	Default	Modify
		3: HDI 4: Modbus/Modbus TCP setting 5: EtherCAT/Profinet/CANopen/ EtherNet IP setting			
P06.07	REV speed limit digital setting	0.00 Hz to P02.11	0.00 Hz to P02.11	0.00 Hz	○
P06.08	Inductance auto-tuning current	0 to 100	0 to 100	80	○
P06.09	Pole position auto-tuning current	0 to 150	0 to 150	120	○
P06.10	Reserved				
P06.11	Reserved				
P07: Motor 1 V/F control parameters					
P07.00	V/F curve	0: Straight-line V/F 1: Multi-point V/F 2: Square V/F 3: Reserved 4: V/F complete separation 5: V/F half separation	0 to 5	0	×
P07.01	Torque boost	0.0 to 50.0	0.0 to 50.0	Depend on model	○
P07.02	Cut-off frequency of torque boost	0.00 Hz to P02.11	0.00 Hz to P02.11	50.00 Hz	×
P07.03	Multi-point V/F frequency 1	0.00 Hz to P07.05	0.00 Hz to P07.05	0.00 Hz	×
P07.04	Multi-point V/F voltage 1	0 V to P07.06	0 V to P07.06	0 V	×
P07.05	Multi-point V/F frequency 2	P07.03 to P07.07	P07.03 to P07.07	0.00 Hz	×
P07.06	Multi-point V/F	P07.04 to P07.08	P07.04 to	0 V	×

Function code	Name	Description	Range	Default	Modify
	voltage 2		P07.08		
P07.07	Multi-point V/F frequency 3	P07.05 to 599.00 Hz	P07.05 to 599.00 Hz	0.00 Hz	×
P07.08	Multi-point V/F voltage 3	P07.06 to 380 V	P07.06 to 380 V	0 V	×
P07.09	Torque compensation coefficient	0 to 300	0 to 300	150	○
P07.10	V/F over-excitation gain	0 to 200	0 to 200	80	×
P07.11	Oscillation suppression gain	0 to 100	0 to 100	40	○
P07.12	Oscillation suppression gain mode	0 to 2	0 to 2	0	×
P07.13	Voltage source for V/F separation	0: Digital setting 1: AI1 2: AI2 3: Reserved 4: HDI 5: Multi-reference 6: Simple PLC 7: PID 8: Modbus/Modbus TCP setting 9: EtherCAT/Profinet/CANopen/ EtherNet IP setting	0 to 9	0	○
P07.14	Digital setting of the voltage source for V/F separation	0 to 1000 V	0 to 1000 V	0 V	○
P07.15	Voltage rise time of V/F separation	0.0 to 6000.0 s	0.0 to 6000.0 s	5.0 s	○
P07.16	Voltage fall time of V/F separation	0.0 to 6000.0 s	0.0 to 6000.0 s	5.0 s	○

Function code	Name	Description	Range	Default	Modify
P07.17	Stop mode for V/F separation	0: Frequency and voltage decline to 0 independently 1: Frequency declines after voltage declines to 0	0 to 1	0	○
P07.18	V/F slip compensation gain	0.0 to 100.0	0.0 to 100.0	0.0	○
P07.19	Reserved	-	-	-	-
P08: Start/Stop control parameters					
P08.00	Startup mode	0: Startup from the startup frequency 1: Startup after speed tracking 2: Startup after DC braking	0 to 2	0	×
P08.01	Startup delay time	The device responds to the operation commands after the delay time. During the delay, the device is in standby.	0.0 to 600.0 s	0.0	×
P08.02	Startup frequency	0.00 to 50.00 Hz	0.00 to 50.00 Hz	0.00	×
P08.03	Startup frequency hold time	0.0 to 50.0 s	0.0 to 50.0 s	0.0	×
P08.04	Braking current at startup	0.0 to 100.0%	0.0 to 100.0%	0.0%	×
P08.05	Braking time at startup	0.00 (no action) 0.00 to 50.00 s	0.00 to 50.00 s	0.0	×
P08.06	Stop mode	0: Decelerate to stop 1: Coast to stop 2: Emergency stop	0 to 2	0	○
P08.07	Stop frequency	0.00 to 3.00 Hz	0.00 to 3.00 Hz	0.50	×
P08.08	Stop frequency hold time	0.0 to 600.0 s	0.0 to 600.0 s	0.0	○

Function code	Name	Description	Range	Default	Modify
P08.09	Stop frequency detection mode	0: Speed reference (for V/F control, only this mode is available) 1: Speed detection value	0 to 1	0	×
P08.10	Stop frequency detection time	After the P08.08 delay, stop frequency detection starts. During the time defined by P08.10, if P08.09 = 0, the drive will immediately stop when the ramp frequency reference is equal to or lower than P08.07; if P08.09 = 1, the drive will stop only when the actual frequency is equal to or lower than P08.07. If no stop frequency is detected after P08.10, the drive will directly stop.	0.00 to 100.00 s	0.50	×
P08.11	Start frequency of braking at stop	0.00 to P02.10 (maximum frequency)	0.00 to P02.10 (maximum frequency)	0.00	○
P08.12	Braking delay at stop	0.00 to 30.00 s	0.00 to 30.00 s	0.00	○
P08.13	DC braking current at stop	0.0 to 120.0%	0.0 to 120.0%	50.0%	○
P08.14	DC braking time at stop	0: Disable DC braking at stop 6553.5: Always keep DC braking at stop	0.0 to 6553.5 s	0.0	O
P08.15	Speed tracking mode	0: From the stop frequency 1: From the maximum frequency **Note:** Only for asynchronous motors.	0 to 1	0	×
P08.16	Speed of speed tracking	The larger the parameter is, the faster the tracking speed will be. However, an excessively large parameter value may cause the tracking unreliable.	1 to 100	20	○

Function code	Name	Description	Range	Default	Modify
P08.17	Current of speed tracking	Ensure the maximum current during speed tracking is within the range. An excessively small current may cause the speed tracking unreliable.	10 to 200%	Depend on model	×
P08.18	Output upon vector 0 Hz	0: Enable voltage output 1: No voltage output 2: Output according to the DC braking current at stop 3: Zero-servo running	0 to 3	0	○
P08.19	Running mode when below frequency lower limit	0: Running at frequency lower limit 1: Decelerate to stop 2: Hibernation When the frequency reference is below the frequency lower limit, the drive coasts to stop; when the frequency reference is above the frequency lower limit again and the hold time exceeds the time set by P08.20, the drive automatically resumes operation.	0 to 2	0	×
P08.20	Recovery delay from hibernation	0.0 to 3600.0 s	0.0 to 3600.0 s	0.0	○
P08.21 to P08.24	Reserved				
P08.25	Restart selection upon power failure	0: Disabled 1: Enabled	0 to 1	0	○
P08.26	Waiting time for restart upon power failure	0.0 to 3600.0 s	0.0 to 3600.0 s	1.0	○
P08.27	Reverse running prohibit	0: Reverse running enabled 1: Reverse running disabled	0 to 1	0	○

Function code	Name	Description	Range	Default	Modify
P08.28	FWD/REV switchover dead-zone time	0.0 to 3600.0 s	0.0 to 3600.0 s	0.0	○
P08.29	FWD/REV switchover mode	0: Switchover after the zero frequency 1: Switchover after the startup frequency 2: Switchover after the delay at the stop frequency	0 to 2	0	×
P08.30	Reserved				
P08.31	Dynamic braking usage ratio	0 to 100%	0 to 100%	100%	○
P08.32	Braking startup voltage	650 to 790 V	650 to 790 V	680 V	○
P08.33	Deceleration time for emergency stop	0.0 to 60.0 s	0.0 to 60.0 s	2.0	○
P08.34	Terminal running protection selection	0: Enable protection 1: Disable protection It decides, after a power-on or fault reset, whether the terminals need to be enabled again before drive operation. **Note:** If protection is disabled, the terminal command will be immediately responded after fault reset.	0 to 1	0	×
P08.35	Reserved				
P09: Terminal input parameters					
P09.00	Function selection of terminals 4, 5, 6, and 8	Ones place: 0: Terminal 4 as DI1 1: Terminal 4 as DO1 2: Terminal 4 as HDO1	0 to 0x22	0x00	○

Function code	Name	Description	Range	Default	Modify
		Tens place: 0: Terminal 5 as DI2 1: Terminal 5 as DO2 2: Terminal 5 as HDO2 Hundreds place: Reserved Thousands place: Reserved **Note:** Terminal 6 can only be set as DI3; terminal 8 can only be set as DI4.			
P09.01	Function selection of terminals 7, 10, 12, and 16	Ones place: 0: Terminal 7 as DI5 1: Terminal 7 as thermistor signal input Tens place: 0: Terminal 10 as DI6 1: Terminal 10 as HDI Hundreds place: Reserved Thousands place: 0: Terminal 16 as DI8 1: Terminal 16 as AI1 voltage input 2: Terminal 16 as AI1 current input **Note:** Terminal 12 can only be set as DI7.	0 to 0x2011	0x2010	○
P09.02	Function selection of terminals 13 and 11	Ones place: 0: Terminal 13 as AI2 voltage input 1: Terminal 13 as AI2 current input Tens place: 0: Terminal 11 as DO3/RO2 1: Terminal 11 as AO1 voltage	0 to 0x21	0x10	○

Function code	Name	Description	Range	Default	Modify
		output 2: Terminal 11 as AO1 current output Hundreds place: Reserved Thousands place: Reserved			
P09.03	DI1 function selection	0: No function 1: Forward run 2: Reverse run 3: Forward jog 4: Reverse jog 5: Three-wire control 6: Multi-reference terminal 1 7: Multi-reference terminal 2 8: Multi-reference terminal 3 9: Multi-reference terminal 4 10: Acceleration/Deceleration time terminal 1 11: Acceleration/Deceleration time terminal 2 12: Frequency UP/DOWN setting clear (terminal) 13: Frequency UP/DOWN setting clear (terminal + keypad) 14: Frequency increase command (UP) 15: Frequency decrease command (DN) 16: External fault NO input 17: External fault NC input 18 to 19: Reserved 20: Frequency reference source switchover from A to B 21: Frequency reference source switchover from combination to	0 to 76	23	○
P09.04	DI2 function selection		0 to 76	57	○
P09.05	DI3 function selection		0 to 76	58	○
P09.06	DI4 function selection		0 to 76	0	○
P09.07	DI5 function selection		0 to 76	0	○
P09.08	DI6 function selection		0 to 76	0	○
P09.09	DI7 function selection		0 to 76	0	○
P09.10	DI8 function selection		0 to 76	0	○

Function code	Name	Description	Range	Default	Modify
		A 22: External reset (RESET) input 23: Coast to stop input (FRS) 24: Acceleration/Deceleration prohibit 25: DC braking input at stop 26: Simple PLC pause command 27: Frequency reference source switchover from combination to B 28: PLC stop memory clear 29: PID pause 30: PID clear 31: PID integral hold 32: Running at 0 Hz 33: PID regulating feature switchover 34: Main reference frequency source selection 1 35: Main reference frequency source selection 2 36: Main reference frequency source selection 3 37: Main reference frequency source selection 4 38: Command channel switched to keypad 39: Command channel switched to terminal 40: Command channel switched to communication 41: Direct DC brake running 42: REV prohibit 43: Reserved 44: External stop command (it is			

Function code	Name	Description	Range	Default	Modify
		valid for all control modes, and the device will be stopped according to the present stop mode) 45: Auxiliary frequency reference clear 46: Pulse input clear 47: Speed control and torque control switchover terminal 48: Torque direction switchover terminal in torque control 49: Position selection 1 50: Position selection 2 51: Position selection 3 52: Digital positioning cycle mode enable 53: Main axis homing 54: Speed/Position mode switchover 55: Motor 1 and 2 switchover terminal 56: Safety terminal input (reserved) 57: Electromagnetic valve control signal 58: Control signal of fan at power line frequency 59: PTC signal 60: Emergency stop 61: Wobble pause 62: Wobble reset 63: Counter reset 64: Counter trigger 65: Power consumption clear 66: Power consumption hold			

Function code	Name	Description	Range	Default	Modify
		67: Length counter input 68: Length reset 69: Switched to V/F control 70: Switched to FVC control 71: Air filter block signal 72: Oil filter block signal 73: Separator filter block signal 74: Air manifold block signal 75: External fault 1 (for air compressors only) 76: External fault 2 (for air compressors only)			
P09.11	Terminal conducting mode selection	0: Digital external high conducting 1: Digital external low conducting	0 to 1	1	○
P09.12	DI1 to DI4 active mode selection	Ones place: 0: DI1 positive logic active 1: DI1 negative logic active Tens place: 0: DI2 positive logic active 1: DI2 negative logic active Hundreds place: 0: DI3 positive logic active 1: DI3 negative logic active Thousands place: 0: DI4 positive logic active 1: DI4 negative logic active	0 to 0×1111	1	○
P09.13	DI5 to DI8 active mode selection	Ones place: 0: DI5 positive logic active 1: DI5 negative logic active Tens place: 0: DI6 positive logic active 1: DI6 negative logic active	0 to 0×1111	0	○

<table>
<tr><th>Function code</th><th>Name</th><th>Description</th><th>Range</th><th>Default</th><th>Modify</th></tr>
<tr><td></td><td></td><td>Hundreds place:
0: DI7 positive logic active
1: DI7 negative logic active
Thousands place:
0: DI8 positive logic active
1: DI8 negative logic active</td><td></td><td></td><td></td></tr>
<tr><td>P09.14</td><td>FWD/REV operation mode</td><td>0: Two-wire mode 1
The combination of FWD and REV generates the running commands.
<table>
<tr><th>FWD</th><th>REV</th><th>Command</th></tr>
<tr><td>0</td><td>0</td><td>Stop</td></tr>
<tr><td>0</td><td>1</td><td>Reverse</td></tr>
<tr><td>1</td><td>0</td><td>Forward</td></tr>
<tr><td>1</td><td>1</td><td>Stop</td></tr>
</table>
1: Two-wire mode 2
FWD is the source of running commands, and REV controls the running directions.
<table>
<tr><th>FWD</th><th>REV</th><th>Command</th></tr>
<tr><td>0</td><td>0</td><td>Stop</td></tr>
<tr><td>0</td><td>1</td><td>Stop</td></tr>
<tr><td>1</td><td>0</td><td>Forward</td></tr>
<tr><td>1</td><td>1</td><td>Reverse</td></tr>
</table>
2: Three-wire mode 1
Three-wire operation control terminal EN is the enabling terminal, and the rising edges of FWD and REV are the source of the running commands and directions respectively.</td><td>0 to 3</td><td>0</td><td>○</td></tr>
</table>

<table>
<tr><th>Function code</th><th>Name</th><th>Description</th><th>Range</th><th>Default</th><th>Modify</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>EN</th><th>FWD</th><th>REV</th><th>Command</th></tr>
<tr><td rowspan="4">1</td><td rowspan="2">0→1</td><td>0</td><td rowspan="2">Forward</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td><td rowspan="2">0→1</td><td rowspan="2">Reverse</td></tr>
<tr><td>1</td></tr>
<tr><td rowspan="2">0</td><td></td><td></td><td rowspan="2">Stop</td></tr>
<tr><td></td><td></td></tr>
</table>
3: Three-wire mode 2
Three-wire operation control terminal EN is the enabling terminal, the rising edge of FWD is the source of running commands, and REV controls the running directions.
<table>
<tr><th>EN</th><th>FWD</th><th>REV</th><th>Command</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">0→1</td><td>0</td><td>Forward</td></tr>
<tr><td>1</td><td>Reverse</td></tr>
<tr><td rowspan="2">0</td><td></td><td></td><td rowspan="2">Stop</td></tr>
<tr><td></td><td></td></tr>
</table>
</td><td></td><td></td><td></td></tr>
<tr><td>P09.15</td><td>DI filter time</td><td>Used to set the filter time for DI terminal sampling. When there is significant interference, it is recommended to increase the parameter value for the purpose of misoperation prevention.</td><td>0.000 to 1.000</td><td>0.010 s</td><td>○</td></tr>
<tr><td>P09.16</td><td>VDI active state</td><td>bit0: VDI1
bit1: VDI2
bit2: VDI3
bit3: VDI4
bit4: VDI5
bit5: VDI6</td><td>0 to 0xFF</td><td>0</td><td>×</td></tr>
</table>

Function code	Name	Description	Range	Default	Modify
		bit6: VDI7 bit7: VDI8			
P09.17	DI1 switch-on delay time	Used to set the delay time for level jump upon switch-on and switch-off of the digital input terminals Range: 0.0 to 600.0 s	0.0 to 600.0	0.0 s	○
P09.18	DI1 switch-off delay time		0.0 to 600.0	0.0 s	○
P09.19	DI2 switch-on delay time		0.0 to 600.0	0.0 s	○
P09.20	DI2 switch-off delay time		0.0 to 600.0	0.0 s	○
P09.21	DI3 switch-on delay time		0.0 to 600.0	0.0 s	○
P09.22	DI3 switch-off delay time		0.0 to 600.0	0.0 s	○
P09.23	DI4 switch-on delay time		0.0 to 600.0	0.0 s	○
P09.24	DI4 switch-off delay time		0.0 to 600.0	0.0 s	○
P09.25	AI1 lower limit	0.00 V to P09.27	0.00 to P09.27	2.00 V	○
P09.26	Percentage corresponding to AI1 lower limit	-1000.0% to 100.0%	-1000.0% to 100.0%	0.0%	○
P09.27	AI1 upper limit	P09.25 to 10.00 V	P09.25 to 10.00 V	10.00 V	○
P09.28	Percentage corresponding to AI1 upper limit	-1000.0% to 100.0%	-1000.0% to 100.0%	100.0%	○
P09.29	AI1 filter time	0.000 to 10.000 s	0.000 to 10.000 s	0.200 s	○
P09.30	AI2 lower limit	-10.00 V to P09.32	-10.00 V to P09.32	-10.00 V	○

Function code	Name	Description	Range	Default	Modify
P09.31	Percentage corresponding to AI2 lower limit	-100.0 to 100.0%	-100.0 to 100.0%	-100.0%	○
P09.32	AI2 middle value 1	P09.30 to P09.34	P09.30 to P09.34	0.00 V	○
P09.33	Percentage corresponding to AI2 middle value 1	-100.0 to 100.0%	-100.0 to 100.0%	0.0%	○
P09.34	AI2 middle value 2	P09.32 to P09.36	P09.32 to P09.36	0.00 V	○
P09.35	Percentage corresponding to AI2 middle value 2	-100.0 to 100.0%	-100.0 to 100.0%	0.0%	○
P09.36	AI2 upper limit	P09.34 to 10.00 V	P09.34 to 10.00 V	10.00 V	○
P09.37	Percentage corresponding to AI2 upper limit	-100.0 to 100.0%	-100.0 to 100.0%	100.0%	○
P09.38	AI2 filter time	0.000 to 10.000 s	0.000 to 10.000s	0.200 s	○
P09.39	HDI frequency lower limit	0.000 kHz to P09.41	0.000 kHz to P09.41	0.000 kHz	○
P09.40	Percentage corresponding to HDI frequency lower limit	-1000.0% to 100.0%	-1000.0% to 100.0%	0.0%	○
P09.41	HDI frequency upper limit	P09.39 to 50.000 kHz	P09.39 to 50.000 kHz	50.000 kHz	○
P09.42	Percentage corresponding to HDI frequency upper limit	-1000.0% to 100.0%	-1000.0% to 100.0%	100.0%	○
P09.43	HDI filter time	0.000 to 10.000 s	0.000 to 10.000 s	0.030 s	○
P10: Terminal output parameters					

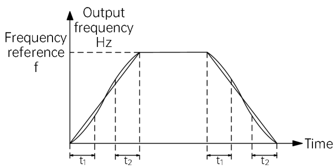
<table>
<tr><th>Function code</th><th>Name</th><th>Description</th><th>Range</th><th>Default</th><th>Modify</th></tr>
<tr><td>P10.00</td><td>DO1 function selection</td><td rowspan="4">0: Disabled
1: AC drive in running
2: Forward running
3: Reverse running
4: Frequency reach signal (FAR)
5: Frequency-level detection signal (FDT1)
6: Frequency-level detection signal (FDT2)
7: Overload detection signal (OL)
8: Lockout for undervoltage (LU)
9: External fault stop (EXT)
10: Frequency upper limit (FHL)
11: Frequency lower limit (FLL)
12: Zero-speed running
13: Simple PLC stage completion
14: Simple PLC cycle completion
15: Running time reach of this run
16: Accumulated running time reach
17: AC drive ready to run (RDY)
18: AC drive fault
19: Host device on/ff signal
20: Motor overheat
21: Torque limited (Valid when the torque command is limited by the torque limit value 1 or 2.)
22: Motor overload pre-alarm signal
23: Start/Stop signal of the fan at power line frequency
24: Electromagnetic valve control output
25: Air compressor fault alarm</td><td>0 to 47</td><td>0</td><td>○</td></tr>
<tr><td>P10.01</td><td>DO2 function selection</td><td>0 to 47</td><td>1</td><td>○</td></tr>
<tr><td>P10.02</td><td>DO3 function selection</td><td>0 to 47</td><td>0</td><td>○</td></tr>
<tr><td>P10.03</td><td>Relay RO1 output selection</td><td>0 to 47</td><td>23</td><td>○</td></tr>
</table>

Function code	Name	Description	Range	Default	Modify
		output 26: Reference count value reach 27: Designated count value reach 28: Length reach 29: Positioning completed 30: Zero point positioning completed 31: Index positioning completed 32 to 37: Reserved 38: Motor 1 and 2 indication terminal 39: Bus card switch signal 40 to 45: Reserved 46: PID feedback loss 47: Reserved			
P10.04	Output terminal polarity selection	Ones place: 0: DO1 positive logic active 1: DO1 negative logic active Tens place: 0: DO2 positive logic active 1: DO2 negative logic active Hundreds place: 0: DO3/RO2 positive logic active 1: DO3/RO2 negative logic active Thousands place: 0: RO1 positive logic active 1: RO1 negative logic active	0 to 0x1111	0	○
P10.05	DO1 switch-on delay time	Used to set the delay time for level jump upon switch-on and switch-off of the output terminals. Value range: 0.0 to 600.0 s	0.0 to 600.0	0.0 s	○
P10.06	DO1 switch-off delay time		0.0 to 600.0	0.0s	○
P10.07	DO2 switch-on delay		0.0 to 600.0	0.0 s	○

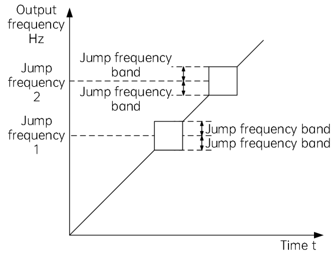
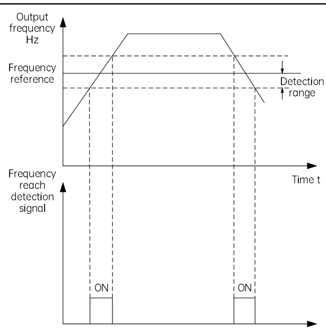
Function code	Name	Description	Range	Default	Modify
	time				
P10.08	DO2 switch-off delay time		0.0 to 600.0	0.0 s	○
P10.09	DO3 switch-on delay time / RO2 switch-on delay time		0.0 to 600.0	0.0 s	○
P10.10	DO3 switch-off delay time / RO2 switch-off delay time		0.0 to 600.0	0.0 s	○
P10.11	Relay RO1 switch-on delay time		0.0 to 600.0	0.0 s	○
P10.12	Relay RO1 switch-off delay time		0.0 to 600.0	0.0 s	○
P10.13	AO1 function selection	0: Output frequency (0 to maximum frequency) 1: Frequency reference (0 to maximum frequency) 2: Frequency reference (after acceleration/deceleration) (0 to maximum frequency) 3: Motor speed (0 to maximum speed) 4: Output current (0 to 2 * Iei) 5: Output current (0 to 2 * Iem) 6: Torque current (0 to 3 * Iem) 7: Reserved 8: Output voltage (0 to 1.2 * Ve) 9: Bus voltage (0 to 800 V) 10: AI1 after correction 11: AI2 after correction 12: Reserved 13: Output power (0 to 2 * Pe) 14: Host device percentage (0 to	0 to 28	0	○
P10.14	HDO1 function selection		0 to 28	0	○
P10.15	HDO2 function selection		0 to 28	0	○

Function code	Name	Description	Range	Default	Modify
		100.0%) 15: Torque limit value 1 (0.0 to 300.0%) 16: Torque limit value 2 (0.0 to 300.0%) 17 to 25: Reserved 26: Bus card percentage (0 to 100.0%) 27: High-speed pulse HDIA input value 28: Exciting current (0.0 to 100.0%)			
P10.16	AO1 output lower limit	0.00% to P10.18	0.00% to P10.18	0.00%	○
P10.17	Voltage corresponding to AO1 output lower limit	0.00 to 10.00 V	0.00 to 10.00	0.00 V	○
P10.18	AO1 output upper limit	P10.16 to 100.00%	P10.16 to 100.00%	100.00 %	○
P10.19	Voltage corresponding to AO1 output upper limit	0.00 to 10.00 V	0.00 to 10.00	10.00 V	○
P10.20	AO1 output filter	0.000 to 10.000 s	0.000 to 10.000	0.005 s	○
P10.21	HDO1 output lower limit	0.00% to P10.23	0.00% to P10.23	0.00%	○
P10.22	Frequency corresponding to HDO1 output lower limit	0.00 to 50.00 kHz	0.00 to 50.00	0.00 kHz	○
P10.23	HDO1 output upper limit	P10.21 to 100.00%	P10.21 to 100.00%	100.00 %	○
P10.24	Frequency corresponding to HDO1 output upper	0.00 to 50.00 kHz	0.00 to 50.00	50.00 kHz	○

Function code	Name	Description	Range	Default	Modify
	limit				
P10.25	HDO1 output filter time	0.000 to 10.000 s	0.000 to 10.000	0.005 s	○
P10.26	HDO2 output lower limit	0.00% to P10.28	0.00% to P10.28	0.00%	○
P10.27	Frequency corresponding to HDO2 output lower limit	0.00 to 50.00 kHz	0.00 to 50.00	0.00 kHz	○
P10.28	HDO2 output upper limit	P10.26 to 100.00%	P10.26 to 100.00%	100.00 %	○
P10.29	Frequency corresponding to HDO2 output upper limit	0.00 to 50.00 kHz	0.00 to 50.00	50.00 kHz	○
P10.30	HDO2 output filter time	0.000 to 10.000 s	0.000 to 10.000	0.005 s	○
P11: Auxiliary function parameters					
P11.00	Acceleration/Deceleration mode	0: Straight-line acceleration/deceleration 1: S-curve acceleration/deceleration	0 to 1	0	○
P11.01	Acceleration time 2	0.0 to 6000.0 s	0.0 to 6000.0 s	Depend on model	○
P11.02	Deceleration time 2	0.0 to 6000.0 s	0.0 to 6000.0 s	Depend on model	○
P11.03	Acceleration time 3	0.0 to 6000.0 s	0.0 to 6000.0 s	Depend on model	○
P11.04	Deceleration time 3	0.0 to 6000.0 s	0.0 to 6000.0 s	Depend on	○

Function code	Name	Description	Range	Default	Modify
				model	
P11.05	Acceleration time 4	0.0 to 6000.0 s	0.0 to 6000.0 s	Depend on model	○
P11.06	Deceleration time 4	0.0 to 6000.0 s	0.0 to 6000.0 s	Depend on model	○
P11.07	Time proportion of S-curve start segment	In the following figure, t_1 is defined by P11.07, in which the output frequency slope gradually increases according to the curve; t_2 is defined by P11.08, in which the output frequency slope gradually decreases according to the curve; the segment between t_1 and t_2 is straight-line acceleration/deceleration. They are relative to the present acceleration/deceleration time.  **Note:** P11.07 + P11.08 ≤ 100.0%	0.0 to 100.0%	10.0%	○
P11.08	Time proportion of S-curve end segment		0.0 to 100.0%	10.0%	○
P11.09	Switchover frequency of acceleration/deceleration time 1 and 2	0.00 Hz to P02.10	0.00 Hz to P02.10	0.00 Hz	○
P11.10	Jog running frequency	0.00 Hz to P02.10	0.00 Hz to P02.10	5.00 Hz	○
P11.11	Jog acceleration time	0.0 to 6000.0 s	0.0 to 6000.0 s	6.0 s	○
P11.12	Jog deceleration time	0.0 to 6000.0 s	0.0 to	6.0 s	○

Function code	Name	Description	Range	Default	Modify
			6000.0 s		
P11.13	Reserved				
P11.14	Number of decimal places for line speed	0 to 2	0 to 2	2	○
P11.15	Number of decimal places for acceleration/deceleration time	1 to 2	1 to 2	1	○
P11.16	Terminal UP/DOWN speed	0.01 to 50.00 Hz/s	0.01 to 50.00 Hz/s	0.50 Hz/s	○
P11.17	Keypad frequency setting selection	Ones place: Whether the frequency adjustment via the UP/DOWN terminal is valid; 0: Invalid 1: Valid Tens place: Whether to retain the frequency reference (keypad + terminal) set via the keypad UP/DOWN buttons when a power failure occurs; 0: Not retain 1: Retain Hundreds place: Whether to retain the frequency reference set via the keypad UP/DOWN buttons upon a stop; 0: Not retain 1: Retain Thousands place: Whether to retain the frequency reference set via the UP/DOWN terminals upon a stop; 0: Not retain 1: Retain	0 to 0x1111	0x1111	○

Function code	Name	Description	Range	Default	Modify
P11.18	Jump frequency 1	If the frequency reference is within the jump frequency band, the actual output will be at the jump frequency boundary to avoid the mechanical resonance of the load.	0.00 Hz to P02.10	0.00 Hz	○
P11.19	Jump frequency 1 band		0.00 Hz to P02.10	0.00 Hz	○
P11.20	Jump frequency 2	If the jump frequency is set to 0, the function is disabled.	0.00 Hz to P02.10	0.00 Hz	○
P11.21	Jump frequency 2 band		0.00 Hz to P02.10	0.00 Hz	○
P11.22	Wobble amplitude	0.0 to 100.0% (frequency reference percentage)	0.0 to 100.0%	0.0%	○
P11.23	Wobble step	0.0 to 100.0% (wobble amplitude percentage)	0.0 to 100.0%	0.0%	○
P11.24	Wobble rise time	0.0 to 6000.0 s	0.0 to 6000.0 s	6.0 s	○
P11.25	Wobble fall time	0.0 to 6000.0 s	0.0 to 6000.0 s	6.0 s	○
P11.26	Frequency reach (FAR) detection range	 When the running frequency of the drive is within the P11.26 percentage range of maximum	0.0 to 100.0%	5.0%	○

Function code	Name	Description	Range	Default	Modify
		frequency, the multi-function DO terminal outputs an ON signal.			
P11.27	FDT1 frequency-level detection value	When the running frequency is higher than P11.27 or P11.29, the multi-function DO terminal outputs an ON signal; when the running frequency is lower than the P11.28 or P11.30 percentage of the frequency detection value, the DO terminal cancels the ON signal.	0.00 Hz to P02.11	0.00 Hz	○
P11.28	FDT1 frequency-level detection hysteresis		0.0 to 100.0%	0.0%	○
P11.29	FDT2 frequency-level detection value		0.00 Hz to P02.11	0.00 Hz	○
P11.30	FDT2 frequency-level detection hysteresis		0.0 to 100.0%	0.0%	○
P11.31	Temperature for automatic fan start	5.0 to 80.0℃	5.0 to 80.0℃	40.0℃	○
P11.32	Reserved				
P11.33	Length reference	0 to 60000 m	0 to 60000 m	0 m	○
P11.34	Actual length	0 to 60000 m	0 to 60000 m	0 m	○
P11.35	Number of pulses per meter	1 to 60000	1 to 60000	1000	○
P11.36	Reference count value	0 to 60000	0 to 60000	0	○
P11.37	Designated count value	0 to 60000	0 to 60000	0	○
P11.38	Running time setting	0 to 65535 min	0 to 65535 min	0 min	○
P11.39	Accumulated running time reach	0 to 65535 h	0 to 65535 h	0 h	○
P11.40	Wake-up frequency	When the frequency reference is higher than P11.40, the drive wakes up and starts running after the delay defined by P11.41.	0.00 Hz to P02.10	0.00 Hz	○
P11.41	Wake-up delay time	0.0 to 6553.5 s	0.0 to 6553.5 s	0.0 s	○

Function code	Name	Description	Range	Default	Modify
P11.42	Hibernation frequency	When the frequency reference is lower than P11.42, the drive decelerates to stop and enters the hibernation state after the delay defined by P11.43.	0.00 Hz to P02.10	0.00 Hz	○
P11.43	Hibernation delay time	0.0 to 6553.5 s	0.0 to 6553.5 s	0.0 s	○
P11.44	Fan control	0: Auto running (based on the inverter temperature) 1: Continuous running after power-on 2: Controlled by start/stop commands (running upon start, off upon stop)	0 to 2	2	×
P11.45	Frequency adjustment via keypad UP/DOWN	Used to adjust the frequency via the keypad UP/DOWN buttons based upon the present frequency reference. Press DOWN to change the frequency into a negative value; press UP to change the frequency into a positive value.	-P02.10 to P02.10	0	*
P11.46	Frequency adjustment via keypad and terminal UP/DOWN	Used to adjust the frequency via the keypad and terminal UP/DOWN based upon the present frequency reference. Use DOWN to change the frequency into a negative value; use UP to change the frequency into a positive value.	-P02.10 to P02.10	0	*
P12: Control optimization parameters					
P12.00	Reserved	-	-	-	-
P12.01	PWM modulation mode	0: Asynchronous modulation 1: Synchronous modulation	0 to 1	0	
P12.02	Dead-zone compensation mode	0: No compensation 1: Compensation mode 1	0 to 1	1	○

Function code	Name	Description	Range	Default	Modify
P12.03	Random PWM depth	0: Disabled 1 to 10: Random PWM depth	0 to 10	0	○
P12.04	Dead-zone compensation cutoff frequency	0.00 to 599.00 Hz	0.00 to 599.00 Hz	200.00 Hz	○
P12.05	Voltage over-modulation coefficient	100 to 110	100 to 110	105	×
P12.06	Wave generation mode switchover point	0.00 to 599.00 Hz	0.00 to 599.00 Hz	500.00 Hz	×
P12.07	SVPWM mode	Ones place: 0: Wave generation mode 1 1: Wave generation mode 2 Tens place: Carrier frequency adjustment following temperature change 0: Disable 1: Enable Hundreds place: Carrier frequency adjustment following frequency change 0: Disable 1: Enable Thousands place: Carrier frequency adjustment following overload change 0: Disable 1: Enable	0 to 0x1111	0x1110	×
P12.08	Start frequency for carrier frequency adjustment following frequency change	0.00 to 599.00 Hz	0.00 to 599.00 Hz	10.00 Hz	×
P12.09	AVR function	0: Disable	0 to 1	1	

Function code	Name	Description	Range	Default	Modify
		1: Enable			
P12.10	Reserved	-	-	-	-
P13: Multi-speed and simple PLC parameters					
P13.00	PLC running mode	LED ones: PLC running mode 0: Stop after running for one cycle 1: Keep final values after running for one cycle 2: Repeat after running for one cycle LED tens: Startup mode 0: Run from the first stage 1: Continue to run from the retained stage and frequency upon a stop or fault LED hundreds: Power failure retention 0: Not retain 1: Retain the stage and frequency upon power failure LED thousands: Stage time unit 0: Second 1: Minute	0 to 0x1112	0x0000	×
P13.01	Multi-speed reference 0	The frequency range of stage 0 to stage 15: -100.0 to 100.0%. The maximum value 100.0% corresponds to the maximum output frequency P02.10. When running with simple PLC, it is required to set the parameters (P13.01 to P13.32) to determine the running frequency and running time of each stage. The running time range of stage 0	-100.0 to 100.0%	0.0	○
P13.02	Multi-speed reference 1		-100.0 to 100.0%	0.0	○
P13.03	Multi-speed reference 2		-100.0 to 100.0%	0.0	○
P13.04	Multi-speed reference 3		-100.0 to 100.0%	0.0	○
P13.05	Multi-speed reference 4		-100.0 to 100.0%	0.0	○

Function code	Name	Description	Range	Default	Modify
P13.06	Multi-speed reference 5	to stage 15: 0.0 to 6553.5 s (min). The unit of the running time is set by P13.00.	-100.0 to 100.0%	0.0	○
P13.07	Multi-speed reference 6		-100.0 to 100.0%	0.0	○
P13.08	Multi-speed reference 7		-100.0 to 100.0%	0.0	○
P13.09	Multi-speed reference 8		-100.0 to 100.0%	0.0	○
P13.10	Multi-speed reference 9		-100.0 to 100.0%	0.0	○
P13.11	Multi-speed reference 10		-100.0 to 100.0%	0.0	○
P13.12	Multi-speed reference 11		-100.0 to 100.0%	0.0	○
P13.13	Multi-speed reference 12		-100.0 to 100.0%	0.0	○
P13.14	Multi-speed reference 13		-100.0 to 100.0%	0.0	○
P13.15	Multi-speed reference 14		-100.0 to 100.0%	0.0	○
P13.16	Multi-speed reference 15		-100.0 to 100.0%	0.0	○
P13.17	Multi-speed reference 0 running time		0.0 to 6553.5 s (min)	0.0	○
P13.18	Multi-speed reference 1 running time		0.0 to 6553.5 s (min)	0.0	○
P13.19	Multi-speed reference 2 running time		0.0 to 6553.5 s (min)	0.0	○
P13.20	Multi-speed reference		0.0 to 6553.5 s	0.0	○

Function code	Name	Description	Range	Default	Modify
	3 running time		(min)		
P13.21	Multi-speed reference 4 running time		0.0 to 6553.5 s (min)	0.0	○
P13.22	Multi-speed reference 5 running time		0.0 to 6553.5 s (min)	0.0	○
P13.23	Multi-speed reference 6 running time		0.0 to 6553.5 s (min)	0.0	○
P13.24	Multi-speed reference 7 running time		0.0 to 6553.5 s (min)	0.0	○
P13.25	Multi-speed reference 8 running time		0.0 to 6553.5 s (min)	0.0	○
P13.26	Multi-speed reference 9 running time		0.0 to 6553.5 s (min)	0.0	○
P13.27	Multi-speed reference 10 running time		0.0 to 6553.5 s (min)	0.0	○
P13.28	Multi-speed reference 11 running time		0.0 to 6553.5 s (min)	0.0	○
P13.29	Multi-speed reference 12 running time		0.0 to 6553.5 s (min)	0.0	○
P13.30	Multi-speed reference 13 running time		0.0 to 6553.5 s (min)	0.0	○
P13.31	Multi-speed reference 14 running time		0.0 to 6553.5 s (min)	0.0	○

<table>
<tr><th>Function code</th><th>Name</th><th>Description</th><th>Range</th><th>Default</th><th>Modify</th></tr>
<tr><td>P13.32</td><td>Multi-speed reference 15 running time</td><td></td><td>0.0 to 6553.5 s (min)</td><td>0.0</td><td>○</td></tr>
<tr><td>P13.33</td><td>Acceleration/Deceleration time of simple PLC reference 0 to 3</td><td>
<table>
<tr><th></th><th>Reference</th><th>Acc/Dec time 1</th><th>Acc/Dec time 2</th><th>Acc/Dec time 3</th><th>Acc/Dec time 4</th></tr>
<tr><td>Ones</td><td>0</td><td>0</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>Tens</td><td>1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>Hundreds</td><td>2</td><td>0</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>Thousands</td><td>3</td><td>0</td><td>1</td><td>2</td><td>3</td></tr>
</table>
</td><td>0 to 0x3333</td><td>0x0000</td><td>○</td></tr>
<tr><td>P13.34</td><td>Acceleration/Deceleration time of simple PLC reference 4 to 7</td><td>
<table>
<tr><th></th><th>Reference</th><th>Acc/Dec time 1</th><th>Acc/Dec time 2</th><th>Acc/Dec time 3</th><th>Acc/Dec time 4</th></tr>
<tr><td>Ones</td><td>4</td><td>0</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>Tens</td><td>5</td><td>0</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>Hundreds</td><td>6</td><td>0</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>Thousands</td><td>7</td><td>0</td><td>1</td><td>2</td><td>3</td></tr>
</table>
</td><td>0 to 0x3333</td><td>0x0000</td><td>○</td></tr>
<tr><td>P13.35</td><td>Acceleration/Deceleration time of simple PLC reference 8 to 11</td><td>
<table>
<tr><th></th><th>Reference</th><th>Acc/Dec time 1</th><th>Acc/Dec time 2</th><th>Acc/Dec time 3</th><th>Acc/Dec time 4</th></tr>
<tr><td>Ones</td><td>8</td><td>0</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>Tens</td><td>9</td><td>0</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>Hundreds</td><td>10</td><td>0</td><td>1</td><td>2</td><td>3</td></tr>
</table>
</td><td>0 to 0x3333</td><td>0x0000</td><td>○</td></tr>
</table>

