MV820E Series Elevator AC Drive

User Manual

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BOM Code

Shenzhen Megmeet Electrical Co., Ltd. provides professional technical support for our customers. You can contact the local branch office or customer service center, or directly contact the company headquarters.

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Foreword

Thank you for choosing Megmeet MV820E series elevator AC drive.

As a new-generation vector control platform, MV820E adopts an advanced drive solution, which integrates synchronous motor drive and asynchronous motor drive, torque control and speed control, and possesses leading drive indicators, able to meet various needs that require high performance. Meanwhile, MV820E has sound anti-trip control and strong adaptation to harsh environments with bad power mains, high temperature, high humidity or filled with dust, largely improving the reliability.

MV820E provides modular expansion, enabling you to add modules flexibly based on your special needs. Besides, MV820E has advanced V/F, SVC and FVC for speed and torque control, closed-loop process control, multi-function input and output terminals, pulse frequency reference, simple PLC, main/auxiliary reference control, master-slave control and so on, fully capable for various drive scenarios, lowering system costs and improving system reliability.

MV820E is designed with overall electromagnetic compatibility and optimized PWM control, meeting environmental requirements for low noise and low electromagnetic interference.

This manual mainly consists of installation, wiring, parameter setting, fault diagnosis, trouble shooting, daily maintenance and related matters. Please read this manual carefully before you install and use the drive so as to release the drive's full potential, keep the manual properly and give it to the actual user when necessary.

Unboxing inspection

When you unbox the product, remember to check the following:

- whether there is any damage;
- whether the rated values on the nameplate are the same as what you ordered.

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 drives. The relevant manuals provided by us are subject to change 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 equipment damage.

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. ● The wiring work must be done by professional personnel. Otherwise, there will be an electric shock. ● Before wiring, check that the input power supply is cut off. Otherwise, there will be an electric shock. ● Properly connect the grounding terminal of the drive. Otherwise, there will be an electric shock. ● Properly close the cover before power-on. Otherwise, electric shock or explosion may occur. ● When powering on a drive that has been stored for 2 years, use a voltage regulator to increase voltage gradually. Otherwise, electric shock or explosion may occur. ● To avoid electric shock, do not touch terminals when the drive is powered on. ● To avoid electric shock, do not operate the drive with wet hands. ● Before conducting maintenance, ensure that the power is cut off for 10 minutes, and check that the charging indicator is completely off or the voltage of bus negative/positive is below 36 V. Failure to comply will result in an electric shock. ● Only professional personnel is qualified to replace the components. Do not leave any wire or metal parts inside the drive. Failure to comply will result in a fire. ● After changing the control board, you need to properly set the parameters before running. Otherwise, there will be equipment damage. ● The bare parts of the terminal lugs in the main circuit must be wrapped with insulation tape. Otherwise, electric shock may occur.

WARNING

- When carrying the drive, protect the operating panel and the cover against any stress. Failure to comply will result in personal injuries or equipment damage.
- Install the product on the place that can bear the weight. Failure to comply will result in personal injuries or equipment damage.
- Do not install the drive near water pipes or other places with water splash. Otherwise, there will be equipment damage.
- Take care not to drop screws, gaskets, metal bars and the like into the drive. Otherwise, fire and equipment damage may occur.
- If the drive is damaged or lack of components, do not run the drive. Failure to comply will result in a fire or personal injuries.
- Do not install the product in the place exposed to direct sunlight. Otherwise, there will be equipment damage.
- Do not short terminal + and (-). Otherwise, fire and equipment damage may occur.
- Cable lugs must be firmly connected to main circuit terminals. Otherwise, there will be equipment damage.
- Do not connect 220 VAC input to control terminals other than RA, RB and RC. Otherwise, there will be equipment damage.

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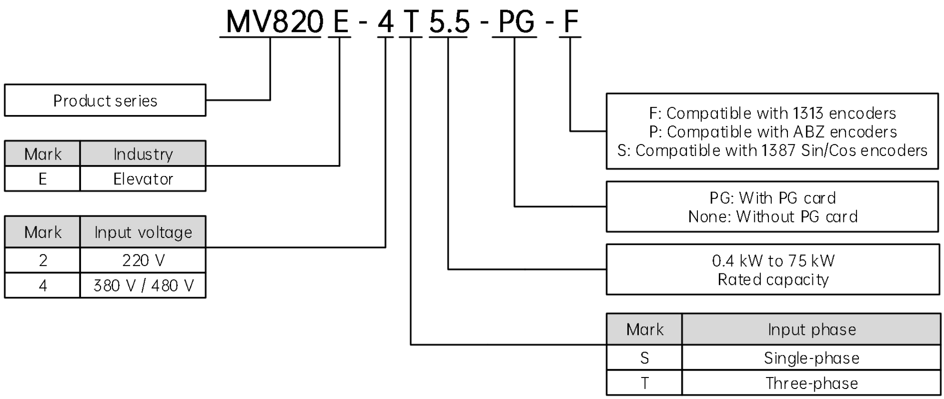
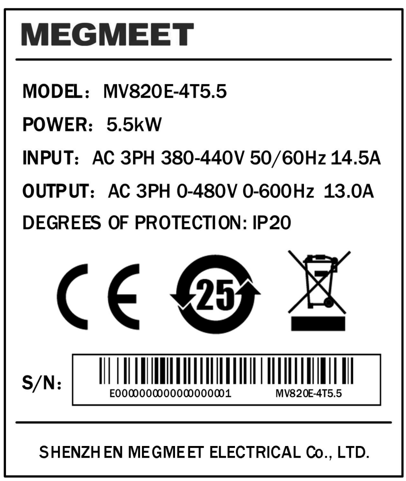
Chapter 1 Introduction of MV820E Series

1.1 Product model

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



1.2 Product nameplate



1.3 Product series

Table 1-1 Drive series

Enclosure model	Drive model	Rated input current (A)	Rated output current (A)	Rated output power (kW)	Fan's air volume (m^3/min)
B	MV820E-2S0.4	5.3	2.4	0.4	0.4
	MV820E-2S0.75	10.4	4.2	0.75	
	MV820E-2S1.5	16.2	7.5	1.5	
	MV820E-4T0.75	3.5	2.7	0.75	
	MV820E-4T1.5	5.1	4.2	1.5	
	MV820E-4T2.2	5.8	5.6	2.2	0.48
C	MV820E-4T3.7	10.5	9.4	3.7	0.8
	MV820E-4T5.5	14.5	13.0	5.5	
D	MV820E-2T3.7	21.3	17.0	3.7	1.8
	MV820E-2T5.5	32.0	25.0	5.5	
	MV820E-4T7.5	20.5	17.0	7.5	
	MV820E-4T11	26.0	25.0	11.0	
E	MV820E-4T15	35.0	32.0	15.0	4.0
	MV820E-4T18.5	49.0	37.0	18.5	
F	MV820E-4T22	58.0	45.0	22.0	5.8
	MV820E-4T30	62.0	60.0	30.0	
G	MV820E-4T37	76.0	75.0	37.0	7.21
	MV820E-4T45	92.0	90.0	45.0	
	MV820E-4T55	113.0	110.0	55.0	
H	MV820E-4T75	157.0	152.0	75.0	7.5

1.4 Technical specifications

Table 1-2 Technical specifications

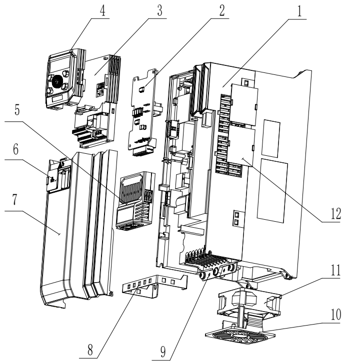
Input	Rated voltage (V)	2S/2T models: single/three-phase 220 V to 240 V; continuous fluctuation of voltage ±10%, transient fluctuation -15% to +10%, that is, 187 V to 264 V; voltage unbalance rate: < 3%, distortion rate compliant with IEC 61800-2 4T models: three-phase 380 V to 480 V; continuous fluctuation of voltage ±10%, transient fluctuation -15% to +10%, that is, 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 Hz/60 Hz, fluctuation range: ±2 Hz
Output	Rated output power (kW)	Refer to Table 1-1.
	Rated output current (A)	Refer to Table 1-1.
	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: 0.00 to 599.00 Hz
	Overload capacity	1 min for 150% rated current 10 s for 200% rated current
Drive control	Control mode	Flux vector control without PG, V/F control, Flux vector control with PG
	Maximum output frequency	V/F control: 599 Hz, other control methods: 599 Hz; high-frequency version: 3500 Hz
	Speed regulation range	1: 200 (flux vector control without PG); 1: 1000 (flux vector control with PG)
	Speed control precision	±0.5% (flux vector control without PG); ±0.02% (flux vector control with PG)
	Speed fluctuation	±0.3% (flux vector control without PG); ±0.1% (flux vector control with PG)
	Torque response	< 20 ms (flux vector control without PG); < 10 ms (flux vector control with PG)
	Torque control	Torque control precision ±5% for vector control without PG (above 5 Hz for asynchronous motors, above 10 Hz for synchronous motors); ±3% for vector control with PG
	Startup torque	0.25 Hz 150% (flux vector control without PG); 0.00 Hz 180% (flux vector control with PG)

<table>
<tr><td rowspan="9">Product functions</td><td>Key functions</td><td>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, sleep function, power dip ride-through, Modbus, torque control, torque control and speed control switchover, automatic restart, DC braking, dynamic braking; simple PLC, AVR, 2 sets of motor parameters switchover, fieldbus communication; master-slave control and so on.</td></tr>
<tr><td>Basic frequency</td><td>0.01 Hz to 599.00 Hz</td></tr>
<tr><td>Startup frequency</td><td>0.00 Hz to 50.00 Hz</td></tr>
<tr><td>Frequency setting mode</td><td>Digital panel setting, analog reference: AI1/AI2, terminal pulse HDI setting; simple PLC reference, multiple PLC reference, host controller communication setting, PID control reference and fieldbus communication setting</td></tr>
<tr><td>Acceleration/ Deceleration time</td><td>0.1 to 6000.0 (unit: 0.1 s)</td></tr>
<tr><td>Dynamic braking capacity</td><td>Built-in braking units for the whole MV820E series, braking ratio 0.0 to 100.0%</td></tr>
<tr><td>DC braking capacity</td><td>Startup frequency: 0.00 Hz to 599.00 Hz; braking time: 0.1 s to 50.0 s
Braking current: 0% to 100%, according to the nominal rated current of the drive</td></tr>
<tr><td>Terminal functions</td><td>Refer to the terminal function part for details.</td></tr>
<tr><td>Protection function</td><td colspan="2">Refer to the fault protection part for details.</td></tr>
<tr><td rowspan="4">Others</td><td>Efficiency</td><td>≧93% (7.5 kW or below); ≧95% (15 kW or below)</td></tr>
<tr><td>Installation method</td><td>Wall-mounted: vertically mounted on a solid base indoors, with at least 100 mm space for air inlet and outlet, and at least 10 mm left for both the left side and the right side (excluding enclosure B), air cooling.</td></tr>
<tr><td>Protection degree</td><td>IP20</td></tr>
<tr><td>Cooling method</td><td>Air cooling</td></tr>
</table>

Environment	Operating site	Indoors without direct sunlight, dust, corrosive gas, combustible gas, oil mist, water vapour, drip or salt
	Altitude	⩽1000 m: derating not required; 1000 m < altitude < 3000 m: derated by 1% for every additional 100 m; maximum altitude: 3000 m
	Ambient temperature	-10℃ to +50℃, air temperature change < 0.5℃/min (derating required if the ambient temperature is above 40℃)
	Humidity	5% to 95% RH, non-condensing, no rain, snow and hail, solar radiation < 700 W/m^2, air pressure 70 to 106 kPa
	Vibration	Sine vibration: 2 to 9 Hz, displacement 1.5 mm; 9 to 200 Hz, 5.9 m/s^2 (0.6 g)
	Storage temperature	-30℃ to +70℃, air temperature change < 1℃/min. Maximum 60℃ for long-time storage, 60℃ to 70℃ only for short-time storage.

1.5 Product components



1: Enclosure 2: Encoder board 3: Control box 4: Keypad 5: Expansion box 6: Rubber plug
7: Upper cover 8: Wire fixation bracket 9: Grounding board 10: Fan cover 11: Fan 12: Dustproof plate

Fig. 1-1 Part of components (taking enclosure B as an example)

1.6 Product dimensions

There are seven types of outline dimensions as shown below. The specific outline dimensions, mounting dimensions and gross weight are shown in Table. 1-3. The drawings are only for illustration. For details, check your actual products.

(1) Enclosure B: 2S0.4 kW to 1.5 kW
4T0.75 kW to 4T2.2 kW

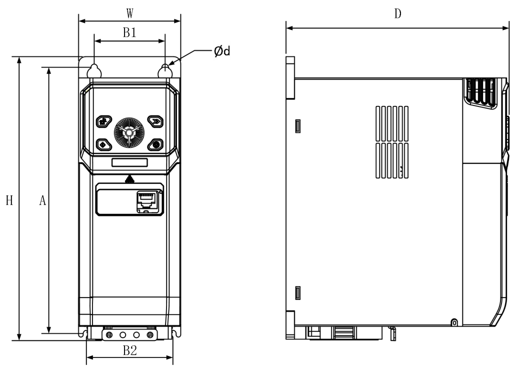


Fig. 1-2 Enclosure B

(2) Enclosure C: 4T3.7 kW / 5.5 kW

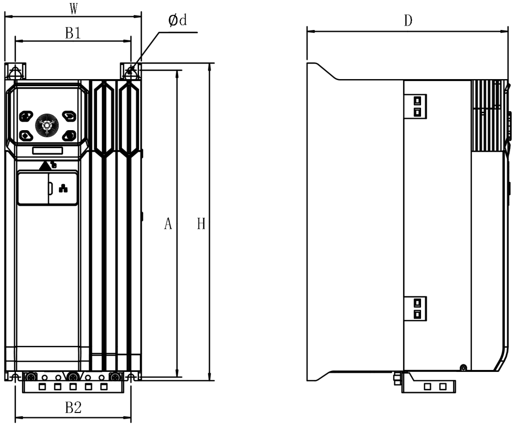


Fig. 1-3 Enclosure C

(3) Enclosure D: 2T3.7/5.5 kW; 4T7.5/11 kW

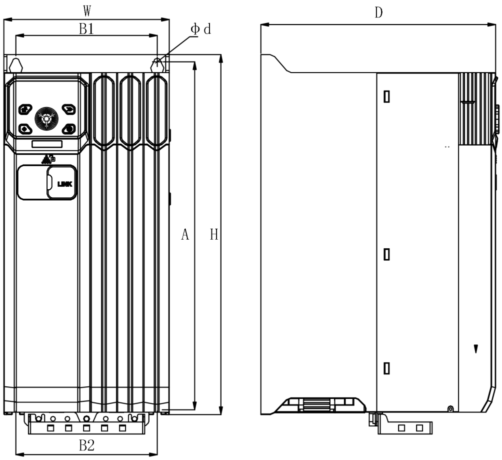


Fig. 1-4 Enclosure D

(4) Enclosure E: 4T15/18.5 kW

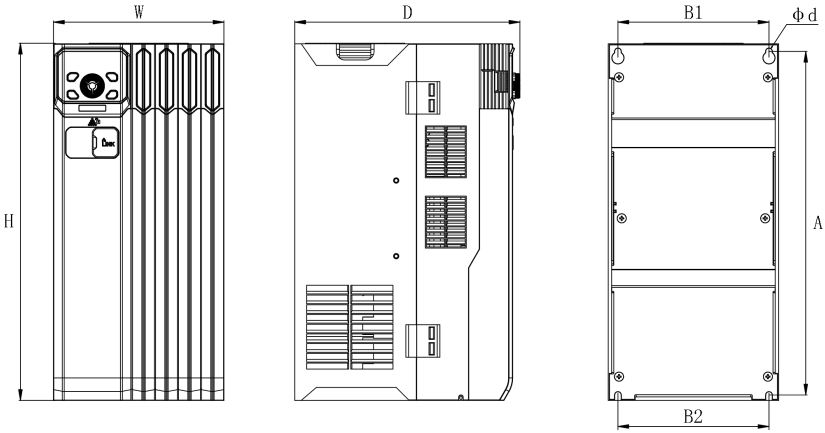


Fig. 1-5 Enclosure E

(5) Enclosure F: 4T22/30 kW

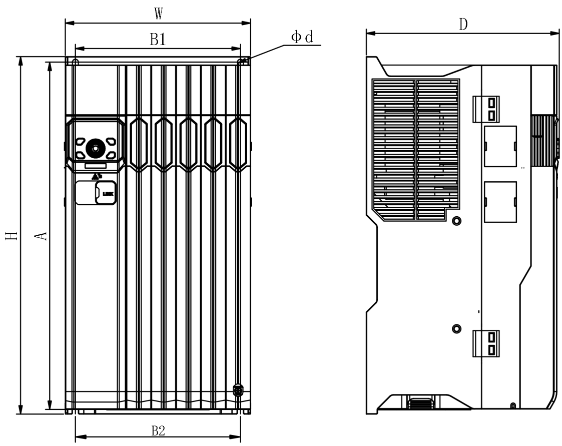


Fig. 1-6 Enclosure F

(6) Enclosure G: 4T37/45/55 kW

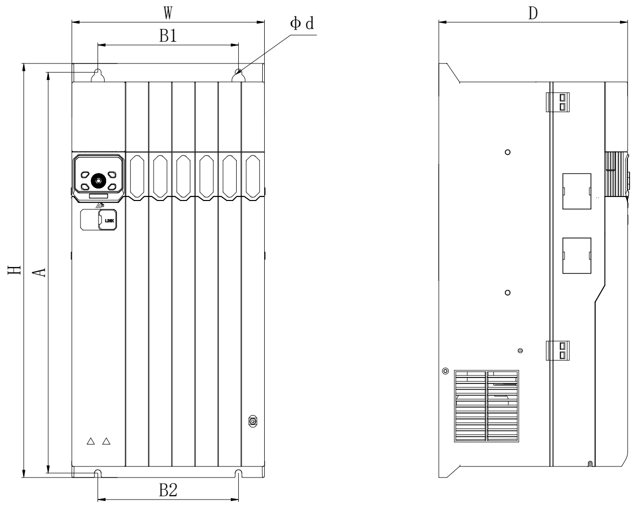


Fig. 1-7 Enclosure G

(7) Enclosure H: 4T75 kW

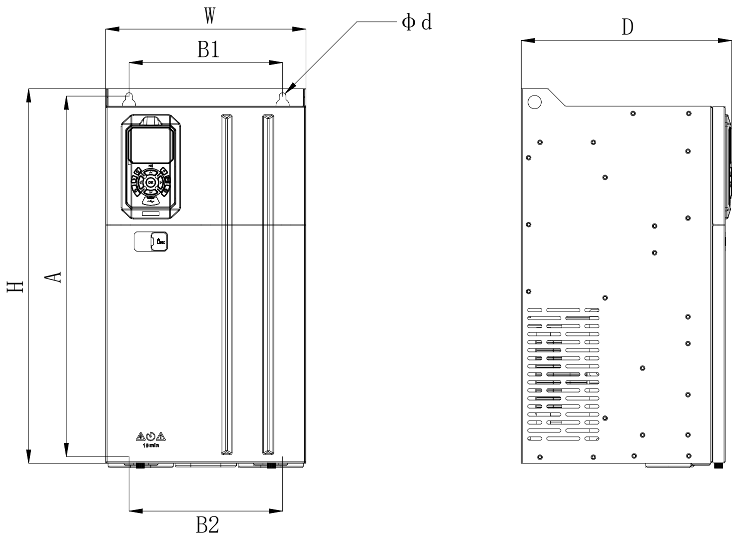


Fig. 1-8 Enclosure H

Table 1-3 Outline, mounting dimensions and gross weight

Enclosure model	Drive model	A (mm)	B1 (mm)	B2 (mm)	H (mm)	W (mm)	D (mm)	Mounting hole diameter (mm)	Gross weight± 0.5 (kg)
Enclosure B	MV820E-2S0.4	187.5	50	61	200	72	158.5	4.5	1.4
	MV820E-2S0.75								
	MV820E-2S1.5								
	MV820E-4T0.75								
	MV820E-4T1.5								
	MV820E-4T2.2								
Enclosure C	MV820E-4T3.7	259	97.5	97.5	267	115	171	5	2.5
	MV820E-4T5.5								
Enclosure D	MV820E-2T3.7	290	118	118	300	138	195.92	6	4.1
	MV820E-2T5.5								
	MV820E-4T7.5								
	MV820E-4T11								
Enclosure E	MV820E-4T15	318	140	140	330	158	204.8	6	6.5
	MV820E-4T18.5								
Enclosure F	MV820E-4T22	412	196	196	424	220	229	7	15
	MV820E-4T30								
Enclosure G	MV820E-4T37	542	190	190	560	260	255	9	20
	MV820E-4T45								
	MV820E-4T55								
Enclosure H	MV820E-4T75	539	230	230	560	300	315	10	30

1.7 Operating panel dimensions

(1) MV820-DP01 as the standard configuration for AC drives within 55 kW (included)

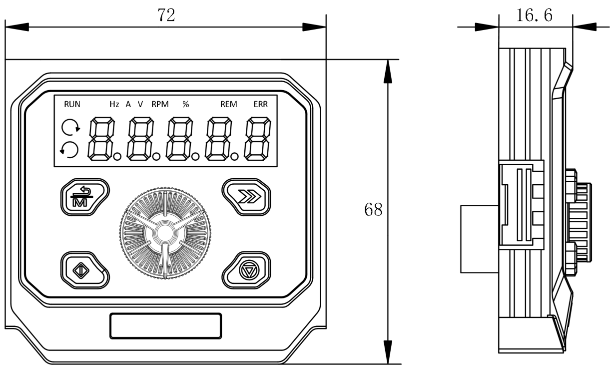


Fig. 1-9 MV820-DP01 appearance and mounting dimensions (unit: mm)

(2) MV820-DP02 as the standard configuration for the 75 kW AC drive

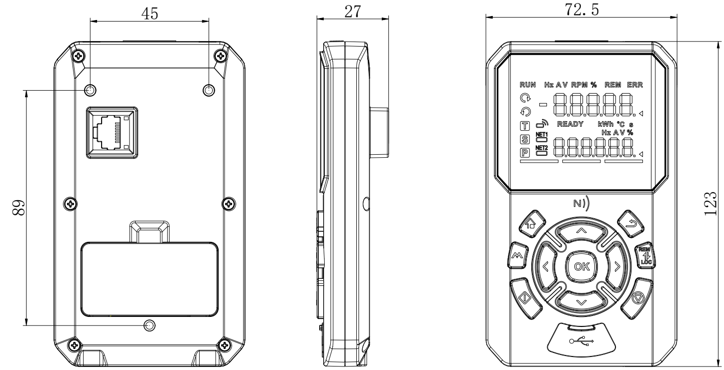


Fig. 1-10 MV820-DP02 appearance and mounting dimensions (unit: mm)

WARNING

(1) A removable small LED keypad (with a shuttle button) or large keypad (small or large depending on the drive power) is the standard configuration for MV820E, which supports external use. If you want to add a remote LCD keypad, refer to 2.2.8.

(2) An RJ45 port is reserved for an external keypad.

Chapter 2 Options and Accessories

The options and accessories introduced in this manual include accessory cards, bus options, IO options and others. You can purchase them individually or purchase the AC drive with attached options and accessories by consulting the local distributor. During installation and use, follow the corresponding steps to avoid damage to the drive.

To clarify, the options in this manual refer to IO, CAN and the like with an expansion box (refer to 1.5 Fig. 1-1) while the accessory cards refer to independent PCBA boards without an expansion box, such as encoder cards.

2.1 Accessory cards/options

The entire MV820E series supports a wide range of expansions, such as CANopen, Modbus, I/O and encoder expansions, capable for scenarios requiring excellent control performance and multi-unit network.

MV820E provides three kinds of PG cards, as shown in the following table.

Table 2-1 Encoder card description

Encoder card	Function
MV820E-PG-P ABZ encoder card with frequency-division output	Supports differential ABZ input and open-collector input; Supports pulse frequency-division output; Applicable for FVC of asynchronous motors.
MV820E-PG-S Sin/Cos encoder card with frequency-division output	Supports Sin/Cos encoder signal input; Supports pulse frequency-division output; Applicable for FVC of synchronous motors.
MV820E-PG-F Serial communication encoder card with frequency-division output	Supports serial communication signal input; Supports pulse frequency-division output; Applicable for FVC of synchronous motors.

2.1.1 Installation of accessory cards/options

2.1.1.1 Installation position

MV820E provides two positions for accessory cards and options, as shown in Fig. 2-1 position 1 and position 2 (taking enclosure B as an example, similar for other enclosures), where position 1 is for the installation of various PG cards and position 2 is for the installation of various bus options, I/O options, and so on.

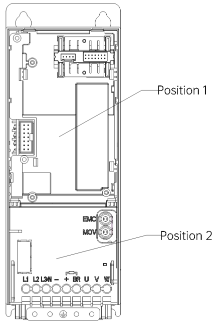


Fig. 2-1

2.1.1.2 Installation interfaces

The electrical interfaces of accessory cards/options connected to the drive are shown in Fig. 2-2.

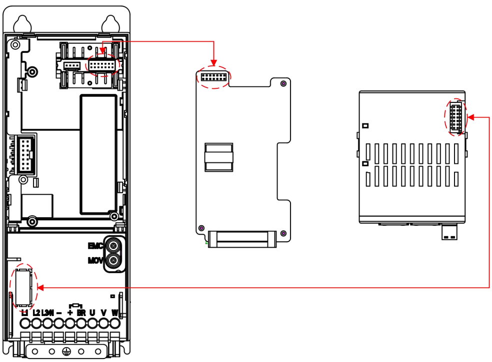


Fig. 2-2 Electrical interfaces

2.1.1.3 Installation steps for accessory cards at position 1

Installation method: reverse side mounting for the accessory card (PG card)

(1) When the drive is powered off, press the granulated part on the middle-upper of the lower cover, slide it down firmly to take down the cover, as shown in Fig. 2-3 a.

(2) Use a straight screwdriver to pry open the two snap-fit joints between the control box and the drive, and then remove the control box upwards, as shown in Fig. 2-3 b and c.

(3) Install the PG card: hold the PG card with its terminal block downwards, then align the three round holes on the PG card with the location column, and press down to buckle the PG card firmly into the four snap-fit joints, as shown in Fig. 2-3 d.

(4) After the PG card is installed, align the control box with the snap-fit joints, and press down the control box to make its lower part firmly buckled, then slide the lower cover to lock it on the drive, as shown in Fig. 2-3 e and f.

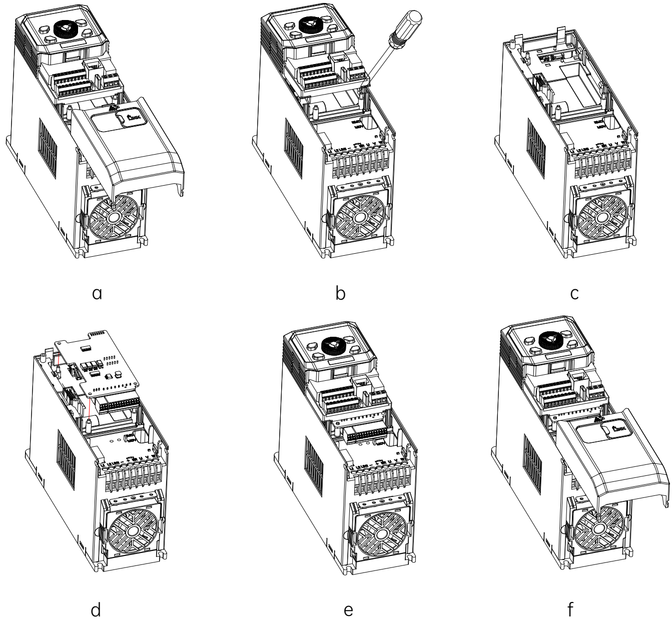


Fig. 2-3 Position 1 - PG card installation steps

2.1.1.4 Installation steps for options at position 2

Installation method: front side mounting for the option (IO options)

(1) When the drive is powered off, press the granulated part on the middle-upper of the lower cover, slide it down firmly to take down the cover, as shown in Fig. 2-4 a.

(2) Use a straight screwdriver to pry open the dustproof cap, as shown in Fig. 2-4 b.

(3) Install the IO option: hold the expansion box (with the IO card inside) upwards (terminals upwards), then align the expansion box with the electrical interface of position 2, and press down horizontally to buckle the spring snap of the expansion box into the groove at the lower part of the drive, as shown in Fig. 2-4 c and d.

(4) The IO card is successfully installed, as shown in Fig. 2-4 e.

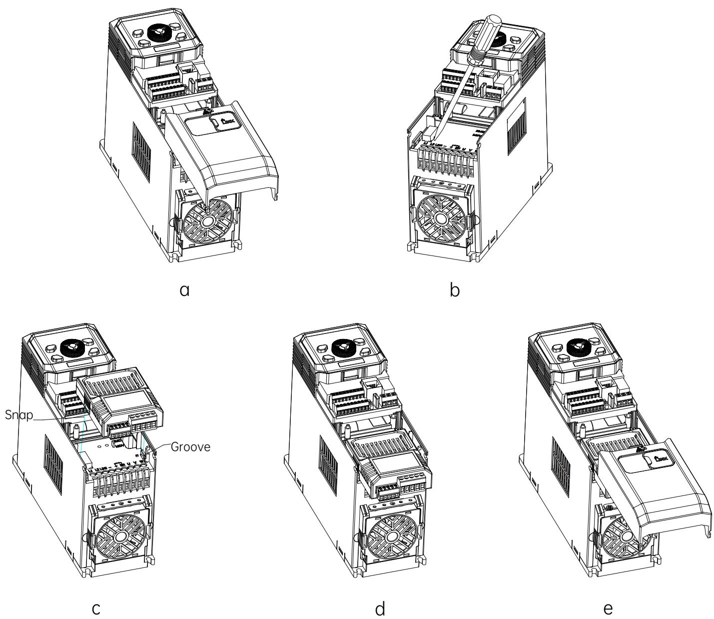


Fig. 2-4 Position 2 - IO option installation steps

2.1.2 MV810-IO01: Simple IO option

2.1.2.1 Product appearance

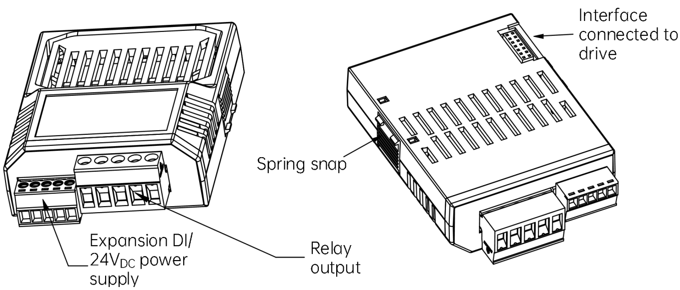


Fig. 2-5 Components and terminals

2.1.2.2 Technical specifications

Table 2-2 MV810-IO01 terminal functions

Name	Terminal Mark	Specifications
Simple IO option	DI1 to DI3	Multi-function input terminals, set by P41.00–P41.02; Support NPN/PNP input, set by P41.03, active level: 9 V to 30 V; Power supplied by the option's terminal (24V_{DC}) or external 24 VDC (see wiring details in 4.2.2.4); Support filter and switch-on/off delay.
	RO1, RO2	Multi-function output terminals, set by P41.13–P41.14; RO1 contains one TA1/TB1 (normally closed), one TA1/TC1 (normally open), contact capacity: 250 VAC / 3 A, 30 VDC / 3 A; RO2 contains one TA2/TC2 (normally open), contact capacity: 250 VAC / 3 A, 30 VDC / 3 A; Support output polarity and switch-on/off delay, see 4.2.2.6 for wiring details.
	24 V, GND	Power output: +24 V_{DC}, ±5%, < 200 mA

2.1.2.3 Installation

Accessory list

Accessory list	Specifications	Number

Accessory list	Specifications	Number
MV810-IO01	75 × 60 × 24 mm	1
User manual	A4 × 1	1

For installation, refer to "2.1.1 Installation of accessory cards/options" for details.

2.1.3 MV820E-PG-P: Incremental ABZ encoder card with frequency-division output

MV820E supports the simple incremental PG card.

Pay close attention to the drive model you ordered.

See 4.2.2.7 for wiring details of the incremental PG card.

2.1.3.1 Function description

MV820E-PG-P is an accessory card of MV820E series, which provides encoder interfaces, supports differential ABZ input and open-collector input, and serves as the speed or position feedback.

2.1.3.2 Product appearance

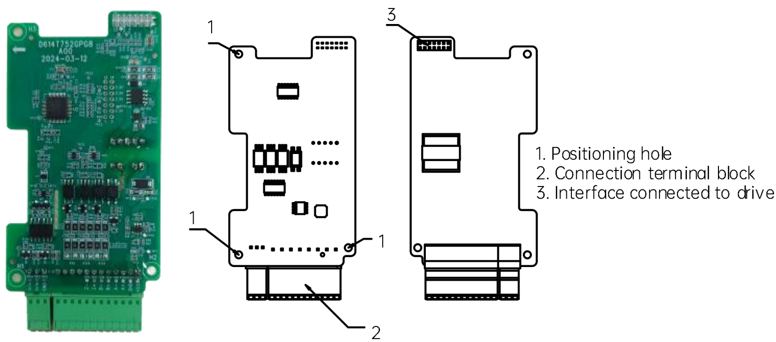


Fig. 2-6 Components and terminals

2.1.3.3 Terminal description

The following figure shows the terminal marks on MV820E-PG-P.

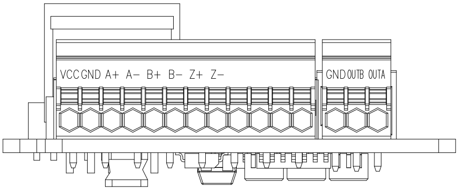


Fig. 2-7 Terminal mark

The following table lists the terminal functions of MV820E-PG-P.

Table 2-3 PG-P terminal functions

Type	Mark	Name	Function	Specifications
Encoder card	A+, A-	Encoder phase A signal	Encoder phase A differential input signal	Maximum input frequency ≤ 250 kHz
	B+, B-	Encoder phase B signal	Encoder phase B differential input signal	
	Z+, Z-	Encoder phase Z signal	Encoder phase Z differential input signal	
	VCC, GND	Encoder power supply	Provides power supply for external encoders (reference ground GND) 5 V or 12 V set by P04.04	Output voltage: +5 V/12 V Maximum output current: 200 mA/150 mA

Table 2-4 Frequency-division output terminal functions

Type	Mark	Function	Specifications
Encoder card	OUTA	Frequency-division output A signal	NPN-type OC output
	OUTB	Frequency-division output B signal	
	GND	Frequency-division output signal GND	/

2.1.4 MV820E-PG-S: Sin/Cos encoder card with frequency-division output

MV820E supports the Sin/Cos encoder card with frequency-division output. Pay close attention to the drive model you ordered. See 4.2.2.7 for wiring details of the Sin/Cos encoder card with frequency-division output.

2.1.4.1 Function description

MV820E-PG-S is an accessory card of MV820E series, which provides encoder interfaces, supports Sin/Cos encoder signal input, and serves as the speed or position feedback.

2.1.4.2 Product appearance

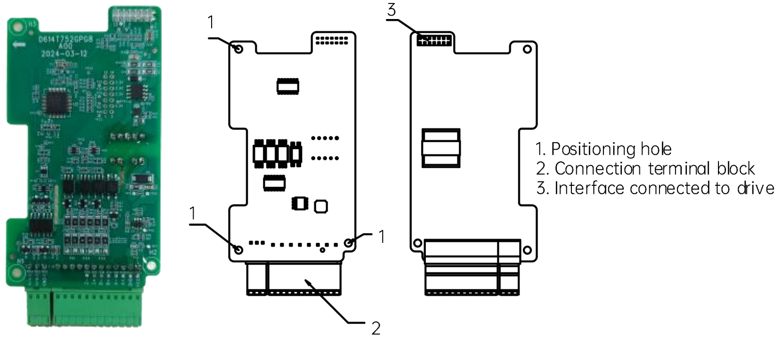


Fig. 2-8 Components and terminals

2.1.4.3 Terminal description

The following figure shows DB15 terminals of MV820E-PG-S.

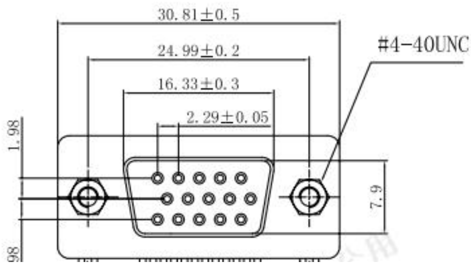


Fig. 2-9 DB15 of MV820E-PG-S

The following table lists DB15 terminal functions of MV820E-PG-S.

Table 2-5 PG-S terminal functions

No.	Name	Function	Note
9	VCC	Encoder power supply	/
7	GND		
5	A+	Encoder A+ input signal	/
6	A-	Encoder A- input signal	/
8	B+	Encoder B+ input signal	/
1	B-	Encoder B- input signal	/
10	C+	Encoder C+ input signal	/
11	C-	Encoder C- input signal	/
12	D+	Encoder D+ input signal	/
13	D-	Encoder D- input signal	/

No.	Name	Function	Note
3	R+	Encoder R+ input signal	/
4	R-	Encoder R- input signal	/

Table 2-6 Frequency-division output terminal functions

Type	Mark	Function	Specifications
Encoder card	OUTA	Frequency-division output A signal	NPN-type OC output
	OUTB	Frequency-division output B signal	
	GND	Frequency-division output GND signal	/

WARNING

For the AC drive equipped with MV820E-PG-S, PG terminals (DB15 and frequency-division output terminals) are extended out through cables for wiring.

2.1.5 MV820E-PG-F: Serial communication encoder card with frequency-division output

MV820E supports the serial communication encoder card with frequency-division output. Pay close attention to the drive model you ordered. See 4.2.2.7 for wiring details of the serial communication encoder card with frequency-division output.

2.1.5.1 Function description

MV820E-PG-F is an accessory card of MV820E series, which provides encoder interfaces, supports serial communication encoder signal input, and serves as the speed or position feedback.

2.1.5.2 Product appearance

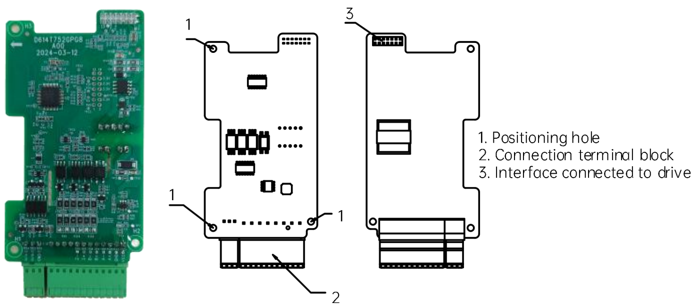


Fig. 2-10 Components and terminals

2.1.5.3 Terminal description

The following figure shows DB15 terminals of MV820E-PG-F.

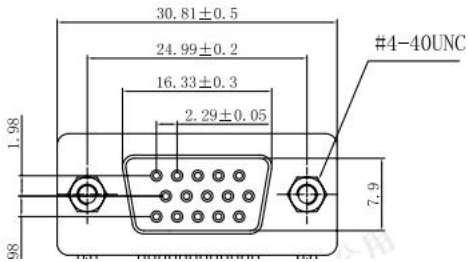


Fig. 2-11 DB15 of MV820E-PG-F

The following table lists DB15 terminal functions of MV820E-PG-F.

Table 2-7 PG-F terminal functions

No.	Name	Function	Note
9	VCC	Encoder power supply	/
7	GND		
5	A+	Encoder A+ input signal	/
6	A-	Encoder A- input signal	/
8	B+	Encoder B+ input signal	/
1	B-	Encoder B- input signal	/
10	CLK+	Encoder C+ input signal	/
11	CLK-	Encoder C- input signal	/
12	DATA+	Encoder D+ input signal	/
13	DATA-	Encoder D- input signal	/

Table 2-8 Frequency-division output terminal functions

Type	Mark	Function	Specifications
Encoder card	OUTA	Frequency-division output A signal	NPN-type OC output
	OUTB	Frequency-division output B signal	
	GND	Frequency-division output signal GND	/

WARNING

For the AC drive equipped with MV820E-PG-F, PG terminals (DB15 and frequency-division output terminals) are extended out through cables for wiring.

2.2 Other accessories

MV820E also has other accessories, including components for protection, installation and maintenance, remote LED and LCD keypads, as shown below:

2.2.1 Dustproof kit

MV810-FHJ is a dustproof kit which consists of four covers, large or small, packaged as a whole. It can keep out dust, oil mist and particles in harsh environments. See the following figure (marked in green).

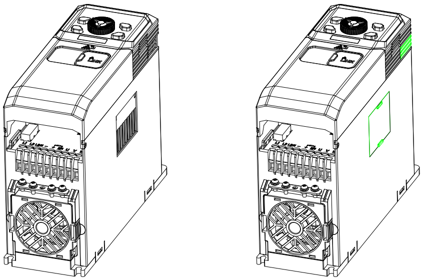
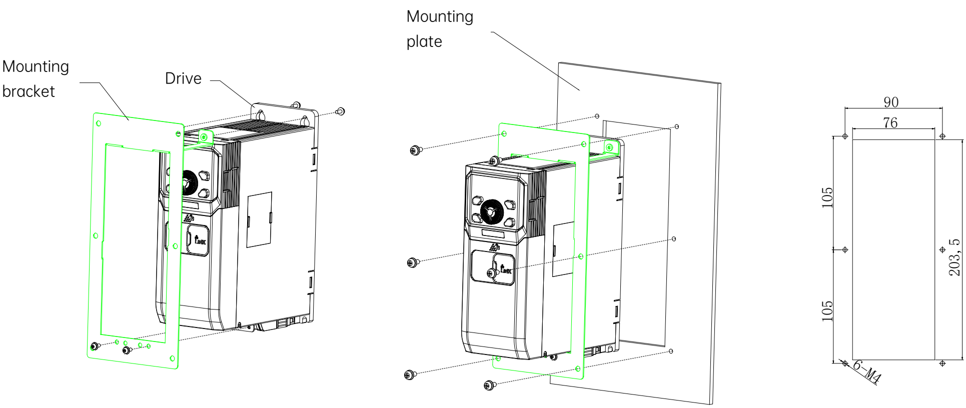


Fig. 2-12 Dustproof covers

2.2.2 Embedded mounting bracket kit

MV810-EMBB, MV810-EMBC and MV810-EMBD are bracket kits for embedded mounting of drives corresponding to enclosures B, C and D. They can improve the airduct design, create independent heat dissipation, and keep out dust, oil mist and particles. See the following figure (marked in green) to learn how to install.



Mount the bracket

Mount the drive

Hole dimensions

Fig. 2-13 MV810-EMBB embedded mounting bracket kit

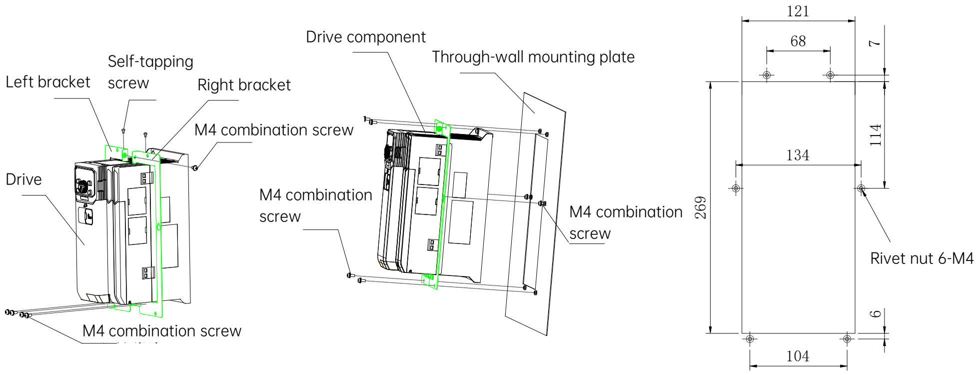


Fig. 2-14 MV810-EMBC embedded mounting bracket kit

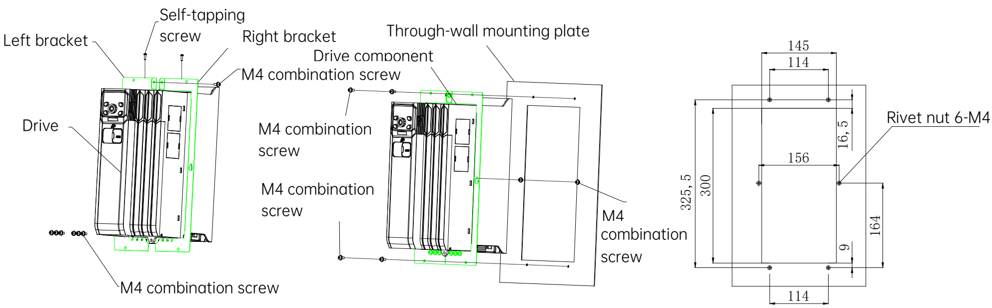


Fig. 2-15 MV810-EMBD embedded mounting bracket kit

2.2.3 Reinforced metal bottom plate

MV810-METB, MV810-METC and MV810-METD are reinforced metal bottom plates corresponding to enclosures of B, C and D. They can reinforce the drive in corrosive environments with high temperature and oil mist. They can be installed through the countersunk head screws included in the accessory package, as shown in the following figure (marked in green).

