Operation Manual

Goodrive300-EP Series VFD

SHENZHEN INVT ELECTRIC CO., LTD.

No.	Change description	Version	Release date
1	First release	V1.0	September 2020
2	Updated C.2 Peripheral wiring and C.3 Harmonic filter	V1.1	April 2025

Preface

Thanks for choosing INVT Goodrive300-EP series variable-frequency drive (VFD).

Goodrive300-EP series VFD can be widely applicable for various scenarios, such as the onshore power supply (OPS), emergency power system (EPS), fire emergency power system (FEPS), soft-start motor, power frequency and variable frequency switching, and constant-voltage and constant-frequency power supply scenarios. The VFD has been equipped with a standard mains supply synchronization card, which can implement the synchronous phase locking between the mains supply and standby power output in a timely manner. The reliability, environmental adaptability, and customized and industrial design of the VFD help implement optimized functions, flexible application, and stable performance.

The VFD is applicable to all EPS application scenarios. In addition, the VFD features high reliability and safety for the outstanding protection performance, anti-tripping performance, and the capabilities to adapt to the harsh grid, temperature, humidity, and dust conditions.

The VFD is designed in modular mode and is equipped with standard mains supply synchronization card. The VFD provides abundant terminals for external connections to support multiple control modes while meeting EPS phase locking requirements. The stable proportional–integral–derivative (PID) voltage feedback channel ensures the stability of output voltage in scenario where the load changes.

This manual describes the precautions for installation and wiring, parameter setting, fault diagnosis and troubleshooting, and routine maintenance. To ensure that you install and operate the VFD properly to make full use of its excellent performance, read this manual carefully before installing it.

If the end user is a military unit or the product is used for weapon manufacturing, please comply with relevant export control regulations in the Foreign Trade Law of the People's Republic of China, and complete necessary formalities.

We reserve the right to update product information without prior notice.

If not otherwise specified in this manual, the VFD always indicates Goodrive300-EP series VFD.

Contents

1 Safety precautions

1.1 What this chapter contains

Read this manual carefully and follow all safety precautions before moving, installing, operating and servicing the VFD. If these safety precautions are ignored, physical injury or death may occur, or damage may occur to the equipment.

We shall not be liable or responsible for any equipment damage or physical injury or death caused by you or your customers due to your neglect of the safety precautions in the manual.

1.2 Safety definition

Danger: Severe personal injury or even death can result if related requirements are not followed.

Warning: Personal injury or equipment damage can result if related requirements are not followed.

Note: Actions taken to ensure proper running.

Trained and qualified professionals: People working on the VFD must have received professional electrical and safety training and obtained the certificates, and must be familiar with all steps and requirements of VFD installing, commissioning, running and maintaining and capable to prevent any emergencies.

1.3 Warning symbols

Warnings caution you about conditions which can result in serious injury or death and/or damage to the equipment, and advice on how to avoid the danger. The following warning symbols are used in this manual:

Symbol	Name	Description	Abbreviation
 Danger	Danger	Severe personal injury or even death can result if related requirements are not followed.	
 Warning	Warning	Physical injury or equipment damage can result if related requirements are not followed.	
 Do not	Electrostatic sensitive	PCBA board damage can result if related requirements are not followed.	

Symbol	Name	Description	Abbreviation
 Hot sides	Hot sides	The VFD base may be hot. Do not touch.	
Note	Note	Actions taken to ensure proper running.	Note

1.4 Safety guidelines

✧Only trained and qualified professionals are allowed to operate on the VFD.

✧Do not carry out any wiring and inspection or changing components when the power supply is applied. Ensure all input power supply is disconnected before wiring and checking and always wait for at least the time designated on the VFD or until the DC bus voltage is less than 36V. Below is the table of the waiting time:

VFD model		Minimum waiting time
380V	4kW – 110kW	5 minutes
380V	132kW – 315kW	15 minutes
380V	Higher than 315kW	25 minutes
660V	22kW – 132kW	5 minutes
660V	160kW – 350kW	15 minutes
660V	400kW – 630kW	25 minutes

✧Do not refit the VFD unless authorized; otherwise fire, electric shock or other injury may occur.

✧The base may become hot during running. Do not touch to avoid hurt.

✧The electrical parts and components inside the VFD are electrostatic. Take measurements to avoid electrostatic discharge during relevant operation.

1.4.1 Delivery and installation

✧Please install the VFD on fire-retardant material and keep the VFD away from combustible materials.

✧Connect the braking optional parts (braking resistors, braking units or feedback units) according to the wiring diagram.

✧Do not operate the VFD if there is any damage or components loss to the VFD.

✧Do not touch the VFD with wet items or body, otherwise electric shock may occur.

Note:

- ✧ Select appropriate moving and installing tools to ensure a safe and normal running of the VFD and avoid physical injury or death. For physical safety, take some mechanical protective measurements, such as wearing safety shoes and working uniforms.
- ✧ Ensure to avoid physical shock or vibration during delivery and installation.
- ✧ Do not carry the VFD by its cover. The cover may fall off.
- ✧ Install the VFD far away from children and other public places.
- ✧ Please use the VFD in appropriate conditions.
- ✧ Prevent screws, cables and other conductive items from falling into the VFD.
- ✧ As leakage current of the VFD during running may exceed 3.5mA, ground properly and ensure the grounding resistance is less than 10Ω. The conductivity of the PE grounding conductor is the same as that of the phase conductor (with the same cross sectional area). For the VFD models higher than 30kW, the cross sectional area of the PE grounding conductor can be slightly less than the recommended value.
- ✧ R, S and T are the power input terminals, while U, V and W are the output terminals for motors. Please connect the input power cables and motor cables with proper techniques; otherwise the damage to the VFD may occur.

1.4.2 Commission and running

	✧Disconnect all power supplies applied to the VFD before the terminal wiring and wait for at least the designated time after disconnecting the power supply. ✧High voltage is present inside the VFD during running. Do not carry out any operation except for the keypad setting. It must be noted that the control terminals of 3PH AC660V VFD models are Extra Low Voltage (ELV) circuit, which cannot be connected directly to the accessible terminals of other equipment if no protective isolation measure is taken. ✧The VFD may start up by itself when P01.21=1. Do not get close to the VFD and motor. ✧The VFD cannot be used as "Emergency-stop device". ✧The VFD cannot be used to brake the motor suddenly. A mechanical braking device must be provided.

Note:

- ✧ Do not switch on or off the input power supply of the VFD frequently.
- ✧ If the VFD has been stored for a long time without being used, set the capacitance and carry out inspection and pilot run on the VFD before use.
- ✧ Close the front cover before VFD running; otherwise, electric shock may occur.

1.4.3 Maintenance and replacement of components

	✧Only trained and qualified professionals are allowed to perform the maintenance, inspection, and component replacement for the VFD. ✧Disconnect all power supplies to the VFD before the terminal wiring. Wait for at least the time designated on the VFD after disconnection. ✧Take measures to prevent screws, cables and other conductive matters from falling into the VFD during maintenance and component replacement.

Note:

- ✧ Please select proper torque to tighten screws.
- ✧ Keep the VFD, parts and components away from combustible materials during maintenance and component replacement.
- ✧ Do not carry out any insulation voltage-endurance test on the VFD and do not measure the control circuit of the VFD by megohmmeter.
- ✧ Take proper anti-static measures on the VFD and its internal parts during maintenance and component replacement.

1.4.4 What to do after scrapping

	✧The VFD contains heavy metal. Dispose of a scrap VFD as industrial waste.
	✧When the life cycle ends, the VFD should enter the recycling system. Dispose of it separately at an appropriate collection point instead of placing it in the normal waste stream.

2 Product overview

2.1 Product specification

Function		Specification
AC input	Input voltage (Vac)	3PH 380V (-15%)–440V (+10%); Rated voltage: 380V 3PH 520V (-15%)–690V (+10%); Rated voltage: 660V
	Input current (A)	Refer to section 2.4 Rated specifications.
	Input frequency (Hz)	50Hz or 60Hz Allowed range: 47–63Hz
	Efficiency	> 97%
DC input	Input voltage (Vdc)	380Vac models: 500V (+35%/-30%) 660Vac models: 850V (+35%/-30%)
AC output power	Output voltage (V)	Open loop voltage mode (with sine wave filter): 380/500/660±3%, which can be set when the set value is greater than the input voltage, a transformer needs to be configured. Close loop voltage mode (with sine wave filter): 380/500/660±1%, which can be set. When the set value is greater than the input voltage, a transformer needs to be configured.
	Rated output current (A)	Refer to section 2.4 Rated specifications.
	Rated output power (kW)	Refer to section 2.4 Rated specifications.
	Output frequency (Hz)	50Hz/60Hz; Fluctuation range: < ±0.5%
	Output voltage distortion	Equipped with sine wave Filter: <3% at linear load, <5% at non-linear load, load PF≥0.8
	Dynamic response	< ±10%, compliant with IEC62040-3 Class 1
Running control performance	Motor control mode	Open loop vector, space voltage vector, and V/F separation
	Voltage control mode	Voltage open loop, and voltage closed loop
	Phase compensation mode	Manual phase compensation mode Automatic phase compensation mode
	Voltage setting method	PID control setting, Modbus communication setting, and keypad setting.