<table>
<tr><th>Function code</th><th>Name</th><th>Description</th><th>Range</th><th>Default</th><th>Modify</th></tr>
<tr><td></td><td></td><td><table><tr><td>Thousands</td><td>11</td><td>0</td><td>1</td><td>2</td><td>3</td></tr></table></td><td></td><td></td><td></td></tr>
<tr><td>P13.36</td><td>Acceleration/Deceleration time of simple PLC reference 12 to 15</td><td><table><tr><td></td><td>Reference</td><td>Acc/Dec time 1</td><td>Acc/Dec time 2</td><td>Acc/Dec time 3</td><td>Acc/Dec time 4</td></tr><tr><td>Ones</td><td>12</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>Tens</td><td>13</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>Hundreds</td><td>14</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>Thousands</td><td>15</td><td>0</td><td>1</td><td>2</td><td>3</td></tr></table></td><td>0 to 0x3333</td><td>0x0000</td><td>○</td></tr>
<tr><td colspan="6">P14: Process PID parameters</td></tr>
<tr><td>P14.00</td><td>PID reference source</td><td>0: P14.02 digital setting
1: AI1
2: AI2
3: Reserved
4: HDI
5: Modbus/Modbus TCP setting
6: EtherCAT/Profinet/CANopen/ Ethernet IP setting
7: Air compressor pressure reference</td><td>0 to 7</td><td>7</td><td>○</td></tr>
<tr><td>P14.01</td><td>PID feedback source</td><td>0: AI1
1: AI2
2: Reserved
3: HDI
4: Modbus/Modbus TCP setting
5: EtherCAT/Profinet/CANopen/ Ethernet IP setting
6: AI1 + AI2</td><td>0 to 10</td><td>10</td><td>○</td></tr>
</table>

Function code	Name	Description	Range	Default	Modify
		7: AI1 - AI2 8: MIN (AI1, AI2) 9: MAX (AI1, AI2) 10: Air compressor pressure feedback			
P14.02	PID digital setting value	-100.0% to 100.0%	-100.0% to 100.0%	50.0%	○
P14.03	Acceleration/Deceleration time of PID reference	0.0 to 3600.0 s	0.0 to 3600.0 s	0.0 s	○
P14.04	PID regulating feature selection	0: Positive action 1: Negative action	0 to 1	0	○
P14.05	Proportional gain Kp1	0.0 to 1000.0	0.0 to 1000.0	20.0	○
P14.06	Integral time Ti1	0.01 to 10.00 s	0.01 to 10.00 s	2.00 s	○
P14.07	Derivative time Td1	0.000 to 10.000 s	0.000 to 10.000 s	0.000 s	○
P14.08	Derivative limit	0.00 to 100.00%	0.00 to 100.00%	0.10%	○
P14.09	Sampling cycle	0.01 to 10.00 s	0.01 to 10.00 s	0.01 s	○
P14.10	Deviation limit	0.0 to 100.0% (relative to the maximum span)	0.0 to 100.0%	0.0%	○
P14.11	PID parameter low-frequency switchover point	When the ramp frequency reference is lower than the low-frequency switchover point, the PID parameters include P14.05 to P14.07; when it is higher than the high-frequency switchover point, the PID parameters include P14.13 to P14.15; when it is between the low-frequency and high-frequency switchover points, the PID parameter is the linear	0.00 Hz to P14.12	5.00 Hz	○

Function code	Name	Description	Range	Default	Modify
		interpolation of these two parameter groups.			
P14.12	PID parameter high-frequency switchover point	P14.11 to P02.10	P14.11 to P02.10	10.00 Hz	○
P14.13	Proportional gain Kp2	0.0 to 1000.0	0.0 to 1000.0	20.0	○
P14.14	Integral time Ti2	0.01 to 10.00 s	0.01 to 10.00 s	1.00 s	○
P14.15	Derivative time Td2	0.000 to 10.000 s	0.000 to 10.000 s	0.000 s	○
P14.16	PID upper limit digital setting	P14.17 to 100.0%	P14.17 to 100.0%	100.0%	○
P14.17	PID lower limit digital setting	-100.0% to P14.16	-100.0% to P14.16	0.0%	○
P14.18	Output filter time	0.00 to 60.00 s	0.00 to 60.00 s	0.00 s	○
P14.19	PID output property	Ones place: 0: Integral separation disabled 1: Integral separation enabled Tens place: 0: When the PID output is a negative value, the limit is 0; 1: When the PID output is a negative value, the output is negative. Hundreds place: 0: The integral regulation continues after the frequency reaches the upper/lower limit; 1: The integral regulation stops after the frequency reaches the upper/lower limit.	0x000 to 0x111	0x100	○
P14.20	PID preset value	0.0 to 100.0%	0.0 to	0.0%	○

Function code	Name	Description	Range	Default	Modify
			100.0%		
P14.21	PID preset value hold time	0.00 to 650.00 s	0.00 to 650.00 s	0.0 s	○
P14.22	PID feedback loss detection threshold	0.0 to 100.0% 0.0%: Disabled	0.0 to 100.0%	0.0%	○
P14.23	PID feedback loss detection time	0.0 to 20.0 s	0.0 to 20.0 s	1.0 s	○
P14.24	PID calculation mode	0: Calculation disabled at stop 1: Calculation enabled at stop	0 to 1	0	○
P14.25	PID upper/lower limit unit selection	0: Percentage 1: Hz **Note:** When Hz is chosen, P14.26 and P14.27 are the upper and lower PID limits. When Hz is chosen, the maximum frequency P02.10 cannot exceed 327.67 Hz.	0 to 1	0	×
P14.26	PID frequency upper limit	0 to P02.10	0 to P02.10	50.00 Hz	
P14.27	PID frequency lower limit	-P02.10 to P14.26	-P02.10 to P14.26	0.00 Hz	
P15: Communication parameters					
P15.00	Communication format	Ones place: 0: Modbus protocol 1: Profinet to 485 protocol Tens place: 0: 1-8-2-N format 1: 1-8-1-E format 2: 1-8-1-O format 3: 1-8-1-N format	0 to 0x31	0x30	○
P15.01	Baud rate	0: 4800 BPS	0 to 6	1	○

Function code	Name	Description	Range	Default	Modify
		1: 9600 BPS 2: 19200 BPS 3: 38400 BPS 4: 57600 BPS 5: 115200 BPS 6: 125000 BPS			
P15.02	Local address	0 to 247 (0 is the broadcast address)	0 to 247	1	○
P15.03	Communication timeout detection time	0.0 to 60.0 s The function code is disabled when set to 0.0. When the function code is set to a non-zero value, if the interval between two consecutive communication actions exceeds the timeout detection time, the system will report a "485 communication error" (CE).	0.0 to 60.0 s	0.0 s	○
P15.04	Response delay of the local drive	0 to 200 ms	0 to 200 ms	5 ms	○
P15.05	Communication action	Ones place: 0: Response to the write operation 1: No response to the write operation Tens place: 485 mapping enable 0: Disable 1: Enable **Note:** Only control parameters starting with 0x64 are provided with the choices whether there is a response or not to the write operation. For writing function codes, only the choice with	0 to 0x11	0	○

Function code	Name	Description	Range	Default	Modify
		response is available.			
P15.06	Reserved function 2 for user	0 to 65535	0 to 65535	0	○
P16: Keypad display setting parameters (reserved)					
P16.00	Selection 1 of parameters displayed in the running state	0: No display. 1: Display This parameter determines whether each of the parameters in the running state display list of the operating panel level-0 menu is displayed or not. Meaning of each bit is explained below. 0: Main frequency channel 1: Main frequency reference 2: Auxiliary frequency reference 3: Frequency reference 4: Ramp frequency reference 5: Output frequency 6: Output voltage 7: Output current 8: Torque current 9: Exciting current 10: Motor speed 11: Motor power 12: Estimated motor frequency 13: Actual motor frequency 14: High byte of accumulated power consumption 15: Low byte of accumulated power consumption	0 to 0xFFFF	0x4F0	○
P16.01	Selection 2 of parameters displayed in the running state	0: No display. 1: Display This parameter determines whether each of the parameters in the running state display list of the operating panel level-0 menu is	0 to 0xFFFF	0x1	○

Function code	Name	Description	Range	Default	Modify
		displayed or not. Meaning of each bit is explained below. 0: Bus voltage 1: Drive running state 2: DI1 to DI4 status 3: DI5 to DI8 status 4: DO status 5: AI1 voltage 6: AI2 voltage 7: AI1 current 8: AI2 current 9: AO1 voltage 10: HDI frequency 11: HDO1 frequency 12: HDO2 frequency 13: PID reference 14: PID feedback 15: PID deviation			
P16.02	Default selection of parameter for display in the running state	This parameter determines the default parameter number for display in the operating panel level-0 menu in the running state after power-on. Value 0 to 31 correspond respectively to the 32 parameters listed in the parameters P16.00 to P16.01. Note: Press the Shift key on the operating panel to switch the parameter on display. Modification can be saved to RAM only; EEPROM saving is denied.	0 to 31	4	○
P16.03	Selection of parameters displayed in the stop state	Decimal setting: 0: No display. 1: Display	0 to 0xFFFF	0x3	○

Function code	Name	Description	Range	Default	Modify
		This parameter determines whether each parameter on the operating panel level-0 menu list is displayed or not in the stop state. Each bit (bit0 to bit15) corresponds to one of the 16 parameters listed in P16.04. **Note:** When all bits are set to 0, the default parameter for display is frequency reference.			
P16.04	Default selection of parameter for display in the stop state	This parameter determines the default parameter number for display in the operating panel level-0 menu in the stop state after power-on. 0: Frequency reference 1: Bus voltage 2: DI input state 1 3: DI input state 2 4: DO output state 5: AI1 input voltage 6: AI2 input voltage 7: AO1 output percentage 8: HDI frequency reference 9: HDO1 output value 10: HDO2 output value 11: Length 12: Simple PLC present step 13: Linear speed display 14: PID reference 15: Torque reference **Note:** When all bits are set to 0, the default parameter for display is	0 to 15	0	○

Function code	Name	Description	Range	Default	Modify
		frequency reference.			
P16.05	Linear speed display coefficient	0.1 to 999.9% P01.44 = Linear speed × P16.05	0.1 to 999.9%	100.0%	○
P16.06	Speed display coefficient	0.1 to 999.9% Mechanical speed = 60 * Frequency display in the running state × P16.06/ Number of motor pole pairs	0.1 to 999.9%	100.0%	○
P16.07	Frequency display coefficient	0.0 to 100.0% P01.57 = P01.05 * Frequency display coefficient	0.0 to 100.0%	100.0%	○
P17: Master-slave control parameters (reserved)					
P18: Commissioning parameter group 1					
P18.00	Control data 1 address	0 to 0xFFFF	0 to 0xFFFF	0x1000	○
P18.01	Control data 1 value	0 to 65535	0 to 65535	0	*
P18.02	Control data 2 address	0 to 0xFFFF	0 to 0xFFFF	0x1002	○
P18.03	Control data 2 value	0 to 65535	0 to 65535	0	*
P18.04	Control data 3 address	0 to 0xFFFF	0 to 0xFFFF	0x1004	○
P18.05	Control data 3 value	0 to 65535	0 to 65535	0	*
P18.06	Control data 4 address	0 to 0xFFFF	0 to 0xFFFF	0x1006	○
P18.07	Control data 4 value	0 to 65535	0 to 65535	0	*
P18.08	Function data 1 address	0 to 0xFFFF	0 to 0xFFFF	0x1000	○
P18.09	Function data 1 value	0 to 65535	0 to 65535	0	*
P18.10	Function data 2 address	0 to 0xFFFF	0 to 0xFFFF	0x1002	○
P18.11	Function data 2 value	0 to 65535	0 to 65535	0	*
P18.12	Function data 3 address	0 to 0xFFFF	0 to 0xFFFF	0x1004	○

Function code	Name	Description	Range	Default	Modify
P18.13	Function data 3 value	0 to 65535	0 to 65535	0	*
P18.14	Function data 4 address	0 to 0xFFFF	0 to 0xFFFF	0x1006	○
P18.15	Function data 4 value	0 to 65535	0 to 65535	0	*
P20: Motor 2 parameters					
P20.00	Motor type	0: Asynchronous motor 1: Synchronous motor	0 to 1	0	×
P20.01	Asynchronous motor rated power	0.1 to 3000.0 kW	0.1 to 3000.0 kW	Depend on model	×
P20.02	Asynchronous motor rated voltage	0 to 1200 V	0 to 1200 V	Depend on model	×
P20.03	Asynchronous motor rated current	0.8 to 6000.0 A	0.8 to 6000.0 A	Depend on model	×
P20.04	Asynchronous motor rated frequency	0.01 Hz to P02.10	0.01 Hz to P02.10	50.00 Hz	×
P20.05	Asynchronous motor rated speed	1 to 36000 rpm	1 to 36000 rpm	Depend on model	×
P20.06	Asynchronous motor stator resistance	0.001 to 65.535 Ω	0.001 to 65.535 Ω	Depend on model	×
P20.07	Asynchronous motor rotor resistance	0.001 to 65.535 Ω	0.001 to 65.535 Ω	Depend on model	×
P20.08	Asynchronous motor leakage inductance	0.01 mH to 655.35 mH (drive power ≤ 55 kW) 0.001 mH to 65.535 mH (drive power > 55 kW)	Depend on model	Depend on model	×
P20.09	Asynchronous motor	0.1 mH to 6553.5 mH (drive power	Depend on	Depend on	×

Function code	Name	Description	Range	Default	Modify
	mutual inductance	≤ 55 kW) 0.01 mH to 655.35 mH (drive power > 55 kW)	model	model	
P20.10	Asynchronous motor no-load current	0.1 to 6553.5 A	0.1 to 6553.5 A	Depend on model	×
P20.11	Asynchronous motor iron core magnetic saturation coefficient 1	0.0 to 100.0%	0.0 to 100.0%	80.0%	×
P20.12	Asynchronous motor iron core magnetic saturation coefficient 2	0.0 to 100.0%	0.0 to 100.0%	68.0%	×
P20.13	Asynchronous motor iron core magnetic saturation coefficient 3	0.0 to 100.0%	0.0 to 100.0%	57.0%	×
P20.14	Asynchronous motor iron core magnetic saturation coefficient 4	0.0 to 100.0%	0.0 to 100.0%	40.0%	×
P20.15	Synchronous motor rated power	0.1 to 3000.0 kW	0.1 to 3000.0 kW	Depend on model	×
P20.16	Synchronous motor rated voltage	0 to 1200 V	0 to 1200 V	Depend on model	×
P20.17	Synchronous motor rated current	0.8 to 6553.5 A	0.8 to 6553.5 A	Depend on model	×
P20.18	Synchronous motor rated frequency	0.01 Hz to P02.10	0.01 Hz to P02.10	Depend on model	×

Function code	Name	Description	Range	Default	Modify
P20.19	Number of synchronous motor pole pairs	1 to 128	1 to 128	2	×
P20.20	Synchronous motor stator resistance	0.001 to 65.535 Ω (drive power ⩽ 55 kW) 0.0001 to 6.5535 Ω (drive power > 55 kW)	Depend on model	Depend on model	×
P20.21	Synchronous motor D-axis inductance	0.01 to 655.35 mH (drive power ⩽ 55 kW) 0.001 to 65.535 mH (drive power > 55 kW)	Depend on model	Depend on model	×
P20.22	Synchronous motor Q-axis inductance	0.01 to 655.35 mH (drive power ⩽ 55 kW) 0.001 to 65.535 mH (drive power > 55 kW)	Depend on model	Depend on model	×
P20.23	Synchronous motor back EMF	0.0 to 6553.5 V/krpm	0.0 to 6553.5 V/krpm	Depend on model	×
P20.24	Reserved	-	-	-	-
P20.25	Reserved	-	-	-	-
P20.26	Reserved	-	-	-	-
P20.27	Motor auto-tuning	0: No operation 1: Partial parameter auto-tuning in the static state 2: Full parameter auto-tuning in the rotating state	0 to 2	0	×
P20.28	Motor overload protection coefficient	0.0 to 300.0%	0.0 to 300.0%	100.0%	×
P20.29	Reserved				
P21: Motor 2 encoder parameters					
P21.00	Encoder PPR	1 to 65535	1 to 65535	1024	×
P21.01	Encoder type	0: ABZ incremental encoder	0	0	×

Function code	Name	Description	Range	Default	Modify
P21.02	A/B phase sequence of the ABZ incremental encoder	0: FWD 1: REV Note: The phase sequence will be automatically identified after the auto-tuning in the rotating state.	0 to 1	0	×
P21.03	Speed feedback PG disconnection detection time	0.1 to 10.0 s When set to 0.0 s, the detection is disabled.	0.0 to 10.0	0.0 s	○
P21.04	PG card voltage class selection	0: 5 V 1: 12 V	0 to 1	0	×
P21.05	Z signal enable	0: Disable 1: Correction mode 1 (rotary auto-tuning is required) 2: Correction mode 2 (rotary auto-tuning is not mandatory)	0 to 2	0	×
P21.06	Synchronous motor angle compensation	0.0 to 360.0	0.0 to 360.0	0.0	○
P21.07	Synchronous motor initial position	0.0 to 360.0	0.0 to 360.0	0.0	○
P21.08	Resolver angle correction enable	0: Disable 1: Enable the correction mode 1 2: Enable the correction mode 2	0 to 2	2	○
P21.09	Enable the maximum ratio between torque and current	0: Disable 1: Enable	0 to 1	1	○
P21.10	ABX synchronous closed-loop quick start mode	0: Disable 1: Enable	0 to 1	1	○
P21.11	Cyclic value of position identification	Obtained through auto-tuning	3400 to 65535	3400	×
P21.12	Frequency-division	Obtained through auto-tuning	0 to 9	0	×

Function code	Name	Description	Range	Default	Modify
	value of position identification				
P21.13	PG card version number	0 to 65535	0 to 65535	0	*
P21.14	PG card disconnection enable	0: Disconnection fault invalid 1: Disconnection fault enabled	0 to 1	1	×
P21.15	Initial position auto-tuning before synchronous motor running	Ones place: In open-loop mode 0: No auto-tuning 1: Auto-tuning before first running upon power-on 2: Auto-tuning before each running Tens place: In ABZ encoder closed-loop mode 0: Auto-tuning before first running upon power-on 1: Auto-tuning before each running	0x00 to 0x21	0	×
P21.16 to P21.30	Reserved	-	-	-	-
P22: Motor 2 vector control parameters					
P22.00	Speed loop proportional gain 1	1 to 100	1 to 100	10	○
P22.01	Speed loop integral time 1	0.01 to 10.00 s	0.01 to 10.00 s	0.50 s	○
P22.02	Switchover frequency 1	0.00 Hz to P02.11	0.00 Hz to P02.11	5.00 Hz	○
P22.03	Speed loop proportional gain 2	1 to 100	1 to 100	10	○
P22.04	Speed loop integral time 2	0.01 to 10.00 s	0.01 to 10.00 s	1.00 s	○
P22.05	Switchover frequency	0.00 Hz to P02.11	0.00 Hz to	10.00 Hz	○

Function code	Name	Description	Range	Default	Modify
	2		P02.11		
P22.06	Slip compensation coefficient	50 to 200%	50 to 200%	100%	○
P22.07	Speed loop filter time constant	0.00 to 20.00 s	0.00 to 20.00 s	0.02 s	○
P22.08	Vector control over-excitation gain	50 to 200%	50 to 200%	100%	○
P22.09	Drive torque upper limit source	0: Digital setting (P22.10) 1: AI1 2: AI2 3: HDI 4: Modbus 5: PROFINET 6: MIN (AI1,AI2) 7: MAX (AI1,AI2)	0 to 7	0	○
P22.10	Drive torque upper limit digital setting	0.0 to 300.0%	0.0 to 300.0%	150.0%	○
P22.11	Braking torque upper limit source	0: Digital setting (P22.12) 1: AI1 2: AI2 3: HDI 4: Modbus 5: PROFINET 6: MIN (AI1,AI2) 7: MAX (AI1,AI2)	0 to 7	0	○
P22.12	Braking torque upper limit digital setting	0.0 to 300.0%	0.0 to 300.0%	150.0%	○
P22.13	Excitation regulation Kp	0 to 60000	0 to 60000	2000	○
P22.14	Excitation regulation Ki	0 to 60000	0 to 60000	1300	○

Function code	Name	Description	Range	Default	Modify
P22.15	Torque regulation Kp	0 to 60000	0 to 60000	2000	○
P22.16	Torque regulation Ki	0 to 60000	0 to 60000	1300	○
P22.17	Synchronous motor field weakening mode	0: Disabled 1: Enabled	0 to 1	0	○
P22.18	Synchronous motor field weakening coefficient	0 to 110	0 to 110	5	○
P22.19	Maximum field weakening current	0.0 to 120.0%	0.0 to 120.0%	100.0%	○
P22.20	Field weakening auto-tuning coefficient	0.0 to 120.0%	0.0 to 120.0%	100.0%	○
P22.21	Field weakening integral multiple	0.000 to 1.200	0.000 to 1.200	1.000	○
P23: Motor 2 torque control parameters					
P23.00	Torque control enable	0: Disabled 1: Enabled	0 to 1	0	○
P23.01	Torque reference channel	0: Digital setting 1: AI1 2: AI2 3: HDI 4: Modbus 5: PROFINET	0 to 5	0	○
P23.02	Torque digital setting	-300.0 to 300.0%	-300.0 to 300.0%	0.0%	○
P23.03	Torque reference acceleration/deceleration time	0.0 to 6000.0 s	0.0 to 6000.0 s	6.0 s	○
P23.04	FWD speed limit channel	0: Digital setting 1: AI1 2: AI2	0 to 5	0	○

Function code	Name	Description	Range	Default	Modify
		3: HDI 4: Modbus 5: PROFINET			
P23.05	FWD speed limit digital setting	0.00 Hz to P02.11	0.00 Hz to P02.11	0.00 Hz	○
P23.06	REV speed limit channel	0: Digital setting 1: AI1 2: AI2 3: HDI 4: Modbus 5: PROFINET	0 to 5	0	○
P23.07	REV speed limit digital setting	0.00 Hz to P02.11	0.00 Hz to P02.11	0.00 Hz	○
P23.08 to P23.11	Reserved				
P24: Motor 2 V/F control parameters					
P24.00	V/F curve setting	0: Straight-line V/F 1: Multi-point V/F 2: Square V/F 3: Reserved 4: V/F complete separation 5: V/F half separation	0 to 5	0	×
P24.01	Torque boost	0.0 to 50.0	0.0 to 50.0	0.0	○
P24.02	Cut-off frequency of torque boost	0.00 Hz to P02.11	0.00 Hz to P02.11	10.00 Hz	×
P24.03	Multi-point V/F frequency 1	0.00 Hz to P24.05	0.00 Hz to P24.05	0.00 Hz	×
P24.04	Multi-point V/F voltage 1	0 V to P24.06	0 V to P24.06	0 V	×
P24.05	Multi-point V/F frequency 2	P24.03 to P24.07	P24.03 to P24.07	0.00 Hz	×

Function code	Name	Description	Range	Default	Modify
P24.06	Multi-point V/F voltage 2	P24.04 to P24.08	P24.04 to P24.08	0 V	×
P24.07	Multi-point V/F frequency 3	P24.05 to 599.00 Hz	P24.05 to 599.00 Hz	0.00 Hz	×
P24.08	Multi-point V/F voltage 3	P24.06 to 380 V	P24.06 to 380 V	0 V	×
P24.09	Slip compensation coefficient	0 to 300	0 to 300	150	○
P24.10	V/F over-excitation gain	0.0 to 100.0	0.0 to 100.0	0.0	○
P24.11	Oscillation suppression gain	0 to 100	0 to 100	10	○
P24.12	Oscillation suppression gain mode	0 to 2	0 to 2	0	×
P24.13	Voltage source for V/F separation	0: Digital setting 1: AI1 2: AI2 3: Reserved 4: HDI 5: Multi-reference 6: Simple PLC 7: PID 8: Modbus 9: PROFINET	0 to 9	0	○
P24.14	Digital setting of voltage source for V/F separation	0 to 1000 V	0 to 1000 V	0 V	○
P24.15	Voltage rise time of V/F separation	0.0 to 6000.0 s	0.0 to 6000.0 s	5.0 s	○
P24.16	Voltage fall time of V/F separation	0.0 to 6000.0 s	0.0 to 6000.0 s	5.0 s	○

Function code	Name	Description	Range	Default	Modify
P24.17	Stop mode for V/F separation	0: Frequency and voltage decline to 0 independently 1: Frequency declines after voltage declines to 0	0 to 1	0	○
P24.18	V/F slip compensation gain	0.0 to 100.0	0.0 to 00.0	0.0	○
P24.19	Reserved	-	-	-	-
P26: Commissioning parameter group 2					
P26.00	Commissioning parameter 1	0 to 65535	0 to 65535	5	○
P26.01	Commissioning parameter 2	0 to 65535	0 to 65535	1	○
P26.02	Commissioning parameter 3	0 to 65535	0 to 65535	10	○
P26.03	Commissioning parameter 4	0 to 65535	0 to 65535	70	○
P26.04	Commissioning parameter 5	0 to 65535	0 to 65535	300	○
P26.05	Commissioning parameter 6	0 to 65535	0 to 65535	0	○
P26.06	Commissioning parameter 7	0 to 65535	0 to 65535	0	○
P26.07	Commissioning parameter 8	0 to 65535	0 to 65535	0	○
P26.08	Commissioning parameter 9	0 to 65535	0 to 65535	0	○
P26.09	Commissioning parameter 10	0 to 65535	0 to 65535	0	○
P26.10	Commissioning parameter 11	0 to 65535	0 to 65535	0	○
P26.11	Commissioning	0 to 65535	0 to 65535	0	○

Function code	Name	Description	Range	Default	Modify
	parameter 12				
P26.12	Commissioning parameter 13	0 to 65535	0 to 65535	0	○
P26.13	Commissioning parameter 14	0 to 65535	0 to 65535	0	○
P26.14	Commissioning parameter 15	0 to 65535	0 to 65535	0	○
P26.15	Commissioning parameter 16	0 to 65535	0 to 65535	0	○
P26.16	Commissioning parameter 17	0 to 65535	0 to 65535	0	○
P26.17	Commissioning parameter 18	0 to 65535	0 to 65535	0	○
P26.18	Commissioning parameter 19	0 to 65535	0 to 65535	0	○
P26.19	Commissioning parameter 20	0 to 65535	0 to 65535	0	○
P26.20	Commissioning parameter 21	0 to 65535	0 to 65535	0	○
P26.21	Commissioning parameter 22	0 to 65535	0 to 65535	0	○
P26.22	Commissioning parameter 23	0 to 65535	0 to 65535	0	○
P26.23	Commissioning parameter 24	0 to 65535	0 to 65535	0	○
P26.24	Commissioning parameter 25	0 to 65535	0 to 65535	0	○
P26.25	Commissioning parameter 26	0 to 65535	0 to 65535	0	○
P26.26	Commissioning parameter 27	0 to 65535	0 to 65535	0	○

Function code	Name	Description	Range	Default	Modify
P26.27	Commissioning parameter 28	0 to 65535	0 to 65535	0	○
P26.28	Commissioning parameter 29	0 to 65535	0 to 65535	0	○
P26.29	Commissioning parameter 30	0 to 65535	0 to 65535	0	○
P29: Special function parameter group 1					
P29.00	Lockup time	Lock cycle 0 to 65535 h	0 to 65535 h	0	×
P29.01	Lockup mode	Reserved	0 to 1	0	×
P29.02	Lockup status	Lock status 0: Disabled 1: Counting down 2: Locked	0 to 2	0	*
P29.03	Running time remainder	Running time remainder	0 to 65535 h	0	*
P29.04	Random seed	Randomly generated	0 to 65535	0	*
P29.05	Secret key	Secret key	0 to 65535	0	×
P29.06	Accumulated running time when lockup is enabled	Lock cycle	0 to 65535 h	0	*
P29.07	Parameter selection for display in auxiliary display zone	0: No display. 1: Display This parameter determines whether each of the parameters in the auxiliary display zone list is displayed or not. Meaning of each bit is explained below. 0: State of the status machine 1: Output current 2: Output voltage 3: Frequency reference	0x1 to 0xFFFF	0x1	

Function code	Name	Description	Range	Default	Modify
		4: Ramp frequency reference 5: Output frequency 6: Bus voltage 7: Fault code 8: DI input state 1 9: DI input state 2 10: AI1 input voltage 11: AI2 input voltage 12: DO output state 13: PID reference 14: PID feedback 15: Drive running state			
P29.08	Default selection of parameter for display in auxiliary display zone	0 to 15 This parameter sets the default parameter number to be displayed in the auxiliary display zone after power-on. Each value of 0 to 15 corresponds respectively to one of the 16 parameters listed in P29.07. **Note:** Press the Shift key on the operating panel to switch the parameter on display. Modification can be saved to RAM only; EEPROM saving is denied.	0 to 15	0	
P29.09 to P29.39	Reserved	-	-	-	-
P40: Bus option parameters					
P40.00	Reserved	-			
P40.01	Identification time for options	0.0 to 10.0 s The value of 0 indicates that there is no timeout detection.	0.0 to 10.0	0.0 s	○

Function code	Name	Description	Range	Default	Modify
P40.02	IP address 1	0 to 255	0 to 255	192	○
P40.03	IP address 2	0 to 255	0 to 255	168	○
P40.04	IP address 3	0 to 255	0 to 255	1	○
P40.05	IP address 4	0 to 255	0 to 255	10	○
P40.06	Subnet mask 1	0 to 255	0 to 255	255	○
P40.07	Subnet mask 2	0 to 255	0 to 255	255	○
P40.08	Subnet mask 3	0 to 255	0 to 255	255	○
P40.09	Subnet mask 4	0 to 255	0 to 255	0	○
P40.10	Gateway 1	0 to 255	0 to 255	192	○
P40.11	Gateway 2	0 to 255	0 to 255	168	○
P40.12	Gateway 3	0 to 255	0 to 255	1	○
P40.13	Gateway 4	0 to 255	0 to 255	1	○
P40.14	MAC address 1	0 to 255	0 to 255	0	*
P40.15	MAC address 2	0 to 255	0 to 255	0	*
P40.16	MAC address 3	0 to 255	0 to 255	0	*
P40.17	MAC address 4	0 to 255	0 to 255	0	*
P40.18	MAC address 5	0 to 255	0 to 255	0	*
P40.19	MAC address 6	0 to 255	0 to 255	0	*
P40.20	CANopen communication station number	1 to 127 Modification takes effect only after re-power on.	1 to 127	1	
P40.21	CANopen communication baud rate	0: 1 Mbit/s 1: 800 kbit/s 2: 500 kbit/s 3: 250 kbit/s 4: 125 kbit/s 5: 100 kbit/s 6: 50 kbit/s	0 to 8	2	

Function code	Name	Description	Range	Default	Modify
		7: 20 kbit/s 8: 10 kbit/s Modification takes effect only after re-power on.			
P40.22 to P40.33	Reserved	-	-	-	-
P41: I/O option parameters					
P41.00 to P41.12	Reserved	-	-	-	-
P41.13	Relay RO2 output selection	0: Disabled 1: AC drive in running 2: FWD running 3: REV running 4: Frequency reach signal (FAR) 5: Frequency-level detection signal (FDT1) 6: Frequency-level detection signal (FDT2) 7: Overload detection signal (OL) 8: Lockout at undervoltage (LU) 9: External fault stop (EXT) 10: Frequency upper limit (FHL) 11: Frequency lower limit (FLL) 12: Zero-speed drive running 13: Simple PLC stage completion 14: Simple PLC cycle completion 15: Running time reach of this run 16: Accumulated running time reach 17: AC drive ready to run (RDY) 18: AC drive fault 19: Host device on/ff signal	0 to 47	24	○

Function code	Name	Description	Range	Default	Modify
		20: Motor overheat 21: Torque limited (Valid when the torque command is limited by the torque limit value 1 or 2.) 22: Motor overload pre-alarm signal 23: Start/Stop signal of the fan at power line frequency 24: Electromagnetic valve control output 25: Air compressor fault alarm output 26: Reference count value reach 27: Designated count value reach 28: Length reach 29 to 37: Reserved 38: Motor 1 and 2 indication terminal 39: Bus card switch signal 40 to 45: Reserved 46: PID feedback loss 47: Reserved			
P41.14	Reserved				
P41.15	Output terminal polarity selection	Ones place: 0: RO2 positive logic active 1: RO2 negative logic active Tens place: Reserved Hundreds place: Reserved Thousands place: Reserved	0 to 0x1	0	○
P41.16	Relay RO2 switch-on delay time	Used to set the delay time for level jump upon switch-on and switch-off of the output terminals.	0.0 to 600.0 s	0.0 s	○
P41.17	Relay RO2 switch-off delay time		0.0 to 600.0 s	0.0 s	○

Function code	Name	Description	Range	Default	Modify
P41.18 to P41.50	Reserved	-	-	-	-
P42: PLC card option parameters (reserved)					
P43: PROFINET communication parameters (reserved)					
P47: Air compressor dedicated parameters					
P47.00	Air compressor mode enable	Used to enable the dedicated functions for air compressors 0: Disabled 1: Enabled	0 to 1	1	×
P47.01	Pressure sensor channel	0: AI1 1: AI2	0 to 1	0	×
P47.02	Pressure sensor upper limit	0.00 to 20.00 MPa	0.00 to 20.00 MPa	1.60 MPa	×
P47.03	Loading mode	In the manual mode, loading is processed via the DI terminal or the electromagnetic valve controlled by communication; in the automatic mode, loading is processed automatically based on pressure. 0: Automatic 1: Manual	0 to 1	0	○
P47.04	Loading pressure	In the automatic mode, if the air outlet pressure is lower than this value, the system automatically starts loading after the delay time defined by P47.07. 0.00 to P47.02	0.00 to P47.02	0.60 MPa	○
P47.05	Unloading pressure	In the automatic mode, if the air outlet pressure is higher than this value, the system automatically starts unloading. 0.00 to P47.02	0.00 to P47.02	0.80 MPa	○

Function code	Name	Description	Range	Default	Modify
P47.06	Pressure reference	Used to set the exhaust pressure during the stable running of the air compressor. 0.00 to P47.02	0.00 to P47.02	0.70 MPa	○
P47.07	Loading delay time	Only after this delay time will the loading of the motor be allowed (for both automatic and manual loading). 0 to 3600 s	0 to 3600	10 s	○
P47.08	Loading running frequency lower limit	Used to define the minimum frequency reference allowed during the process of loading. P47.09 to P02.10	P47.09 to P02.10	100.0 Hz	○
P47.09	No-load running frequency	Used to define the frequency reference allowed during no-load running. P08.07 to P47.08	P08.07 to P47.08	90.00 Hz	○
P47.10	No-load delay time	The system enters hibernation after no-load running for a period of this delay. 0 to 3600 s	0 to 3600 s	60 s	○
P47.11	Stop delay time	When a stop command is received, the system stops after no-load running for a period of this delay. 0 to 3600 s	0 to 3600 s	10 s	○
P47.12	Restart delay time	When the system is stopped, a restart can be enabled only after this delay. 0 to 36000 s	0 to 3600 s	30 s	○
P47.13	Hibernation function selection	0: Invalid 1: Automatic 2: Manual	0 to 1	1	×
P47.14	Temperature sensor	0: Head temperature PT1, auxiliary	0 to 1	0	×

Function code	Name	Description	Range	Default	Modify
	channel	temperature PT2 1: Head temperature PT2，auxiliary temperature PT1			
P47.15	PT1 correction low-point sampling value	Used to define the sampling value corresponding to -15℃ during temperature correction. 0 to 4095	0 to 4095	845	○
P47.16	PT1 correction middle-point sampling value	Used to define the sampling value corresponding to 105℃ during temperature correction. 0 to 4095	0 to 4095	1960	○
P47.17	PT1 correction high-point sampling value	Used to define the sampling value corresponding to 185℃ during temperature correction. 0 to 4095	0 to 4095	2662	○
P47.18	PT2 correction low-point sampling value	Used to define the sampling value corresponding to -15℃ during temperature correction. 0 to 4095	0 to 4095	845	○
P47.19	PT2 correction middle-point sampling value	Used to define the sampling value corresponding to 105℃ during temperature correction. 0 to 4095	0 to 4095	1960	○
P47.20	PT2 correction high-point sampling value	Used to define the sampling value corresponding to 185℃ during temperature correction. 0 to 4095	0 to 4095	2662	○
P47.21	Fan action temperature	-30 to 170℃ The fan will start action when the compressor head temperature exceeds this value.	-30 to 170℃	85℃	○
P47.22	Fan stop temperature	-30 to 170℃ The fan will stop action when the compressor head temperature	-30 to 170℃	75℃	○

Function code	Name	Description	Range	Default	Modify
		falls below this value.			
P47.23	Pre-alarm pressure threshold	0.00 to P47.24 The system reports a pre-alarm when the air outlet pressure exceeds this threshold.	0.00 to P47.24	0.90 MPa	○
P47.24	Alarm pressure threshold	P47.23 to P47.02 The system reports an alarm and stops operation when the air outlet pressure exceeds this value.	P47.23 to P47.02	1.00 MPa	○
P47.25	Pre-alarm temperature threshold	-20 to P47.26 The system reports a pre-alarm when the compressor head temperature exceeds this value.	-20 to P47.26	105℃	○
P47.26	Alarm temperature threshold	P47.25 to 170℃ The system reports an alarm and stops operation when the compressor head temperature exceeds this value.	P47.25 to 170℃	110℃	○
P47.27	Low-temperature protection threshold	-30 to P47.25 The system reports an alarm and the air compressor start is disabled when the compressor head temperature falls below this value.	-30 to P47.25	-10℃	○
P47.28	Auxiliary temperature protection enable	0: Disabled 1: Enabled	0 to 1	0	×
P47.29	Auxiliary temperature pre-alarm value	-30 to P47.30 The system reports a pre-alarm when the auxiliary temperature exceeds this value.	-30 to P47.30	105℃	○
P47.30	Auxiliary temperature alarm value	P47.29 to 170℃ The system reports an alarm and stops operation when the auxiliary temperature exceeds this value.	P47.29 to 170℃	110℃	○

Function code	Name	Description	Range	Default	Modify
P47.31 to 33	Reserved				*
P47.34	Fan control mode	0: Automatic (Power line frequency fan automatically starts/stops based on the actual temperature.) 1: Manual (The start/stop of the fan is controlled by the DI terminal or 485 communication.)	0 to 1	0	×
P47.35	Pressure for frequency upper limit decrease	0.00 to P47.06 The frequency upper limit starts to decrease when the pressure exceeds this value.	0.00 to P47.06	0.05 MPa	○
P47.36	Frequency upper limit decrease ratio	0.0to 5.0% (rated motor frequency) Used to define the decrease volume of the frequency upper limit for each increase of 0.01 MPa in pressure.	0.0 to 5.0%	2.0%	○
P47.37	Automatic frequency decrease threshold	0 to 120% When the percentage of the output current relative to the drive's rated current exceeds this value, the automatic frequency decrease function will be triggered. The value of 0 indicates that this function is disabled.	0 to 120%	120%	○
P47.38	Power correction coefficient	0 to 200%	0 to 200%	100%	○
P47.39	Maintenance timeout	0 to 8000 h The value of 0 indicates that this function is disabled.	0 to 8000	0 h	○
P47.40	Maintenance count mode	0: Count during compressor running 1: Count during compressor	0 to 1	0	○

Function code	Name	Description	Range	Default	Modify
		running and hibernation			
P47.41	Fan protection selection	Ones place: 0: Protection disabled for fan three-phase current unbalance 1: Protection enabled for fan three-phase current unbalance Tens place: 0: Fan overload protection disabled 1: Fan overload protection enabled	0 to 0x11	0x11	○
P47.42	Fan rated current	0.0 to 40.0 A This parameter is related to the overload judgement of the fan.	0.0 to 40.0 A	0.0 A	○
P47.43	Fan current transformation ratio	1.0 to 4000.0	1.0 to 4000.0	1000.0	○
P47.44	Current unbalance ratio	1.00 to 3.00 When the ratio of the maximum current to the minimum current exceeds the value of P47.44 during the three-phase current detection of the fan, the system reports a fan current unbalance fault.	1.00 to 3.00	1.60	○
P47.45	Fan phase A current correction coefficient	0.0 to 150.0%	0.0 to 150.0%	100.0%	○
P47.46	Fan phase B current correction coefficient	0.0 to 150.0%	0.0 to 150.0%	100.0%	○
P47.47	Fan phase C current correction coefficient	0.0 to 150.0%	0.0 to 150.0%	100.0%	○
P47.48 to 59	Reserved				*