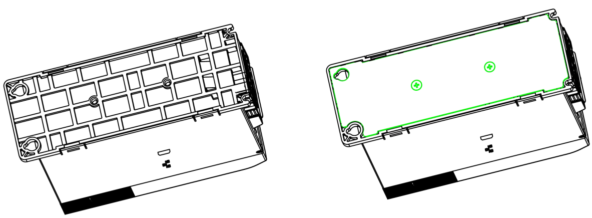


Fig. 2-16 Reinforced metal bottom plate

2.2.4 Wire fixation bracket

MV810-FIXB，MV810-FIXC，MV810-FIXD are brackets for wire management corresponding to enclosures of B, C and D. The brackets are used for re-fixing input and output wires in order to protect terminals from excessive stress or external impact, and also for stable grounding of the cable shield. They are fixed to the screws on the grounding plate (marked in green), as shown in the following figure.

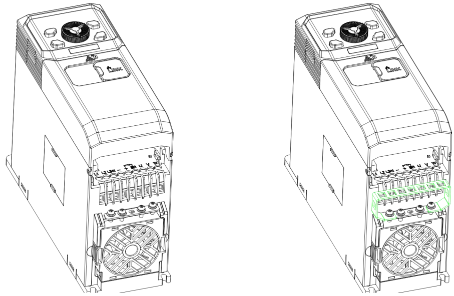


Fig. 2-17 Wire fixation bracket

2.2.5 Guide rail bracket

MV-DIN3563 (only for enclosure B) is a bracket for guide rail installation, with a mounting hole distance of 63 mm, fit for the standard DIN 35 mm guide rail. Fix it to the bottom of a drive, and then fix the drive to a guide rail. The M4*25 countersunk head screws included in the accessory package are used for installation. See the following figure (marked in green).

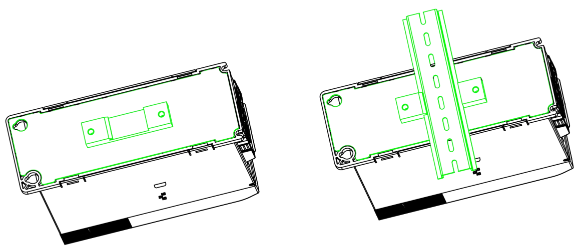


Fig. 2-18 Guide rail bracket

2.2.6 Keypad/Operating panel mounting base

MV800 series AC drive contains both small and large keypad mounting bases, respectively for small keypads and large keypads, as shown below:

Model of small keypad mounting base: MV820-JPT01, used to install a remote small keypad/operating panel to the cabinet door, as shown in the following figure:

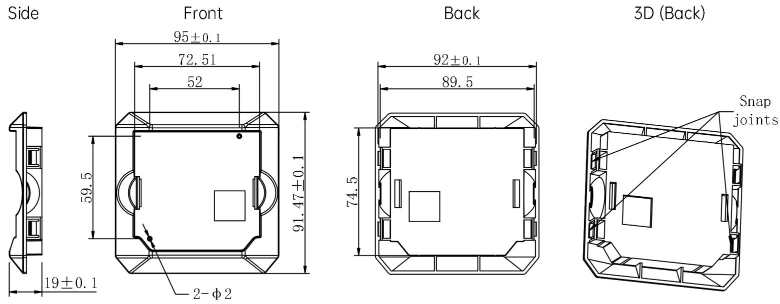


Fig. 2-19　Small keypad mounting base (unit: mm)

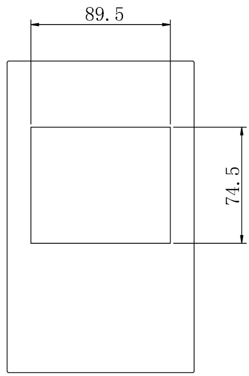


Fig. 2-20　Mounting hole dimensions for operating panel fixed base (unit: mm)

Model of large keypad mounting base: MV820-JPT02, used to install a remote large keypad/operating panel to the cabinet door, as shown in the following figure:

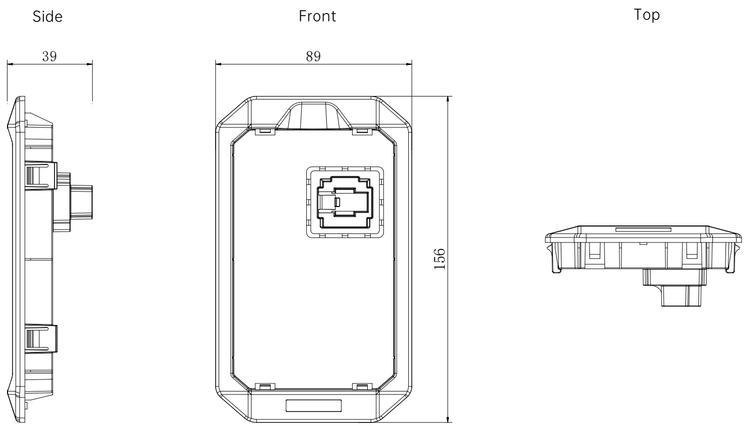


Fig. 2-21　Large keypad mounting base (unit: mm)

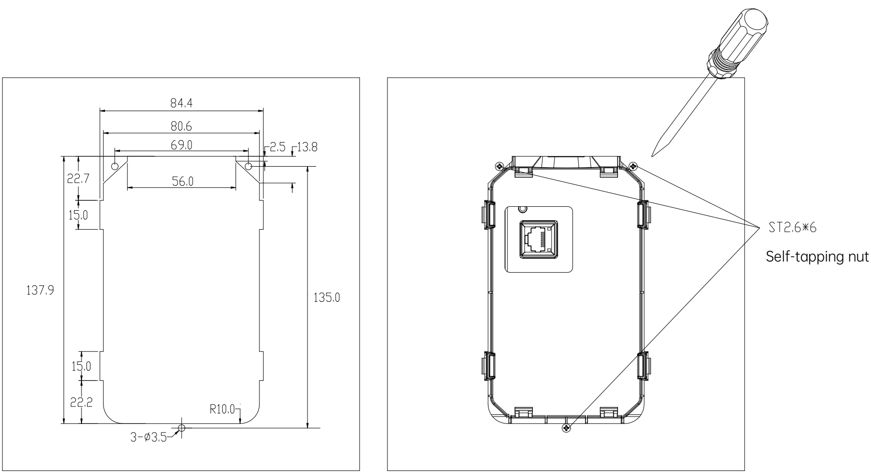


Fig. 2-22 Mounting hole dimensions for large operating panel fixed base (unit: mm)

2.2.7 Remote LED keypad/operating panel (with shuttle)

Remote LED operating panels of MV820E series AC drive can be divided into the small LED panel (with shuttle) and the large LED panel. The former is the standard panel for small- and medium-power drives (55 kW and below) while the latter is the standard panel for large-power drives (75 kW). Both two panels can be used remotely for MV820E.

MV820-DP01, remote small LED operating panel, removable, supporting external use, with the shuttle button, parameter copy function (refer to P00.07) and IP23 protection.

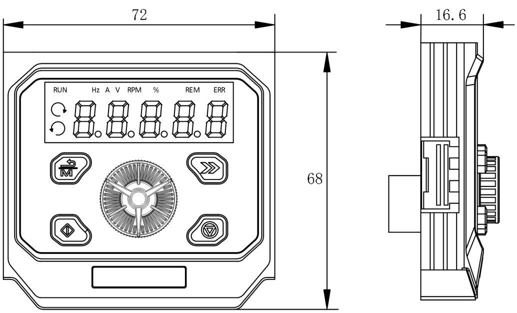


Fig. 2-23 Remote small LED keypad/Operating panel

The remote small LED keypad/operating panel can be fixed to the cabinet door/plate through a mounting base (see 2.2.6 for details); or easily through the two diagonal internal thread holes provided on the back of the remote small LED keypad/operating panel, as shown in the following figure. Hole dimensions (unit: mm):

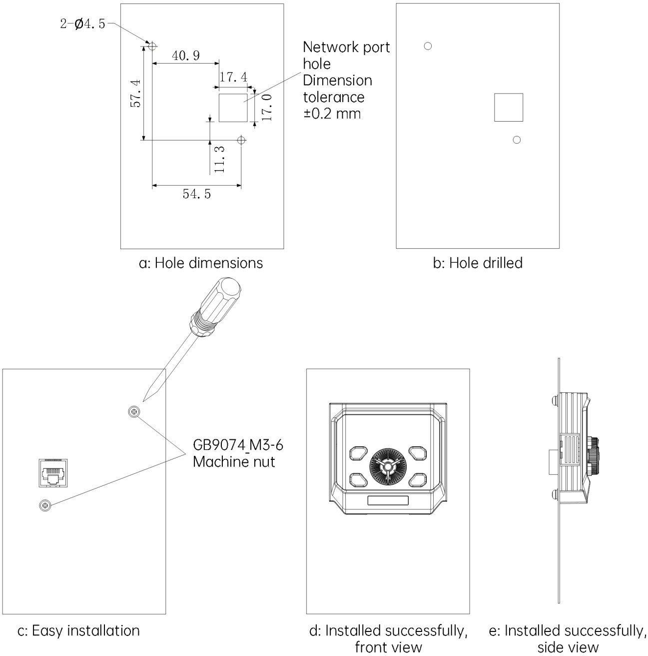


Fig. 2-24 Easy installation of remote small LED keypad/Operating panel

MV820-DP02, remote large LED operating panel, removable, supporting external use, with dual-row LED display, abundant functions along with parameter copy (refer to P00.07) and IP23 protection.

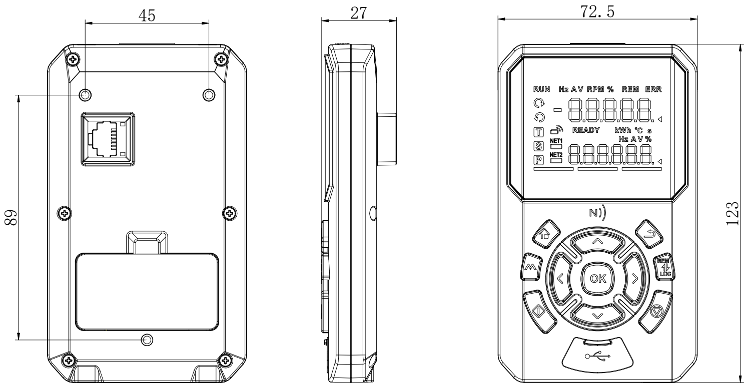
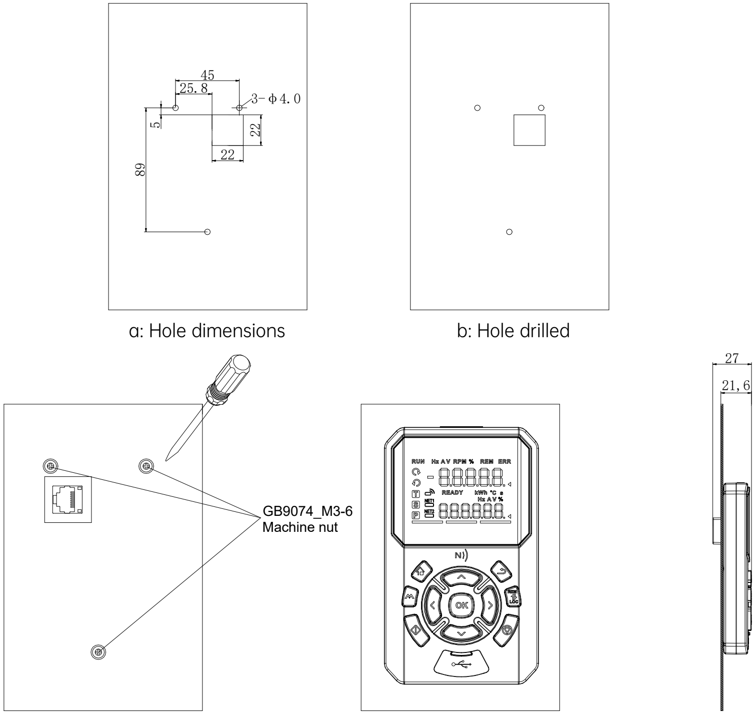


Fig. 2-25 Remote large LED keypad/Operating panel

The remote large LED keypad/operating panel can be fixed to the cabinet door/plate through a mounting base (see 2.2.6 for details); or easily through the two diagonal internal thread holes provided on the back of the remote large LED keypad/operating panel, as shown in the following figure. Hole dimensions (unit: mm):



a: Hole dimensions

b: Hole drilled

c: Easy installation

d: Installed successfully, front view

e: Installed successfully, side view

Fig. 2-26 Easy installation of remote large LED keypad/Operating panel

2.2.8 Remote LCD keypad/operating panel (in development)

MV820E remote LCD panel, IP23 protection.

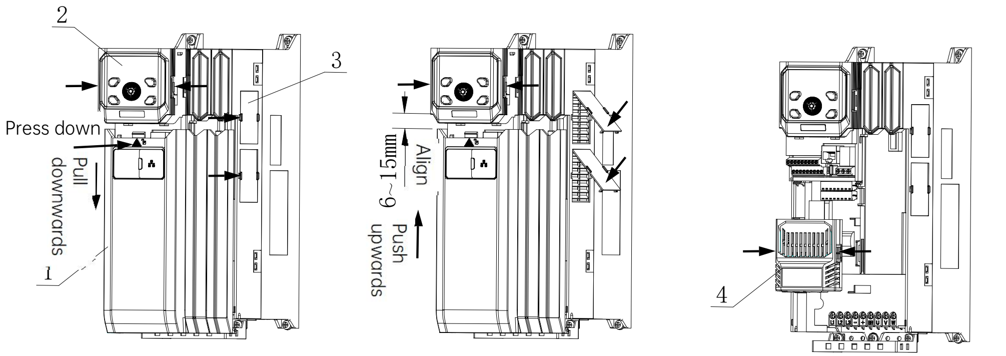
Fig. 2-27 Remote LCD operating panel

2.2.9 Braking unit (see Appendix 2)

The series offers built-in braking units for drives of 75 kW or below. You can select the recommended braking resistors and units by referring to Appendix 2.

Chapter 3 Drive Installation

3.1 Assembly/Disassembly of drive components



1: Cover 2: Operating panel 3: Dustproof plate 4: Expansion box

Fig. 3-1 Assembly and disassembly of drive components (taking enclosure C as an example)

(1) Assembly/Disassembly of the cover

Disassembly: Press down the granulated part of the cover slightly inwards, then pull it downwards until the snap-fit joints of the cover are separated from the drive to remove the cover.

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

(2) Assembly/Disassembly of the dustproof plate

Disassembly: Insert your fingernail or a flat screwdriver to the groove of the dustproof plate, and pry the dustproof plate.

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

(3) Assembly/Disassembly of the expansion box

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

Assembly: Hold the expansion box, slightly press the spring snap, adjust its location, and release your hands, then the spring snap is buckled successfully.

3.2 Installation environment

To choose the installation place, follow the below instructions:

- Ambient temperature: -10℃ to 50℃, derating required if the ambient temperature is 40℃ to 50℃;
- Ambient humidity: 5% to 95% RH, non-condensing;
- Install the product in a place with the vibration less than 5.9 m/s^2 (0.6g);
- Do not install the product in a place with direct sunlight;
- 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 and explosive gases.

If you have any special installation requirements, consult us before installation.

3.3 Installation direction and gap

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

The specific gap distance is shown in Fig. 3-2.

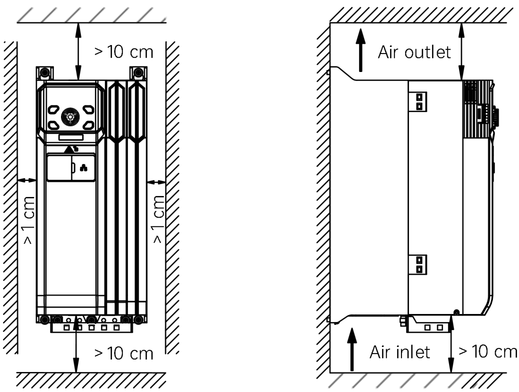


Fig. 3-2 Gap distance for vertical installation

Besides the installation through screws, MV820E Size A/B also support installation through a guide rail (needs to operate with a guide rail bracket, referring to 2.2.5), as shown in Fig. 3-3.

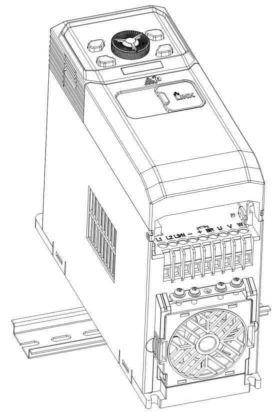


Fig. 3-3 Guide rail installation

If two or more drives are installed closely up and down, for better heat dissipation, it is recommended to use a baffle plate to redirect the flow, preventing the lower drive from affecting the upper drive, as shown in Fig. 3-4.

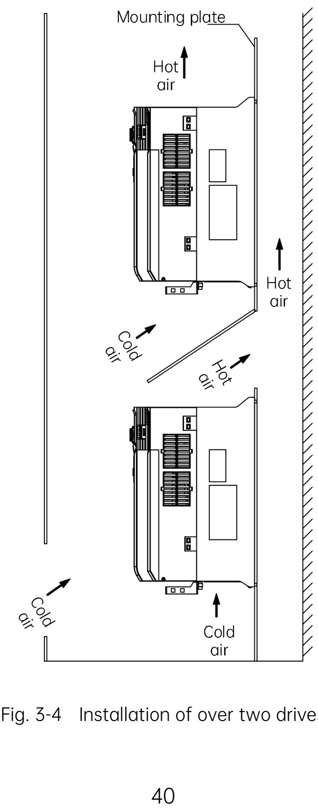


Fig. 3-4 Installation of over two drives

Chapter 4 Drive Wiring

This chapter explains the wiring and related precautions.

DANGER

- Ensure that the drive's power supply is completely cut off and wait for at least 10 minutes before you open the cover of the drive.
- Ensure that the panel indicator (5-digit LED) of the drive is off and the voltage between + and − of the main circuit is below 36 VDC before you start to wire.
- The internal wiring of the drive can only be conducted by trained and qualified professionals.
- When connecting the emergency stop circuit or the safe circuit, check the wiring carefully before and after operation.
- Check the voltage class of the drive before power-on. Otherwise, personal injuries and equipment damage may occur.

WARNING

- Before use, check carefully whether the rated input voltage of drive is consistent with the voltage of the AC power supply.
- The drive has passed the withstand voltage test in the factory, so do not perform the withstand voltage test again.
- If you need to connect an external braking resistor, see the first chapter.
- Do not connect the power cord to U, V and W.
- The grounding cable is generally a copper wire with the diameter more than 3.5 mm and the ground resistance less than 10 Ω.
- There is current leakage in the drive. The specific value of leakage is determined by the actual condition. To ensure safety, the drive and the motor must be grounded. A residual current device (RCD) is strongly required. It is recommended to choose the B model of RCD with the leakage current limit of 300 mA.
- To provide input overcurrent protection and power-off maintenance, the drive needs to be connected to the power supply through an air switch or a fuse cutout.

You can use the following diagram in Fig. 4-1 during trial operation.

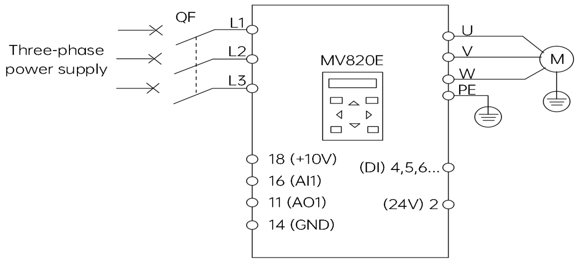
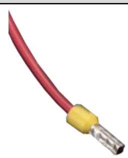
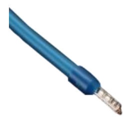


Fig. 4-1 Simple wiring of the main circuit (for three-phase models)

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

Table 4-1 Recommended cables

Type	Cable	Drawing	Type	Cable	Drawing
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

MV820E models	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
MV820E-2S0.4	1.0	1.0	0.5	1.7	1.8	1.3
MV820E-2S0.75	1.5	1.5	0.5	2.0	2.0	1.3
MV820E-2S1.5	2.5	2.5	0.5	2.6	2.6	1.3
MV820E-4T0.75	1	1	0.5	1.8	1.8	1.3
MV820E-4T1.5	1.5	1.5	0.5	2.0	2.0	1.3

MV820E models	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
MV820E-4T2.2	1.5	1.5	0.5	2.0	2.0	1.3
MV820E-4T3.7	2.5	2.5	0.5	2.6	2.6	1.3
MV820E-4T5.5	4	4	0.5	3.2	3.2	1.3
MV820E-2T3.7	6	6	0.5	3.9	3.9	1.3
MV820E-2T5.5	6	6	0.5	3.9	3.9	1.3
MV820E-4T7.5	6	6	0.5	3.9	3.9	1.3
MV820E-4T11	6	6	0.5	3.9	3.9	1.3
MV820E-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	MV820E models	Main circuit terminals			Control circuit terminals
		L1, L2, L3, N	U, V, W, ⏚	+, -, BR	1–18
B	MV820E-2S0.4 MV820E-2S0.75 MV820E-2S1.5 MV820E-4T0.75 MV820E-4T1.5 MV820E-4T2.2	0.5 N·m	0.5 N·m	0.5 N·m	0.2 N·m
C	MV820E-4T3.7 MV820E-4T5.5	0.5 N·m	0.5 N·m	0.5 N·m	0.2 N·m
D	MV820E-2T3.7 MV820E-2T5.5 MV820E-4T7.5 MV820E-4T11	1.5 N·m	1.5 N·m	1.5 N·m	0.2 N·m
E	MV820E-4T15 MV820E-4T18.5	2.8 N·m	2.8 N·m	2.8 N·m	0.2 N·m
F	MV820E-4T22 MV820E-4T30	3.5 N·m	3.5 N·m	3.5 N·m	0.2 N·m
G	MV820E-4T37 MV820E-4T45 MV820E-4T55	4.5 N·m	4.5 N·m	4.5 N·m	0.2 N·m
H	MV820E-4T75	4.5 N·m	4.5 N·m	4.5 N·m	0.2 N·m

WARNING

The torque values in the table are for recommendation. During wiring, using excessive torque to tighten drive screws may cause loose joint or damage.

4.1 Main circuit terminal wiring and description

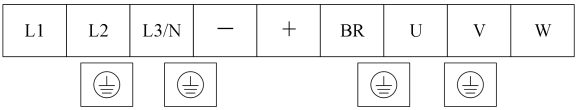
4.1.1 Main circuit input and output terminal types

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

(1) Terminal type 1

Enclosure type: Enclosure B (applicable power: 2S0.4 to 1.5)

Enclosure B (applicable power: 4T0.75 to 2.2)

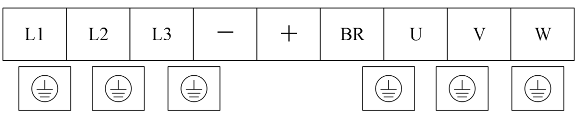


Terminal name	Function description
L1, L2, L3/N	Three-phase 220 VAC input terminals
L1, L3/N	2S models: single-phase 220 VAC input terminals
+, BR	Connected to the external braking resistor
+, -	DC bus terminals
U, V, W	Three-phase AC output terminals
⏚	PE connection terminal, screws used to fix the wire fixation bracket

(2) Terminal type 2

Enclosure type: Enclosure C (applicable power: 4T3.7/5.5)

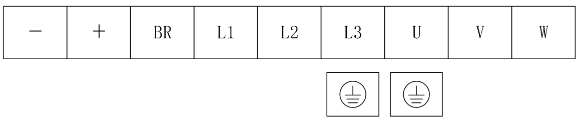
Enclosure D (applicable power: 2T3.7/5.5; 4T7.5/11)



Terminal name	Function description
L1, L2, L3	Three-phase 380 VAC or three-phase 220 VAC input terminals
+, BR	Connected to the external braking resistor
+, -	DC bus terminals
U, V, W	Three-phase AC output terminals
⏚	PE connection terminal, screws used to fix the wire fixation bracket

(3) Terminal type 3

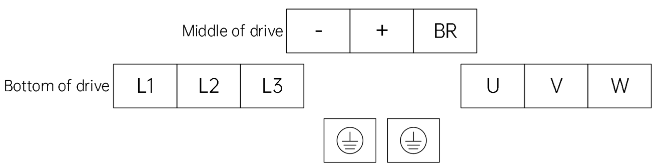
Enclosure type: Enclosure E (applicable power: 4T15/18.5)



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

(4) Terminal type 4

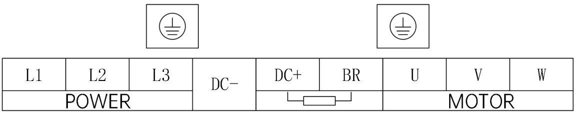
Enclosure type: Enclosure F (applicable power: 4T22/30)



Terminal name	Function description
L1, L2, L3	Three-phase 380 VAC or three-phase 220 VAC input terminals
+, BR	Connected to the external braking resistor
+, -	DC bus terminals
U, V, W	Three-phase AC output terminals
⏚	PE connection terminal

(5) Terminal type 5

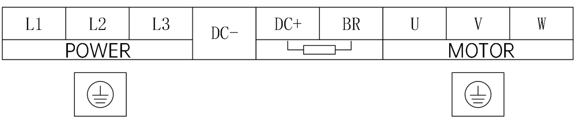
Enclosure type: Enclosure G (applicable power: 4T37/45/55)



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

(6) Terminal type 6

Enclosure type: Enclosure H (applicable power: 4T75)



Terminal name	Function description
L1, L2, L3	Three-phase 380 VAC input terminals
DC+, BR	Connected to the external braking resistor

Terminal name	Function description
DC+, DC-	DC bus terminals
U, V, W	Three-phase AC output terminals
⏚	PE connection terminal

WARNING

(1) For common DC bus applications, the positive and negative poles of the DC input should be connected to + and - separately to achieve power-on buffering of the internal DC bus capacitor of the drive.

(2) Connect the wire fixation bracket to the grounding plate through two PE terminals.

4.1.2 Connection of drive and accessories

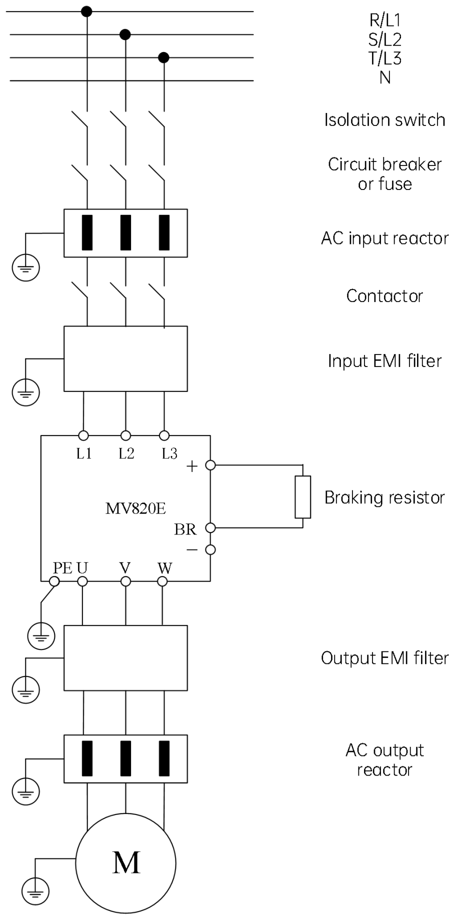


Fig. 4-2 Connection of drive and accessories (taking three-phase models as the example)

(1) A de-energizing device such as an isolation switch must be installed between the power grid and the drive to ensure personal safety during equipment maintenance.

(2) In North America, a time-delay fuse must be used before the drive (FUSE current rating is 225% of the maximum full-load output current) to avoid fault extension to downstream devices. Refer to Table 4-3 for fuse selection.

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

MV820E models	Input line protection	Main circuit (mm^2)		Control circuit (mm^2)
	Fuse (A)	Input cable	Output cable	Control terminal cable
MV820E-2S0.4	10	1.0	1.0	0.5
MV820E-2S0.75	15	1.5	1.5	0.5
MV820E-2S1.5	20	2.5	2.5	0.5
MV820E-4T0.75	10	1	1	0.5
MV820E-4T1.5	10	1.5	1.5	0.5
MV820E-4T2.2	15	1.5	1.5	0.5
MV820E-4T3.7	30	2.5	2.5	0.5
MV820E-4T5.5	40	4	4	0.5
MV820E-2T3.7	40	6	6	0.5
MV820E-2T5.5	70	6	6	0.5
MV820E-4T7.5	60	6	6	0.5
MV820E-4T11	70	6	6	0.5
MV820E-4T15	70	6	6	0.5
MV820E-4T18.5	100	10	10	0.5
MV820E-4T22	125	16	16	0.5
MV820E-4T30	125	25	25	0.5
MV820E-4T37	150	25	25	0.5
MV820E-4T45	200	35	35	0.5
MV820E-4T55	250	35	35	0.5
MV820E-4T75	275	70	70	0.5
Note: The parameter values in the table are for recommendation.				

(3) When the contactor is used for power supply control, do not use the contactor to control 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 still cannot meet the requirements after the drive is configured with a DC reactor, an AC input reactor can be added. The AC input reactor can also improve the power factor at the input end of the drive.

(5) AC output reactor

When the distance between the drive and the motor exceeds 80 meters, it is recommended to use multi-paired cables and install an AC output reactor that can suppress the high-frequency oscillation, so as to avoid motor insulation damage, excessive leakage current and frequent drive protection.

(6) Input EMI filter

An EMI filter is optional to suppress high-frequency noise interference emitted from the power cable of the drive.

(7) Output EMI filter

An EMI filter is optional to suppress noise interference and wire leakage current generated at the output end 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 ground resistance should be less than 10 Ω. The grounding cable should be made as short as possible and its diameter should comply with the standards in Table 4-4.

Note: The values in the table are correct only when the same metal is used for both two conductors. If not, the cross sectional area of the protective conductor should be determined by 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 should be installed close to the drive.

4.1.3 Basic operation wiring

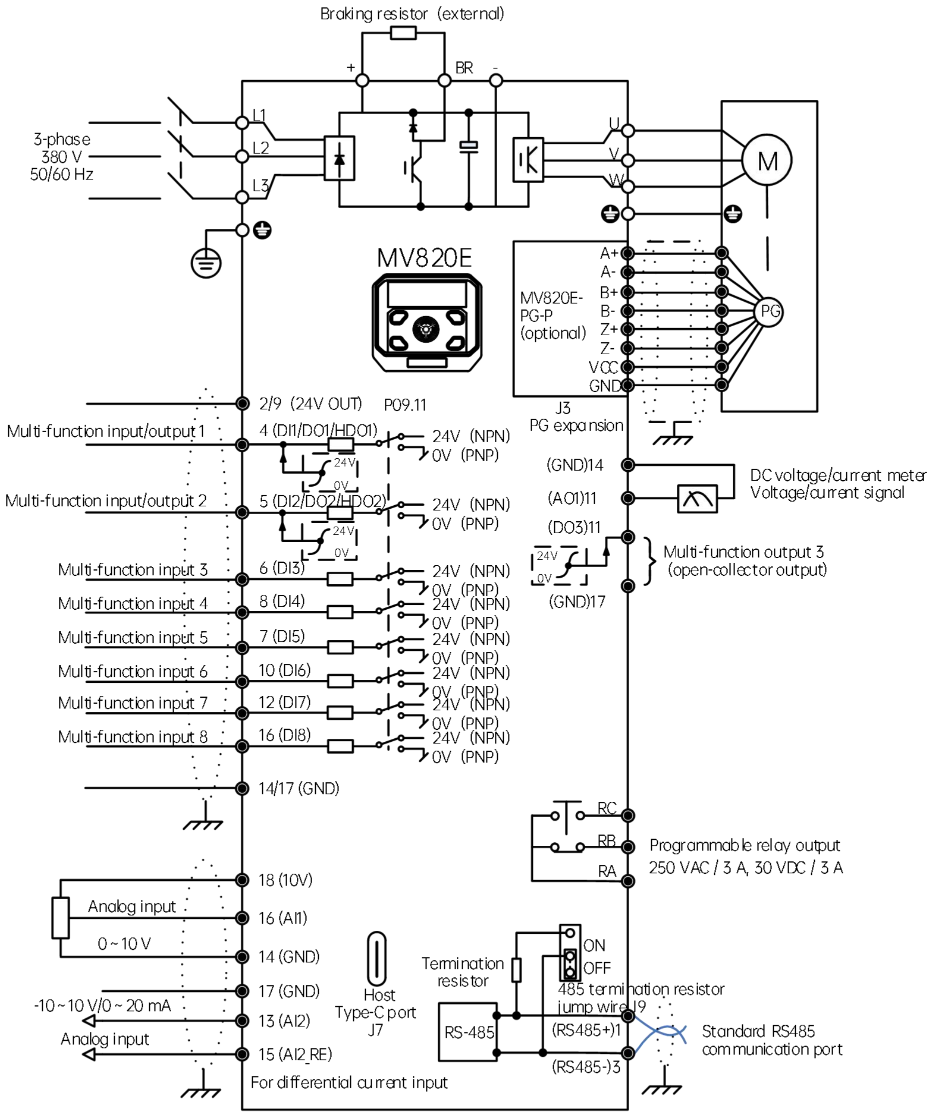


Fig. 4-3 Basic wiring diagram 1

Notes:

(1) The GND terminal should be connected to the 0 V of an external device.

(2) AI1 and AI2 can be set to input voltage signals or current signals through the function codes P09.01 and P09.02.

(3) AO1 can be set to output voltage signals or current signals through the function code P09.02.

(4) If external braking components are required, an external braking resistor should be connected. See the model selection of braking resistors in the Appendix 2.

(5) In the figure, "○" means main circuit terminals and "⦿" means control circuit terminals.

(6) To use control circuit terminals, refer to section 4.2.

(7) The above basic wiring figure takes a three-phase model as the example. The actual wiring depends on the specific model.

4.2 Control circuit terminal wiring and description

4.2.1 Control circuit terminal layout

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

Fig. 4-4 Control circuit terminal layout

4.2.2 Control circuit terminal wiring

WARNING

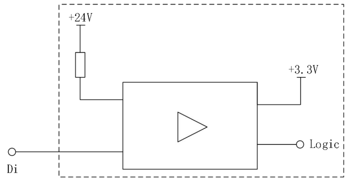
It is recommended to use wires above 0.5 mm^2 for connection of control circuit terminals.

The terminal functions are shown in Table 4-5.

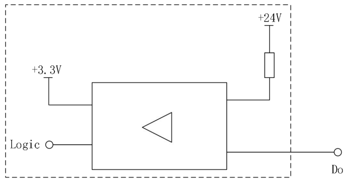
Table 4-6 Terminal functions of the interface board

Type	Mark	Name	Function description	Specifications
Communication	1	RS485	485 differential signal positive (reference ground: GND)	Standard RS485 communication port Use twisted pair cables or shielded cables
	3		485 differential signal negative (reference ground: GND)	

Type	Mark	Name	Function description	Specifications
Power supply	2/9	+24 V power supply	+24 V reference power output	Permissible maximum output current 200 mA (the total current with all digital outputs included)
	18	+10 V power supply	+10 V reference power output	Permissible maximum output current 10 mA
	14/17	+24 V, +10 V power ground	Reference GND of +24 V and +10 V	Reference 0 V for digital input/output, analog input/output and communication signals
Analog input	16	Analog single-ended input AI1	Receives analog voltage or current single-ended input. You can choose voltage or current analog input through the 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	Receives analog voltage or current single-ended input, or current differential input. You can choose voltage or current analog input through the 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, you need to connect this terminal to GND.	Input current: 0 mA to 20 mA (input impedance: 10 Ω), resolution: 1/4000, supporting differential input

<table>
<tr><th>Type</th><th>Mark</th><th>Name</th><th>Function description</th><th>Specifications</th></tr>
<tr><td>Analog output</td><td>11</td><td>Analog output AO1</td><td>Provides analog voltage/current output, with 28 kinds available. You can choose voltage or current analog output through the function code P09.02 (reference ground: GND).</td><td>Output voltage: 0 to 10 V, ±5%
Output current: 0 to 20 mA</td></tr>
<tr><td rowspan="6">Multi-function input terminals</td><td>4</td><td>Multi-function DI1</td><td rowspan="6">You can set the multi-function DI, HDI and thermosensitive signal input through the function codes P09.00 and P09.01.
For more explanations, refer to P09.03–P09.10 for input functions and P09.14 for two/three-wire control functions (reference point: GND).</td><td rowspan="2">For multiple input circuit function selection, refer to the multi-function input/output terminal wiring below:


Example:
<table><tr><td>P09.00</td><td>Terminal 5</td><td>Terminal 4</td></tr><tr><td>0x00</td><td>DI2</td><td>DI1</td></tr><tr><td>0x21</td><td>HDO2</td><td>DO1</td></tr><tr><td>...</td><td>...</td><td>...</td></tr></table></td></tr>
<tr><td>5</td><td>Multi-function DI2</td></tr>
<tr><td>6</td><td>Multi-function DI3</td><td rowspan="2">The terminals can only be used as digital inputs DI3 and DI4, and cannot be defined for other signal functions through function codes.</td></tr>
<tr><td>8</td><td>Multi-function DI4</td></tr>
<tr><td>7</td><td>Multi-function DI5 or for thermal sensitivity</td><td>The terminal can be used as digital input DI5 through the function code P09.01, and be defined as the thermosensitive element input with PT1000 supported.</td></tr>
<tr><td>10</td><td>Multi-function DI6 or HDI</td><td>The terminal can be used as digital input DI6 or digital pulse HDI input through the function code P09.01 with pulse 0 to 50 kHz.</td></tr>
</table>

<table>
<tr><th>Type</th><th>Mark</th><th>Name</th><th>Function description</th><th>Specifications</th></tr>
<tr><td rowspan="2"></td><td>12</td><td>Multi-function DI7</td><td rowspan="2"></td><td>The terminal can only be used as digital input DI7, and cannot be defined for other signal functions through function codes.</td></tr>
<tr><td>16</td><td>Multi-function AI1</td><td>The terminal can be used as digital input DI8 or analog input AI1 through the 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">In addition to being used as ordinary multi-function terminals (same as 4, 5, 6, 8, 7, 10, 12, 16), 4 and 5 can also be programmed as DO/HDO output terminals. Refer to P09.00–P09.02 for specific terminal selection (reference point: GND).</td><td rowspan="2">For multiple output circuit function selection, refer to the multi-function input/output terminal wiring 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 operating 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 output terminal</td><td rowspan="2">The terminal can be programmed as multi-function DO or AO. Refer to P09.02 for specific terminal selection (reference point: GND).</td><td>The terminal can be used as digital output DO3 through the function code P09.02.
Maximum output current: 50 mA</td></tr>
<tr><td>The terminal can also be used as analog output AO1 through the function code P09.02. Refer to the AO1 description in the table.</td></tr>
</table>

Type	Mark	Name	Function description	Specifications
Relay output terminal RO1	RA	Relay output	The terminal can be programmed as multi-function RO. Refer to P10.03 for specific function selection.	RA-RB: normally closed, RA-RC: normally open Contact capacity: 250 VAC / 3 A 30 VDC / 3 A Refer to P10 for usage instructions. The overvoltage level of the input voltage of the relay output terminal is overvoltage level II.
	RB			
	RC			

WARNING

(1) Most multi-function terminals can be set with multiple IO functions through function codes, such as DI, DO, HDI, HDO, AI, AO and thermocouple input.

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

If the customer orders the closed-loop MV820E drive, a PG card is provided as the standard configuration. Refer to Chapter 2 for the description of PG terminal functions.

4.2.2.1 Analog input terminal wiring

(1) Terminal 16 receives the single-ended input of analog voltage or current. The voltage or current input type can be selected through the thousands place of P09.01. The wiring method is shown in Fig. 4-5:

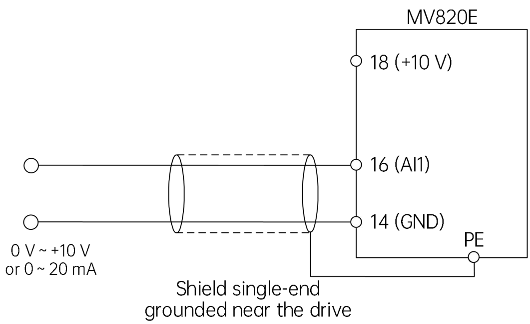


Fig. 4-5 Terminal 16 single-ended input wiring

(2) Terminal 13 receives the analog current differential input or analog voltage/current single-ended input. The voltage or current input type can be selected through the ones place of P09.02. The wiring method is shown in Fig. 4-6, Fig. 4-7 and Fig. 4-8.

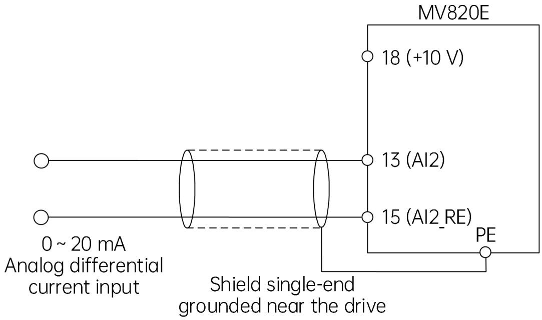


Fig. 4-6 Terminal 13 current differential input wiring

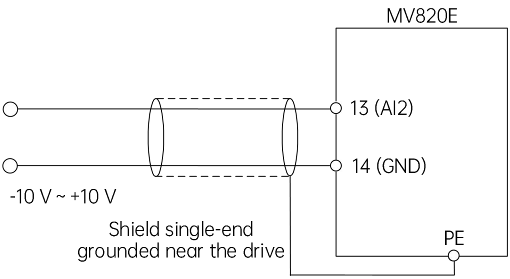


Fig. 4-7 Terminal 13 voltage single-ended input wiring

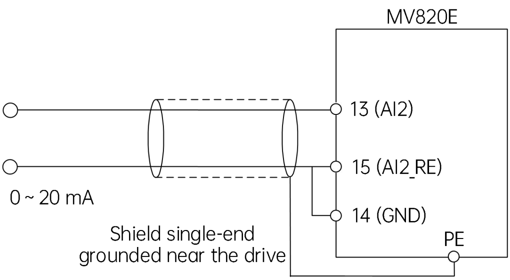


Fig. 4-8 Terminal 13 current single-ended input wiring

4.2.2.2 Analog output terminal wiring

Analog output terminal AO1 is connected to an external analog meter to indicate a variety of physical quantities. Voltage or current analog output can be selected through P09.02. The terminal wiring method is shown in Fig. 4-9:

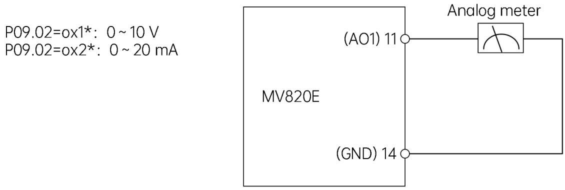


Fig. 4-9 Analog output terminal wiring

WARNING

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

MV820E drive provides the RS485 serial communication interface for users. Through the following wiring methods, a control system of single host/single slave or single host/multiple slaves can be created. With the host device (PC or PLC controller) software, multiple functions can be realized such as real-time monitoring, remote control, auto control and complicated running control (for example, infinite multi-stage PLC running).

(1) Wiring of the drive and the host device with RS485 interface:

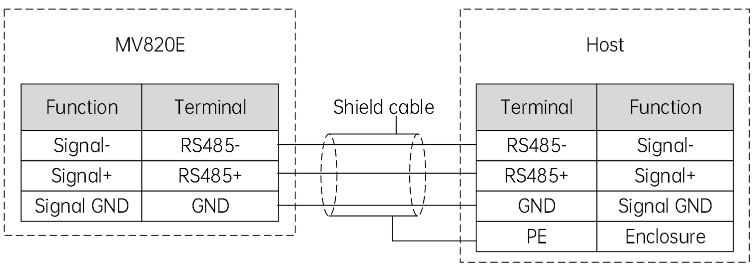


Fig. 4-10 RS485-RS485 communication wiring

(2) Wiring of the drive and the host device with RS232 interface:

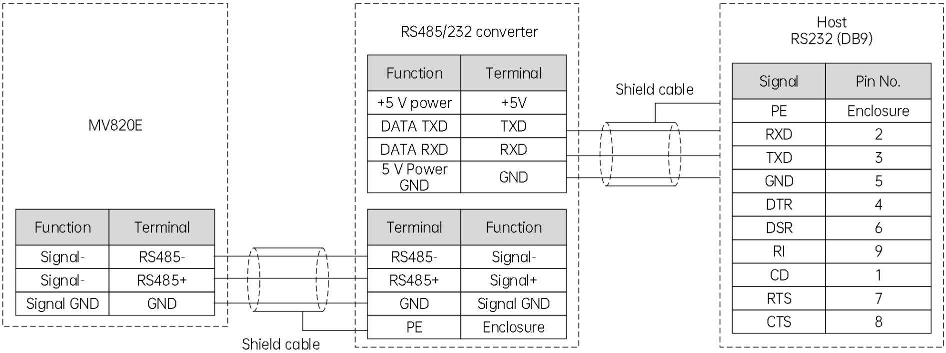


Fig. 4-11 RS485-(RS485/232)-RS232 communication wiring

(3) Wiring of multiple drives connected in the single RS485 system:

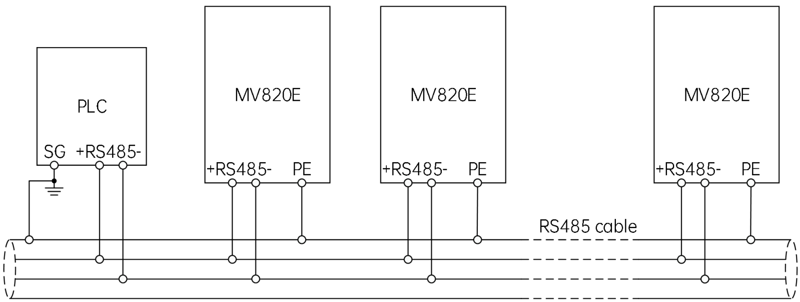


Fig. 4-12 Recommended wiring diagram for the communication between PLC and several drives

(ensure the drives and motors are reliably grounded)

If the communication is abnormal using the above wiring, you can try the following solutions:

(1) Provide separate power supply for the PLC (or host PC) or isolate its power supply. In case of severe external interference, isolate the communication wire to protect the PLC (or host PC) from interference;

(2) If an RS485/RS232 converter is used, you can provide separate power supply for the conversion module;

(3) Use magnetic rings on the communication wires;

(4) If the field conditions permit, reduce the drive's carrier frequency properly.