Function		Specification
	Frequency setting method	PID control setting, Modbus communication setting, analog setting, and keypad setting.
	Overload capacity	150% of rated current: 1 minute
	Fault reset	Support for fault reset, which allows you to set the automatic fault reset count, and the automatic fault reset time interval.
	Forcible undervoltage start function	When the battery is insufficient (for 380V models: the second undervoltage point is configurable in 300–400V; for 660V models: the second undervoltage point is configurable in 450–570V), but the VFD still needs to work, the output voltage capability is determined by the externally connected transformer, the output current capacity is not derated, and no undervoltage fault is reported.
Terminal functions	Analog input	One analog input. Range: 0–10V or 0–20mA
	Analog output	One analog output. Range: 0–10V or 0–20mA
	Digital input	Six digital inputs. Maximum frequency: 1KHz
	Digital output	Three relay outputs, 250VAC/3A
	RS485	One channel of RS485 communication
	Grid voltage detection input	Used to detect the RST phase sequence and line voltage instantaneous value
	Input for output detection	Used to detect the output voltage and phase according to the UVW phase voltage feedback
Protection functions	Fault protection	Provides more than 30 fault protection functions, including overcurrent, overvoltage, undervoltage, overheating, input/output phase loss and overload.
	DC bus undervoltage protection	The DC bus undervoltage (the first undervoltage point) protection function supports the undervoltage pre-alarm output (relay output) and supports second undervoltage point protection.
	Input phase detection protection	Grid voltage synchronous card detection signal: Input phase loss (UIPL), and input phase reverse (UIPE).
	Output phase detection protection	Grid voltage synchronous card detection signal: Output phase loss (UOPL), and output phase reverse (UOPE).
	Phase locked fault protection	Voltage feedback and phase lock failure (PLLE)

Function		Specification
Others	Mounting method	Wall, flange and floor mountable
	Temperature of the running environment	-10–50°C. If the temperature exceeds 40°C, derate 2% for every increase of 1°C.
	Ingress protection (IP) rating	IP20
	Pollution degree	Degree 2
	Cooling	Forced air cooling
	Sine wave filter	Adding a sine wave filter (optional part) can meet the requirement of load lighting.

2.2 Nameplate

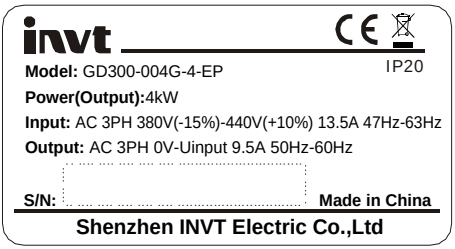


Figure 2.1 Nameplate

Note: This is a nameplate example for a standard VFD model. The mark such as CE/TUV/IP20 will be applied according to the actual certification result.

2.3 Model designation code

A model designation code contains VFD information. You can find the model designation code on the model designation label attached to the VFD or on the simplified nameplate.

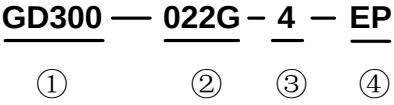


Figure 2.2 Product model

Field	No.	Description	Content
Abbreviation	①	Abbreviation	GD300: High-performance vector VFD
Rated power	②	Power + Load	022G: 22kW G: constant torque load
Voltage class	③	Voltage class	4: AC 3PH 380V (-15%)–440V (+10%) Rated voltage: 380V 6: AC 3PH 520V (-15%)–690V (+10%) Rated voltage: 660V
Lot number	④	Lot number	EP: Emergency Power Supply

2.4 Rated specifications

2.4.1 AC 3PH 380V (-15%)–440V (+10%)

Model	Rated output power (kW)	Rated input current (A)	Rated output current (A)
GD300-004G-4-EP	4	13.5	9.5
GD300-5R5G-4-EP	5.5	19.5	14
GD300-7R5G-4-EP	7.5	25	18.5
GD300-011G-4-EP	11	32	25
GD300-015G-4-EP	15	40	32
GD300-018G-4-EP	18.5	47	38
GD300-022G-4-EP	22	56	45
GD300-030G-4-EP	30	70	60
GD300-037G-4-EP	37	80	75
GD300-045G-4-EP	45	94	92
GD300-055G-4-EP	55	128	115
GD300-075G-4-EP	75	160	150
GD300-090G-4-EP	90	190	180
GD300-110G-4-EP	110	225	215
GD300-132G-4-EP	132	265	260
GD300-160G-4-EP	160	310	305
GD300-185G-4-EP	185	345	340
GD300-200G-4-EP	200	385	380
GD300-220G-4-EP	220	430	425
GD300-250G-4-EP	250	485	480
GD300-280G-4-EP	280	545	530
GD300-315G-4-EP	315	610	600
GD300-350G-4-EP	350	625	650
GD300-400G-4-EP	400	715	720

Model	Rated output power (kW)	Rated input current (A)	Rated output current (A)
GD300-500G-4-EP	500	890	860

Note:

- The VFD input current in the table is the result measured in cases where the input voltage is 380V and no DC reactor is configured.
- The rated output current in the table is the output current corresponding to 380V output voltage.
- The input current of 350–500kW VFD models in the table is the result measured when the VFD models contain standard built-in input reactors.

2.4.2 AC 3PH 520V (-15%)–690V (+10%)

Model	Rated output power (kW)	Rated input current (A)	Rated output current (A)
GD300-022G-6-EP	22	35	27
GD300-030G-6-EP	30	40	35
GD300-037G-6-EP	37	47	45
GD300-045G-6-EP	45	52	52
GD300-055G-6-EP	55	65	62
GD300-075G-6-EP	75	85	86
GD300-090G-6-EP	90	95	98
GD300-110G-6-EP	110	118	120
GD300-132G-6-EP	132	145	150
GD300-160G-6-EP	160	165	175
GD300-185G-6-EP	185	190	200
GD300-200G-6-EP	200	210	220
GD300-220G-6-EP	220	230	240
GD300-250G-6-EP	250	255	270
GD300-280G-6-EP	280	286	300
GD300-315G-6-EP	315	334	350
GD300-350G-6-EP	350	360	380
GD300-400G-6-EP	400	411	430
GD300-500G-6-EP	500	518	540
GD300-560G-6-EP	560	578	600
GD300-630G-6-EP	630	655	680

Note:

- The input current of VFDs is detected when the input voltage is 660V and there is no DC reactors and input/output reactors.

- The rated output current is defined when the output voltage is 660V.
- The input current of VFDs 400–630kW are test while standard built-in input reactors.
- The VFD input current in the table is the result measured in cases where the input voltage is 660V and no DC reactor is configured.
- The rated output current in the table is the output current corresponding to 660V output voltage.
- The input current of 400–630kW VFD models in the table is the result measured when the VFD models contain standard built-in input reactors.

3 Standard wiring

3.1 Standard wiring of main circuit

3.1.1 AC 3PH 380V (-15%)–440V (+10%)

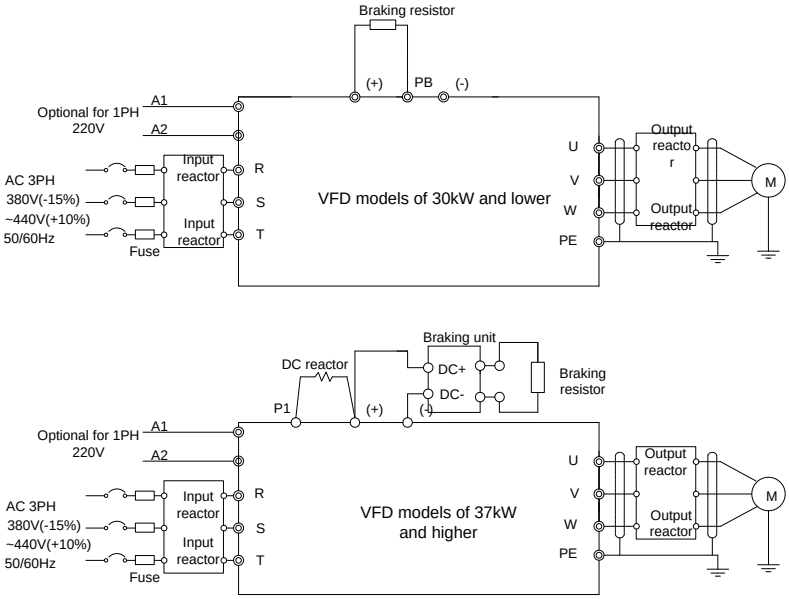


Figure 3.1 Connection diagram of main circuit for the VFD models of 380V

Note:

- The fuse, DC reactor, braking unit, braking resistor, input reactor, input filter, output reactor, output filter are optional parts. Please refer to Appendix C Optional peripheral accessories for detailed information.
- A1 and A2 are optional parts.
- P1 and **(**+) are short circuited in factory for the 380V ≥37kW VFD models. If you need to connect to an external DC reactor, take off the short-contact tag between P1 and (+).
- Before connecting the braking resistor cable, remove the yellow labels of PB, (+), and (-) from the terminal blocks. Otherwise, poor connection may occur.