Function code	Name	Description	Range	Default	Modify
P48: Air compressor status check parameters					
P48.00	Maintenance time for Part 1	0 to 65535 h When the Part 1 use time (P48.05) exceeds this value, the system reports a pre-alarm. When the exceeding time extends longer than P47.37, the system reports an alarm and stops operation. The value of 0 indicates that the pre-alarm function is disabled.	0 to 65535	500 h	*
P48.01	Maintenance time for Part 2	0 to 65535 h When the Part 2 use time (P48.06) exceeds this value, the system reports a pre-alarm. When the exceeding time extends longer than P47.37, the system reports an alarm and stops operation. The value of 0 indicates that the pre-alarm function is disabled.	0 to 65535	500 h	*
P48.02	Maintenance time for Part 3	0 to 65535 h When the Part 3 use time (P48.07) exceeds this value, the system reports a pre-alarm. When the exceeding time extends longer than P47.37, the system reports an alarm and stops operation. The value of 0 indicates that the pre-alarm function is disabled.	0 to 65535	500 h	*
P48.03	Maintenance time for Part 4	0 to 65535 h When the Part 4 use time (P48.08) exceeds this value, the system reports a pre-alarm. When the exceeding time extends longer than P47.37, the system reports an alarm and stops operation. The value of 0 indicates that the	0 to 65535	500 h	*

Function code	Name	Description	Range	Default	Modify
		pre-alarm function is disabled.			
P48.04	Maintenance time for Part 5	0 to 65535 h When the Part 5 use time (P48.09) exceeds this value, the system reports a pre-alarm. When the exceeding time extends longer than P47.37, the system reports an alarm and stops operation. The value of 0 indicates that the pre-alarm function is disabled.	0 to 65535	500 h	*
P48.05	Part 1 use time	0 to 65535 h	0 to 65535	0 h	*
P48.06	Part 2 use time	0 to 65535 h	0 to 65535	0 h	*
P48.07	Part 3 use time	0 to 65535 h	0 to 65535	0 h	*
P48.08	Part 4 use time	0 to 65535 h	0 to 65535	0 h	*
P48.09	Part 5 use time	0 to 65535 h	0 to 65535	0 h	*
P48.10	Present pressure	0.00 to 20.00 MPa	0.00 to 20.00	0.00 MPa	*
P48.11	Present temperature	-30 to 170℃	-30 to 170	0℃	*
P48.12	Reserved				*
P48.13	Present auxiliary temperature	-30 to 170℃	-30 to 170℃	0℃	*
P48.14	Actual output power of the motor	0.0 to 6553.5 kW	0.0 to 6553.5	0 kW	*
P48.15	Signal status 1	Bit0: Air filter block signal 0: Normal 1: Fault Bit1: Oil filter block signal 0: Normal 1: Fault Bit2: Separator block signal 0: Normal	0 to 0xFFFF	0	*

Function code	Name	Description	Range	Default	Modify
		1: Fault Bit3: Air manifold block signal 0: Normal 1: Fault Bit4: External fault signal 1 0: Normal 1: Fault Bit5: External fault signal 2 0: Normal 1: Fault Bit6: Electromagnetic valve signal status 0: Unloading 1: Loading Bit7: Auxiliary motor state 0: Stopped 1: Running Bit8: Pressure pre-alarm signal 0: Invalid 1: Valid Bit9: Temperature pre-alarm signal 0: Invalid 1: Valid Bit10: Pressure alarm signal 0: Invalid 1: Valid Bit11: Temperature alarm signal 0: Invalid 1: Valid Bit12: Pressure signal fault 0: Invalid 1: Valid			

Function code	Name	Description	Range	Default	Modify
		Bit13: Temperature signal fault 0: Invalid 1: Valid Bit14: Low-temperature protection 0: Invalid 1: Valid Bit15: Main motor state 0: Stopped 1: Running			
P48.16	Signal status 2	Bit0: Part 1 maintenance reminder 0: Normal 1: Maintenance required Bit1: Part 2 maintenance reminder 0: Normal 1: Maintenance required Bit2: Part 3 maintenance reminder 0: Normal 1: Maintenance required Bit3: Part 4 maintenance reminder 0: Normal 1: Maintenance required Bit4: Part 5 maintenance reminder 0: Normal 1: Maintenance required Bit5 to 7: Reserved Bit8: Auxiliary temperature signal fault 0: Invalid 1: Valid Bit9: Auxiliary temperature pre-alarm signal 0: Invalid	0 to 0xFFFF	0	*

Function code	Name	Description	Range	Default	Modify
		1: Valid Bit10: Auxiliary temperature alarm signal 0: Invalid 1: Valid Bit11: Maintenance timeout signal 0: Invalid 1: Valid Bit12: Phase sequence signal 0: Normal 1: Fault Bit13: Reversed Bit14: PTC overheat signal 0: Invalid 1: Valid Bit15: Emergency stop signal 0: Invalid 1: Valid			
P48.17	System state	0: Standby 1: Running 2: Fault 3: Emergency stop 4: Undervoltage 5: Alarm 6: Hibernation 7: Stopping 8: Restart delay	0 to 8	0	*
P48.18	Accumulated running time of the device	0 to 65535 h	0 to 65535	0	*
P48.19	Accumulated loading running time	0 to 65535 h	0 to 65535	0	*
P48.20	Restart count down	0 to 3600 s	0 to 3600	0	*

Function code	Name	Description	Range	Default	Modify
P48.21	Reserved	-	-	-	-
P48.22	Fan phase A current display	0.0 to 40.0 A	0.0 to 40.0 A	0.0 A	*
P48.23	Fan phase B current display	0.0 to 40.0 A	0.0 to 40.0 A	0.0 A	*
P48.24	Fan phase C current display	0.0 to 40.0 A	0.0 to 40.0 A	0.0 A	*
P48.25	Fan phase A current sampling zero drift	0 to 4095	0 to 4095	0	*
P48.26	Fan phase B current sampling zero drift	0 to 4095	0 to 4095	0	*
P48.27	Reserved				*
P48.28	Fan output current	0.0 to 40.0 A	0.0 to 40.0 A	0.0 A	*
P48.29	Fan state	0 to 0x1 Bit0: 0: Fan stopped 1: Fan running	0 to 0x1	0	*
P48.30	AD value of PT1	0 to 4095	0 to 4095	0	*
P48.31	AD value of PT2	0 to 4095	0 to 4095	0	*
P48.32 to 59	Reserved				*
P50: Option status check parameters					
P50.00	Option 1 type	0: No option 1 to 2: Reserved 3: I/O option	0 to 3	0	*
P50.01	Option 2 type	0: No option 1 to 2: Reserved 3: I/O option	0 to 3	0	*
P50.02	Reserved				

Function code	Name	Description	Range	Default	Modify
P50.03	Reserved				
P50.04	DO status of the I/O option	0: Disabled 1: Enabled	0 to 0x1	0	*
P50.05	Option card 1 software version	0.00 to 99.99	0.00 to 99.99	0.00	*
P50.06	Option card 2 software version	0.00 to 99.99	0.00 to 99.99	0.00	*
P50.07 to P50.39	Reserved				
P97: Fault and protection parameters					
P97.00	Fault enable	Ones place: 0: Pulse-by-pulse current limit protection disabled 1: Pulse-by-pulse current limit protection enabled Tens place: 0: Hardware input phase loss detection fault disabled (for models of 18.5 kW and above) 1: Hardware input phase loss detection fault enabled (for models of 18.5 kW and above) Hundreds place: 0: Overload pre-alarm disabled 1: Overload pre-alarm enabled Thousands place: 0: Braking overcurrent disabled 1: Braking overcurrent enabled	0 to 0x1111	0x1111	×
P97.01	Stall protection enable	Ones place: 0: Overvoltage stall protection disabled 1: Overvoltage stall protection	0 to 0x1121	0x1101	×

Function code	Name	Description	Range	Default	Modify
		enabled Tens place: 0: Undervoltage stall protection disabled 1: Undervoltage stall protection enabled 2: Undervoltage stop Hundreds place: 0: Overcurrent stall protection disabled 1: Overcurrent stall protection enabled Thousands place: 0: Input phase sequence disabled 1: Input phase sequence enabled			
P97.02	Current limit level	20 to 200%	20 to 200%	150%	×
P97.03	Current limit adjustment coefficient	0 to 100	0 to 100	20	×
P97.04	Overvoltage stall protection action voltage	600 to 750 V	600 to 750 V	720 V	○
P97.05	Voltage regulator proportional coefficient for overvoltage stall protection	Used to define the proportional coefficient of the bus voltage regulator upon overvoltage stall.	0 to 1000	10	○
P97.06	Input phase sequence fault enable	0: Disable 1: Enable	0 to 1	1	×
P97.07	Speed regulator proportional coefficient for overvoltage stall protection	Used to define the proportional coefficient of the rotation speed regulator upon overvoltage stall.	0 to 1000	60	○

Function code	Name	Description	Range	Default	Modify
P97.08	Reserved				
P97.09	Voltage regulator proportional coefficient for undervoltage stall protection	Used to define the proportional coefficient of the bus voltage regulator upon undervoltage stall.	0 to 1000	40	○
P97.10	Voltage regulator integral coefficient for undervoltage stall protection	Used to define the integral coefficient of the bus voltage regulator upon undervoltage stall. Range: 0 to 1000	0 to 1000	20	○
P97.11	Undervoltage stall protection action voltage	When the bus voltage is lower than this value, the undervoltage stall protection will be triggered to lower the frequency and raise the voltage.	400 to 460 V	460 V	×
P97.12	Undervoltage stall recovery judgment time	When the bus voltage is greater than P97.13, the drive stops lowering the frequency after the delay time defined by P97.12.	0.0 to 100.0 s	2.0 s	×
P97.13	Undervoltage stall protection pause voltage	When the bus voltage is greater than this value, the drive stops lowering the frequency.	460 to 500 V	485 V	×
P97.14	Phase loss protection enable	Ones place: 0: Input phase loss protection disabled 1: Input phase loss protection enabled Tens place: 0: Output phase loss protection disabled in the running state 1: Output phase loss protection enabled in the running state Hundreds place: 0: Short-to-ground detection upon power-on disabled	0 to 0x1111	0x1101	○

Function code	Name	Description	Range	Default	Modify
		1: Short-to-ground detection upon power-on enabled Thousands place: 0: Output phase loss protection before running disabled 1: Output phase loss protection before running enabled			
P97.15	Fault protection and alarm property setting 1	0: Coast to stop 1: Decelerate to stop 2: Keep running Ones place: Input phase loss (reserved) Tens place: Output phase loss (reserved) Hundreds place: Reserved Thousands place: Reserved	0 to 0	0	○
P97.16	Fault protection and alarm property setting 2	0: Coast to stop 1: Decelerate to stop 2: Keep running Ones place: EEPROM read/write fault Tens place: Reserved Hundreds place: Reserved Thousands place: 485 communication fault	0 to 0x2002	0	○
P97.17	Fault protection and alarm property setting 3	0: Coast to stop 1: Decelerate to stop 2: Keep running Ones place: Fan locked-rotor Tens place: Motor overload Hundreds place: Motor overheat Thousands place: Reserved	0 to 0x222	0x0002	○
P97.18	Fault protection and	0: Coast to stop	0 to 0x20	0	○

Function code	Name	Description	Range	Default	Modify
	alarm property setting 4	1: Decelerate to stop 2: Keep running Ones place: Reserved Tens place: 24 V power supply overload Hundreds place: Reserved Thousands place: Reserved			
P97.19	Fault protection and alarm property setting 5	0: Coast to stop 1: Decelerate to stop 2: Keep running Ones place: Power line frequency fan overload Tens place: Power line frequency fan three-phase unbalance Hundreds place: Input phase sequence fault Thousands place: Reserved	0 to 0x222	0	○
P97.20	Reserved	-	-	-	-
P97.21	Reserved	-	-	-	-
P97.22	U phase fault	0 to 0x1111	0 to 0x1111	0	*
P97.23	V phase fault	0 to 0x1111	0 to 0x1111	0	*
P97.24	W phase fault	0 to 0x1111	0 to 0x1111	0	*
P97.25	Reserved	-	-	-	-
P97.26	Reserved	-	-	-	-
P97.27	Detection value of excessive speed deviation	0.0 to 50.0%	0.0 to 50.0%	0.0%	○
P97.28	Detection time of excessive speed deviation	When it is set to 0.0 s, speed deviation protection is disabled.	0.0 to 10.0 s	1.0 s	○
P97.29	Automatic fault reset	When there are faults, the drive starts to reset after the time	0 to 100	0	○

Function code	Name	Description	Range	Default	Modify
	count	interval defined by P97.31. After the automatic fault reset count is reached, the reset can be started by the manual reset command only. If there is any manual reset command during the automatic reset, the automatic reset count will be cleared. If the drive runs normally without faults for 600 s, the fault reset count will be cleared. The value of 0 indicates that the automatic fault reset function is disabled.			
P97.30	Fault relay action selection during automatic reset	0: Disabled 1: Enabled	0 to 1	0	○
P97.31	Automatic fault reset interval	2.0 to 600.0 s	2.0 to 600.0 s	5.0 s	○
P97.32	Present fault type	0: No fault 1: Overcurrent during acceleration (OC1) 2: Overcurrent during deceleration (OC2) 3: Overcurrent during operation at constant speed (OC3) 4: Overvoltage during acceleration (OV1) 5: Overvoltage during deceleration (OV2) 6: Overvoltage during operation at constant speed (OV3) 7: Undervoltage fault (Uv) 8: Input phase loss (SPI) 9: Output phase loss (SPO)	0 to 65	0	*
P97.33	Previous fault type		0 to 65	0	*
P97.34	Penultimate fault type		0 to 65	0	*

Function code	Name	Description	Range	Default	Modify
		10: Power module protection (drv) 11: Inverter overheat (OH1) 12: Rectifier bridge overheat (OH2) 13: AC drive overload (OL1) 14: Motor overload (OL2) 15: External device fault (EF) 16: EEPROM read/write fault (EEP) 17: 485 communication error (CE) 18: EtherCAT communication timeout (E-CAt) 19: Current detection error (ItE) 20: CANopen communication timeout (E-CAN) 21: PID feedback loss (FbL) 22: EtherNet IP communication timeout (E-IP) 23: Braking resistor over-current (brOC) 24: Auto-tuning fault (tUN) 25: Reserved 26: Profinet communication timeout (E-Pn) 27: I/O card communication timeout (E-Io) 28: Modbus TCP communication timeout (E-TCP) 29: STO1 fault (STO1) 30: STO2 fault (STO2) 31 to 32: Reserved 31: Option fault (oPt) 32: Reserved 33: Short-to-ground fault (GdF) 34: Speed deviation fault (dEv) 35 to 38: Reserved			

Function code	Name	Description	Range	Default	Modify
		39: Motor overheat (OH3) 40: Reserved 41: 24 V power supply overload (24OL) 42 to 45: Reserved 46: Board-level communication error (bCE) 47: Reserved 48: BootLoader failure (bLt) 49: Power board software version mismatching (vEr) 50: Parameter upload/download timeout (UPdnE) 51: AI1 current input overcurrent (AIOC) 52: Reserved 53: Fan locked-rotor (FAn) 54: Pre-overload (POL1) 55: I/O option 24 V overload (IO-OL) 56: Hardware input phase loss (HSPI) 57: Power line frequency fan overload (PFOL) 58: Power line frequency fan three-phase unbalance (SPOF) 59: Input phase sequence fault (PSF) 60: Fan input phase loss (PFSPI) 61: Reserved 62: IGBT hardware fault 63: CBC fault 64: fan undervoltage fault (Fuv) 65: Pre-charge relay engagement			

Function code	Name	Description	Range	Default	Modify
		fault (CtF)			
P97.35	Bus voltage upon the present fault	0.0 to 6553.5 V	0.0 to 6553.5 V	0.0 V	*
P97.36	Actual current upon the present fault	0.0 to 999.9 A	0.0 to 999.9 A	0.0 A	*
P97.37	Running frequency upon the present fault	0.00 to 655.35 Hz	0.00 to 655.35 Hz	0.00 Hz	*
P97.38	AC drive operation state upon the present fault	0 to 0xFFFF	0 to 0xFFFF	0	*
P97.39	Inverter bridge temperature upon the present fault	-40.0 to 150.0℃	-40.0 to 150.0℃	0.0℃	*
P97.40	Reserved				
P97.41	Input terminal status upon the present fault	0 to 0xFF	0 to 0xFF	0	*
P97.42	Output terminal status upon the present fault	0 to 0xF	0 to 0xF	0	*
P97.43	Running time upon the present fault	0.0 to 6553.5 s	0.0 to 6553.5 s	0.0 s	*
P97.44	Bus voltage upon the previous fault	0.0 to 6553.5 V	0.0 to 6553.5 V	0.0 V	*
P97.45	Actual current upon the previous fault	0.0 to 999.9 A	0.0 to 999.9 A	0.0 A	*
P97.46	Running frequency upon the previous fault	0.00 to 655.35 Hz	0.00 to 655.35 Hz	0.00 Hz	*
P97.47	AC drive operation state upon the previous fault	0 to 0xFFFF	0 to 0xFFFF	0	*
P97.48	Inverter bridge temperature upon the	0.0 to 150.0℃	0.0 to 150.0℃	0.0℃	*

Function code	Name	Description	Range	Default	Modify
	previous fault				
P97.49	Reserved				
P97.50	Input terminal status upon the previous fault	0 to 0xFF	0 to 0xFF	0	*
P97.51	Output terminal status upon the previous fault	0 to 0xF	0 to 0xF	0	*
P97.52	Running time upon the previous fault	0.0 to 6553.5 min	0.0 to 6553.5 min	0.0 min	*
P97.53	Bus voltage upon the penultimate fault	0.0 to 6553.5 V	0.0 to 6553.5 V	0.0 V	*
P97.54	Actual current upon the penultimate fault	0.0 to 999.9 A	0.0 to 999.9 A	0.0 A	*
P97.55	Running frequency upon the penultimate fault	0.00 to 655.35 Hz	0.00 to 655.35 Hz	0.00 Hz	*
P97.56	AC drive operation state upon the penultimate fault	0 to 0xFFFF	0 to 0xFFFF	0	*
P97.57	Inverter bridge temperature upon the penultimate fault	0.0 to 150.0℃	0.0 to 150.0℃	0.0℃	*
P97.58	Reserved				
P97.59	Input terminal status upon the penultimate fault	0 to 0xFF	0 to 0xFF	0	*
P97.60	Output terminal status upon the penultimate fault	0 to 0xF	0 to 0xF	0	*
P97.61	Running time upon the penultimate fault	0.0 to 6553.5 min	0.0 to 6553.5 min	0.0 min	*
P98: Drive parameters					

Function code	Name	Description	Range	Default	Modify
P98.00	Serial number	0 to 1000	0 to 1000	0	*
P98.01	Software version number	0.00 to 99.99	0.00 to 99.99	0.00	*
P98.02	Performance software present version number	0.00 to 99.99	0.00 to 99.99	0.00	*
P98.03	Performance software burning version number	0.00 to 99.99	0.00 to 99.99	0.00	*
P98.04	Rated capacity	Output power, 0 to 999.9 kW (automatically set based on the model)	0 to 999.9 kW	Depend on model	*
P98.05	Rate voltage	0 to 999 V (automatically set based on the model)	0 to 999 V	Depend on model	*
P98.06	Rated current	0 to 999.9 A (automatically set based on the model)	0 to 999.9 A	Depend on model	*
P98.07	Manufacturer's bar code 1	0 to 0xFFFF	0 to 0xFFFF	0	*
P98.08	Manufacturer's bar code 2	0 to 0xFFFF	0 to 0xFFFF	0	*
P98.09	Manufacturer's bar code 3	0 to 0xFFFF	0 to 0xFFFF	0	*
P98.10	Manufacturer's bar code 4	0 to 0xFFFF	0 to 0xFFFF	0	*
P98.11	Manufacturer's bar code 5	0 to 0xFFFF	0 to 0xFFFF	0	*
P98.12	Manufacturer's bar code 6	0 to 0xFFFF	0 to 0xFFFF	0	*

Chapter 7 Parameter Description

The parameter is described in the following format:

Function code	Function name	Value range	Default value

7.1 P00: System management parameters

P00.00	Menu mode selection	0 to 2	1

0: Quick-commissioning menu mode

It displays parameters related to quick initiation of the drive. Modification of parameters in this menu mode will quickly start the drive.

1: Full menu mode

It displays all the function codes (excluding the hidden function codes associated with other function codes).

2: Modification record menu mode

It displays the parameters whose setting values differ from default values (excluding P00.03).

P00.01	User password	0 to 65535	0

The user password function is used to prohibit the unauthorized person from viewing and modifying the parameters.

P00.03	Parameter protection setting	0 to 2	0

This function code determines the protection level of drive parameters, including:

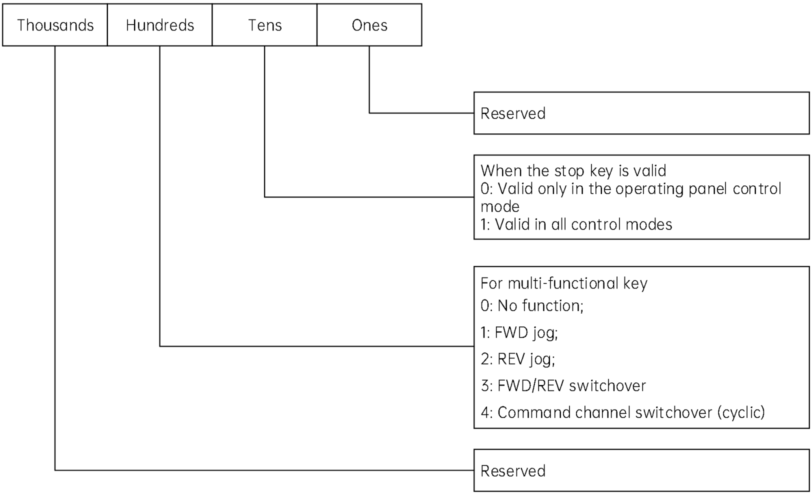
0: Modification available for all data

1: Modification available for this function code and P02.09 (main frequency reference digital setting) only

2: Modification available for this function code only

If it is needed to change other parameters, set this function code to 0. After the parameters are changed, set this function code to the protection level needed.

P00.04	Button function selection	0 to 0x0410	0



P00.05	Parameter initialization	0 to 3	0

0: All parameters can be modified

When it is set to 0, all parameters can be changed.

1: Clear fault records

When it is set to 1, fault records related to P97.32 to P97.61 will be cleared.

2: Restore to factory settings

When it is set to 2, all parameters before P97.32 (excluding user password parameter P00.01, status display parameters Group P01, and motor parameters Group P03 and Group P20) will be restored to the factory settings based on the model.

3: Restore partial parameters to factory settings (motor parameters not restored)

When it is set to 3, part of the parameters will be restored to the factory settings, excluding motor parameters.

P00.06	Power board upgrading command	0 to 1	0

0: Disabled

Power board upgrading is prohibited.

1: Enabled

Power board upgrading is allowed.

P00.07	Parameter copy	0 to 4	0

0: No function

1: Upload local parameters to keypad;

2: Download keypad parameters to local (all parameters);

3: Download keypad parameters to local (excluding motor parameters);

4: Download keypad parameters to local (motor parameters only).

7.2 P01: Status display parameters

Group P01 is used to monitor certain status parameters of the drive and motor, and to display frequency reference channel, frequency reference, PID reference, PID feedback, PID error, and the like.

P01.00	Main frequency channel	0 to 8	0

It monitors the main frequency channel in the common running mode. 0 is displayed in a non-common mode.

P01.01	Main frequency reference	0.00 to P02.10	0

It monitors the main frequency reference in the common running mode. 0 is displayed in a non-common mode.

P01.02	Auxiliary frequency reference	0.00 to P02.10	0

It monitors the auxiliary frequency reference in the common running mode. 0 is displayed in a non-common mode or when there is no auxiliary reference.

P01.03	Frequency reference	0.00 to P02.10	0

It monitors the final frequency based on the combination of the main frequency and the auxiliary frequency. A positive value indicates forwarding running, and a negative value indicates reverse running.

P01.04	Ramp frequency reference	0.00 to P02.10	0

It displays the present ramp frequency reference of the drive.

P01.05	Output frequency	0.00 to P02.10	0

It monitors the present output frequency of the drive.

P01.06	Output voltage	0 to 65535 V	0

It monitors the present output voltage of the drive.

P01.07	Output current	0.0 to 6553.5 A	0

It monitors the present output current of the drive.

P01.08	Torque current	-300.0 to 300.0%	0

It monitors the present torque current of the drive, indicated as its percentage relative to the rated current of the motor.

P01.09	Exciting current	-300.0 to 300.0%	0

It monitors the present exciting current of the drive, indicated as its percentage relative to the rated current of the motor.

P01.10	Keypad version number	0.00 to 2.55	0

P01.11	Motor power	0.0 to 6553.5 kW	0

It displays the present output power of the drive.

P01.12	Estimated motor frequency	0.00 to P02.10	0

It displays the estimated motor rotor frequency under the condition of open-loop vector.

P01.13	Actual motor frequency	-P02.10 to P02.10	0

It displays the actual output frequency of the motor.

P01.14	Accumulated power consumption H of the drive	0 to 65535 kWh	0

It displays the accumulated power consumption of the drive.

P01.15	Accumulated power consumption L of the drive	0 to 3600	0

It displays the accumulated power consumption of the drive. Another 1 kWh is added to the value of P01.14 when the number of the accumulation times reaches 3600.

P01.16	Bus voltage	0.0 to 6553.5 V	0

It displays the present bus voltage of the drive.

P01.17	Operation state of the drive	0 to 0xFFFF	0

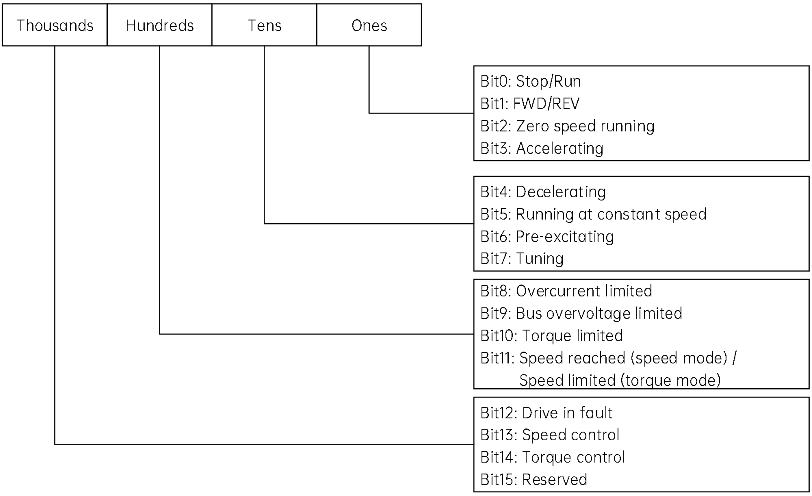


Figure 7-1 Operation state of the drive

LED ones place Bit0: Stop/Run

When the drive is in the stop state, Bit0 is 0; otherwise, it is 1.

LED ones place Bit1: FWD/REV

When the drive is the in the FWD running state, Bit0 is 0; otherwise, it is 1.

For other bits, if the condition is met, they will be set to 1.

P01.18	DI1 to DI4 status	0 to 0x1111	0

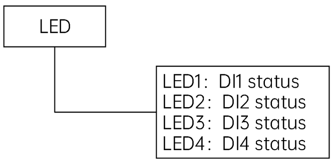


Figure 7-2 DI terminal status

It displays the status of the four terminals (DI1 to DI4); the value of 0 indicates that the terminal is off, and the value of 1 indicates that the terminal is on.

P01.19	DI5 to DI8 status	0 to 0x1111	0

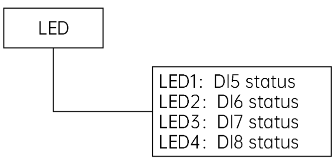


Figure 7-3 DI terminal status

It displays the status of the four terminals (DI5 to DI8); the value of 0 indicates that the terminal is off, and the value of 1 indicates that the terminal is on.

P01.20	DO status	0 to 0x1111	0

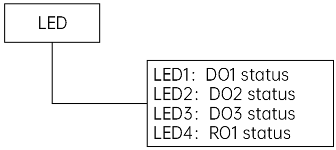


Figure 7-4 DO terminal state

It displays the output status of the terminals DO1, DO2, DO3/RO2, and relay RO1. When there is a signal output, the bit of the corresponding LED will be set to 1. For example, if there is a signal output on DO1 only, LED1 will display 1, and the value of P01.20 will be displayed as 0001. If there is a signal output on RO1 only, the displayed value of P01.20 will be 1000.

P01.21	AI1 input voltage	0.00 to 10.00 V	0
P01.22	AI2 input voltage	-10.00 to 10.00 V	0

P01.21 and P01.22 are used to display the AI voltage before adjustment.

P01.23	AI1 input current	0.00 to 20.00 mA	0

It displays the AI1 input current.

P01.24	AI2 input current	0.00 to 20.00 mA	0

It displays the AI2 input current.

P01.25	AO1 output	0.00 to 100.00%	0

It displays the AO1 output (percentage).

P01.26	HDI input frequency	0.000 to 50.000 kHz	0

It displays the HDI input frequency.

P01.27	HDO1 frequency	0.000 to 50.000 kHz	0
P01.28	HDO2 frequency	0.000 to 50.000 kHz	0

They respectively display the output frequency of HDO1 and HDO2.

P01.29	PID reference	-100.0% to 100.0%	0
P01.30	PID feedback	-100.0% to 100.0%	0

P01.31	PID deviation	-100.0% to 100.0%	0
P01.32	PID output	-100.0% to 100.0%	0

Function codes (P01.29 to P01.32) are used to display the reference, feedback, deviation, and output of the process closed-loop control in Group P14, each indicated as a percentage relative to the full range.

P01.33	PID proportional output	-100.0% to 100.0%	0
P01.34	PID integral output	-100.0% to 100.0%	0
P01.35	PID derivative output	-100.0% to 100.0%	0
P01.36	Present AD of AI1	0 to 4095	0
P01.37	Present AD of AI2	0 to 4095	0

Function codes (P01.33 to P01.35) are used to display the proportional, integral, and derivative outputs (percentage) of the PID controller.

Function codes P01.36 and P01.37 are used to display the present AD values of AI1 and AI2 for use in the verification.

P01.38	Present AD value of motor temperature	0 to 4095	0

It displays the present AD value of the motor temperature.

P01.39	Motor temperature	-40℃ to 200℃	0

The motor temperature indicates the temperature value actually measured. The range for display: -40℃ to 200℃. Margin of error: ±5%.

P01.40	Encoder count	0 to 65535	0

P01.41	Speed loop output	-300.0% to 300.0%	0

It displays the output (percentage) of the speed-loop controller.

P01.42	Torque reference	-300.0% to 300.0%	0

It displays the present torque reference of the drive, indicated as its percentage relative to the rated current of the motor.

P01.43	Rotation speed of the motor	0 to 65535 rpm	0
P01.44	Line speed	0 to 65535 m/min	0
P01.45	Output power	0.0 to 6553.5 kW	0

It displays the present rotation speed, line speed, and output power of the motor.

P01.46	Inverter bridge temperature	-40.0 to 150.0℃	0

It displays the present temperature of the inverter bridge inside the drive.

P01.47	Accumulated running time of the drive (min)	0 to 65535 min	0
P01.48	Accumulated running time of the drive (hour)	0 to 65535 h	0
P01.49	Drive running time of this run (min)	0 to 65535 min	0
P01.50	Accumulated running time of the fan	0 to 65535 h	0

The above function codes respectively display the accumulated drive running time , the drive running time of this run, and the accumulated running time of the fan.

P01.51	PLC present step	0 to 15	0

It displays the present running step of the simple PLC.

P01.52	High bits of the running time of the present PLC step	0 to 65535	0

It displays the high 16 bits of the present step running time of the simple PLC.

Note:

Actual time = P01.52 << 16 + P01.53

P01.53	Low bits of the running time of the present PLC step	0.0 to 6553.5 s	0

It displays the low 16 bits of the present step running time of the simple PLC.

P01.54	Counter input	0 to 65535	0
P01.55	Length counter remainder	0 to 65535	0

It displays the input value of the counter and the remainder of the length counter.

P01.56	Rectifier bridge temperature	-40.0 to 200.0℃	0

P01.57	User-defined frequency display	0.00 to P02.10	0

7.3 P02: Basic function parameters

P02.00	Control mode selection	0 to 3	2

0: Vector control 1 without PG

1: Vector control 2 without PG (only for asynchronous motors)

2: V/F control (only for asynchronous motors)

3: Closed-loop vector control

P02.01	Motor selection	0 to 1	0

0: Motor 1

1: Motor 2

The parameters of motor 1 and motor 2 correspond respectively to the parameters of Group P03 and Group P20. Please set the corresponding motor parameters based on the actual motor.

P02.02	Operation command channel selection	0 to 2	1

MV810A has three operation command channels:

0: Panel control (reserved)

1: Terminal control

Control (start/stop) via the external control terminals (FWD, REV, FWD Jog, and REV Jog).

2: Communication control

Control (start/stop) via the communication methods of the drive (serial port, bus expansion card, etc.).

P02.03	Communication command channel selection	0 to 3	0

When P02.02 is set to 2, the following communication channels are available:

0: Modbus channel

1 to 2: Reserved

3: EtherCAT channel / PROFINET channel / CANopen channel / Ethernet IP channel

---

WARNING

Note:

A corresponding communication card must be inserted before using 1, 2, and 3.

P02.04	Running direction	0 to 1	0

This function is valid for the operating panel and serial port channels, and invalid for the terminal channel.

0: Same direction

1: Opposite direction

P02.05	Main frequency source selection	0 to 8	6

0: Digital setting P02.09

The value of P02.09 will be used as the present frequency reference of the drive once the drive is powered on.

The present frequency reference of the drive can be changed via the ∧ and ∨ buttons on the operating panel when the drive is in the running/stop state.

1: AI1 setting

2: AI2 setting

AI1 and AI2 are two independent physical channels for analog reference.

AI is the analog signal input channel. When AI is set to voltage signal input, its voltage input range is:

AI1: 0 to 10 V

AI2: -10 to 10 V

When AI is set to current signal input, the current input range for both AI1 and AI2 is 0 to 20 mA. AI1 supports singled-ended input, and AI2 supports both single-ended input and differential input.

For the adjusted analog input signals (-10 V to 0 V to +10 V), it is specified as below:

0 V to +10 V, forward, corresponding frequency defined in Group P09.

0 V to -10 V, reverse, corresponding frequency defined in Group P09.

3: High-speed pulse HDI reference

The terminal pulse frequency is used as the source of the main frequency, and it can only be input via terminal T6. For details, refer to Group P09.

4: Simple PLC programming reference

The simple PLC program is used as the source of the main frequency. The present frequency reference, running time, and cycle method of the drive are determined by Group P13.

5: Multi-speed running reference

In this mode, multi-speed terminals are combined to form various multi-speed references. For details, refer to the terminal functions.

6: PID control

The main frequency is determined by the calculation of process closed-loop PID.

7: Modbus

The frequency is set by the serial port frequency setting command.

8: EtherCAT/Profinet/CANopen/EtherNet IP setting

The frequency is set by the bus expansion card.

P02.06	Auxiliary frequency source selection	0 to 8	4

0: Digital setting P02.09

Digital setting P02.09 is used as the source of auxiliary frequency.

1: AI1 setting

2: AI2 setting

AI1 and AI2 are used as the source of auxiliary frequency.

3: High-speed pulse HDI reference

The auxiliary frequency is determined by the terminal pulse frequency, and it can only be input by the terminal 10. For details, refer to Group P09.

4: Simple PLC programming reference

The simple PLC program is used as the source of auxiliary frequency.

5: Multi-speed running reference

The multi-speed reference is used as the source of auxiliary frequency.

6: PID control

The process PID is used as the source of auxiliary frequency.

7: Modbus

The frequency is set by the serial port frequency setting.

8: EtherCAT/Profinet/CANopen/EtherNet IP setting

The auxiliary frequency is set by the bus expansion card.

WARNING

① When choosing 1, 2, or 3 as the auxiliary frequency source, the polarity of the auxiliary frequency output is determined by either the analog/pulse value itself or the function code P02.04, which is selected via the setting of Group P09.

② The source channels for the main frequency and the auxiliary frequency are mutually exclusive.

P02.07	Auxiliary frequency reference range selection	0 to 1	0

0: Maximum output frequency

1: Main frequency reference

P02.08	Frequency reference source calculation	0 to 5	0

0: Main frequency

Only the main frequency reference is used as the frequency reference.

1: Auxiliary frequency

Only the auxiliary frequency reference is used as the frequency reference.

2: Main + Auxiliary

The sum of the main frequency reference and the auxiliary frequency reference is used as the frequency reference.

When the polarity of the combined frequency is opposite to that of the main frequency reference, the frequency reference is 0.

3: Main - Auxiliary

The main frequency reference minus the auxiliary frequency reference is used as the frequency reference.

When the polarity of the combined frequency is opposite to that of the main frequency reference, the frequency reference is 0.

4: MAX (main, auxiliary)

Select the maximum absolute value between the main reference and the auxiliary reference as the frequency reference.

When the polarity of the auxiliary frequency reference is opposite to that of the main frequency reference, the main frequency reference is the frequency reference.

5: MIN (main, auxiliary)

Select the minimum absolute value between the main reference and the auxiliary reference as the frequency reference.

When the polarity of the auxiliary frequency reference is opposite to that of the main frequency reference, the frequency reference is 0.

P02.09	Frequency digital setting	0.00 Hz to P02.11	50.00 Hz

When the main frequency reference channel is digital setting (P02.05=0 or 5), this parameter indicates the initial frequency value of the drive's main frequency reference.

P02.10	Maximum output frequency	P02.11 to 599.00 Hz	200.00 Hz
P02.11	Frequency upper limit	P02.12 to P02.10	200.00 Hz
P02.12	Frequency lower limit	0.00 Hz to P02.11	0.00 Hz

The maximum output frequency is the highest frequency output allowed by the drive, such as Fmax in Figure 7-5;

The frequency upper limit is the highest frequency allowed in operation, which is set by the user, such as FH in Figure 7-5;

The frequency lower limit is the lowest frequency allowed in operation, which is set by the user, such as FL in Figure 7-5;

Fb in Figure 7-5 is the basic operating frequency, defined as the minimum output frequency corresponding to the highest voltage output by the drive in the V/F mode.

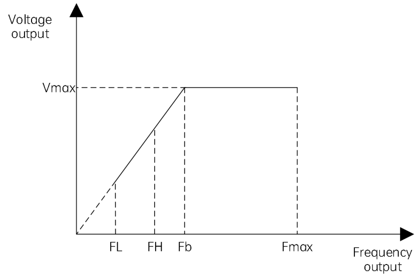


Figure 7-5 Frequency limit parameter definition

WARNING

(1) The maximum output frequency, frequency upper limit, and frequency lower limit should be carefully set according to the nameplate parameters of the actual motor and the requirements of the operating conditions.

(2) The limit range of the upper and lower frequency limits has no effect on the jog operation, but it will affect the auto-tuning of the motor (parameter identification)

(3) In addition to the upper and lower frequency limits, the output frequency of the drive during operation is also affected by the startup frequency, start frequency of DC braking at stop, jump frequency, and other parameters.

(4) Figure 7-5 shows the relationship of the maximum output frequency, frequency upper limit, and frequency lower limit. Note the order of values during setting.

(5) The upper and lower frequency limits are used to limit the actual frequency output to the motor. If the frequency reference is higher than the frequency upper limit, the device will run at the upper limit frequency; if the frequency reference is lower than the frequency lower limit, the device will run at the lower limit frequency; if the frequency reference is lower than the startup frequency, the device will run at zero frequency.

P02.13	Acceleration time 1	0 to 6000.0 s	Depend on model
P02.14	Deceleration time 1	0 to 6000.0 s	Depend on model

The acceleration time refers to the time required for the drive to accelerate from zero frequency to the maximum output frequency (P02.10). The deceleration time refers to the time required for the drive to decelerate from the maximum output frequency (P02.10) to zero frequency.