WARNING

(1) In places with severe interference, an RS485 converter (with isolation) shall be used.

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

4.2.2.4 Multi-function input terminal wiring

MV820E multi-function input terminals include 4, 5, 6, 7, 8, 10, 12, 16, which can be defined as digital inputs DI1–DI18 through the function codes P09.00 and P09.01. Besides, there are multiple ways of wiring according to the terminal open-circuit voltage selected through P09.11. The typical ways of wiring are shown below:

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

① Dry contact mode, shown in Fig. 4-13.

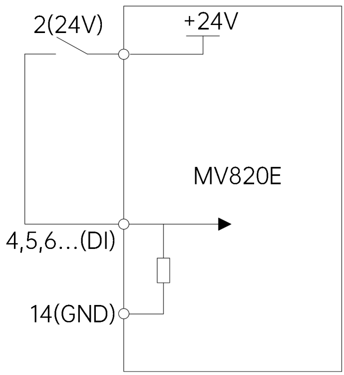


Fig. 4-13 Wiring diagram when the internal +24 V power supply of the drive is used

② When the internal power supply of the drive is used and the external controller is the PNP common emitter output, the wiring is shown in Fig. 4-14.

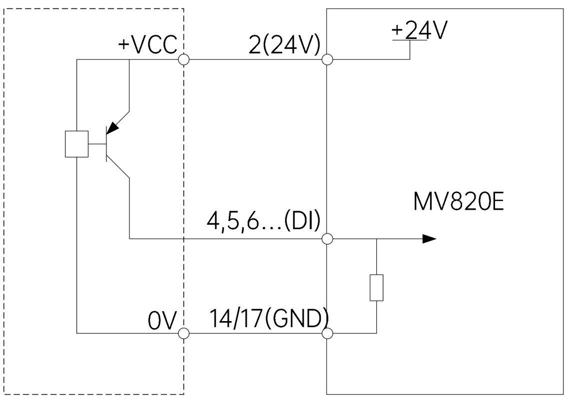


Fig. 4-14 Wiring diagram with PNP and using the internal power supply

③ When the external power supply is used and the external controller is the PNP common emitter output, the wiring is shown in Fig. 4-15.

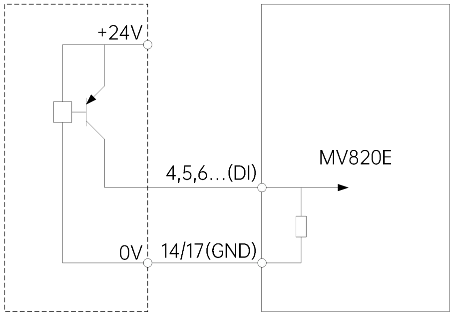


Fig. 4-15 Wiring diagram with PNP and using the external power supply

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

① Dry contact mode, shown in Fig. 4-16.

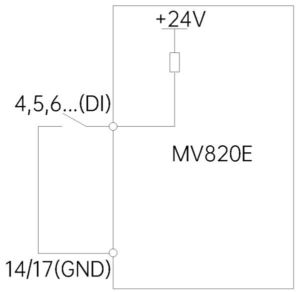


Fig. 4-16 Wiring diagram with the internal +24 V power supply of the drive is used

② When the external controller is the NPN common emitter output, the wiring is shown in Fig. 4-17.

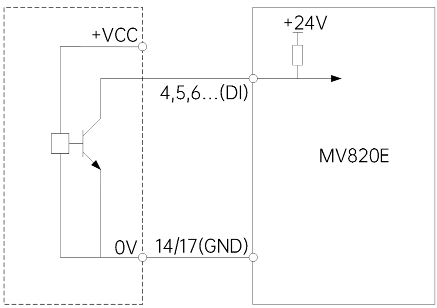


Fig. 4-17 Wiring diagram with the external controller being NPN

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 no more than 200 mA). The wiring is shown in Fig. 4-18.

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

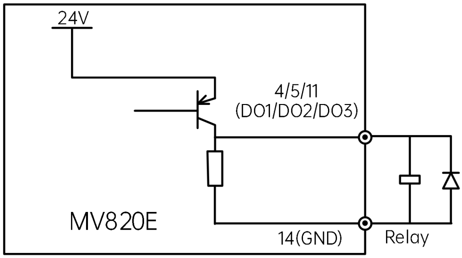


Fig. 4-18 Wiring diagram for multi-function DO

4.2.2.6 Relay output RA, RB and RC wiring

In case of drive inductive load (e.g., electromagnetic relay, contactor), the surge absorption circuit shall be added, such as the RC absorption circuit (whose leakage current shall be less than the holding current of the controlled contactor or relay), piezoresistor or fly-wheel diode (used in DC electromagnetic circuit. Check the polarity carefully during installation). The components of the absorption circuit shall be installed near the two ends of the windings of the relay or contactor.

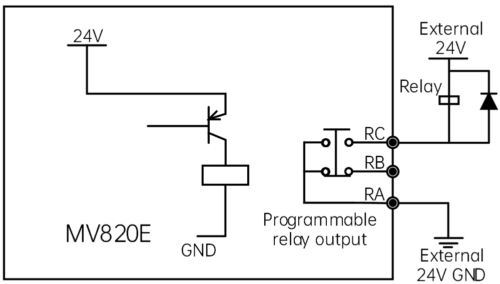


Fig. 4-19 Wiring diagram for relay output RA, RB and RC

WARNING

(1) Do not short the 24 V terminal and GND terminal. Otherwise, there will be control board damage.

(2) Use multi-shielded cables or twisted cables (1 mm^2 or above) for terminal connection.

(3) When the shielded cable is used, the near end of the shielded layer (the end near the drive) shall be connected to the grounding terminal PE of the drive.

(4) During wiring, the control cables shall be kept away from the main circuit and the strong current lines (including the power cable, motor cable, relay cable, contactor connection cable, etc.) for at least 20 cm, and they shall not be laid in a parallel way. The vertical wiring is recommended to reduce interference and avoid misoperation of the drive.

(5) For the non-24 V relay, 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.

4.2.2.7 Notes for encoder wiring

The encoder (PG) signal cable shall be kept away from the main circuit and other power cables, and parallel wiring with narrow clearance is strictly forbidden. The shield cable is required for encoder wiring, and the shield layer (near the drive) shall be connected to PE.

(1) When the PG output signal is an open-collector signal, the wiring with the interface board is as shown in Fig. 4-20 (the broken line in the figure is the voltage-type output encoder):

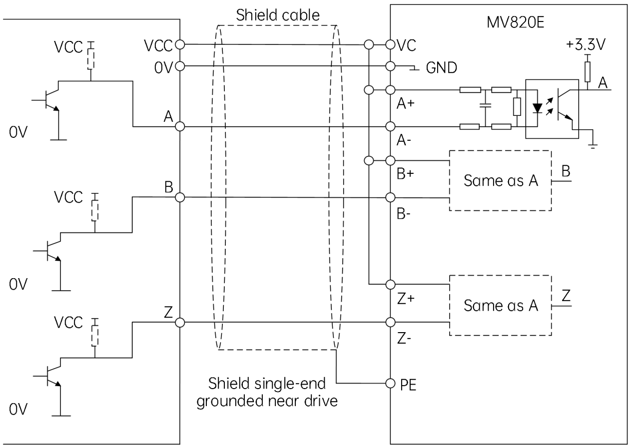


Fig. 4-20 Wiring diagram for open-collector PG

(2) When the PG output signal is a push-pull signal, the wiring with the interface board is as shown in Fig. 4-21:

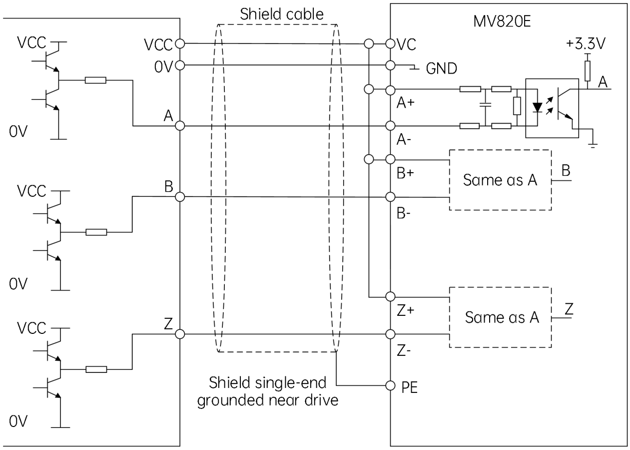


Fig. 4-21 Wiring diagram for push-pull PG

(3) When the PG output signal is a differential signal, the wiring with the interface board is as shown in Fig. 4-22:

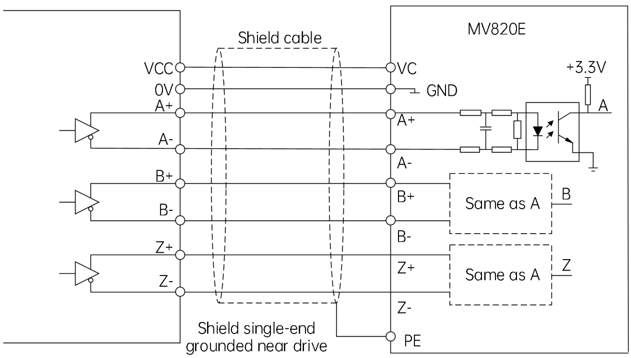


Fig. 4-22 Wiring diagram for differential signal PG

4.2.3 Drawing of control board

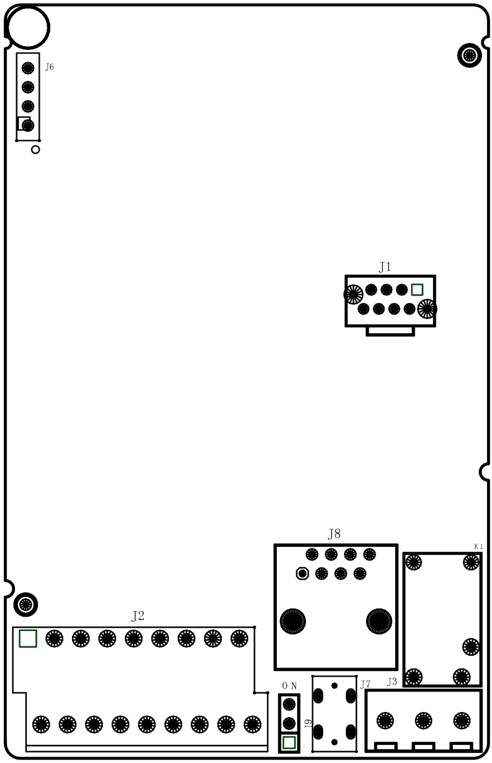


Fig. 4-23 Drawing of control board

4.3 Installation instructions for EMC requirements

Noise is inevitably made during drive operation, which deviates from the EMC requirements. To reduce the interference of the drive to the ambient environment, this section explains the EMC oriented installation method in terms of noise suppression, field wiring, grounding, leakage current, use of power filter and so on.

4.3.1 Noise suppression

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

4.3.1.1 Noise type

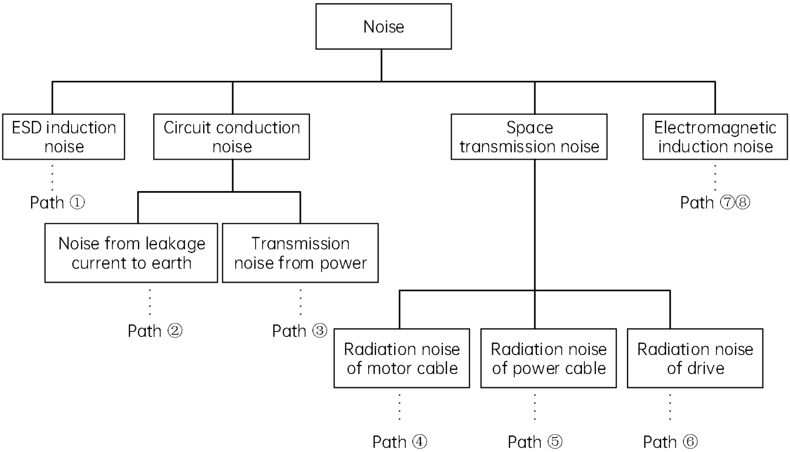


Fig. 4-24 Noise type

4.3.1.2 Noise transmission path

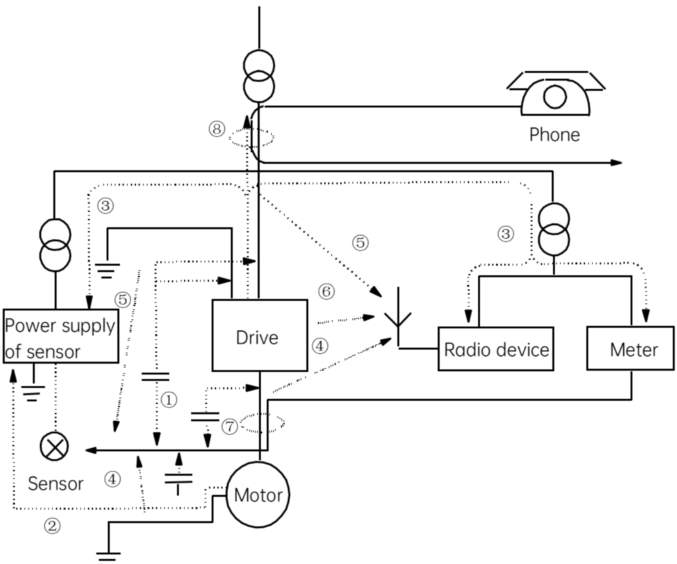


Fig. 4-25 Noise transmission path

4.3.1.3 Basic measures for noise suppression

Table 4-7 Measures for noise suppression

Noise transmission path	Measures to reduce influence
②	If the external devices form a closed loop through the drive wiring, the leakage current of the grounding cable may cause misoperation of relevant devices. The misoperation can be reduced if you remove the grounding.
③	When the external devices and drive share the same power system, the noise generated by the drive will transmit along the power cable in a reverse direction, causing misoperation of other devices in the system. Take the following measures: installing the noise filter at the input end of the drive, and isolating the noise for other devices using an isolation transformer or power filter.
④⑤⑥	If the devices (for processing weak signals of 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, then misoperation may occur due to space noise. 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 shielded 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 the radio noise filter and linear noise filter (ferrite common mode choke) at the input and output ends of the drive 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 (more than 2 mm), or buried into the cement trough. The power cable shall be put into a metal tube, and grounded using a shielded cable (the motor cable uses a 4-core 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 transmit along the signal cables to cause misoperation. Thus, such wiring should be avoided. Vulnerable devices should be kept away from the drive, and vulnerable signal cables should be kept away from the input/output cables of the drive. Besides, use shielded cables for signal and power, and put them into metal tubes 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 control cable, power cable and motor cable should be installed separately and kept away from each other, especially when the cables are parallel and extend for a long distance. If the signal cable inevitably crosses the power cable, ensure it crosses perpendicularly.

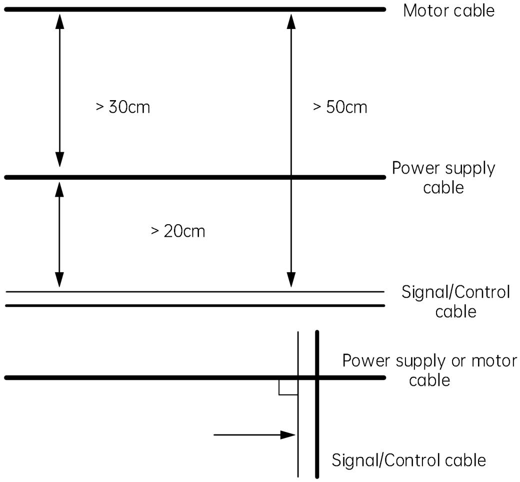


Fig. 4-26 System wiring requirements

If the motor cable is too long or its cross sectional area is too large, derating 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 should be reduced by about 5% for each level of area increase.

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 through the cable clamps on both ends.

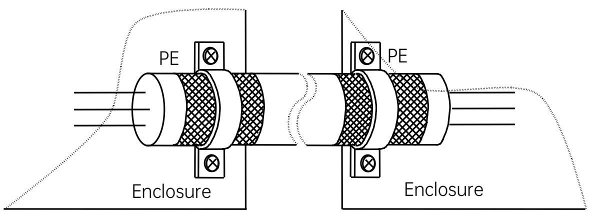


Fig. 4-27 Correct shielded grounding

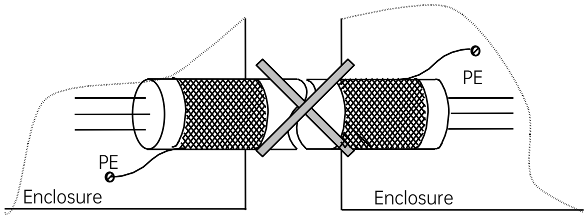


Fig. 4-28　Wrong shielded grounding

4.3.3 Grounding

Dedicated grounding pole (the best)

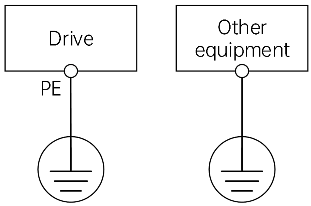


Fig. 4-29　Grounding diagram 1

Shared grounding pole (acceptable)

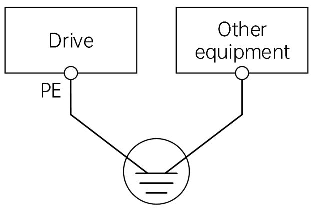


Fig. 4-30　Grounding diagram 2

Shared grounding cable (unacceptable)

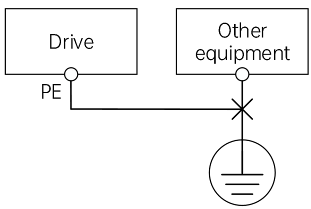


Fig. 4-31　Grounding diagram 3

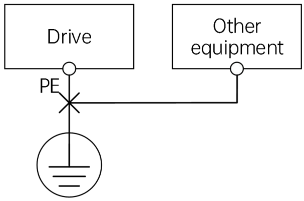


Fig. 4-32 Grounding diagram 4

In addition, pay attention to the following notes:

- To minimize the impedance of different grounding systems, the standard grounding cable of largest size shall be adopted. The flat cable is preferred, because the high-frequency impedance is smaller than the round cable of the same cross sectional area.
- One end of the 4-core motor cable should be grounded at the drive side, and the other end should be connected to the motor grounding end. It is much better if the motor and drive have the dedicated grounding pole.
- If the grounding ends of the system are connected together, the leakage current will become a noise source and affect devices in the system. Therefore, the grounding end of the drive should be separated from the grounding ends of audio equipment, sensors, computers, and so on.
- To obtain low high-frequency impedance, 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, that is ,the grounding point shall be as close as possible to the drive.

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 generating large noise, such as the relay, contactor and electromagnetic brake, even though they are installed outside the drive enclosure, the surge suppressor must be installed.

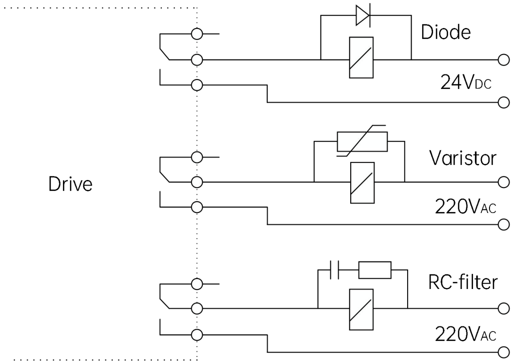


Fig. 4-33 Installation requirements for relay, contactor and electromagnetic brake

4.3.5 Leakage current and measures

The leakage current passes the line capacitor and motor capacitor at the input and output ends of the drive. Its magnitude depends on the distributed capacitance and carrier frequency. The leakage current includes the grounding leakage current and line-to-line leakage current.

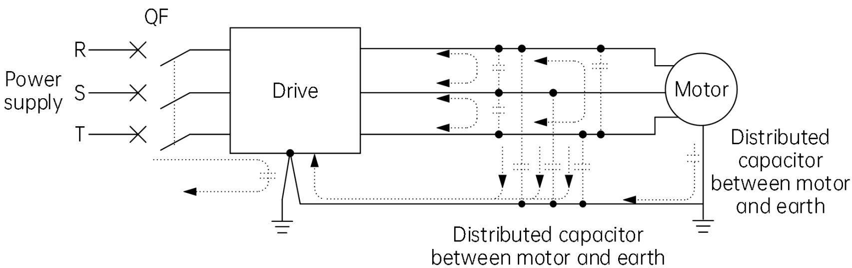


Fig. 4-34 Leakage current path

(1) Grounding leakage current

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

Suppression measures:

- Lower the carrier frequency, but the motor noise will increase;
- Shorten the motor cable;

- Adopt the leakage current breaker designed for the leakage current of high harmonics/surge in the drive system and other systems;
- Try to disconnect the EMC capacitor connection screw to avoid leakage protection, as shown in Fig. 4-35.

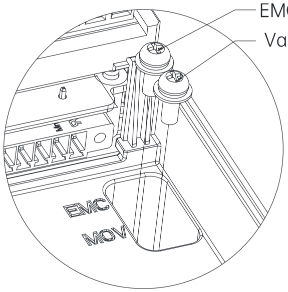


Fig. 4-35 Connection screws for EMC capacitor and varistor

(2) Line-to-line leakage current

When the leakage current passes the distributed capacitance among output cables at the output end of the drive, its high-order harmonics may cause misoperation of the external thermal relay. For the drive with small capacity (7.5 kW and below) and long wires (over 50 m), the leakage current will increase, which makes misoperation more likely to happen.

Suppression measures:

- Lower the carrier frequency, but 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 Proper EMC installation of drive

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 needs to be suppressed at the main connection points. Therefore, the radio noise filter and incoming reactor shall be installed in the cabinet. The cabinet shall also meet the EMC requirements.

To isolate the noise source and noise receiver through physical space in the mechanical/system design stage is the most effective but most expensive measure to reduce the interference. In the drive system formed by the drive and motor, the noise source could be the drive, braking unit and contactor, and noise receiver could be the automation device, encoder and sensor.

Different EMC areas are divided according to the electrical characteristics of the mechanical/system design. It is recommended to install the device in the corresponding area as shown in Fig. 4-36.

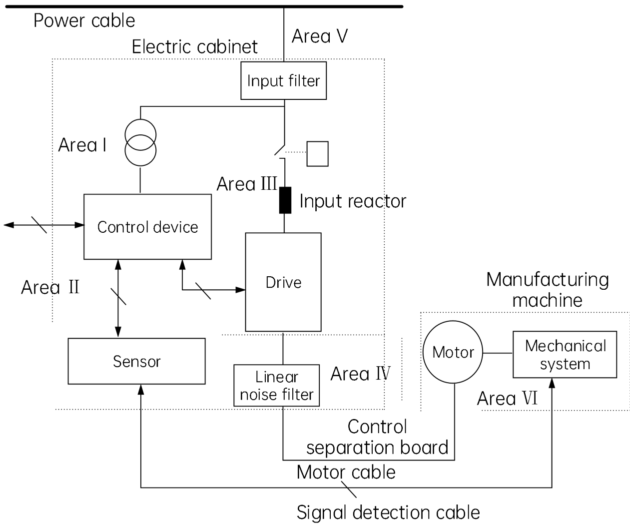


Fig. 4-36 Recommended partition for drive EMC installation

Notes:

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.

Area Ⅲ: the incoming reactor, drive, braking unit, contactor and other noise source.

Area Ⅳ: the output noise filter and its wiring.

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

Area Ⅵ: the motor and its cables

- There shall be space isolation among areas to realize electromagnetic decoupling.
- The minimum spacing between areas shall be 20 cm.
- The areas shall be decoupled via the grounding plate. Cables of different areas shall be put into different 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

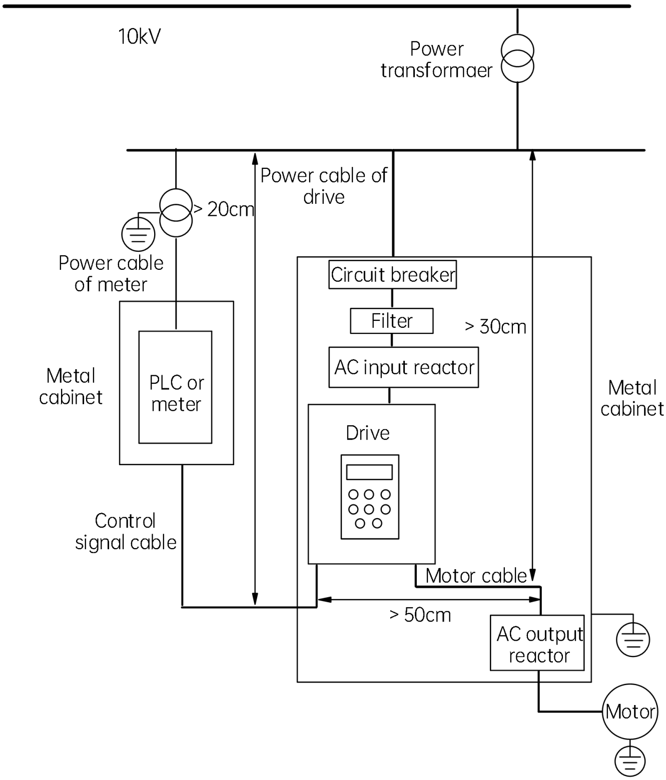


Fig. 4-37 Installation diagram for the drive

The grounding cable of the motor shall be grounded at the drive side. The motor and the drive shall be separately grounded.

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 scraping gasket and conductive mounting plate shall be used.

If there is any sensitive device on the site, a separate power filter can be installed at the sensitive device side to reduce the cost.

4.3.7 Operating instructions for power filter

A power filter shall be used for the device generating strong interference and sensitive to external interference. The power line filter is a two-way low-pass filter, which allows DC or 50 Hz industrial frequency current to pass, and does not allow the high-frequency electromagnetic interference current to pass.

Role of the power line filter

It can help the device meet the EMC requirements on conduction transmission and conduction sensitivity, and suppress the radiation emission of the device.

It can prevent the electromagnetic interference of the device from entering the power line, and the interference of the power line from entering the device.

Common errors for the power line filter installation

(1) Too long power input line

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

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

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

(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 not effective for suppressing the high-frequency interference signal when you choose to connect the filter to the metal enclosure with a cable, because the impedance of the long cable (not the resistance of the resistor) is very large at high frequency, making the bypass less effective. The correct installation method is to directly install the filter enclosure against the conducting surface of the equipment metal enclosure, with the relevant insulating paint removed.

4.3.8 Drive radiation emission

The drive inevitably emits radiation during operation. The drive is installed in a metal cabinet in most cases, which causes little radiation influence on equipment outside the cabinet. The external connecting cables are the main source for radiation emission. Conduct proper wiring according to the requirements in this section, then the radiation emission can be effectively suppressed.

If the drive and other control devices are installed in the same cabinet, isolate each special area and conduct proper wiring, shielding and line crossing by taking into account of the partition principles above mentioned.

Chapter 5 Quick Operation Guide for Drive

5.1 Operating panel

5.1.1 Introduction

MV820E has two kinds of operating panels. One is the small operating panel/keypad, MV820-DP01, as the standard configuration for drives of 55 kW and below; the other is the large operating panel/keypad with more functions, MV820-DP02, as the standard configuration for drives of 75 kW, which can also be used as option of other models (see 2.2.7 for mounting dimensions). The small operating panel is shown below:

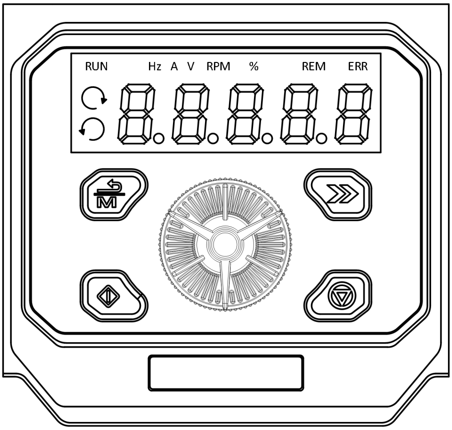


Fig. 5-1 Small operating panel

5.1.1.1 LED description of small operating panel

Table 5-1 LED description of small operating panel

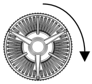
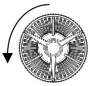
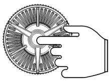
LED		Name	Description	Color
Unit LED	Hz	Frequency LED	Flashing: The current parameter is the running frequency On: The current parameter is the frequency reference	Yellow
	A	Current LED	On: The current parameter is the current	Yellow
	V	Voltage LED	On: The current parameter is the voltage	Yellow

LED		Name	Description	Color
	RPM	Speed LED	On: The current parameter is the speed	Yellow
	%	Percent LED	On: The current parameter is the percent	Yellow
Status LED	↻	Forward running LED	On: During stop, there is a forward running command for the drive During running, the drive is running forward Flashing: The drive is switching from FWD to REV	Green
	↺	Reverse running LED	On: During stop, there is a reverse running command for the drive During running, the drive is running reversely Flashing: The drive is switching from REV to FWD	Green
	ERR	Alarm LED	On: The drive enters the alarm status	Red
	RUN	Running LED	On: Running Flashing: Stopping Off: Stopped	Green
	REM	Operation command channel LED	Off: Local Flashing: Communication On: Terminal	Yellow

5.1.1.2 Key description of small operating panel

Table 5-2 Key functions of small operating panel

Key	Name	Function
	Return/Multi-function key	To exit the programming state. The multi-function description is shown in Table 5-5
	Shift key	To select the data bit for change in the editing state, or switch the display of status parameters

Key	Name	Function
	RUN key	Press this key in the operating panel mode, then the drive starts to run
	Stop/Reset key	Stop or fault reset
		Rotate it clockwise, then the data or function code increases
	Shuttle	Rotate it counterclockwise, then the data or function code decreases
		Press the shuttle button to enter the menu or confirm the data

The large operating panel is shown below:

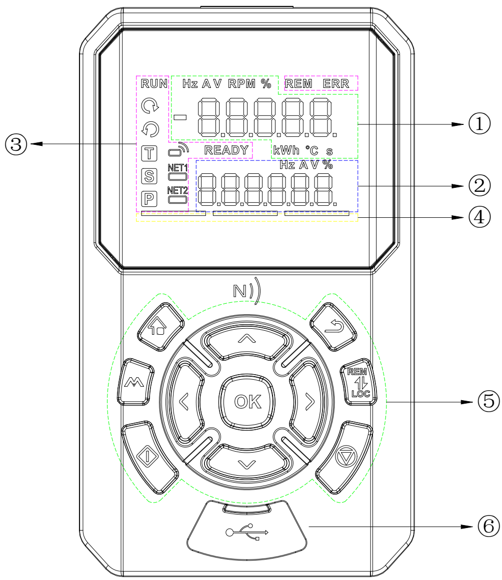


Fig. 5-2 Large operating panel

5.1.1.3 Interface description of large operating panel

No.	Name	Description
①	Main display area	Function parameters, parameter unit, positive or negative
②	Auxiliary display area	Monitored parameter display and unit
③	State indication area	Power state, run/stop, FWD/REV, local/remote control, fault/alarm state, speed/torque/position mode, communication status and wireless NFC status
④	Menu mode area	Displays the current menu mode, such as quick menu, full menu, and changed memory menu modes
⑤	Key area	Function/data code input of drive
⑥	USB-Type C	Connected to the PC host controller

5.1.1.4 LED description of large operating panel

Table 5-3 LED description of large operating panel

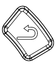
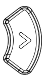
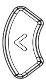
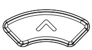
LED		Name	Description	Color
Unit LED	Hz	Frequency LED	Flashing: The current parameter is the running frequency On: The current parameter is the frequency reference	Yellow
	A	Current LED	On: The current parameter is the current	Yellow
	V	Voltage LED	On: The current parameter is the voltage	Yellow
	r/min	Speed LED	On: The current parameter is the speed	Yellow
	%	Percent LED	On: The current parameter is the percent	Yellow
	℃	Temperature LED	On: The current parameter is the degree centigrade	
	s	Time LED	On: The current parameter is seconds	
	kWh	Power LED	On: The current parameter is electric quantity	

LED		Name	Description	Color
Status LED		Forward running LED	On: During stop, there is a forward running command for the drive During running, the drive is running forward Flashing: The drive is switching from FWD to REV	Green
		Reverse running LED	On: During stop, there is a reverse running command for the drive During running, the drive is running reversely Flashing: The drive is switching from REV to FWD	Green
	ERR	Alarm LED	On: The drive enters the alarm status	Red
	RUN	Running LED	On: Running Flashing: Stopping Off: Stopped	Green
	REM	Operation command channel LED	Off: Local Flashing: Communication On: Terminal	Yellow
	T	Torque control mode indicator	On: The drive is now in the torque control mode	
	S	Speed control mode indicator	On: The drive is now in the speed control mode	
	P	Position control mode indicator	On: The drive is now in the position control mode	
		Wireless communication indicator	Flashing: Waiting for connection; On: Connection is successful; Off: Function is disabled	
	NET1	Communication indicator 1	Reserved	Reserved
	NET2	Communication	Reserved	Reserved

LED		Name	Description	Color
		indicator 2		
	REDY	Standby state indicator	On: In the standby state	White
	▬▬▬	Menu mode indicator	On: Current menu mode (quick menu, full menu and changed memory menu modes from left to right)	
	▬	Negative sign indicator	On: The current data is negative; Off: The current data is positive	
	◂	Main and auxiliary display area indicator	On: Indicates the current display area (main/auxiliary) that is being operated	
	N))	NFC indicator	Flashing: Normal data communication Off: No data communication	

5.1.1.5 Key description of large operating panel

Table 5-4 Key functions of large operating panel

Key	Name	Function
	Return key	To exit the programming state
	Right shift key	To select the data bit for change or switch the displayed parameter; switch the monitored variables or move the cursor in the right direction
	Left shift key	To select the data bit for change or switch the displayed parameter; switch the monitored variables or move the cursor in the left direction
	RUN key	Press this key in the operating panel mode, then the drive starts to run
	Stop/Reset key	Stop or fault reset
	Up Key	Increase of data or function code

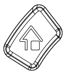
Key	Name	Function
	Down key	Decrease of data or function code
	Confirm key	To enter the next level menu, and confirm parameters
	Menu switchover key	Short press it to switch the menu modes, including quick menu, full menu and changed memory menu modes, same as P00.00. Long press it to switch between the main display area and the auxiliary display area
	Multi-function key	Functions specified by P00.04, such as JOG, FWD and REV switchover
	Operation command channel switchover key	To switch the operation command channels among local, terminal and communication.

Table 5-5 Usage of multi-function key

Multi-function key (M)	Function	Function description
0	No function	The M key is disabled.
1	Forward JOG	The M key is used as a forward JOG key, effective in three command channels. Press and hold the key, then the drive will run in the forward JOG mode. Release the key, then the JOG stops.
2	Reverse JOG	The M key is used as a reverse JOG key, effective in three command channels. Press and hold the key, then the drive will run in the reverse JOG mode. Release the key, then the JOG stops.
3	FWD and REV switchover	The M key is used as the key for FWD and REV switchover, only available in the operating panel command channel, effective during both running and stop.
4	Command channel switchover 1	The M key is used as the key for operation command channel switchover, only effective during stop. The channel is cyclically switched from local, terminal to remote.

5.1.1.6 Status display of operating panel

The display status of the MV820E operating panel includes stop status parameter display, run status parameter display, function code parameter editing status display and fault status display. This part takes the small operating panel as the example. The operations of large operating panel are similar.

(1) Stop parameter display status

When the drive is in stop, the operating panel displays the stop status parameters, as shown in Fig. 5-3a. The unit LED indicates the unit of parameters.

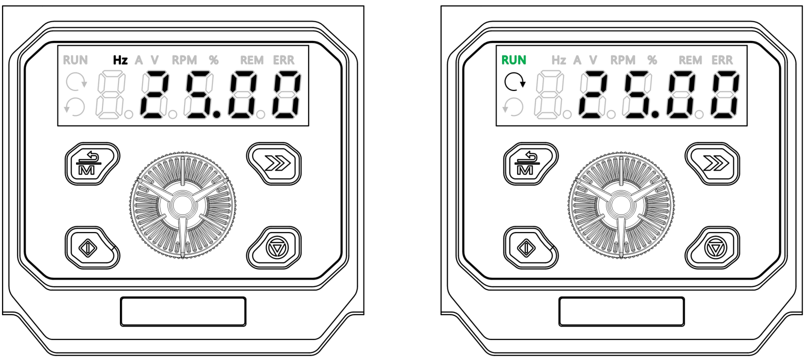
When you choose the verification menu, only the function codes whose parameter values are different from factory settings will be displayed. You can rotate " " to browse all such function codes, and check which parameters have been changed.

You can press the " " key to view different stop status parameters cyclically (defined by the function code P16.03).

(2) Run parameter display status

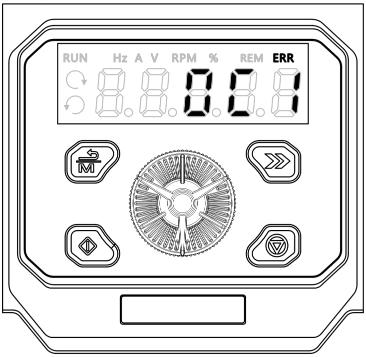
When the drive receives the valid operation command, it will start to run. The operating panel will display the running status parameters, and the RUN indicator becomes on. The on/off of forward running or reverse running LED depends on the current running direction. As shown in Fig. 5-3b, the unit LED indicates the unit of parameters.

You can press the " " key to view different running status parameters cyclically (defined by the function codes P16.00 and P16.01).



a: Stop status display

b: Run status display



c: Fault status display

Fig. 5-3 Stop, run and fault display

(3) Fault display status

When the drive detects a fault signal, it will immediately enter the fault display status and display the fault code, as shown in Fig. 5-3c.

You can press the " " key to view stop parameters and fault codes cyclically. Through the " " key, the control terminal or the communication command, you can reset the fault. If the fault still exists, the fault code will not disappear.

You can also choose the stop mode or choose to keep the drive running during certain fault through P97.15 to P97.19.

(4) Function code editing status

In the stop, run or fault alarm status, press the " "key, then you can enter the editing status (if any user password is required, refer to the description of P00.01). The editing status is displayed in three-level menu: function code group or function code → function code parameter → function code parameter value, and you can press the " "key to enter the parameter value display status. In the parameter value display status, you can press the " " key to save the parameter, or press the " " key to exit.

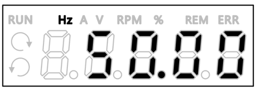
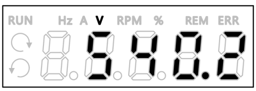
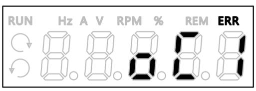
5.1.2 Identification of LED display symbols

The LED display symbols correspond to the following figures/letters:

LED display	Meaning	LED display	Meaning	LED display	Meaning	LED display	Meaning
	0		A		I		S
	1		b		J		T

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

LED panel display example:

LED panel display	Unit LED	Displayed data/code	Meaning of data/code
	Solid on	Flashing	Frequency reference
	Flashing	Solid on	Output frequency
	Solid on	Flashing	Bus voltage
	Solid on	Solid on	Bus voltage
	Solid on	Solid on	Overcurrent during acceleration

WARNING

When the drive is in the stop or standby state, the panel value is flashing; and when the drive is in the running or fault state, the panel value is solid on. To customize parameters displayed during running or stop, refer to "7.17 P16: Keypad display setting parameters".

5.1.3 Basic operations

In the below example, the stop display parameter is the set frequency and its factory setting is 50.00 Hz. The black part in the figure indicates the current editing status.

This part takes the small operating panel as the example. The operations of large operating panel are similar.

5.1.3.1 Password setting

To protect the parameters, the drive offers the password protection function. It requires a user to input the correct password before entering the function code editing status. For the manufacturer's parameter setting zone and AI/AO correction group, you need to input the correct manufacturer password.

WARNING

Do not change the manufacturer's set parameters. Improper parameter setting may cause abnormal operation or even damage to the drive.

Function code P00.01 can be used to set the user password.

Assuming that the valid user password is "1368", the drive is currently locked and no operation can be performed. You can unlock the drive by entering the user password through the following steps.

(1) Press the "" key in the locked status, and then the LED will enter the password verification status 00000;

(2) Change 00000 to 01368;

(3) Press the "" key to confirm and pass the password verification, then the LED displays P00.

The steps are shown below:

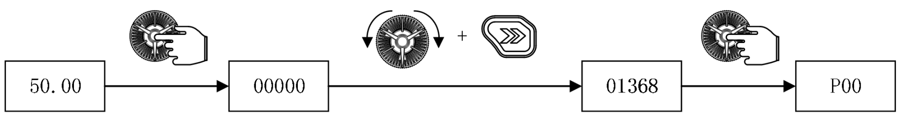


Fig. 5-4 Unlock the drive with a user password

You can conduct various operations on the drive after passing the password verification.

WARNING

If there is no key-pressing operation in 30 s after the correct user password is entered, the password protection will be triggered again to lock the drive.

5.1.3.2 Restore to factory settings

To restore the parameter values to factory settings, set P00.05 to 2.

(1) In the stop parameter display status, press the “ ” key to enter the first level menu P00;

(2) Press the “ ” key to enter the second level menu P00.00;

(3) Rotate “ ” clockwise to change P00.00 to P00.05;

(4) Press the “ ” key to enter the third level menu;

(5) Rotate “ ” to change 0 to 2;

(6) Press the “ ” key to confirm the change and return to the second level menu. The change is successful.

The steps are shown below:

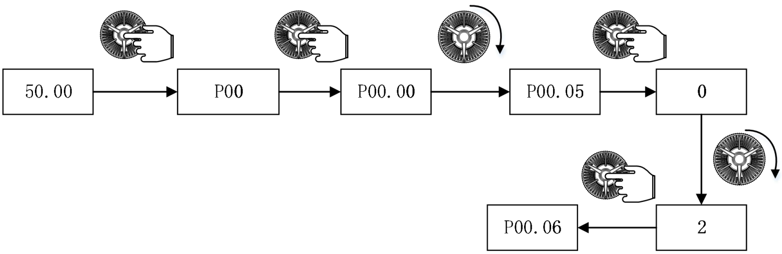


Fig. 5-5 Restore to factory settings

5.1.3.3 Set frequency

For example, set P02.09=25.00 Hz.

Example: Change the function code P02.09 from 50.00 Hz to 25.00 Hz.

(1) In the stop parameter display status, press the “ ” key to enter the first level menu P00;

(2) Rotate “ ” clockwise to enter the first level menu P02;

(3) Press the “ ” key to enter the second level menu P02.00;

(4) Rotate “ ” clockwise to enter the second level menu P02.09;

(5) Press the “ ” key to enter the third level menu 50.00;

(6) Press the “ ” key to choose the thousands place and the hundreds place;

(7) Rotate “ ” counterclockwise to change 50.00 to 25.00;

(8) Press the “ ” key to confirm the change and return to the second level menu. The change is successful.

(9) Press the “ ” key twice to return to the main menu displaying 25.00.

The steps are shown below:

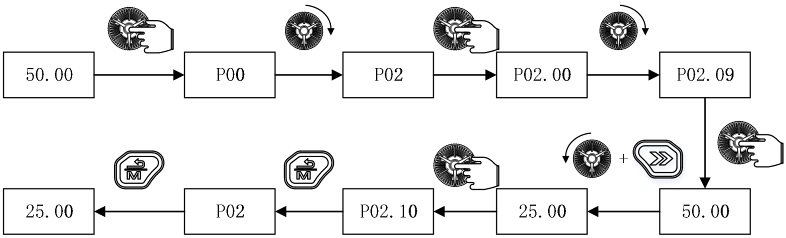


Fig. 5-6 Configure the set frequency

5.1.3.4 Monitoring status parameter display

Through the function codes P16.00, P16.01 and P16.02, you can choose the drive parameters to be displayed on the operating panel during running, such as set frequency, output frequency, bus voltage DI, DO, AI and so on (for details, refer to Group P16). Then, you can view the chosen parameters through the " " key on the operating panel.