3.1.2 AC 3PH 520V (-15%)–690V (+10%)

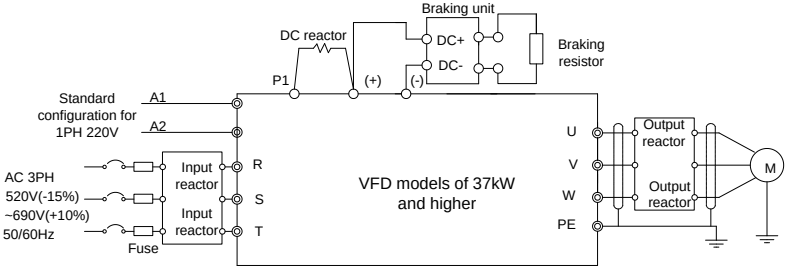


Figure 3.2 Connection diagram of main circuit for the VFDs of 660V

Note:

- The fuse, DC reactor, braking unit, braking resistor, input reactor, input filter, output reactor, output filter are optional parts. Please refer to Appendix C Optional peripheral accessories for detailed information.
- A1 and A2 are optional parts.
- P1 and **(**+) are short circuited in factory. If you need to connect to an external DC reactor, take off the short-contact tag between P1 and (+).
- Before connecting the braking resistor cable, remove the yellow labels of PB, (+), and (-) from the terminal blocks. Otherwise, poor connection may occur.

3.1.3 Terminals of main circuit

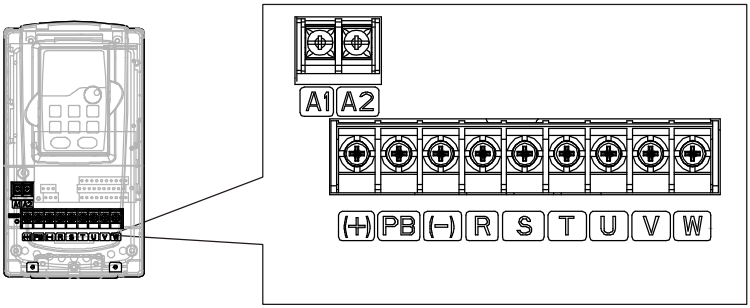


Figure 3.3 Terminals of main circuit for the VFD models of 380V 4–5.5kW

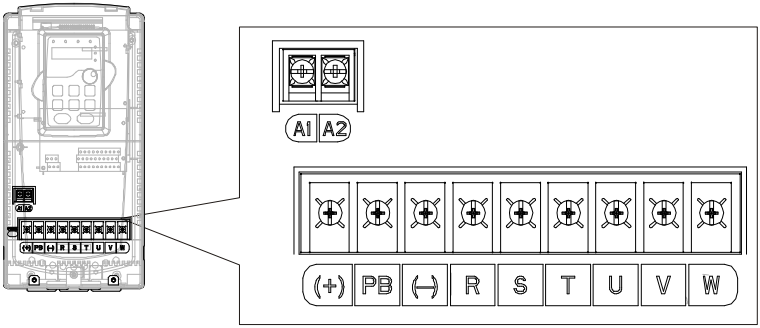


Figure 3.4 Terminals of main circuit for the VFD models of 380V 7.5–11kW

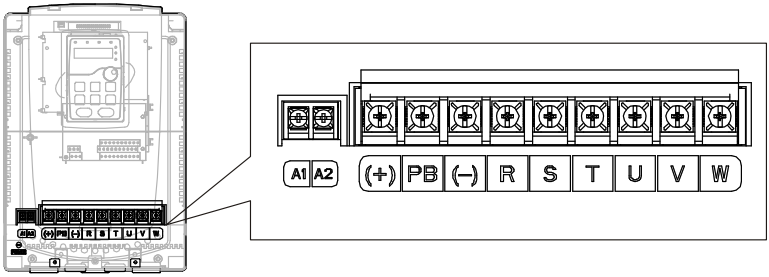


Figure 3.5 Terminals of main circuit for the VFD models of 380V 15–18kW

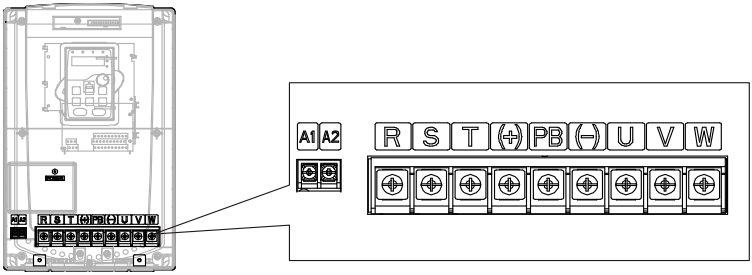


Figure 3.6 Terminals of main circuit for the VFD models of 380V 22–30kW

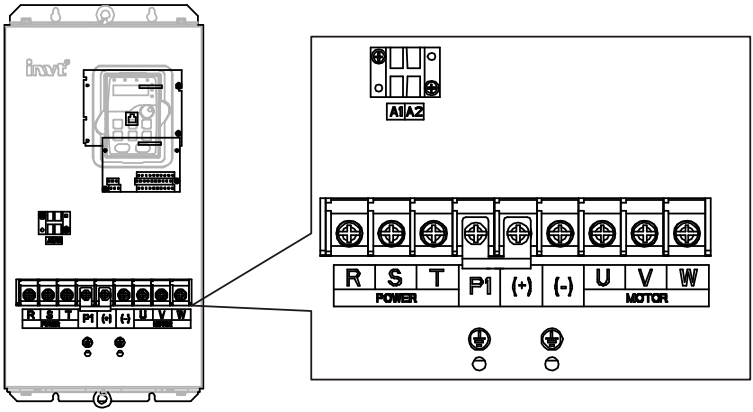


Figure 3.7 Terminals of main circuit for the VFD models of 380V 37–55kW/660V 22–45kW

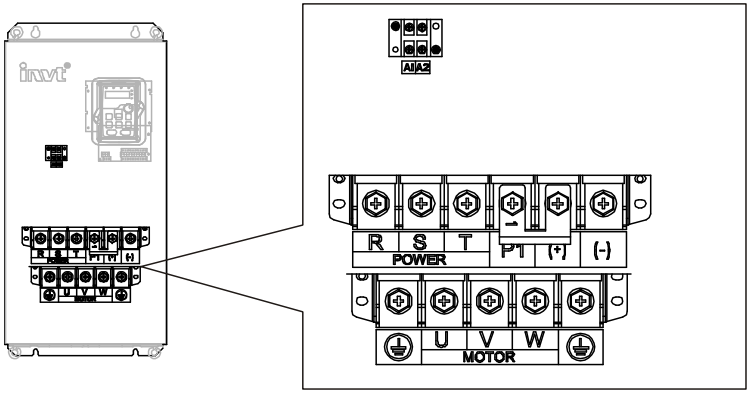


Figure 3.8 Terminals of main circuit for the VFD models of 380V 75–110kW/660V 55–132kW

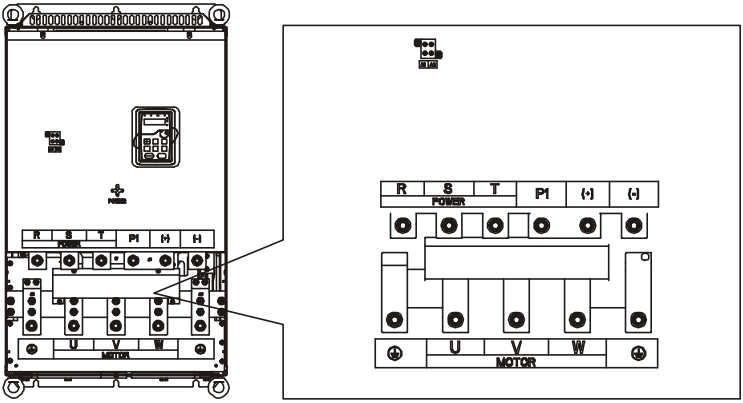


Figure 3.9 Terminals of main circuit for the VFD models of 380V 132–200kW/660V 160–220kW

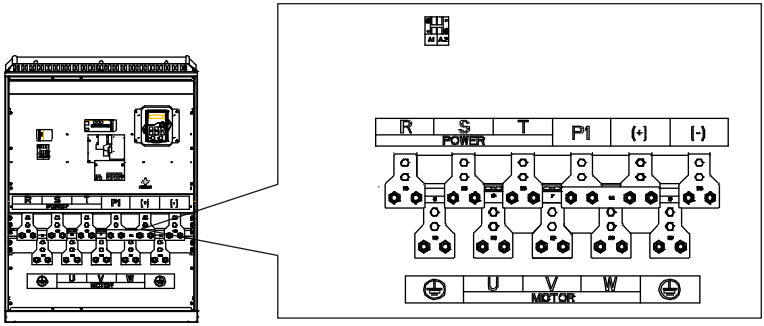


Figure 3.10 Terminals of main circuit for the VFD models of 380V 220–315kW/660V 250–350kW