P02.15	GP type	0 to 1	0

0: G type

1: P type

P02.16	Carrier frequency	2.0 to 12.0 kHz	4.0 kHz

Table 7-1 Carrier frequency for PWM output of the drive

Drive power	Default carrier frequency
0.4 to 15 kW	4 kHz

WARNING

① The carrier frequency affects the noise level of the motor during operation, and it is usually set to a value between 3 to 5 kHz. For occasions requiring silent operation, it can be set to a value between 6 to 8 kHz.

② When the carrier frequency is above the factory setting value, the drive needs to be derated by 5% for every increase of 1 kHz.

③ Under the vector control, the carrier frequency should not be lower than 2 kHz (under the vector control, the carrier frequency can be set between 2 to 16 kHz, applicable for all control modes.)

P02.17	Customized parameter	0 to 1	0

7.4 P03: Motor 1 parameters

P03.00	Motor type selection	0 to 1	0

0: Asynchronous motor

1: Synchronous motor

P03.01	Asynchronous motor rated power	0.1 to 3000.0 kW	Depend on model
P03.02	Asynchronous motor rated voltage	0 to 1200 V	Depend on model
P03.03	Asynchronous motor rated current	0.8 to 6000.0 A	Depend on model
P03.04	Asynchronous motor rated frequency	0.01 Hz to P02.10	50.00 Hz
P03.05	Asynchronous motor rated speed	1 to 36000 rpm	Depend on model

The above parameters apply to the situation where the motor 1 is an asynchronous motor.

To enter the motor 1 parameter group, it is required to set both P02.01 and P03.00 to 0. To ensure the control performance, make sure to set the values of the function codes (P03.01 to P03.05) properly according to the nameplate parameters of the motor.

WARNING

The power ratings of the motor and the drive should be matched. Generally, the motor's power can only be lower than that of the drive by two levels or higher than that of the drive by one level. Otherwise, the control performance will be affected

P03.06	Asynchronous motor stator resistance	0.001 to 65.535 Ω	Depend on model
P03.07	Asynchronous motor rotor resistance	0.001 to 65.535 Ω	Depend on model
P03.08	Asynchronous motor leakage inductance	0.01 mH to 655.35 mH (drive power ≤ 55 kW) 0.001 mH to 65.535 mH (drive power > 55 kW)	Depend on model
P03.09	Asynchronous motor mutual inductance	0.1 mH to 6553.5 mH (drive power ≤ 55 kW) 0.01 mH to 655.35 mH (drive power > 55 kW)	Depend on model
P03.10	Asynchronous motor no-load current	0.1 to 6553.5 A	Depend on model

When P03.00 is set to 0 (motor 1 is asynchronous), the above motor parameters are illustrated in Figure 7-6.

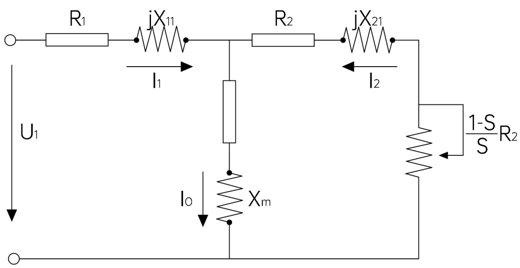


Figure 7-6 Equivalent circuit diagram for asynchronous motor in steady state

In Figure 7-6, R_1, X_{11}, R_2, X_{21}, X_m, and I_o indicate respectively the stator resistance, stator leakage inductance, rotor resistance, rotor leakage inductance, mutual inductance, and no-load current. The value of the function code P03.08 is the sum of the stator leakage inductance and the rotor leakage inductance.

If the parameters of the asynchronous motor are already known, write the actual value to P03.06 to P03.09 accordingly. P03.10 is the no-load current of the asynchronous motor; the user can directly input the no-load current value.

If the motor parameters are auto tuned, the set values of P03.06 to P03.10 will be updated after the auto-tuning

After the motor power P03.01 is changed, the drive will set the parameters of P03.02 to P03.10 to the default values corresponding to the motor power.

P03.11	Asynchronous motor iron core magnetic saturation coefficient 1	0 to 100.0%	80.0%
P03.12	Asynchronous motor iron core magnetic saturation coefficient 2	0 to 100.0%	68.0%
P03.13	Asynchronous motor iron core magnetic saturation coefficient 3	0 to 100.0%	57.0%
P03.14	Asynchronous motor iron core magnetic saturation coefficient 4	0 to 100.0%	40.0%

The above four parameters refer to the four asynchronous motor iron core magnetic saturation coefficients respectively.

P03.15	Synchronous motor rated power	0.1 to 3000.0 kW	Depend on model
P03.16	Synchronous motor rated voltage	0 to 1200 V	Depend on model
P03.17	Synchronous motor rated current	0.8 to 6553.5 A	Depend on model
P03.18	Synchronous motor rated frequency	0.01 Hz to P02.10	Depend on model

The above parameters apply to the situation where the motor 1 is a synchronous motor.

To enter the motor 1 parameter group, it is required to set both P02.01 and P03.00 to 1. To ensure the control performance, set the values of the function codes (P03.15 to P03.18) properly according to the nameplate parameters of the motor.

P03.19	Number of synchronous motor pole pairs	1 to 128	2

It sets the number of pole pairs for the synchronous motor.

P03.20	Synchronous motor stator resistance	0.001 to 65.535 Ω (drive power ≤ 55 kW) 0.0001 to 6.5535 Ω (drive power > 55 kW)	Depend on model
P03.21	Synchronous motor D-aixs inductance	0.01 to 655.35 mH (drive power ≤ 55 kW) 0.001 to 65.535 mH (drive power > 55 kW)	Depend on model
P03.22	Synchronous motor Q-aixs inductance	0.01 to 655.35 mH (drive power ≤ 55 kW)	Depend on model

		0.001 to 65.535 mH (drive power ＞ 55 kW)	
P03.23	Synchronous motor back EMF	0.0 to 6553.5 V	Depend on model

The above parameters refer to the control parameters of the synchronous motor, which can be identified via auto-tuning, or manually input according to the search result of related motor parameters.

P03.27	Motor auto-tuning	0 to 3	0

It provides the motor auto-tuning function in the static/rotating state. The result differs in different state, as shown below:

0: No action

1: Partial parameter auto-tuning in the static state

2: Full parameter auto-tuning in the rotating state

3: Full parameter auto-tuning in the static state

P03.28	Motor overload protection coefficient	0.0 to 300.0%	100.0%
P03.29	Motor overload protection enable	0 to 1	1

0: Disabled

1: Enabled

In order to implement effective overload protection for different types of load motors, it is necessary to adjust the maximum permissible output current of the drive, as shown in Figure 7-7.

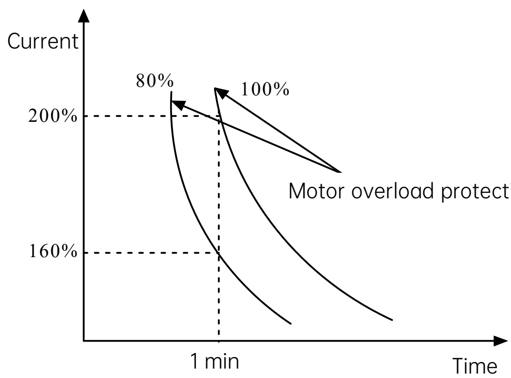


Figure 7-7 Setting of the motor overload protection coefficient

The adjustment value differs according to the user's needs. Under the same conditions, if the motor overload protection is required to be faster, set P03.28 to a smaller value; otherwise, set it to a larger value.

WARNING

If the rated current of the load motor does not match the rated current of the drive, modify P03.28 to enable the overload protection for the motor.

7.5 P04: Motor 1 encoder parameters

P04.00	Encoder PPR	1 to 65535	1024

It is used to set the encoder PPR for motor 1.

The local encoder parameter is determined by the PPR of the selected PG.

WARNING

It is required to correctly set this parameter when running with a speed sensor; otherwise, the motor is unable to operate normally.

P04.01	Encoder type	0 to 5	0

It is used to set the encoder type for motor 1. Currently, only the ABZ incremental encoder is supported. Other choices are reserved.

0: No encoder

1: ABZ encoder

2: Resolver

3: ABZ encoder + STO

4: STO card

5: Resolver + STO

P04.02	A/B phase sequence of the ABZ incremental encoder	0 to 1	0

0: FWD, with phase A ahead of phase B

1: REV, with phase B ahead of phase A

Local encoder parameters

Phase A leads phase B in FWD running, and phase B leads phase A in REV running. Set the value to 0 (FWD) if the direction represented by the sequence of the connection between the local PG interface and the PG card matches the direction represented by the sequence of the connection between the drive and the motor; otherwise, set the value to 1 (REV). By modifying this parameter, it is easy to adjust the corresponding relations of the direction without the need to rewire.

WARNING

The drive will reports a PG fault (PG1) if this function code is set to a wrong value. The phase sequence will be automatically identified after auto-tuning in the rotating state.

P04.03	ABZ encoder disconnection detection time	0.0 to 10.0	0.0 s

0.0 to 10.0 s

No detection when set to 0.0 s

P04.04	PG card voltage class selection	0 to 1	0

0: 5 V

1: 12 V

P04.05	Z signal enable	0 to 1	0

0: Disable

1: Enable

P04.06	Synchronous motor angle compensation	0.0 to 360.0	0.0
P04.07	Synchronous motor initial position	0.0 to 360.0	0.0
P04.08	Resolver angle correction enable	0 to 2	2

0: Disable

1: Enable the correction mode 1

2: Enable the correction mode 2

P04.09	Enable the maximum ratio between torque and current	0 to 1	1
P04.10	ABX synchronous closed-loop quick start mode	0 to 1	1

0: Disable

1: Enable

P04.11	Cyclic value of position identification	3400 to 65535	3400
P04.12	Frequency-division value of position identification	0 to 9	0
P04.13	PG card version number	0 to 65535	0

P04.14	PG card disconnection enable	0 to 1	1

0: Disconnection fault invalid

1: Disconnection fault enabled

P04.15	Initial position auto-tuning before synchronous motor running	0x00 to 0x21	0

Ones place: In open-loop mode

0: No auto-tuning

1: Auto-tuning before first running upon power-on

2: Auto-tuning before each running

Tens place: In ABZ encoder closed-loop mode

0: Auto-tuning before first running upon power-on

1: Auto-tuning before each running

P04.23	Synchronous open-loop Q-axis correction coefficient	0 to 100	40
P04.24	Synchronous open-loop D-axis correction coefficient	0 to 100	30
P04.25	Synchronous open-loop speed filter coefficient	0 to 1000	100
P04.26	Synchronous open-loop D-axis injection current	0% to 100%	10
P04.27	Synchronous open-loop low-frequency carrier frequency	1.0 to 8.0	4.0
P04.28	Speed tracking Kp adjustment	10 to 1000	10
P04.29	Speed tracking Ki adjustment	10 to 1000	10
P04.30	Speed tracking target current	30% to 200%	100%

7.6 P05: Motor 1 vector control parameters

P05.00	Speed loop proportional gain 1	1 to 100	10
P05.01	Speed loop integral time 1	0.01 to 10.00 s	0.50 s
P05.02	Switchover frequency 1	0.00 Hz to P02.11	5.00 Hz

P05.03	Speed loop proportional gain 2	1 to 100	10
P05.04	Speed loop integral time 2	0.01 to 10.00 s	1.00 s
P05.05	Switchover frequency 2	0.00 Hz to P02.11	10.00 Hz

It is used to adjust the proportional gain and integral time for the speed loop. Function codes (P05.00 to P05.05) are valid in the vector control mode, and serve as the PI parameters of motor 1 at high/low speed.

P05.00 and P05.01 are the PI parameters of the speed loop when the running frequency is lower than the ASR switchover frequency 1 (P05.02). P05.03 and P05.04 are the PI parameters of the speed loop when the running frequency is higher than the ASR switchover frequency 2 (P05.05). When it is between the switchover frequency 1 and switchover frequency 2, the two sets of PI parameters are linearly switched.

Increasing the proportional gain P can accelerate the dynamic response of the system. However, if P is too large, the system is prone to oscillation. Reducing the integral time I can speed up the dynamic response of the system. However, if I is too small, the system will have larger overshoots and oscillate easily. Usually, the proportional gain P is adjusted first to increase P as much as possible without oscillating the system. Then the integral time I is adjusted so that the system has both fast response and small overshoots.

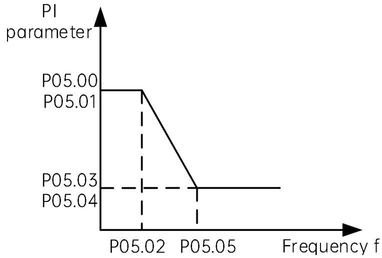


Figure 7-8 PI parameter

WARNING

If the PI value is not properly selected, an overvoltage failure may occur (if there is no external braking resistor or braking unit) when the system accelerates to a high speed after a quick start, which is caused by the energy feedback resulted from the regenerative braking state of the system during the drop process subsequent to the speed overshoot. Adjust the PI parameter to eliminate the risk of such failures.

In the vector control mode, set the proportional gain P and integral time I of the speed regulator to change the speed response features of the vector control.

(1) Composition of speed regulator (ASR)

K_p refers to the proportional gain P, and T_i refers to the integral time I, as shown in Figure 7-9.

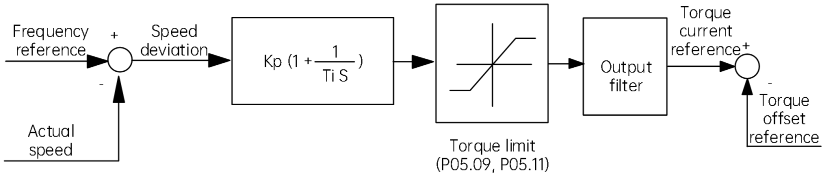
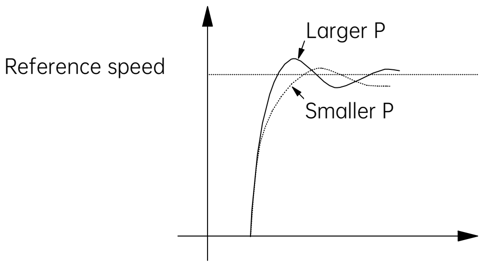


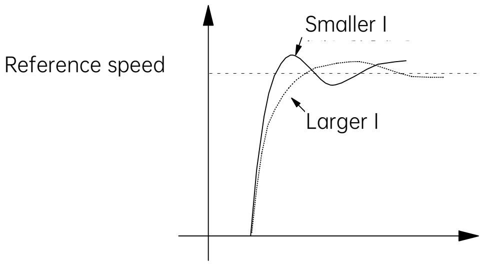
Figure 7-9 Simplified diagram of ASR

When the integral time is set to 0 (P05.01 = 0, P05.04 = 0), the integral function is ineffective. Meanwhile, the speed loop serves as a proportional regulator only.

(2) Setting of the proportional gain P and integral time I of the speed regulator (ASR)



(a)



(b)

Figure 7-10 Relations between the step response and PI parameters

Increasing the proportional gain P can accelerate the dynamic response of the system. However, if P is too large, the system is prone to oscillation.

Reducing the integral time I can speed up the dynamic response of the system. However, if I is too small, the system will have larger overshoots and oscillate easily, as shown in Figure 7-10.

Usually, the proportional gain P is adjusted first to increase P as much as possible without oscillating the system. Then the integral time I is adjusted so that the system has both fast response and small overshoots. Figure 7-11 shows the speed step response curve when P and I are well selected (the speed response curve can be observed via the analog output terminal AO1; refer to the parameters in Group P10).

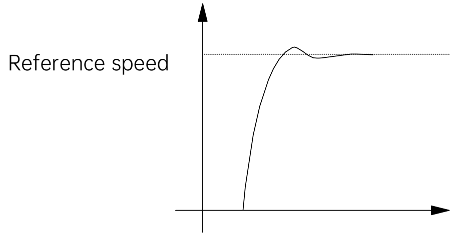


Figure 7-11 Step response with good dynamic response

WARNING

If the PI value is not properly selected, an overvoltage failure may occur (if there is no external braking resistor or braking unit) when the system accelerates to a high speed after a quick start, which is caused by the energy feedback resulted from the regenerative braking state of the system during the drop process subsequent to the speed overshoot. Adjust the PI parameter to eliminate the risk of such failures.

(3) PI adjustment for the speed regulator (ASR) at high/low speed

If the system requires fast response for both high-speed and low-speed on-load running, set the ASR switchover frequency (P05.02 and P05.05). Generally, the proportional gain P can be increased and the integral time I can be decreased relatively to improve the dynamic response when the system is running at a low frequency. In most cases, the speed regulator parameters can be adjusted according to the following order:

① Select the appropriate switchover frequencies P05.02 and P05.05;

② Adjust the proportional gain P05.03 and the integral time P05.04 at high speed to ensure that the system does not oscillate and has good dynamic response;

③ Adjust the proportional gain P05.00 and the integral time P05.01 at low speed to ensure that the system does not oscillate and has good dynamic response at low frequency.

P05.06	Slip compensation coefficient	50 to 200%	100%

It is used to set the slip compensation coefficient when the motor 1 is an asynchronous motor.

It is valid only when both P02.01 and P03.00 are set to 0.

P05.07	Speed loop filter time constant	0.00 to 20.00 s	0.02 s

The speed regulator (ASR) output goes through a delay filter and the torque current reference is produced. P05.07 is used to set the time constant of the speed loop output filter of motor 1. Generally, no modification is required.

P05.08	Vector control over-excitation gain	50 to 200%	100%

It is used to set the over-excitation gain of motor 1 in vector control.

P05.09	Drive torque upper limit source	0 to 5	0
P05.10	Drive torque upper limit digital setting	0.0 to 300.0%	180.0%

It is used to set the physical channel for the drive torque limit.

0: Digital setting (P05.10)

P05.10 defines the value of the drive torque limit.

1: AI1

2: AI2

The maximum AI input voltage/current (10 V / 20 mA) corresponds to 300% of the rated torque reference.

3: HDI

The maximum pulse input frequency (50 kHz) of the terminal corresponds to 300% of the rated torque reference. For the corresponding relations between the pulse input and output, refer to the description of Group P09.

4: Modbus/Modbus TCP setting

The drive torque limit value is set via Modbus/Modbus TCP.

5: EtherCAT/Profinet/CANopen/EtherNet IP setting

The drive torque limit value is set via EtherCAT/Profinet/CANopen/EtherNet IP setting.

P05.11	Braking torque upper limit source	0 to 5	0
P05.12	Braking torque upper limit digital setting	0.0 to 300.0%	150.0%
P05.13	Excitation regulation Kp	0 to 60000	2000
P05.14	Excitation regulation Ki	0 to 60000	1300
P05.15	Torque regulation Kp	0 to 60000	2000
P05.16	Torque regulation Ki	0 to 60000	1300

It is used to set the physical channel for the braking torque limit.

0: Digital setting (P05.12)

P05.12 defines the value of the braking torque limit.

1: AI1

2: AI2

The maximum AI input voltage/current (10 V / 20 mA) corresponds to 300% of the rated torque reference.

3: HDI

The maximum pulse input frequency (50 kHz) of the terminal corresponds to 300% of the rated torque reference. For the corresponding relations between the pulse input and output, refer to the description of Group P09.

4: Modbus/Modbus TCP setting

The drive torque limit value is set via Modbus/Modbus TCP.

5: EtherCAT/Profinet/CANopen/EtherNet IP setting

The drive torque limit value is set via EtherCAT/Profinet/CANopen/EtherNet IP setting.

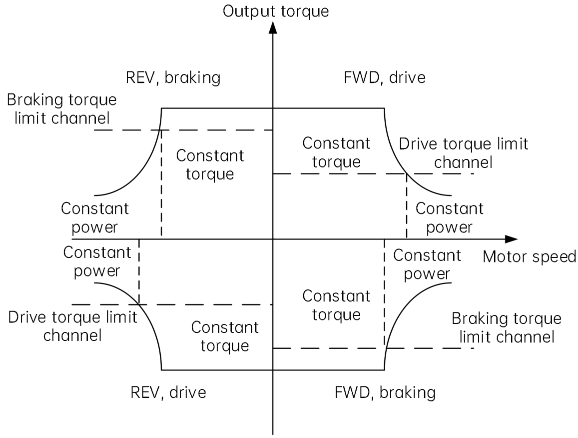


Figure 7-12　Torque control diagram

WARNING

The torque limit value shall be positive. If the reference value is negative, the torque limit will become 0 automatically.

P05.17	Integral separation	0 to 1	0

0: Disabled

1: Enabled

P05.18	Synchronous motor field weakening coefficient	0 to 100	5

P05.19	Maximum field weakening current	0 to 120.0%	100.0%

P05.20	Field weakening auto-tuning coefficient	0.0 to 120.0%	100.0%

P05.21	Field weakening integral multiple	0.000 to 1.200	0

7.7 P06: Motor 1 torque control parameters

P06.00	Torque control enable	0 to 1	0

0: Disabled

1: Enabled

This function code serves as the switchover between the speed control and the torque control.

0: Speed control mode

In this mode, the motor is controlled by the speed reference, and the internal ASR is effective. The speed control mode shall be used in cooperation with the drive torque limit and the braking torque limit.

1: Torque control mode

In this mode, the internal ASR is ineffective, and the torque reference can be selected via the setting of the function code P06.01. Under torque control, the motor speed may increase due to the mismatch between the torque reference and the load torque, so the speed limit shall be properly set.

WARNING

In the vector control mode, use the terminal to switch between the speed control mode and the torque control mode. When P06.00 is set to 0 and the terminal function (47) is invalid, the actual mode will be the speed control; if the terminal function is valid, the mode will be switched to torque control. When P06.00 is set to 1 and the terminal function (47) is invalid, the actual mode will be the torque control; if the terminal function is valid, the mode will be switched to speed control. For details, refer to the "47: Speed control and torque control switchover terminal" in the function selection of P09.03 to P09.10.

P06.01	Torque reference channel	0 to 5	0

It is used to set the physical channel of the torque reference in torque control.

0: Digital setting

The torque reference is set via the digital setting of the function code P06.02, and the digital setting range of the torque reference is -300% to +300%.

1: AI1

2: AI2

The maximum AI input voltage/current (10 V / 20 mA) corresponds to 300% of the rated torque. For the specific relations between AI input and torque, refer to the description of Group P09. The positive/negative input of AI corresponds to the positive/negative value of the torque reference.

3: HDI

The maximum pulse input frequency (50 kHz) of the terminal corresponds to 300% of the rated torque reference. For the corresponding relations between the pulse input and output, refer to the description of Group P09.

4: Modbus/Modbus TCP setting

The host device sets the present torque reference of the drive via the standard RS485 interface built in the drive.

For details about the programming method, operation method, and communication protocol, see Modbus communication protocol description.

5: EtherCAT/Profinet/CANopen/EtherNet IP setting

The host device sets the present torque reference of the drive via the expansion card bus interface.

For related use, see "P40: Bus option parameters."

P06.02	Torque digital setting	-300.0% to 300.0%	0.0%

The digital setting range of the torque reference is -300.0% to +300.0%.

P06.03	Torque reference acceleration/deceleration time	0 to 6000.0 s	6.0 s

It is used to set the torque acceleration/deceleration time under torque control. It is invalid under speed control.

It specifies the time the system takes to reach the reference torque from the present torque.

P06.04	FWD speed limit channel	0 to 5	0
P06.05	FWD speed limit digital setting	0.00 Hz to P02.11	0.00 Hz
P06.06	REV speed limit channel	0 to 5	0
P06.07	REV speed limit digital setting	0.00 Hz to P02.11	0.00 Hz

Function codes (P06.04 to P06.07) are valid only in the torque control mode.

The speed limits of the motor in the torque control are set by function codes P06.04 to P06.07. In the torque control mode, if the motor speed exceeds the speed limit, the internal torque command switches to the speed regulator (ASR) output to control the motor speed.

Function codes P06.04 and P06.06 are used to select the maximum speed limit channel of the motor FWD and REV running respectively.

FWD and REV speed limit channels:

0: Digital setting

The FWD and REV speed limits under torque control are set by the function codes P06.05 and P06.07 respectively.

1: AI1

2: AI2

The AI value is used as the speed limit in the torque control. The AI-speed relations are determined by the AI curve in Group P09.

3: HDI

The maximum pulse input frequency (50 kHz) of the terminal corresponds to 100% of the speed limit reference (maximum output frequency P02.10). For the corresponding relations between the pulse input and output, refer to the description of Group P09.

4: Modbus/Modbus TCP setting

The host device sets the present speed limit reference of the drive via the standard RS485 interface built in the drive.

For details about the programming method, operation method, and communication protocol, see Modbus communication protocol description.

5: EtherCAT/Profinet/CANopen/EtherNet IP setting

The host device sets the present speed limit reference of the drive via the expansion card bus interface.

For related use, see “P40: Bus option parameters”.

The FWD/REV limit is valid when P06.04 = 0 (or P06.06 = 0), and the 100% of the setting value corresponds to the maximum output frequency of the drive (P02.10).

P06.08	Inductance auto-tuning current	0 to 100	80
P06.09	Pole position auto-tuning current	0 to 150	120

7.8 P07: Motor 1 V/F control parameters

P07.00	V/F curve	0 to 5	0

0: Straight-line V/F

1: Multi-point V/F

2: Square V/F

3: Reserved

4: V/F complete separation

5: V/F half separation

Function codes (P07.00 to P07.08) define the different V/F curves of motor 1 under V/F control.

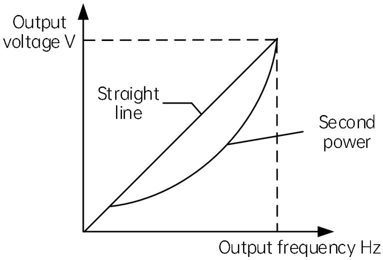


Figure 7-14 V/F curve

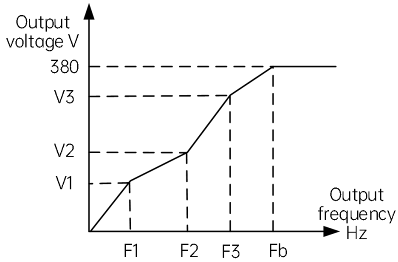


Figure 7-15 Multi-point V/F curve

When P07.00 is set to 1, the curve is user-defined and applicable for segmented constant-torque loads, as shown in Figure 7-14.

In Figure 7-15, F1 < F2 < F3 < Fb. Fb is the basic operating frequency, which is generally the rated frequency of the motor.

V1 ⩽ V2 ⩽ V3 ⩽ 380

P07.01	Torque boost	0.0 to 50.0	Depend on model
P07.02	Cut-off frequency of torque boost	0.00 Hz to P02.11	50.00 Hz

For torque compensation at low frequency, the output voltage needs to be boosted. P07.01 is relative to the maximum output voltage. When set to 0, it indicates the automatic torque boost; when set to a non-zero value, it indicates the manual torque boost, as shown in Figure 7-16.

P07.02 defines the cut-off frequency for manual torque boost, shown as fz in Figure 7-16. This cut-off frequency is applicable to any V/F curve selected by P07.00.

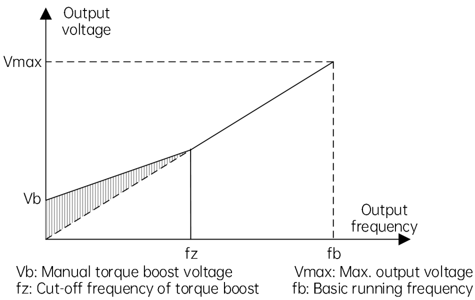


Figure 7-16 Torque boost (the amount of boost is indicated as the shaded area)

WARNING

① Improper setting of this parameter may lead to motor overheat or overcurrent protection.

② Refer to the function code P07.02 for the definition of fz.

③ When driving the synchronous motor, it is recommended to use the manual torque boost, and adjust the V/F curve according to the motor parameters and working conditions.

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④) The maximum output voltage Vmax corresponds to the rated voltage of the motor, so it is necessary to properly set the rated voltage of the motor according to the actual motor selected.

P07.03	Multi-point V/F frequency 1	0.00 Hz to P07.05	0.00 Hz
P07.04	Multi-point V/F voltage 1	0 V to P07.06	0 V
P07.05	Multi-point V/F frequency 2	P07.03 to P07.07	0.00 Hz
P07.06	Multi-point V/F voltage 2	P07.04 to P07.08	0 V
P07.07	Multi-point V/F frequency 3	P07.05 to 599.00 Hz	0.00 Hz
P07.08	Multi-point V/F voltage 3	P07.06 to 380 V	0 V

P07.09	Torque compensation coefficient	0 to 300	150
P07.10	V/F over-excitation gain	0 to 200	80
P07.11	Oscillation suppression gain	0 to 100	10

P07.12	Oscillation suppression gain mode	0 to 2	0

P07.13	Voltage source for V/F separation	0 to 9	0

0: Digital setting

1: AI1

2: AI2

3: Reserved

4: HDI

5: Multi-reference

6: Simple PLC

7: PID

8: Modbus/Modbus TCP setting

9: EtherCAT/Profinet/CANopen/EtherNet IP setting

P07.14	Digital setting of the voltage source for V/F separation	0 to 1000 V	0 V
P07.15	Voltage rise time of V/F separation	0 to 6000.0 s	5.0 s

P07.16	Voltage fall time of V/F separation	0 to 6000.0 s	5.0 s

P07.17	Stop mode for V/F separation	0 to 1	0

0: Frequency and voltage decline to 0 independently

1: Frequency declines after voltage declines to 0

P07.18	V/F slip compensation gain	0.0 to 100.0	0.0

7.9 P08: Start/Stop control parameters

P08.00	Startup mode	0 to 2	0

The drive provides different startup modes for various applications.

0: Startup from the startup frequency

The drive starts from the startup frequency P08.02, and accelerates to the frequency reference after the startup frequency hold time P08.03. If the motor is still rotating when the drive starts, the motor will be automatically braked to a low speed before the acceleration.

1: Startup after speed tracking

The drive identifies the speed of the rotating motor and starts directly from the identified frequency. The current and voltage in the starting process are smooth and without impact.

2: Startup after DC braking

DC excitation and DC braking are performed first. The DC injection amount and time are set by P08.04 and P08.05. After the DC braking time is reached, the drive starts from the startup frequency P08.02, and accelerates to the frequency reference after the startup frequency hold time P08.03.

P08.01	Startup delay time	0.0 to 600.0 s	0.0 s

It is used to define the delay time after which the drive starts to run when an operation command is received.

P08.02	Startup frequency	0.0 to 50.00 Hz	0.00 Hz
P08.03	Startup frequency hold time	0.0 to 50.0 s	0.0 s

The drive starts from the startup frequency P08.02, and accelerates according to the set acceleration time after the startup frequency hold time P08.03.

WARNING

For heavy-load startup applications, a properly-set startup frequency hold time will facilitate the startup.

P08.04	Braking current at startup	0.0 to 100.0%	0.0%
P08.05	Braking time at startup	0.00 to 50.00	0.0s

P08.04 sets the magnitude of the DC braking current at startup, which is its percentage relative to the drive's rated current.

P08.05 sets the action time for DC braking at startup.

P08.06	Stop mode	0 to 2	0

The drive provides different stop modes for various applications.

0: Decelerate to stop

The motor decelerates to stop according to the set deceleration time.

1: Coast to stop

The drive cuts off the output, and the motor coasts to stop.

2: Emergency stop

The motor decelerates to stop according to the set deceleration time, and when the frequency is lower than the start frequency of DC braking at stop P08.11, the DC braking current P08.13 will be injected after the braking delay at stop P08.12. The DC braking time at stop is set by P08.14.

P08.07	Stop frequency	0.00 to 3.00 Hz	0.50 Hz

It defines the frequency used to detect whether the stop action is completed.

P08.08	Stop frequency hold time	0.0 to 600.0 s	0.0 s

It defines the hold time of the frequency which is used to detect whether the stop action is completed.

P08.09	Stop frequency detection mode	0 to 1	0

0: Speed reference (For V/F control, only this mode is available.)

1: Speed detection value

P08.10	Stop frequency detection time	0.00 to 100.00 s	0.50 s

After the P08.08 delay, stop frequency detection starts. During the time defined by P08.10, if P08.09 = 0, the drive will immediately stop when the ramp frequency reference is equal to or lower than P08.07; if P08.09 = 1, the drive will stop only when the actual frequency is equal to or lower than P08.07. If no stop frequency is detected after P08.10, the drive will directly stop.

P08.11	Start frequency of braking at stop	0.00 to P02.10	0.00

		(maximum frequency)	
P08.12	Braking delay at stop	0.00 to 30.00	0.00 s
P08.13	DC braking current at stop	0.0 to 120.0%	50.0%
P08.14	DC braking time at stop	0.0 to 6553.5 s	0.0 s

P08.11 sets the start frequency at which the DC braking current begins to be injected during the stop process.

P08.12 defines the time interval from the moment when the running frequency reaches the start frequency of braking at stop (P08.11) to the moment when the DC braking current beings to be injected during the process of decelerating to stop.

P08.13 sets the magnitude of the DC braking current at stop, which is represented by its percentage relative to the drive's rated current.

P08.14 sets the action time of the DC braking at stop.

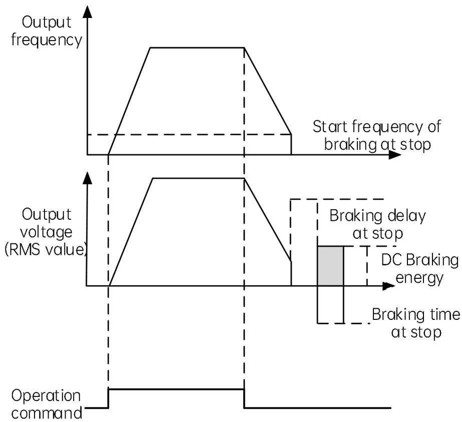


Figure 7-17 Decelerate to stop + DC braking

P08.15	Speed tracking mode	0 to 1	0

0: From the stop frequency

1: From the maximum frequency

WARNING

Only for asynchronous motors.

P08.16	Speed of speed tracking	1 to 100	20

A larger value of the parameter indicates a faster tracking speed. However, an excessively large value may impact the reliability of the tracking.

P08.17	Current of speed tracking	10 to 200%	Depend on model

Make sure that the maximum current during speed tracking is within the range. An excessively small value may impact the effect of the speed tracking.

P08.18	Output upon vector 0 Hz	0 to 3	0

0: Enable voltage output

1: No voltage output

2: Output according to the DC braking current at stop

3: Zero-servo running

P08.19	Running mode when below frequency lower limit	0 to 2	0

0: Running at frequency lower limit

1: Decelerate to stop

2: Hibernation

When the frequency reference is below the frequency lower limit, the drive coasts to stop; when the frequency reference is above the frequency lower limit again and the hold time exceeds the time set by P08.20, the drive automatically resumes operation.

P08.20	Recovery delay from hibernation	0.0 to 3600.0	0.0 s

P08.21 to P08.24	Reserved		

P08.25	Restart selection upon power failure	0 to 1	0
P08.26	Waiting time for restart upon power failure	0.0 to 3600.0	1.0 s

The above function codes determine whether the drive automatically restarts upon power-on after a power failure, and the waiting time before such automatic restart.

When P08.25 is set to 0, there is no automatic restart upon power-on after a power failure.

When P08.25 is set to 1, the drive will restart automatically after the waiting time set by P08.26 if the drive is powered on again after a power failure.

WARNING

① If there is a stop command, the stop command shall prevail.

② When the function of restart upon power failure is effective, if the drive is powered on again while not being completely powered off (the drive LED displays -LU-), the drive will act in the same manner used in the situation where the drive is powered on after being completely powered off (the LED on the operating panel is completely turned off); that is, the drive will restart according to the startup mode defined by P08.00.

P08.27	Reverse running prohibit	0 to 1	0

0: Reverse running enabled

1: Reverse running disabled

P08.28	FWD/REV switchover dead-zone time	0.0 to 3600.0	0.0 s

For some production equipment, reverse running may cause equipment damage. This function can prohibit the drive from running reversely.

The FWD/REV switchover dead-zone time defines the transition waiting time during zero-frequency output which occurs when the drive switches from forward running to reverse running (or from reverse running to forward running), as t1 shown in Figure 7-18.

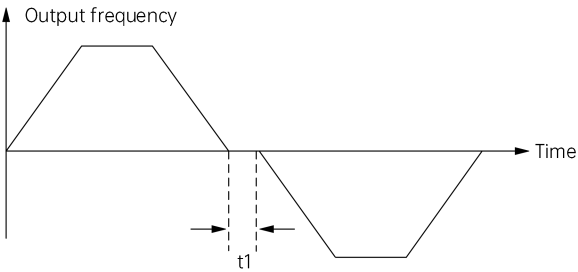


Figure 7-18 FWD/REV switchover dead-zone time

P08.29	FWD/REV switchover mode	0 to 2	0

0: Switchover after the zero frequency

1: Switchover after the startup frequency

2: Switchover after the delay at the stop frequency

P08.31	Dynamic braking usage ratio	0 to 100%	100%
P08.32	Braking startup voltage	650 to 790 V	680 V

The function codes P08.31 and P08.32 are effective only for the drives with built-in braking units.

P08.32 can select the action voltage of the braking unit. A proper action voltage can achieve fast dynamic braking stop.

P08.33	Deceleration time for emergency stop	0.0 to 60.0	2.0 s

When the input of the emergency stop terminal (terminal function 60) is effective, the drive begins to decelerate to stop. The deceleration time is determined by P08.33. When the time is set to 0 s, the drive can be stopped in the shortest deceleration time allowed by the system.

P08.34	Terminal running protection selection	0 to 1	0

0: Enable protection

1: Disable protection

It decides, after a power-on or fault reset, whether the terminals need to be enabled again before drive operation.

Note:

If protection is disabled, the terminal command will be immediately responded after fault reset.

7.10 P09: Terminal input parameters

P09.00	Function selection of terminals 4, 5, 6, and 8	0 to 0x22	0x00

Ones place:

- 0: Terminal 4 as DI1
- 1: Terminal 4 as DO1
- 2: Terminal 4 as HDO1

Tens place:

- 0: Terminal 5 as DI2
- 1: Terminal 5 as DO2
- 2: Terminal 5 as HDO2

Hundreds place: Reserved

Thousands place: Reserved

WARNING

Terminal 6 can only be set as DI3; terminal 8 can only be set as DI4.

P09.01	Function selection of terminals 7, 10, 12, and 16	0 to 0x2011	0x2010

Ones place:

- 0: Terminal 7 as DI5

1: Terminal 7 as thermistor signal input

Tens place:

0: Terminal 10 as DI6

1: Terminal 10 as HDI

Hundreds place: Reserved

Thousands place:

0: Terminal 16 as DI8

1: Terminal 16 as AI1 voltage input

2: Terminal 16 as AI1 current input

P09.02	Function selection of terminals 13 and 11	0 to 0x21	0x10

Ones place:

0: Terminal 13 as AI2 voltage input

1: Terminal 13 as AI2 current input

Tens place:

0: Terminal 11 as DO3/RO2

1: Terminal 11 as AO1 voltage output

2: Terminal 11 as AO1 current output

Hundreds place: Reserved

Thousands place: Reserved

P09.03	DI1 function selection	0 to 76	23
P09.04	DI2 function selection	0 to 76	57
P09.05	DI3 function selection	0 to 76	58
P09.06	DI4 function selection	0 to 76	0
P09.07	DI5 function selection	0 to 76	0
P09.08	DI6 function selection	0 to 76	0
P09.09	DI7 function selection	0 to 76	0
P09.10	DI8 function selection	0 to 76	0

Table 7-2 Digital input terminal functions

Item	Function	Item	Function
0	No function	1	Forward run
2	Reverse run	3	Forward jog

Item	Function	Item	Function
4	Reverse jog	5	Three-wire control
6	Multi-reference terminal 1	7	Multi-reference terminal 2
8	Multi-reference terminal 3	9	Multi-reference terminal 4
10	Acceleration/Deceleration time terminal 1	11	Acceleration/Deceleration time terminal 2
12	Frequency UP/DOWN setting clear (terminal)	13	Frequency UP/DOWN setting clear (terminal + keypad)
14	Frequency increase command (UP)	15	Frequency decrease command (DN)
16	External fault NO input	17	External fault NC input
18	Reserved	19	Reserved
20	Frequency reference source switchover from A to B	21	Frequency reference source switchover from combination to A
22	External reset (RESET) input	23	Coast to stop input (FRS)
24	Acceleration/Deceleration prohibit	25	DC braking input at stop
26	Simple PLC pause command	27	Frequency reference source switchover from combination to B
28	PLC stop memory clear	29	PID pause
30	PID clear	31	PID integral hold
32	Running at 0 Hz	33	PID regulating feature switchover
34	Main reference frequency source selection 1	35	Main reference frequency source selection 2
36	Main reference frequency source selection 3	37	Main reference frequency source selection 4
38	Command channel switched to keypad	39	Command channel switched to terminal
40	Command channel switched to communication	41	Direct DC brake running
42	REV prohibit	43	Reserved
44	External stop command (it is valid for all control modes, and the device will be stopped according to the present stop	45	Auxiliary frequency reference clear

Item	Function	Item	Function
	mode)		
46	Pulse input clear	47	Speed control and torque control switchover terminal
48	Torque direction switchover terminal in torque control	49	Position selection 1
50	Position selection 2	51	Position selection 3
52	Digital positioning cycle mode enable	53	Main axis homing
54	Speed/Position mode switchover	55	Motor 1 and 2 switchover terminal
56	Safety terminal input (reserved)	57	Electromagnetic valve control signal
58	Control signal of fan at power line frequency	59	PTC signal
60	Emergency stop	61	Wobble pause
62	Wobble reset	63	Counter reset
64	Counter trigger	65	Power consumption clear
66	Power consumption hold	67	Length counter input
68	Length reset	69	Switched to V/F control
70	Switched to FVC control	71	Air filter block signal
72	Oil filter block signal	73	Separator filter block signal
74	Air manifold block signal	75	External fault 1 (for air compressors only)
76	External fault 2 (for air compressors only)		

WARNING

The settings of the multi-function digital input terminals are mutually exclusive (excluding the function 0).