The following figure shows the parameter display switchover during running with P16.00=0xFF, P16.01=0xF and P16.02=4.

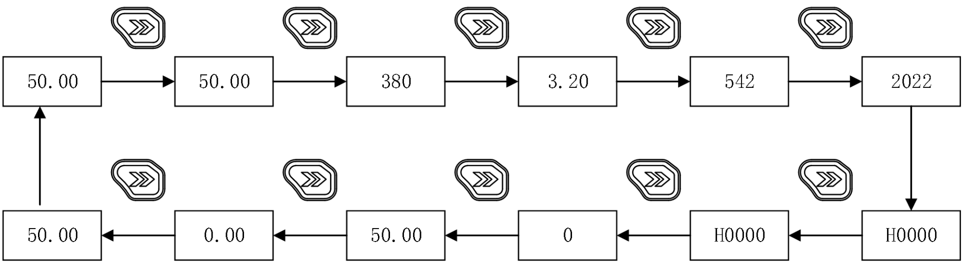


Fig. 5-7 Monitoring status parameter display

5.1.3.5 Switching status parameter display

Through the function codes P16.03 and P16.04, you can choose the drive parameters to be displayed on the operating panel during stop, such as set frequency, bus voltage, DI, DO, AI and so on (for details, refer to Group P16). Then, you can view the chosen parameters through the " " key on the operating panel.

The following figure shows the parameter display switchover during stop, with P16.03=0xFF.

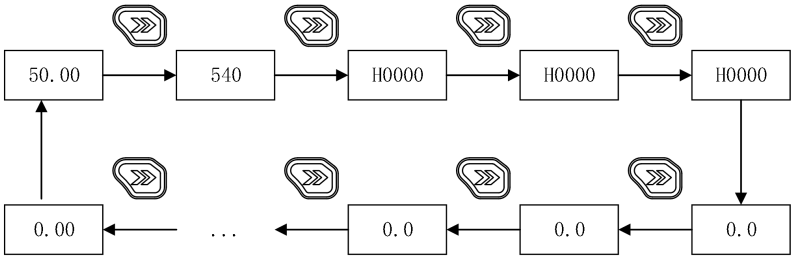


Fig. 5-8 Switching status parameter display

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 helps you understand and use the subsequent 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. The operation command channel can be controlled through four ways:

(1) Operating panel: use the "", "", "" (multi-function key, set to JOG function) keys to control.

(2) Control terminals: use the multi-function terminals 4, 5, 6, 8, 7, 10, 12, 16 (set to digital input FWD or REV) and P09.14 designated GND (two-wire), DIi (three-wire) terminals to control.

(3) Serial port: use the communication interface to control the start and stop.

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

The command channel can be selected through the function code P02.02, the "" multi-function key and the multi-function input terminal selection (No.38, No.39 and No.40 functions for P09.03 to P09.10)

WARNING

Before switching the channels, make sure that you have done necessary commissioning. Otherwise, there will be equipment damage and personal injuries.

5.2.2 Operation status

The operating states of MV820E include the stop status, running status and motor parameter auto-tuning status.

(1) Stop status: if there is no operation command after the drive is started and initialized, or the stop command is executed during operation, the drive will enter the stop status immediately.

(2) Running status: the drive will enter the running status once receiving the running command.

(3) Motor parameter auto-tuning status: if there is any running command after the function code P03.27 is set to 1 or 2, the drive enters the motor parameter identification status. After identification is completed, the drive will enter the stop status.

5.2.3 Control mode and operation mode

Control mode

The MV820E drive has three control modes, set by the function code P02.00:

(1) SVC (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 control and speed control, achieving high torque on low frequencies and high constant speed precision. 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) FVC (vector control with PG): a PG needs to be installed. It is recommended to install the PG on the controlled motor shaft to ensure control performance. The mode is suitable for scenarios requiring fast torque response, high torque and speed control precision.

Operation mode

The MV820E drive has two operation modes for vector control:

(1) Speed control: controls the motor speed precisely. P05 and P22 function groups shall be set.

(2) Torque control: controls the motor torque precisely. P06 and P23 function groups shall be set.

The MV820E drive supports online switchover of these operation modes.

5.2.4 Drive frequency and torque channel

(1) Frequency reference channel under the speed control mode

There are five running modes for the MV820E speed control mode, including jog running, process closed-loop running, PLC running, multi-speed running and common running. The running mode is selected through the P02.05 channel. The priority is shown in below.

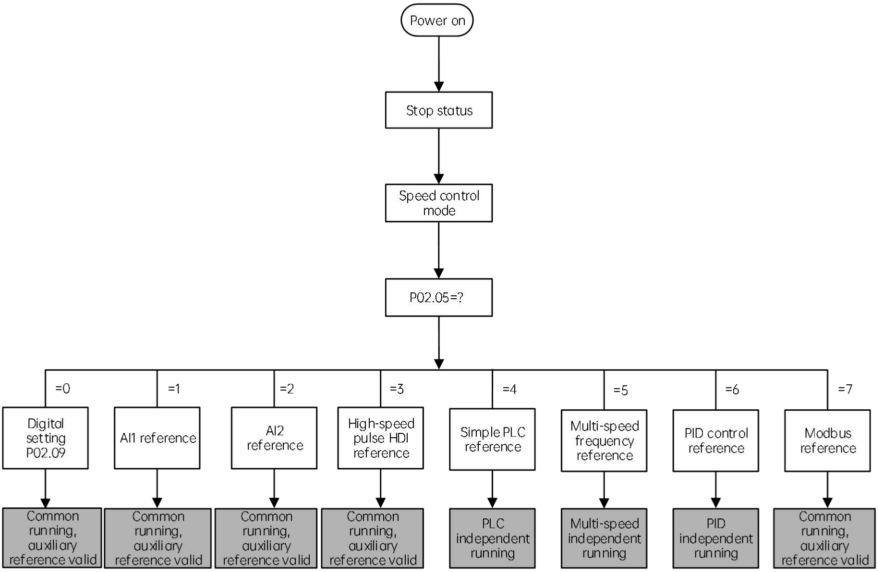


Fig. 5-9 Running mode selection under speed control

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 the jog running command, it will run according to the jog frequency (refer to function codes P11.10–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, adjusting in closed loop according to the reference and feedback (refer to the P14 function group). Through the multi-function terminal (No.29 function), 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, running at a preset mode (refer to the description of P13.00–P13.36).

④ Multi-speed running: when the multi-speed function is enabled (P02.05=5), the drive can perform multi-speed running with multiple frequency from 1 to 15 (P13.01 to P13.16), through the on/off combinations of multi-function terminals (No.6, No.7, No.8 and No.9 functions). Note: the multi-frequency setting is the percentage of maximum frequency, and if it is negative, then the drive will run reversely.

WARNING

For the specific frequency reference channels of the running modes under speed control, refer to Chapter 7 Parameter Description.

(2) Torque reference channel under the torque control mode

There are five torque reference channels for the MV820E torque control mode, including:

① Digital setting

② AI1 analog reference

③ AI2 analog reference

④ Terminal HDI reference

⑤ Serial port communication reference

For details, refer to P06 and P23 function groups.

5.3 Initial power-on

5.3.1 Inspection before power-on

Conduct wiring properly according to the technical requirements mentioned in Chapter 4 Drive Wiring.

5.3.2 Initial power-on operation

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 supply power for the drive. The operating panel will first display "- - - - -", and the contactor will be normally engaged. When the characters displayed in the digital tube change into the set frequency, the drive initialization is completed.

The initial power-on process is shown below:

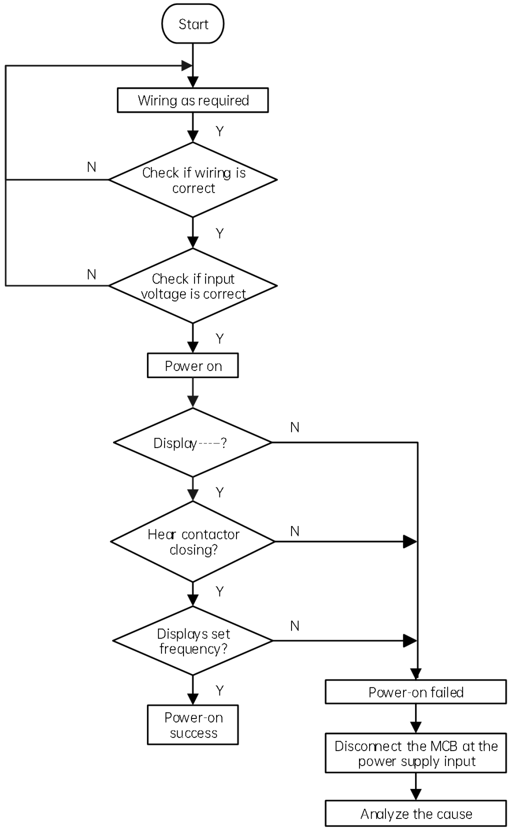


Fig. 5-10 Initial power-on process of drive

Chapter 6 Parameter List

6.1 Explanation of terms related to function codes

Table field	Explanation
Function code number	Represents the number of the function code, such as P00.00
Function code name	Represents the name of the function code, explaining its function
Default value	Represents the factory settings of function codes
Value range	Represents the maximum value and minimum value of function codes
Unit	V: voltage; A: current; ℃: temperature; Ω: resistance; mH: inductance; rpm: rotating speed; %: percentage; bps: baud rate; Hz, kHz: frequency; ms.s, min, h.kh: time; kW: power; /: no unit.
Change	○: means the function code can be changed during running; ×: means the function code can be changed during stop; *: means the function code can be read only and can not be changed.
Function code selection	List of function code parameter settings
User-customized setting	Used to set the customized parameter for the user

6.2 Function codes of basic menu

Function code	Name	Description	Value range	Default value	Change
P00: System management parameters					
P00.00	Menu mode selection	0: Quick menu mode Only quick commissioning related parameters are displayed. 1: Full menu mode All function parameters are	0 to 2	1	○

Function code	Name	Description	Value range	Default value	Change
		displayed. 2: Changed memory menu mode Only parameters that are different from factory settings are displayed.			
P00.01	User password	0: No password Others: Password protection	0 to 65535	0	○
P00.02	Reserved				
P00.03	Parameter protection setting	0: All data can be changed. 1: Only main frequency reference digital setting P02.09 and this function code can be changed. 2: Only this function code can be changed.	0 to 2	0	○
P00.04	Selection of key functions	Ones place: Reserved Tens place: Function selection of the STOP key 0: The STOP key is valid only in the panel control channel. 1: The STOP key is valid in all control channels. Hundreds place: Function selection of multi-function M key 0: No function 1: FWD JOG 2: REV JOG 3: FWD and REV switchover 4: Command channel switchover (cyclic) Thousands place: Reserved	0 to 0x0410	0	○
P00.05	Parameter initialization	0: Parameters rewritable 1: Clear fault records	0 to 3	0	×

Function code	Name	Description	Value range	Default value	Change
		2: Restore to factory settings 3: Restore some parameters to 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 operation 1: Drive's parameters uploaded to the keypad 2: Keypad's parameters downloaded to the drive (all) 3: Keypad's parameters downloaded to the drive (excluding motor parameters) 4: Keypad's parameters downloaded to the drive (only motor parameters)	0 to 4	0	×
P01: Status display parameters					
P01.00	Main frequency channel	Refers to P02.05	0 to 8	0	*
P01.01	Main frequency reference	Displays the main frequency reference.	0.00 to P02.10	0	*
P01.02	Auxiliary frequency reference	Displays the 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 reference frequency	Displays the ramp reference frequency.	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 output voltage.	0 to 65535 V	0	*

Function code	Name	Description	Value range	Default value	Change
P01.07	Output current	Displays the output current.	0.0 to 6553.5 A	0	*
P01.08	Torque current	Displays the drive's current torque current as a percentage of the motor's rated current.	-300.0 to 300.0%	0	*
P01.09	Exciting current	Displays the drive's current exciting current as a percentage of the motor's rated current.	-300.0 to 300.0%	0	*
P01.10	Keypad version No.	0.00 to 2.55	0.00 to 2.55	0	*
P01.11	Motor power	Displays the drive's output power as a percentage of the motor's rated power.	-300.0% to 300.0%	0	*
P01.12	Estimated frequency of motor	Estimated rotor frequency under the open-loop vector conditions	0.00 to P02.10	0	*
P01.13	Measured frequency of motor	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 After accumulation of 3600 times, 1 kWh is additionally added to P01.14	0 to 3600	0	*
P01.16	Bus voltage	Displays the bus voltage.	0.0 to 6553.5 V	0	*
P01.17	Operation status of the drive	Bit0: 0: Stop; 1: Run Bit1: 0: FWD: 1: REV Bit2: Zero speed running Bit3: Accelerating Bit4: Decelerating Bit5: Running at constant speed Bit6: Pre-excitating	0 to 0xFFFF	0	*

Function code	Name	Description	Value range	Default value	Change
		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 state	0: Invalid 1: Valid	0 to 0x1111	0	*
P01.19	DI5 to DI8 state	0: Invalid 1: Valid	0 to 0x1111	0	*
P01.20	DO state	0: Invalid 1: Valid	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 frequency	Displays the HDI frequency.	0.000 to 50.000 kHz	0	*
P01.27	HDO1 frequency	Displays the HDO1 frequency.	0.000 to 50.000 kHz	0	*
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	*

Function code	Name	Description	Value range	Default value	Change
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	Current AD of AI1	0 to 4095	0 to 4095	0	*
P01.37	Current AD of AI2	0 to 4095	0 to 4095	0	*
P01.38	Current AD 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 value	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 drive’s current torque reference as a percentage of the motor’s rated current.	-300.0% to 300.0%	0	*
P01.43	Rotation speed of motor	Displays the rotation speed of the motor.	0 to 65535 rpm	0	*
P01.44	Line speed	Displays the line speed of the motor.	0 to 65535 m/min	0	*
P01.45	Output power	Displays the 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 duration of the drive (min)	0 to 65535 min	0 to 65535 min	0	*

Function code	Name	Description	Value range	Default value	Change
P01.48	Accumulated running duration of the drive (h)	0 to 65535 h	0 to 65535 h	0	*
P01.49	Current running duration of the drive (min)	0 to 65535 min	0 to 65535 min	0	*
P01.50	Accumulated running duration of the fan	0 to 65535 h	0 to 65535 h	0	*
P01.51	PLC current STEP	Displays the current STEP of the simple PLC.	0 to 15	0	*
P01.52	High-order bits of PLC current STEP running time	Displays the high 16 bits of the current STEP running time of the simple PLC. Note: actual time=P01.52 << 16+P01.53	0 to 65535	0	*
P01.53	Low-order bits of PLC current STEP running time	Displays the low 16 bits of the current STEP running time of the simple PLC.	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	Reserved				
P01.57	User-defined frequency display	0.00 to P02.10 (the keypad does not display unit)	0.00 to P02.10	0	*
P02: Basic function parameters					
P02.00	Control mode selection	0: SVC1 1: SVC2 (only for asynchronous motors) 2: V/F control (only for asynchronous motors)	0 to 3	2	×

Function code	Name	Description	Value range	Default value	Change
		3: FVC			
P02.01	Motor selection	0: Motor 1 1: Motor 2	0 to 1	0	×
P02.02	Operation command channel selection	0: Keypad control 1: Terminal control 2: Communication control	0 to 2	0	×
P02.03	Communication command channel selection	0: Modbus channel / Modbus TCP channel 1, 2: Reserved 3: EtherCAT channel / PROFINET channel / CANopen 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 2: AI2 3: High-speed pulse HDI reference 4: Simple PLC programming reference 5: Multi-speed running reference 6: PID control 7: Modbus / Modbus TCP 8: PROFINET / EtherCAT	0 to 8	0	×
P02.06	Auxiliary frequency source selection	0: Digital setting P02.09 1: AI1 2: AI2 3: High-speed pulse HDI reference 4: Simple PLC programming reference	0 to 8	4	×

Function code	Name	Description	Value range	Default value	Change
		5: Multi-speed running reference 6: PID control 7: Modbus / Modbus TCP 8: PROFINET / EtherCAT			
P02.07	Auxiliary frequency reference range	0: Maximum output frequency 1: Main frequency reference	0 to 1	0	×
P02.08	Frequency reference source calculation	0: Main frequency 1: Auxiliary frequency 2: Main + Auxiliary 3: Main - Auxiliary 4: Max (main reference, auxiliary reference) 5: Min (main reference, auxiliary reference)	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	50.00 Hz	×
P02.11	Upper limit frequency	P02.12 to P02.10	P02.12 to P02.10	50.00 Hz	×
P02.12	Lower limit frequency	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 default values, 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	0.0 to 6000.0 s	4.0 s	○

Function code	Name	Description	Value range	Default value	Change
		Above 30 kW: 40 s			
P02.14	Deceleration time 1	0.0 to 6000.0 s	0.0 to 6000.0 s	4.0 s	○
P02.15	Reserved				
P02.16	Carrier frequency	2.0 to 12.0 kHz	2.0 to 12.0 kHz	4.0 kHz	○
P02.17	User-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	Model dependent	×
P03.02	Asynchronous motor rated voltage	0 to 1200 V	0 to 1200 V	Model dependent	×
P03.03	Asynchronous motor rated current	0.8 to 6000.0 A	0.8 to 6000.0 A	Model dependent	×
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	Model dependent	×
P03.06	Asynchronous motor stator resistance	0.001 to 65.535 Ω	0.001 to 65.535 Ω	Model dependent	×
P03.07	Asynchronous motor rotor resistance	0.001 to 65.535 Ω	0.001 to 65.535Ω	Model dependent	×
P03.08	Asynchronous motor leakage inductive reactance	0.01 mH to 655.35 mH (drive power ⩽ 55 kW) 0.001 mH to 65.535 mH (drive power > 55 kW)	Model dependent	Model dependent	×

Function code	Name	Description	Value range	Default value	Change
P03.09	Asynchronous motor mutual inductive reactance	0.1 mH to 6553.5 mH (drive power ⩽ 55 kW) 0.01 mH to 655.35 mH (drive power > 55 kW)	Model dependent	Model dependent	×
P03.10	Asynchronous motor no-load current	0.1 to 6553.5 A	0.1 to 6553.5A	Model dependent	×
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	Model dependent	×
P03.16	Synchronous motor rated voltage	0 to 1200 V	0 to 1200 V	Model dependent	×
P03.17	Synchronous motor rated current	0.8 to 6553.5 A	0.8 to 6553.5 A	Model dependent	×
P03.18	Synchronous motor rated frequency	0.01 Hz to P02.10	0.01 Hz to P02.10	Model dependent	×
P03.19	Number of synchronous motor	1 to 128	1 to 128	2	×

Function code	Name	Description	Value range	Default value	Change
	pole pairs				
P03.20	Synchronous motor stator resistance	0.001 to 65.535 Ω (drive power ⩽ 55kW) 0.0001 to 6.5535 Ω (drive power > 55 kW)	Model dependent	Model dependent	×
P03.21	Synchronous motor axis-D inductance	0.01 to 655.35 mH (drive power ⩽ 55 kW) 0.001 to 65.535 mH (drive power > 55 kW)	Model dependent	Model dependent	×
P03.22	Synchronous motor axis-Q inductance	0.01 to 655.35 mH (drive power ⩽ 55 kW) 0.001 to 65.535 mH (drive power > 55 kW)	Model dependent	Model dependent	×
P03.23	Synchronous motor back EMF	0.0 to 6553.5 V/krpm	0.0 to 6553.5 V/krpm	Model dependent	×
P03.24	Reserved				
P03.25	Reserved				
P03.26	Reserved				
P03.27	Motor auto-tuning	0: No operation 1: Part parameter auto-tuning in the static status 2: Full parameter auto-tuning in the rotating status 3: Full parameter auto-tuning in the static status	0 to 3	0	×
P03.28	Motor overload protection factor	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	×

Function code	Name	Description	Value range	Default value	Change
P04: Motor 1 encoder parameters					
P04.00	Encoder PPR	1 to 65535	1 to 65535	1024	×
P04.01	Encoder type	0: ABZ incremental encoder	0	0	×
P04.02	A/B phase sequence of ABZ incremental encoder	0: Forward 1: Reverse Note: Rotation auto-tuning automatically detects the phase sequence	0 to 1	0	×
P04.03	Reserved				
P04.04	PG card voltage class selection	0: 5 V 1: 12 V	0 to 1	0	×
P04.05	Motor control function selection	0: Disabled 1: Enabled	0 to 0xFFFF	0x0BFF	×
P04.06	Magnetic pole angle		0 to 359.9	0	*
P04.07	PG card frequency division factor	0: No frequency division 1: Divide-by-2 2: Divide-by-4 3: Divide-by-8 4: Divide-by-16	0 to 4		*
P04.08 to P04.22	Reserved				*
P04.23	Synchronous open-loop axis-Q correction coefficient	0 to 100	0 to 100	40	○
P04.24	Synchronous open-loop axis-D correction coefficient	0 to 100	0 to 100	30	○

Function code	Name	Description	Value range	Default value	Change
P04.25	Synchronous open-loop speed filter coefficient	0 to 1000	0 to 1000	100	○
P04.26	Synchronous open-loop axis-D injection current	0% to 100%	0 to 100	10	○
P04.27	Synchronous open-loop low-frequency carrier frequency	1.0 to 6.0	1.0 to 6.0	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	○

Function code	Name	Description	Value range	Default value	Change
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 overexcitation gain	50 to 200%	50 to 200%	100%	○
P05.09	Drive torque upper limit source	0: Digital setting (P05.10) 1: AI1 2: AI2 3: HDI 4: Modbus / Modbus TCP 5: PROFINET / EtherCAT	0 to 5	0	○
P05.10	Drive torque upper limit digital setting	0.0 to 300.0%	0.0 to 300.0%	150.0%	○
P05.11	Braking torque upper limit source	0: Digital setting (P05.12) 1: AI1 2: AI2 3: HDI 4: Modbus / Modbus TCP 5: PROFINET / EtherCAT	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	○

Function code	Name	Description	Value range	Default value	Change
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 auto-tuning coefficient	0.0 to 120.0%	0.0 to 120.0%	100.0%	○
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 1: AI1 2: AI2 3: HDI 4: Modbus / Modbus TCP 5: PROFINET / EtherCAT	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%	○

Function code	Name	Description	Value range	Default value	Change
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 1: AI1 2: AI2 3: HDI 4: Modbus / Modbus TCP 5: PROFINET / EtherCAT	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 1: AI1 2: AI2 3: HDI 4: Modbus / Modbus TCP 5: PROFINET / EtherCAT	0 to 5	0	○
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	0 to 5	0	×

Function code	Name	Description	Value range	Default value	Change
		2: Square V/F 3: Reserved 4: V/F complete separation 5: V/F half separation			
P07.01	Torque boost	0.0 to 50.0	0.0 to 50.0	Model dependent	○
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	0V	×
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 voltage 2	P07.04 to P07.08	P07.04 to P07.08	0V	×
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 overexcitation 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	×

Function code	Name	Description	Value range	Default value	Change
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 9: PROFINET / EtherCAT	0 to 9	0	○
P07.14	Digital setting of 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	○
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	Reserved				
P07.19	Reserved				
P08: Startup/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	×

Function code	Name	Description	Value range	Default value	Change
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 (disabled) 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	○
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 reference frequency 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	×

Function code	Name	Description	Value range	Default value	Change
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 150.0%	0.0 to 150.0%	0.0%	○
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, too large parameter may cause the tracking unreliable.	1 to 100	20	○
P08.17	Speed tracking current	Ensure the maximum current during speed tracking is within the range. Too small current may cause bad speed tracking.	10 to 200%	Model dependent	×
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: Position lock 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; and when the	0 to 2	0	×

Function code	Name	Description	Value range	Default value	Change
		frequency reference is once above the frequency lower limit and running duration exceeds the time set by P08.20, the drive automatically resumes operation.			
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 inhibition	0: Disabled 1: Enabled	0 to 1	0	○
P08.28	FWD/REV switchover deadzone 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 subsequent to 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	500 to 800 V	500 to 800 V	680 V	○

Function code	Name	Description	Value range	Default value	Change
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	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 you disable protection, 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, 8	Ones: 0: Terminal 4 as DI1 1: Terminal 4 as DO1 2: Terminal 4 as HDO1 Tens: 0: Terminal 5 as DI2 1: Terminal 5 as DO2 2: Terminal 5 as HDO2 Hundreds: Reserved Thousands: Reserved Note: Terminal 6 can only be set as DI3. Terminal 8 can only be set as DI4.	0 to 0x22	0	○

<table>
<tr><th>Function code</th><th>Name</th><th>Description</th><th>Value range</th><th>Default value</th><th>Change</th></tr>
<tr><td>P09.01</td><td>Function selection of terminals 7, 10, 12, 16</td><td>Ones:
0: Terminal 7 as DI5
1: Terminal 7 as thermosensitive signal input
Tens:
0: Terminal 10 as DI6
1: Terminal 10 as HDI
Hundreds: Reserved
Thousands:
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</td><td>0 to 0x2011</td><td>0</td><td>○</td></tr>
<tr><td>P09.02</td><td>Function selection of terminals 13, 11</td><td>Ones:
0: Terminal 13 as AI2 voltage input
1: Terminal 13 as AI2 current input
Tens:
0: Terminal 11 as DO3
1: Terminal 11 as AO1 voltage output
2: Terminal 11 as AO1 current output
Hundreds: Reserved
Thousands: Reserved</td><td>0 to 0x21</td><td>0</td><td>○</td></tr>
<tr><td>P09.03</td><td>DI1 function selection</td><td rowspan="5">0: No function
1: Forward RUN
2: Reverse RUN
3: Forward jog
4: Reverse jog
5: Three-wire control</td><td>0 to 79</td><td>1</td><td>○</td></tr>
<tr><td>P09.04</td><td>DI2 function selection</td><td>0 to 79</td><td>22</td><td>○</td></tr>
<tr><td>P09.05</td><td>DI3 function selection</td><td>0 to 79</td><td>0</td><td>○</td></tr>
<tr><td>P09.06</td><td>DI4 function selection</td><td>0 to 79</td><td>0</td><td>○</td></tr>
<tr><td>P09.07</td><td>DI5 function selection</td><td>0 to 79</td><td>0</td><td>○</td></tr>
</table>

Function code	Name	Description	Value range	Default value	Change
P09.08	DI6 function selection	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 A 22: External reset (RESET) input 23: Coast to stop input (FRS) 24: Acceleration/Deceleration inhibition 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	0 to 79	0	○
P09.09	DI7 function selection		0 to 79	0	○
P09.10	DI8 function selection		0 to 79	0	○

Function code	Name	Description	Value range	Default value	Change
		30: PID clear 31: PID integral hold 32: Reserved 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: Reserved 38: Command channel switched to keypad 39: Command channel switched to terminal 40: Command channel switched to communication 41: Reserved 42: REV inhibition 43: Drive running inhibition 44: External stop command (it is valid for all control modes, and the device will be stopped according to the current stop mode) 45: Auxiliary reference frequency 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			

Function code	Name	Description	Value range	Default value	Change
		51: Position selection 3 52: Digital position cyclic positioning mode enable 53: Spindle homing 54: Speed/Position mode switchover 55: Motor 1 and 2 switchover terminal 56: Safety terminal input (reserved) 57 to 59: Reserved 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: Controller enable (EN) 72: Inspection input (INS) 73: Emergency running input (UPS) 74: RUN contactor feedback input 75: Brake feedback input 76: Motor overheat input (OH) 77: Up forced slow-down speed input (UPF) 78: Down forced slow-down speed input (DNF) 79: Overspeed governor feedback			

Function code	Name	Description	Value range	Default value	Change
		input (OSG)			
P09.11	Terminal open-circuit voltage	0: Digital terminal open-circuit voltage 0 V 1: Digital terminal open-circuit voltage 24 V	0 to 1	1	○
P09.12	DI1 to DI4 active mode	Ones: 0: DI1 positive logic active 1: DI1 negative logic active Tens: 0: DI2 positive logic active 1: DI2 negative logic active Hundreds: 0: DI3 positive logic active 1: DI3 negative logic active Thousands: 0: DI4 positive logic active 1: DI4 negative logic active	0 to 0×1111	0	○
P09.13	DI5 to DI8 active mode	Ones: 0: DI5 positive logic active 1: DI5 negative logic active Tens: 0: DI6 positive logic active 1: DI6 negative logic active Hundreds: 0: DI7 positive logic active 1: DI7 negative logic active Thousands: 0: DI8 positive logic active 1: DI8 negative logic active	0 to 0×1111	0	○

<table>
<tr><th>Function code</th><th>Name</th><th>Description</th><th>Value range</th><th>Default value</th><th>Change</th></tr>
<tr><td>P09.14</td><td>FWD/REV operation mode</td><td>0: Two-wire mode 1
The combination of FWD and REV controls the running commands and directions.
<table>
<tr><td>FWD</td><td>REV</td><td>Command</td></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><td>FWD</td><td>REV</td><td>Command</td></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 running commands and directions.
<table>
<tr><td>EN</td><td>FWD</td><td>REV</td><td>Command</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">0->1</td><td>0</td><td rowspan="2">Forward</td></tr>
<tr><td>1</td></tr>
</table>
</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>Value range</th><th>Default value</th><th>Change</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td rowspan="2"></td><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 FWD's rising edge is the source of running commands, and REV controls the running directions.
<table>
<tr><td>EN</td><td>FWD</td><td>REV</td><td>Command</td></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. It is recommended to increase the parameter when there is strong interference to avoid misoperation.</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
bit6: VDI7
bit7: VDI8</td><td>0 to 0xFF</td><td>0</td><td>×</td></tr>
</table>

Function code	Name	Description	Value range	Default value	Change
P09.17	DI1 switch-on delay time	Used to set the delay time for level jump upon switch-on/off of digital input terminals. Value 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	0.00 V	○
P09.26	Percentage corresponding to AI1 lower limit	0.0% to 100.0%	0.0 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	0.0 to 100.0%	0.0 to 100.0%	100.0%	○
P09.29	AI1 filter time	0.000 to 10.000 s	0.000 to 10.000 s	0.030 s	○
P09.30	AI2 lower limit	-10.00 V to P09.32	-10.00V to P09.32	-10.00 V	○
P09.31	Percentage corresponding to AI2 lower limit	-100.0 to 100.0%	-100.0 to 100.0%	-100.0%	○

Function code	Name	Description	Value range	Default value	Change
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 10.000 s	0.030 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	0.0 to 100.0%	0.0 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	0.0 to 100.0%	0.0 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					
P10.00	DO1 function selection	0: Disabled 1: AC drive in running 2: Forward running	0 to 47	1	○
P10.01	DO2 function selection		0 to 47	4	○

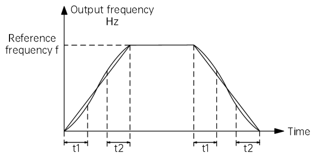
Function code	Name	Description	Value range	Default value	Change
P10.02	DO3 function selection	3: Reverse running 4: Frequency reach signal (FAR)	0 to 47	0	○
P10.03	Relay RO1 output selection	5: Frequency-level detection signal (FDT1) 6: Frequency-level detection signal (FDT2) 7: Overload detection signal (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: Current running duration reach 16: Accumulated running duration 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 torque command is limited by the torque limit value 1 or 2. 22: Motor overload warning 23 to 25: Reserved 26: Reference count value reach 27: Designated count value reach 28: Length reach 29: Positioning completed	0 to 47	18	○

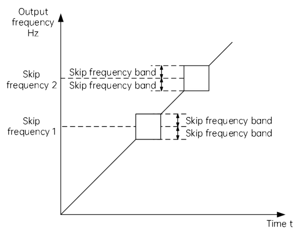
Function code	Name	Description	Value range	Default value	Change
		30: Zero positioning completed 31: Index positioning completed 32 to 37: Reserved 38: Motor 1 and 2 indication terminal 39: Bus card switch signal 40 to 45: Reserved 46: PID feedback loss 47: Reserved			
P10.04	Output terminal polarity selection	Ones: 0: DO1 positive logic active 1: DO1 negative logic active Tens: 0: DO2 positive logic active 1: DO2 negative logic active Hundreds: 0: DO3 positive logic active 1: DO3 negative logic active Thousands: 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/off of 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	0.0 s	○
P10.07	DO2 switch-on delay time		0.0 to 600.0	0.0 s	○
P10.08	DO2 switch-off delay time		0.0 to 600.0	0.0 s	○
P10.09	DO3 switch-on delay		0.0 to 600.0	0.0 s	○

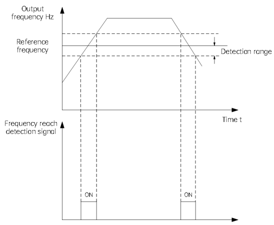
Function code	Name	Description	Value range	Default value	Change
	time				
P10.10	DO3 switch-off delay time		0.0 to 600.0	0.0 s	○
P10.11	RO1 switch-on delay time		0.0 to 600.0	0.0 s	○
P10.12	RO1 switch-off delay time		0.0 to 600.0	0.0 s	○
P10.13	AO1 function	0: Output frequency (0 to maximum frequency) 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	0 to 28	0	○
P10.14	HDO1 function		0 to 28	0	○
P10.15	HDO2 function		0 to 28	0	○

Function code	Name	Description	Value range	Default value	Change
		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 limit	0.00 to 50.00 kHz	0.00 to 50.00	50.00 kHz	○
P10.25	HDO1 output filter time	0.000 to 10.000 s	0.000 to 10.000	0.005 s	○

Function code	Name	Description	Value range	Default value	Change
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	4.0	○
P11.02	Deceleration time 2	0.0 to 6000.0 s	0.0 to 6000.0 s	4.0	○
P11.03	Acceleration time 3	0.0 to 6000.0 s	0.0 to 6000.0 s	Model dependent	○
P11.04	Deceleration time 3	0.0 to 6000.0 s	0.0 to 6000.0 s	Model dependent	○
P11.05	Acceleration time 4	0.0 to 6000.0 s	0.0 to 6000.0 s	Model dependent	○
P11.06	Deceleration time 4	0.0 to 6000.0 s	0.0 to 6000.0 s	Model dependent	○
P11.07	Time proportion of S-curve start	In the below figure, t1 is defined by P11.07, in which the output	0.0 to 100.0%	30.0%	○

Function code	Name	Description	Value range	Default value	Change
	segment	frequency slope gradually increases			
P11.08	Time proportion of S-curve end segment	according to the curve; t2 is defined by P11.08, in which the output frequency slope gradually decreases according to the curve; and the segment between t1 and t2 is straight-line acceleration/deceleration. They are relative to the current acceleration/deceleration time.  Note: P11.07+P11.08 ≤ 100.0%	0.0 to 100.0%	30.0%	○
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 operation 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 6000.0 s	6.0 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	0.01 to 50.00 Hz/s	0.01 to 50.00 Hz/s	0.50 Hz/s	○

Function code	Name	Description	Value range	Default value	Change
	speed				
P11.17	Keypad frequency setting selection	Ones: Whether UP/DOWN terminal frequency adjustment is valid 0: Invalid 1: Valid Tens: Whether to retain the keypad UP/DOWN set frequency upon a power failure 0: Does not retain 1: Retain Hundreds: Whether to retain the keypad UP/DOWN set frequency upon a stop 0: Does not retain 1: Retain	0 to 0x111	0x100	○
P11.18	Skip frequency 1	If the reference frequency is within the skip frequency, the drive will output according to the skip frequency boundary actually to avoid the mechanical resonance. If the skip frequency is set to 0, the function is disabled.	0.00 Hz to P02.10	0.00 Hz	○
P11.19	Skip frequency 1 band		0.00 Hz to P02.10	0.00 Hz	○
P11.20	Skip frequency 2		0.00 Hz to P02.10	0.00 Hz	○
P11.21	Skip frequency 2 band		0.00 Hz to P02.10	0.00 Hz	○
P11.22	Wobble amplitude	0.0 to 100.0% (reference frequency 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%	○

Function code	Name	Description	Value range	Default value	Change
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 frequency, the multi-function DO terminal outputs an ON signal.	0.0 to 100.0%	0.0%	○
P11.27	FDT1 frequency 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 range 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 detection hysteresis		0.0 to 100.0%	0.0%	○
P11.29	FDT2 frequency detection value		0.00 Hz to P02.11	0.00 Hz	○
P11.30	FDT2 frequency detection hysteresis		0.0 to 100.0%	0.0%	○
P11.31	Auto start temperature of fan	40.0 to 80.0℃	40.0 to 80.0℃	55.0℃	○
P11.32	Reserved				
P11.33	Reference length	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	0 to 60000	0 to 60000	1000	○
P11.36	Reference count	0 to 60000	0 to 60000	0	○

Function code	Name	Description	Value range	Default value	Change
	value				
P11.37	Designated count value	0 to 60000	0 to 60000	0	○
P11.38	Running duration setting	0 to 65535 min	0 to 65535 min	0 min	○
P11.39	Accumulated running duration reach	0 to 65535 h	0 to 65535 h	0 h	○
P11.40	Wakeup frequency	When the frequency reference is higher than P11.40, the drive starts directly after the delay defined by P11.41.	0.00 Hz to P02.10	0.00 Hz	○
P11.41	Wakeup delay	0.0 to 6553.5 s	0.0 to 6553.5 s	0.0 s	○
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	0.0 to 6553.5 s	0.0 to 6553.5 s	0.0 s	○
P11.44	Cooling fan control	0: Auto running (based on the inverter temperature) 1: Always running after power-on 2: Controlled by start/stop commands (On during operation, Off during stop)	0 to 2	2	×
P11.45	Keypad UP/DOWN frequency	The frequency adjusted based on the current set frequency through Up/Down of keypad. Down for negative, and UP for positive.	-P02.10 to P02.10	0	*
P11.46	UP/DOWN frequency	The frequency adjusted based on the current set frequency through Up/Down of keypad and terminal.	-P02.10 to P02.10	0	*

Function code	Name	Description	Value range	Default value	Change
		Down for negative, and UP for positive.			
P12: Control optimization parameters					
P12.00	Reserved				
P12.01	Reserved				
P12.02	Deadzone compensation mode	0: No compensation 1: Compensation mode 1	0 to 1	1	○
P12.03	Random PWM depth	0: Disabled 1 to 10: Random PWM depth	0 to 10	0	○
P12.04	Reserved				
P12.05	Voltage overmodulation coefficient	100 to 110	100 to 110	105	×
P12.06	Reserved				
P12.07	SVPWM mode	0 to 1	0 to 1	0	×
P12.08 to 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	0 to 0x1112	0x0000	×

Function code	Name	Description	Value range	Default value	Change
		LED hundreds: Power failure retention 0: Non-retentive 1: Retain the stage and frequency upon power failure LED thousands: Stage time unit 0: s 1: min			
P13.01	Multi-speed reference 0	The frequency range from stage 0 to stage 15 is -100.0 to 100.0%, and the maximum 100.0% corresponds to the maximum frequency P02.10. When simple PLC running is chosen, P13.01–P13.32 need to be set to determine the running frequency and running time of each stage. The running time range from stage 0 to stage 15 is 0.0 to 6553.5 s (min), and the time unit is determined by P13.00.	-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	○

Function code	Name	Description	Value range	Default value	Change
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 3 running time		0.0 to 6553.5 s (min)	0.0	○
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	○

<table>
<tr><th>Function code</th><th>Name</th><th>Description</th><th>Value range</th><th>Default value</th><th>Change</th></tr>
<tr><td>P13.24</td><td>Multi-speed reference 7 running time</td><td rowspan="9"></td><td>0.0 to 6553.5 s (min)</td><td>0.0</td><td>○</td></tr>
<tr><td>P13.25</td><td>Multi-speed reference 8 running time</td><td>0.0 to 6553.5 s (min)</td><td>0.0</td><td>○</td></tr>
<tr><td>P13.26</td><td>Multi-speed reference 9 running time</td><td>0.0 to 6553.5 s (min)</td><td>0.0</td><td>○</td></tr>
<tr><td>P13.27</td><td>Multi-speed reference 10 running time</td><td>0.0 to 6553.5 s (min)</td><td>0.0</td><td>○</td></tr>
<tr><td>P13.28</td><td>Multi-speed reference 11 running time</td><td>0.0 to 6553.5 s (min)</td><td>0.0</td><td>○</td></tr>
<tr><td>P13.29</td><td>Multi-speed reference 12 running time</td><td>0.0 to 6553.5 s (min)</td><td>0.0</td><td>○</td></tr>
<tr><td>P13.30</td><td>Multi-speed reference 13 running time</td><td>0.0 to 6553.5 s (min)</td><td>0.0</td><td>○</td></tr>
<tr><td>P13.31</td><td>Multi-speed reference 14 running time</td><td>0.0 to 6553.5 s (min)</td><td>0.0</td><td>○</td></tr>
<tr><td>P13.32</td><td>Multi-speed reference 15 running time</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><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>0</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>Value range</th><th>Default value</th><th>Change</th></tr>
<tr><td></td><td></td><td><table>
<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></td><td></td><td></td></tr>
<tr><td>P13.34</td><td>Acceleration/ Deceleration time of simple PLC reference 4 to 7</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>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><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>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>
<tr><td>Thousands</td><td>11</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>P13.36</td><td>Acceleration/ Deceleration time of simple PLC reference</td><td><table>
<tr><td></td><td>Refere</td><td>Acc/ Dec</td><td>Acc/ Dec</td><td>Acc/ Dec</td><td>Acc/ Dec</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>Value range</th><th>Default value</th><th>Change</th></tr>
<tr><td></td><td>12 to 15</td><td><table>
<tr><td></td><td>nce</td><td>time 1</td><td>time 2</td><td>time 3</td><td>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></td><td></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
6: PROFINET / EtherCAT</td><td>0 to 6</td><td>0</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
5: PROFINET / EtherCAT
6: AI1+AI2
7: AI1-AI2
8: MIN (AI1，AI2)
9: MAX (AI1，AI2)</td><td>0 to 9</td><td>0</td><td>○</td></tr>
<tr><td>P14.02</td><td>PID digital setting</td><td>-100.0% to 100.0%</td><td>-100.0% to 100.0%</td><td>50.0%</td><td>○</td></tr>
</table>

Function code	Name	Description	Value range	Default value	Change
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 maximum span)	0.0 to 100.0%	0.0%	○
P14.11	PID parameter low-frequency switchover point	When the ramp reference frequency is lower than the low-frequency switchover point, the PID parameter is P14.05 to P14.07; when it is greater than the high-frequency switchover point, the PID parameter is 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 these two group parameters.	0.00 Hz to P14.12	5.00 Hz	○
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	2.00 s	○
P14.15	Derivative time Td2	0.000 to 10.000 s	0.000 to 10.000 s	0.000 s	○

Function code	Name	Description	Value range	Default value	Change
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: 0: Integral separation disabled 1: Integral separation enabled Tens: 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: 0: Continue integral regulation after the frequency reaches the upper/lower limit 1: Stop integral regulation 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 100.0%	0.0%	○
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	0: Percentage	0 to 1	0	×

Function code	Name	Description	Value range	Default value	Change
	unit selection	1: Hz Note: When Hz is chosen, P14.26 and P14.27 are the upper and lower limits. When Hz is chosen, the maximum frequency P02.10 cannot exceed 327.67 Hz.			
P14.26	PID frequency upper limit	P14.27 to 327.67 Hz	P14.27 to 327.67 Hz	50.00 Hz	
P14.27	PID frequency lower limit	-327.67 Hz to P14.26	-327.67 Hz to P14.26	0.00 Hz	
P15: Communication parameters					
P15.00	Communication format	Ones: 0: Modbus protocol 1: Expansion card to 485 protocol Tens: 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 1: 9600 BPS 2: 19200 BPS 3: 38400 BPS 4: 57600 BPS 5: 115200 BPS 6: 125000 BPS	0 to 6	1	○
P15.02	Local address	0 to 247, 0 is the broadcast address	0 to 247	1	○

Function code	Name	Description	Value range	Default value	Change
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 the current communication and next communication exceeds the timeout detection time, the system will report "485 communication error" (CE).	0.0 to 60.0 s	0.0 s	○
P15.04	Response delay of the drive	0 to 200 ms	0 to 200 ms	5 ms	○
P15.05	Communication action	Ones: 0: Response to write operation 1: No response to write operation Tens: 485 mapping function 0: Disable 1: Enable Note: Only control parameters starting with 0x64 can decide whether there is a response for the write operation. For writing of function codes, it is sure to have response.	0 to 0x11	0	○
P15.06	Reserved function 2 for user	0 to 65535	0 to 65535	0	○
P16: Keypad display setting parameters					
P16.00	LED display parameter selection 1 during running	0: No display; 1: Display Used to set whether a parameter displays on the zero level of the keypad menu during running. The related bits are listed below: 0: Main frequency channel	0 to 0xFFFF	0xF0	○