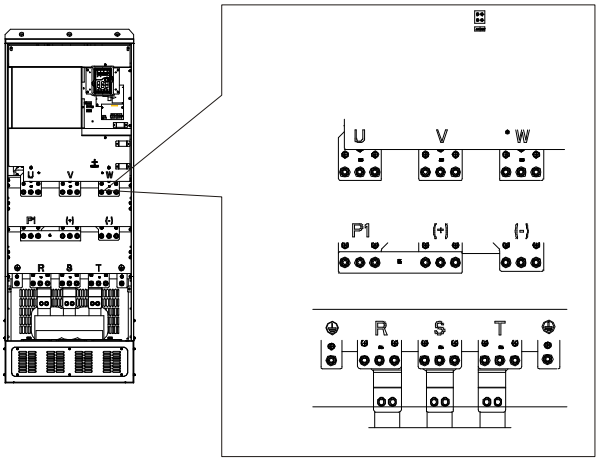


Figure 3.11 Terminals of main circuit for the VFD models of 380V 350–500kW/660V 400–630kW

Terminal	Terminal name		Description
	380V ≤30kW	380V ≥37kW 660V	
R, S, T	Power input of the main circuit		3PH AC input terminals which are generally connected with the power supply.
U, V, W	VFD output		3PH AC output terminals which are generally connected to the motor.
P1	Not available	DC reactor terminal 1	P1 and (+) are connected to the terminals of DC reactor. (+) and (-) are connected to the terminals of braking unit. PB and (+) are connected to the terminals of braking resistor.
(+)	Braking resistor 1	DC reactor terminal 2, braking unit terminal 1	
(-)	/	Braking unit terminal 2	
PB	Braking resistor 2	Not available	
PE	380V: grounding resistor less than 10Ohm 660V: grounding resistor less than 10Ohm		Protective grounding terminal. Each VFD device provides two PE terminals. The terminals must be grounded with proper techniques.
A1, A2	Control power supply terminal		Optional for the 380V VFD models, standard for the 660V VFDs models (with external 220V control power supply) If no voltage is present on the main

Terminal	Terminal name		Description
	380V ≤30kW	380V ≥37kW 660V	
			circuit, more convenient and safer commissioning is available through the auxiliary power supply.

Note:

- Do not use an asymmetrically constructed motor cable. If there is a symmetrically constructed grounding conductor in the motor cable in addition to the conductive shield, connect the grounding conductor to the grounding terminal at the VFD and motor ends.
- Braking resistor, braking unit and DC reactor are optional parts.
- Route the motor cable, input power cable and control cables separately.
- "Not available" means this terminal is not for external connection.

3.2 Wiring of terminals of control circuit

3.2.1 Synchronous card terminals

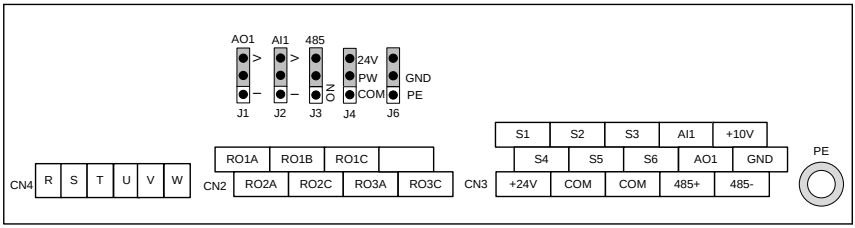


Figure 3.12 Synchronous card terminal layout

3.2.2 Terminal function description

Item	Terminal symbol	Terminal name	Description
Communication	485+ 485-	RS485 communication	RS485 communication terminals, using Modbus protocol. You can choose the terminal resistor through J3. You can connect H4 as a PE shield terminal to reduce interference for RS485 communication. For shield purpose, you can short connect PE to GND through J6.
Inputs	S1 S2 S3	Digital input	1. Internal impedance: 3.3kΩ 2. 12–30V voltage input is available 3. The terminals are bidirectional input terminals,

Item	Terminal symbol	Terminal name	Description
	S4		supporting both NPN and PNP, which can be selected through J4 4. Max input frequency: 1kHz
	S5		
	S6		
24V	+24V	24V power supply	24V ± 10%, 200mA Generally used as the working power of digital input.
	COM		
IO	AI1	Analog input	1. Input range: 0–10V/0–20mA, which can be selected through J2 2. Input impedance: voltage input: 20kΩ; current input: 500Ω 3. Resolution: the minimum one is 10mV when 10V corresponds to 50Hz 4. Deviation ±1%, 25°C
	AO1	Analog output	1. Output range: 0–10V or 0–20mA 2. The voltage or the current output is depended on J1. 3. Deviation±1%, 25°C
Relay	RO1A	Relay1 NO	Contactor capability: 3A/AC250V,1A/DC30V Not for high frequency switching output
	RO1B	Relay1 NC	
	RO1C	Relay1 common	
	RO2A	Relay2 NO	
	RO2C	Relay2 common	
	RO3A	Relay1 NO	
	RO3C	Relay3 common	
Input and output detection	R	Phase detection of grid voltage	3PH grid voltage input terminals, used to detect the grid phases RS and ST Detected voltage range: 0–690Vac
	S		
	T		
	U	Phase detection of output voltage	Output voltage feedback channels, used for the closed-loop feedback of the load side voltage phase detection in the synchronous mode, or the voltage feedback when the output voltage is in closed loop control. Detected voltage range: 0–690Vac
	V		
	W		

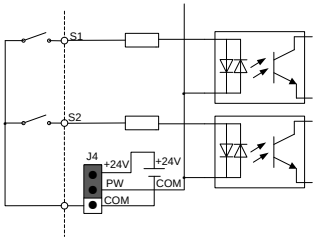


Figure 3.13 Internal power supply (NPN mode)

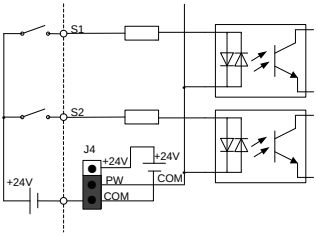


Figure 3.14 External power supply (PNP mode)

When the digital input uses the internal +24V, the jumper cap is set according to Figure 3.13, and the +24V and PW are short connected. When the digital input uses the external +24V, the jumper cap is set according to Figure 3.14, and the COM and PW are short connected.

3.3 Wiring diagram of control circuit

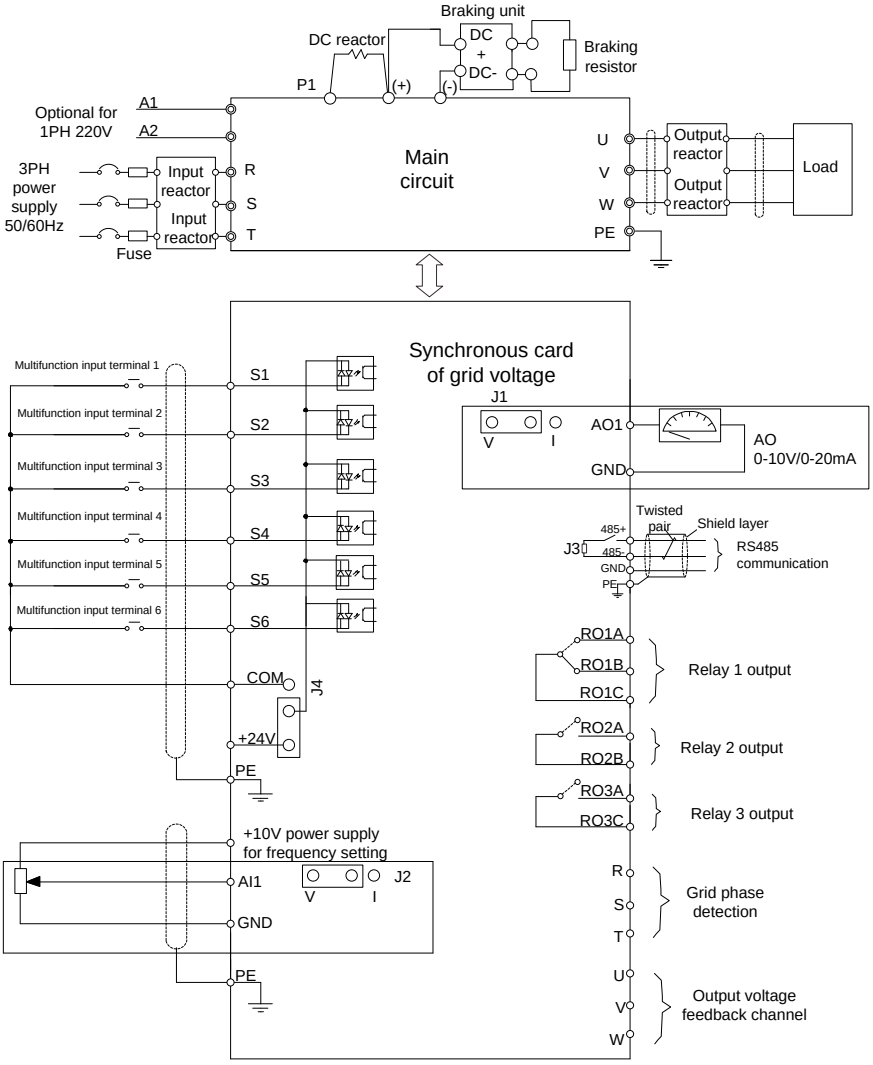


Figure 3.15 Wiring diagram of control circuit

4 Debugging instructions

4.1 EPS application

4.1.1 System diagram

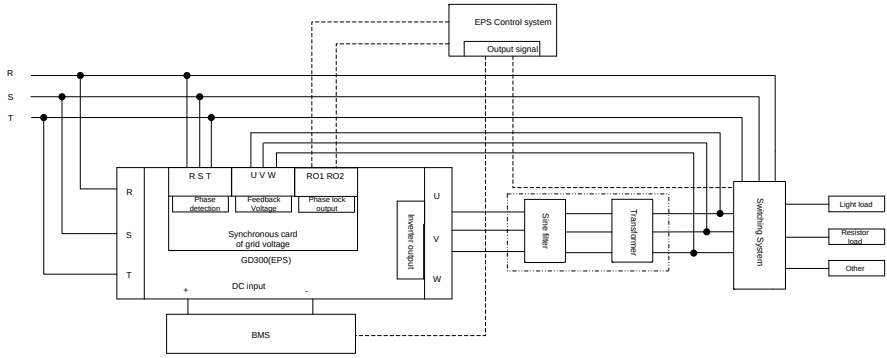


Figure 4.1 EPS application diagram

4.1.2 Debugging steps

Step 1 Connect the grid phases to the R, S, and T terminals of the synchronous card, and connect feedback voltage to the U, V, and W terminals of the card. Ensure that wiring is correct.