0: No function

1: Forward run: Terminal forward running input

2: Reverse run: Terminal reverse running input

3: Forward jog: Terminal forward jogging input

4: Reverse jog: Terminal reverse jogging input

The above 1 to 4 functions are effective only when the operation command channel P02.02 is set to 1; The running commands and jogging commands are mutually exclusive, which means the jog command will not be responded in the running state and the running command will not be responded in the jogging state.

5: Three-wire control

This parameter is valid only when the operation command channel P02.02 is set to 1. See P09.14 for the usage method.

6: Multi-reference terminal 1

7: Multi-reference terminal 2

8: Multi-reference terminal 3

9: Multi-reference terminal 4

The parameters are valid when P02.05 is set to 5.

By the ON/OFF combination of these function terminals, an operation curve with up to 15 segments of speed can be defined.

Table 7-3 Multi-speed reference combination table

K_4	K_3	K_2	K_1	Frequency setting
OFF	OFF	OFF	OFF	Multi-speed 0
OFF	OFF	OFF	ON	Multi-speed 1
OFF	OFF	ON	OFF	Multi-speed 2
OFF	OFF	ON	ON	Multi-speed 3
OFF	ON	OFF	OFF	Multi-speed 4
OFF	ON	OFF	ON	Multi-speed 5
OFF	ON	ON	OFF	Multi-speed 6
OFF	ON	ON	ON	Multi-speed 7
ON	OFF	OFF	OFF	Multi-speed 8
ON	OFF	OFF	ON	Multi-speed 9
ON	OFF	ON	OFF	Multi-speed 10
ON	OFF	ON	ON	Multi-speed 11
ON	ON	OFF	OFF	Multi-speed 12
ON	ON	OFF	ON	Multi-speed 13
ON	ON	ON	OFF	Multi-speed 14

K_4	K_3	K_2	K_1	Frequency setting
ON	ON	ON	ON	Multi-speed 15

10: Acceleration/Deceleration time terminal 1

11: Acceleration/Deceleration time terminal 2

When only one motor (motor 1 or motor 2) is controlled, the ON/OFF combination of the acceleration/deceleration time terminals 1 and 2 enables the acceleration/deceleration selections 1 to 4.

Table 7-4 Acceleration/Deceleration time selection

Terminal 2	Terminal 1	Acceleration/Deceleration time
OFF	OFF	Acceleration time 1 / Deceleration time 1
OFF	ON	Acceleration time 2 / Deceleration time 2
ON	OFF	Acceleration time 3 / Deceleration time 3
ON	ON	Acceleration time 4 / Deceleration time 4

If the drive needs to perform time-based control of two motors (terminal function 55 of motor 1 and motor 2 switchover is selected, and this terminal is valid), the acceleration/deceleration time 1 and 2 correspond to motor 1, and the acceleration/deceleration time 3 and 4 correspond to motor 2. The acceleration/deceleration time terminal 1 controls the switchover between the two groups of acceleration/deceleration time of motor 1 (acceleration/deceleration time 1 and 2), while the acceleration/deceleration time terminal 2 controls the switchover between the two groups of acceleration/deceleration time of motor 2 (acceleration/deceleration time 3 and 4).

12: Frequency UP/DOWN setting clear (terminal)

13: Frequency UP/DOWN setting clear (terminal + keypad)

14: Frequency increase command (UP)

15: Frequency decrease command (DN)

Instead of the operating panel, the frequency is increased or decreased via remote control of the control terminal. It is valid when P02.05 is set to 0 in the normal running state or when P02.06 is set to 0 (as auxiliary frequency). The increase/decrease rate is set by P11.16.

16: External fault NO input

17: External fault NC input

The terminal can receive the fault signal of an external device, which is convenient for the drive to monitor the fault of the external device. After receiving the fault signal of the external device, the drive displays “EF” (external device fault alarm). The fault signal adopts two input modes: NO and NC.

18 to 19: Reserved

20: Frequency reference source switchover from A to B

This function enables the switchover between the main frequency reference and the auxiliary frequency reference (P02.08 is set to 0 or 1).

21: Frequency reference source switchover from combination to A

This function enables the switchover from the combined frequency reference channel to the main frequency reference (P02.08 is set to a value from 2 to 5).

22: External reset (RESET) input

This function defines the reset signal input via the external terminal to facilitate the fault reset, valid only in the terminal control mode.

23: Coast to stop input (FRS)

When the drive is in the running state, if the terminal function is enabled, the drive immediately coasts to stop

24: Acceleration/Deceleration prohibit

If the function terminal is enabled, the running frequency remains unchanged unless there is a stop command.

25: DC braking input at stop

After the drive receives a stop command, when the running frequency is lower than the start frequency of braking at stop P08.11, the drive starts DC braking. The braking current is set by P08.13. The braking time is the longer one between the function hold time of this terminal and the DC braking time at stop P08.14.

26: Simple PLC pause command

It is used to realize the pause control of the PLC process. When the terminal is enabled, the drive runs at zero frequency, and the PLC runs without time counting. When the terminal is disabled, the drive will start in the speed tracking mode, and continue the PLC operation. For details, see the function description of P13.00 to P13.36.

27: Frequency reference source switchover from combination to B

This function enables the switchover from the combined frequency channel to the auxiliary frequency reference (P02.08 is set to a value from 2 to 5).

28: PLC stop memory clear

If the drive is in the stop state under the PLC running mode, when the terminal is enabled, the PLC running stage, running time, running frequency and other information stored in the PLC upon the drive stop will be cleared. For details, see the function description of P13.00 to P13.36.

29: PID pause

When this function is enabled, the PID output is disabled and the PID is forced by the drive to output with zero frequency.

30: PID clear

31: PID integral hold

When the input terminal is closed, the system mandates the maintenance of the integral value of the PID control. When the input terminal is open, the PID control will restart the integral. For details of this function, see "Figure 7-44 PID control diagram."

32: Running at 0 Hz

33: PID regulating feature switchover

It refers to the integral value of PID control when the input terminal is closed. For details of this function, see "Figure 7-44 PID control diagram."

34: Main reference frequency source selection 1

35: Main reference frequency source selection 2

36: Main reference frequency source selection 3

37: Main reference frequency source selection 4

The ON/OFF combination of the frequency reference channel selection terminals 1, 2, 3, and 4 enables the switchover of the frequency reference channels shown in Table 7-6. Between the switchover via terminals and the setting of P02.09, the later command shall prevail.

Table 7-5 Frequency reference channel selection

Main frequency reference channel selection terminal 4	Main frequency reference channel selection terminal 3	Main frequency reference channel selection terminal 2	Main frequency reference channel selection terminal 1	Main frequency reference channel
OFF	OFF	OFF	OFF	P02.09
OFF	OFF	OFF	ON	AI1
OFF	OFF	ON	OFF	AI2
OFF	OFF	ON	ON	HDI
OFF	ON	OFF	OFF	Simple PLC
OFF	ON	OFF	ON	Multi-speed reference
OFF	ON	ON	OFF	PID
OFF	ON	ON	ON	Modbus\Modbus TCP
ON	OFF	OFF	OFF	EtherCAT/Profinet/ CANopen/EtherNet IP setting

38: Command channel switched to keypad

When the function terminal is enabled, the operation command channel will be switched to the keypad. When the function terminal is disabled, the operation command channel will be restored.

39: Command channel switched to terminal

When the function terminal is enabled, the operation command channel will be switched to the terminal. When the function terminal is disabled, the operation command channel will be restored.

40: Command channel switched to communication

When the function terminal is enabled, the operation command channel will be switched to communication. The specific communication method is set by P02.03. When the function terminal is disabled, the operation command channel will be restored.

41: Direct DC brake running

42: REV prohibit

If the terminal is enabled during the reverse running, the drive will coast to stop. If this terminal is enabled before the the reverse running, the drive will enter the zero frequency running state. Operations in the forward running state will not be affected.

43: Reserved

44: External stop command

When the drive is running, if the terminal function is enabled, the drive will stop immediately according to the present stop mode, valid for all control modes.

45: Auxiliary frequency reference clear

It is valid only for the digital auxiliary frequency (P02.06=0, 7). When the function terminal is enabled, the auxiliary frequency reference will be cleared, and the frequency reference will be determined by the main frequency reference.

46: Pulse input clear

47: Speed control and torque control switchover terminal

This function shall be used with P06.00 (speed/torque control). In vector control, the speed control mode and torque control mode can be switched via the terminal. When P06.00 is set to 0 and the terminal function is disabled, the present mode is speed control; when the terminal function is enabled, the present mode is torque control. When P06.00 is set to 1 and the terminal function is disabled, the present mode is torque control; when the terminal function is enabled, the present mode is speed control.

48: Torque direction switchover terminal in torque control

In torque control, if the terminal function is enabled, the torque direction of the torque reference can be changed.

49: Position selection 1

50: Position selection 2

51: Position selection 3

52: Digital positioning cycle mode enable

53: Main axis homing

54: Speed/Position mode switchover

55: Motor 1 and 2 switchover terminal

When the terminal function is enabled, the two motors can be switched. The drive performs time-based control of the two motors and uses this terminal function to switch between the two motors. The acceleration/deceleration time of motor 1 can be set by the acceleration/deceleration time 1 and acceleration/deceleration time 2, and the acceleration/deceleration time of motor 2 can be set by the acceleration/deceleration time 3 and acceleration/deceleration time 4.

56: Safety terminal input (reserved)

57: Electromagnetic valve control signal

58: Control signal of fan at power line frequency

59: PTC signal

60: Emergency stop

When this terminal function is enabled, the drive will stop as fast as possible according to the deceleration time automatically determined by the load torque.

61: Wobble pause

In wobble running, when this terminal function is enabled, the wobble output is paused.

62: Wobble reset

When this terminal function is enabled, the present wobble output frequency will be reset.

63: Counter reset

When this terminal function is enabled, the present count of the counter will be reset to 0.

64: Counter trigger

When this terminal function is enabled, the present counter will continue to count.

65: Power consumption clear

When this terminal function is enabled, the present count of power consumption will be cleared.

66: Power consumption hold

When this terminal function is enabled, the present count of power consumption will remain unchanged.

67: Length counter input

When this terminal function is enabled, the length count input is valid

68: Length reset

When this terminal function is enabled, the present length count input will be reset.

69: Switched to V/F control

When this terminal function is enabled, the drive is forced to switch to the V/F control mode.

70: Switched to FVC control

When this terminal function is enabled, the drive is forced to switch to the FVC control mode.

71: Air filter block signal

72: Oil filter block signal

73: Separator filter block signal

74: Air manifold block signal

75: External fault 1 (for air compressors only)

76: External fault 2 (for air compressors only)

P09.11	Terminal conducting mode selection	0 to 1	1

0: Digital external high conducting

1: Digital external low conducting

P09.12	DI1 to DI4 active mode selection	0 to 0x1111	0

Ones place:

0: DI1 positive logic active

1: DI1 negative logic active

Tens place:

0: DI2 positive logic active

1: DI2 negative logic active

Hundreds place:

0: DI3 positive logic active

1: DI3 negative logic active

Thousands place:

0: DI4 positive logic active

1: DI4 negative logic active

P09.13	DI5 to DI8 active mode selection	0 to 0x1111	0

Ones place:

0: DI5 positive logic active

1: DI5 negative logic active

Tens place:

0: DI6 positive logic active

1: DI6 negative logic active

Hundreds place:

0: DI7 positive logic active

1: DI7 negative logic active

Thousands place:

0: DI8 positive logic active

1: DI8 negative logic active

P09.14	FWD/REV operation mode	0 to 3	0

This parameter defines four different modes that the external terminals use to control the drive running.

0: Two-wire mode 1

K1	K2	Command
0	0	Stop
0	1	Reverse
1	0	Forward
1	1	Stop

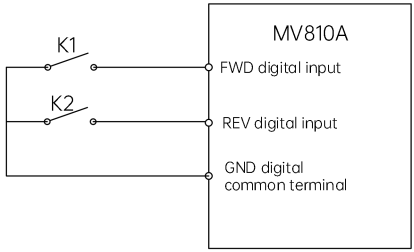


Figure 7-19 Two-wire mode 1

1: Two-wire mode 2

K1	K2	Command
0	0	Stop
0	1	Stop
1	0	Forward
1	1	Reverse

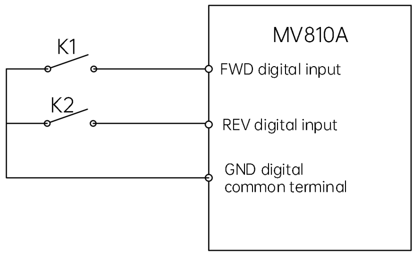


Figure 7-20 Two-wire mode 2

2: Three-wire mode 1

<table>
<tr><th>SB1</th><th>SB2</th><th>SB3</th><th>Command</th></tr>
<tr><td rowspan="4">1</td><td rowspan="2">0→1</td><td>0</td><td rowspan="2">Forward</td></tr>
<tr><td>1</td></tr>
<tr><td>0</td><td rowspan="2">0→1</td><td rowspan="2">Reverse</td></tr>
<tr><td>1</td></tr>
<tr><td rowspan="2">0</td><td></td><td></td><td rowspan="2">Stop</td></tr>
<tr><td></td><td></td></tr>
</table>

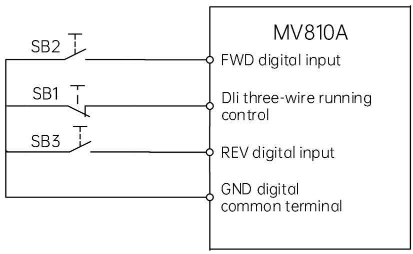


Figure 7-21 Three-wire mode 1

In the above figure:

SB1: Stop button

SB2: FWD button

SB3: REV button

DIi is the multi-function input end of DI1 to DI8, so it is required to set the terminal to function 5 “Three-wire control.”

3: Three-wire mode 2

SB1	SB2	SB3	Command
1	0→1	0	Forward
		1	Reverse
0			Stop

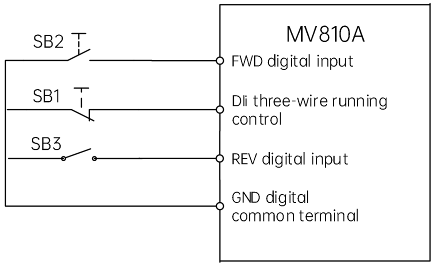


Figure 7-22 Three-wire mode 2

In the above figure:

SB1: Stop button

SB2: Run button

Dli is the multi-function input end of DI1 to DI8, so it is required to set the terminal to function 5 "Three-wire control."

P09.15	DI filter time	0.000 to 1.000	0.010 s

It is used to set the filter time for DI terminal sampling. It is recommended to increase the parameter value when there is significant interference to avoid misoperation.

P09.16	VDI active state	0 to 0xFF	0

0: Disabled

1: Enabled

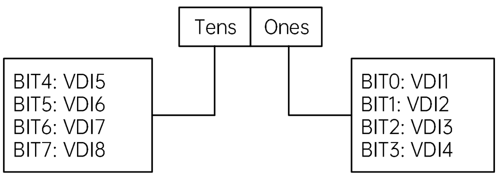


Figure 7-23 VDI active state

P09.17	DI1 switch-on delay time	0.0 to 600.0	0.0 s
P09.18	DI1 switch-off delay time	0.0 to 600.0	0.0 s
P09.19	DI2 switch-on delay time	0.0 to 600.0	0.0 s
P09.20	DI2 switch-off delay time	0.0 to 600.0	0.0 s
P09.21	DI3 switch-on delay time	0.0 to 600.0	0.0 s
P09.22	DI3 switch-off delay time	0.0 to 600.0	0.0 s
P09.23	DI4 switch-on delay time	0.0 to 600.0	0.0 s

P09.24	DI4 switch-off delay time	0.0 to 600.0	0.0 s

The above function codes are used to set the delay time for the level jump upon switch-on and switch-off of the digital input terminals.

P09.25	AI1 lower limit	0.00 V to P09.27	2.00 V
P09.26	Percentage corresponding to AI1 lower limit	-1000.0% to 100.0%	0.0%
P09.27	AI1 upper limit	P09.25 to 10.00	10.00 V
P09.28	Percentage corresponding to AI1 upper limit	-1000.0% to 100.0%	100.0%
P09.29	AI1 filter time	0.000 to 10.000 s	0.200 s
P09.30	AI2 lower limit	-10.00 V to P09.32	-10.00 V
P09.31	Percentage corresponding to AI2 lower limit	-100.0 to 100.0%	-100.0%
P09.32	AI2 middle value 1	P09.30 to P09.34	0.00 V
P09.33	Percentage corresponding to AI2 middle value 1	-100.0 to 100.0%	0.0%
P09.34	AI2 middle value 2	P09.32 to P09.36	0.00 V
P09.35	Percentage corresponding to AI2 middle value 2	-100.0 to 100.0%	0.0%
P09.36	AI2 upper limit	P09.34 to 10.00	10.00 V
P09.37	Percentage corresponding to AI2 upper limit	-100.0 to 100.0%	100.0%
P09.38	AI2 filter time	0.000 to 10.000s	0.200 s
P09.39	HDI frequency lower limit	0.000 kHz to P09.41	0.000 kHz
P09.40	Percentage corresponding to HDI frequency lower limit	-1000.0% to 100.0%	0.0%
P09.41	HDI frequency upper limit	P09.39 to 50.000 kHz	50.000 kHz
P09.42	Percentage corresponding to HDI frequency upper limit	-1000.0% to 100.0%	100.0%
P09.43	HDI filter time	0.000 to 10.000 s	0.030 s

AI1, AI2, and HDI pulse input can be used as different reference channels. The analog input channel function can be set by P09.01 and P09.02, and the pulse input function can be set by P09.01 (terminal 10 input function selection). For example, when choosing AI1, AI2, or HDI pulse input as the frequency reference channel, the relation between the frequency reference source and the frequency reference is shown in Figure 7-24 (example based on AI1 as the main frequency reference channel).

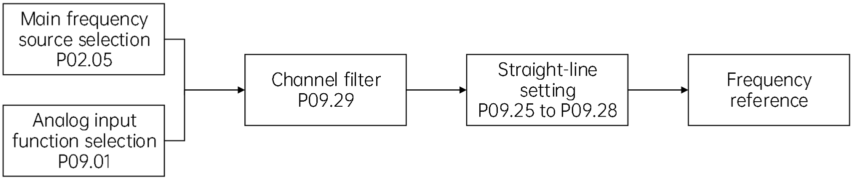


Figure 7-24 Relation between reference channel input and frequency reference

After the analog signal reference is filtered, the relation between the signal and the frequency reference is in the form of a straight line or a curve. The AI1 frequency reference line (straight) is defined by P09.25 to P09.28, the AI2 frequency reference line (curve) is defined by P09.30 to P09.37, and the HDI frequency reference line (curve) is defined by P09.30 to P09.42. See Figure 7-25.

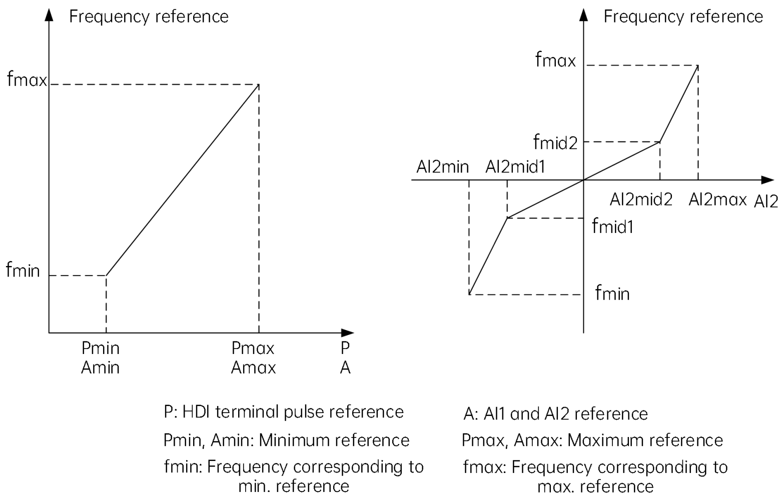


Figure 7-25 Analog input frequency feature curve

7.11 P10: Terminal output parameters

P10.00	DO1 function selection	0 to 47	0
P10.01	DO2 function selection	0 to 47	1

P10.02	DO3 function selection	0 to 47	0
P10.03	Relay RO1 output selection	0 to 47	23

The functions of the multi-function DO terminals are defined in the following table:

Table 7-6 Table of digital output terminal functions

Item	Function	Item	Function
0	Disabled	1	AC drive in running
2	Forward running	3	Reverse running
4	Frequency reach signal (FAR)	5	Frequency-level detection signal (FDT1)
6	Frequency-level detection signal (FDT2)	7	Overload detection signal (OL)
8	Lockout for undervoltage (LU)	9	External fault stop (EXT)
10	Frequency upper limit (FHL)	11	Frequency lower limit (FLL)
12	Zero-speed running	13	Simple PLC stage completion
14	Simple PLC cycle completion	15	Running time reach of this run
16	Accumulated running time reach	17	AC drive ready to run (RDY)
18	AC drive fault	19	Host device on/ff signal
20	Motor overheat	21	Torque limited (Valid when the torque command is limited by the torque limit value 1 or 2.)
22	Motor overload pre-alarm signal	23	Start/Stop signal of the fan at power line frequency
24	Electromagnetic valve control output	25	Air compressor fault alarm output
26	Reference count value reach	27	Designated count value reach
28	Length reach	29	Positioning completed
30	Zero point positioning completed	31	Index positioning completed
32 to 37	Reserved	38	Motor 1 and 2 indication terminal
39	Bus card switch signal	40 to 45	Reserved
46	PID feedback loss	47	Reserved

0: Disabled

1: AC drive in running

When in the running state, the drive outputs the indication signal of the state.

2: Forward running

3: Reverse running

The corresponding indication signal is output according to the drive's actual running direction.

4: Frequency reach signal (FAR)

Refer to the function description of P11.26.

5: Frequency-level detection signal (FDT1)

6: Frequency-level detection signal (FDT2)

Refer to the function description of P11.27 to P11.30.

7: Overload detection signal (OL)

When the drive's output current exceeds the overload pre-alarm detection level, and its hold time exceeds the overload pre-alarm detection time, the relevant indication signal will be output. It is used for overload pre-alarm in most cases. Refer to the function description of P97.21 to P97.22.

8: Lockout for undervoltage (LU)

When the DC bus voltage is lower than the undervoltage detection level, the relevant indication signal will be output, and the LED displays "-Uv-."

9: External fault stop (EXT)

When the drive has external fault tripping alarm (EF), the relevant indication signal will be output.

10: Frequency upper limit (FHL)

When frequency reference ⩾ frequency upper limit and the running frequency reaches the frequency upper limit, the relevant indication signal will be output.

11: Frequency lower limit (FLL)

When frequency reference ⩽ frequency lower limit and the running frequency reaches the frequency lower limit, the relevant indication signal will be output.

12: Zero-speed running

When the drive is running at zero speed, the relevant indication signal is output. To make it clear, in the V/F mode, the indication signal is output when the output frequency is 0; in a non-V/F mode, the indication signal is output when the feedback frequency is lower than the corresponding frequency of P11.32.

13: Simple PLC stage completion

When the simple PLC completes the present stage, the relevant indication signal will be output.

14: Simple PLC cycle completion

When the simple PLC completes an operation cycle, the relevant indication signal will be output.

15: Running time reach of this run

When the running time (see P11.38) of the drive is reached, the relevant indication signal will be output.

16: Accumulated running time reach

When the accumulated running time (see P11.39) of the drive is reached, the relevant indication signal will be output.

17: AC drive ready to run (RDY)

If the signal output is enabled, it means that the drive does not have any fault, and the bus voltage is normal. If the drive running prohibit terminal is disabled, the drive can receive the startup command.

18: AC drive fault

When a fault occurs in the drive, the relevant indication signal will be output.

19: Host device on/ff signal

The serial port directly controls the output signal of DO1, DO2, DO3/RO2, or RO1. The output is also affected by P10.04 (output terminal polarity selection).

20: Motor overheat

The signal is output when the motor overheats. For the specific conditions and settings, refer to P97.25 and P97.26.

21: Torque limited

When the torque command is limited by the drive or braking torque limit value, the relevant indication signal will be output.

22: Motor overload pre-alarm signal

23: Start/Stop signal of the fan at power line frequency

24: Electromagnetic valve control output

25: Air compressor fault alarm output

26: Reference count value reach

The signal is output when the count reference value is reached.

27: Designated count value reach

The signal is output when the designated count value is reached.

28: Length reach

The signal is output when the length reference is reached.

29: Positioning completed

30: Zero point positioning completed

31: Index positioning completed

32 to 37: Reserved

38: Motor 1 and 2 indication terminal

The output signal indicates the selected motor.

39: Bus card switch signal

The digital terminal signal adopts the virtual reference of the bus card.

40 to 45: Reserved

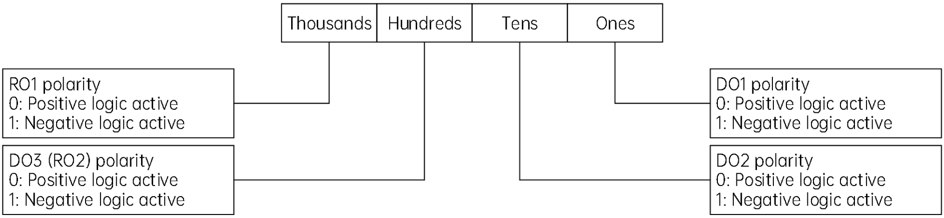
46: PID feedback loss

When the feedback signal is less than the detection value set by P14.22 and its hold time exceeds the time set by P14.23, the PID feedback is considered as "loss."

47: Reserved

P10.04	Output terminal polarity selection	0 to 0x1111	0

It is used to set the polarity of the digital output terminals, as shown below:



P10.05	DO1 switch-on delay time	0.0 to 600.0 s	0.0 s
P10.06	DO1 switch-off delay time	0.0 to 600.0 s	0.0 s
P10.07	DO2 switch-on delay time	0.0 to 600.0 s	0.0 s
P10.08	DO2 switch-off delay time	0.0 to 600.0 s	0.0 s
P10.09	DO3 switch-on delay time / RO2 switch-on delay time	0.0 to 600.0 s	0.0 s
P10.10	DO3 switch-off delay time / RO2 switch-off delay time	0.0 to 600.0 s	0.0 s
P10.11	Relay RO1 switch-on delay time	0.0 to 600.0 s	0.0 s
P10.12	Relay RO1 switch-off delay time	0.0 to 600.0 s	0.0 s

It is used to set the delay time for the level jump upon switch-on and switch-off of the output terminals.

P10.13	AO1 function selection	0 to 28	0
P10.14	HDO1 function selection	0 to 28	0
P10.15	HDO2 function selection	0 to 28	0

Table 7-7 Multi-function DO definition

Item	Function	Value range
0	Output frequency	0 to maximum frequency

1	Frequency reference	0 to maximum frequency
2	Frequency reference (after acceleration/deceleration)	0 to maximum frequency
3	Motor speed	0 to maximum speed
4	Output current	0 to 2 * Iei
5	Output current	0 to 2 * Iem
6	Torque current	0 to 3 * Iem
7	Reserved	
8	Output voltage	0 to 1.2 * Ve
9	Bus voltage	0 to 800 V
10	AI1 after correction	
11	AI2 after correction	
12	Reserved	
13	Output power	0 to 2 * Pe
14	Host device percentage	0 to 100.0%
15	Torque limit value 1	0.0 to 300.0%
16	Torque limit value 2	0.0 to 300.0%
17 to 25	Reserved	
26	Bus card percentage	0 to 100.0%
27	High-speed pulse HDIA input value	
28	Exciting current	0.0 to 100.0%

P10.16	AO1 output lower limit	0.00% to P10.18	0.00%
P10.17	Voltage corresponding to AO1 output lower limit	0.00 to 10.00	0.00 V
P10.18	AO1 output upper limit	P10.16 to 100.00%	100.00%
P10.19	Voltage corresponding to AO1 output upper limit	0.00 to 10.00	10.00 V
P10.20	AO1 output filter	0.000 to 10.000	0.005 s

P10.21	HDO1 output lower limit	0.00% to P10.23	0.00%
P10.22	Frequency corresponding to HDO1 output lower limit	0.00 to 50.00	0.00 kHz
P10.23	HDO1 output upper limit	P10.21 to 100.00%	100.00%
P10.24	Frequency corresponding to HDO1 output upper limit	0.00 to 50.00	50.00 kHz
P10.25	HDO1 output filter time	0.000 to 10.000	0.005 s
P10.26	HDO2 output lower limit	0.00% to P10.28	0.00%
P10.27	Frequency corresponding to HDO2 output lower limit	0.00 to 50.00	0.00 kHz
P10.28	HDO2 output upper limit	P10.26 to 100.00%	100.00%
P10.29	Frequency corresponding to HDO2 output upper limit	0.00 to 50.00	50.00 kHz
P10.30	HDO2 output filter time	0.000 to 10.000	0.005 s

The above function codes define the output filter and curve settings of AO1, HDO1, and HDO2.

7.12 P11: Auxiliary function parameters

P11.00	Acceleration/Deceleration mode	0 to 1	0

0: Straight-line acceleration/deceleration

The output frequency is decreased or increased according to the constant slope, as shown in Figure 7-26.

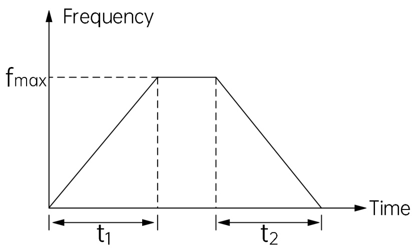


Figure 7-26 Straight-line acceleration/deceleration

1: S-curve acceleration/deceleration

The output frequency is decreased or increased according to the S curve, as shown in Figure 7-27.

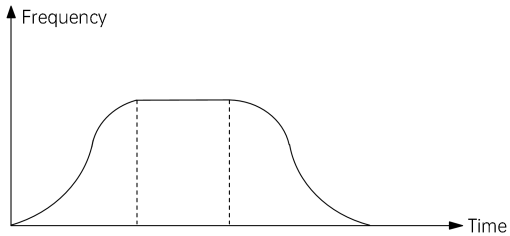


Figure 7-27 S-curve acceleration/deceleration

Adopt an S curve of speed values between the acceleration start and the reach of speed, as well as between the deceleration start and the reach of speed. In this way, the acceleration and deceleration will be smooth and with less impact. The S curve acceleration/deceleration mode is applicable to the start/stop of load handling, such as elevators and conveyors.

P11.01	Acceleration time 2	0.0 to 6000.0 s	Depend on model
P11.02	Deceleration time 2	0.0 to 6000.0 s	Depend on model
P11.03	Acceleration time 3	0.0 to 6000.0 s	Depend on model
P11.04	Deceleration time 3	0.0 to 6000.0 s	Depend on model
P11.05	Acceleration time 4	0.0 to 6000.0 s	Depend on model
P11.06	Deceleration time 4	0.0 to 6000.0 s	Depend on model

The acceleration time refers to the time required for the drive to accelerate from 0 Hz to the maximum output frequency (P02.10), as t_1 shown in Figure 7-28. The deceleration time refers to the time required for the drive to decelerate from the maximum output frequency (P02.10) to 0 Hz, as t_2 shown in Figure 7-28.

The MV810A series AC drive provides four types of acceleration/deceleration time, which can be selected via the different combinations of control terminals during operation. Refer to the acceleration/deceleration time terminal function in P09.03 to P09.10. They can also be defined as the acceleration/deceleration time for the running frequency switchover for each segment when the drive is running in the simple PLC mode. Refer to the description in Group P13.

P11.07	Time proportion of S-curve start segment	0.0 to 100.0%	10.0%
P11.08	Time proportion of S-curve end segment	0.0 to 100.0%	10.0%

In Figure 7-28, t_1 refers to the parameter value set by P11.07, in which the slope of the output frequency gradually increases; t_2 refers to the parameter set by P11.08, in which the slope of the output frequency gradually decreases. The segment between t_1 and the subsequent t_2 is the straight-line acceleration/deceleration. They are relative to the present acceleration/deceleration time.

Note:

The sum of the set values of P11.07 and P11.08 shall not exceeds 100.0%.

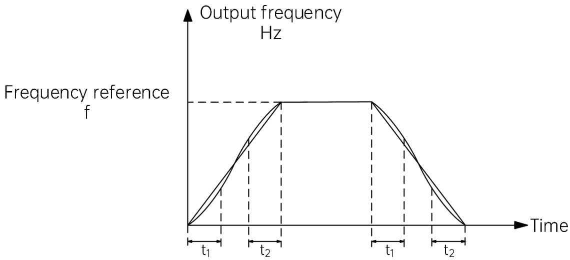


Figure 7-28　Time proportion of S-curve start and end

P11.09	Switchover frequency of acceleration/deceleration time 1 and 2	0.00 Hz to P02.10	0.00 Hz

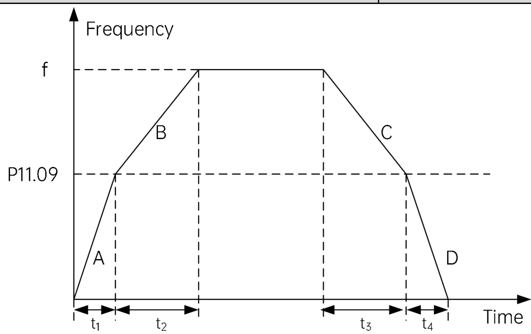


Figure 7-29　Switchover of acceleration/deceleration time 1 and 2

As shown in Figure 7-29, to accelerate motor 1, the motor will firstly run according to the acceleration time 1 shown as the A curve, and the acceleration time is defined as $t_1 = \frac{P11.09 \times P02.13}{P02.10}$. When the output frequency reaches to the switching point P11.09, the acceleration time will switch from P02.13 to P11.01 shown as the B curve, and the acceleration time is defined as $t_2 = \frac{(f - P11.09) \times P11.01}{P02.10}$. To decelerate, the motor will firstly run according to the deceleration time 2 shown as the C curve, and the deceleration time is defined as $t_3 = \frac{(f - P11.09) \times P02.14}{P02.10}$. When the output frequency decreases to a value lower than P11.09, the deceleration time will switch from 2 to 1 shown as the D curve, and the deceleration time is defined as $t_4 = \frac{P11.09 \times P11.02}{P02.10}$.

P11.10	Jog running frequency	0.00 Hz to P02.10	5.00 Hz
P11.11	Jog acceleration time	0.0 to 6000.0 s	6.0 s
P11.12	Jog deceleration time	0.0 to 6000.0 s	6.0 s

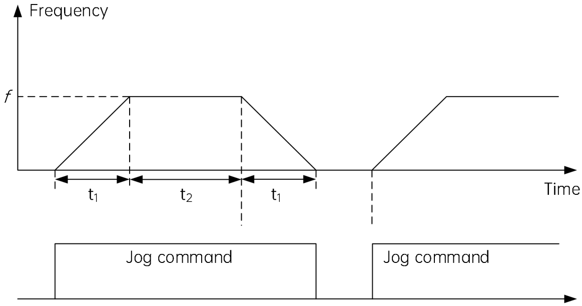


Figure 7-30 Description of jog running parameters

As shown in Figure 7-30, t_1 is the jog acceleration time (P11.11) and the jog deceleration time (P11.12) in actual running; t_2 is the jog time and f is the jog running frequency (P11.10).

The jog acceleration/deceleration time t_1 in actual running is determined by the following equation:

$$t_1 = \frac{P11.11 \times P11.10}{P02.10}$$

The drive can receive the jog command and accelerate immediately without the need to wait til stop during the process of the jog deceleration.

WARNING

① The jog operation starts according to the start mode 0 and stops according to the stop mode 0. The unit for the acceleration/deceleration time is fixed to second.

② All of the operating panel, terminals and serial port can perform the jog control.

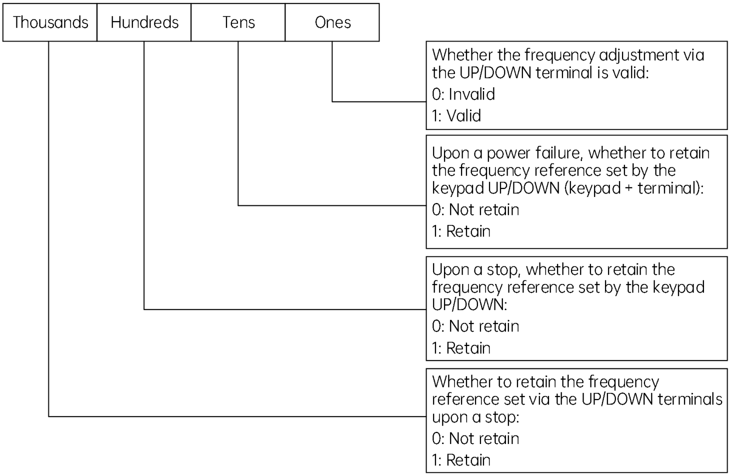
P11.13	Reserved		
P11.14	Number of decimal places for line speed	0 to 2	2
P11.15	Number of decimal places for acceleration/deceleration time	1 to 2	1

The above function codes are used to set the number of decimal places (precision) of the frequency, line speed, and acceleration/deceleration time.

P11.16	Terminal UP/DOWN speed	0.01 to 50.00 Hz/s	0.50 Hz/s

It is used to set the UP/DOWN speed of the terminal.

P11.17	Keypad frequency setting selection	0 to 0x1111	0x1111



P11.18	Jump frequency 1	0.00 Hz to P02.10	0.00 Hz
P11.19	Jump frequency 1 band	0.00 Hz to P02.10	0.00 Hz
P11.20	Jump frequency 2	0.00 Hz to P02.10	0.00 Hz
P11.21	Jump frequency 2 band	0.00 Hz to P02.10	0.00 Hz

If the frequency reference is within the jump frequency band, the actual output will be at the jump frequency boundary to avoid the mechanical resonance of the load.

If the jump frequency is set to 0, the function is disabled.

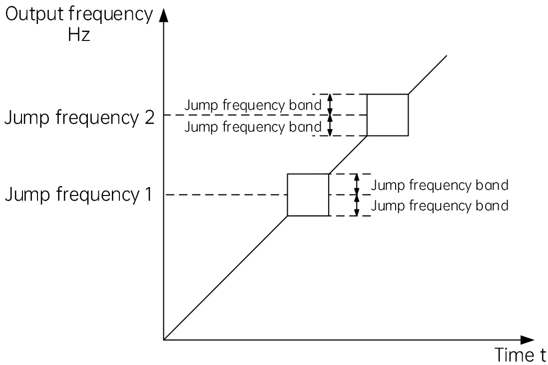


Figure 7-31

P11.22	Wobble amplitude	0.0 to 100.0%	0.0%
P11.23	Wobble step	0.0 to 100.0%	0.0%

P11.24	Wobble rise time	0.0 to 6000.0 s	6.0 s
P11.25	Wobble fall time	0.0 to 6000.0 s	6.0 s

It is used to set parameters related to wobble running.