Function code	Name	Description	Value range	Default value	Change
		1: Main frequency reference 2: Auxiliary frequency reference 3: Reference frequency 4: Ramp reference frequency 5: Output frequency 6: Output voltage 7: Output current 8: Torque current 9: Exciting current 10: Reserved 11: Motor power 12: Estimated motor frequency 13: Actual motor frequency 14: HIWORD of the drive's accumulated power consumption 15: LOWORD of the drive's accumulated power consumption			
P16.01	LED display parameter selection 2 during running	0: No display; 1: Display Used to set whether a parameter displays on the zero level of the keypad menu during running. The related bits are listed below: 0: Bus voltage 1: Drive running status 2: DI1 to DI4 state 3: DI5 to DI8 state 4: DO state 5: AI1 voltage 6: AI2 voltage 7: AI1 current 8: AI2 current	0 to 0xFFFF	0x1	○

Function code	Name	Description	Value range	Default value	Change
		9: AO1 voltage 10: HDI frequency 11: HDO1 frequency 12: HDO2 frequency 13: Process PID reference 14: Process PID feedback 15: Process PID deviation			
P16.02	LED default parameter display during running	Used to set the default parameter number displayed on the zero level of the keypad menu during running after power-on. 0-31 represent the 32 parameters listed in P16.00 and P16.01. Note: When you press the shift key, the function code displays the switched parameter number, only RAM modified and not saved to EEPROM.	0 to 31	4	○
P16.03	LED parameter display selection at stop	Binary setting: 0: No display; 1: Display Used to set whether a parameter is displayed on the zero level of the keypad menu at stop. Bit0 to bit15 correspond to 16 parameters listed in P16.04. Note: If all is set to 0, the reference frequency will be displayed.	0 to 0xFFFF	0x3	○
P16.04	LED default parameter display at stop	Used to set the default parameter number displayed on the zero level of the keypad menu at stop after power-on. 0: Reference frequency 1: Bus voltage 2: DI input status 1	0 to 15	0	○

Function code	Name	Description	Value range	Default value	Change
		3: DI input status 2 4: DO output status 5: AI1 input voltage 6: AI2 input voltage 7: AO1 output percentage 8: HDI reference frequency 9: HDO1 output 10: HDO2 output 11: Length 12: Simple PLC current step 13: Line speed 14: PID reference 15: Torque reference Note: When you press the shift key, the function code only displays the switched parameter number, only RAM modified and not saved to EEPROM.			
P16.05	Line speed display coefficient	0.1 to 999.9% P01.44=line speed×P16.05	0.1 to 999.9%	100.0%	○
P16.06	Rotation speed display coefficient	0.1 to 999.9% Mechanical rotation speed=60× displayed running frequency× 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	0 to 0xFFFF	0 to 0xFFFF	0x1000	○

Function code	Name	Description	Value range	Default value	Change
	address				
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	○
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	*
P26: Commissioning parameter group 2					

Function code	Name	Description	Value range	Default value	Change
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 parameter 12	0 to 65535	0 to 65535	0	○
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	0 to 65535	0 to 65535	0	○

Function code	Name	Description	Value range	Default value	Change
	parameter 15				
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	○
P26.27	Commissioning parameter 28	0 to 65535	0 to 65535	0	○
P26.28	Commissioning parameter 29	0 to 65535	0 to 65535	0	○

Function code	Name	Description	Value range	Default value	Change
P26.29	Commissioning parameter 30	0 to 65535	0 to 65535	0	○
P28: Elevator function parameters					
P28.00	Inspection speed selection	Used to select the multi-speed during inspection.	0 to 15	0	○
P28.01	Emergency running speed selection	Used to select the multi-speed during emergency running.	0 to 15	0	○
P28.02	Up speed detection level	0.00 Hz to maximum frequency	0.00 Hz to P02.10	0.00 Hz	○
P28.03	Down speed detection level	0.00 Hz to maximum frequency	0.00 Hz to P02.10	0.00 Hz	○
P28.04	Deceleration time at abnormality	Used to set the deceleration time from the maximum frequency to 0 Hz upon drive abnormality.	0.0 s to 300.0 s	0.500 s	○
P28.05	Advance door opening detection level	0.00 Hz to maximum frequency	0.00 Hz to P02.10	0 Hz	○
P28.06	Brake release delay	0.20 to 10.00 s	0.00 to 10.00 s	0.20 s	○
P28.07	Zero-speed delay	0.00 to 10.00 s	0.00 to 10.00 s	0.30 s	○
P28.08	Brake close delay	0.00 to 10.00 s	0.00 to 10.00 s	0.20 s	○
P28.09	Release delay upon stop	0.00 to 10.00 s	0.00 to 10.00 s	0.30 s	○
P28.10	RUN contactor open delay	0.00 to 10.00 s	0.00 to 10.00 s	0.00 s	○
P28.11	Zero-speed running output delay	0.000 to 2.000 s	0.000 to 20.000 s	0.000 s	○
P28.12	Zero-speed signal output delay	0 ms to 9999 ms	0 ms to 9999 ms	0	○

Function code	Name	Description	Value range	Default value	Change
P28.13	Current cancellation time upon stop	0 to 9999 s	0 to 9999 s	300 ms	○
P28.14	Brake release frequency	0 to 10.00	0 to 10.00	0 Hz	○
P28.15	Zero servo proportional gain	0 to 100	0 to 100	0.05 V	○
P28.16	Zero servo integral gain	0 to 100.0	0 to 100.0	30.0 s	○
P28.17	Zero servo gain coefficient	10 to 160	10 to 160	150%	○
P28.18	Parameter write address for drive test	0 to 65535	0 to 65535	20%	○
P28.19	Parameter value written by drive test	0 to 65535	0 to 65535	40%	○
P28.20	Zero servo feedforward gain	0 to 100	0 to 100	15.0 s	○
P28.21	Parameter read address for drive test	0 to 65535	0 to 65535	0	○
P28.22	Parameter value read by drive test	0 to 65535	0 to 65535	0	○
P28.23	Detected encoder type	0 to 65535	0 to 65535	0	○
P28.24	Time proportion of S-curve start segment during deceleration	0 to 100	0 to 100	50%	○
P28.25	Time proportion of S-curve end segment during deceleration	0 to 100	0 to 100	50%	○
P28.26	Time proportion of S-curve start	0 to 100	0 to 100	20%	○

Function code	Name	Description	Value range	Default value	Change
	segment upon stop				
P28.27	Time proportion of S-curve end segment upon stop	0 to 100	0 to 100	30%	○
P28.28	Method for canceling inspection running command	0 to 1	0 to 1	0	○
P28.29 to P28.39	Reserved				
P30: 485 mapping parameters					
P30.00	485 parameter mapping address 1	0 to 0xFFFF Mapping address is the actual address of parameter inherent for the drive while used address is the actually used address of parameter in messages (such as the actual address for PLC operation).	0 to 0xFFFF	0	○
P30.01	485 parameter used address 1		0 to 0xFFFF	0	○
P30.02	485 parameter mapping address 2		0 to 0xFFFF	0	○
P30.03	485 parameter used address 2		0 to 0xFFFF	0	○
P30.04	485 parameter mapping address 3		0 to 0xFFFF	0	○
P30.05	485 parameter used address 3		0 to 0xFFFF	0	○
P30.06	485 parameter mapping address 4		0 to 0xFFFF	0	○
P30.07	485 parameter used address 4		0 to 0xFFFF	0	○
P30.08	485 parameter mapping address 5		0 to 0xFFFF	0	○
P30.09	485 parameter used		0 to 0xFFFF	0	○

Function code	Name	Description	Value range	Default value	Change
	address 5				
P30.10	485 parameter mapping address 6		0 to 0xFFFF	0	○
P30.11	485 parameter used address 6		0 to 0xFFFF	0	○
P30.12	485 parameter mapping address 7		0 to 0xFFFF	0	○
P30.13	485 parameter used address 7		0 to 0xFFFF	0	○
P30.14	485 parameter mapping address 8		0 to 0xFFFF	0	○
P30.15	485 parameter used address 8		0 to 0xFFFF	0	○
P30.16	485 parameter mapping address 9		0 to 0xFFFF	0	○
P30.17	485 parameter used address 9		0 to 0xFFFF	0	○
P30.18	485 parameter mapping address 10		0 to 0xFFFF	0	○
P30.19	485 parameter used address 10		0 to 0xFFFF	0	○
P30.20	485 parameter mapping address 11		0 to 0xFFFF	0	○
P30.21	485 parameter used address 11		0 to 0xFFFF	0	○
P30.22	485 parameter mapping address 12		0 to 0xFFFF	0	○
P30.23	485 parameter used address 12		0 to 0xFFFF	0	○

Function code	Name	Description	Value range	Default value	Change
P30.24	485 parameter mapping address 13		0 to 0xFFFF	0	○
P30.25	485 parameter used address 13		0 to 0xFFFF	0	○
P30.26	485 parameter mapping address 14		0 to 0xFFFF	0	○
P30.27	485 parameter used address 14		0 to 0xFFFF	0	○
P30.28	485 parameter mapping address 15		0 to 0xFFFF	0	○
P30.29	485 parameter used address 15		0 to 0xFFFF	0	○
P30.30	485 parameter mapping address 16		0 to 0xFFFF	0	○
P30.31	485 parameter used address 16		0 to 0xFFFF	0	○
P30.32	485 parameter mapping address 17		0 to 0xFFFF	0	○
P30.33	485 parameter used address 17		0 to 0xFFFF	0	○
P30.34	485 parameter mapping address 18		0 to 0xFFFF	0	○
P30.35	485 parameter used address 18		0 to 0xFFFF	0	○
P30.36	485 parameter mapping address 19		0 to 0xFFFF	0	○
P30.37	485 parameter used address 19		0 to 0xFFFF	0	○
P30.38	485 parameter		0 to 0xFFFF	0	○

Function code	Name	Description	Value range	Default value	Change
	mapping address 20				
P30.39	485 parameter used address 20		0 to 0xFFFF	0	○
P40: Fieldbus option parameters					
P40.00	Reserved				
P40.01	Detection time for options	0.0 to 10.0 s 0 indicates no timeout detection	0.0 to 10.0	0.0 s	○
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	*

Function code	Name	Description	Value range	Default value	Change
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	1 to 127	1	○
P40.21	CANopen baud rate	0 to 8	0 to 8	2	○
P40.22 to P40.33	Reserved				
P41: IO option parameters					
P41.00	DI9 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: Reserved 13: Frequency up/down setting clear 14: Frequency increase command (UP) 15: Frequency decrease command (DN)	0 to 72	0	○
P41.01	DI10 function selection		0 to 72	0	○
P41.02	DI11 function selection		0 to 72	0	○

Function code	Name	Description	Value range	Default value	Change
		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 A 22: External reset (RESET) input 23: Coast to stop input (FRS) 24: Acceleration/Deceleration inhibition 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: Reserved 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: Reserved 38: Command channel switched to the keypad 39: Command channel switched to the terminal			

Function code	Name	Description	Value range	Default value	Change
		40: Command channel switched to communication 41: Reserved 42: REV inhibition 43: Drive running inhibition 44: External stop command (it is valid for all control modes, and the device will be stopped according to the current stop mode) 45: Auxiliary reference frequency clear 46: Reserved 47: Speed control and torque control switchover terminal 48: Torque direction switchover terminal in torque control 49 to 54: Reserved 55: Motor 1 and 2 switchover terminal 56 to 59: Reserved 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: Reserved			

Function code	Name	Description	Value range	Default value	Change
		72: Reserved			
P41.03	Terminal open-circuit voltage	0: Digital terminal open-circuit voltage 0 V 1: Digital terminal open-circuit voltage 24 V	0 to 1	1	○
P41.04	DI9 to DI11 active mode	Ones: 0: DI9 positive logic active 1: DI9 negative logic active Tens: 0: DI10 positive logic active 1: DI10 negative logic active Hundreds: 0: DI11 positive logic active 1: DI11 negative logic active Thousands: Reserved	0 to 0x111	0	○
P41.05	Reserved				
P41.06	DI filter time	Used to set the filter time for DI terminal sampling. It is recommended to increase the parameter when there is strong interference to avoid misoperation.	0.000 to 1.000	0.010 s	○
P41.07	DI9 switch-on delay time	Used to set the delay time for level jump upon switch-on/off of digital input terminals.	0.0 to 600.0 s	0.0 s	○
P41.08	DI9 switch-off delay time		0.0 to 600.0 s	0.0 s	○
P41.09	DI10 switch-on delay time		0.0 to 600.0 s	0.0 s	○
P41.10	DI10 switch-off delay time		0.0 to 600.0 s	0.0 s	○
P41.11	DI11 switch-on delay		0.0 to 600.0 s	0.0 s	○

Function code	Name	Description	Value range	Default value	Change
	time				
P41.12	DI11 switch-off delay time		0.0 to 600.0 s	0.0 s	○
P41.13	Relay RO2 output selection	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: Current running duration reach 16: Accumulated running duration 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 torque command is limited by the torque limit value 1 or 2.	0 to 47	0	○
P41.14	Relay RO3 output selection		0 to 47	0	○

Function code	Name	Description	Value range	Default value	Change
		22: Motor overload warning 23 to 25: Reserved 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			
P41.15	Output terminal polarity selection	Ones: 0: RO2 positive logic active 1: RO2 negative logic active Tens: 0: RO3 positive logic active 1: RO3 negative logic active Hundreds: Reserved Thousands: Reserved	0 to 0x11	0	○
P41.16	RO2 switch-on delay time	Used to set the delay time for level jump upon switch-on/off of output terminals.	0.0 to 600.0 s	0.0 s	○
P41.17	RO2 switch-off delay time		0.0 to 600.0 s	0.0 s	○
P41.18	RO3 switch-on delay time		0.0 to 600.0 s	0.0 s	○
P41.19	RO3 switch-off delay time		0.0 to 600.0 s	0.0 s	○
P41.20 to P41.50	Reserved				

Function code	Name	Description	Value range	Default value	Change
P42: PLC card option parameters (reserved)					
P50: Option status parameters					
P50.00	Option card 1 type	0: No communication option 1: PROFINET option 2: EtherCAT option 3: IO option 4: Modbus TCP	0 to 4	0	*
P50.01	Option card 2 type	0: No communication option 1: PROFINET option 2: EtherCAT option 3: IO option 4: Modbus TCP	0 to 4	0	*
P50.02	Reserved				
P50.03	DI status of the IO option	0: Disabled 1: Enabled	0 to 0x111	0	*
P50.04	DO status of the IO option	0: Disabled 1: Enabled	0 to 0x11	0	*
P50.05	Software version of option 1	0.00 to 99.99	0.00 to 99.99	0.00	*
P50.06	Software version of option 2	0.00 to 99.99	0.00 to 99.99	0.00	*
P50.07	OP state of the option	0 to 65535	0 to 65535	0	*
P50.08	Count value of CANopen RX&TX error	0 to 65535	0 to 65535	0	*
P50.09 to	Reserved				

Function code	Name	Description	Value range	Default value	Change
P50.39					
P88: AIAO correction (manufacturer's parameters)					
P97: Fault and protection parameters					
P97.00	Fault enable	Ones: 0: Pulse-by-pulse current limit (fast current limiting) protection disabled 1: Pulse-by-pulse current limit (fast current limiting) protection enabled Tens: 0: Fan fault disabled 1: Fan fault enabled Hundreds: 0: Overload prewarning disabled 1: Overload prewarning enabled Thousands: 0: Braking overcurrent disabled 1: Braking overcurrent enabled	0 to 0x1111	0x1001	×
P97.01	Stall suppression enable	Ones: 0: Overvoltage stall suppression disabled 1: Overvoltage stall suppression enabled Tens: 0: Undervoltage stall suppression disabled 1: Undervoltage stall suppression enabled Hundreds: 0: Overcurrent stall suppression disabled 1: Overcurrent stall suppression	0 to 0x111	0x101	×

Function code	Name	Description	Value range	Default value	Change
		enabled			
P97.02	Current limit level	20 to 200%	20 to 200%	150%	×
P97.03	Current limit adjustment coefficient	Range: 0 to 100	0 to 100	20	×
P97.04	Overvoltage stall suppression action voltage	600 to 750 V	600 to 750 V	720 V	○
P97.05	Voltage regulator proportional coefficient upon overvoltage stall	Defines the proportional coefficient of the bus voltage regulator upon overvoltage stall.	0 to 1000	10	○
P97.06	Reserved				
P97.07	Speed regulator proportional coefficient upon overvoltage stall	Defines the proportional coefficient of the rotation speed regulator upon overvoltage stall.	0 to 1000	60	○
P97.08	Reserved				
P97.09	Voltage regulator proportional coefficient upon undervoltage stall	Defines the proportional coefficient of the bus voltage regulator upon undervoltage stall.	0 to 1000	40	○
P97.10	Voltage regulator integral coefficient upon undervoltage stall	Defines the integral coefficient of the bus voltage regulator upon undervoltage stall. Range: 0 to 1000	0 to 1000	20	○
P97.11	Undervoltage stall suppression action voltage	When the bus voltage is lower than this value, the undervoltage stall suppression will be triggered to lower the frequency and raise the voltage.	400 to 460 V	460 V	×

Function code	Name	Description	Value range	Default value	Change
P97.12	Undervoltage stall recovery judgment time	When the bus voltage is greater than P97.13, the drive stops lowering frequency after the delay time defined here.	0.0 to 100.0 s	2.0 s	×
P97.13	Undervoltage stall suppression pause voltage	When the bus voltage is greater than this value, the drive no longer lowers frequency.	460 to 500 V	485 V	×
P97.14	Phase loss protection enable	Ones: 0: Input phase loss protection disabled 1: Input phase loss protection enabled Tens: 0: Output phase loss protection disabled during running 1: Output phase loss protection enabled during running Hundreds: 0: Short-to-ground detection upon power-on disabled 1: Short-to-ground detection upon power-on enabled Thousands: 0: Output phase loss protection before running disabled 1: Output phase loss protection before running enabled	0 to 0x1111	0x100	○
P97.15	Fault protection and alarm property 1	0: Coast to stop 1: Decelerate to stop 2: Keep running Ones: Input phase loss (reserved) Tens: Output phase loss (reserved)	0 to 0	0	○

Function code	Name	Description	Value range	Default value	Change
		Hundreds: Reserved Thousands: Reserved			
P97.16	Fault protection and alarm property 2	0: Coast to stop 1: Decelerate to stop 2: Keep running Ones: EEPROM read/write fault Tens: Reserved Hundreds: Reserved Thousands: 485 communication error	0 to 0x2002	0x2002	○
P97.17	Fault protection and alarm property 3	0: Coast to stop 1: Decelerate to stop 2: Keep running Ones: Fan locked-rotor Tens: Motor overload Hundreds: Motor overheat Thousands: Reserved	0 to 0x222	0x0002	○
P97.18	Fault protection and alarm property 4	0: Coast to stop 1: Decelerate to stop 2: Keep running Ones: Reserved Tens: 24 V power supply overload Hundreds: Reserved Thousands: Reserved	0 to 0x20	0	○
P97.19 to P97.24	Reserved				
P97.25	Motor overheat protection threshold	0 to 200℃	0 to 200℃	120℃	○

Function code	Name	Description	Value range	Default value	Change
P97.26	Motor temperature sensor type	0: No temperature sensor 1: PT1000 2: KTY84-130	0 to 2	0	○
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	Auto reset attempts	When there are faults, the drive starts to reset according to the interval defined by P97.31. After the auto reset attempts are reached, you can only reset through the manual reset commands. If there are manual reset commands during auto reset, the auto reset count will be cleared. When the drive is running normally without faults for 600 s, the fault reset count will be cleared. 0 means the auto reset function is disabled.	0 to 100	0	○
P97.30	Relay action during auto reset	0: Disabled 1: Enabled	0 to 1	0	○
P97.31	Auto reset interval	2.0 to 600.0 s	2.0 to 600.0 s	5.0 s	○
P97.32	Current fault type	0: No fault 1: Overcurrent during acceleration (OC1) 2: Overcurrent during deceleration (OC2) 3: Overcurrent during operation at constant speed (OC3)	0 to 61	0	*
P97.33	Latest fault type		0 to 61	0	*
P97.34	Second latest fault type		0 to 61	0	*

Function code	Name	Description	Value range	Default value	Change
		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) 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 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: Reserved 23: Braking resistor overcurrent (brOC) 24: Auto-tuning fault (tUN) 25: Reserved 26: PROFINET communication timeout (E-Pn) 27: IO card communication timeout (E-Io)			

Function code	Name	Description	Value range	Default value	Change
		28: Modbus TCP communication timeout (E-TCP) 29 to 32: Reserved 31: Options fault (oPt) 32: Reserved 33: Short-to-ground fault (GdF) 34: Speed deviation fault (dEv) 35 to 38: Reserved 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 and download timeout (UPdnE) 51: AI1 current input overcurrent (AIOC) 52: Reserved 53: FAN locked-rotor (FAn) 54: Pre-overload (POL1) 55: IO option 24 V overload (IO-OL) 56: Hardware input phase loss (HSPI) 57: DI zero positioning failed (POFL) 58: Sensor loss (PLoSS) 59: Sensor too high (PoH) 60: Water shortage (PPL)			

Function code	Name	Description	Value range	Default value	Change
		61: Burst pipe (PPb)			
P97.35	Bus voltage upon the current fault	0.0 to 6553.5 V	0.0 to 6553.5 V	0.0 V	*
P97.36	Actual current upon the current fault	0.0 to 999.9 A	0.0 to 999.9 A	0.0 A	*
P97.37	Running frequency upon the current fault	0.00 to 655.35 Hz	0.00 to 655.35 Hz	0.00 Hz	*
P97.38	AC drive status upon the current fault	0 to 0xFFFF	0 to 0xFFFF	0	*
P97.39	Inverter bridge temperature upon the current fault	-40.0 to 150.0℃	-40.0 to 150.0℃	0.0℃	*
P97.40	Current fault subcode	1901 Encoder card communication abnormal 1902 Z signal correction abnormal 1903 Z signal loss 1904 CD signal correction abnormal 1905 AB signal abnormal 1907 CD signal abnormal 1909 Pulse count abnormal 1920 PG card type error	0 to 65535	0	*
P97.41	Input terminal state upon the current fault	0 to 0xFF	0 to 0xFF	0	*
P97.42	Output terminal state upon the current fault	0 to 0xF	0 to 0xF	0	*
P97.43	Running duration upon the current fault	0.0 to 6553.5 s	0.0 to 6553.5 s	0.0 s	*

Function code	Name	Description	Value range	Default value	Change
P97.44	Bus voltage upon the latest fault	0.0 to 6553.5 V	0.0 to 6553.5 V	0.0 V	*
P97.45	Actual current upon the latest fault	0.0 to 999.9 A	0.0 to 999.9 A	0.0 A	*
P97.46	Running frequency upon the latest fault	0.00 to 655.35 Hz	0.00 to 655.35 Hz	0.00 Hz	*
P97.47	AC drive status upon the latest fault	0 to 0xFFFF	0 to 0xFFFF	0	*
P97.48	Inverter bridge temperature upon the latest fault	0.0 to 150.0℃	0.0 to 150.0℃	0.0℃	*
P97.49	Fault subcode of the latest fault	0 to 65535	0 to 65535	0	*
P97.50	Input terminal state upon the latest fault	0 to 0xFF	0 to 0xFF	0	*
P97.51	Output terminal state upon the latest fault	0 to 0xF	0 to 0xF	0	*
P97.52	Running duration upon the latest fault	0.0 to 6553.5 s	0.0 to 6553.5 s	0.0 s	*
P97.53	Bus voltage upon the second latest fault	0.0 to 6553.5 V	0.0 to 6553.5 V	0.0 V	*
P97.54	Actual current upon the second latest fault	0.0 to 999.9 A	0.0 to 999.9 A	0.0 A	*
P97.55	Running frequency upon the second latest fault	0.00 to 655.35 Hz	0.00 to 655.35 Hz	0.00 Hz	*

Function code	Name	Description	Value range	Default value	Change
P97.56	AC drive status upon the second latest fault	0 to 0xFFFF	0 to 0xFFFF	0	*
P97.57	Inverter bridge temperature upon the second latest fault	0.0 to 150.0℃	0.0 to 150.0℃	0.0℃	*
P97.58	Fault subcode of the second latest fault	0 to 65535	0 to 65535	0	*
P97.59	Input terminal state upon the second latest fault	0 to 0xFF	0 to 0xFF	0	*
P97.60	Output terminal state upon the second latest fault	0 to 0xF	0 to 0xF	0	*
P97.61	Running duration upon the second latest fault	0.0 to 6553.5 s	0.0 to 6553.5 s	0.0 s	*
P98: Drive parameters					
P98.00	Serial No.	0 to 1000	0 to 1000	0	*
P98.01	Software version No.	0.00 to 99.99	0.00 to 99.99	0.00	*
P98.02	Performance software current version No.	0.00 to 99.99	0.00 to 99.99	0.00	*
P98.03	Performance software burning version No.	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 according to the model)	0 to 999.9 kW	Model dependent	*

Function code	Name	Description	Value range	Default value	Change
P98.05	Rate voltage	0 to 999 V (automatically set according to the model)	0 to 999 V	Model dependent	*
P98.06	Rated current	0 to 999.9A (automatically set according to the model)	0 to 999.9 A	Model dependent	*
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 format is shown below:

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 menu mode

Only quick commissioning related parameters are displayed. These parameters can be changed to quickly start or stop the drive.

1: Full menu mode

All function parameters are displayed (excluding some associated hidden function codes).

2: Changed memory menu mode

Only parameters that are different from factory settings are displayed (excluding P00.03).

P00.01	User password	0 to 65535	0

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

To set the password:

Input a four-digit number as your user password and then press ENTER/DATA to confirm. After that, you need to re-enter this function code to input the same number and press ENTER/DATA to confirm within 10 s. When "P.SEt" is displayed, the password is successfully set. If there is no other key operation within 5 minutes or you re-power the drive after a shutdown, the password will become effective automatically.

To change the password:

Press the "" key to enter the password verification status and input the original four-digit password to enter the parameter editing status. Select P00.01 (P00.01 displays 00000 at the moment), and set the new password with the same steps above.

To clear the password:

Press the "" key to enter the password verification status and input the original four-digit password to enter the parameter editing status. Select P00.01 (P00.01 displays 00000 at the moment). The process of clearing a password is same as setting a new password, however, you need to input 0000 twice. When the password is successfully cleared, “P.Clr” is displayed.

WARNING

Keep the user password properly. There is no user password by default.

P00.02	Reserved		

P00.03	Parameter protection setting	0 to 2	0

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

0: All data can be changed.

1: Only main frequency reference digital setting P02.09 and this function code can be changed.

2: Only this function code can be changed.

If you want to change other function parameters, set this function code to 0. After such function parameters are changed, you can set this function code to the protection level you want.

P00.04	Selection of key functions	0 to 0x0410	0

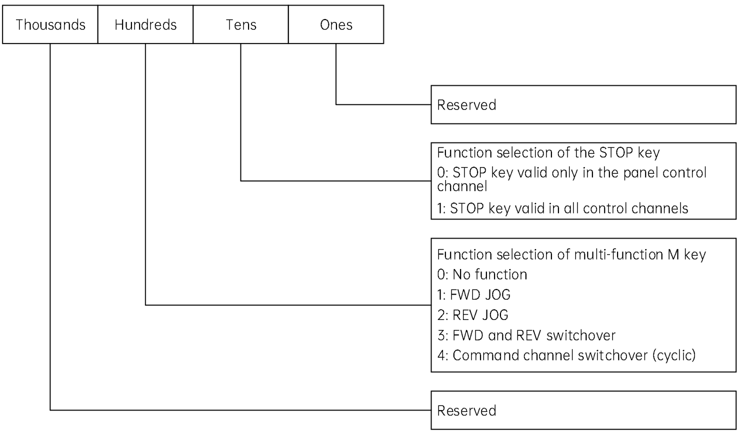


Fig. 7-1 Selection of key functions

Ones place: Reserved
Tens place: Function selection of the STOP/RESET key

Table 7-1 Keypad working mode

Tens place	Function	Description
0	Invalid when not in the panel control mode	The STOP key is valid only in the operating panel control channel.
1	Stop according to the defined mode when not in the panel control mode	The STOP key is valid in the panel, terminal and serial port operation command channels. Press this button, and the drive will stop according to the stop mode defined by P08.06.

WARNING

When the STOP/RESET key is used as the fault reset key "RESET", it is valid only in the local keypad operation command channel. When you press the "RUN" and "STOP" keys at the same time, the drive will coast to stop.

Hundreds place: Function selection of the M key

When it is set to 0, the M key is disabled.

When it is set to 1, the M key is used as FWD JOG.

When it is set to 2, the M key is used as REV JOG.

When it is set to 3, the M key is used as the direction switchover FWD/REV. In the operating panel operation command channel, you can switch the direction of output frequency online.

When it is set to 4, the M key is used as the command channel switchover key, only valid during stop. The sequence of operation command channel switchover:

Operating panel command channel (REM off) → Terminal command channel (REM on) → Serial port command channel (REM flashing) → Operating panel command channel (REM off).

WARNING

The operation command channel takes effect immediately once you use the M key for switchover.

Thousands place: Reserved

P00.05	Parameter initialization	0 to 3	0

0: Parameters rewritable

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–P97.61 will be cleared.

2: Restore to factory settings

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

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

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

P00.06	Power board upgrading command	0 to 1	0

0: Disabled

Disallowed to upgrade the power board.

1: Enabled

Allowed to upgrade the power board.

P00.07	Parameter copy	0 to 4	0

0: No operation

1: Drive's parameters uploaded to the keypad

2: Keypad's parameters downloaded to the drive (all)

3: Keypad's parameters downloaded to the drive (excluding motor parameters)

4: Keypad's parameters downloaded to the drive (only motor parameters)

7.2 P01: Status display parameters

The P01 group is used to monitor some status parameters of the drive and motor, and display frequency reference channel, frequency reference, PID reference, PID feedback, PID error and so on.

P01.00	Main frequency channel	0 to 8	0

Monitors the channel of the main frequency under the common running mode. It displays 0 under a non-common running mode.

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

Monitors the main frequency setpoint value under the common running mode. It displays 0 under a non-common running mode.

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

Monitors the auxiliary frequency setpoint value under the common running mode. It displays 0 under a non-common running mode or without auxiliary reference.

P01.03	Frequency reference	0.00 to P02.10	0

Monitors the final frequency after the combination of main frequency and auxiliary frequency. A positive value means forward running, and a negative value means reverse running.

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

Displays the current ramp reference frequency of the drive.

P01.05	Output frequency	0.00 to P02.10	0

Displays the current actual output frequency of the drive.

P01.06	Output voltage	0 to 65535 V	0

Displays the current output voltage of the drive.

P01.07	Output current	0.0 to 6553.5 A	0

Displays the current output current of the drive.

P01.08	Torque current	-300.0 to 300.0%	0

Monitors the drive's current torque current as a percentage of the motor's rated current.

P01.09	Exciting current	-300.0 to 300.0%	0

Monitors the drive's current exciting current as a percentage of the motor's rated current.

P01.10	Keypad version No.	0.00 to 2.55	0

P01.11	Motor power	-300.0% to 300.0%	0

Displays the drive's output power as a percentage of the motor's rated power.

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

Displays the estimated rotor frequency under the open-loop vector conditions.

P01.13	Measured frequency of motor	-P02.10 to P02.10	0

Displays the actual output frequency of the motor.

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

Displays the accumulated power consumption of the drive.

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

Displays the accumulated power consumption of the drive. After accumulation of 3600 times, 1 kWh is additionally added to P01.14.

P01.16	Bus voltage	0.0 to 6553.5 V	0

Displays the current bus voltage of the drive.

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

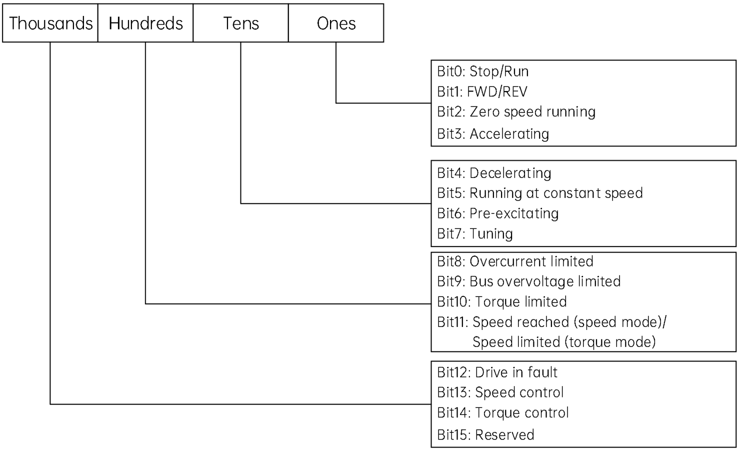


Fig. 7-2 Operation status of the drive

LED ones place Bit0: STOP/RUN

When the drive is at stop, Bit0 is 0, otherwise, it is 1.

LED ones place Bit1: FWD/REV

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

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

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

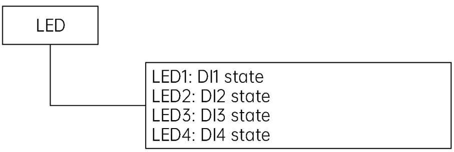


Fig. 7-3 DI terminal state

Displays the on/off state of DI1 to DI4. “0” means the terminal is off, and “1” means the terminal is on.

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

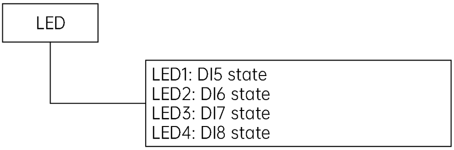


Fig. 7-4 DI terminal state

Displays the on/off state of DI5 to DI8. "0" means the terminal is off, and "1" means the terminal is on.

P01.20	DO state	0 to 0x1111	0

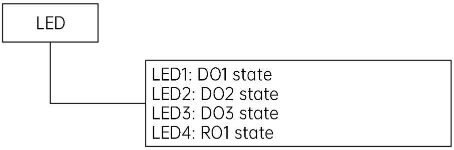


Fig. 7-5 DO terminal state

The function code P01.20 can display the state of the output terminals DO1, DO2, DO3 and RO1. When there is signal output, the corresponding LED place will be set as 1. For example, if there is signal output only on DO1, LED1 will display 1, and P01.20 will display 0001. If there is signal output only on RO1, P01.20 will display 1000.

P01.21	AI1 input voltage	0.00 to 10.0 V	0
P01.22	AI2 input voltage	-10.00 to 10.0 V	0

P01.21 and P01.22 display the AI input voltage before adjustment.

P01.23	AI1 input current	0.00 to 20.00 mA	0

Displays the AI1 input current.

P01.24	AI2 input current	0.00 to 20.00 mA	0

Displays the AI2 input current.

P01.25	AO1 output	0.00 to 100.00%	0

Displays the AO1 output (percentage).

P01.26	HDI frequency	0.00 to 50.00 kHz	0

Displays the HDI input frequency.

P01.27	HDO1 frequency	0.00 to 50.00 kHz	0
P01.28	HDO2 frequency	0.00 to 50.00 kHz	0

Display the HDO1 and HDO2 output frequency.

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

P01.29–P01.32 display the percentage of the process closed-loop reference, feedback, deviation and output in Group P14 related 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	Current AD of AI1	0 to 4095	0
P01.37	Current AD of AI2	0 to 4095	0

P01.33–P01.35 display the proportional, integral and derivation output (percentage) of the PID controller.

P01.36 and P01.37 display the current AD values of AI1 and AI2, used for verification.

P01.38	Current AD of motor temperature	0 to 4095	0

Displays the current AD value of motor temperature.

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

The motor temperature means the actually measured motor temperature. Temperature display range: -40℃ to 200℃; precision: ±5%

P01.40	Encoder count value	0 to 65535	0

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

Displays the output (percentage) of the speed loop controller.

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

Displays the drive's torque reference as a percentage of the motor's rated current.

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

Display the current rotation speed, line speed and output power of the motor.

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

Displays the current temperature of the inverter bridge inside the drive.

P01.47	Accumulated running duration of the drive (min)	0 to 65535 min	0

P01.48	Accumulated running duration of the drive (h)	0 to 65535 h	0
P01.49	Current running duration of the drive (min)	0 to 65535 min	0
P01.50	Accumulated running duration of the fan	0 to 65535 h	0

Display the accumulated running duration, current running duration of the drive and the accumulated running duration of the fan.

P01.51	PLC current STEP	0 to 15	0

Displays the current STEP of the simple PLC.

P01.52	High-order bits of PLC current STEP running time	0 to 65535	0

Displays the high 16 bits of the current STEP running time of the simple PLC.

Note: actual time=P01.52 << 16+P01.53

P01.53	Low-order bits of PLC current STEP running time	0.0 to 6553.5 s	0

Displays the low 16 bits of the current STEP running time of the simple PLC.

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

Display the counter input and the length counter reminder.

P01.56	Reserved		
P01.57	User-defined frequency display	0.00 to P02.10	0

P01.64	Zero servo vibration quantity	0 to 65535	0
P01.65	Software version of encoder card	0 to 65535	0
P01.66	Sub-version of function software	0 to 65535	0
P01.67	Sub-version of drive software	0 to 65535	0

7.3 P02: Basic function parameters

P02.00	Control mode selection	0 to 3	2

0: SVC1

1: SVC2 (only for asynchronous motors)

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

3: FVC

P02.01	Motor selection	0 to 1	0

0: Motor 1

1: Motor 2

Motor 1 and motor 2 parameters correspond to Group P03 and Group P20 separately. Configure parameters according to actual conditions.

P02.02	Operation command channel selection	0 to 2	0

MV820E has three operation command channels.

0: Operating panel

Use RUN, STOP and the M key (set to JOG function) for control.

1: Terminal

Use external control terminals (FWD, REV, FWD JOG, REV JOG) for control.

2: Communication

Used the serial ports, bus expansion cards and other communication methods for control.

WARNING

During running, it is not allowed to switch the operation command channel by changing this function code, using external terminals or the M key.

P02.03	Communication command channel selection	0 to 3	0

When P02.02=2, the following communication channels are available:

0: Modbus channel / Modbus TCP channel

1, 2: Reserved

3: EtherCAT channel / PROFINET channel / CANopen channel

WARNING

Note: An option must be installed before using 1, 2, 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	0

0: Digital setting P02.09

When the drive is powered on, set the value of P02.09 as the current frequency reference.

When the drive is running or at stop, you can use the "∧" and "∧" keys on the keypad to change such frequency.

1: AI1 reference

2: AI2 reference

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 the Group P09.

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

3: High-speed pulse HDI reference

The terminal pulse frequency is used as the source of main frequency, and it can only be input by the terminal 10. For details, refer to the Group P09.

4: Simple PLC programming reference

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

5: Multi-speed running reference

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

6: PID control reference

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

7: Modbus / Modbus TCP

The main frequency reference can be changed through the serial port frequency command.

8: PROFINET / EtherCAT

The bus expansion card is used as the source of main frequency.

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 reference

2: AI2 reference

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 the 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 reference

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

7: Modbus / Modbus TCP

The serial port frequency is used as the source of auxiliary frequency.

8: PROFINET / EtherCAT

The bus expansion card is used as the source of auxiliary frequency.

WARNING

(1) When you choose 1, 2 and 3 as the auxiliary frequency source, you can make selections in the Group P09 function code to choose whether the positive/negative polarity of output auxiliary frequency is decided by the analog or pulse itself, or decided by the function code P02.04.

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

P02.07	Auxiliary frequency reference range	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.

4: Max (main reference, auxiliary reference)

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 reference, auxiliary reference)

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, 5), this parameter is the initial frequency setpoint of the drive's main frequency reference.

P02.10	Maximum output frequency	P02.11 to 599.00 Hz	50.00 Hz
P02.11	Upper limit frequency	P02.12 to P02.10	50.00 Hz
P02.12	Lower limit frequency	0.00 Hz to P02.11	0.00 Hz

The maximum output frequency is the highest frequency allowed by the drive, such as Fmax in Fig. 7-6;

The upper limit frequency is the highest frequency allowed in operation set by the user, such as FH in Fig. 7-6;

The lower limit frequency is the lowest frequency allowed in operation set by the user, such as FL in Fig. 7-6;

Fb in Fig. 7-6 is the basic operating frequency, defined as the minimum corresponding output frequency when the drive outputs the highest voltage in the V/F mode.

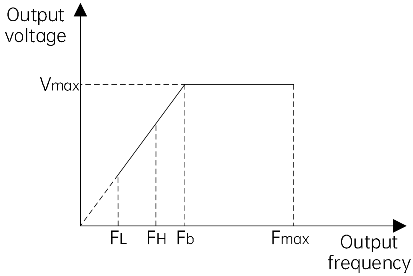


Fig. 7-6 Frequency limit parameter definition

WARNING

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

(2) The limit range of the upper and lower frequency 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 limit frequency and lower limit frequency, the output frequency of the drive during operation is also limited by the startup frequency, start frequency of DC braking at stop, skip frequency and other parameters.

(4) Fig. 7-6 shows the relationship between the maximum output frequency, upper limit frequency, and lower limit frequency. Note the value ranges during setting.

(5) The upper and lower frequency limits are used to limit the actual output frequency to the motor. If the frequency reference is higher than the upper limit frequency, the device will run at the upper limit frequency; if the frequency reference is lower than the lower limit frequency, the device will run at the lower limit frequency; and 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	4.0 s
P02.14	Deceleration time 1	0 to 6000.0 s	4.0 s

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	Reserved		

P02.16	Carrier frequency	2.0 to 12.0 kHz	4.0 kHz

Table 7-2 Carrier frequency for PWM output of drive

Drive power	Default carrier frequency
0.4 to 15 kW	4 kHz

WARNING

(1) The carrier frequency affects the noise of the motor during operation, and it is usually set from 3 to 5 kHz. For occasions requiring silent operation, it can be set at 6 to 8 kHz.

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

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

P02.17	User-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	Model dependent
P03.02	Asynchronous motor rated voltage	0 to 1200 V	Model dependent
P03.03	Asynchronous motor rated current	0.8 to 6000.0 A	Model dependent
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	Model dependent

The controlled motor 1 is an asynchronous motor here.

To enter the motor 1 parameter group, you need to set P02.01 to 0 and P03.00 to 0. To ensure the control performance, set the values of P03.01–P03.05 correctly according to the nameplate parameters of the motor.

WARNING

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

P03.06	Asynchronous motor stator resistance	0.001 to 65.535 Ω	Model dependent
P03.07	Asynchronous motor rotor resistance	0.001 to 65.535 Ω	Model dependent
P03.08	Asynchronous motor leakage inductive reactance	0.01 mH to 655.35 mH (drive power ⩽ 55 kW) 0.001 mH to 65.535 mH (drive power > 55 kW)	Model dependent

P03.09	Asynchronous motor mutual inductive reactance	0.1 mH to 6553.5 mH (drive power ⩽ 55 kW) 0.01 mH to 655.35 mH (drive power > 55 kW)	Model dependent
P03.10	Asynchronous motor no-load current	0.1 to 6553.5 A	Model dependent

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

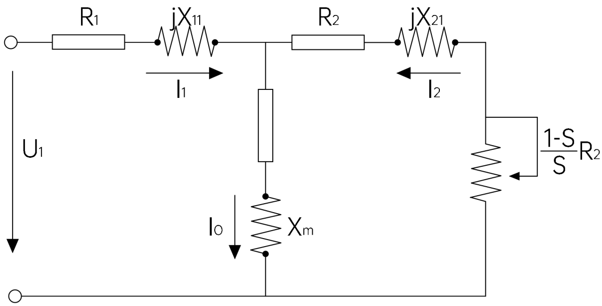


Fig. 7-7 Equivalent circuit diagram for asynchronous motor in steady state

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

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

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

After the motor power P03.01 is changed, the drive will set the P03.02–P03.10 to the default parameters 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%

Specify the asynchronous motor iron core magnetic saturation coefficient 1 to 4.

P03.15	Synchronous motor rated power	0.1 to 3000.0 kW	Model dependent
P03.16	Synchronous motor rated voltage	0 to 1200 V	Model dependent

P03.17	Synchronous motor rated current	0.8 to 6553.5 A	Model dependent
P03.18	Synchronous motor rated frequency	0.01 Hz to P02.10	Model dependent

The controlled motor 1 is a synchronous motor here.

To enter the motor 1 parameter group, you need to set P02.01 to 0 and P03.00 to 1. To ensure the control performance, set the values of P03.15–P03.18 correctly according to the nameplate parameters of the motor.

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

Used to set the number of synchronous motor pole pairs.

P03.20	Synchronous motor stator resistance	0.001 to 65.535 Ω (drive power ⩽ 55kW) 0.0001 to 6.5535 Ω (drive power > 55 kW)	Model dependent
P03.21	Synchronous motor axis-D inductance	0.01 to 655.35 mH (drive power ⩽ 55 kW) 0.001 to 65.535 mH (drive power > 55 kW)	Model dependent
P03.22	Synchronous motor axis-Q inductance	0.01 to 655.35 mH (drive power ⩽ 55 kW) 0.001 to 65.535 mH (drive power > 55 kW)	Model dependent
P03.23	Synchronous motor back EMF	0.0 to 6553.5 V/krpm	Model dependent

Specify the control parameters of a synchronous motor, which can be identified by auto-tuning, or manually input by the search of related motor parameters.

P03.27	Motor auto-tuning	0 to 3	0

Provides the motor auto-tuning function in the static or rotating status, as shown below:

0: No operation

1: Part parameter auto-tuning in the static status

2: Full parameter auto-tuning in the rotating status

3: Full parameter auto-tuning in the static status

P03.28	Motor overload protection factor	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 permissible maximum output current of the drive, as shown in Fig. 7-8.