Step 2 Set P00.18=1 to restore factory settings. See the parameter settings when P22.00=1.

Step 3 Start the trial run.

4.1.3 EPS parameters

Function code	Name	Value	Remarks
P00.00	Speed control mode	2	In EPS power mode, only VF control can be selected.
P00.01	Channel of running commands	0	Keypad
P00.11	ACC time 1	0	EPS power mode, in which the VFD needs to quickly track the power frequency
P00.12	DEC time 1	0	
P01.08	Stop mode	1	Coast to stop
P04.00	V/F curve setting of motor 1	5	Customized V/F curve (V/F separation)
P04.01	Torque boost of motor 1	0.1%	Set torque boost manually.
P04.10	Low-frequency oscillation control factor of motor 1	0	Invalid
P04.11	High-frequency oscillation control factor of motor 1	0	

Function code	Name	Value	Remarks
P04.29	Voltage increase time	5	0.0–3600.0s
P04.30	Voltage decrease time	5	0.0–3600.0s
P04.31	Output maximum voltage	100%	P04.32–100.0% (VFD rated voltage)
P04.32	Output minimum voltage	0%	0.0%–P04.31 (VFD rated voltage)
P05.01	S1 terminal function	1	In terminal control mode: Forward rotation
P05.06	S6 terminal function	42	42: Second undervoltage point
P06.03	RO1 output selection	27	Output of phase lock success (The output is valid when the VFD output is synchronized with the grid, and it is kept if power failure occurs during running.)
P06.04	RO2 output selection	28	Output of synchronization success (The output is valid when the VFD output is synchronized with the grid, and it is kept if power failure occurs during running.)
P11.00	Phase loss protection	0x1111	LED ones: 1: Enable input phase loss protection LED tens: 1: Enable output phase loss protection LED hundreds: 1: Enable terminal board RST input signal phase loss protection (UIPL) LED thousands: 1: Enable terminal board UVW output signal phase loss protection (UOPL)
P11.05	Current limit action	0	Invalid
P20.00	PWM selection	0	0: 3-phase SVPWM
P20.04	Output voltage display correction coefficient	100.0%	Output voltage display correction coefficient (three-phase)
P20.05	Undervoltage warning delay	0.0	1. In running, the bus voltage is below the undervoltage point +40V, the alarm delay starts. If the bus voltage is below the undervoltage point and the delay time is over, the VFD reports undervoltage fault. 2. If the VFD is not in running and the bus voltage is below the undervoltage point, it reports POFF.
P20.06	Software undervoltage point 1	420	380 models: 420V
P20.07	Software undervoltage	480	380 models: 480V

Function code	Name	Value	Remarks
	point recovery point 1		
P20.08	Software undervoltage point 2	380	380 models: 380V
P20.09	Software undervoltage point recovery point 2	480	380 models: 480V
P20.11	Output angle compensation value	0.0°	0.0° indicates automatic phase compensation (closed loop phase regulation); a value but not 0.0° indicates manual phase compensation.
P22.00	VFD working mode selection	1	1: EPS mode
P22.01	Frequency synchronization mode of power grid	0x111	LED ones: 1: Power frequency synchronization mode LED tens: 1: Phase sequence continuous mode LED hundreds: 1: Start to power frequency directly
P22.11	I/O inversion/phase lock failure detection protection	0x211	LED ones: 1: Terminal board RST (UIPE) input inversion enabled LED tens: 1: Terminal board UVW (UOPE) output inversion enabled LED hundreds: 2: Phase lock failure (PLLE) detection is valid all the time

4.1.4 Debugging steps

Before running, you need to check whether the status is normal according to the phase lock setting and phase lock output setting.

Step 1 Set P22.01=001, turn on the grid power and perform phase lock. If the PLLE fault is reported, the grid voltage on the terminal board RST is abnormal, you need to check the grid input access signal. If no fault is reported, check the value of the P23.00. You can obtain the grid positive and negative sequences and phase lock state. A negative value indicates negative sequence input, while a positive value indicates positive sequence input. When you set RO1/2/3=27, the relay outputs the phase lock state.

Step 2 If the FWD/REV indicator is off when P23.00 is a negative value, change the grid connection

line sequence, or set P00.13=1 (reverse rotation); otherwise, the UIPE fault is reported during running.

Step 3 Set the hundreds place of P22.01 according to the application requirement. When P22.01=001, the output voltage waveform in the phase lock synchronization process is not distorted, and the impact on the load is very small; if the time demand for phase locking is shorter, you can set P22.01=101, VFD output directly starts at the power frequency, but the output voltage waveform in the phase lock synchronization process may be slightly changed and a certain impact on the load occurs.

Step 4 Connecting a transformer to the VFD output side will cause a phase difference between the VFD output side and the load side. You can set automatic or manual phase adjustment according to the application requirement. In the automatic phase adjustment mode (P20.11=0), the system automatically adjusts the phase to make the voltage on the load side consistent with the grid input phase. In manual phase adjustment mode (P20.11≠0), you can set P20.11 to compensate for the phase deviation compensation angle to ensure the phase of the voltage output to the load side is consistent with that of the grid.

4.1.5 EPS timing diagram

Figure 4.2 shows EPS key timing points, including start, grid phase lock, VFD output phase synchronization, and re-phase lock after grid disconnection.

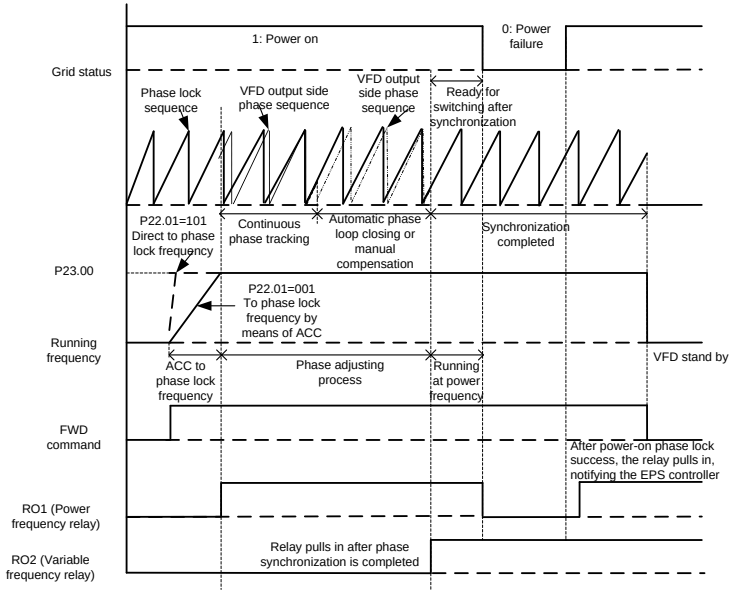


Figure 4.2 EPS timing diagram

Notes:

- If the phase locked output is applied, when the output terminal is connected to the transformer, ensure that the phase sequence should be same for grid input and feedback voltage of the terminal board. Meanwhile, the voltage feedback connection cable should be drawn from the back end of the transformer.
- For details about sine filter model selection, see Appendix C Optional peripheral accessories.

4.1.6 First and second undervoltage point setting steps

When used as EPS power, the VFD needs to be equipped with forcible undervoltage start capability. A common VFD (but not Goodrive300-EP) without the first and second undervoltage points will report the undervoltage fault when the DC-bus voltage goes down to an undervoltage point,; but EPS has the first and second undervoltage points, the VFD can implement the forcible undervoltage start function through the following settings:

(1) Set P20.06–P20.09. That is, set the first and second undervoltage points and the undervoltage recovery point.

(2) Enter the P05 group, set P05.01 to P05.06 (selection of S1 to S6), among which S6 = 42, and make the first and second undervoltage points valid through the external switch. If the first or second undervoltage point is valid, the default undervoltage point group is invalid.

(3) Before VFD bus voltage reaches the first undervoltage point, enable the undervoltage alarm delay P20.05, and set the second undervoltage point as the undervoltage point. In this way, the forcible undervoltage start function is enabled.