P11.26	Frequency reach (FAR) detection range	0.0 to 100.0%	5.0%

When the running frequency of the drive is within the P11.26 percentage range of maximum frequency, the multi-function DO terminal outputs an ON signal, as shown in Figure 7-32.

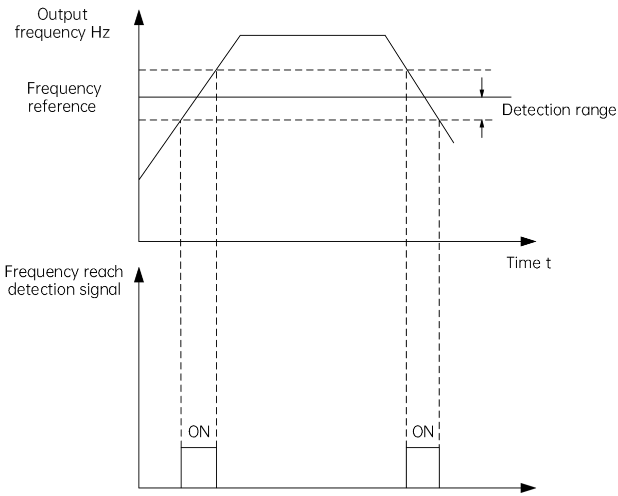


Figure 7-32 Frequency reach (FAR) detection range

P11.27	FDT1 frequency-level detection value	0.00 Hz to P02.11	0.00 Hz
P11.28	FDT1 frequency-level detection hysteresis	0.0 to 100.0%	0.0%
P11.29	FDT2 frequency-level detection value	0.00 Hz to P02.11	0.00 Hz
P11.30	FDT2 frequency-level detection hysteresis	0.0 to 100.0%	0.0%

When the output frequency exceeds P11.27 (FDT1 frequency-level detection value), the relevant indication signal will be output and kept on until the output frequency drops below a certain percentage P11.28 (FDT1 frequency-level detection hysteresis) relative to the FDT1 detection value. The function of FDT2 is similar, with the corresponding parameters P11.29 (FDT2 frequency-level detection value) and P11.30 (FDT2 frequency-level detection hysteresis), as shown in Figure 7-33.

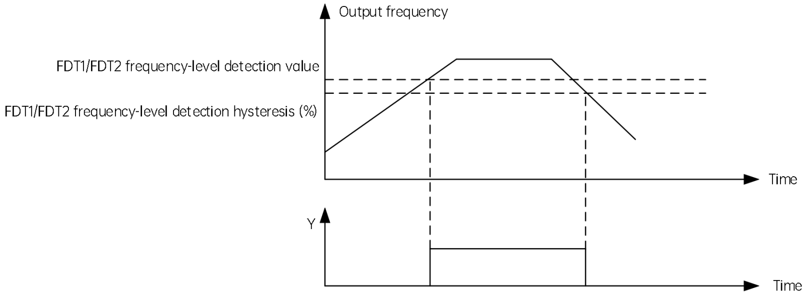


Figure 7-33 Frequency level detection

P11.31	Temperature for automatic fan start	5.0 to 80.0℃	40.0℃
P11.33	Length reference	0 to 60000 m	0 m
P11.34	Actual length	0 to 60000 m	0 m
P11.35	Number of pulses per meter	1 to 60000	1000
P11.36	Reference count value	0 to 60000	0
P11.37	Designated count value	0 to 60000	0
P11.38	Running time setting	0 to 65535 min	0 min
P11.39	Accumulated running time reach	0 to 65535 h	0 h

P11.40	Wake-up frequency	0.00 Hz to P02.10	0.00 Hz

When the frequency reference is higher than P11.40, the drive starts after the delay defined by P11.41.

P11.41	Wake-up delay time	0.0 to 6553.5 s	0.0 s
P11.42	Hibernation frequency	0.00 Hz to P02.10	0.00 Hz

When the frequency reference is lower than P11.42, the drive decelerates to stop and enters the hibernation state after the delay defined by P11.43.

P11.43	Hibernation delay time	0.0 to 6553.5 s	0.0 s

When the frequency reference is lower than P11.42, the drive coasts to stop after the delay defined by P11.43 and enters the hibernation state. When the frequency reference is higher than P11.40, the drive automatically resumes operation after the time defined by P11.41.

P11.44	Fan control	0 to 2	2

0: Auto running (based on the inverter temperature)

The drive automatically starts the internal temperature detection program during operation, and decides the start and stop of the fan according to the temperature of the module.

1: Continuous running after power-on

The fan keeps running after the drive is powered on.

2: Controlled by start/stop commands (running upon start, off upon stop)

The fan runs when the drive runs, and stops when the drive stops.

P11.45	Frequency adjustment via keypad UP/DOWN	-P02.10 to P02.10	0

It indicates the frequency resulted from the adjustment via the keypad UP/DOWN based on the present frequency reference. Press DOWN to change it into a negative value, and press UP to change it into a positive value.

P11.46	Frequency adjustment via keypad and terminal UP/DOWN	-P02.10 to P02.10	0

It indicates the frequency resulted from the adjustment via the keypad and terminal UP/DOWN based on the present frequency reference. Use DOWN to change it into a negative value, and use UP to change it into a positive value.

7.13 P12: Control optimization parameters

P12.01	PWM modulation mode	0 to 1	0

0: Asynchronous modulation

1: Synchronous modulation

P12.02	Dead-zone compensation mode	0 to 1	1

0: No compensation

1: Compensation mode 1

P12.03	Random PWM depth	0 to 10	0

0: Disabled

1 to 10: Random PWM depth

P12.04	Dead-zone compensation cutoff frequency	0.00 to 599.00 Hz	200.00 Hz
P12.05	Voltage over-modulation coefficient	100 to 110	105
P12.06	Wave generation mode switchover point	0.00 to 599.00 Hz	500.00 Hz

P12.07	SVPWM mode	0 to 0x1111	0x1110

Ones place:

0: Wave generation mode 1

1: Wave generation mode 2

Tens place: Carrier frequency adjustment following temperature change

0: Disable

1: Enable

Hundreds place: Carrier frequency adjustment following frequency change

0: Disable

1: Enable

Thousands place: Carrier frequency adjustment following overload change

0: Disable

1: Enable

P12.08	Start frequency for carrier frequency adjustment following frequency change	0.00 to 599.00 Hz	10.00 Hz
P12.09	AVR function	0 to 1	1

0: Disable

1: Enable

7.14 P13: Multi-speed and simple PLC parameters

P13.00	PLC running mode	0 to 0x1112	0x0000

The simple PLC is a multi-speed generator. The drive can automatically change its running frequency and direction according to its running time to meet requirements. This function is previously fulfilled by PLC (programmable logic controller); however, it can be performed by the drive itself now, as shown in Figure 7-34

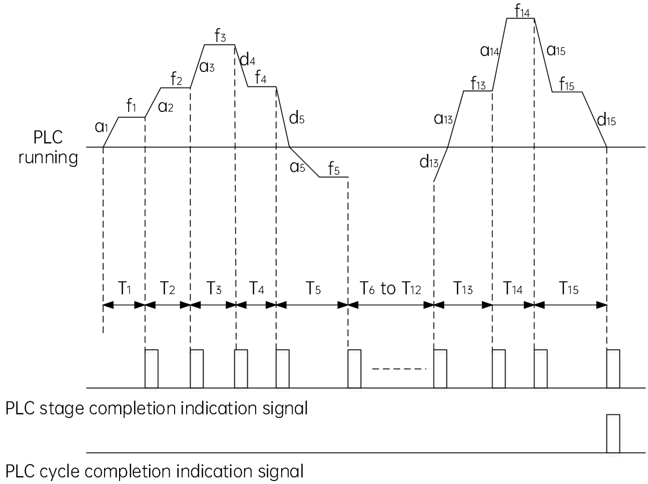


Figure 7-34 Simple PLC running

In Figure 7-34, segments (a1 to a15, and d1 to d15) represent the acceleration and deceleration time of their relevant stages, and segments (f1 to f15, and T1 to T15) represent the frequency reference and stage running time of their relevant stages. They will be explained in the following function codes.

PLC stage/cycle completion can be indicated by the pulse indication signal (500 ms) output via the open-collector output terminals (DO1, DO2, and DO3/RO2) or the relay RO. Refer to the Function 13 "Simple PLC stage completion" and function 14 "Simple PLC cycle completion" in P10.00 to P10.03.

The simple PLC running mode selection in P13.00 is explained as shown in Figure 7-35.

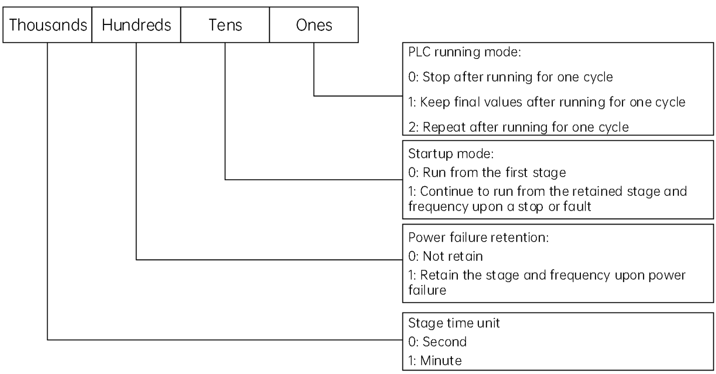


Figure 7-35 Simple PLC running mode selection

LED ones: PLC running mode

0: Stop after running for one cycle

As shown in Figure 7-36, the drive completes one cycle and automatically stops. It restarts only after another operation command is given.

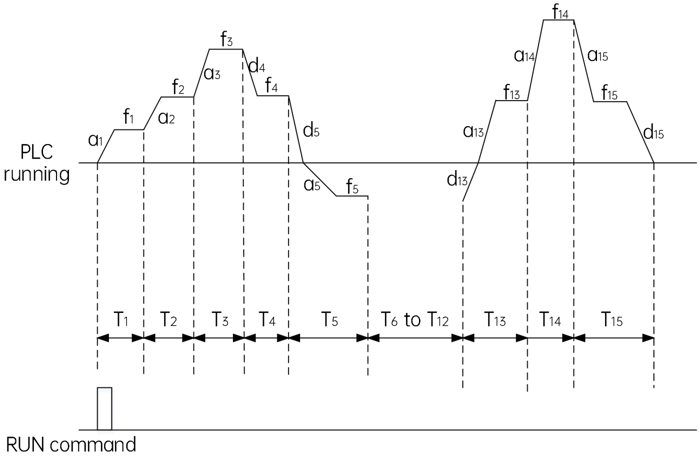


Figure 7-36 PLC stops after running for one cycle

1: Keep final values after running for one cycle

As shown in Figure 7-37, the drive completes one cycle and automatically retains the final running frequency and direction.

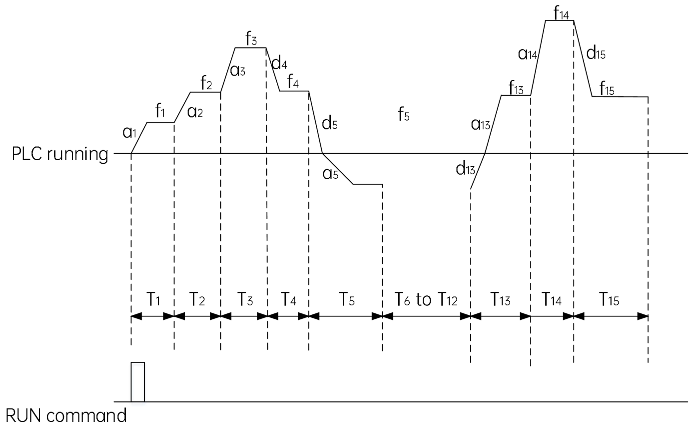


Figure 7-37 PLC retains final values after running for one cycle

2: Repeat after running for one cycle

As shown in Figure 7-38, the drive will start the next cycle automatically after running for one cycle, and it will not stop until a stop command is given.

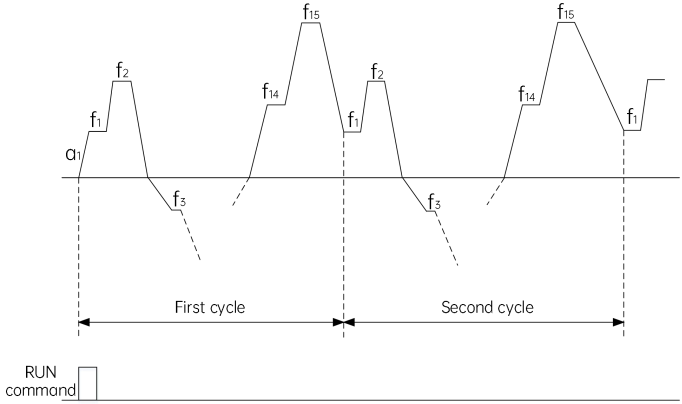


Figure 7-38 PLC repeats after running for one cycle

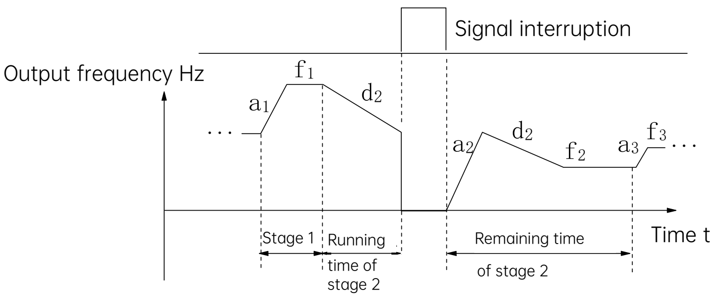
LED tens: Startup mode

0: Run from the first stage

If the drive is stopped (due to a stop command, fault or power failure), it will operate from the first stage after restart.

1: Continue to run from the retained stage and frequency upon a stop or fault

If the drive is stopped (due to a stop command or fault), the drive will automatically record the running time of the present stage and the running frequency at stop, and, after restart, continue to run from the remaining stage at the running frequency at the previous stop, as shown in Figure 7-39.



a_1: Acceleration time of stage 1
a_2: Acceleration time of stage 2
a_2: Acceleration time of stage 3
d_2: Deceleration time of stage 2
f_1: Frequency of stage 1
f_2: Frequency of stage 2
f_3: Frequency of stage 3

Figure 7-39 PLC startup mode 2

LED hundreds: Power failure retention

0: Not retain

Upon power failure, the PLC running status is not retained. The drive will run from the first stage after restart.

1: Retain the stage and frequency upon power failure

Upon power failure, the PLC running status, including the stage, running frequency, and running time, will be retained. After being powered on again, the drive will run in the mode (restart mode upon PLC operation interruption) set in the tens place.

LED thousands: Stage time unit

0: Second

The running time of each stage is counted by seconds.

1: Minute

The stage running time is counted by minutes.

This unit is valid only for the PLC running stage time (T1 to T15). The acceleration/deceleration time unit in PLC running is determined by P13.33 to P13.36.

WARNING

① If the running time of a certain stage of PLC is set to 0, this stage is invalid.

② Functions, including PLC process pause and memory status clear, can be controlled by terminals. Refer to the function definition of Group P09.

P13.01	Multi-speed reference 0	-100.0 to 100.0%	0.0
P13.02	Multi-speed reference 1	-100.0 to 100.0%	0.0
P13.03	Multi-speed reference 2	-100.0 to 100.0%	0.0
P13.04	Multi-speed reference 3	-100.0 to 100.0%	0.0
P13.05	Multi-speed reference 4	-100.0 to 100.0%	0.0
P13.06	Multi-speed reference 5	-100.0 to 100.0%	0.0
P13.07	Multi-speed reference 6	-100.0 to 100.0%	0.0
P13.08	Multi-speed reference 7	-100.0 to 100.0%	0.0
P13.09	Multi-speed reference 8	-100.0 to 100.0%	0.0
P13.10	Multi-speed reference 9	-100.0 to 100.0%	0.0
P13.11	Multi-speed reference 10	-100.0 to 100.0%	0.0
P13.12	Multi-speed reference 11	-100.0 to 100.0%	0.0
P13.13	Multi-speed reference 12	-100.0 to 100.0%	0.0
P13.14	Multi-speed reference 13	-100.0 to 100.0%	0.0

P13.15	Multi-speed reference 14	-100.0 to 100.0%	0.0
P13.16	Multi-speed reference 15	-100.0 to 100.0%	0.0
P13.17	Multi-speed reference 0 running time	0.0 to 6553.5 s	0.0 s
P13.18	Multi-speed reference 1 running time	0.0 to 6553.5 s	0.0 s
P13.19	Multi-speed reference 2 running time	0.0 to 6553.5 s	0.0 s
P13.20	Multi-speed reference 3 running time	0.0 to 6553.5 s	0.0 s
P13.21	Multi-speed reference 4 running time	0.0 to 6553.5 s	0.0 s
P13.22	Multi-speed reference 5 running time	0.0 to 6553.5 s	0.0 s
P13.23	Multi-speed reference 6 running time	0.0 to 6553.5 s	0.0 s
P13.24	Multi-speed reference 7 running time	0.0 to 6553.5 s	0.0 s
P13.25	Multi-speed reference 8 running time	0.0 to 6553.5 s	0.0 s
P13.26	Multi-speed reference 9 running time	0.0 to 6553.5 s	0.0 s
P13.27	Multi-speed reference 10 running time	0.0 to 6553.5 s	0.0 s
P13.28	Multi-speed reference 11 running time	0.0 to 6553.5 s	0.0 s
P13.29	Multi-speed reference 12 running time	0.0 to 6553.5 s	0.0 s
P13.30	Multi-speed reference 13 running time	0.0 to 6553.5 s	0.0 s
P13.31	Multi-speed reference 14 running time	0.0 to 6553.5 s	0.0 s
P13.32	Multi-speed reference 15 running time	0.0 to 6553.5 s	0.0 s

The frequency reference of stage 0 to stage 15 ranges from -100.0 to 100.0%; the 100% value of the frequency reference corresponds to the maximum output frequency P02.10.

When the simple PLC running is selected, it is required to set the running frequency and running time of each stage via the function codes P13.01 to P13.32.

The running time of stage 0 to stage 15 ranges from 0.0 to 6553.5 s (min); the time unit is determined by P13.00.

P13.33	Acceleration/Deceleration time of simple PLC reference 0 to 3	0 to 0x3333	0x0000

The acceleration/deceleration time selection from stage 0 to stage 3 of the simple PLC is shown in the following figure.

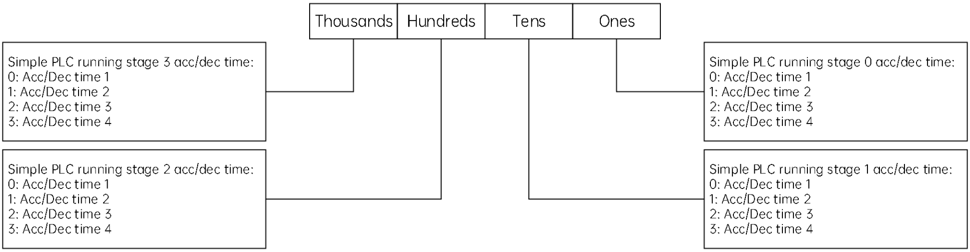


Figure 7-40 Acceleration/Deceleration time selection of simple PLC stage 0 to 3

P13.34	Acceleration/Deceleration time of simple PLC reference 4 to 7	0 to 0x3333	0x0000

The acceleration/deceleration time selection from stage 4 to stage 7 of the simple PLC is shown in the following figure.

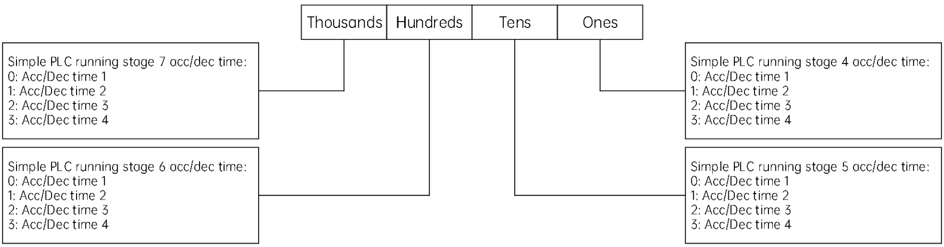


Figure 7-41 Acceleration/Deceleration time selection of simple PLC stage 4 to 7

P13.35	Acceleration/Deceleration time of simple PLC reference 8 to 11	0 to 0x3333	0x0000

The acceleration/deceleration time selection from stage 8 to stage 11 of the simple PLC is shown in the following figure.

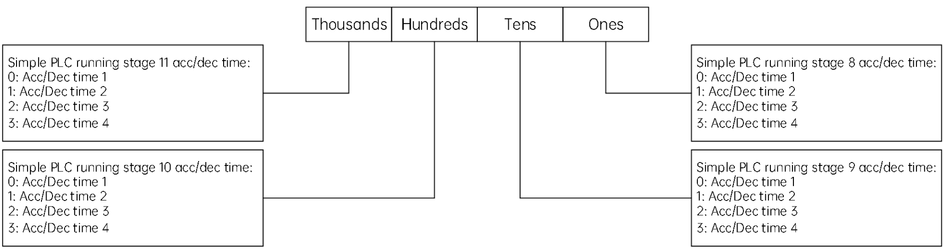


Figure 7-42 Acceleration/Deceleration time selection of simple PLC stage 8 to 11

P13.36	Acceleration/Deceleration time of simple PLC reference 12 to 15	0 to 0x3333	0x0000

The acceleration/deceleration time selection from stage 12 to stage 15 of the simple PLC is shown in the following figure.

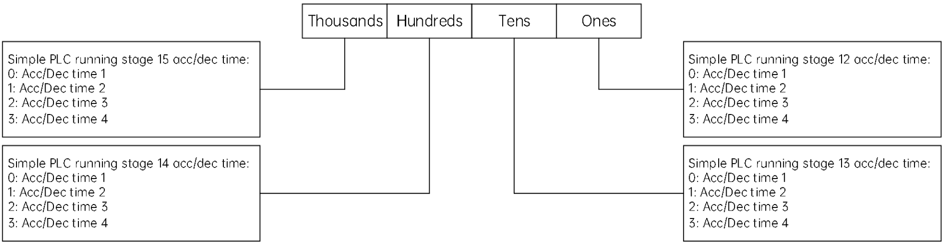


Figure 7-43 Acceleration/Deceleration time selection of simple PLC stage 12 to 15

WARNING

When the running direction of the PLC stage is determined by the running command, the motor running direction can be changed in real time by the external direction command. For example, the user can employ the DI terminal to switch between the forward and reverse running. The running direction is the direction determined by the running command; if the direction cannot be determined, the direction of the last stage shall prevail.

7.15 P14: Process PID parameters

The PID closed-loop control adopts the combination of proportional control (P), integral control (I), and derivative control (D) to make the feedback value consistent with the target value.

Proportional control (P)

It defines the adjustment intensity in proportion to the deviation. Solely using P control can not eliminate the steady-state error.

Integral control (I)

It defines the adjustment intensity in proportion to the deviation integral value, which can eliminate the steady-state error but cannot control sharp changes.

Derivative control (D)

It defines the adjustment intensity in proportion to the deviation change rate, which can predict the tendency of deviation, quickly respond to sharp changes, and improve the dynamic performance. However, it is vulnerable to interference, so use D control only when necessary. The PID control diagram is shown in Figure 7-44.

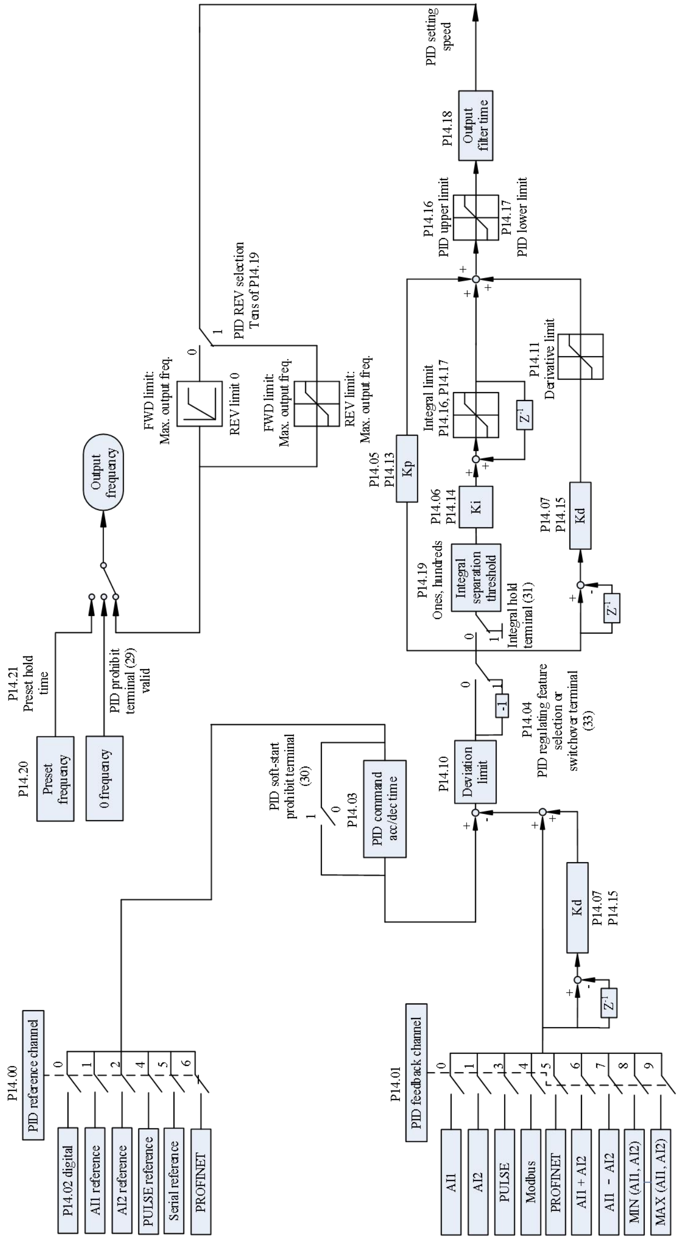


Figure 7-44 PID control diagram

P14.00	PID reference source	0 to 7	0

0: P14.02 digital setting

1: AI1

2: AI2

3: Reserved

4: HDI

5: Modbus/Modbus TCP setting

6: EtherCAT/Profinet/CANopen/Ethernet IP setting

7: Air compressor pressure reference

P14.01	PID feedback source	0 to 10	0

0: AI1

1: AI2

2: Reserved

3: HDI

4: Modbus/Modbus TCP setting

5: EtherCAT/Profinet/CANopen/Ethernet IP setting

6: AI1 + AI2

7: AI1 - AI2

8: MIN (AI1, AI2)

9: MAX (AI1, AI2)

10: Air compressor pressure feedback

P14.02	PID digital setting value	-100.0% to 100.0%	50.0%

It can be set via the operating panel or the serial port.

P14.03	Acceleration/Deceleration time of PID reference	0 to 3600.0	0.0 s

The PID acceleration/deceleration command is the soft start function that increases or decreases the PID target value by the acceleration/deceleration time reference

The set time refers to the required time for increasing from 0.0% reference to 100.0% reference, or the time for decreasing from 100.0% reference to 0.0% reference.

P14.04	PID regulating feature selection	0 to 1	0

0: Positive action, selected when the motor speed needs to be increased upon the increased reference;

1: Negative action, selected when the motor speed needs to be decreased upon the increased reference.

P14.05	Proportional gain Kp1	0.0 to 1000.0	20.0

A larger Kp indicates quicker response, but an excessively large Kp may easily cause oscillation. The steady-state error can not be eliminated by using Kp control only.

P14.06	Integral time Ti1	0.01 to 10.00	2.00 s

Ti1 is used to eliminate the steady-state error, so the feedback value would be kept consistent with the target value. An excessively small Ti1 may cause overshoot and oscillation.

P14.07	Derivative time Td1	0.000 to 10.000	0.000 s

Td1 is used to improve the response of the system, but an excessively small value may cause oscillation

P14.08	Derivative limit	0.00 to 100.00%	0.10%

It is used to limit the output of derivative regulating intensity.

When the PID output is used as the frequency reference, the maximum output frequency is 100%.

P14.09	Sampling cycle	0.01 to 10.00	0.01 s

The sampling cycle is for the sampling of feedback values, which also serves as the PID control cycle. The PID regulator calculates once for each sampling cycle. The longer the sampling cycle is, the slower the response will be.

P14.10	Deviation limit	0.0 to 100.0%	0.0%

When the deviation of the feedback value from the reference value, represented as a percentage relative to the reference value, falls less than this deviation limit value, the PID will stop adjusting and the output remains unchanged. This function can avoid frequent actions of PID control, as shown in Figure 7-45.

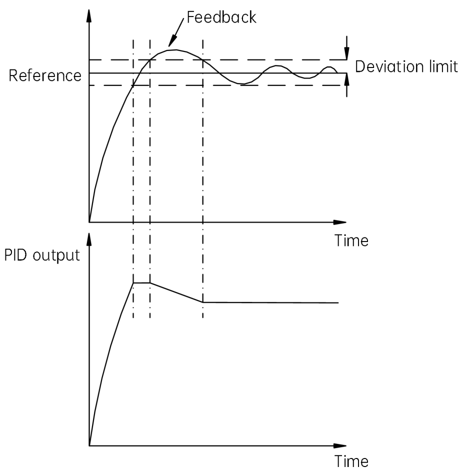


Figure 7-45 Deviation limit

P14.11	PID parameter low-frequency switchover point	0.00 Hz to P14.12	5.00 Hz

When the ramp frequency reference is lower than the low-frequency switchover point, the PID parameters include P14.05 to P14.07.

When it is higher than the high-frequency switchover point, the PID parameters include P14.13 to P14.15.

When it is between the low-frequency and high-frequency switchover points, the PID parameter is the linear interpolation of the parameters of these two groups.

P14.12	PID parameter high-frequency switchover point	P14.11 to P02.10	10.00 Hz
P14.13	Proportional gain Kp2	0.0 to 1000.0	20.0
P14.14	Integral time Ti2	0.01 to 10.00	1.00 s
P14.15	Derivative time Td2	0.000 to 10.000	0.000 s

The definitions of Kp2, Ti2, and Td2 are the same as Kp1, Ti1, and Td1.

P14.16	PID upper limit digital setting	P14.17 to 100.0%	100.0%
P14.17	PID lower limit digital setting	-100.0% to P14.16	0.0%

The above function codes are used to limit the output of PID.

When the PID output is used as the frequency reference, the maximum output frequency is 100%.

P14.18	Output filter time	0.00 to 60.00	0.00 s

It defines the filter time for the output of the PID regulator. The longer the output filter time is, the slower the response will be.

P14.19	PID output property	0x000 to 0x111	0x100

It is used to set the PID output property, as shown in Figure 7-46.

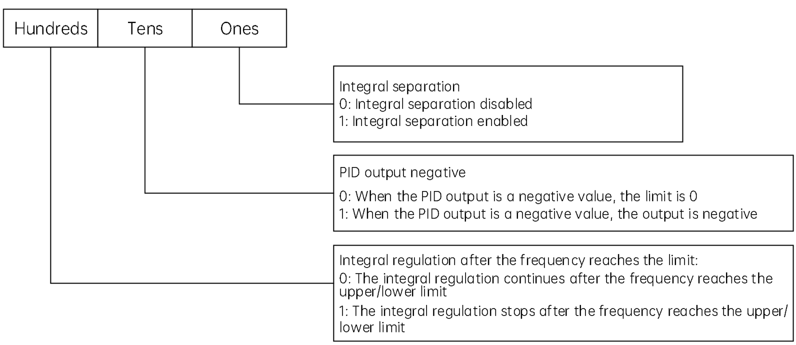


Figure 7-46 PID output property

P14.20	PID preset value	0.0 to 100.0%	0.0%
P14.21	PID preset value hold time	0.00 to 650.00	0.0 s

Proper PID preset value and its hold time enable the closed-loop adjustment to quickly enter a stable stage.

After the PID operation starts, the frequency will firstly accelerate to the PID preset value according to the acceleration time, and then run continuously at this frequency till the time defined by P14.21 is reached before it runs according to the PID adjustment output, as shown in Figure 7-47.

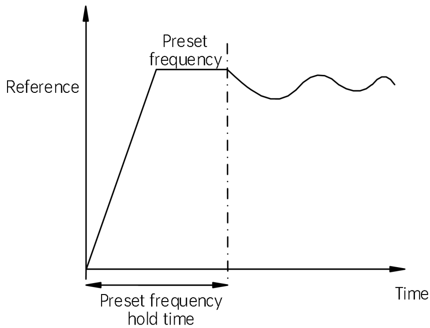


Figure 7-47 PID preset frequency running

P14.22	PID feedback loss detection threshold	0.0 to 100.0%	0.0%
P14.23	PID feedback loss detection time	0.0 to 20.0	1.0 s

When the feedback signal is smaller than the detection value set by P14.22 and its holding time exceeds the value set by P14.23, the PID feedback is considered as “loss.”

P14.24	PID calculation mode	0 to 1	0

PID calculation mode selection:

0: Calculation disabled at stop

1: Calculation enabled at stop

P14.25	PID upper/lower limit unit selection	0 to 1	0

0: Percentage

1: Hz

Note:

When Hz is chosen, P14.26 and P14.27 are the upper and lower PID limits. When Hz is chosen, the maximum frequency P02.10 cannot exceed 327.67 Hz.

P14.26	PID frequency upper limit	0 to P02.10	50.00 Hz
P14.27	PID frequency lower limit	-P02.10 to P14.26	0.00 Hz

7.16 P15: Communication parameters

P15.00	Communication format	0 to 0x31	0x30

Ones place:

0: Modbus protocol

1: Profinet to 485 protocol

Tens place:

0: 1-8-2-N format

1: 1-8-1-E format

2: 1-8-1-O format

3: 1-8-1-N format

P15.01	Baud rate	0 to 6	1

0: 4800 BPS

1: 9600 BPS

2: 19200 BPS

3: 38400 BPS

4: 57600 BPS

5: 115200 BPS

6: 125000 BPS

P15.02	Local address	0 to 247	1

This function code is used to identify the address of the drive.

Note:

The value 0 is the broadcast address. When set to the broadcast address, the drive can only receive and execute the broadcast command from the host device, and can not respond to the host device.

P15.03	Communication timeout detection time	0.0 to 60.0	0.0 s

If the serial port communication signal disappears for a time period exceeding the value of this function code, the drive is considered to be in a communication error state.

When the value is set to 0, the drive will not detect the serial port communication signal.

P15.04	Response delay of the local drive	0 to 200	5 ms

It refers to the delay time between the drive's receiving and executing of the host command and the returning of the response frame to the host. For the RTU mode, the response delay shall not be less than the transmission time of 3.5 characters.

P15.05	Communication action	0 to 0x11	0

Ones place:

0: Response to the write operation

1: No response to the write operation

Tens place: 485 mapping enable

0: Disable

1: Enable

Note:

Only control parameters starting with 0x64 are provided with the choices whether there is a response or not to the write operation. For writing function codes, only the choice with response is available.

P15.06	Reserved function 2 for user	0 to 65535	0

Function reserved.

7.17 P16: Keypad display setting parameters

P16.00	Selection 1 of parameters displayed in the running state	0 to 0xFFFF	0x4F0

Parameters P16.00 and P16.01 determine the parameters available for display in the running state via binary settings, as shown in Figure 7-48.

When a bit is set to 0, it indicates that the corresponding parameter is not displayed;

When a bit is set to 1, it indicates that the corresponding parameter is displayed.

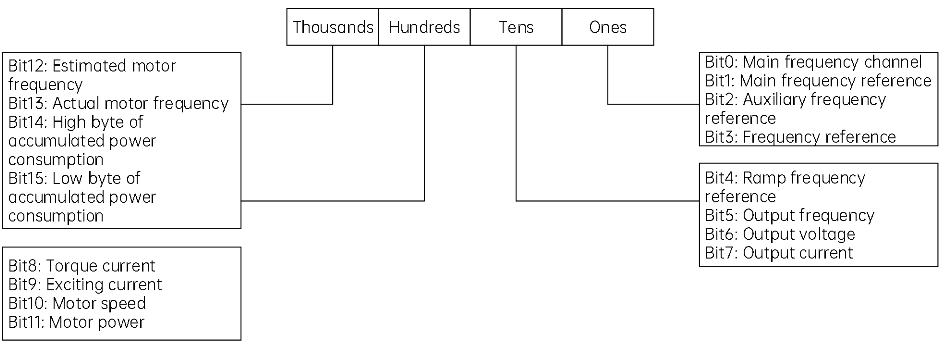


Figure 7-48 Selection 1 of parameters displayed in the running state

P16.01	Selection 2 of parameters displayed in the	0 to 0xFFFF	0x1

	running state		

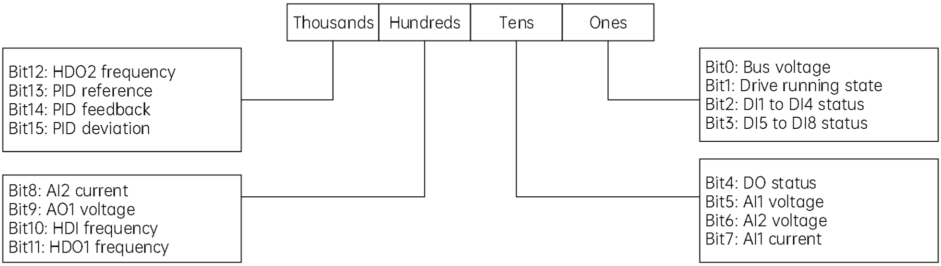


Figure 7-49 Selection 2 of parameters displayed in the running state

P16.02	Default selection of parameter for display in the running state	0 to 31	4

This parameter determines the default parameter number for display in the operating panel level-0 menu in the running state after power-on. Value 0 to 31 correspond respectively to the 32 parameters listed in the parameters P16.00 to P16.01.

WARNING

Press on the operating panel to switch the parameter on display. Modification can be saved to RAM only; EEPROM saving is denied.

P16.03	Selection of parameters displayed in the stop state	0 to 0xFFFF	0x3

0: No display

1: Display

This parameter determines whether each parameter on the operating panel level-0 menu list is displayed or not in the stop state. Each bit (bit0 to bit15) corresponds to one of the 16 parameters listed in P16.04.

Note:

When all bits are set to 0, the default parameter for display is frequency reference.

P16.04	Default selection of parameter for display in the stop state	0 to 15	0

This parameter determines the default parameter number for display in the operating panel level-0 menu in the stop state after power-on.

0: Frequency reference

1: Bus voltage

2: DI input state 1

3: DI input state 2

4: DO output state

5: AI1 input voltage

6: AI2 input voltage

7: AO1 output percentage

8: HDI frequency reference

9: HDO1 output value

10: HDO2 output value

11: Length

12: Simple PLC present step

13: Linear speed display

14: PID reference

15: Torque reference

WARNING

Press ⟫ on the operating panel to switch the parameter on display. Modification can be saved to RAM only; EEPROM saving is denied.