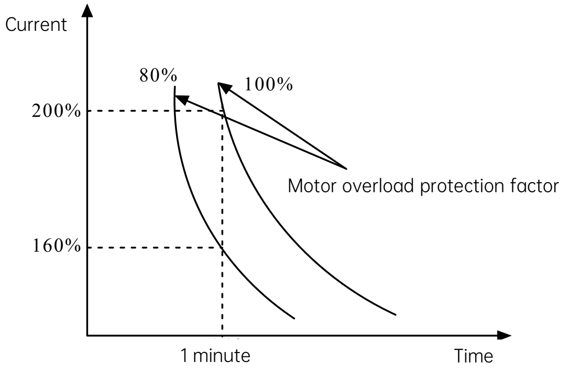


Fig. 7-8 Setting of motor overload protection factor

The adjustment value differs according to the user's needs. Under the same conditions, if the fast protection is required when the motor is overloaded, you need to set P03.28 to a small value; otherwise, set it to a big value.

WARNING

If the rated current of the load motor does not match the rated current of the drive, you can set P03.28 to realize overload protection of the motor.

7.5 P04: Motor 1 encoder parameters

P04.00	Encoder PPR	1 to 65535	1024

Used to set the encoder PPR of motor 1.

Local encoder parameter, set according to the pulses per revolution (PPR) of the selected pulse encoder (PG).

WARNING

Set this parameter correctly, especially when a speed sensor is running; otherwise, the motor may fail to run.

P04.01	Encoder type	0	0

Used to set the encode type of motor 1. Only the ABZ incremental encoder is supported by now, and other encoders are reserved.

0: ABZ incremental encoder

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

0: Forward, A leads B

1: Reverse, B leads A

Local encoder parameter

When the motor is running forward, A leads B; and when the motor is running reversely, B leads A.

If the wiring sequence direction between the drive's local PG interface and the PG matches the wiring sequence direction between the drive and the motor, the value should be set to "0" (FWD); otherwise, it should be set to "1" (REV). By changing this parameter, you can adjust the corresponding relations of wiring directions with no need to re-wire.

WARNING

If the function code is set incorrectly, the drive will report PG fault PG1, and the phase sequence will be automatically identified after rotation auto-tuning.

P04.03	Reserved		
P04.04	PG card voltage class selection	0 to 1	0

0: 5 V

1: 12 V

P04.05	Motor control function selection	0 to 0xFFFF	0x0BFF

0: Disabled

1: Enabled

P04.06	Magnetic pole angle	0 to 359.9	0

P04.07	PG card frequency division factor	0 to 4	

0: No frequency division

1: Divide-by-2

2: Divide-by-4

3: Divide-by-8

4: Divide-by-16

P04.23	Synchronous open-loop axis-Q correction coefficient	0 to 100	40
P04.24	Synchronous open-loop axis-D correction coefficient	0 to 100	30
P04.25	Synchronous open-loop speed filter coefficient	0 to 1000	100
P04.26	Synchronous open-loop axis-D injection current	0% to 100%	10

P04.27	Synchronous open-loop low-frequency carrier frequency	1.0 to 6.0	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

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 PI parameters of motor 1 at high speed and 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), and 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 has large overshoots and oscillates 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.

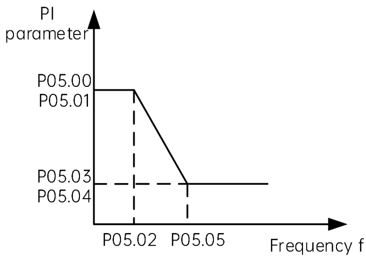


Fig. 7-9 PI parameter

WARNING

If the PI parameter is not well selected, the system may produce overvoltage failure (if there is no external braking resistor or braking unit) after a fast start to high speed, which is due to the energy feedback produced in the regenerative braking state of system during drop after the speed overshoot. This can be avoided by adjusting the PI parameter.

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

(1) The composition of speed regulator (ASR)

As shown in Fig. 7-10, K_p is the proportional gain P and T_i is the integral time I.

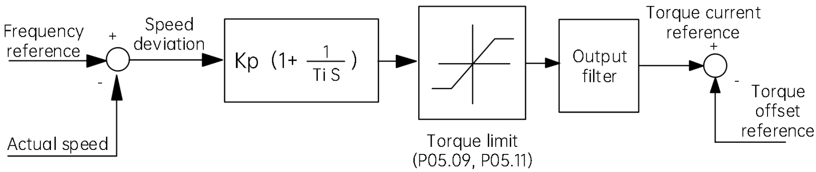


Fig. 7-10 Simplified diagram of ASR

When the integral time is set to 0 (P05.01=0, P05.04=0), there is no integral effect, and the speed loop is a simple proportional regulator.

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

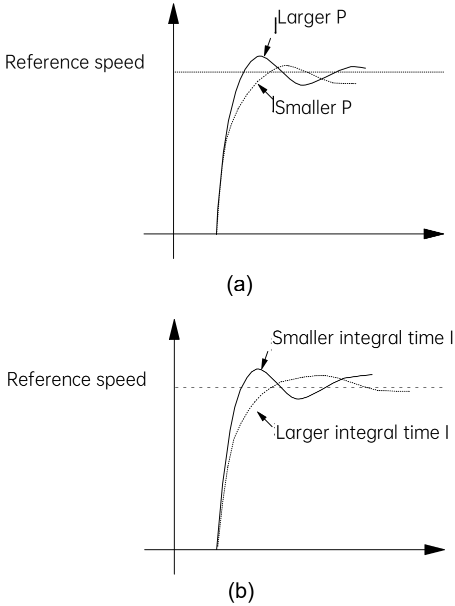


Fig. 7-11 Relations between the step response and PI parameters

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 has large overshoots and oscillates easily, as shown in Fig. 7-11.

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. Fig. 7-12 shows the speed step response curve when P and I are well selected (the speed response curve can be observed with the analog output terminal AO1, referring to the Group P10 parameters).

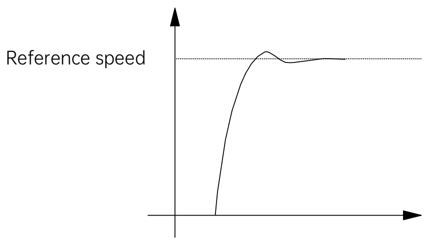


Fig. 7-12 Step response with good dynamic response

WARNING

If the PI parameter is not well selected, the system may produce overvoltage failure (if there is no external braking resistor or braking unit) after a fast start to high speed, which is due to the energy feedback produced in the regenerative braking state of system during drop after the speed overshoot. This can be avoided by adjusting the PI parameter.

(3) Adjustment of the PI parameter for the speed regulator (ASR) at high/low speed

If the system requires fast response for both high and low speed with-load running, the ASR switchover frequency (P05.02 and P05.05) can meet the needs. 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 low frequency. The speed regulator parameters are adjusted according to the following order in most cases:

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 no oscillate and has good dynamic response at low frequency.

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

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

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

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

The speed regulator (ASR) output is passed through a delay filter to get the reference torque current. 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 overexcitation gain	50 to 200%	100%

Used to set the overexcitation gain of motor 1 under 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%	150.0%

Used to set the physical channel for the drive torque limit.

0: Digital setting (P05.10)

P05.10 is the drive torque limit.

1: AI1

2: AI2

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

3: HDI

The maximum PULSE input frequency (50 kHz) of the terminal can correspond 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

The drive torque limit is set by Modbus communication.

5: PROFINET / EtherCAT

The drive torque limit is set by PROFINET or EtherCAT.

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

Used to set the physical channel for the braking torque limit.

0: Digital setting (P05.12)

P05.12 is the braking torque limit.

1: AI1

2: AI2

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

3: HDI

The maximum PULSE input frequency (50 kHz) of the terminal can correspond 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

The braking torque limit is set by Modbus communication.

5: PROFINET / EtherCAT

The braking torque limit is set by PROFINET or EtherCAT.

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

Through this function code, the speed control and torque control can be switched.

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 value and the braking torque limit value.

1: Torque control mode

In this mode, the internal ASR is ineffective, and the torque reference amount can be selected according to 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 you need to set the speed limit properly.

WARNING

Under vector control, the speed control mode and torque control mode can be switched through the terminal. When P06.00 is set to 0 and the terminal function (47) is invalid, the current mode is 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 current mode is torque control; if the terminal function is valid, the mode will be switched to speed control. For details, refer to the "No.47 function of terminals: Speed control and torque control switchover terminal" in P09.03–P09.10.

P06.01	Torque reference channel	0 to 5	0

Used to set the physical channel of torque reference in torque control.

0: Digital setting

The torque reference is set by the function code P06.02, and the digital setting range of 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 torque reference.

3: HDI

The maximum PULSE input frequency (50 kHz) of the terminal can correspond 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

The host device sets the current torque reference of the drive through the standard RS485 communication interface built in the drive.

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

5: PROFINET / EtherCAT

The host device sets the current torque reference of the drive through the PROFINET expansion card bus interface.

For related use, see Group P40 Fieldbus 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

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

Specifies the time the system takes to reach the reference torque from the current 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 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 respectively.

FWD and REV speed limit channels:

0: Digital setting

The FWD and REV limits are set by function codes P06.05 and P06.07.

1: AI1

2: AI2

The AI value is used as the speed limit in 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 can correspond 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

The host device sets the current speed limit reference of the drive through the standard RS485 communication interface built in the drive.

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

5: PROFINET / EtherCAT

The host device sets the current speed limit reference of the drive through the PROFINET expansion card bus interface.

For related use, see Group P40 Fieldbus option parameters.

The FWD/REV limit value (digital setting) is enabled when P06.04=0 (or P06.06=0), and the 100% setting 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

P06.10	Reserved		
P06.11	Reserved		

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

P07.00 to P07.08 determine the different V/F curves of motor 1 under V/F control.

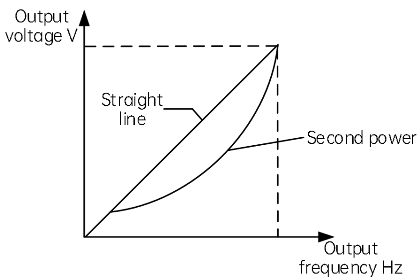


Fig. 7-13 V/F curve

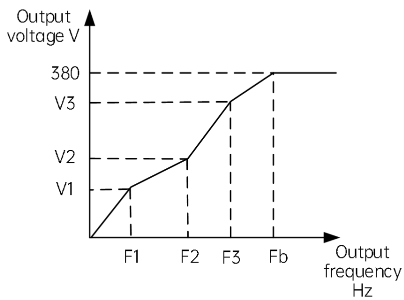


Fig. 7-14 Multi-point V/F curve

P07.00=1: User-defined curve, applicable to segmented constant torque loads, as shown in Fig. 7-14.

In Fig. 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	Model dependent
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 automatic torque boost; when set to a non-zero value, it indicates manual torque boost, as shown in Fig. 7-16.

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

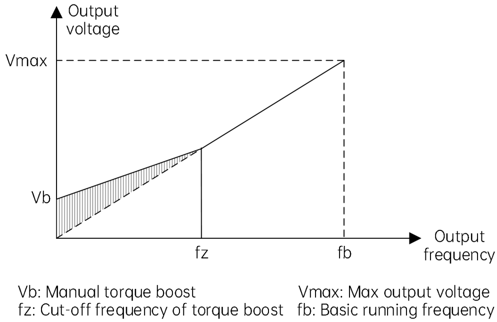


Fig. 7-15 Torque boost (boosted amount is the shaded area)

WARNING

(1) Improper setting of this parameter can lead to motor overheat or overcurrent protection.

(2) fz is defined in the function code P07.02.

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

(4) The maximum output voltage Vmax corresponds to the rated voltage of the motor, so it is necessary to set the rated voltage of the motor correctly.

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	0.0 V

P07.09	Torque compensation coefficient	0 to 300	150
P07.10	V/F overexcitation gain	0 to 200	80

P07.11	Oscillation suppression gain	0 to 100	40

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

9: PROFINET / EtherCAT

P07.14	Digital setting of 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

7.9 P08: Startup/Stop control parameters

P08.00	Startup mode	0 to 2	0

The drive provides different startup modes according to 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. 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

Specifies the delay time after which the drive starts to run when receiving an operation command.

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 to the frequency reference after the startup frequency hold time P08.03.

WARNING

For heavy load startup application, setting a proper 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 a 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 according to various applications.

0: Decelerate to stop

Decelerate 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

Decelerate to stop according to the set deceleration time, and when the frequency is lower than the start frequency of 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

Specifies 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

Specifies the hold time for detecting the frequency upon which the stop action is completed.

P08.09	Stop frequency detection mode	0 to 1	0

0: Speed reference

In 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 reference frequency 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 (max. frequency)	0.00
P08.12	Braking delay at stop	0.00 to 30.00	0.00 s
P08.13	DC braking current at stop	0.0 to 150.0%	0.0%
P08.14	DC braking time at stop	0.0 to 6553.5 s	0.0 s

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

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

P08.13 sets the magnitude of the DC braking current at stop, which is a percentage relative to the drive’s rated current.

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

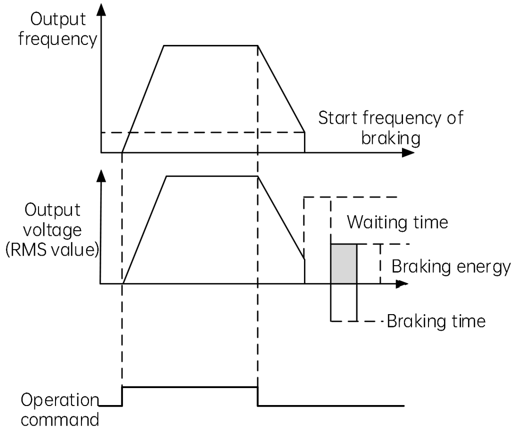


Fig. 7-16 Diagram for "decelerate to stop + DC braking"

P08.15	Speed tracking mode	0 to 1	0

0: From the stop frequency

1: From the maximum frequency

WARNING

Only available for asynchronous motors.

P08.16	Speed of speed tracking	1 to 100	20

The larger the parameter is, the faster the tracking speed will be. However, too large parameter may cause the tracking unreliable.

P08.17	Speed tracking current	10 to 200%	Model dependent

Ensure the maximum current during speed tracking is within the range. Too small current may cause bad 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: Position lock 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; and when the frequency reference is once above the frequency lower limit and running duration 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 to 3600	1.0 s

The functions can decide whether the drive can restart automatically after a power failure, and the waiting time before such auto restart.

P08.25=0: When you power on the drive after a power failure, the drive is forbidden to restart.

P08.25=1: When you power on the drive after a power failure, the drive will restart automatically after the waiting time defined by P08.26.

WARNING

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

(2) When the restart upon power failure function is effective, if the drive is powered on again while not being completely powered down (the drive LED displays -LU-), the drive will act as though it is powered on again after being completely powered down (the LED on the operating panel is completed extinguished), that is, the drive will restart according to the startup mode defined by P08.00.

P08.27	Reverse running inhibition	0 to 1	0

0: Disabled

1: Enabled

P08.28	FWD/REV switchover deadzone time	0.0 to 3600.0	0.0 s

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

The FWD/REV switchover deadzone time specifies the waiting transition time at the output of zero frequency, when the drive switches from forward running to reverse running (or from reverse running to forward running), as t1 shown in Fig. 7-18.

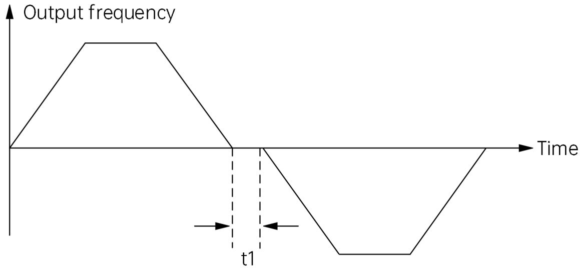


Fig. 7-17 FWD/REV switchover deadzone time

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 subsequent to the stop frequency

P08.30	Reserved		
P08.31	Dynamic braking usage ratio	0 to 100%	100%
P08.32	Braking startup voltage	500 to 800 V	680 V

The usage ratio of dynamic braking P08.31 and braking startup voltage P08.32 can only be applied to the drive with a built-in braking unit.

P08.32 can be set to 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 (No.60 terminal function) is effective, the drive begins to decelerate to stop. The deceleration time is determined by P08.23. When the time is set to 0 s, the drive can be stopped with the shortest deceleration time.

P08.34	Terminal running protection	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 you disable protection, 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, 8	0 to 0x22	0

Ones:

0: Terminal 4 as DI1

1: Terminal 4 as DO1

2: Terminal 4 as HDO1

Tens:

0: Terminal 5 as DI2

1: Terminal 5 as DO2

2: Terminal 5 as HDO2

Hundreds: Reserved

Thousands: Reserved

WARNING

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

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

Ones:

0: Terminal 7 as DI5

1: Terminal 7 as thermosensitive signal input

Tens:

0: Terminal 10 as DI6

1: Terminal 10 as HDI

Hundreds: Reserved

Thousands:

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, 11	0 to 0x21	0

Ones:

0: Terminal 13 as AI2 voltage input

1: Terminal 13 as AI2 current input

Tens:

0: Terminal 11 as DO3

1: Terminal 11 as AO1 voltage output

2: Terminal 11 as AO1 current output

Hundreds: Reserved

Thousands: Reserved

P09.03	DI1 function selection	0 to 79	1
P09.04	DI2 function selection	0 to 79	22
P09.05	DI3 function selection	0 to 79	0
P09.06	DI4 function selection	0 to 79	0
P09.07	DI5 function selection	0 to 79	0
P09.08	DI6 function selection	0 to 79	0
P09.09	DI7 function selection	0 to 79	0
P09.10	DI8 function selection	0 to 79	0

Table 7-3 Table of digital input terminal functions

Item	Function	Item	Function
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	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 inhibition	25	DC braking input at stop
26	Simple PLC pause command	27	Frequency reference source switchover from

Item	Function	Item	Function
			combination to B
28	PLC stop memory clear	29	PID pause
30	PID clear	31	PID integral hold
32	Reserved	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	Reserved
38	Command channel switched to keypad	39	Command channel switched to terminal
40	Command channel switched to communication	41	Reserved
42	REV inhibition	43	Drive running inhibition
44	External stop command (it is valid for all control modes, and the device will be stopped according to the current stop mode)	45	Auxiliary reference frequency 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 position cyclic positioning mode enable	53	Spindle homing
54	Speed/Position mode switchover	55	Motor 1 and 2 switchover terminal
56	Safety terminal input (reserved)	57 to 59	Reserved
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	Controller enable (EN)
72	Inspection input (INS)	73	Emergency running input (UPS)
74	RUN contactor feedback input	75	Brake feedback input
76	Motor overheat input (OH)	77	Up forced slow-down speed input (UPF)
78	Down forced slow-down speed input (DNF)	79	Overspeed governor feedback input (OSG)

WARNING

The settings of multi-function input terminals are mutually exclusive (excluding the No.0 function)

0: No function

1: Terminal forward running input

2: Terminal reverse running input

3: Terminal forward jog input

4: Terminal reverse jog 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 jog commands are mutually exclusive, that is, the jog command will not be responded during the running state, and the running command will not be responded during the jog 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 7-4 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

K_4	K_3	K_2	K_1	Frequency setting
ON	ON	OFF	ON	Multi-speed 13
ON	ON	ON	OFF	Multi-speed 14
ON	ON	ON	ON	Multi-speed 15

10: Acceleration/Deceleration time terminal 1

11: Acceleration/Deceleration time terminal 2

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

Table 7-5 Expression of 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-share control of two motors (a terminal's function is selected as No.55 for motor 1 and motor 2 switchover and the terminal is active), the acceleration/deceleration time 1 and 2 belong to motor 1, and the acceleration/deceleration time 3 and 4 belong 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, 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, 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)

The frequency is increased or decreased by the control terminal for remote control instead of the operating panel. It is valid when P02.05=0 in common running or when P02.06=0 (as auxiliary frequency). The increase and decrease rate is set by P11.16.

16: External fault NO input

17: External fault NC input

The terminal can input 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". The fault signal can adopt two input modes: normally open and normally closed.

18, 19： Reserved

20： Frequency reference source switchover from A to B

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

Switchover from the combined frequency channel to the main frequency reference (P02.08 is set to 2–5)

22: External reset (RESET) input

Defines the reset signal of the external terminal input to achieve fault reset, only valid 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 inhibition

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 of this terminal's function hold time and P08.14 (DC braking time at stop).

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

Switchover from the combined frequency channel to the auxiliary frequency reference (P02.08 is set to 2–5)

28: PLC stop memory clear

If the drive stops 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 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 integral value of the PID control is forced to be maintained. When the input terminal is open, the PID control will restart the integral. For details about this function, see "Fig. 7-44 PID control diagram".

32: Reserved

33: PID regulating feature switchover

It refers to the integral value of PID control when the input terminal is closed. For details about this function, see "Fig.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

Through the ON/OFF combination of selection terminals 1, 2 and 3, the frequency reference channels can be switched as shown in Table 7-6. For the switching function via terminals and P02.09, the later comer is effective.

Table 7-6 Expression of frequency reference channel selection

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	P02.09
OFF	OFF	ON	AI1
OFF	ON	OFF	AI2
OFF	ON	ON	HDI
ON	OFF	OFF	Simple PLC
ON	OFF	ON	Multi-speed reference
ON	ON	OFF	PID
ON	ON	ON	Modbus

37: Reserved

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: Reserved

42: REV inhibition

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. The forward running will not be affected.

43: Drive running inhibition

When the terminal function is enabled, the drive will coast to stop; when the terminal function is disabled, the drive can start normally.

44: External stop command

When the drive is running, if the terminal function is enabled, the drive will stop according to the current stop mode, valid for all control modes.

45: Auxiliary reference frequency clear

It is only valid 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 the speed/torque control function code P06.00. In vector control, the speed control mode and torque control mode can be switched through the terminal. When P06.00 is set to 0 and the terminal function is disabled, the current mode is speed control; and when the terminal function is enabled, the current mode is torque control. When P06.00 is set to 1 and the terminal function is disabled, the current mode is torque control; and when the terminal function is enabled, the current 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 position cyclic positioning mode enable

53: Spindle 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-share control on 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 to 59: Reserved

60: Emergency stop

When this terminal function is enabled, the drive will stop as soon as possible according to the deceleration time 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 current wobble output frequency will be reset.

63: Counter reset

When this terminal function is enabled, the current count of the reset counter will be cleared.

64: Counter trigger

When this terminal function is enabled, the current counter will continue to count.

65: Power consumption clear

When this terminal function is enabled, the current count of power consumption will be cleared.

66: Power consumption hold

When this terminal function is enabled, the current count of power consumption will be 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 current length count input will be reset.

69: Switched to V/F control

When this function is enabled, the drive is forcibly switched to the V/F control mode.

70: Switched to FVC control

When this function is enabled, the drive is forcibly switched to the FVC control mode.

71: Controller enable (EN)

When this function is valid, the controller can run normally.

When this function is invalid, the controller is forbidden to run during stop, and coasts to stop during running.

If no terminal is designated with this function, the controller is enabled by default.

72: Inspection input (INS)

When inspection input is valid, MV820E adopts the multi-speed set by P28.00 (non-zero). During stop, if the inspection input signal is invalid, MV820E decelerates to 0 according to the multi-speed deceleration time set by P28.00 until the FWD or REV command is withdrawn; if the FWD or REV command is directly withdrawn during inspection running, MV820E stops output immediately.

73: Emergency running input (UPS)

When this function is valid, the elevator enters the emergency running state.

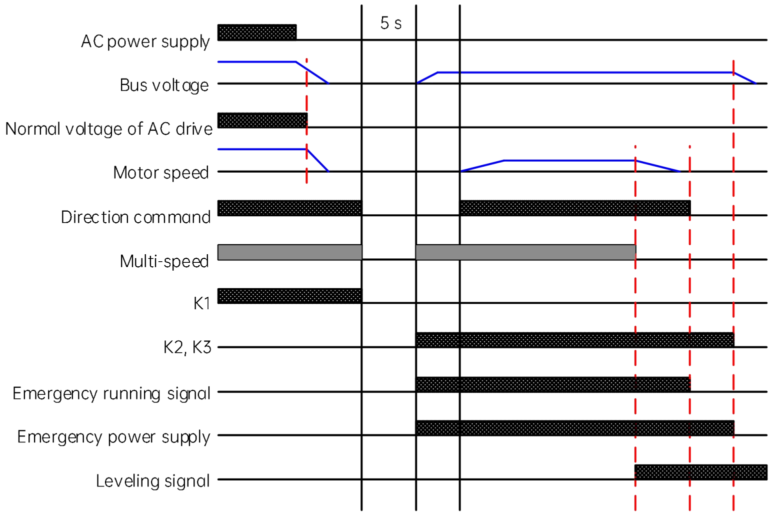


Fig. 7-18 Emergency running sequence

In the above figure, the emergency running signal is provided by the elevator controller. The DI terminal is connected to the AC drive, and the AC drive judges whether the current state is emergency running through the terminal. Contactors K1, K2 and K3 are controlled by the elevator controller.

74: RUN contactor feedback input

75: Brake feedback input

If terminals are configured with the contactor feedback signal and brake feedback signal, the drive starts to detect the contactor feedback signal and brake feedback signal after stop (output contactor signal disconnected). If such two feedback signals still exist and last for more than 2.5 seconds, "stuck signals" are output for MV820E.

When the RUN contactor feedback signal is set, MV820E detects the signal during startup.

When the brake feedback signal is set, MV820E detects the signal during running.

76: Motor overheat input (OH)

If a DI terminal set to 17 (motor overheat NC input) is valid, motor overheat protection is triggered. If the DI terminal becomes invalid, motor overheat fault will be reset automatically.

77: Up forced slow-down speed input (UPF)

78: Down forced slow-down speed input (DNF)

Through the two signals, P28.02 and P28.03, the forced slow-down function can be achieved. During up running, if the up speed detection switch (forced slow-down switch) acts, MV820E compares the current running frequency with

P28.02. If it is larger than P28.02, MV820E will decelerate to stop immediately (according to time of P28.04) to ensure elevator safety. The logic for down running is the same.

P28.02 and P28.03 are forced slow-down detection levels for elevator up and down (note: the FWD command received by the drive corresponds to elevator up running while the REV command received by the drive corresponds to elevator down running).

Upon the input of up (down) speed detection signals (forced slow-down switch signals), the drive checks whether the current running frequency is higher than P28.02 (P28.03). If yes, the drive will decelerate to stop according to the time set by P28.04. During up running, the down frequency detection signal is invalid and vice versa.

The forced slow-down logic for MV820E series is shown below:

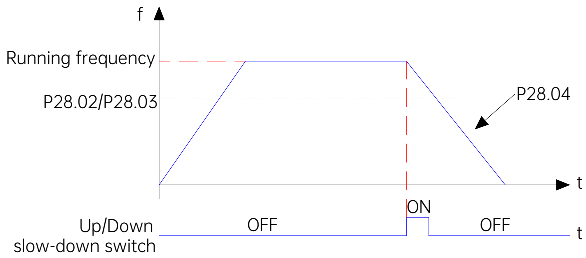


Fig. 7-19 Forced slow-down logic

79: Overspeed governor feedback input (OSG)

During running, if the overspeed governor input is invalid, the overspeed governor fault is reported.

P09.11	Terminal open-circuit voltage	0 to 1	1

0: Digital terminal open-circuit voltage 0 V

1: Digital terminal open-circuit voltage 24 V

P09.12	DI1 to DI4 active mode	0 to 0x1111	0

Ones:

0: DI1 positive logic active

1: DI1 negative logic active

Tens:

0: DI2 positive logic active

1: DI2 negative logic active

Hundreds:

0: DI3 positive logic active

1: DI3 negative logic active

Thousands:

0: DI4 positive logic active

1: DI4 negative logic active

P09.13	DI5 to DI8 active mode	0 to 0x1111	0

Ones:

0: DI5 positive logic active

1: DI5 negative logic active

Tens:

0: DI6 positive logic active

1: DI6 negative logic active

Hundreds:

0: DI7 positive logic active

1: DI7 negative logic active

Thousands:

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

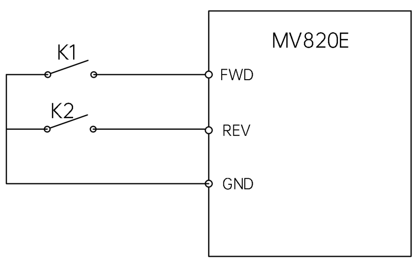


Fig. 7-20 Two-wire mode 1

1: Two-wire mode 2

K1	K2	Command
0	0	Stop
0	1	Stop
1	0	Forward
1	1	Reverse

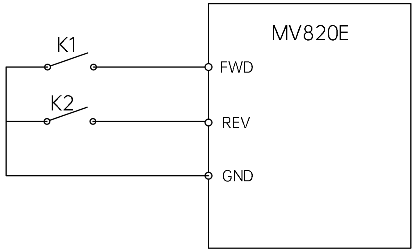


Fig. 7-21 Two-wire mode 2

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>

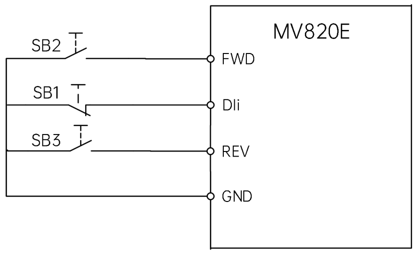


Fig. 7-22 Three-wire mode 1

In the above figure:

SB1: Stop button

SB2: FWD button

SB3: REV button

DIi is the input end of DI1 to DI8, so it is required to set the terminal's function to No.5 function "Three-wire control".

3: Three-wire mode 2

<table>
<tr><th>SB1</th><th>SB2</th><th>SB3</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>

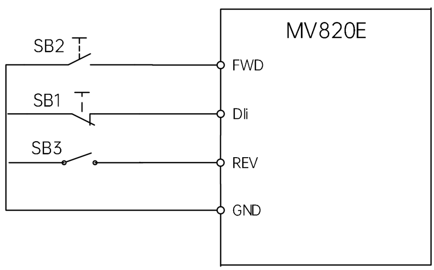


Fig. 7-23 Three-wire mode 2

In the above figure:

SB1: Stop button

SB2: Run button

DIi is the input end of DI1 to DI8, so it is required to set the terminal's function to No.5 function "Three-wire control".

P09.15	DI filter time	0.000 to 1.000	0.010 s

Used to set the filter time for DI terminal sampling. It is recommended to increase the parameter when there is strong interference to avoid misoperation.

P09.16	VDI active state	0 to 0xFF	0

0: Disabled

1: Enabled

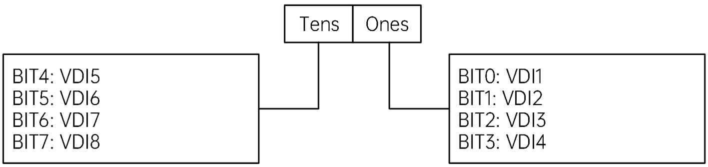


Fig. 7-24 VDI active state

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

Used to set the delay time for level jump upon switch-on/off of digital input terminals.

P09.25	AI1 lower limit	0.00 V to P09.27	0.00 V
P09.26	Percentage corresponding to AI1 lower limit	0.0% 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	0.0% to 100.0%	100.0%
P09.29	AI1 filter time	0.000 to 10.000	0.030 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 10.000 s	0.030s
P09.39	HDI frequency lower limit	0.000 kHz to P09.41	0.000 kHz
P09.40	Percentage corresponding to HDI frequency lower limit	0.0 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	0.0 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 the terminal 10 input of P09.01. For example, when you choose AI1, AI2 and HDI pulse input as the frequency reference channels, the relation between frequency reference source and the frequency reference is shown in Fig. 7-24 (taking AI1 as the main frequency reference channel):

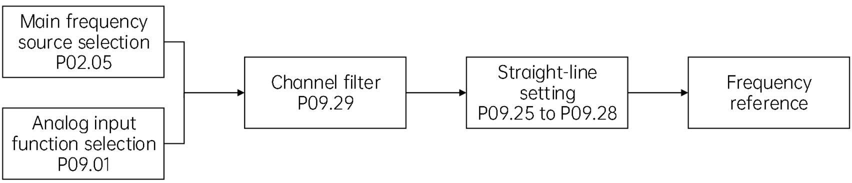
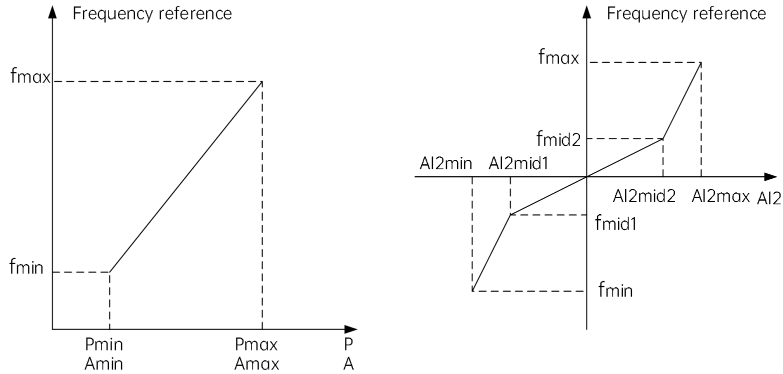


Fig. 7-25 Relation between reference channel input and frequency reference

After the analog signal reference is filtered, the relation between the signal and the frequency reference is in the shape of a straight line or a curve. The AI1 frequency reference line is defined by P09.25 to P09.28, the AI2 frequency reference line is defined by P09.30 to P09.37, and the HDI frequency reference line is defined by P09.30 to P09.42. See Fig. 7-25.



P: HDI terminal pulse reference
A: AI1, AI2 reference
Pmin, Amin: Minimum reference
Pmax、Amax: Maximum reference
fmin: Frequency corresponding to min. reference
fmax: Frequency corresponding to max. reference

Fig. 7-26 Analog input frequency feature curve

7.11 P10: Terminal output parameters

P10.00	DO1 function selection	0 to 47	1
P10.01	DO2 function selection	0 to 47	4
P10.02	DO3 function selection	0 to 47	0
P10.03	Relay RO1 output selection	0 to 47	18

The function of DO terminals are defined in the following table:

Table 7-7 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	Current running duration reach
16	Accumulated running duration 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 torque command is limited by the torque limit value 1 or 2.)

Item	Function	Item	Function
22	Motor overload warning	23 to 25	Reserved
26	Reference count value reach	27	Designated count value reach
28	Length reach	29	Positioning completed
30	Zero 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 the drive is running, the indication signal is output.

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 prewarning detection level, and the retention time exceeds the overload prewarning detection time, the relevant indication signal will be output. 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; and 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 current 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: Current running duration reach

When the current running duration (see P11.38) of the drive is reached, the relevant indication signal will be output.

16: Accumulated running duration reach

When the accumulated running duration (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 inhibition terminal is disabled, the drive can receive the startup command.

18: AC drive fault

When the drive has any fault, the relevant indication signal will be output.

19: Host device on/ff signal

The output signals of DO1, DO2, DO3 and RO1 are directly controlled by the serial port. 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 electric or braking torque limit value, the relevant indication signal will be output.

22: Motor overload warning

23 to 25: Reserved

26: Reference count value reach

The signal is output when the reference count 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 set length is reached.

29: Positioning completed

30: Zero positioning completed

31: Index positioning completed

32 to 37: Reserved

38: Motor 1 and 2 indication terminal

The output signal indicates the currently selected motor.

39: Bus card switch signal

The digital terminal signal adopts the virtual reference of the bus card.

40 to 45: Reserved

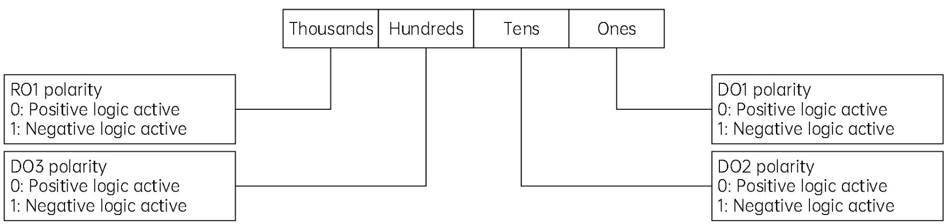
46: PID feedback loss

When the feedback signal is less than the detection value set by P14.22 and its 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

Used to set the polarity of 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	0.0 to 600.0 s	0.0 s
P10.10	DO3 switch-off delay time	0.0 to 600.0 s	0.0 s
P10.11	RO1 switch-on delay time	0.0 to 600.0 s	0.0 s
P10.12	RO1 switch-off delay time	0.0 to 600.0 s	0.0 s

Used to set the delay time for level jump upon switch-on/off of output terminals.

P10.13	AO1 function	0 to 28	0
P10.14	HDO1 function	0 to 28	0
P10.15	HDO2 function	0 to 28	0

Table 7-8 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

Specify the AO1, HDO1 and HDO2 output filter and the curve settings.

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 Fig. 7-26.

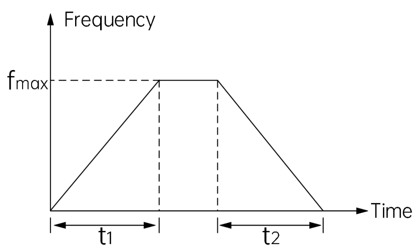


Fig. 7-27 Straight-line acceleration/deceleration

1: S-curve acceleration/deceleration

The output frequency is decreased or increased according to the S curve, as shown in Fig. 7-27.

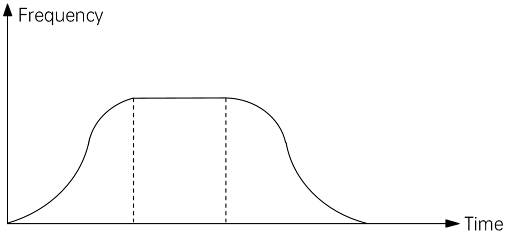


Fig. 7-28 S-curve acceleration/deceleration

The speed values are set to be an S curve at the beginning of the acceleration and reach of speed, and the beginning of the deceleration and reach of speed. In this way, the acceleration and deceleration can be smooth with less impact. The S curve acceleration/deceleration mode is applicable to the start and stop of load carry and transmission, such as elevators and conveyors.

P11.01	Acceleration time 2	0.0 to 6000.0 s	4.0
P11.02	Deceleration time 2	0.0 to 6000.0 s	4.0
P11.03	Acceleration time 3	0.0 to 6000.0 s	Model dependent
P11.04	Deceleration time 3	0.0 to 6000.0 s	Model dependent
P11.05	Acceleration time 4	0.0 to 6000.0 s	Model dependent
P11.06	Deceleration time 4	0.0 to 6000.0 s	Model dependent

The acceleration time means the time required for the drive to accelerate from 0 Hz to the maximum output frequency (P02.10), as t_1 shown in Fig. 7-28. The deceleration time means the time required for the drive to decelerate from the maximum output frequency (P02.10) to 0 Hz, as t_2 shown in Fig. 7-28.

The MV820E series drive defines four kinds of acceleration/deceleration time, which can be selected through the different combinations of control terminals during operation, referring 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%	30.0%
P11.08	Time proportion of S-curve end segment	0.0 to 100.0%	30.0%

In Fig. 7-28, t_1 is the parameter set by P11.07, in which the slope of output frequency gradually increases; t_2 is the parameter set by P11.08, in which the slope of output frequency gradually decreases; and the segment between t_1 and t_2 is the straight-line acceleration/deceleration. They are relative to the current acceleration/deceleration time.

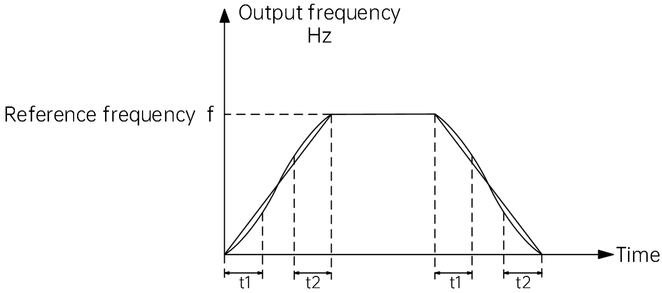


Fig. 7-29 Time proportion of S-curve start and end

P11.09	Switchover frequency of acceleration/deceleration time 1 and 2	0.00 Hz to P02.10	0.00 Hz

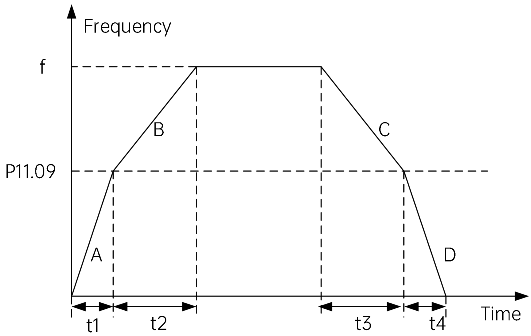


Fig. 7-30 Switchover of acceleration/deceleration time 1, 2

As shown in Fig. 7-29, for the motor 1 acceleration, it will run at the acceleration time 1 first as the A curve and the acceleration time is $t_1 = \frac{P11.09 \times P02.13}{P02.10}$. When the output frequency increases to the switching point P11.09, the acceleration time will switch from P02.13 to P11.01 as the B curve and the acceleration time is $t_2 = \frac{(f - P11.09) \times P11.01}{P02.10}$.

For the deceleration, it will run at the deceleration time 2 first as the C curve, and the deceleration time is $t_3 = \frac{(f - P11.09) \times P02.14}{P02.10}$. When the output frequency decreases to a frequency lower than P11.09, the deceleration time will switch from 2 to 1 as the D curve and the deceleration time is $t_4 = \frac{P11.09 \times P11.02}{P02.10}$.

P11.10	Jog operation 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

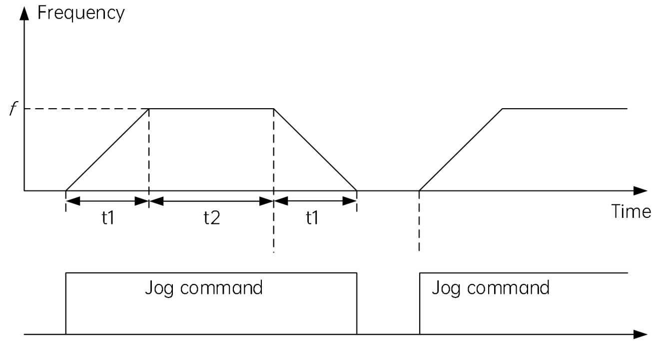


Fig. 7-31 Description of jog operation

As shown in Fig. 7-30, t_1 is the jog acceleration time (P11.11) and jog deceleration time (P11.12) of actual running; t_2 is the jog time and f is the jog operation frequency (P11.10).

The jog acceleration and deceleration time t_1 of actual running is determined by the following equation:

$$t_1 = \frac{P11.11 \times P11.10}{P02.10}$$

The drive does not need to wait for a while to stop during the jog deceleration. It can receive the jog command and accelerate immediately.

WARNING

(1) The jog operation starts and stops according to the start mode 0 and 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.

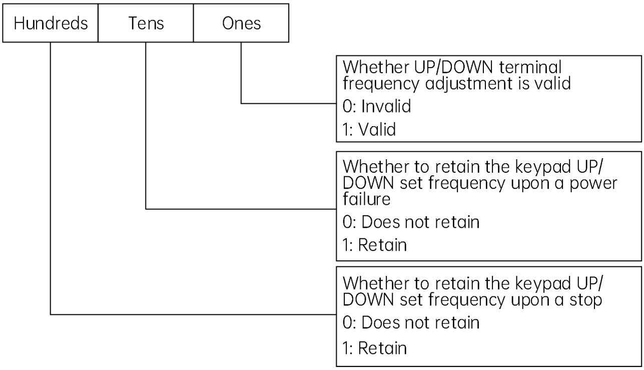
P11.13	Reserved		
P11.14	Number of decimal places for line speed	0 to 2	2
P11.15	Number of decimal places for acceleration/deceleration time	1 to 2	1

Used to set the decimal places (precision) of frequency, line speed and acceleration/deceleration time.

P11.16	Terminal UP/DOWN speed	0.01 to 50.00 Hz/s	0.50 Hz/s

Used to set the UP/DOWN speed of the terminal.

P11.17	Keypad frequency setting selection	0 to 0x111	0x100



P11.18	Skip frequency 1	0.00 Hz to P02.10	0.00 Hz
P11.19	Skip frequency 1 band	0.00 Hz to P02.10	0.00 Hz
P11.20	Skip frequency 2	0.00 Hz to P02.10	0.00 Hz
P11.21	Skip frequency 2 band	0.00 Hz to P02.10	0.00 Hz

If the reference frequency is within the skip frequency, the drive will output according to the skip frequency boundary actually to avoid the mechanical resonance.

If the skip frequency is set to 0, the function is disabled.

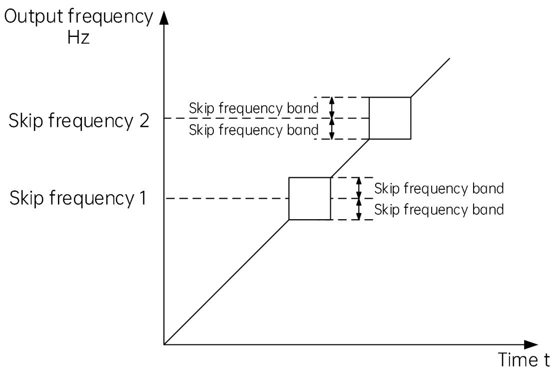


Fig. 7-32

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

Used to set parameters related to wobble running.