	Undervoltage point 1	Undervoltage point 2	Default undervoltage point
P20.06=0&&P20.08=0	N	N	Y
S1...S6 = 42	N	Y	N
S1...S6 != 42	Y	N	N

(4) Undervoltage pre-alarm time sequence diagram

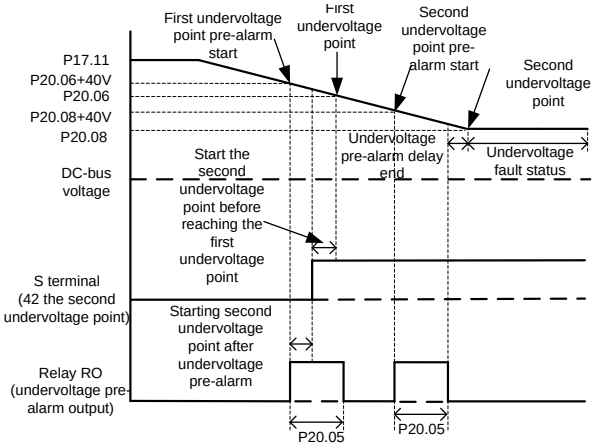


Figure 4.3 Second undervoltage point start timing sequence diagram

4.2 Application of stable voltage power supply

When the VFD is used as a voltage regulator, the basic parameter table of voltage control as follows:

Function code	Name	Value	Remarks
P00.00	Speed control mode	2	In EPS power mode, only the V/F control mode can be selected.
P00.01	Channel of running commands	0	Keypad
P00.11	ACC time 1	0	EPS power mode, in which the VFD needs to quickly track the power frequency
P00.12	DEC time 1	0	
P01.08	Stop mode	1	Coast to stop
P02.04	Rated voltage of IM1	380	0-1200V
P02.18	Rated voltage of PMSM1	380	0-1200V
P04.00	V/F curve setting of motor 1	5	Customized V/F curve (V/F separation)
P04.01	Torque boost of motor 1	0.1%	Set torque boost manually.
P04.10	Low-frequency oscillation control factor of motor 1	0	Invalid
P04.11	High-frequency oscillation control factor of motor 1	0	

Function code	Name	Value	Remarks
P04.29	Voltage increase time	5	0.0–3600.0s
P04.30	Voltage decrease time	5	0.0–3600.0s
P04.31	Output maximum voltage	100%	P04.32–100.0% (VFD rated voltage)
P04.32	Output minimum voltage	0%	0.0%– P04.31 (VFD rated voltage)
P20.00	PWM selection	0	0: 3PH SVPWM; 1: 3PH independence SPWM;
P20.04	Output voltage display correction coefficient	100.0%	0.0–200.0% Output voltage display correction coefficient (three phase);
P22.00	VFD working mode selection	1	1: EPS mode
P22.01	Frequency synchronization mode of power grid	0x000	LED ones: 0: Non-frequency synchronization mode; LED tens: 0: Tracking fast mode (Phase sequence non-continuous); LED hundreds: 0: Acceleration to power frequency directly
P22.11	I/O inversion/phase lock failure detection protection	0x000	LED ones: 0: Terminal board RST (UIPE) input inversion disabled LED tens: 0: Terminal board UVW (UOPE) output inversion disabled LED hundreds: 0: Phase lock failure (PLLE) detection is invalid all the time

4.2.1 Application of voltage closed loop control

4.2.1.1 System diagram

In PID adjustment application, as shown in Figure 4.4, feedback voltage is connected to the U, V, and W terminals of the grid synchronous card.

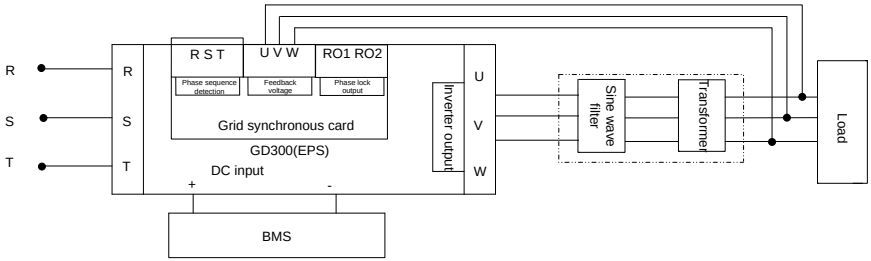


Figure 4.4 PID voltage closed loop

4.2.1.2 Parameters of voltage closed loop control

Function code	Name	Value	Remarks
P04.27	Selection of voltage setting channel	6	6: PID setting voltage
P09.00	PID given source selection	0	0: Keypad setting (P09.01)
P09.01	Keypad pre-set PID given	100%	P09.00=0, this parameter needs to be set, and the reference value of this parameter is the feedback of the system. 100% correspond to the rated voltage of the VFD.
P09.02	PID feedback source selection	8	8: Synchronous card UVW voltage feedback (valid value)
P09.04	Proportional gain (Kp)	100	0.00–100.00
P09.05	Integral time (Ti)	0.10s	0.00–10.00s
P09.06	Differential time (Td)	0.00s	0.00–10.00s
P09.07	Sampling period (T)	0.001s	0.001–10.000s
P11.00	Phase loss protection	0x1011	LED ones: 1: Enable input phase loss protection LED tens: 1: Enable output phase loss protection LED hundreds: 0: Disable terminal board RST input signal phase loss (UIPL) protection LED thousands: 1: Enable terminal board UVW output signal phase loss protection (UOPL)
P20.04	Output voltage display correction coefficient	100.0%	0.0–200.0% Output voltage display correction coefficient (three-phase)

4.2.1.3 Debugging steps for PID closed loop control

Step 1 According to Fig 4-4 to connect feedback voltage wiring (The feedback voltage is directly connected to the terminal board UVW from the front of the load).

Step 2 Specific function parameters according to voltage control basic parameter table and voltage closed loop control application parameter table.

Step 3 Run the VFD to see if the output voltage value (P23.03) reaches the set value or not; otherwise, according to the PID principle, the PID parameters are adjusted to meet the control requirements.

Step 4 If P20.00 = 1 (SPWM mode): For the voltage utilization of SPWM is lower than that of SVPWM, just raising the DC-bus voltage is unable to increase the output voltage. If we want to get the 380V line voltage output, we need to modify the P20.01/P20.02/P20.03 voltage regulator coefficient to 115.7, and at the same time, we need to increase the DC-bus voltage to 621.7V at least, so that we can achieve the same SVPWM control effect.

4.2.2 Application of voltage open loop control

4.2.2.1 System diagram

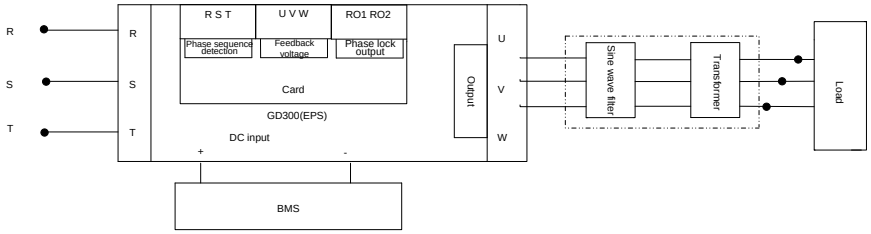


Figure 4.5 Diagram of voltage open loop control

4.2.2.2 Parameters of voltage open loop control

Function code	Name	Value	Remarks
P04.27	Selection of voltage setting channel	0	0: Keypad setting voltage, output voltage is depends on P04.28.
P04.28	Keypad setting voltage value	100%	100.0% corresponds to motor rated voltage.
P11.00	Phase loss protection	0x0011	LED ones: 1: Enable input phase loss protection LED tens: 1: Enable output phase loss protection LED hundreds: 0: Disable terminal board RST input signal phase loss (UIPL) protection

Function code	Name	Value	Remarks
			LED thousands: 0: Disable terminal board UVW output signal phase loss (UOPL) protection
P20.00	PWM selection	0	0: 3PH SVPWM 1: 3PH independent SPWM
P20.04	Output voltage display correction coefficient	100.0%	0.0–200.0% Output voltage display correction coefficient (three-phase)
P20.10	Voltage compensation gain	0	0–200 (invalid in voltage PID closed loop) Applied to open loop control: mainly in heavy-duty running, voltage compensation required

4.2.2.3 Debugging steps for open loop control

Step 1 Connect the circuit of the VFD according to Figure 4.5.

Step 2 Set function parameters according to the voltage control basic parameter table and the voltage open loop control application parameter table.

Step 3 If P20.00=1 (SPWM mode): Since the voltage utilization of SPWM is lower than that of SVPWM, just raising the DC-bus voltage is unable to increase the output voltage. If you want to get the 380V line voltage output, you need to modify the P20.01/P20.02/P20.03 voltage regulator coefficient to 115.7, and at the same time, you need to increase the DC-bus voltage to 621.7V at least, so as to achieve the same SVPWM control effect.

Step 4 Run the VFD to check whether the output voltage effective value (P23.03) reaches the set value. When suddenly loading, the output voltage value of standby power can be stabilized by setting the compensation gain of P20.10 appropriately.

4.3 Undisturbed variable/power frequency switching with reactor

4.3.1 System diagram

According to different control needs and field-site requirements, there are several wiring modes below, as shown in Figure 4.6 and Figure 4.7. Different applications and wiring modes lead to different control logic of contactors.