P16.05	Linear speed display coefficient	0.1 to 999.9%	100.0%

This parameter corrects the display errors on the linear speed scale, and does not impact the actual speed.

$$P01.42 = \text{Linear speed} \times P16.05$$

P16.06	Speed display coefficient	0.1 to 999.9%	100.0%

This parameter corrects the display errors on the rotating speed scale, and does not impact the actual speed.

$$\text{Mechanical speed} = 60 \times \text{Frequency display in the running state} \times P16.06 / \text{Number of motor pole pairs}$$

P16.07	Frequency display coefficient	0.0 to 100.0%	100.0%

$$P01.57 = P01.05 \times \text{Frequency display coefficient}$$

7.18 P18: Commissioning parameter group 1

P18.00	Control data 1 address	0 to 0xFFFF	0x1000

P18.01	Control data 1 value	0 to 65535	0
P18.02	Control data 2 address	0 to 0xFFFF	0x1002
P18.03	Control data 2 value	0 to 65535	0
P18.04	Control data 3 address	0 to 0xFFFF	0x1004
P18.05	Control data 3 value	0 to 65535	0
P18.06	Control data 4 address	0 to 0xFFFF	0x1006
P18.07	Control data 4 value	0 to 65535	0
P18.08	Function data 1 address	0 to 0xFFFF	0x1000
P18.09	Function data 1 value	0 to 65535	0
P18.10	Function data 2 address	0 to 0xFFFF	0x1002
P18.11	Function data 2 value	0 to 65535	0
P18.12	Function data 3 address	0 to 0xFFFF	0x1004
P18.13	Function data 3 value	0 to 65535	0
P18.14	Function data 4 address	0 to 0xFFFF	0x1006
P18.15	Function data 4 value	0 to 65535	0

7.19 P20: Motor 2 parameters

P20.00	Motor type	0 to 1	0

0: Asynchronous motor

1: Synchronous motor

P20.01	Asynchronous motor rated power	0.1 to 3000.0 kW	Depend on model
P20.02	Asynchronous motor rated voltage	0 to 1200 V	Depend on model
P20.03	Asynchronous motor rated current	0.8 to 6000.0 A	Depend on model
P20.04	Asynchronous motor rated frequency	0.01 Hz to P02.10	50.00 Hz
P20.05	Asynchronous motor	1 to 36000 rpm	Depend on model

	rated speed		
P20.06	Asynchronous motor stator resistance	0.001 to 65.535 Ω	Depend on model
P20.07	Asynchronous motor rotor resistance	0.001 to 65.535 Ω	Depend on model
P20.08	Asynchronous motor leakage inductance	0.01 mH to 655.35 mH (drive power ⩽ 55 kW) 0.001 mH to 65.535 mH (drive power > 55 kW)	Depend on model
P20.09	Asynchronous motor mutual inductance	0.1 mH to 6553.5 mH (drive power ⩽ 55 kW) 0.01 mH to 655.35 mH (drive power > 55 kW)	Depend on model
P20.10	Asynchronous motor no-load current	0.1 to 6553.5 A	Depend on model
P20.11	Asynchronous motor iron core magnetic saturation coefficient 1	0.0 to 100.0%	80.0%
P20.12	Asynchronous motor iron core magnetic saturation coefficient 2	0.0 to 100.0%	68.0%
P20.13	Asynchronous motor iron core magnetic saturation coefficient 3	0.0 to 100.0%	57.0%
P20.14	Asynchronous motor iron core magnetic saturation coefficient 4	0.0 to 100.0%	40.0%
P20.15	Synchronous motor rated power	0.1 to 3000.0 kW	Depend on model
P20.16	Synchronous motor rated voltage	0 to 1200 V	Depend on model
P20.17	Synchronous motor rated current	0.8 to 6553.5 A	Depend on model
P20.18	Synchronous motor rated frequency	0.01 Hz to P02.10	Depend on model

P20.19	Number of synchronous motor pole pairs	1 to 128	2
P20.20	Synchronous motor stator resistance	0.001 to 65.535 Ω (drive power ≤ 55 kW) 0.0001 to 6.5535 Ω (drive power > 55 kW)	Depend on model
P20.21	Synchronous motor D-axis inductance	0.01 to 655.35 mH (drive power ≤ 55 kW) 0.001 to 65.535 mH (drive power > 55 kW)	Depend on model
P20.22	Synchronous motor Q-axis inductance	0.01 to 655.35 mH (drive power ≤ 55 kW) 0.001 to 65.535 mH (drive power > 55 kW)	Depend on model
P20.23	Synchronous motor back EMF	0.0 to 6553.5 V	Depend on model
P20.24 to P20.26	Reserved		
P20.27	Motor auto-tuning	0 to 2	0
P20.28	Motor overload protection coefficient	0.0 to 300.0%	100.0%
P20.29	Reserved		

For the parameter description of this parameter group, refer to "7.4 P03: Motor 1 parameters."

7.20 P21: Motor 2 encoder parameters

P21.00	Encoder PPR	1 to 65535	1024
P21.01	Encoder type	0	0

0: ABZ incremental encoder

P21.02	A/B phase sequence of the ABZ incremental encoder	0 to 1	0

0: FWD

1: REV

Note:

The phase sequence will be automatically identified after the auto-tuning in the rotating state.

P21.03	Speed feedback PG disconnection detection time	0.0 to 10.0 s	0.0 s

It is used to set the PG disconnection detection time. If the value is set to 0, it indicates that the detection is disabled.

P21.04	PG card voltage class selection	0 to 1	0

0: 5 V

1: 12 V

P21.05	Z signal enable	0 to 2	0

0: Disable

1: Correction mode 1 (rotary auto-tuning is required)

2: Correction mode 2 (rotary auto-tuning is not mandatory)

P21.06	Synchronous motor angle compensation	0.0 to 360.0	0.0
P21.07	Synchronous motor initial position	0.0 to 360.0	0.0
P21.08	Resolver angle correction enable	0 to 2	2

0: Disable

1: Enable the correction mode 1

2: Enable the correction mode 2

P21.09	Enable the maximum ratio between torque and current	0 to 1	1
P21.10	ABX synchronous closed-loop quick start mode	0 to 1	1

0: Disable

1: Enable

P21.11	Cyclic value of position identification	3400 to 65535	3400
P21.12	Frequency-division value of position identification	0 to 9	0
P21.13	PG card version number	0 to 65535	0
P21.14	PG card disconnection enable	0 to 1	1

0: Disconnection fault invalid

1: Disconnection fault enabled

P21.15	Initial position auto-tuning before synchronous motor running	0x00 to 0x21	0

Ones place: In open-loop mode

0: No auto-tuning

1: Auto-tuning before first running upon power-on

2: Auto-tuning before each running

Tens place: In ABZ encoder closed-loop mode

0: Auto-tuning before first running upon power-on

1: Auto-tuning before each running

For the parameter description of this parameter group, refer to "7.5 P04: Motor 1 encoder parameters".

7.21 P22: Motor 2 vector control parameters

P22.00	Speed loop proportional gain 1	1 to 100	10
P22.01	Speed loop integral time 1	0.01 to 10.00	0.50 s
P22.02	Switchover frequency 1	0.00 Hz to P02.11	5.00 Hz
P22.03	Speed loop proportional gain 2	1 to 100	10
P22.04	Speed loop integral time 2	0.01 to 10.00	1.00 s
P22.05	Switchover frequency 2	0.00 Hz to P02.11	10.00 Hz
P22.06	Slip compensation coefficient	50 to 200%	100%
P22.07	Speed loop filter time constant	0.00 to 20.00	0.02 s
P22.08	Vector control over-excitation gain	50 to 200%	100%
P22.09	Drive torque upper limit source	0 to 7	0
P22.10	Drive torque upper limit digital setting	0.0 to 300.0%	150.0%
P22.11	Braking torque upper limit source	0 to 7	0
P22.12	Braking torque upper limit digital setting	0.0 to 300.0%	150.0%
P22.13	Excitation regulation Kp	0 to 60000	2000
P22.14	Excitation regulation Ki	0 to 60000	1300
P22.15	Torque regulation Kp	0 to 60000	2000
P22.16	Torque regulation Ki	0 to 60000	1300

P22.17	Synchronous motor field weakening mode	0 to 1	0
P22.18	Synchronous motor field weakening coefficient	0 to 110	5
P22.19	Maximum field weakening current	0.0 to 120.0%	100.0%
P22.20	Field weakening auto-tuning coefficient	0.0 to 120.0%	100.0%
P22.21	Field weakening integral multiple	0.000 to 1.200	1.000

For the parameter description of this parameter group, refer to "7.6 P05: Motor 1 vector control parameters".

7.22 P23: Motor 2 torque control parameters

P23.00	Torque control enable	0 to 1	0

0: Disabled

1: Enabled

P23.01	Torque reference channel	0 to 5	0

0: Digital setting

1: AI1

2: AI2

3: HDI

4: Modbus

5: PROFINET

P23.02	Torque digital setting	-300.0% to 300.0%	0.0%

The digital setting range of the torque reference is -300.0% to 300.0%.

P23.03	Torque reference acceleration/deceleration time	0.0 to 6000.0	6.0 s

It is used to set the torque acceleration/deceleration time under torque control. It is invalid under speed control.

It determines the time the system takes to reach the torque reference from the present torque.

P23.04	FWD speed limit channel	0 to 5	0
P23.05	FWD speed limit digital setting	0.00 Hz to P02.11	0.00 Hz
P23.06	REV speed limit channel	0 to 5	0

P23.07	REV speed limit digital setting	0.00 Hz to P02.11	0.00 Hz

FWD and REV speed limit channel:

0: Digital setting

1: AI1

2: AI2

3: HDI

4: Modbus

5: PROFINET

P23.08 to P23.11	Reserved		

For the parameter description of this parameter group, refer to "7.7 P06: Motor 1 torque control parameters".

7.23 P24: Motor 2 V/F control parameters

P24.00	V/F curve setting	0 to 5	0

0: Straight-line V/F

1: Multi-point V/F

2: Square V/F

3: Reserved

4: V/F complete separation

5: V/F half separation

P24.01	Torque boost	0.0 to 50.0	0.0
P24.02	Cut-off frequency of torque boost	0.00 Hz to P02.11	10.00 Hz

P24.03	Multi-point V/F frequency 1	0.00 Hz to P24.05	0.00 Hz
P24.04	Multi-point V/F voltage 1	0 V to P24.06	0 V
P24.05	Multi-point V/F frequency 2	P24.03 to P24.07	0.00 Hz
P24.06	Multi-point V/F voltage 2	P24.04 to P24.08	0 V
P24.07	Multi-point V/F frequency 3	P24.05 to 599.00	0.00 Hz
P24.08	Multi-point V/F voltage 3	P24.06 to 380	0 V

P24.09	Slip compensation coefficient	0 to 300	150
P24.10	V/F over-excitation gain	0.0 to 100.0	0.0
P24.11	Oscillation suppression gain	0 to 100	10
P24.12	Oscillation suppression gain mode	0 to 2	0
P24.13	Voltage source for V/F separation	0 to 9	0

0: Digital setting

1: AI1

2: AI2

3: Reserved

4: HDI

5: Multi-reference

6: Simple PLC

7: PID

8: Modbus

9: PROFINET

P24.14	Digital setting of voltage source for V/F separation	0 to 1000	0 V
P24.15	Voltage rise time of V/F separation	0.0 to 6000.0	5.0 s
P24.16	Voltage fall time of V/F separation	0.0 to 6000.0	5.0 s
P24.17	Stop mode for V/F separation	0 to 1	0

0: Frequency and voltage decline to 0 independently

1: Frequency declines after voltage declines to 0

P24.18	V/F slip compensation gain	0.0 to 00.0	0.0
P24.19	Reserved	-	-

For the parameter description of this parameter group, refer to "7.8 P07: Motor 1 V/F control parameters."

7.24 P26: Commissioning parameter group 2

P26.00	Commissioning parameter 1	0 to 65535	5
P26.01	Commissioning parameter 2	0 to 65535	1

P26.02	Commissioning parameter 3	0 to 65535	10
P26.03	Commissioning parameter 4	0 to 65535	70
P26.04	Commissioning parameter 5	0 to 65535	300
P26.05	Commissioning parameter 6	0 to 65535	0
P26.06	Commissioning parameter 7	0 to 65535	0
P26.07	Commissioning parameter 8	0 to 65535	0
P26.08	Commissioning parameter 9	0 to 65535	0
P26.09	Commissioning parameter 10	0 to 65535	0
P26.10	Commissioning parameter 11	0 to 65535	0
P26.11	Commissioning parameter 12	0 to 65535	0
P26.12	Commissioning parameter 13	0 to 65535	0
P26.13	Commissioning parameter 14	0 to 65535	0
P26.14	Commissioning parameter 15	0 to 65535	0
P26.15	Commissioning parameter 16	0 to 65535	0
P26.16	Commissioning parameter 17	0 to 65535	0
P26.17	Commissioning parameter 18	0 to 65535	0
P26.18	Commissioning parameter 19	0 to 65535	0
P26.19	Commissioning parameter 20	0 to 65535	0
P26.20	Commissioning parameter 21	0 to 65535	0
P26.21	Commissioning parameter 22	0 to 65535	0
P26.22	Commissioning parameter 23	0 to 65535	0
P26.23	Commissioning parameter 24	0 to 65535	0
P26.24	Commissioning parameter 25	0 to 65535	0
P26.25	Commissioning parameter 26	0 to 65535	0
P26.26	Commissioning parameter 27	0 to 65535	0
P26.27	Commissioning parameter 28	0 to 65535	0
P26.28	Commissioning parameter 29	0 to 65535	0
P26.29	Commissioning parameter 30	0 to 65535	0

7.25 P29: Special function parameter group 1

P29.00	Lockup time	0 to 65535 h	0
P29.01	Lockup mode	0 to 1	0
P29.02	Lockup status	0 to 2	0
P29.03	Running time remainder	0 to 65535 h	0
P29.04	Random seed	0 to 65535	0
P29.05	Secret key	0 to 65535	0
P29.06	Accumulated running time when lockup is enabled	0 to 65535 h	0
P29.07	Parameter selection for display in auxiliary display zone	0x1 to 0xFFFF	0x1
P29.08	Default selection of parameter for display in auxiliary display zone	0 to 15	0
P29.09 to P29.39	Reserved		

7.26 P40: Bus option parameters.

P40.01	Identification time for options	0.0 to 10.0	0.0 s
P40.02	IP address 1	0 to 255	192
P40.03	IP address 2	0 to 255	168
P40.04	IP address 3	0 to 255	1
P40.05	IP address 4	0 to 255	10
P40.06	Subnet mask 1	0 to 255	255
P40.07	Subnet mask 2	0 to 255	255
P40.08	Subnet mask 3	0 to 255	255
P40.09	Subnet mask 4	0 to 255	0
P40.10	Gateway 1	0 to 255	192
P40.11	Gateway 2	0 to 255	168

P40.12	Gateway 3	0 to 255	1
P40.13	Gateway 4	0 to 255	1
P40.14	MAC address 1	0 to 255	0
P40.15	MAC address 2	0 to 255	0
P40.16	MAC address 3	0 to 255	0
P40.17	MAC address 4	0 to 255	0
P40.18	MAC address 5	0 to 255	0
P40.19	MAC address 6	0 to 255	0
P40.20	CANopen communication station number	1 to 127	1
P40.21	CANopen communication baud rate	0 to 8	2
P40.22 to P40.33	Reserved	-	-

0: 1 Mbit/s

1: 800 kbit/s

2: 500 kbit/s

3: 250 kbit/s

4: 125 kbit/s

5: 100 kbit/s

6: 50 kbit/s

7: 20 kbit/s

8: 10 kbit/s

Modification takes effect only after re-power on.

7.27 P41: I/O option parameters

P41.13	Relay RO2 output selection	0 to 47	23

For the parameter description of this parameter group, refer to 7.11 (P10.00 to P10.03).

P41.15	Output terminal polarity selection	0 to 0x1	0

Ones place:

0: RO2 positive logic active

1: RO2 negative logic active

Tens place: Reserved

Hundreds place: Reserved

Thousands place: Reserved

P41.16	Relay RO2 switch-on delay time	0.0 to 600.0 s	0.0 s
P41.17	Relay RO2 switch-off delay time	0.0 to 600.0 s	0.0 s

For the parameter description of this parameter group, refer to 7.11 (P10.11 and P10.12).

7.28 P47: Air compressor dedicated parameters

P47.00	Air compressor mode enable	0 to 1	1
P47.01	Pressure sensor channel	0 to 1	0
P47.02	Pressure sensor upper limit	0.00 to 20.00 MPa	1.60 MPa
P47.03	Loading mode	0 to 1	0
P47.04	Loading pressure	0.00 to P47.02	0.60 MPa
P47.05	Unloading pressure	0.00 to P47.02	0.80 MPa
P47.06	Pressure reference	0.00 to P47.02	0.70 MPa
P47.07	Loading delay time	0 to 3600	10 s
P47.08	Loading running frequency lower limit	P47.09 to P02.10	100.0 Hz
P47.09	No-load running frequency	P08.07 to P47.08	90.00 Hz
P47.10	No-load delay time	0 to 3600 s	60 s
P47.11	Stop delay time	0 to 3600 s	10 s
P47.12	Restart delay time	0 to 3600 s	30 s
P47.13	Hibernation function selection	0 to 1	1
P47.14	Temperature sensor channel	0 to 1	0
P47.15	PT1 correction low-point sampling value	0 to 4095	845
P47.16	PT1 correction middle-point sampling value	0 to 4095	1960
P47.17	PT1 correction high-point sampling value	0 to 4095	2662
P47.18	PT2 correction low-point sampling value	0 to 4095	845
P47.18	PT2 correction middle-point sampling	0 to 4095	1960

	value		
P47.18	PT2 correction high-point sampling value	0 to 4095	2662
P47.21	Fan action temperature	-30 to 170℃	85℃
P47.22	Fan stop temperature	-30 to 170℃	75℃
P47.23	Pre-alarm pressure threshold	0.00 to P47.24	0.90 MPa
P47.24	Alarm pressure threshold	P47.23 to P47.02	1.00 MPa
P47.25	Pre-alarm temperature threshold	-20 to P47.26	105℃
P47.26	Alarm temperature threshold	P47.25 to 170℃	110℃
P47.27	Low-temperature protection threshold	-30 to P47.25	-10℃
P47.28	Auxiliary temperature protection enable	0 to 1	0
P47.29	Auxiliary temperature pre-alarm value	-30 to P47.30	105℃
P47.30	Auxiliary temperature alarm value	P47.29 to 170℃	110℃
P47.34	Fan control mode	0 to 1	0
P47.35	Pressure for frequency upper limit decrease	0.00 to P47.06	0.05 MPa
P47.36	Frequency upper limit decrease ratio	0.0 to 5.0%	2.0%
P47.37	Automatic frequency decrease threshold	0 to 120%	120%
P47.38	Power correction coefficient	0 to 200%	100%
P47.39	Maintenance timeout	0 to 8000	0 h
P47.40	Maintenance count mode	0 to 1	0
P47.41	Fan protection selection	0 to 0x11	0x11
P47.42	Fan rated current	0.0 to 40.0 A	0.0 A
P47.43	Fan current transformation ratio	1.0 to 4000.0	1000.0
P47.44	Current unbalance ratio	1.00 to 3.00	1.60
P47.45	Fan phase A current correction coefficient	0.0 to 150.0%	100.0%
P47.46	Fan phase B current correction coefficient	0.0 to 150.0%	100.0%
P47.47	Fan phase C current correction coefficient	0.0 to 150.0%	100.0%
P47.48 to 59	Reserved		

7.29 P48: Air compressor status check parameters

P48.00	Maintenance time for Part 1	0 to 65535	500 h
P48.01	Maintenance time for Part 2	0 to 65535	500 h
P48.02	Maintenance time for Part 3	0 to 65535	500 h
P48.03	Maintenance time for Part 4	0 to 65535	500 h
P48.04	Maintenance time for Part 5	0 to 65535	500 h
P48.05	Part 1 use time	0 to 65535	0 h
P48.06	Part 2 use time	0 to 65535	0 h
P48.07	Part 3 use time	0 to 65535	0 h
P48.08	Part 4 use time	0 to 65535	0 h
P48.09	Part 5 use time	0 to 65535	0 h
P48.10	Present pressure	0.00 to 20.00	0.00 MPa
P48.11	Present temperature	-30 to 170	0℃
P48.13	Present auxiliary temperature	-30 to 170℃	0℃
P48.14	Actual output power of the motor	0.0 to 6553.5	0 kW
P48.15	Signal status 1	0 to 0xFFFF	0
P48.16	Signal status 2	0 to 0xFFFF	0
P48.17	System state	0 to 8	0
P48.18	Accumulated running time of the device	0 to 65535	0
P48.19	Accumulated loading running time	0 to 65535	0
P48.20	Restart count down	0 to 3600	0
P48.22	Fan phase A current display	0.0 to 40.0 A	0.0 A
P48.23	Fan phase B current display	0.0 to 40.0 A	0.0 A
P48.24	Fan phase C current display	0.0 to 40.0 A	0.0 A
P48.25	Fan phase A current sampling zero drift	0 to 4095	0
P48.26	Fan phase B current sampling zero drift	0 to 4095	0
P48.28	Fan output current	0.0 to 40.0 A	0.0 A
P48.29	Fan state	0 to 0x1	0

P48.30	AD value of PT1	0 to 4095	0
P48.31	AD value of PT2	0 to 4095	0
P48.32 to 59	Reserved		

7.30 P50: Option status check parameters

P50.00	Option 1 type	0 to 3	0

0: No option

1 to 2: Reserved

3: I/O option

P50.01	Option 2 type	0 to 3	0

0: No option

1 to 2: Reserved

3: I/O option

P50.02	Reserved		
P50.03	Reserved		
P50.04	DO status of the I/O option	0 to 0x1	0

0: Disabled

1: Enabled

P50.05	Option card 1 software version	0.00 to 99.99	0.0
P50.06	Option card 2 software version	0.00 to 99.99	0.0

P50.07 to P50.014	Reserved		

7.31 P97: Fault and protection parameters

P97.00	Fault enable	0 to 0x1111	0x1111

Ones place:

0: Pulse-by-pulse current limit protection disabled

1: Pulse-by-pulse current limit protection enabled

Tens place:

0: Hardware input phase loss detection fault disabled (for models of 18.5 kW and above)

1: Hardware input phase loss detection fault enabled (for models of 18.5 kW and above)

Hundreds place:

0: Overload pre-alarm disabled

1: Overload pre-alarm enabled

Thousands place:

0: Braking overcurrent disabled

1: Braking overcurrent enabled

P97.01	Stall protection enable	0 to 0x1121	0x1101

Ones place:

0: Overvoltage stall protection disabled

1: Overvoltage stall protection enabled

Tens place:

0: Undervoltage stall protection disabled

1: Undervoltage stall protection enabled

2: Undervoltage stop

Hundreds place:

0: Overcurrent stall protection disabled

1: Overcurrent stall protection enabled

Thousands place:

0: Input phase sequence disabled

1: Input phase sequence enabled

P97.02	Current limit level	20 to 200%	150%
P97.03	Current limit adjustment coefficient	0 to 100	20

The current limit function restricts the load current in real time within the limit set by P97.02 to avoid tripping caused by current overshoot. This function is especially useful for scenarios with large inertia or drastic change.

The current limit level (P97.02) defines the current threshold for the auto current limiting. Its range is a percentage relative to the drive's rated current.

The current limit adjustment coefficient (P97.03) defines the adjustment rate of the output frequency upon the auto current limiting.

If the frequency decrease rate (adjustment coefficient P97.03) upon the current limiting is too small, it is difficult to get out of the current limiting state, causing overload fault. If the frequency decrease rate is too large, the adjustment will be overly intensified, with the drive staying in the power generation state for overlong time, leading to overload protection.

The current limiting action may cause change to the output frequency. Thus, it is not recommended to use this function in applications requiring stable frequency output in constant-speed running.

When the auto current limit function is enabled, the current would be limited to a low level, which may affect the drive's overload capacity.

P97.04	Overvoltage stall protection action voltage	600 to 750 V	720 V

During the drive deceleration, due to the influence of load inertia, the actual decrease rate of the motor speed may be lower than the decrease rate of the output frequency. When this happens, the motor will return the energy to the drive, resulting in the increase of the DC bus voltage of the drive. If no measures are taken, there will be an overvoltage trip.

The function of overvoltage stall protection enables the detection of the bus voltage during the deceleration of the drive, and compares it with the overvoltage stall point defined by P97.04. If the overvoltage stall point is exceeded, the output frequency of the drive stops decreasing. When the detected bus voltage falls lower than the overvoltage stall point again, the drive restarts the deceleration, as shown in Figure 7-50.

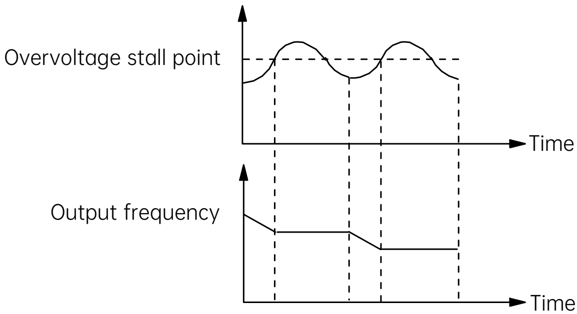


Figure 7-50 Overvoltage stall

P97.05	Voltage regulator proportional coefficient for overvoltage stall protection	0 to 1000	10
P97.06	Input phase sequence fault enable	0 to 1	1
P97.07	Speed regulator proportional coefficient for overvoltage stall protection	0 to 1000	60
P97.08	Reserved		

It is used to set the proportional coefficients for the bus voltage regulator and the speed regulator upon overvoltage stall.

P97.09	Voltage regulator proportional coefficient	0 to 1000	40

	for undervoltage stall protection		
P97.10	Voltage regulator integral coefficient for undervoltage stall protection	0 to 1000	20

It is used to set the proportional coefficient and integral coefficient for the bus voltage regulator upon undervoltage stall.

P97.11	Undervoltage stall protection action voltage	400 to 460 V	460 V

During undervoltage stall, when the bus voltage is lower than this value, the undervoltage stall protection will be triggered to lower the frequency and raise the voltage.

P97.12	Undervoltage stall recovery judgment time	0 to 100.0 s	2.0 s
P97.13	Undervoltage stall protection pause voltage	460 to 500 V	485 V

It is used to set the voltage point for undervoltage stall protection pause. When the bus voltage is greater than this value, the drive stops lowering the frequency after the delay time set by P97.12.

P97.14	Phase loss protection enable	0 to 0x1111	0x1101

It is used to select the input/output phase loss protection modes, as shown in Figure 7-51.

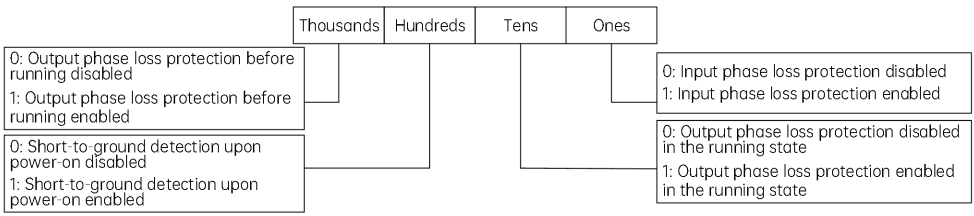


Figure 7-51 Input/output phase loss protection setting

P97.15	Fault protection and alarm property setting 1	0	0

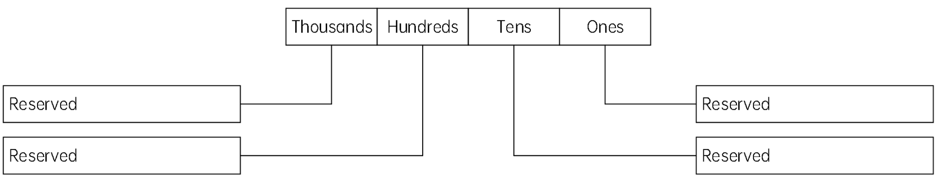


Figure 7-52 Fault protection and alarm property setting 1

P97.16	Fault protection and alarm property	0 to 0x2002	0

	setting 2		

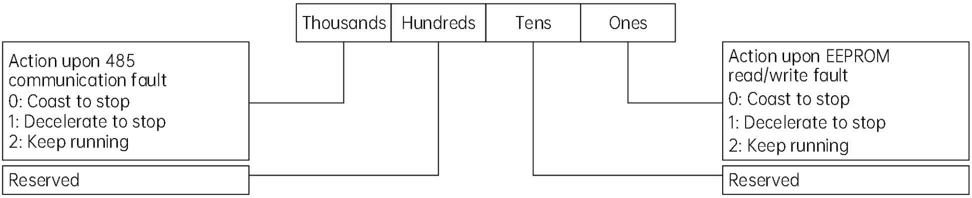


Figure 7-53 Fault protection and alarm property setting 2

P97.17	Fault protection and alarm property setting 3	0 to 0x222	0x0002

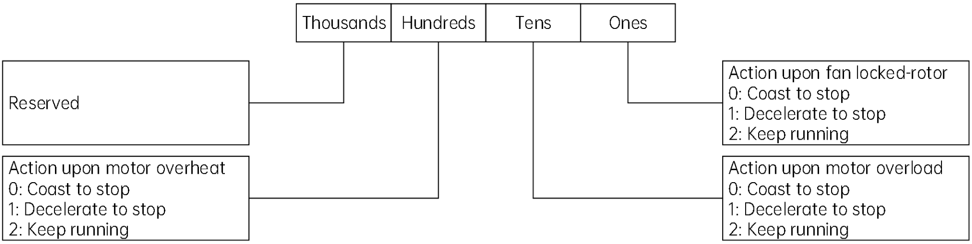


Figure 7-54 Fault protection and alarm property setting 3

P97.18	Fault protection and alarm property setting 4	0 to 0x20	0

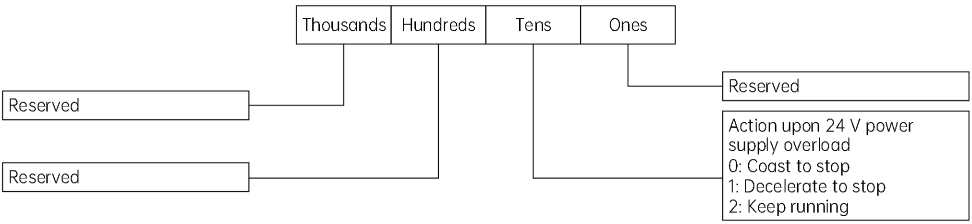


Figure 7-55 Fault protection and alarm property setting 4

P97.19	Fault protection and alarm property setting 5	0 to 0x222	0

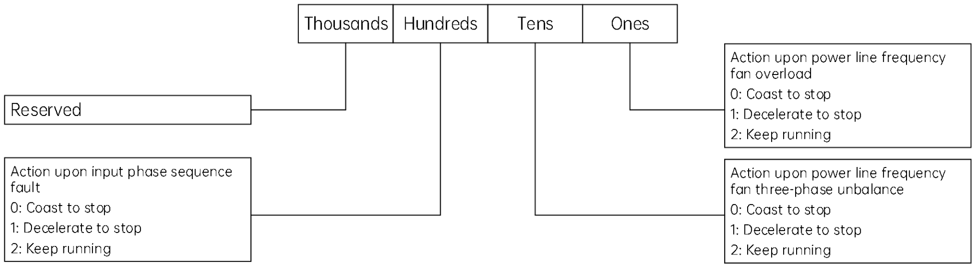


Figure 7-56 Fault protection and alarm property setting 5

P97.22	U phase fault	0 to 0x1111	0
P97.23	V phase fault	0 to 0x1111	0
P97.24	W phase fault	0 to 0x1111	0
P97.27	Detection value of excessive speed deviation	0.0 to 50.0%	0.0%
P97.28	Detection time of excessive speed deviation	0.0 to 10.0 s	1.0 s

It is used to set the detection method for excessive speed deviation (DEV).

When the speed deviation (difference between the speed reference and the actual motor speed) exceeds the value set by P97.27, and the hold time of such state exceeds the time set by P97.28, it is defined as excessive speed deviation. Set P97.27 based upon 100% of the maximum output frequency.

When it is set to 0.0 s, speed deviation protection is disabled.

P97.29	Automatic fault reset count	0 to 100	0

The automatic reset function can automatically reset faults during operation according to the preset number of attempts and the preset time of interval. The value of 0 means the auto reset function is disabled, and the fault protection shall be initiated immediately.

When there are faults, the drive starts to reset after the time interval defined by P97.31. After the automatic fault reset count P97.29 is reached, the reset can be started by the manual reset command only. If there is any manual reset command during the automatic reset, the automatic reset count will be cleared.

If the drive runs normally without faults for 600 s, the fault reset count will be cleared.

WARNING

① The inverter module protection (OUT), external device fault (EF), and the short-to-ground fault (GdF) cannot be reset (neither automatic nor manual reset); the undervoltage fault (Uv), board-level communication error (bCE), and power board software version mismatching (vEr) can be automatically reset immediately when the fault disappears; other faults can be manually reset or automatically reset according to the requirements;

② During the reset interval, the output is locked and the drive runs at zero frequency; after the automatic reset is completed, the drive will automatically start using speed tracking;

③ Implement the automatic fault reset function with caution. Otherwise, personal injury and property damage may occur.

P97.30	Fault relay action selection during automatic reset	0 to 1	0

0: Disabled

1: Enabled

P97.31	Automatic fault reset interval	2.0 to 600.0	5.0 s

P97.32	Present fault type	0 to 65	0
P97.33	Previous fault type	0 to 65	0
P97.34	Penultimate fault type	0 to 65	0

P97.35	Bus voltage upon the present fault	0.0 to 6553.5	0.0 V
P97.36	Actual current upon the present fault	0.0 to 999.9	0.0 A
P97.37	Running frequency upon the present fault	0.00 to 655.35	0.00 Hz
P97.38	AC drive operation state upon the present fault	0 to 0xFFFF	0
P97.39	Inverter bridge temperature upon the present fault	-40.0 to 150.0	0.0℃
P97.41	Input terminal status upon the present fault	0 to 0xFF	0
P97.42	Output terminal status upon the present fault	0 to 0xF	0
P97.43	Running time upon the present fault	0.0 to 6553.5	0.0 s
P97.44	Bus voltage upon the previous fault	0.0 to 6553.5	0.0 V
P97.45	Actual current upon the previous fault	0.0 to 999.9	0.0 A

P97.46	Running frequency upon the previous fault	0.00 to 655.35	0.00 Hz
P97.47	AC drive operation state upon the previous fault	0 to 0xFFFF	0
P97.48	Inverter bridge temperature upon the previous fault	0.0 to 150.0	0.0℃
P97.50	Input terminal status upon the previous fault	0 to 0xFF	0
P97.51	Output terminal status upon the previous fault	0 to 0xF	0
P97.52	Running time upon the previous fault	0.0 to 6553.5 min	0.0 min
P97.53	Bus voltage upon the penultimate fault	0.0 to 6553.5	0.0 V
P97.54	Actual current upon the penultimate fault	0.0 to 999.9	0.0 A
P97.55	Running frequency upon the penultimate fault	0.00 to 655.35	0.00 Hz
P97.56	AC drive operation state upon the penultimate fault	0 to 0xFFFF	0
P97.57	Inverter bridge temperature upon the penultimate fault	0.0 to 150.0	0.0℃
P97.58	Reserved		
P97.59	Input terminal status upon the penultimate fault	0 to 0xFF	0
P97.60	Output terminal status upon the penultimate fault	0 to 0xF	0
P97.61	Running time upon the penultimate fault	0.0 to 6553.5 min	0.0 min

MV810A records the types of the latest three faults (P97.32, P97.33, and P97.34), and records the bus voltage (P97.35), output current (P97.36), running frequency (P97.37), and operation state (P97.38) upon the present fault occurrence, which serve as the reference for users. For details about the operation state, see P01.17.

7.32 P98: Drive parameters

P98.00	Serial number	0 to 1000	0

P98.01	Software version number	0.00 to 99.99	0.00
P98.02	Performance software present version number	0.00 to 99.99	0.00
P98.03	Performance software burning version number	0.00 to 99.99	0.00
P98.04	Rated capacity	0 to 999.9 kW	Depend on model
P98.05	Rate voltage	0 to 999 V	Depend on model
P98.06	Rated current	0 to 999.9 A	Depend on model

The above parameters record the drive's basic information, and are read-only. Parameters (P98.04 to P98.06) are set by the manufacturer.

P98.07	Manufacturer's bar code 1	0 to 0xFFFF	0
P98.08	Manufacturer's bar code 2	0 to 0xFFFF	0
P98.09	Manufacturer's bar code 3	0 to 0xFFFF	0
P98.10	Manufacturer's bar code 4	0 to 0xFFFF	0
P98.11	Manufacturer's bar code 5	0 to 0xFFFF	0
P98.12	Manufacturer's bar code 6	0 to 0xFFFF	0

Chapter 8 Troubleshooting

8.1 Diagnosis and solution of faults on display

All possible fault types of MV810A are summarized in Table 8-1, as categorized into 35 fault codes. Before seeking for assistance, the user can perform the fault diagnosis according to this table and record the fault symptoms in details. This will help when contacting the distributor for technical support.

Table 8-1 Fault types and solutions

Fault code	Fault type	Possible cause	Solution
OC1	Overcurrent during acceleration	The acceleration time is too short.	Prolong the acceleration time.
		The motor parameters are incorrect.	Perform auto-tuning of motor parameters.
		When instantaneous stop happens, the rotating motor is restarted.	Set the startup mode P08.00 to "Startup after speed tracking."
		The drive power is too low.	Use a drive with higher power.
		The V/F curve is improper.	Adjust the V/F curve and the manual torque boost.
OC2	Overcurrent during deceleration	The deceleration time is too short.	Increase the deceleration time.
		There is potential energy load, or the load inertial torque is too large.	Add additional appropriate dynamic braking components.
		The drive power is too low.	Use a drive with higher power.
OC3	Overcurrent during operation at constant speed	The acceleration/deceleration time is set too short.	Increase the acceleration/deceleration time appropriately.
		Sudden load change or abnormal load	Check the load.
		Low grid voltage	Check the input power supply.
		The drive power is too low.	Use a drive with higher power.
OV1	Overvoltage during acceleration	Abnormal input voltage	Check the input power supply.
		The acceleration time is too short.	Increase the acceleration time appropriately.

Fault code	Fault type	Possible cause	Solution
		When instantaneous stop happens, the rotating motor is restarted.	Set the startup mode P08.00 to “Startup after speed tracking.”
OV2	Overvoltage during deceleration	The deceleration time is too short (compared with the regenerative energy).	Increase the deceleration time.
		There is potential energy load, or the load inertial torque is too large.	Select appropriate dynamic braking components.
OV3	Overvoltage during operation at constant speed	In vector control, the ASR parameters are not set properly.	Refer to the ASR parameter setting of Group P05.
		The acceleration/deceleration time is too short.	Increase the acceleration/deceleration time appropriately.
		Abnormal input voltage	Check the input power supply.
		Abnormal fluctuation of input voltage	Install an input reactor.
		Large load inertia	Adopt dynamic braking components.
Uv	Undervoltage fault	The bus voltage of the drive is too low (lower than 350 V DC).	Check the input power voltage; Check the bus voltage of the drive; Seek for technical support.
SPI	Input phase loss	There is phase loss in input R, S, or T.	Check the installation wiring; Check the input voltage.
SPO	Output phase loss	There is phase loss in output U, V, or W.	Check the output wiring; Check the motor and the cables.
drv	Power module protection	There is interphase short circuit or short-to-ground circuit in the three phases output.	Rewire and check the motor insulation.
		Instantaneous overcurrent of the drive.	Refer to the overcurrent solutions.
		The duct is blocked or the fan is damaged.	Unblock the duct or replace the fan.

Fault code	Fault type	Possible cause	Solution
		The ambient temperature is too high.	Lower the ambient temperature.
		Wires or plug-in units of the control board are loose.	Check them and rewire.
		Abnormal current waveform caused by output loss or other reasons	Check the wiring
		The auxiliary power supply is damaged, and the drive voltage is insufficient.	Seek for technical support.
		Inverter module shoot-through	Seek for technical support.
		Abnormal control board	Seek for technical support.
		Braking pipe damaged	Seek for technical support.
OH1	Inverter overheat	The ambient temperature is too high.	Lower the ambient temperature.
		The duct is blocked.	Unblock the duct.
		The fan is damaged.	Replace the fan.
		The inverter module is abnormal.	Seek for technical support.
OH2	Rectifier bridge overheat	The ambient temperature is too high.	Lower the ambient temperature.
		The duct is blocked.	Unblock the duct.
		The fan is damaged.	Replace the fan.
OL1	AC drive overload	The motor parameters are incorrect.	Re-perform auto-tuning of motor parameters.
		The load is too large.	Use a drive with higher power.
		The DC braking amount is too large.	Reduce the DC braking current and increase the braking time.
		When instantaneous stop happens, the rotating motor is restarted.	Set the startup mode P08.00 to "Startup after speed tracking."

Fault code	Fault type	Possible cause	Solution
		The acceleration time is too short.	Increase the acceleration time.
		The power grid voltage is too low.	Check the power grid voltage.
		The V/F curve is inappropriate.	Adjust the V/F curve and the torque boost.
OL2	Motor overload	The motor overload protection coefficient setting is incorrect.	Set the motor overload protection coefficient correctly.
		The motor is blocked or the sudden change of load is too large.	Check the load.
		The general-purpose motor runs at low speed for a long time with high load.	For long-time low-speed running, a specific motor shall be used.
		The power grid voltage is too low.	Check the power grid voltage.
		The V/F curve is inappropriate.	Set the V/F curve and the torque boost correctly
EF	Emergency stop or external device fault	External fault emergency stop terminal is enabled.	After the external fault is revoked, release the external fault terminal.
EEP	EEPROM read/write fault	The read/write error of the control parameters occurs.	Seek for technical support.
CE	485 communication error	The baud rate is set improperly.	Set the baud rate properly.
		Serial port communication error	Seek for technical support.
		The fault alarm parameters are set improperly.	Modify the P15.03 setting.
		The host device does not work.	Check if the host device is working and if the wiring is correct.
ItE	Current detection error	Wires or plug-in units of the control board are loose.	Check them and rewire.
		The auxiliary power supply is damaged.	Seek for technical support.
		The Hall device is damaged.	Seek for technical support.
		The amplifying circuit is abnormal.	Seek for technical support.