P11.26	Frequency reach (FAR) detection range	0.0 to 100.0%	0.0%

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 Fig. 7-32.

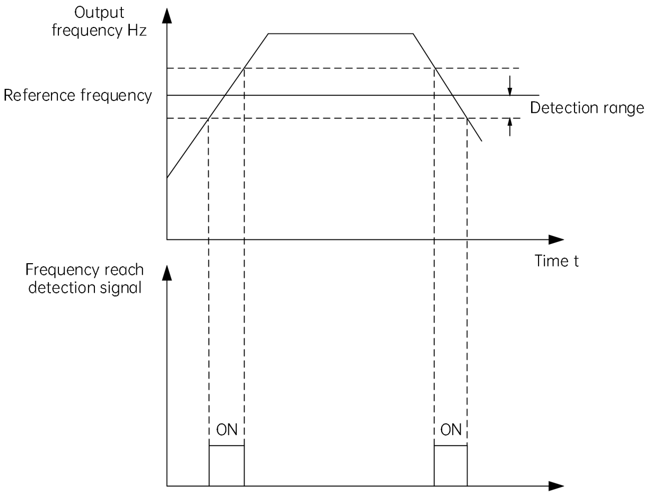


Fig. 7-33 Frequency reach (FAR) detection range

P11.27	FDT1 frequency detection value	0.00 Hz to P02.11	0.00 Hz
P11.28	FDT1 frequency detection hysteresis	0.0 to 100.0%	0.0%
P11.29	FDT2 frequency detection value	0.00 Hz to P02.11	0.00 Hz
P11.30	FDT2 frequency detection hysteresis	0.0 to 100.0%	0.0%

When the output frequency exceeds P11.27 (FDT1 frequency detection value), the relevant signal will be output until the output frequency drops below a certain percentage P11.28 (FDT1 frequency detection hysteresis) of the FDT1 detection value. The function of FDT2 is similar, with the corresponding parameters P11.29 (FDT2 frequency detection value) and P11.30 (FDT2 frequency detection hysteresis), as shown in Fig. 7-33.

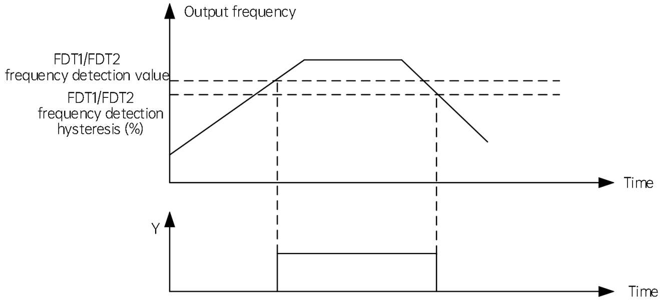


Fig. 7-34 Frequency level detection

P11.31	Auto start temperature of fan	40.0 to 80.0℃	55℃
P11.32	Reserved		

P11.33	Reference length	0 to 60000 m	0 m
P11.34	Actual length	0 to 60000 m	0 m
P11.35	Number of pulses per meter	0 to 60000	1000
P11.36	Reference count value	0 to 60000	0
P11.37	Designated count value	0 to 60000	0
P11.38	Running duration setting	0 to 65535 min	0 min
P11.39	Accumulated running duration reach	0 to 65535 h	0 h

P11.40	Wakeup frequency	0.00 Hz to P02.10	0.00 Hz

When the frequency reference is higher than P11.40, the drive starts directly after the delay defined by P11.41.

P11.41	Wakeup delay	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	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 resumes operation after the time defined by P11.41.

P11.44	Cooling 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 running and stop of the fan according to the temperature condition of the module.

1: Always running after power on

The fan is always running after the drive is powered on.

2: Controlled by start/stop commands (On during operation, Off during stop)

The fan is running when the drive is in operation, and is stopped after the drive is at stop.

P11.45	Keypad UP/DOWN frequency	-P02.10 to P02.10	0

The frequency adjusted based on the current set frequency through Up/Down of keypad.

Down for negative, and UP for positive.

P11.46	UP/DOWN frequency	-P02.10 to P02.10	0

The frequency adjusted based on the current set frequency through Up/Down of keypad and terminal.

Down for negative, and UP for positive.

7.13 P12: Control optimization parameters

P12.00	Reserved		
P12.01	Reserved		
P12.02	Deadzone 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	Reserved		
P12.05	Voltage overmodulation coefficient	100 to 110	105
P12.06	Reserved		
P12.07	SVPWM mode	0 to 1	0
P12.08 to P12.10	Reserved		

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 achieved by PLC (programmable logic controller), but it now can be realized by the drive itself, as shown in Fig. 7-34.

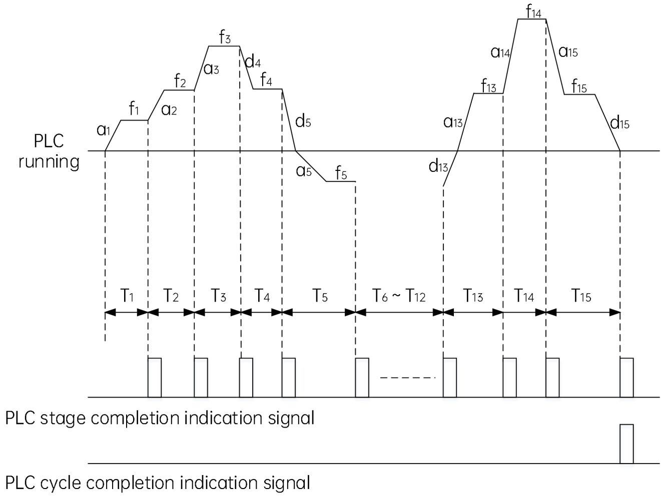


Fig. 7-35 Simple PLC running

In Fig. 7-34, a_l to a_{15} and d_1 to d_{15} represent the acceleration and deceleration time of their current stages, and f_1 to f_{15} and T_1 to T_{15} represent the frequency reference and stage running time of their current stages. They will be explained in the following function codes.

PLC stage and cycle completion can be indicated by the open-collector output terminals DO1, DO2, DO3 and relay output RO 500 ms signals. Refer to the No.13 function "Simple PLC stage completion" and No.14 function "Simple PLC cycle completion" in P10.00 to P10.03.

The simple PLC running modes are defined in P13.00 as shown in Fig. 7-35:

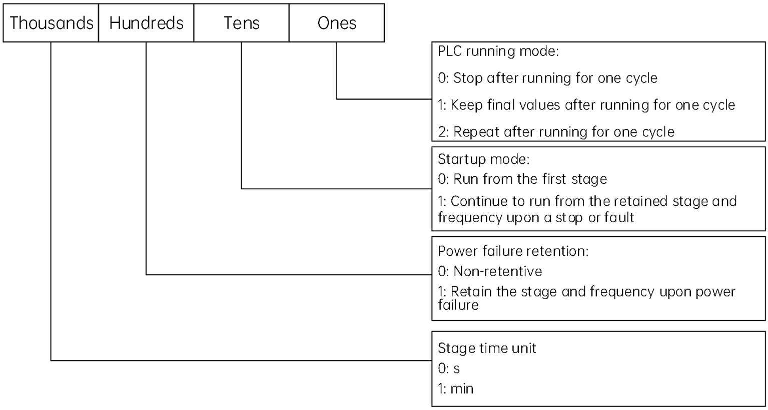


Fig. 7-36 Simple PLC running mode

LED ones: PLC running mode

0: Stop after running for one cycle

As shown in Fig. 7-36, the drive completes one cycle and automatically stops. It starts only after another operation command is given.

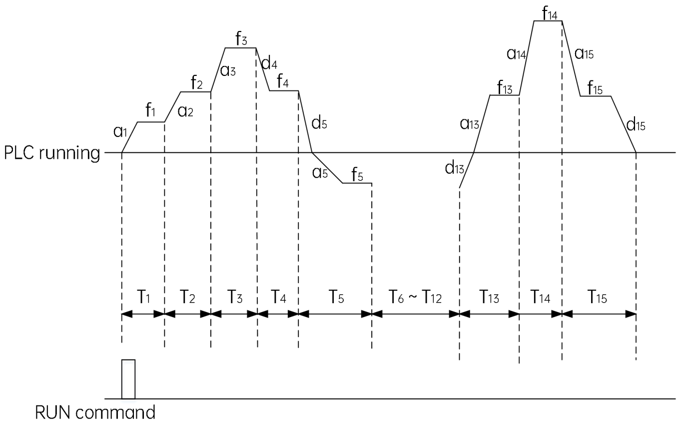


Fig. 7-37 PLC stops after running for one cycle

1: Keep final values after running for one cycle

As shown in Fig.7-37, the drive completes one cycle and automatically keeps the final running frequency and direction.

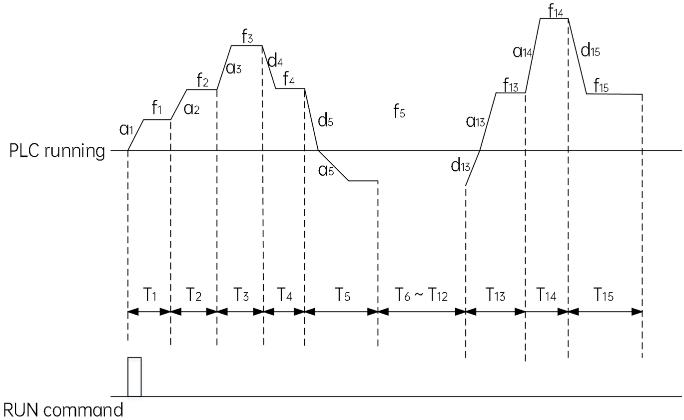


Fig. 7-38 PLC keeps final values after running for one cycle

2: Repeat after running for one cycle

As shown in Fig. 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.

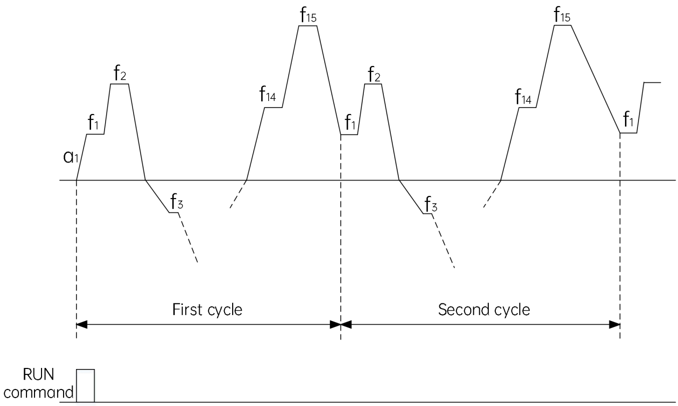


Fig. 7-39 PLC repeats after running for one cycle

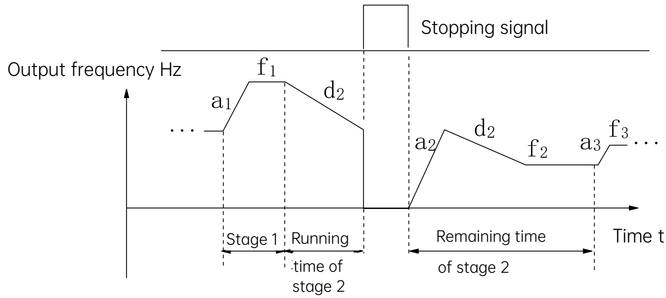
LED tens: Startup mode

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 restarting.

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 current stage and the running frequency upon the stop, and continue to run from the remaining stage and frequency after restarting, as shown in Fig. 7-39.



a_1: Acc time of stage 1

a_2: Acc time of stage 3

f_1: Frequency of stage 1

f_3: Frequency of stage 3

a_2: Acc time of stage 2

d_2: Dec time of stage 2

f_2: Frequency of stage 2

Fig. 7-40 PLC startup mode 2

LED hundreds: Power failure retention

0: Non-retentive

Upon power failure, the PLC running status is not retained. The device will run from the first stage after restarting.

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. The device will run from the startup mode upon interrupted PLC operation defined in the tens place.

LED thousands: stage time unit

0: s

The running time of each stage will be counted by seconds.

1: min

The unit is only valid for the PLC running stage time T1 to T15. The acceleration/deceleration time unit during PLC running is determined by P133.33 to P13.36.

WARNING

(1) If the running time of a certain stage of PLC is set to zero, this stage is disabled.

(2) Functions such PLC process pause, memory status clear can be controlled by terminals, referring 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 from stage 0 to stage 15 ranges from -100.0 to 100.0%, and the 100.0% frequency corresponds to the maximum output frequency P02.10.

When you choose simple PLC running, P13.01 to P13.32 shall be set to determine the running frequency and running time of each stage.

The running time from stage 0 to stage 15 ranges from 0.0 to 6553.5 s (min), and the time unit is set 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.

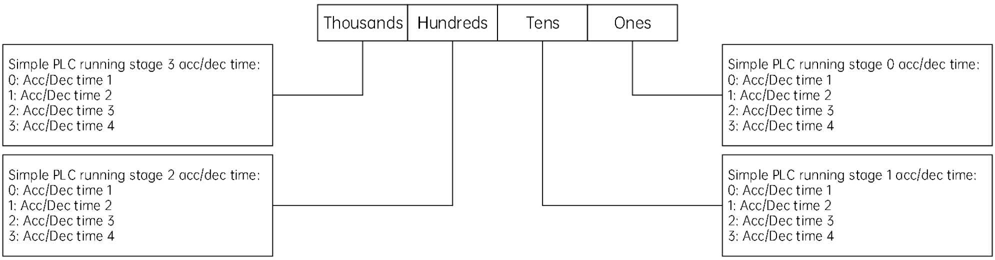


Fig. 7-41 Acceleration/Deceleration time selection of simple PLC reference 0 to 3

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.

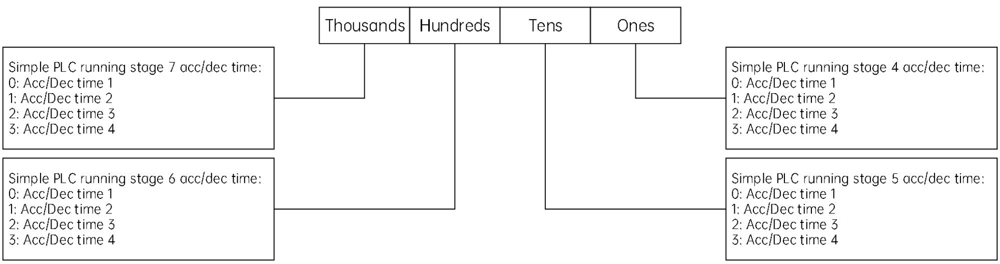


Fig. 7-42 Acceleration/Deceleration time selection of simple PLC reference 4 to 7

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.

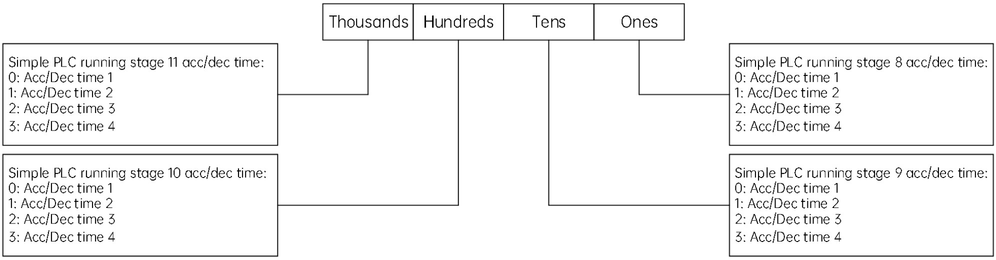


Fig. 7-43 Acceleration/Deceleration time selection of simple PLC reference 8 to 11

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.

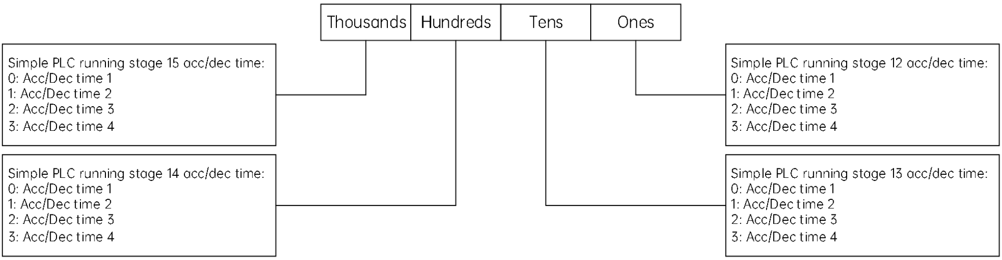


Fig. 7-44 Acceleration/Deceleration time selection of simple PLC reference 12 to 15

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, you can use the DI terminal to realize forward and reverse running. The running direction is the direction determined by the running command; if the direction cannot be determined, the direction of last stage will be followed.

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 change.

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 change and improve dynamic performance. It is vulnerable to interference, so use D control only when necessary. The PID control diagram is shown below.

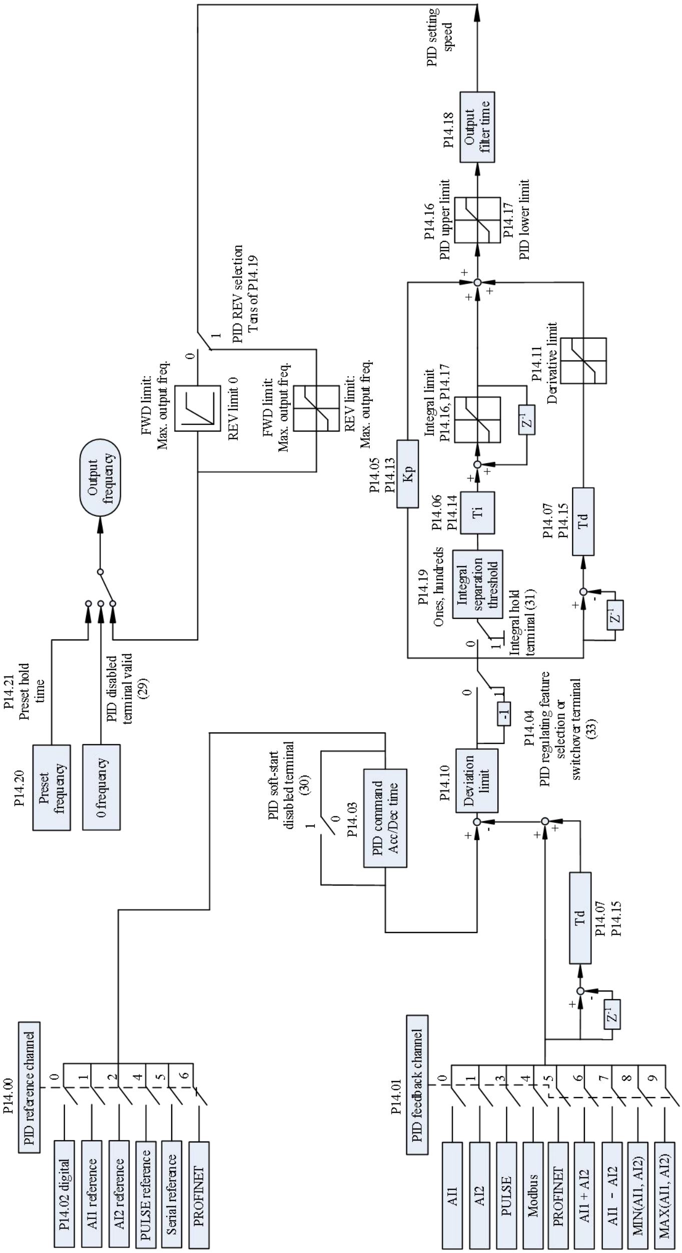


Fig. 7-45 PID control diagram

P14.00	PID reference source	0 to 6	0

0: P14.02 digital setting

1: AI1

2: AI2

3: Reserved

4: HDI

5: Modbus / Modbus TCP

6: PROFINET / EtherCAT

P14.01	PID feedback source	0 to 9	0

0: AI1

1: AI2

2: Reserved

3: HDI

4: Modbus / Modbus TCP

5: PROFINET / EtherCAT

6: AI1+AI2

7: AI1-AI2

8: MIN (AI1，AI2)

9: MAX (AI1，AI2)

P14.02	PID digital setting	-100.0% to 100.0%	50.0%

Used to set the PID value through the operating panel or 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 to increase or decrease the PID target value by the acceleration/deceleration reference.

The set time refers to the required time of increasing from 0.0% reference to 100.0% reference, or the time of 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 increase upon the increased reference.

1: Negative action, selected when the motor speed needs to decrease upon the increased reference.

P14.05	Proportional gain Kp1	0.0 to 1000.0	20.0

A larger Kp indicates quicker response, but too large Kp may easily cause oscillation and 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 to make the feedback value consistent with the target value. Too 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 too small value may cause oscillation.

P14.08	Derivative limit	0.00 to 100.00%	0.10%

Used to limit the output of derivative regulating intensity.

When the PID's 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 and also for the PID control. 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 reference value and feedback value relative to the percentage of reference value is less than the 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 Fig. 7-45.

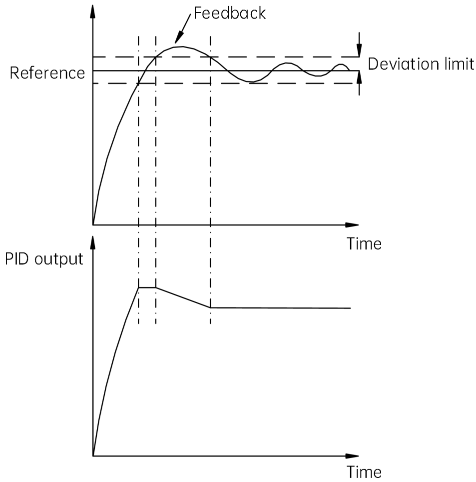


Fig. 7-46 Deviation limit

P14.11	PID parameter low-frequency switchover point	0.00 Hz to P14.12	5.00 Hz

When the ramp reference frequency is lower than the low-frequency switchover point, the PID parameter is P14.05 to P14.07;

when it is higher than the high-frequency switchover point, the PID parameter is 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 these two group parameters.

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	2.00 s
P14.15	Derivative time Td2	0.000 to 10.000	0.000 s

The definitions of Kp2, Ti2, Td2 are same as Kp1, Ti1, 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%

Used to limit the output of PID.

When the PID's 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

Defines the filter time for the output of PID regulator. The longer the output filter time is, the slower the response will be.

P14.19	PID output property	0x000 to 0x111	0x100

Used to set the PID output property, as shown in Fig. 7-46.

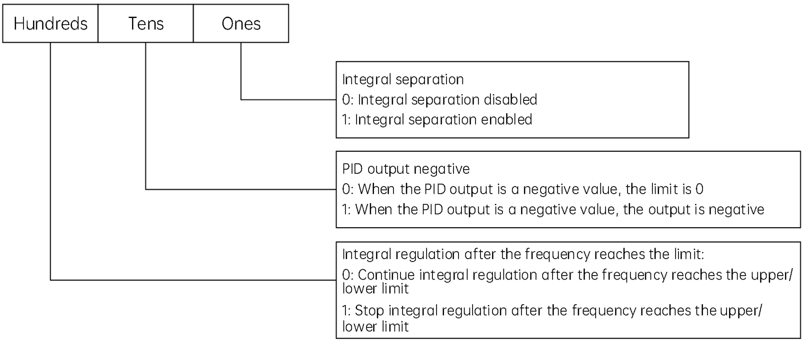


Fig. 7-47 PID output property

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 preset value hold time enable the closed-loop adjustment to quickly enter into the stable stage.

After the PID operation, the frequency will accelerate to the PID preset frequency first according to the acceleration time, and then run continuously at the frequency for the time defined by P14.21 before it runs according to the PID adjustment output, as shown in Fig. 7-47.

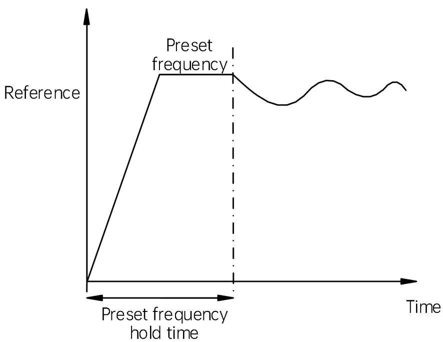


Fig. 7-48 PID preset frequency running

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 time 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 PID upper and lower limits.

When Hz is chosen, the maximum frequency P02.10 cannot exceed 327.67 Hz.

P14.26	PID frequency upper limit	P14.27 to 327.67 Hz	50.00 Hz
P14.27	PID frequency lower limit	-327.67 to P14.26	0.00 Hz

7.16 P15: Communication parameters

P15.00	Communication format	0 to 0x31	0x30

Ones:

0: Modbus protocol

1: Expansion card to 485 protocol

Tens:

0: 1-8-2-N format, RTU

1: 1-8-1-E format, RTU

2: 1-8-1-O format, RTU

3: 1-8-1-N format, RTU

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

Used to identify the address of the drive.

Note: 0 is the broadcast address. When set to the broadcast address, the drive can only receive and execute the broadcast command of the host device, but 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 period exceeding the value of this function code, the drive is considered having a communication error.

When the value is set to 0, the drive will not detect the serial port communication signal.

P15.04	Response delay of the drive	0 to 200	5 ms

Refers to the delay time required from the drive's receiving and executing the host command to returning 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:

0: Response to write operation

1: No response to write operation

Tens: Reserved

Note: Only control parameters starting with 0x64 can decide whether there is a response for the write operation. For writing of function codes, it is sure to have response.

P15.06	Reserved function 2 for user	0 to 65535	0

Reserved function

7.17 P16: Keypad display setting parameters

P16.00	LED display parameter selection 1 during running	0 to 0xFFFF	0xF0

P16.00 and P16.01 define the parameters allowed to be displayed on the LED during drive running, binary setting shown in Fig. 7-48.

When a bit is set to 0, the corresponding parameter will not display;

When a bit is set to 1, the corresponding parameter will display.

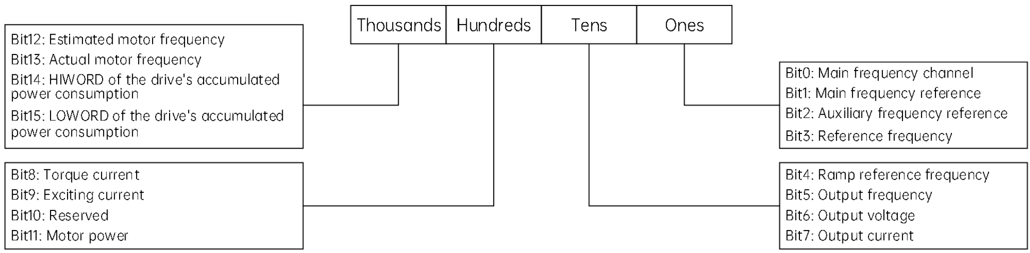


Fig. 7-49 LED display parameter 1 during running

P16.01	LED display parameter selection 2 during running	0 to 0xFFFF	0x1

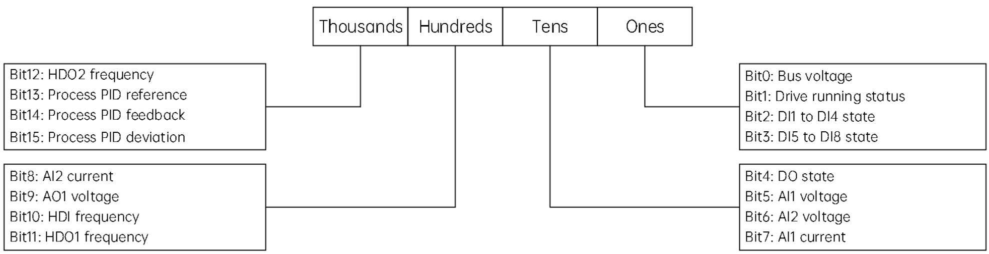


Fig. 7-50 LED display parameter 2 during running

P16.02	LED default parameter display during running	0 to 31	4

Used to set the default parameter number displayed on the zero level of the keypad menu during running after power-on. 0-31 represent the 32 parameters listed in P16.00 and P16.01.

WARNING

When you rotate "" clockwise, the function code displays the switched parameter number, only RAM modified and not save to EEPROM.

P16.03	LED parameter display selection at stop	0 to 0xFFFF	0x3

0: No display

1: Display

Used to set whether a parameter is displayed on the zero level of the keypad menu at stop. Bit0 to bit15 correspond to 16 parameters listed in P16.04.

Note: If all is set to 0, the reference frequency will be displayed.

P16.04	LED default parameter display at stop	0 to 15	0

Used to set the default parameter number displayed on the zero level of the keypad menu at stop after power-on.

0: Reference frequency

1: Bus voltage

2: DI input status 1

3: DI input status 2

4: DO output status

5: AI1 input voltage

6: AI2 input voltage

7: AO1 output percentage

8: HDI reference frequency

9: HDO1 output

10: HDO2 output

11: Length

12: Simple PLC current step

13: Line speed

14: PID reference

15: Torque reference

WARNING

When you rotate "⚙" clockwise, the function code displays the switched parameter number, only RAM modified and not save to EEPROM.

P16.05	Line speed display coefficient	0.1 to 999.9%	100.0%

This function code is used to correct the line speed display error, and has no influence on the actual speed.

$$P01.42 = \text{Line speed} \times P16.05$$

P16.06	Rotation speed display coefficient	0.1 to 999.9%	100.0%

This function code is used to correct the rotation speed display error, and has no influence on the actual speed.

$$\text{Mechanical rotation speed} = 60 \times \text{displayed running frequency} \times P16.06 / \text{number of motor pole pairs}$$

P16.07	Frequency display coefficient	0.0 to 100.0%	100.0%

P01.57=P01.05*Frequency display coefficient

7.18 P28: Elevator function parameters

P28.00	Inspection speed selection	0 to 15	0

Used to select the multi-speed during inspection.

P28.01	Emergency running speed selection	0 to 15	0

Used to select the multi-speed during emergency running.

P28.02	Up speed detection level	0.00 Hz to maximum frequency	0.00 Hz
P28.03	Down speed detection level	0.00 Hz to maximum frequency	0.00 Hz

P28.02 and P28.03 are forced slow-down detection levels for elevator up and down (note: the FWD command received by the drive corresponds to elevator up running while the REV command received by the drive corresponds to elevator down running).

Upon the input of up (down) speed detection signals (forced slow-down switch signals), the drive checks whether the current running frequency is higher than P28.02 (P28.03). If yes, the drive will decelerate to stop according to the time set by P28.04. During up running, the down frequency detection signal is invalid and vice versa.

The forced slow-down logic for MV820E series is shown below:

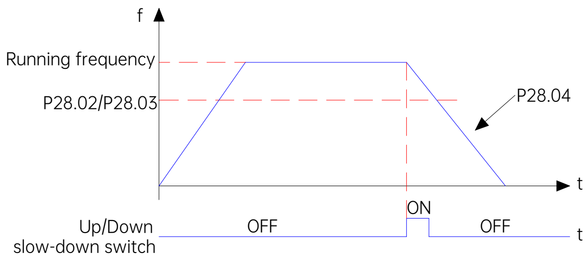


Fig. 7-51 Forced slow-down logic

P28.04	Deceleration time at abnormality	0.0 s to 300.0 s	0.500 s

Used to set the deceleration time from the maximum frequency to 0 Hz upon drive abnormality.

P28.05	Advance door opening detection level	0.00 Hz to maximum frequency	0 Hz

When the elevator decelerates normally, if the output frequency is lower than P28.05, the drive outputs the advance door opening signal through the output terminal until stop.

P28.06	Brake release delay	0.00 to 10.00 s	0.20 s
P28.07	Zero-speed delay	0.00 to 10.00 s	0.30 s
P28.08	Brake close delay	0.00 to 10.00 s	0.20 s
P28.09	Release delay upon stop	0.00 to 10.00 s	0.30 s
P28.10	RUN contactor open delay	0.00 to 10.00 s	0.00 s
P28.11	Zero-speed running output delay	0.000 to 20.000 s	0.000 s
P28.12	Zero-speed signal output delay	0 ms to 9999 ms	0
P28.13	Current cancellation time upon stop	0 to 9999 ms	300 ms

P28.09 defines the time during which the motor retains the zero-speed torque output upon stop. It can improve the riding comfort at stop.

Under the panel control mode, P28.10 is invalid.

Through P28.06 to P28.13, the startup and stop comfort of the elevator can be properly adjusted. The meanings of function codes are shown in the following figure (taking multi-speed running as an example).

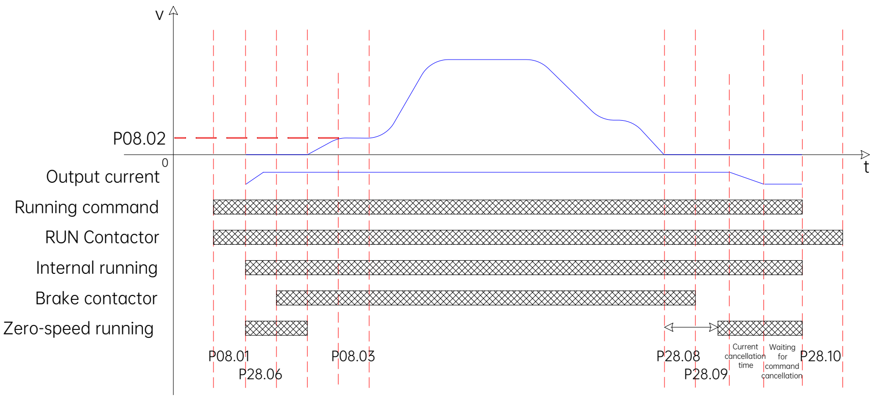


Fig. 7-52 Running sequence

P28.14	Brake release frequency	0 to 10.00	0 Hz
P28.15	Zero servo proportional gain	0 to 100	0.05 V
P28.16	Zero servo integral gain	0 to 100.0	30.0 s
P28.17	Zero servo gain coefficient	10 to 160	150%
P28.18	Parameter write address for drive test	0 to 65535	20%
P28.19	Parameter value written by drive test	0 to 65535	40%
P28.20	Zero servo feedforward gain	0 to 100	15.0 s
P28.21	Parameter read address for drive test	0 to 65535	0
P28.22	Parameter value read by drive test	0 to 65535	0
P28.23	Detected encoder type	0 to 65535	0
P28.24	Time proportion of S-curve start segment during deceleration	0 to 100	50%
P28.25	Time proportion of S-curve end segment during deceleration	0 to 100	50%
P28.26	Time proportion of S-curve start segment upon stop	0 to 100	20%
P28.27	Time proportion of S-curve end segment upon stop	0 to 100	30%

P28.28	Method for canceling inspection running command	0 to 1	0

7.19 P30: 485 mapping parameters

P30.00	485 parameter mapping address 1	0 to 0xFFFF	0
P30.01	485 parameter used address 1	0 to 0xFFFF	0
P30.02	485 parameter mapping address 2	0 to 0xFFFF	0
P30.03	485 parameter used address 2	0 to 0xFFFF	0
P30.04	485 parameter mapping address 3	0 to 0xFFFF	0
P30.05	485 parameter used address 3	0 to 0xFFFF	0
P30.06	485 parameter mapping address 4	0 to 0xFFFF	0
P30.07	485 parameter used address 4	0 to 0xFFFF	0
P30.08	485 parameter mapping address 5	0 to 0xFFFF	0
P30.09	485 parameter used address 5	0 to 0xFFFF	0
P30.10	485 parameter mapping address 6	0 to 0xFFFF	0
P30.11	485 parameter used address 6	0 to 0xFFFF	0
P30.12	485 parameter mapping address 7	0 to 0xFFFF	0
P30.13	485 parameter used address 7	0 to 0xFFFF	0
P30.14	485 parameter mapping address 8	0 to 0xFFFF	0
P30.15	485 parameter used address 8	0 to 0xFFFF	0
P30.16	485 parameter mapping address 9	0 to 0xFFFF	0
P30.17	485 parameter used address 9	0 to 0xFFFF	0
P30.18	485 parameter mapping address 10	0 to 0xFFFF	0
P30.19	485 parameter used address 10	0 to 0xFFFF	0

P30.20	485 parameter mapping address 11	0 to 0xFFFF	0
P30.21	485 parameter used address 11	0 to 0xFFFF	0
P30.22	485 parameter mapping address 12	0 to 0xFFFF	0
P30.23	485 parameter used address 12	0 to 0xFFFF	0
P30.24	485 parameter mapping address 13	0 to 0xFFFF	0
P30.25	485 parameter used address 13	0 to 0xFFFF	0
P30.26	485 parameter mapping address 14	0 to 0xFFFF	0
P30.27	485 parameter used address 14	0 to 0xFFFF	0
P30.28	485 parameter mapping address 15	0 to 0xFFFF	0
P30.29	485 parameter used address 15	0 to 0xFFFF	0
P30.30	485 parameter mapping address 16	0 to 0xFFFF	0
P30.31	485 parameter used address 16	0 to 0xFFFF	0
P30.32	485 parameter mapping address 17	0 to 0xFFFF	0
P30.33	485 parameter used address 17	0 to 0xFFFF	0
P30.34	485 parameter mapping address 18	0 to 0xFFFF	0
P30.35	485 parameter used address 18	0 to 0xFFFF	0
P30.36	485 parameter mapping address 19	0 to 0xFFFF	0
P30.37	485 parameter used address 19	0 to 0xFFFF	0
P30.38	485 parameter mapping address 20	0 to 0xFFFF	0

7.20 P40: Fieldbus option parameters

P40.01	Detection 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 baud rate	0 to 8	2

7.21 P41: IO option parameters

P41.00	DI9 function selection	0 to 72	0
P41.01	DI10 function selection	0 to 72	0
P41.02	DI11 function selection	0 to 72	0

For the parameter description, refer to "7.10 P09.03 to P09.10".

P41.03	Terminal open-circuit voltage	0 to 1	1

0: Digital terminal open-circuit voltage 0 V

1: Digital terminal open-circuit voltage 24 V

P41.04	DI9 to DI11 active mode	0 to 0x111	0

Ones:

0: DI9 positive logic active

1: DI9 negative logic active

Tens:

0: DI10 positive logic active

1: DI10 negative logic active

Hundreds:

0: DI11 positive logic active

1: DI11 negative logic active

Thousands: Reserved

P41.05	Reserved		
P41.06	DI filter time	0.000 to 1.000	0.010 s

Used to set the filter time for DI terminal sampling. It is recommended to increase the parameter when there is strong interference to avoid misoperation.

P41.07	DI9 switch-on delay time	0.0 to 600.0	0.0 s
P41.08	DI9 switch-off delay time	0.0 to 600.0	0.0 s
P41.09	DI10 switch-on delay time	0.0 to 600.0	0.0 s
P41.10	DI10 switch-off delay time	0.0 to 600.0	0.0 s
P41.11	DI11 switch-on delay time	0.0 to 600.0	0.0 s
P41.12	DI11 switch-off delay time	0.0 to 600.0	0.0 s

For the parameter description, refer to "7.10 P09.17 to P09.24".

P41.13	Relay RO2 output selection	0 to 47	0
P41.14	Relay RO3 output selection	0 to 47	0

For the parameter description, refer to "7.11 P10.00 to P10.03".

P41.15	Output terminal polarity selection	0 to 0x11	0

Ones:

0: RO2 positive logic active

1: RO2 negative logic active

Tens:

0: RO3 positive logic active

1: RO3 negative logic active

Hundreds: Reserved

Thousands: Reserved

P41.16	RO2 switch-on delay time	0.0 to 600.0s	0.0 s
P41.17	RO2 switch-off delay time	0.0 to 600.0s	0.0 s
P41.18	RO3 switch-on delay time	0.0 to 600.0s	0.0 s
P41.19	RO3 switch-off delay time	0.0 to 600.0s	0.0 s

For the parameter description, refer to "7.11 P10.11 and P10.12".

7.22 P50: Option status parameters

P50.00	Option card 1 type	0 to 4	0
P50.01	Option card 2 type	0 to 4	0

0: No communication options

1: PROFINET option

2: EtherCAT option

3: IO option

4: Modbus TCP

P50.03	DI status of the IO option	0 to 0x111	0
P50.04	DO status of the IO option	0 to 0x11	0

0: Disabled

1: Enabled

P50.05	Software version of option 1	0.00 to 99.99	0.00
P50.06	Software version of option 2	0.00 to 99.99	0.00
P50.07	OP state of the option	0 to 65535	0

P50.08	Count value of CANopen RX&TX error	0 to 65535	0

7.23 P97: Fault and protection parameters

P97.00	Fault enable	0 to 0x1111	0x1001

Ones:

0: Pulse-by-pulse current limit (fast current limiting) protection disabled

1: Pulse-by-pulse current limit (fast current limiting) protection enabled

Tens:

0: Fan fault disabled

1: Fan fault enabled

Hundreds:

0: Overload prewarning disabled

1: Overload prewarning enabled

Thousands:

0: Braking overcurrent disabled

1: Braking overcurrent enabled

P97.01	Stall suppression enable	0 to 0x111	0x101

Ones:

0: Overvoltage stall suppression disabled

1: Overvoltage stall suppression enabled

Tens:

0: Undervoltage stall suppression disabled

1: Undervoltage stall suppression enabled

Hundreds:

0: Overcurrent stall suppression disabled

1: Overcurrent stall suppression enabled

P97.02	Current limit level	20 to 200%	150%

P97.03	Current limit adjustment coefficient	0 to 100	20

The current limit function controls 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 setting 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 (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 always in the power generation state, causing overload protection.

The current limiting action may cause change to the output frequency. Thus, it is not recommended to use the function in sites requiring stable output frequency at constant speed.

The low setting of auto current limiting function may affect the drive's overload capacity.

P97.04	Overvoltage stall suppression action voltage	600 to 750 V	720 V

During the deceleration operation of the drive, 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. At the time, the motor will return power to the drive, resulting in the increase of the DC bus voltage of the drive. If no measures are taken, there will be overvoltage trip.

The function of overvoltage stall protection detects the bus voltage during the deceleration of the drive and compares it with the stall overvoltage point defined by P97.04. If the stall overvoltage point is exceeded, the output frequency of the drive stops falling. When the bus voltage is lower than the stall overvoltage point, the drive starts to decelerate, as shown in Fig. 7-50.

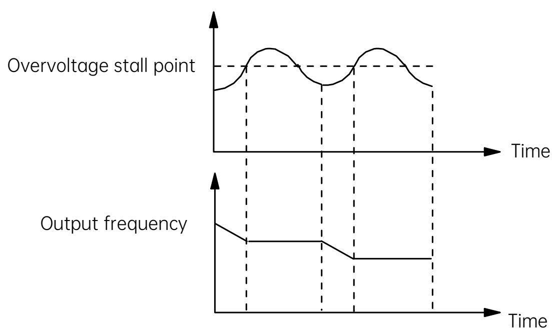


Fig. 7-53 Overvoltage stall

P97.05	Voltage regulator proportional coefficient upon overvoltage stall	0 to 1000	10

P97.06	Reserved		
P97.07	Speed regulator proportional coefficient upon overvoltage stall	0 to 1000	60
P97.08	Reserved		

Used to set the proportional coefficients of the voltage regulator and speed regulator upon overvoltage stall.

P97.09	Voltage regulator proportional coefficient upon undervoltage stall	0 to 1000	40
P97.10	Voltage regulator integral coefficient upon undervoltage stall	0 to 1000	20

Used to set the proportional coefficient and integral coefficient of the bus voltage regulator upon undervoltage stall.

P97.11	Undervoltage stall suppression action voltage	400 to 460 V	460 V

During undervoltage stall, when the bus voltage is lower than this value, the undervoltage stall suppression action 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 suppression pause voltage	460 to 500 V	485 V

Used to set the voltage point for undervoltage stall suppression pause. When the bus voltage is greater than this value, the drive stops lowering frequency after the delay time set by P97.12.

P97.14	Phase loss protection enable	0 to 0x1111	0x100

Use to selection functions related to input and output phase loss protection, as shown in Fig. 7-51.