	RO1, RO2	Contactors of variable/power frequency
Undistributed variable/power switching with reactor (direct control)	Relay output directly controls the contactor.	Non interlocking

	RO1, RO2	Contactors of variable/power frequency
Variable frequency switch to power frequency (Undisturbed switching, indirect control, with reactor)Undistributed variable/power frequency switching with reactor (indirect control)	Relay output is directed to the PLC, which controls the contactor.	Non interlocking

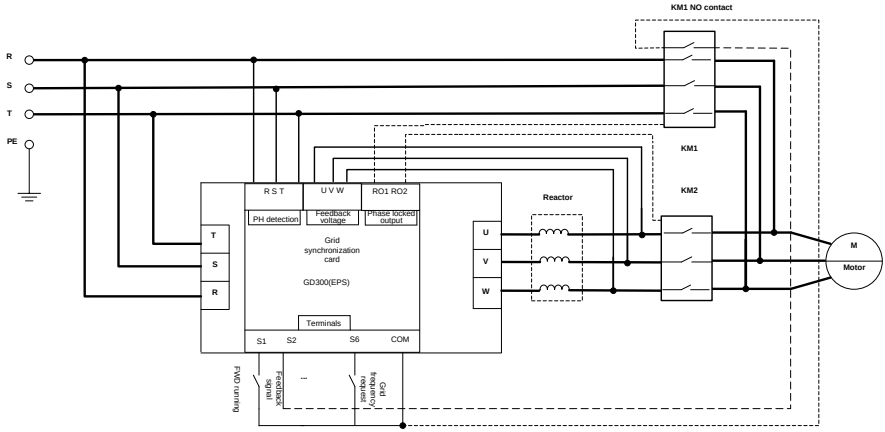


Figure 4.6 Undisturbed variable/power frequency switching with reactor (direct control)

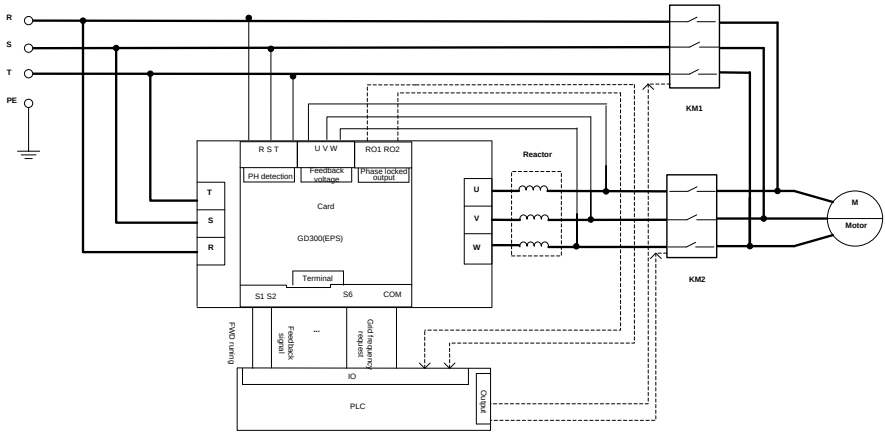


Figure 4.7 Undisturbed variable/power frequency switching with reactor (indirect control)

4.3.2 Debugging steps for basic functions

Step 1 According to the wiring request of no undisturbed switching, connect the circuit, ensure that the R, S, and T terminals on the terminal board correspond to the U, V, and W terminals of the VFD respectively (regardless of before or after switching), and connect and check the wiring according to the application needs.

Step 2 Set P00.18=1 to restore to factory settings.

Step 3 Set motor parameters in P02 group.

Step 4 Set P22.00=2 to select "Variable frequency switch to power frequency (Undisturbed switching)" mode.

Step 5 Start trial running.

4.3.3 Parameters of undisturbed variable/power frequency switching with reactor

Function code	Name	Value	Remarks
P00.00	Speed control mode	2	Only the V/F control mode is supported.
P00.01	Channel of running commands	0	Select the channel as required.
P00.11	ACC time 1	10	Adjust the value as required. Default value: 10
P00.14	Carrier frequency setting	6.0	The switch frequency cannot be too low when the reactor is configured. Otherwise, the output waveform is not sinusoidal enough.

Function code	Name	Value	Remarks
P00.16	AVR function selection	0	Disable the AVR function when the reactor is configured.
P01.00	DEC time 1	0	Direct frequency start
P01.08	Stop mode	1	Coast to stop
P05.01	S1 terminal selection	1	Terminal mode: Forward rotation
P05.02	S2 terminal selection	46	During the switching with reactor, the device coasts to stop after synchronous output, using the NO contact feedback signal of the power frequency contactor
P05.06	S6 terminal selection	44	44: Enable switching from variable frequency to power frequency
P06.03	RO1	29	29: Power frequency output 30: Variable frequency output
P06.04	RO2	30	
P06.12	RO2 On delay time	0.000	Set it as required if the variable frequency contactor is switched on with delay. It is 0 by default.
P06.13	RO2 Off delay time	0.000	Set it for switching with reactor if the variable frequency contactor is switched off with delay. It is 0 by default.
P08.41	Overmodulation selection	11	Enable the function when the reactor is configured.
P11.03	Overvoltage stall protection	0	Enable the function when the reactor is configured.
P11.05	Current limit action selection	0x01	Hardware overload alarm is valid when the reactor is configured.
P20.11	Output angle compensation value	0°	0.0° indicates automatic phase compensation (closed loop phase regulation); a value but not 0.0° indicates manual phase compensation.
P22.00	VFD working mode selection	2	2: Variable frequency switch to power frequency (Undisturbed switching)
P22.01	Power frequency synchronization mode	0x001	LED ones: 1: Power frequency synchronization mode LED tens: 0: Tracking fast mode (Phase sequence non-continuous) LED hundreds:

Function code	Name	Value	Remarks
			0: Acceleration to power frequency directly
P22.11	I/O inversion/phase lock failure detection protection	0x211	LED ones: 1: Terminal board RST (UIPE) input inversion enabled LED tens: 1: Terminal board UVW (UOPE) output inversion enabled LED hundreds: 2: Phase lock failure (PLLE) detection is valid all the time
P22.14	Software delay after power frequency request	8s	0–65535s It sets the software delay time.

4.3.4 Debugging instructions and precautions

(1) According to the parameters in the parameter table, check whether P23.00 phase lock frequency is normal. The direction of the VFD is determined by the positive and negative sequences of the phase lock frequency, P00.13=0 (prohibiting the modification of the default value 0).

(2) In the field debugging process, if the VFD terminal signal FWD/REV command is opposite with the actual FWD/REV direction, change the UVW phase sequence of the motor output line.

(3) Set P00.01=1, terminal control mode, only supporting forward rotation.

(4) Factory debugging steps: Before grid connection, you can simulate grid/variable frequency switching by setting P22.08=1 (test mode) and setting the corresponding power frequency P22.09 and grid voltage P22.10. At this time, RO output cannot directly be applied to the relay; otherwise, it may cause misoperation. In this mode, you can simulate the input grid to check the logic of the phase lock and relay output signals. Note that you must set P22.08=0at the actual grid/variable frequency switching; otherwise, the switching logic is not normal, which will cause damage of the motor.

Precautions:

- This working mode is valid only in V/F control.
- In actual field-site application, according to the field requirements, the power frequency contactor and variable frequency contactor choose whether electrical interlocking or not, to prevent the misoperation danger.
- During the actual use, you are recommended to perform the variable/power frequency switching

in this mode when the motor is empty loaded.

4.3.5 Timing sequence

Figure 4.8 shows the timing sequence diagram in which the VFD directly controls the contactor, which can be used as reference for you to control the contactor through the PLC. The figure shows the timing sequence when the grid phase sequence is forward, and the timing sequence is similar when the phase-locked grid phase sequence is reverse. Note that the given command is still forward running when the sequence is reverse.

Application conditions: If the application needs to be completely switched without disturbance, use the undisturbed switching with reactor mode. If frequency drop is small after the short-period coasting to stop since the load inertia is great, then use the undisturbed switching without reactor mode.