Fault code	Fault type	Possible cause	Solution
FbL	PID feedback loss	The parameters for feedback loss are set improperly.	Modify the P14.22 setting.
		Feedback wire breakage	Rewire.
		The reference of closed-loop feedback is too low.	Refer to the P14.01 setting and increase the feedback reference.
tUN	Auto-tuning fault	The parameters corresponding to the motor nameplate specifications are not set correctly.	Set the parameters properly according to the motor nameplate.
		Reverse rotation auto-tuning is performed when the reverse running is prohibited.	Enable the reverse running.
		Auto-tuning timeout	Check the motor wiring.
			Check the P02.11 (frequency upper limit) and see whether the P02.12 set value is lower than the rated frequency.
oPt	Option fault	The expansion card is not installed properly.	Reinstall the expansion card.
		The expansion card is damaged.	Seek for technical support.
GdF	Short-to-ground fault	One of the phases (most likely the phase U) is short circuited to ground.	Check the connection of the output three phases to ground, and remove the fault.
dEv	Excessive speed deviation (DEV) fault	The ASR parameters are improper.	Modify the Group P05 function codes.
		The speed deviation detection value is set too small.	Modify the speed deviation detection setting.
		Significant load fluctuation	Eliminate the load vibration.
Fbo	PID feedback over-limit	The PID feedback value exceeds the limit.	Check whether the input voltage of the feedback is normal. If it is normal, seek for technical support.
OH3	Motor overheat	The ambient temperature is too high.	Lower the ambient temperature.

Fault code	Fault type	Possible cause	Solution
		The motor duct is blocked.	Unblock the motor duct.
		The motor fan is damaged.	Replace the motor fan.
		The motor runs at low frequency with high load for a long time.	Employ a large external fan to help the cooling of the motor.
24OL	24 V power supply overload	The wiring of the control board terminal may be incorrect, or the load is excessively large.	Control the 24 V output, and the overall current of the digital output shall be less than 200 mA.
bCE	Board-level communication error	Incorrect connection of board detection signals	Seek for technical support.
POL1	Pre-overload alarm	The motor parameters are not set correctly, and the load is excessively large.	Set the related parameters properly; check whether there is abnormal load.
bLt	BootLoader failure		Seek for technical support.
vEr	power board software version mismatching	The software version to be burned is not consistent with the current software version number.	Set P00.06 to 1 to upgrade software.
UPdnE	Parameter upload/download timeout	Parameter upload/download timeout	Check the wiring. If the wiring is correct, seek for technical support.
AIOC	AI1 current input overcurrent	Check whether the AI1 input current is normal.	Seek for technical support.
FAn	Fan locked-rotor	Check whether the fan is blocked by foreign matters.	Clean the motor fan.
IO-OL	I/O option 24 V overload	Check whether the wiring of the I/O option terminal is correct, and whether the load is overlarge.	Control the 24 V output, and the overall current shall be less than 400 mA.

8.2 Operation exceptions

Table 8-2 Operation exceptions and the corresponding solutions

Symptom	Condition	Possible cause	Solution
The function code can not be modified	Function code modification is not available in the running state.	The function code does not support modification in the running state.	Modify the function code in the stop state.
	Modification is available only of part of the function codes.	The function code P00.03 is set to 1 or 2.	Set P00.03 to 0.
		The function code represents the actually detected value.	Parameters of actually detected values do not support modification by the user.
The drive stops unexpectedly during operation.	No stop command is received, but the drive stops automatically and the running indicator is off.	Fault alarms occur.	Perform the fault diagnosis, and reset the fault.
		A single cycle of the simple PLC is completed.	Check the PLC parameter setting.
		Power supply interruption	Check the power supply
		Operation command channel switchover	Check the function codes related to the operation command channels.
		Excessively large speed deviation	Modify the speed deviation detection value.
		The positive/negative logic of the control terminals changes.	Check whether P09.12 and P09.13 are set according to the requirements.
	No stop command is received, but the motor stops automatically and the running indicator is on (running at zero frequency).	Automatic fault reset	Check the automatic fault reset setting and find out the cause
		Simple PLC pause	Check the PLC pause function terminal.
		External interruption	Check the external interruption setting and find out the cause
		The frequency reference is 0.	Check the frequency reference.

Symptom	Condition	Possible cause	Solution
		The startup frequency is higher than the frequency reference.	Check the startup frequency
		Jump frequency is set improperly.	Check the jump frequency setting
		The closed-loop output is negative when the reverse running is disabled.	Check the setting of P14.19 and P08.27.
		"FWD prohibit" terminal is enabled during forward running.	Check the terminal function setting.
		"REV prohibit" terminal is enabled during reverse running.	Check the terminal function setting.
		Transient low-voltage compensation is applied for restart after power failure, and the power supply voltage is too low.	Check the input voltage and the function setting of restart after power failure.
The drive does not work.	The drive does not work when started.	The coast-to-stop function terminal is enabled.	Check the coast-to-stop terminal.
		The drive running prohibit terminal is enabled.	Check the drive running prohibit terminal.
		The external stop function terminal is enabled.	Check the external stop function terminal.
		Under the three-wire control mode, the three-wire control function terminal is not closed.	Configure and close the three-wire control terminal.
		Fault alarms occur.	Clear the fault.
		The virtual terminal function of the host device is set improperly.	Disable the virtual terminal function, or set the function properly via the host device; the fault can also be cleared by modifying the P09.16 setting.

Symptom	Condition	Possible cause	Solution
		The positive and negative logic of the input terminal are not set correctly.	Check the settings of P09.12 and P09.13.
The drive reports Uv immediately upon powering on.	he thyristor or the contactor is disconnected, and the drive is overload.	Since the thyristor or the contactor is not closed, when the drive runs with large load, the DC bus voltage of the main circuit will drop, and the drive will display Uv.	Run the drive after the thyristor or the contactor is fully closed, or seek for technical support.

Chapter 9 Maintenance

Many factors, such as the extremity in ambient temperature, humidity, dust, and vibration, as well as the aging of the internal components, will give rise to the occurrence of potential faults. Therefore, it is necessary to conduct daily/periodical maintenance for this AC drive product.

9.1 Daily inspection

WARNING

As safety precautions, before inspection and maintenance of the drive, please check the following matters. Otherwise, electrical shock may occur:

① The drive's power supply is cut off;

② Confirm that the charging LED indicator is off before opening the drive cover;

③ The voltage between terminals +/DC+ and -/DC- measured by a DC high-voltmeter should be below 36 V.

The drive shall be working in the environments specified in Section 3.2. In addition, there may be some unexpected situations during operation. The users need to carry out daily maintenance according to the following table. The effective ways to prolong the service life of the drive is to maintain a good operating environment, record daily operating data, and locate the causes for potential faults in the early stage.

Table 9-1 Instructions for daily inspection

Item	Instructions			Standard
	Aspect	Cycle	Methods	
Operating environment	1. Temperature and humidity	Any time	1. Thermometer and hygrometer	1. -10℃ to +40℃, derated use from 40℃ to 50℃
	2. Dust, water dripping and leakage		2. Visual inspection	2. No water dripping or leakage
	3. Odor		3. Smell	3. No strange smell
AC drive	1. Vibration and heating	Any time	1. Touch on the enclosure	1. The vibration is stable and limited; the temperature of the enclosure is normal; the fan is operating normally.
	2. Noise		2. Listen	2. No abnormal sound

Item	Instructions			Standard
	Aspect	Cycle	Methods	
Motor	1. Heating	Any time	1. Touch by hand	1. No abnormal heating
	2. Noise		2. Listen	2. Low and regular noise
Running status	1. Output current	Any time	1. Current meter	1. Within the rated range, and three-phase balanced
	2. Output voltage		2. Voltmeter	2. Within the rated range, and three-phase balanced
	3. Internal temperature		3. Thermometer	3. The difference with the ambient temperature is less than 35℃

9.2 Periodical maintenance

Users are recommended to carry out periodical maintenance for the drive once every 3 or 6 months based on the operating environment.

WARNING

① Only trained professionals are allowed to disassemble the drive, maintain, and replace parts of the device;

② Do not leave any screws, gaskets or other metal objects in the machine. Otherwise, the device may be damaged.

General inspections:

(1) Check if the screws of control terminals are loose. If so, use a screwdriver to fasten them;

(2) Check if the main circuit terminals are poorly connected, and if the connection part of the copper bar is overheated;

(3) Check if there is any damage to the power cables and control cables, especially whether there is any wear/cut on the cable sheath which may contact the metal surface;

(4) Check if the insulation tapes around the power cable lugs are stripped;

(5) Clean out the dust on the circuit board and the duct; a vacuum cleaner is recommended;

(6) Before testing the grounding insulating performance of the drive, short all the input and output terminals (L1, L2, L3/N, U, V, W, BR, +/DC+, -/DC-) of the main circuit first. It is strictly forbidden to conduct the grounding test for a single terminal; otherwise, the drive may be damaged. Please use a 500 V megger during the test;

(7) To test the insulating performance of the motor, it is needed to disconnect the input terminals U, V, and W of the motor from the drive, and conduct test independently; otherwise, the drive may be damaged.

WARNING

① The drive has passed the dielectric strength test before delivery. Thus, the user shall not conduct the test again; otherwise, improper test may damage the drive.

② If it is needed to replace the original components, make sure the models and specifications of new components are the same with those of the original components; otherwise, the drive will be damaged.

9.3 Replacement of quick-wear parts

The quick-wear parts of this AC drive product mainly include the fans and the filter electrolytic capacitor, the service life of which depends on the operating environment and the maintenance. The service life of components in general conditions is listed in the table below.

Table 9-2 Service life of components

Component	Service life
Fan	30,000 to 40,000 hours
Electrolytic capacitor	40,000 to 50,000 hours
Relay	About 100,000 times

Users can replace the parts according to the accumulated running time.

(1) Fan

Possible causes of damage: Wear of the bearing, or aging of the blades.

Inspection standards: Check whether there is any crack on the blades, and whether there is any abnormal vibration or noise at startup.

(2) Electrolytic capacitor

Possible causes of damage: High ambient temperature, increased pulse current caused by rapid changing load, or electrolyte aging.

Inspection standards: Check whether there is liquid leakage, and whether the safety valve is protruded; measure the static capacitance and the insulating resistance.

(3) Relay

Possible causes of damage: Erosion, or frequent actions.

Inspection standards: Check whether the relay can be opened and closed properly.

9.4 Storage

The following points must be followed for the temporary and long-term storage of the drive:

(1) The drive should be stored in the place with good ventilation and away from high temperature, humidity, dust, and metal powder;

(2) Long-term storage will cause the deterioration of the electrolytic capacitor. The drive should be powered on for a test at least once (for at least 5 hours) within 2 years. To power on the drive, the input voltage should be raised gradually to the rated value via a regulator.

Appendix 1　Modbus Communication Protocol

1. Network

The two networking methods for this AC drive include: single-master-multi-slave, and single-master-single-slave.

2. Interface

RS485 interface: asynchronous and half-duplex. Default: 1-8-N-1, 9600 BPS, RTU. For the parameter setting, refer to Group P15.

3. Communication

(1) The drive adopts the Modbus communication protocol, which supports the common reading/writing of the register and expands part of the commands to manage the function codes.

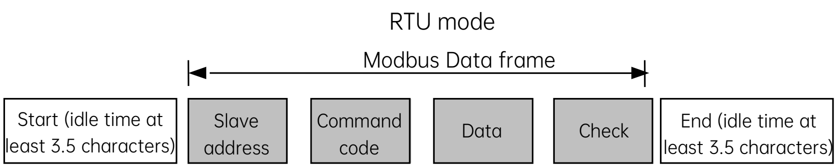
(2) The drive serves as a slave in the network, and communicates with the master in a point-to-point manner. The slave does not respond the master command sent via a broadcast address.

(3) In multi-station or long-distance communication, a resistance unit (ranging from 100 to 120 Ω) in parallel connection with the positive and negative ends of the signal cable of the master station can enhance the immunity to interference.

(4) MV810A provides RS485 type interface only. An additional RS232/RS485 conversion device is required when the external device adopts an RS232 interface.

4. Protocol format

The Modbus protocol supports the RTU mode. The corresponding frame format is shown in Appendix Figure 1-1.



Appendix Figure 1-1　Modbus protocol format

Modbus adopts the "Big-Endian" encoding order, which sends the high bytes first and then sends the low bytes.

In RTU mode, the larger value between the function code setting and the Modbus internal convention shall be selected as the inter-frame idle time. The minimum inter-frame idle time value within the Modbus internal convention is as follows: the idle time that the frame header and frame tail pass the bus shall not be less than 3.5 characters in order to define the frame. The data check adopts CRC-16 and involves the whole information; the high and low bytes of the checksum need to be exchanged before sending. For the specific CRC check, refer to the CRC example subsequent to the protocol description. Note that at least 3.5 characters of the bus idle time shall be kept between frames and there is no need to accumulate the start and end idle time for such bus idle time.

In the example below, the RTU mode is used to read the parameters of the internal register 0101 (P01.01) of No.5 slave.

Request frame:

Slave address	Command code	Data				Check code	
		Register address		Number of bytes read			
0x05	0x03	0x01	0x01	0x00	0x01	0xD5	0xB2

Slave address	Command code	Data			Check code	
		Number of bytes responded	Register content			
0x05	0x03	0x02	0x13	0x88	0x44	0xD2

Response frame:

In the above tables, the check code is the CRC check value. For the CRC check computing method, refer to the following text.

The drive supports the setting of different response delays via the function codes for the purpose of meeting the specific application demands of various master stations. For the RTU mode, the actual time of response delay shall not be less than the interval of 3.5 characters.

5. Protocol functions

The main function of Modbus is reading/writing parameters. Different command codes control different operation requests. The Modbus protocol of MV810A drives supports the operations as shown in the following table:

Command code	Definition
0x03	Used to read the drive parameters, including function code parameters, control

	parameters and status parameters.
0x06	Used to rewrite one function code parameter or control parameter (16-bit), and the result will be saved at power off.
0x07	Used to rewrite one function code parameter or control parameter (16-bit), and the result will not be saved at power off.
0x10	Used to rewrite multiple function code parameters or control parameters, and the parameter values will be saved at power off.

All the function code parameters, control parameters and status parameters of the drive are mapped as the read/write registers of Modbus. The read/write features and ranges of the function code parameters are specified in the user manual. The group number of the drive function codes is mapped as the high byte of the register address, and the group internal index (the serial number of the parameter in the group) is mapped as the low byte of the register address. The control parameters and status parameters are designed as the virtual function code groups of the drive. The correspondence between the group numbers of the function codes and the high bytes of the mapped register address are shown in the following table:

Drive parameter group	High byte of the address mapped	Drive parameter group	High byte of the address mapped
P00	0x00	P20	0x14
P01	0x01	P21	0x15
P02	0x02	P22	0x16
P03	0x03	P23	0x17
P04	0x04	P24	0x18
P05	0x05	P26	0x1A
P06	0x06	P40	0x28
P07	0x07	P41	0x29
P08	0x08	P42	0x2A
P09	0x09	P43	0x2B
P10	0x0A	P50	0x32
P11	0x0B	P88	0x58
P12	0x0C	P97	0x61
P13	0x0D	P98	0x62
P14	0x0E	P99	0x63

Drive parameter group	High byte of the address mapped	Drive parameter group	High byte of the address mapped
P15	0x0F	Control parameter group	0x64
P16	0x10	Status parameter group	0x65
P17	0x11	…	…

For example, the register address of the function code parameter P03.02 is 0x0302, and the register address of the first control parameter (control word 1) is 0x6400.

As the format of the whole data frame has been explained in the above text, the following text will describe the format and meanings of the "command code" and "data" of the Modbus protocol. These two parts constitute the Modbus application-layer protocol data unit which is mentioned in the text below. The following description of the frame format is based on the RTU mode.

(1) Read the drive parameters and status parameters

The application-layer protocol data unit is shown below.

Request format:

Application-layer protocol data unit	Data length (number of bytes)	Value/Range
Command code	1	0x03
Start register address	2	0x0000 to 0xFFFF
Number of registers	2	0x0001 to 0x000A

If the operation is successful, the response format is as follows:

Application-layer protocol data unit	Data length (number of bytes)	Value/Range
Command code	1	0x03
Number of bytes read	1	2 × Number of registers
Content read	2 × Number of registers	Parameter value

If the operation fails, an abnormal response frame will return. The abnormal response frame includes the error code and exception code in which the error code = (command code + 0x80), and the exception code indicates the error cause.

Abnormal response frame format:

Application-layer protocol data unit	Data length (number of bytes)	Value/Range
Error code	1	(Command code + 0x80)
Exception code	1	

The exception codes and their meanings are as follows:

Exception code	Definition
0x01	Incorrect password
0x02	Invalid command code
0x03	CRC check error
0x04	Invalid address
0x05	Invalid parameter
0x06	Invalid modification of parameters
0x07	System lock
0x08	Parameter being saved

(2) Rewrite one function code parameter or control parameter (16-bit), and the result will be saved at power off.

When this command is executed, the changed parameter value will be saved at power on after power off.

The application-layer protocol data unit is shown below.

Request format:

Application-layer protocol data unit	Data length (number of bytes)	Value/Range
Command code	1	0x06
Register address	2	0x0000 to 0xFFFF
Register content	2	0x0000 to 0xFFFF

If the operation is successful, the response format is as follows:

Application-layer protocol data unit	Data length (number of bytes)	Value/Range
Command code	1	0x06
Register address	2	0x0000 to 0xFFFF
Register content	2	0x0000 to 0xFFFF

If the operation fails, an abnormal response frame will return, and the format is described as above.

(3) Rewrite one function code parameter or control parameter (16-bit), and the result will not be saved at power off.

When this command is executed, the changed parameter value will not be saved at power on after power off.

The application-layer protocol data unit is shown below.

Request format:

Application-layer protocol data unit	Data length (number of bytes)	Value/Range
Command code	1	0x07
Register address	2	0x0000 to 0xFFFF
Register content	2	0x0000 to 0xFFFF

If the operation is successful, the response format is as follows:

Application-layer protocol data unit	Data length (number of bytes)	Value/Range
Command code	1	0x07
Register address	2	0x0000 to 0xFFFF
Register content	2	0x0000 to 0xFFFF

If the operation fails, an abnormal response frame will return, and the format is described as above.

(4) Rewrite multiple function code parameters and control parameters of the drive, and the parameter values will be saved at power off.

The application-layer protocol data unit is shown below.

Request format:

Application-layer protocol data unit	Data length (number of bytes)	Value/Range
Command code	1	0x10
Start register address	2	0x0000 to 0xFFFF
Number of registers in operation	2	0x0001 to 0x000A
Number of bytes of register content	1	2 × Number of registers in operation
Register content	2 × Number of registers in operation	

If the operation is successful, the response format is as follows:

Application-layer protocol data unit	Data length (number of bytes)	Value/Range
Command code	1	0x10
Start register address	2	0x0000 to 0xFFFF
Number of registers in operation	2	0x0001 to 0x000A
Number of bytes of register content	1	2 × Number of registers in operation
Register content	2 × Number of registers in	

	operation	

This command is used to change the content of the continuous data units from the start register address. If the operation fails, an abnormal response frame will return, and its format is described as above.

6. Control parameters and status parameters

The control parameters of the drive manage the start, stop, running frequency setting, and other functions alike. The status parameters allow the inquiring of drive parameters, such as the running frequency, output current, and output torque.

(1) Control parameters

The control parameters of the drive are shown in the following table:

Register address	Parameter name	Remarks
0x6400	Control word 1	Refer to its bit definition table.
0x6401	Main frequency reference	Main frequency reference, ranging from 0.00 Hz to P02.10
0x6402	Main frequency reference percentage	0.0 to 100% of maximum frequency
0x6403	Digital process closed-loop (PID) reference	Valid when the process closed-loop function is enabled, with the range of -1000 to 1000 corresponding to the range of -100% to 100%.
0x6404	PID feedback	Valid when the process closed-loop function is enabled, with the range of -1000 to 1000 corresponding to the range of -100% to 100%.
0x6405	AO1 setting	Valid when P10.13 = 14, with the range of 0 to 1000 corresponding to the range of 0.0 to 100.0%.
0x6406	Reserved	
0x6407	DO terminal status setting	0 to 0xF; Bit0 to Bit3 corresponding to the terminals (DO1, DO2, DO3/RO2, and RO1); Valid when P10.00 to P10.03 = 19.
0x6408	Reserved	
0x6409	Virtual terminal control setting	0 to 0xFF;

Register address	Parameter name	Remarks
		Bit0 to bit7 corresponding to virtual terminals DI1 to DI8; Valid when the corresponding bit of P09.16 is set to positive logic active.
0x640C	Auxiliary frequency reference	Range: 0.00 Hz to P02.10.
0x640D	Torque reference	The range of -3000 to 3000 corresponds to the range of -300.0% to 300.0%; Valid when the torque reference channel is the serial port in the torque control mode.
0x640E	FWD frequency limit under torque control	Range: 0.00 Hz to P02.11
0x640F	REV frequency limit under torque control	Range: 0.00 Hz to P02.11
0x6410	Drive torque limit under speed control	The range of 0 to 3000 corresponds to the range of 0.0 to 300.0%.
0x6411	Braking torque limit under speed control	The range of 0 to 3000 corresponds to the range of 0.0 to 300.0%.
0x6412	Voltage reference for V/F separation	0 to 1000 V
0x6413	Reserved	
0x6414	Control word 2	Refer to the definition table of control word 2.
0x6415	Specific control word for the air compressor	Refer to the specific control word table for the air compressor
0x6416	Maintenance time range for Part 1	0 to 65535 h
0x6417	Maintenance time range for Part 2	0 to 65535 h
0x6418	Maintenance time range for Part 3	0 to 65535 h
0x6419	Maintenance time range for Part 4	0 to 65535 h
0x641A	Maintenance time range for Part 5	0 to 65535 h
0x641B	Range of part 1 use time	0 to 65535 h
0x641C	Range of part 2 use time	0 to 65535 h

Register address	Parameter name	Remarks
0x641D	Range of part 3 use time	0 to 65535 h
0x641E	Range of part 4 use time	0 to 65535 h
0x641F	Range of part 5 use time	0 to 65535 h
0x6420	Range of device running time (reserved)	0 to 65535 h

The bit definition of control word 1 is shown in the following table:

Bit	Value	Function	Remarks
BIT2 to BIT0	111B	Stop for external fault	Coast to stop, and the drive displays external fault.
	110B	Stop in mode 1	Coast to stop.
	101B	Stop in mode 0	Stop according to the set deceleration time (valid when the jog is disabled).
	100B	Running command	Start the drive (valid when the jog is disabled).
	Others	No command	
BIT3	1	REV run	Set the running direction when the running command is valid.
	0	FWD run	
BIT4	0	Enable acceleration/deceleration	BIT0 to BIT3, and BIT7 to BIT8 of control word 1 are valid only when acceleration/deceleration is allowed.
	1	Disable acceleration/deceleration	
BIT5	0	Reserved	
BIT6	0	Reserved	
BIT7	1	FWD jog	No action when the bits of FWD and REV jog are both enabled; the jog stops when both are disabled.
	0	Disable FWD jog	
BIT8	1	REV jog	
	0	Disable REV jog	

Bit	Value	Function	Remarks
BIT9	1	Enable fault reset (valid for all command channels)	The bit for fault reset validity selection of the host device
	0	Disable fault reset	
BIT15 to BIT10	0	Reserved	

WARNING

① The control command (control words 1 and 2) of the host device is valid only when the "Operation command channel selection" is set to "communication control".

② The host device processes the faults and alarms as follows: when the drive fault occurs, for control words 1 and 2, only the fault reset command is valid, and any other commands from the host device are invalid. That is, the host shall reset the fault first before sending other commands.

The bit definition of control word 2 is shown in the following table.

Bit	Value	Function	Remarks
BIT0	0	Reserved	Reserved
BIT1	1	Drive running prohibit	Selection bit for enabling/disabling the drive running
	0	Drive running enable	
BIT15 to BIT2	0	Reserved	

The bit definition of the specific control words for the air compressor is shown in the following table.

Bit	Value	Function	Remarks
BIT0	0	Invalid	Part 1 use time control
	1	Part 1 use time clear	
BIT1	0	Invalid	Part 2 use time control
	1	Part 2 use time clear	
BIT2	0	Invalid	Part 3 use time control
	1	Part 3 use time clear	
BIT3	0	Invalid	Part 4 use time control
	1	Part 4 use time clear	
BIT4	0	Invalid	Part 5 use time control

Bit	Value	Function	Remarks
	1	Part 5 use time clear	
BIT5	0	Invalid	Accumulated time control
	1	Accumulated device running/loading time clear	
BIT6	0	Unloading	Loading/Unloading control
	1	Loading	
BIT7	0	Invalid	Hibernation control
	1	Hibernation	
BIT8	0	Invalid	Wake-up control
	1	Wake up	
BIT9	0	Fan stopped	Fan control
	1	Fan running	
BIT15 to BIT10	0	Reserved	Reserved

(2) Status parameters

Register address	Parameter name	Remarks
0x6500	Status word 1 of the drive	Refer to the status word 1 definition table
0x6501	Actual running value of the present main reference	Present running frequency; Range: 0.00 Hz to P02.11.
0x6502	Drive model	Refer to manufacturer's parameters.
0x6503	Drive serial number	Product serial number, such as 810
0x6504	Function software version number	Software version number of the function board
0x6505	Reserved	Reserved
0x6506	Output current	0.0 to 6553.5 A
0x6507	Output voltage	0 to 65535 V
0x6508	Output power	0.0 to 6553.5 kW
0x6509	Rotation speed in running	0 to 65535 rpm
0x650A	Line speed in running	0 to 65535 m/s

Register address	Parameter name	Remarks
0x650B	Reserved	
0x650C	Bus voltage	0.0 to 6553.5 V
0x650D	Reserved	
0x650E	DI terminal status 1	0 to 0x1111 Corresponding to DI1 to DI4
0x650F	DI terminal status 2	0 to 0x1111 Corresponding to DI5 to DI8
0x6510	Output terminal status	0 to 0x1111 Corresponding to DO1, DO2, DO3/RO2, and RO1
0x6511	Reserved	
0x6512	Present fault type	0 to 55
0x6513	Previous fault type	0 to 55
0x6514	Penultimate fault type	0 to 55
0x6515	Running frequency reference	Range: 0.00 Hz to P02.11
0x6516	Reserved	
0x6517	PID reference	-100.0% to 100.0%
0x6518	PID feedback	-100.0% to 100.0%
0x6519	AI1	0.00 to 10.00 V
0x651A	AI2	-10.00 to 10.00 V
0x651B	Reserved	
0x651C	Acceleration time setting 1	0.0 to 6000.0 s
0x651D	Deceleration time setting 1	0.0 to 6000.0 s
0x651E	Operation command channel	Operation command channel (same as P02.02)
0x651F	Status word 2 of drive	Refer to the status word 2 definition table
0x6520	Main frequency source selection	Refer to P02.05
0x6521	Reserved	

Register address	Parameter name	Remarks
0x6522	Motor and mode selection	0 to 0xFFF Ones place: Control mode 0: SVC1 1: FVC 2: VF Tens place: Motor number 0: Motor 1 1: Motor 2 Hundreds place: Motor type 0: Asynchronous motor 1: Synchronous motor
0x6523	Bus voltage upon the present fault	0.0 to 6553.5 V
0x6524	Actual current upon the present fault	0.0 to 6553.5 A
0x6525	Running frequency upon the present fault	Range: 0.00 Hz to P02.11
0x6526	AC drive state upon the present fault	Refer to P01.17
0x6527	Reserved	
0x6528	Status word 3 of the drive	Refer to the status word 3 definition table

WARNING

① The status parameters can not be written.

② In the status parameters, the maximum length of “actual running value of the present main reference”, “present running frequency”, “running frequency reference”, and “running frequency at the 3rd fault” is 32 bits, and others’ maximum length is 16 bits.

The bit definition of status word 1 of the drive is shown in the following table.

Bit	Value	Function	Remarks
BIT0	1	Serial port control enabled	
	0	Serial port control disabled	
BIT1	1	Drive running	

Bit	Value	Function	Remarks
	0	Drive stopped	
BIT2	1	Drive REV running	
	0	Drive FWD running	
BIT3	1	Serial port reference enabled	
	0	Serial port reference disabled	
BIT4	1	Output frequency reaches the main reference.	
	0	Output frequency does not reach the main frequency.	
BIT5	1	Fault	Value 1 indicates the occurrence of a fault. Check the fault type by referring to BIT15 to BIT8 in status word 1.
	0	No fault	
BIT6	0	Reserved	
BIT7	0	Reserved	
BIT15 to BIT8	0x00 to 0xFF	Fault or alarm codes	0: No fault; 1 to 49: Indicates a fault. Refer to P97.32 for the fault type.

The bit definition of status word 2 of the drive is shown in the following table.

Bit	Value	Function	Remarks
BIT0		Reserved	
BIT1	1	Jog running	
	0	Non-jog running	
BIT2	1	Simple PLC running	
	0	Non-simple PLC running	
BIT3		Reserved	
BIT4	1	Process closed-loop running (PID)	
	0	Non-process closed-loop running (PID)	
BIT15 to BIT5		Reserved	

The bit definition of status word 3 of the drive is shown in the following table.

Bit	Value	Function	Remarks
BIT2 to BIT0		Reserved	
BIT3		Accelerating	
BIT4		Decelerating	
BIT5		Running at a constant speed	
BIT6		Pre-exciting	
BIT7		Parameter auto-tuning	
BIT8		Overcurrent limited	
BIT9		DC overvoltage limited	
BIT10		Torque limited	
BIT11		Speed reached (speed mode) / Speed limited (torque mode)	
BIT12		Drive fault	
BIT13		Speed control	
BIT14		Torque control	
BIT15		Reserved	

7. Cautions

1. To read multiple parameters, if any one of the function codes is not read successfully (due to invalid parameter address, parameter being password, etc.), only the error information will return, and no read parameter values will return.

2. To write multiple control parameters or function code parameters (0x10), if any one of the parameters is not written successfully (due to invalid parameter address, value exceeding parameter range, etc.), the error information will return. Control parameters before this parameter will be correctly written and become valid, but subsequent parameters will not be written.

3. The host device's operations on the user password

(1) The user password serves to protect the reading/writing of the function code parameters and the management of the function codes (except "read the address of the displayed data" and "displayed data switchover").

(2) If a user password is set (P00.01), the host device can access the function code parameters only after "decryption" (write the correct password to P00.01), and the control parameters and status parameters are not restricted by the user password.

(3) The host device can set a password, but can not cancel the password; only the operating keypad can cancel the password. The writing operation of P00.01 is valid only in two situations: one is decryption of the set password, and the other is to set a new password when no password is set. In other cases, only password error information will return.

(4) The password operations of the host device and the operating keypad are independent to each other. Even if the user has conducted decryption successfully via the operating keypad, the decryption via the host device is still required when using the host device to visit the function code parameters, and vice versa.

(5) Access to the password-related parameters is forbidden with the communication channel, and, in this case, an invalid parameter address error will return.

(6) When the host device gets the access to the function code after decryption, if there is no communication within 30 s, the access right will be invalidated, and the user password needs to be entered again for another access.

(7) When the host device has acquired the access right (no user password, or decrypted), if a new user password is set or the user password is changed via the keypad, the host device will retain the present access right, which means there is no need to decrypt again. If the present access right becomes invalid, the host device needs to decrypt again (entering the new password) for new access.

8. CRC check

To improve the speed, CRC-16 generally adopts the table type. The following is the C language source code for realizing CRC-16. Note that in the final result the high and low bytes have already been exchanged, which means the results are the CRC checksum to be sent.

```
unsigned short CRC16 (unsigned char *msg, unsigned char length)    /* The function returns the CRC as a unsigned short type */
{
    unsigned char uchCRCHi = 0xFF ;           /* high byte of CRC initialized */
    unsigned char uchCRCLo = 0xFF ;           /* low byte of CRC initialized */
    unsigned uIndex ;                         /* index into CRC lookup table */
    while (length--)                          /* pass through message buffer */
    {
        uIndex = uchCRCLo ^ *msg++ ;          /* calculate the CRC */
```

```
                uchCRCLo = uchCRCHi ^
(crcvalue[uIndex] >>8);

                uchCRCHi =crcvalue[uIndex]&0xff;

        }

        return (uchCRCHi | uchCRCLo<<8) ;

}

/* Table of CRC values */

const unsigned int   crcvalue[ ] = {

0x0000,0xC1C0,0x81C1,0x4001,0x01C3,0xC003,0x8002,0x41C2,0x01C6,0xC006,0x8007,0x41C7,

0x0005,0xC1C5,0x81C4,0x4004,0x01CC,0xC00C,0x800D,0x41CD,0x000F,0xC1CF,0x81CE,0x400E,

0x000A,0xC1CA,0x81CB,0x400B,0x01C9,0xC009,0x8008,0x41C8,0x01D8,0xC018,0x8019,0x41D9,

0x001B,0xC1DB,0x81DA,0x401A,0x001E,0xC1DE,0x81DF,0x401F,0x01DD,0xC01D,0x801C,0x41DC,

0x0014,0xC1D4,0x81D5,0x4015,0x01D7,0xC017,0x8016,0x41D6,0x01D2,0xC012,0x8013,0x41D3,

0x0011,0xC1D1,0x81D0,0x4010,0x01F0,0xC030,0x8031,0x41F1,0x0033,0xC1F3,0x81F2,0x4032,

0x0036,0xC1F6,0x81F7,0x4037,0x01F5,0xC035,0x8034,0x41F4,0x003C,0xC1FC,0x81FD,0x403D,

0x01FF,0xC03F,0x803E,0x41FE,0x01FA,0xC03A,0x803B,0x41FB,0x0039,0xC1F9,0x81F8,0x4038,

0x0028,0xC1E8,0x81E9,0x4029,0x01EB,0xC02B,0x802A,0x41EA,0x01EE,0xC02E,0x802F,0x41EF,

0x002D,0xC1ED,0x81EC,0x402C,0x01E4,0xC024,0x8025,0x41E5,0x0027,0xC1E7,0x81E6,0x4026,

0x0022,0xC1E2,0x81E3,0x4023,0x01E1,0xC021,0x8020,0x41E0,0x01A0,0xC060,0x8061,0x41A1,

0x0063,0xC1A3,0x81A2,0x4062,0x0066,0xC1A6,0x81A7,0x4067,0x01A5,0xC065,0x8064,0x41A4,

0x006C,0xC1AC,0x81AD,0x406D,0x01AF,0xC06F,0x806E,0x41AE,0x01AA,0xC06A,0x806B,0x41AB,

0x0069,0xC1A9,0x81A8,0x4068,0x0078,0xC1B8,0x81B9,0x4079,0x01BB,0xC07B,0x807A,0x41BA,

0x01BE,0xC07E,0x807F,0x41BF,0x007D,0xC1BD,0x81BC,0x407C,0x01B4,0xC074,0x8075,0x41B5,

0x0077,0xC1B7,0x81B6,0x4076,0x0072,0xC1B2,0x81B3,0x4073,0x01B1,0xC071,0x8070,0x41B0,

0x0050,0xC190,0x8191,0x4051,0x0193,0xC053,0x8052,0x4192,0x0196,0xC056,0x8057,0x4197,

0x0055,0xC195,0x8194,0x4054,0x019C,0xC05C,0x805D,0x419D,0x005F,0xC19F,0x819E,0x405E,

0x005A,0xC19A,0x819B,0x405B,0x0199,0xC059,0x8058,0x4198,0x0188,0xC048,0x8049,0x4189,

0x004B,0xC18B,0x818A,0x404A,0x004E,0xC18E,0x818F,0x404F,0x018D,0xC04D,0x804C,0x418C,

0x0044,0xC184,0x8185,0x4045,0x0187,0xC047,0x8046,0x4186,0x0182,0xC042,0x8043,0x4183,
```

0x0041,0xC181,0x8180,0x4040}

If the CRC checksum of each sent byte is computed online, it will take a lot of time, but it can save the program space occupied by the table. The code for computing CRC online is as follows:

```
unsigned int crc_check(unsigned char *data,unsigned char length)
{
    int i;
    unsigned crc_result=0xffff;
    while(length--)
    {
        crc_result^=*data++;
        for(i=0;i<8;i++)
        {
            if(crc_result&0x01)
            {
                crc_result=(crc_result>>1)^0xa001;
            }
            else
            {
                crc_result=crc_result>>1;
            }
        }
    }
    return (crc_result=((crc_result&0xff)<<8)|(crc_result>>8));
}
```

9. Scaling of the drive parameters

(1) Scaling of frequency is 1: 100

To run the drive at 50 Hz, the main reference should be 0x1388 (5000).

(2) Scaling of time is 1: 10

To set the drive's acceleration time to be 30 s, the function code should be set to 0x012C (300).

(3) Scaling of current is 1: 10

If the drive's feedback current is 0x012C (300), the present current is 30 A.

(4) The output power is its absolute value.

(5) For other parameters, refer to the parameter function descriptions.

Appendix 2 Warranty and Service

Megmeet rigorously adheres to the ISO 9001:2008 standard in manufacturing motor drive products. If any irregularities occur with our products, please contact the product supplier or the headquarters directly. Megmeet is committed to delivering comprehensive technical support services to all our clients.

1. Warranty period

The warranty period for the product is 18 months from the date of purchase, but not exceeding 24 months after the manufacturing date recorded on the nameplate.

2. Warranty scope

During the warranty period, any abnormalities arising from the responsibility of our company can be repaired or replaced free of charge by our company. However, a certain amount of repair charges may apply even within the warranty period under the following circumstances:

(1) Damage caused by fire, flood, severe lightning strikes, or similar reasons;

(2) Man-made damage caused by users' unauthorized modifications;

(3) Damage due to dropping or transportation after purchase;

(4) Damage caused by usage beyond the standard specifications or requirements;

(5) Damage resulting from operation/use not in accordance with the user manual.

3. After-sales service

(1) If there are special requirements for the installation and commissioning of the drive product, or if the product's performance or functionality is not satisfactory, please contact the product distributor or Megmeet.

(2) In case of any abnormalities, please seek assistance by contacting the product supplier or Megmeet.

(3) During the warranty period, any abnormalities caused by manufacturing and design defects will be repaired free of charge by our company.

(4) Beyond the warranty period, repairs will be conducted at the customer's request and charged by our company.

(5) Service fees are calculated based on actual costs. Any agreements in place will take precedence.

Shenzhen Megmeet Electrical Co., Ltd.

Add: 5th Floor, Block B, Unisplendour Information Harbor, Langshan Road, Nanshan District, Shenzhen, 518057, China

Tel: +86-755-86600500

Fax: +86-755-86600562

Website: www.megmeet.com

Parameter recording table

Shenzhen Megmeet Electrical Co., Ltd.

Drive Warranty Bill

Customer company:	
Detailed address:	
Zip code:	Contact:
Tel:	Fax:
Machine model:	
Power:	Machine No.:
Contract No.:	Purchase date:
Service unit:	
Contact:	Tel:
Maintenance person:	Tel:
Maintenance date:	
Comment on service: ☐ Excellent ☐ Good ☐ Fair ☐ Unsatisfactory Other comment: User's signature: Date:	
Customer Service Center follow-up record: ☐ Follow-up phone call ☐ Follow-up letter Other: Signature of the technical support engineer: Date:	

Note: This bill becomes invalid if the user can not be visited.

Shenzhen Megmeet Electrical Co., Ltd.

Drive Warranty Bill

Customer company:	
Detailed address:	
Zip code:	Contact:
Tel:	Fax:
Machine model:	
Power:	Machine No.:
Contract No.:	Purchase date:
Service unit:	
Contact:	Tel:
Maintenance person:	Tel:
Maintenance date:	
Comment on service: ☐ Excellent ☐ Good ☐ Fair ☐ Unsatisfactory Other comment: User's signature: Date:	
Customer Service Center follow-up record: ☐ Follow-up phone call ☐ Follow-up letter Other: Signature of the technical support engineer: Date:	

Note: This bill becomes invalid if the user can not be visited.