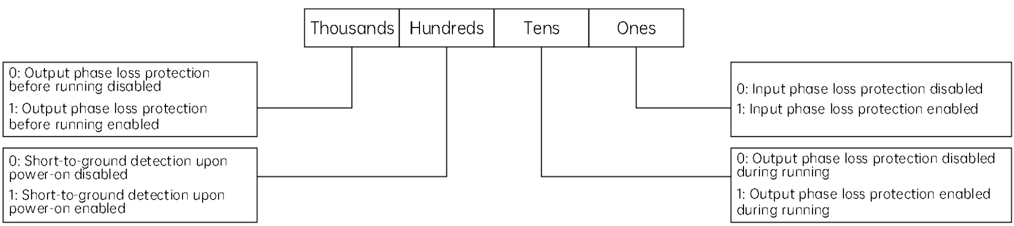


Fig. 7-54 Input and output phase loss protection

P97.15	Fault protection and alarm property 1	0	0

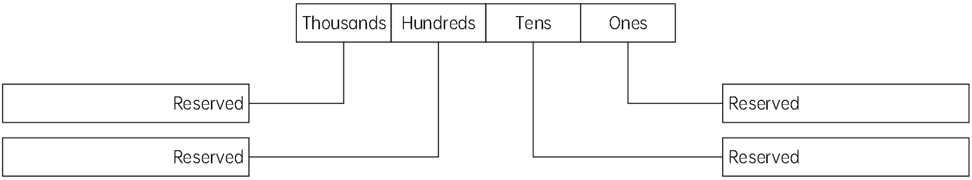


Fig. 7-55 Fault protection and alarm property 1

P97.16	Fault protection and alarm property 2	0 to 0x2002	0x2002

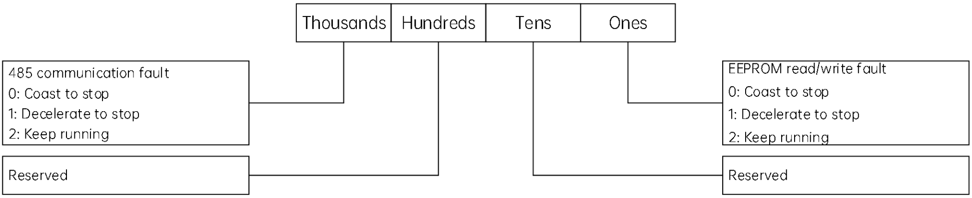


Fig. 7-56 Fault protection and alarm property 2

P97.17	Fault protection and alarm property 3	0 to 0x222	0x0002

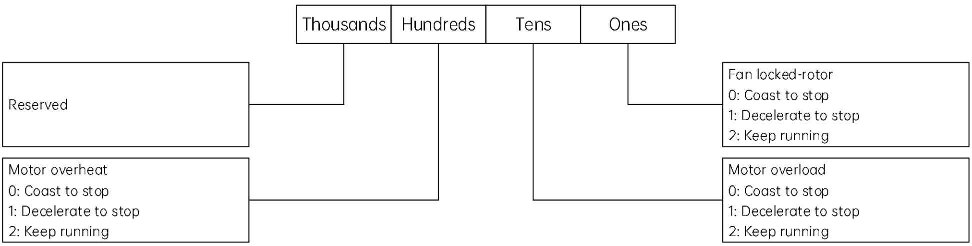


Fig. 7-57 Fault protection and alarm property 3

P97.18	Fault protection and alarm property 4	0 to 0x20	0

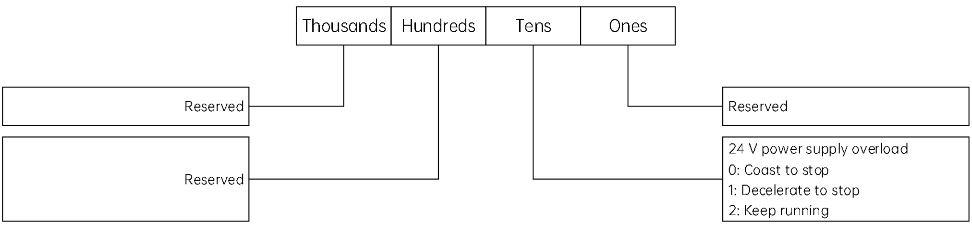


Fig. 7-58 Fault protection and alarm property 4

P97.19 to P97.24	Reserved		
P97.25	Motor overheat protection threshold	0 to 200℃	120℃

Compare the analog feedback value of the thermal sensor installed in the motor with the preset motor overheat protection threshold P97.25. If the feedback value is greater than the protection threshold value and the duration is longer than 10 s, the drive will report the motor overheat fault (OH3). The customer must clearly know the resistance rule of motor temperature detection in order to correctly set this value.

P97.26	Motor temperature sensor type	0 to 2	0

0: No temperature sensor

1: PT1000

2: KTY84-130

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	1.0 s

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 exceeds the time set by P97.28, excessive speed deviation is detected. Set P97.27 with the maximum output frequency being 100%.

When it is set to 0.0 s, speed deviation protection is disabled.

P97.29	Auto reset attempts	0 to 100	0

The auto reset function can automatically reset faults according to the configured attempts and interval during operation. 0 means the auto reset function is disabled.

When there are faults, the drive starts to reset according to the interval defined by P97.31. After the auto reset attempts are reached, you can only reset through the manual reset commands. If there are manual reset commands during auto reset, the auto reset count will be cleared.

When the drive is running normally without faults for 600 s, the fault reset count will be cleared.

WARNING

(1) The inverter module protection (OUT), external device fault (EF), the short circuit to ground fault (GdF) cannot be reset (both automatic and manual ways can not reset); undervoltage (Uv), board level communication error (bCE) and power board software version mismatch (vEr) can be automatically reset immediately when the three faults disappear; other faults can be manually reset or automatically reset according to the policies.

(2) During the reset interval, the output is locked and runs at zero frequency, and after the automatic reset is completed, the drive will automatically start after speed tracking.

(3) Use the automatic fault reset function with caution. Otherwise, personal injury and equipment damage may occur.

P97.30	Relay action during auto reset	0 to 1	0

0: Disabled

1: Enabled

P97.31	Auto reset interval	2.0 to 600.0	5.0 s

P97.32	Current fault type	0 to 61	0
P97.33	Latest fault type	0 to 61	0
P97.34	Second latest fault type	0 to 61	0

P97.35	Bus voltage upon the current fault	0.0 to 6553.5	0.0 V
P97.36	Actual current upon the current fault	0.0 to 999.9	0.0 A
P97.37	Running frequency upon the current fault	0.00 to 655.35	0.00 Hz
P97.38	AC drive status upon the current fault	0 to 0xFFFF	0
P97.39	Inverter bridge temperature upon the current fault	-40.0 to 150.0	0.0℃
P97.40	Current fault subcode	0 to 65535	0
P97.41	Input terminal state upon the current fault	0 to 0xFF	0
P97.42	Output terminal state upon the current fault	0 to 0xF	0
P97.43	Running duration upon the current fault	0.0 to 6553.5	0.0 s
P97.44	Bus voltage upon the latest fault	0.0 to 6553.5	0.0 V
P97.45	Actual current upon the latest fault	0.0 to 999.9	0.0 A
P97.46	Running frequency upon the latest fault	0.00 to 655.35	0.00 Hz
P97.47	AC drive status upon the latest fault	0 to 0xFFFF	0
P97.48	Inverter bridge temperature upon the latest fault	0.0 to 150.0	0.0℃
P97.49	Fault subcode of the latest fault	0 to 65535	0
P97.50	Input terminal state upon the latest fault	0 to 0xFF	0
P97.51	Output terminal state upon the latest fault	0 to 0xF	0
P97.52	Running duration upon the latest fault	0.0 to 6553.5	0.0 s
P97.53	Bus voltage upon the second latest fault	0.0 to 6553.5	0.0 V
P97.54	Actual current upon the second latest fault	0.0 to 999.9	0.0 A
P97.55	Running frequency upon the second latest fault	0.00 to 655.35	0.00 Hz
P97.56	AC drive status upon the second latest fault	0 to 0xFFFF	0
P97.57	Inverter bridge temperature upon the second latest fault	0.0 to 150.0	0.0℃

P97.58	Fault subcode of the second latest fault	0 to 65535	0
P97.59	Input terminal state upon the second latest fault	0 to 0xFF	0
P97.60	Output terminal state upon the second latest fault	0 to 0xF	0
P97.61	Running duration upon the second latest fault	0.0 to 6553.5	0.0 s

MV820E records the latest three fault types (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 current fault for users to query. For details about the operation status, see P01.17.

7.24 P98: Drive parameters

P98.00	Serial No.	0 to 1000	0
P98.01	Software version No.	0.00 to 99.99	0.00
P98.02	Performance software current version No.	0.00 to 99.99	0.00
P98.03	Performance software burning version No.	0.00 to 99.99	0.00
P98.04	Rated capacity	0 to 999.9 kW	Model dependent
P98.05	Rate voltage	0 to 999 V	Model dependent
P98.06	Rated current	0 to 999.9 A	Model dependent

The above parameters are read-only, recording the drive’s basic information. 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 List of fault codes

All possible fault types of MV820E are summarized in Table 8-1, including 18 fault codes. Before seeking for service, the user can perform self-check according to this table and record the fault symptoms in details. This will help a lot when you contact the sales personnel for technical support.

Table 8-1 Fault types and solutions

Fault code	Fault type	Possible fault 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
		Coded disc fault occurs when PG is running.	Check the coded disc and its wiring
		The drive power is too low.	Use a drive with higher power
		The V/F curve is improper.	Adjust the V/F curve and manual torque boost
OC2	Overcurrent during deceleration	The deceleration time is too short.	Prolong the deceleration time
		There is potential energy load or the load inertial torque is large.	Add additional appropriate dynamic braking components
		Encoder fault occurs when PG is running.	Check the encoder and its wiring
		The drive power is too low.	Use a drive with higher power
OC3	Overcurrent at a constant speed	The acceleration/deceleration time is too short.	Prolong the acceleration/deceleration time appropriately
		Sudden load change or abnormal load	Check the load
		Low grid voltage	Check the input power supply

Fault code	Fault type	Possible fault cause	Solution
		Encoder fault occurs when PG is running.	Check the encoder and its wiring
		The drive power is 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.	Prolong the acceleration time appropriately
		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).	Prolong the deceleration time
		There is potential energy load or the load inertial torque is large.	Select appropriate dynamic braking components
OV3	Overvoltage at a 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.	Prolong 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	The bus voltage of the drive is too low (lower than 350 VDC).	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, T.	Check the installation wiring Check the input voltage
SPO	Output phase loss	There is phase loss in output U, V, W.	Check the output wiring Check the motor and the cables
drv	Power module protection	There is interphase short circuit or grounding short circuit in three phases output.	Rewire and check the motor insulation

Fault code	Fault type	Possible fault cause	Solution
		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
		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 module heatsink overheat	The ambient temperature is too high.	Lower the ambient temperature
		The duct is blocked.	Clean the duct
		The fan is damaged.	Replace the fan
		The inverter module is abnormal.	Seek for technical support
OH2	Rectifier heatsink overheat	The ambient temperature is too high.	Lower the temperature
		The duct is blocked.	Clean the duct
		The fan is damaged.	Replace the fan
OL1	Drive overload	The motor parameters are incorrect.	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 prolong 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 fault cause	Solution
		The acceleration time is too short.	Prolong the acceleration time
		The grid voltage is too low.	Check the grid voltage
		The V/F curve is improper.	Adjust the V/F curve and torque boost
OL2	Motor overload	The motor overload protection factor setting is incorrect.	Set the overload protection factor of the motor correctly
		The motor is blocked or the sudden change of load is too large.	Check the load
		The universal motor runs at low speed for a long time with high load	For long-time low-speed running, a specialized motor should be used
		The grid voltage is too low.	Check the grid voltage
		The V/F curve is improper.	Set the V/F curve and torque boost correctly
EF	Emergency stop or external device fault	Sudden stop using the STOP key	See the function definition of the STOP key in P00.04
		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.	Reset by pressing the STOP/RESET key, and seek for technical support
CE	Abnormal remote serial port communication	The baud rate is set improperly.	Set the baud rate properly
		Serial port communication error	Reset by pressing the STOP/RESET key, and 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 circuit abnormal	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

Fault code	Fault type	Possible fault cause	Solution
		The Hall device is damaged.	Seek for technical support
		The amplifying circuit is abnormal.	Seek for technical support
FbL	PID feedback loss	The parameters for feedback loss are set improperly.	Modify the P14.22 setting
		Feedback wire breakage	Rewiring
		The reference of closed-loop feedback is too low.	Refer to the P14.01 setting and increase the feedback reference
brOC	Overcurrent of the braking resistor	The braking resistor is not well matched	Use the braking resistor of a higher level
tUN	Auto-tuning fault	The nameplate parameters of the motor are incorrect.	Set the parameters properly according to the motor nameplate
		When reverse running is inhibited, reverse rotation auto-tuning is performed.	Cancel the reverse running inhibition
		Auto-tuning timeout	Check the motor wiring
			Check the P02.11 (upper limit frequency) and see whether the P02.12 set value is lower than the rated frequency
PG1	Local PG fault	Vector control with PG, encoder signal disconnection	Check the encoder wiring and rewire
oPt	Expansion option fault	The expansion option is poorly inserted.	Insert the expansion option again
		The expansion option is damaged.	Seek for technical support
GdF	Short circuit to ground fault	One of the phases (most likely the phase U) is grounding short circuited.	Check the grounding short circuit of the three phases output and troubleshoot it
dEv	Excessive speed deviation (DEV) fault	The ASR parameters are improper.	Modify the Group P05 function codes
		The speed deviation detection value is too small.	Modify the speed deviation detection setting
		Heavy load fluctuation	Eliminate the load vibration

Fault code	Fault type	Possible fault cause	Solution
Fbo	PID feedback exceeding limit	The PID feedback exceeds the limited range.	Check whether the feedback value input voltage is normal. If normal, you can seek for technical support
OH3	Motor overheat	The ambient temperature is too high.	Lower the ambient temperature
		The motor duct is blocked.	Clean the motor duct
		The motor fan is damaged.	Replace the motor fan
		The motor runs at low frequency for a long time with high load	Add a large fan for the motor to dissipate heat
24OL	24 V power supply overload	Incorrect terminal wiring of the control board, or large overload	Control 24 V output, the total current of digital output less than 200 mA
bCE	Board level communication error	Incorrect connection of board detection signals	Seek for technical support
PnCE	PN bus communication timeout	The identification time for expansion cards is too short.	Set P40.01 properly
		PN communication disconnected	Seek for technical support
bLt	BootLoader failure		
VEr	Power board software version not matching	The software version to be burned is not consistent with the current software version number.	Set P00.06=1 to upgrade software
UPdnE	Parameter upload/download timeout	Parameter upload/download timeout	Check the wiring and seek for technical support
AIOC	Overcurrent of AI1 current input	Check whether the AI1 input current is normal.	Seek for technical support
FAn	Fan blocked	Check whether the fan is blocked by foreign matters.	Clean the motor fan
Err56	Contactor fault	(1) The contactor feedback signal is valid before startup. (2) No feedback signal is received after	Check whether the contactor's contacts (feedback contacts included) are normal

Fault code	Fault type	Possible fault cause	Solution
		the contactor is closed.	Check whether the drive's input functions are set correctly
			Check whether the control circuit power for the contactor is normal
Err57	Brake fault	The inconsistency between brake output and feedback signals exceeds 2 seconds.	Check whether the brake coil and feedback contacts are normal
			Check the signal features of feedback contacts (NO, NC)
			Check whether the control circuit power for the brake coil is normal
Err58	Motor overheat	The motor overheat signal is valid.	Check whether the motor is used properly, or is damaged
			Improve the heat dissipation
Err59	Overspeed governor fault	Check external overspeed governors.	Replace overspeed governors
		Check feedback signals.	Replace wires

8.2 List of operation exceptions

Table 8-2 Operation exceptions and solutions

Symptom	Condition	Possible cause	Solution
The operating panel has no response.	Some keys or all keys have no response.	The wires of the operating panel have poor contact.	Check the wiring and perform hot plug again
		The keys of the operating panel are damaged.	Replace the operating panel or seek for technical support
The function code can not be	Can not be modified during running.	The function code itself cannot be modified during running.	Modify the function code at stop

Symptom	Condition	Possible cause	Solution
modified.	Some function codes can not be modified.	The function code P00.03 is set to 1 or 2.	Set P00.03 to 0
		The function code is the actual detected value.	The actual parameters can not be modified by users.
	No response when pressing the “ ” key	Refer to the possible causes of “The operating panel has no response.”	Refer to the solutions of “The operating panel has no response”
	Cannot enter the editing state when pressing ENTER, and the function code displays 0000	A user password is set.	Enter the correct user password
			Seek for technical support
The drive stops unexpectedly during operation.	No stop command is received, but the drive stops automatically and the drive run indicator is off.	Fault alarm occurs.	Locate the fault causes 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
		Too large speed deviation	Modify the speed deviation detection value
		The positive/negative logic of the control terminals changes.	Check if the P09.12 and P09.13 settings meet the requirements
	No stop command is received, but the motor stops automatically and the drive run indicator is on (running at zero frequency).	Automatic fault reset	Check the fault auto reset setting and find out the cause
		Simple PLC pause	Check the PLC pause function terminal
		External interruption	Check the external interruption setting and

Symptom	Condition	Possible cause	Solution
			find out the cause
		The frequency reference is 0.	Check the frequency reference
		The startup frequency is higher than the frequency reference.	Check the startup frequency
		Skip frequency is set improperly.	Check the skip frequency setting
		The closed-loop output is negative when the reverse running is inhibited.	Check the P14.19 and P08.27 settings
		"Forward running inhibition" terminal is enabled during forward running.	Check the terminal function setting
		"Reverse running inhibition" 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 restart after power failure function setting and the input voltage
The drive does not work.	The drive does not work when you press the run key and the run indicator is off.	The coast-to-stop function terminal is enabled.	Check the coast-to-stop terminal
		The drive running inhibition terminal is enabled.	Check the drive running inhibition 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.	Set and close the three-wire control terminal
		Fault alarm occurs.	Troubleshoot
		The virtual terminal function of the host device is set improperly.	Cancel the virtual terminal function of the

Symptom	Condition	Possible cause	Solution
			host device or set the function properly, or modify the P09.16 setting
		The positive/negative logic of the input terminal is set improperly.	Check the P09.12 and P09.13 settings.
When the drive is powered on, it reports Uv immediately.	The thyristor or the contactor is disconnected and the drive load is large.	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

The ambient temperature, humidity, dust, vibration as well as the aging of components may cause drive faults. Thus, it is necessary to carry out daily and periodical maintenance.

9.1 Daily inspection

WARNING

Before inspection and maintenance, check the following matters. Otherwise, electrical shock may occur.

① The drive's power supply is cut off.

② Ensure the charging LED indicator is off before you open the cover.

③ The voltage between terminals + and − 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 other unexpected situations during operation, so 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 discover faults and causes as early as possible.

Table 9-1 Instructions for daily inspection

Inspection item	Inspection instructions			Inspection standard
	Inspection contents	Cycle	Inspection means	
Operating environment	1. Temperature and humidity	Anytime	1. Temperature meter and hygrometer	1. -10℃ to +40℃, derating required at 40℃ to 50℃
	2. Dust, water and drop leak		2. Visual inspection	2. No water drop and leakage
	3. Odor		3. Smell	3. No strange smell
Drive	1. Vibration and heat generation	Anytime	1. Touch	1. The vibration is stable and normal; the temperature of the enclosure is moderate; and the fan is running well.
	2. Noise		2. Hear	2. No abnormal sound

Inspection item	Inspection instructions			Inspection standard
	Inspection contents	Cycle	Inspection means	
Motor	1. Heat generation	Anytime	1. Touch by hand	1. No abnormal heat generation
	2. Noise		2. Hear	2. Low and regular noise
Running status	1. Output current	Anytime	1. Current meter	1. Within the rated range and three-phase equilibrium
	2. Output voltage		2. Voltmeter	2. Within the rated range and three-phase equilibrium
	3. Internal temperature		3. Thermometer	3. The difference with 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 dismantle, maintain and replace parts of the device;

② Do not leave any screws, gaskets or other metal things in the machine. Otherwise, the device may be damaged.

General inspection items:

(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 contacted, and the connection part of copper bar is overheated;

(3) Check if there is any damage to power cables and control cables, especially whether there is any wear on the cable sheath;

(4) Check if the insulation tapes around the power cables are stripped;

(5) Clean out the dust on the circuit board and the duct. It is better to use a dust collector;

(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, +, -) of the main circuit first, and then conduct the grounding test. 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, you need to disconnect the input terminals U, V, 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, you should not conduct the test again; otherwise, improper test may damage the drive.

② If you need to replace the original components, make sure the models and specifications of new components are the same; otherwise, the drive will be damaged.

9.3 Replacing wearing parts

The wearing parts of the drive mainly include the cooling fan and filter electrolytic capacitor, whose service life depends on the operating environment and maintenance conditions. The general service life is listed in the table below.

Table 9-2 Component life

Part name	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 running time.

(1) Cooling fan

Possible damage causes: wear of the bearing, aging of the blades.

Inspection standards: whether there is crack on the blades and whether there is any abnormal vibration or noise.

(2) Electrolytic capacitor

Possible damage causes: high ambient temperature, increased pulsating current caused by rapid changing load, electrolyte aging.

Inspection standards: whether there is liquid leakage, whether the safety valve is protruded, measurement of static capacitance, measurement of insulating resistance.

(3) Relay

Possible damage causes: erosion, frequent actions

Inspection standards: whether the relay can be opened and closed properly.

9.4 Storage of drive

Note the following for the short and long-term storage of the drive:

(1) The drive should be stored in the place with good ventilation away from high temperature, humidity, dust and metal powder.

(2) Long-term storage will degrade the electrolytic capacitor. The drive should be powered on at least once for 5 hours within 2 years. To power on the drive, the input voltage should be raised slowly up to the rated value through a regulator.

Chapter 10 Application of Special Functions

Besides the common functions, the MV820E drive also provides some special functions to lower the cost and improve the convenience for customers.

10.1 Closed-loop application

Hardware wiring

(1) OC wiring

When the encoder's ABZ signal has only one cable for output, the OC wiring is adopted, as shown in Fig. 10-1.

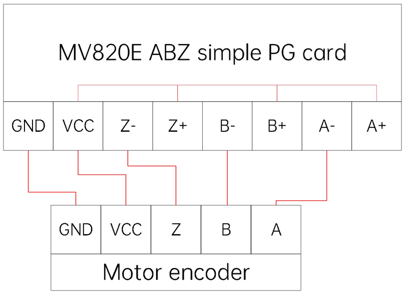


Fig. 10-1 OC wiring

(2) Differential wiring

When the encoder's ABZ signal is differential output, the differential wiring can be adopted, as shown in Fig. 10-2. Note: In this case, OC wiring can also be adopted, and at the time, the encoder's ABZ- is disconnected (ABZ+ connected to the ABZ+ of the PG card) or the encoder's ABZ+ is disconnected (ABZ- connected to the ABZ+ of the PG card).

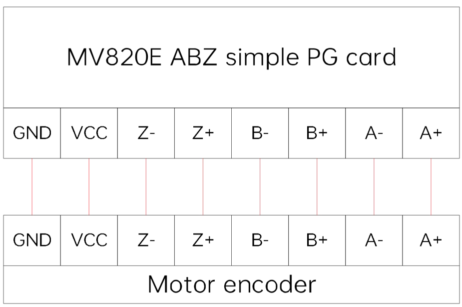


Fig. 10-2 Differential wiring

Parameter setting

Confirm the motor encoder's voltage class P04.04 (currently, the PG card only supports 5 V and 12 V). The default value is 0 (corresponding to 5 V), and if the encoder's voltage class is 12 V, you can set P04.04 to 1;

Confirm the encoder's PPR P04.00;

Set the Group P03 motor parameters properly;

For the asynchronous motor, set P02.00 to 2 (V/F control). For the synchronous motor, set P02.00 to 0 (open-loop vector control)；

Set P03.27 to 2 (full parameter auto-tuning in the rotating status), and run by the keypad;

After the auto-tuning is completed, set the running frequency, and set P02.04=0 (Forward RUN);

Press to run, and check whether the P01.13 (actual running frequency) is consistent with the running frequency reference；

If it is consistent, the encoder is running normally. Then, if closed-loop vector control is required, set P02.00 to 3, and the encoder verification is completed; if it is not consistent and P01.13 is 0, it may be due to lack of encoder signals, incorrect wiring, PG card fault and incorrect setting of encoder voltage; if it is not consistent and P01.13 is not 0, it may be because the encoder PPR is set incorrectly or the encoder direction is not automatically corrected due to lack of rotation auto-tuning.

Appendix 1 Modbus Communication Protocol

1. Networking mode

The drive has two networking modes: single master/multiple slaves mode and single master/single slave mode.

2. Interface mode

RS485 interface: asynchronous and half-duplex. Default: 1-8-N-1, 9600 bps, RTU. For the parameter setting, refer to Group P15.

3. Communication mode

(1) The communication protocol of the drive is Modbus protocol, which does not only support common register reading and writing, but also expand some commands to manage the drive function codes.

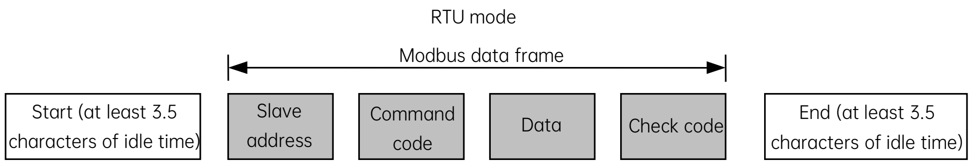
(2) The drive is the slave station, adopting master/slave point-to-point communication. When the master sends the command via a broadcast address, the slave will not response.

(3) In multiple units communication or long-distance communication, parallel connecting the resistance of 100 to 120 ohm with the positive end and negative end of the communication signal line of the master station can enhance the immunity to interference.

(4) MV820E provides the RS485 interface only. If the communication interface of external device is RS232, an RS232/485 conversion device is needed.

4. Protocol format

Modbus protocol supports the RTU mode, the corresponding format shown in Appendix Fig. 1-1.



Appendix Fig. 1-1 Modbus protocol format

Modbus adopts the "Big Endian" encoding mode, which sends the high bytes first and then sends the low bytes.

In RTU mode, the larger value between the function code value and the Modbus internal conventional value shall be selected as the idle time between frames. The minimum idle time value between frames under 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 to define the frame. The data check adopts CRC-16 for the whole information, and high and low bytes of the checksum can only be sent after exchange. For the specific CRC check, refer to the CRC example after 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

Response frame:

Slave address	Command code	Data			Check code	
		Number of bytes responded	Register content			
0x05	0x03	0x02	0x13	0x88	0x44	0xD2

In the above table, the check code is the CRC check value. For the CRC check computing method, refer to the following text.

The drive can be set with different response delays via the function codes to meet 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 MV820E drive supports the operations as shown in the following table:

Command code	Meaning
0x03	Used to read the drive parameters, including function code parameters, control parameters and status parameters.
0x06	Used to change the single 16-bit function code parameter or control parameter of the drive, and parameter value will be saved after power off.
0x07	Used to change the single 16-bit function code parameter or control parameter of the drive, and the parameter value will not be saved after power off.
0x10	Used to change multiple function code parameters or control parameters of the drive, and the parameter values will be saved after 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 function code parameters are specified in the user manual. The group number of the drive function code 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 to be 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 as 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
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 Modbus protocol. These two parts constitute the Modbus application layer data unit. The following description to 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 as below.

Request format:

Application-layer protocol data unit	Data length (number of bytes)	Value or 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 or range
Command code	1	0x03
Number of bytes read	1	2 x Number of registers
Content read	2 x Number of registers	Parameter value

If the operation fails, the 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 or range
Error code	1	(command code +0x80)
Exception code	1	

The exception codes and meanings are as follows:

Exception code	Meaning
0x01	Incorrect password
0x02	Invalid command code
0x03	CRC check error
0x04	Invalid address
0x05	Invalid parameter
0x06	Invalid parameter change
0x07	System lock
0x08	Parameter is being saved

(2) Change the single 16-bit function code parameter and control parameter of the drive, and the parameter values will be saved after power off.

When this command is used, the changed parameter value will be saved upon power on after power off.

The application-layer protocol data unit is as follows.

Request format:

Application-layer protocol data unit	Data length (number of bytes)	Value or 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 or range
Command code	1	0x06
Register address	2	0x0000 to 0xFFFF
Register content	2	0x0000 to 0xFFFF

If the operation fails, the abnormal response frame will return, and the format is described as above.

(3) Change the single 16-bit function code parameter and control parameter of the drive, and the parameter values will not be saved after power off.

When this command is used, the changed parameter value will not be saved upon power on after power off.

The application-layer protocol data unit is as follows.

Request format:

Application-layer protocol data unit	Data length (number of bytes)	Value or 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 or range
Command code	1	0x07
Register address	2	0x0000 to 0xFFFF
Register content	2	0x0000 to 0xFFFF

If the operation fails, the abnormal response frame will return, and the format is described as above.

(4) Change multiple function code parameters and control parameters of the drive, and the parameter values will be saved after power off.

The application-layer protocol data unit is as follows:

Application-layer protocol data unit	Data length (number of bytes)	Value or 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 or 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, the abnormal response frame will return and its format is described as above.

6. Control parameters and status parameters of drive

The control parameters of the drive can realize the start, stop, running frequency setting and other functions. The status parameters allow the inquiring of drive parameters like the running frequency, output current and output torque.

(1) Control parameters

The control parameters of the drive are as 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, -1000 to 1000 corresponding to -100% to 100%
0x6404	PID feedback	Valid when the process closed-loop function is enabled, -1000 to 1000 corresponding to -100% to 100%
0x6405	AO1 setting	Valid when P10.13=14, 0 to 1000 corresponding to 0.0 to 100.0%
0x6406	Reserved	

Register address	Parameter name	Remarks
0x6407	DO terminal state setting	0 to 0xFF Bit0 to bit 3 corresponding to DO1 to DO3, RO1 Valid when P10.00 to P10.03=19
0x6408	Reserved	
0x6409	Virtual terminal control setting	0 to 0xFF Bit0 to bit 7 corresponding to virtual terminals DI1 to DI8 Valid when the corresponding bit of P09.16 is set
0x640C	Auxiliary frequency reference	Range: 0.00 Hz to P02.10
0x640D	Torque reference	-3000 to 3000, corresponding to -300.0% to 300.0% In the torque control mode, it is 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	0 to 3000 corresponding to 0.0 to 300.0%
0x6411	Braking torque limit under speed control	0 to 3000 corresponding to 0.0 to 300.0%
0x6412	Voltage reference for V/F separation	0 to 1000 V
0x6413	Reserved	
0x6414	Control word 2	Refer to its bit definition table

The bit definition of the control word 1 is as 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

Bit	Value	Function	Remarks
	110B	Stop in mode 1	Coast to stop
	101B	Stop in mode 0	Stop according to the deceleration time set (valid when the jog is disabled)
	100B	Running command	Start the drive (valid when the jog is disabled)
	Others	No command	
BIT3	1	Run reversely	Set the running direction when the running command is valid
	0	Run forward	
BIT4	0	Enable acceleration/deceleration	BIT0 to BIT3, 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	Jog forward	When both jog forward and reverse running are enabled, no action will be performed; when both are disabled, the jog will stop.
	0	Jog forward disabled	
BIT8	1	Jog reversely	
	0	Jog reversely disabled	
BIT9	1	Fault reset enabled (valid for all command channels)	The selected bit for the validity of the fault reset of the host device
	0	Fault reset disabled	
BIT15 to BIT10	0	Reserved	

WARNING

(1) The control command (control words 1 and 2) of the host device is valid only when "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 the control word 2 is shown in the following table.

Bit	Value	Function	Remarks
BIT0	0	Reserved	Reserved
BIT1	1	Drive running inhibited	Bit for enabling/disabling drive running
	0	Drive running allowed	
BIT15 to BIT2	0	Reserved	

(2) Status parameters

Register address	Parameter name	Remarks
0x6500	Status word 1 of drive	Refer to the status word 1 definition table
0x6501	Actual running value of current main reference	Range: 0.00 Hz to P02.11, current running frequency
0x6502	Drive model	Refer to manufacturer's parameters.
0x6503	Drive serial No.	Product series, such as 810
0x6504	Function software version No.	Software version No. 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
0x650 A	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 state 1	0 to 0x1111 Corresponding to DI1 to DI4
0x650F	DI terminal state 2	0 to 0x1111 Corresponding to DI5 to DI8
0x6510	Output terminal state	0 to 0x1111 Corresponding to DO1–DO3, RO1
0x6511	Reserved	
0x6512	Current fault type	0 to 55
0x6513	Latest fault type	0 to 55
0x6514	Second latest 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
0x651 A	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

Register address	Parameter name	Remarks
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	
0x6522	Motor and mode selection	0 to 0xFFF Ones: Control mode 0: SVC1 1: FVC 2: V/F Tens: Motor number 0: Motor 1 1: Motor 2 Hundreds: Motor type 0: Asynchronous motor 1: Synchronous motor
0x6523	Bus voltage upon the current fault	0.0 to 6553.5 V
0x6524	Actual current upon the current fault	0.0 to 6553.5 A
0x6525	Running frequency upon the current fault	Range: 0.00 Hz to P02.11
0x6526	AC drive status upon the current fault	Refer to P01.17
0x6527	Reserved	
0x6528	Status word 3 of 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 current main reference", "current running frequency", "running frequency reference" and "running frequency at the 3rd fault" is 32 bits, and others' length is 16 bits.

The bit definition of the 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	
	0	Drive stop	
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	1 means there is a fault. At the time, you can refer to the bit15 to bit8 to check the current fault type.
	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: Fault exists Refer to P97.32 for the fault type

The bit definition of the 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 the 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 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 parameters will return.

2. To write multiple control parameters or function code parameters (0×10), if any one of the parameters is not written successfully (due to invalid parameter address, exceeding parameter range, etc.), the error information will return. 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) Protection on reading/writing of function code parameters via the user password and management of function codes (except "reading the address of 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 as the operating keypad. The writing operation of P00.01 is valid only in two cases: one is decryption to 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 operations of the host device and the operating keypad are independent. Even if you have done decryption through the operating keypad, the decryption through the host device is still required when you use the host device to visit function code parameters, vice versa.

(5) Password related parameters are forbidden to access in communication, and in this case the 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 invalid, and the user password needs to be entered again for another access.

(7) When the host device has gotten the access (no user password or already being decrypted), if the user password is set or changed through the keypad, the host device still has the current access with no need to decrypt. When the access right becomes invalid, the host device needs to decrypt again (entering the new password) for 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 the final results have exchanged high and low bytes, that is, the results are the CRC checksum to send.

```
unsigned short CRC16  (unsigned ch Ar *msg, unsigned ch Ar      /* The function returns the CRC  As  A
length)                                                        unsigned short type */

{

    unsigned ch Ar uchCRCHi = 0xFF ;                           /* high byte of CRC initi Alized */

    unsigned ch Ar uchCRCLo = 0xFF ;                           /* low byte of CRC initi Alized */

    unsigned uIndex ;                                          /* index into CRC lookup t Able */

    while  (length--)                                          /* p Ass through mess Age buffer */

    {

        uIndex = uchCRCLo ^ *msg++ ;                           /* c Alcul Ate the CRC */

        uchCRCLo = uchCRCHi ^  (crc V Alue[uIndex] >>8) ;

        uchCRCHi =crc V Alue[uIndex]&0xff;

    }

    return  (uchCRCHi | uchCRCLo<<8)  ;

}

/* T Able of CRC  V Alues */

const unsigned int  crc V Alue[ ] = {

0x0000,0xC1C0,0x81C1,0x4001,0x01C3,0xC003,0x8002,0x41C2,0x01C6,0xC006,0x8007,0x41C7,

0x0005,0xC1C5,0x81C4,0x4004,0x01CC,0xC00C,0x800D,0x41CD,0x000F,0xC1CF,0x81CE,0x400E,
```

0x000 A,0xC1C A,0x81CB,0x400B,0x01C9,0xC009,0x8008,0x41C8,0x01D8,0xC018,0x8019,0x41D9,

0x001B,0xC1DB,0x81D A,0x401 A,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,0x01F A,0xC03 A,0x803B,0x41FB,0x0039,0xC1F9,0x81F8,0x4038,

0x0028,0xC1E8,0x81E9,0x4029,0x01EB,0xC02B,0x802 A,0x41E A,0x01EE,0xC02E,0x802F,0x41EF,

0x002D,0xC1ED,0x81EC,0x402C,0x01E4,0xC024,0x8025,0x41E5,0x0027,0xC1E7,0x81E6,0x4026,

0x0022,0xC1E2,0x81E3,0x4023,0x01E1,0xC021,0x8020,0x41E0,0x01 A0,0xC060,0x8061,0x41 A1,

0x0063,0xC1 A3,0x81 A2,0x4062,0x0066,0xC1 A6,0x81 A7,0x4067,0x01 A5,0xC065,0x8064,0x41 A4,

0x006C,0xC1 AC,0x81 AD,0x406D,0x01 AF,0xC06F,0x806E,0x41 AE,0x01 A A,0xC06 A,0x806B,0x41 AB,

0x0069,0xC1 A9,0x81 A8,0x4068,0x0078,0xC1B8,0x81B9,0x4079,0x01BB,0xC07B,0x807 A,0x41B A,

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,

0x005 A,0xC19 A,0x819B,0x405B,0x0199,0xC059,0x8058,0x4198,0x0188,0xC048,0x8049,0x4189,

0x004B,0xC18B,0x818 A,0x404 A,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 ch Ar *d At A,unsigned ch Ar length)

{

```
    int i;
    unsigned crc_result=0xffff;
    while (length--)
    {
        crc_result^=*d At A++;
        for (i=0;i<8;i++)
        {
            if (crc_result&0x01)
            {
            crc_result= (crc_result>>1) ^0x A001;
            }
            else
            {
                crc_result=crc_result>>1;
        }
      }
    }
    return  (crc_result= ( (crc_result&0xff) <<8) | (crc_result>>8) ) ;
}
```

9. Scaling of drive parameters

(1) Scaling of frequency 1:100

To run the drive at 50 Hz, the main reference should be 0x1388 (5000).

(2) Scaling of time 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 1:10

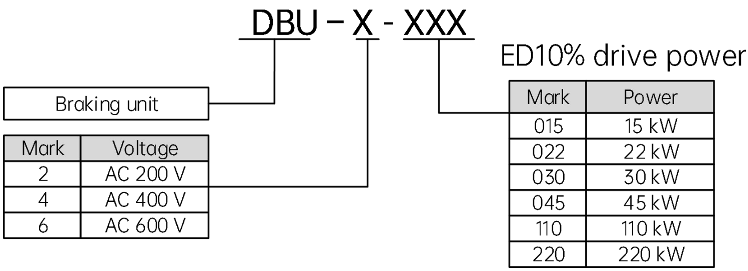
If the drive's feedback current is 0x012C (300), the present current is 30 A.

(4) The output power is its absolute value.

(5) For other parameters, refer to the function parameter descriptions.

Appendix 2 Braking Components

1. External braking unit model definition



Appendix Fig. 2-1 Definition of braking unit models

WARNING

ED10% means the braking usage ratio is 10%.

---

2. Braking resistor configuration of built-in braking unit drive

Appendix Table 2-1 Braking resistor configuration

Drive model	Recommended braking resistor	Minimum braking resistance	Braking torque (%)
MV820E-2S0.4	80 W / 200 Ω	95 Ω	120
MV820E-2S0.75	80 W / 150 Ω	68 Ω	120
MV820E-2S1.5	100 W / 100 Ω	32 Ω	120
MV820E-4T0.75	140 W / 800 Ω	270 Ω	120
MV820E-4T1.5	300 W / 380 Ω	220 Ω	120
MV820E-4T2.2	440 W / 260 Ω	100 Ω	120

Drive model	Recommended braking resistor	Minimum braking resistance	Braking torque (%)
MV820E-4T3.7	740 W / 150 Ω	82 Ω	120
MV820E-4T5.5	1100 W / 100 Ω	50 Ω	120
MV820E-2T3.7	800 W / 33 Ω	22 Ω	120
MV820E-2T5.5	1300 W / 22 Ω	16.5 Ω	120
MV820E-4T7.5	1500 W / 75 Ω	50 Ω	120
MV820E-4T11	2200 W / 50 Ω	30 Ω	120
MV820E-4T15	3000 W / 38 Ω	22 Ω	120
MV820E-4T18.5	4000 W / 33 Ω	24 Ω	120
MV820E-4T22	4500 W / 27 Ω	24 Ω	120
MV820E-4T30	6000 W / 20 Ω	19.2 Ω	120
MV820E-4T37B	7000 W / 16 Ω	14.8 Ω	120
MV820E-4T45	9000 W / 13 Ω	12.8 Ω	120
MV820E-4T55	11000 W / 10.5 Ω	9.6 Ω	120
MV820E-4T75	15000 W / 7.7 Ω	6.8 Ω	120

WARNING

(1) The recommended specifications of braking resistors are based on the working conditions with the braking usage ratio being 10% and the maximum single braking time being 10 s.

(2) 75 kW and below drives have built-in braking units. Users only need to install the external braking resistor for dynamic braking.

Appendix 3 Warranty and Service

Shenzhen Megmeet Electrical Co., Ltd. manufactures motor drive products strictly according to the ISO9001:2008 standard. In case of any product abnormalities, please contact the distributor or the headquarters. Our company will provide full technical support for you.

1. Warranty period

The product is warranted for 18 months from the purchase date, however, the warranty date shall not exceed 24 months after the manufacturing date on the nameplate.

2. Warranty scope

During the warranty period, any product abnormalities incurred due to our company can be freely repaired or replaced by our company. In case of the following situations, maintenance fees will also be charged even if the product is still in the warranty period.

(1) The damages are caused by fire, flood, strong lightning strike, etc.

(2) The damages are caused by users' unauthorized modifications.

(3) The product is damaged due to drop or in transmission after the purchase.

(4) The product is damaged because the standard requirements are not obeyed in actual use.

(5) The product is damaged because the user does not follow the instructions of the user manual.

3. After-sales service

(1) If there are specific requirements for drive installation and trial operation, or the working status of the drive is not satisfactory (such as unsatisfactory performance and function), please contact the distributor or Shenzhen Megmeet Electrical Co., Ltd.

(2) In case of any abnormality, contact the distributor or Shenzhen Megmeet Electrical Co., Ltd. immediately for help.

(3) During the warranty period, our company will repair any drive abnormality incurred due to the product manufacturing and design free of charge.

(4) If the product is out of the warranty period, our company can provide paid repairing service according to the customers' needs.

(5) The service charge is calculated by actual costs. If there is an agreement, the agreement shall prevail.

Shenzhen Megmeet Electrical Co., Ltd.

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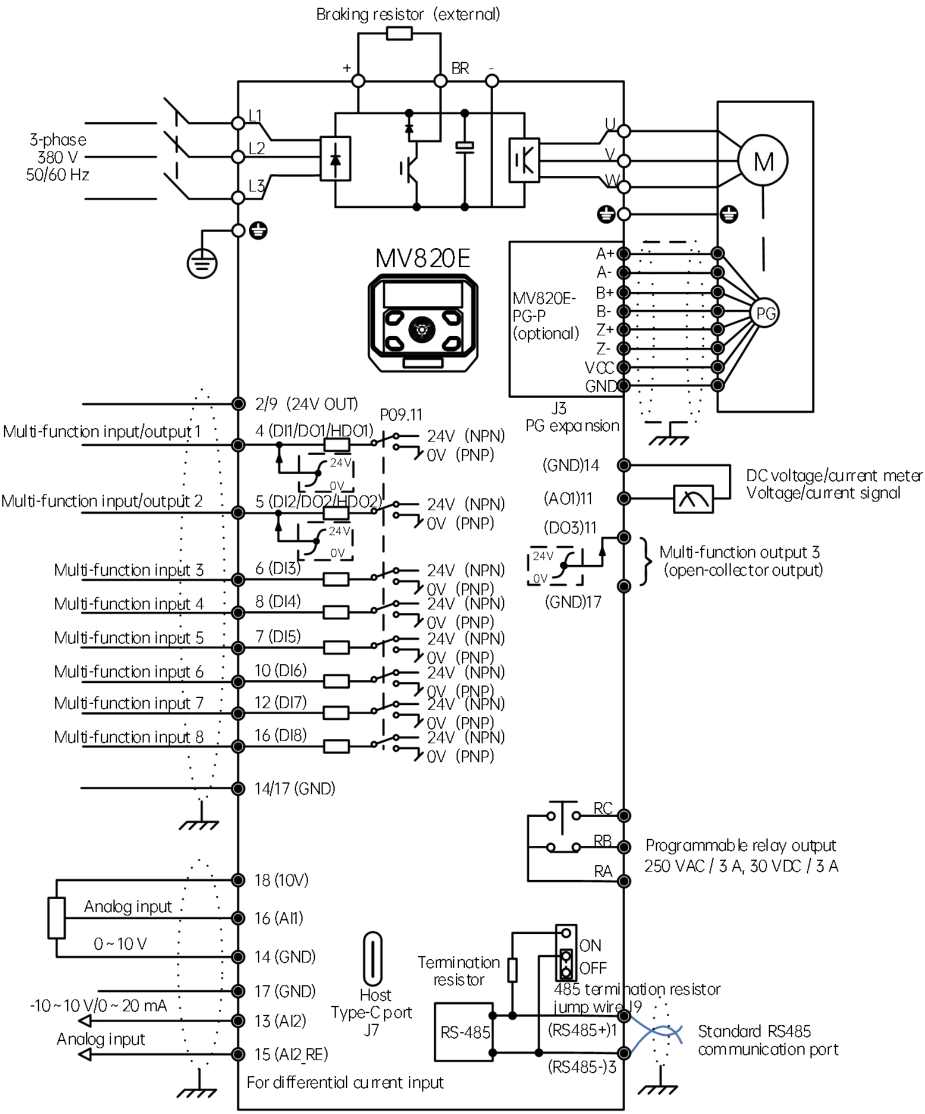
Zip code: 518057

Website: https://www.megmeet.com

Parameter recording table

Wiring Diagram



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: ☐Good ☐Fair ☐ So so ☐ Poor Other comment: User's signature: Date:	
Return visit record in Customer Service Center: ☐Telephone return visit ☐Letter return visit 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: ☐Good ☐Fair ☐ So so ☐ Poor Other comment: User's signature: Date:	
Return visit record in Customer Service Center: ☐Telephone return visit ☐Letter return visit Other: Signature of the technical support engineer: Date:	

Note: This bill becomes invalid if the user can not be visited.