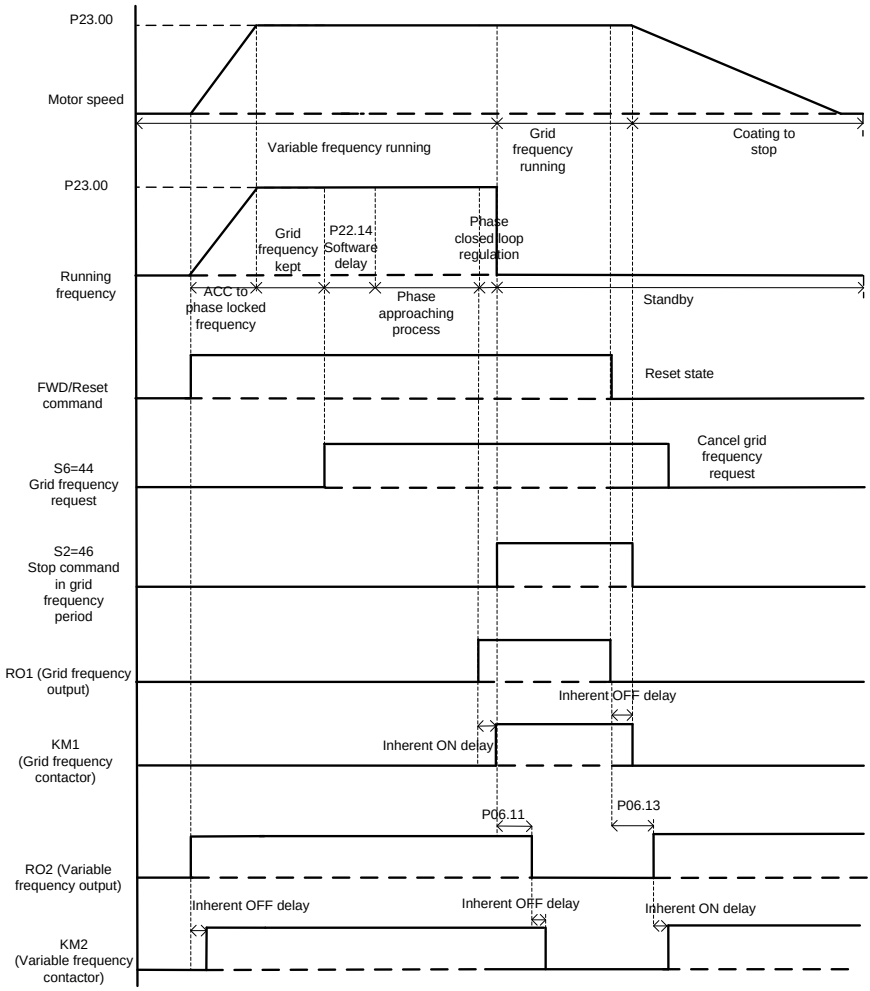


Figure 4.8 Undisturbed switching mode with reactor (non-interlocking of contactor)

4.4 Undisturbed variable/power frequency switching without reactor

If thoroughly undisturbed switching is required, the reactor is required; if frequency drop is small after the short-period coasting to stop since the load inertia is great, the reactor may not be required.

4.4.1 System diagram

According to different control needs and field-site requirements, there are several wiring modes, as shown in Figure 4.9 and Figure 4.10. Different applications and wiring modes lead to different control logic of contactors.

	RO1, RO2	Contactors of variable/power frequency
Undisturbed variable/power frequency switching without reactor (direct control)	Reactor output directly controls the contactor.	Interlocking
Undisturbed variable/power frequency switching without reactor (indirect control)	Reactor output goes to the PLC controller, and the PLC controller controls the contactor.	Interlocking

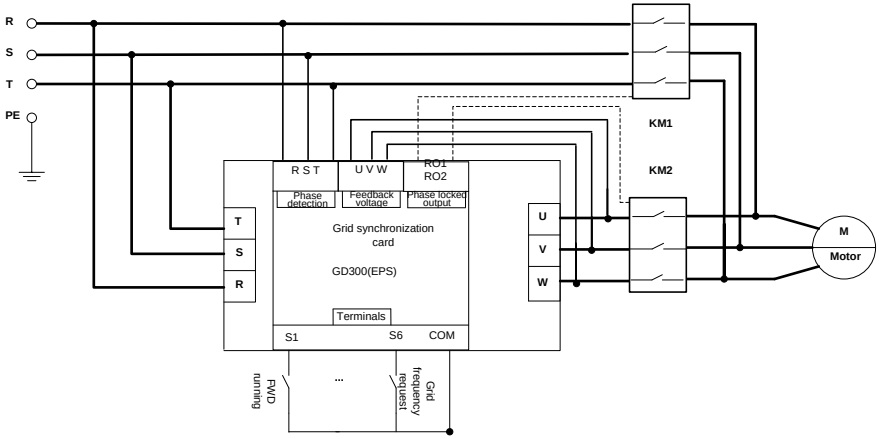


Figure 4.9 Undisturbed variable/power frequency switching without reactor (direct control)

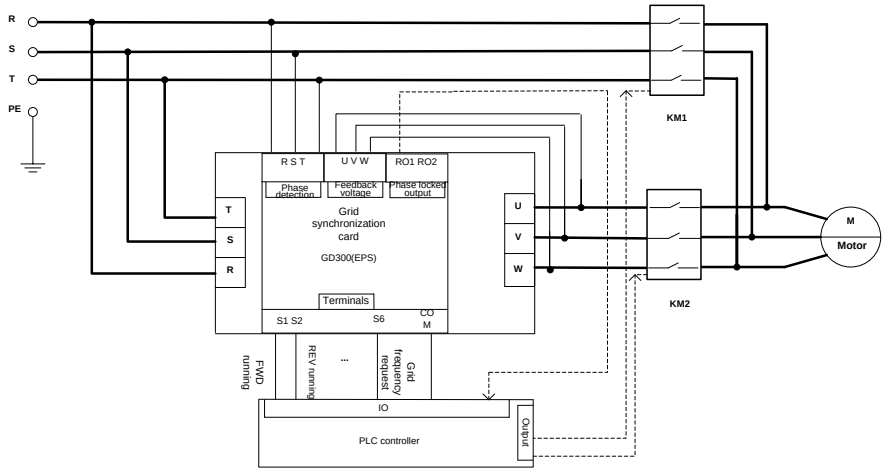


Figure 4.10 Undisturbed variable/power frequency switching without reactor (indirect control)

4.4.2 Debugging steps for basic functions

Step 1 According to the wiring requirement of undisturbed switching, connect the circuit, ensure that the RST terminals on the terminal block correspond to the UVW terminals of the VFD (regardless of before or after switching), and perform and check the wiring according to the application needs.

Step 2 Set P00.18=1.

Step 3 Set motor parameters in P2 group.

Step 4 Set P22.00=2.

Step 5 Start trial running.

4.4.3 Parameters of undisturbed variable/power frequency switching without reactor

Function code	Name	Value	Remarks
P00.00	Speed control mode	2	Only the V/F control mode is supported.
P00.01	Channel of running commands	0	Set it as required.
P00.11	ACC time 1	10	Adjust the time according to the actual load. It is 10 by default.
P01.00	DEC time 1	0	Direct frequency start
P01.08	Stop mode	1	Coasting to stop
P05.01	S1 terminal selection	1	Terminal mode: Forward rotation
P05.06	S6 terminal selection	44	44: Enable switching from variable frequency to power frequency

Function code	Name	Value	Remarks
P06.03	RO1 output	29	29: Power frequency output 30: Variable frequency output
P06.04	RO2 output	30	
P06.10	RO1 switching-on delay time	0.000	You must set it for switching without reactor if the power frequency contactor is switched on with delay. It is 0 by default.
P06.12	RO2 switching-on delay time	0.000	You can set it as required if the variable frequency contactor is switched on with delay. It is 0 by default.
P20.11	Output angle compensation value	0°	0.0° indicates automatic phase compensation (closed loop phase regulation); a value but not 0.0° indicates manual phase compensation.
P22.00	VFD working mode selection	2	2: Variable frequency switch to power frequency (Undisturbed switching)
P22.01	Power frequency synchronization mode	0x001	LED ones: 1: Power frequency synchronization mode; LED tens: 0: Tracking fast mode (Phase sequence non-continuous); LED hundreds: 0: Acceleration to power frequency directly
P22.11	I/O inversion/phase lock failure detection protection	0x211	LED ones: 1: Terminal board RST (UIPE) input inversion enabled LED tens: 1: Terminal board UVW (UOPE) output inversion enabled LED hundreds: 2: (PLLE) detection valid all the time.
P22.14	Software delay after power frequency request	8s	0–65535s It sets the software delay time.

4.4.4 Debugging instructions and precautions

(1) Set the parameters according to the undisturbed variable/power frequency switching parameter

table, and check whether the setting of P23.00 is normal. The running direction of the VFD is determined by the positive and negative sequences of the phase-locked frequency, P00.13=0, disallowing the modification on the default value 0.

(2) In the field debugging process, if the VFD terminal signal FWD/REV command is opposite with the actual FWD/REV direction, change the UVW phase sequence of the motor output line.

(3) Set P00.01 = 1, supporting only forward running.

Factory debugging steps: Before connecting to the grid, set P22.08=1 (test mode), P22.09 (power frequency) and P22.10 (grid voltage), which can simulate the variable/power frequency switching. At this time, RO output cannot be applied to the relay; otherwise, it will cause malfunction. In this mode, you can simulate the input power grid to check whether the phase lock and relay output signal logic is correct. Note that you must set P22.08=0 during the actual frequency switching; otherwise, the switching logic is not normal, causing damage to the motor.

Precautions:

- This working mode is valid only in V/F control.
- During actual use, choose whether to perform electrical interlocking for the power frequency contactor and variable frequency contactor according to the onsite application situation so as to avoid danger caused by malfunction.
- During the actual use, you are recommended to perform the variable/power frequency switching in this mode when the motor is empty loaded.

4.4.5 Timing sequence of undisturbed variable/power frequency switching without reactor

Figure 4.11 is the timing sequence diagram in which the VFD directly controls the contactor. You can refer to the diagram when PLC controls the contactor. The figure shows the timing sequence when the grid phase sequence is forward, and the timing sequence is similar when the phase-locked grid phase sequence is reverse. Note that the given command is still forward running when the sequence is reverse.

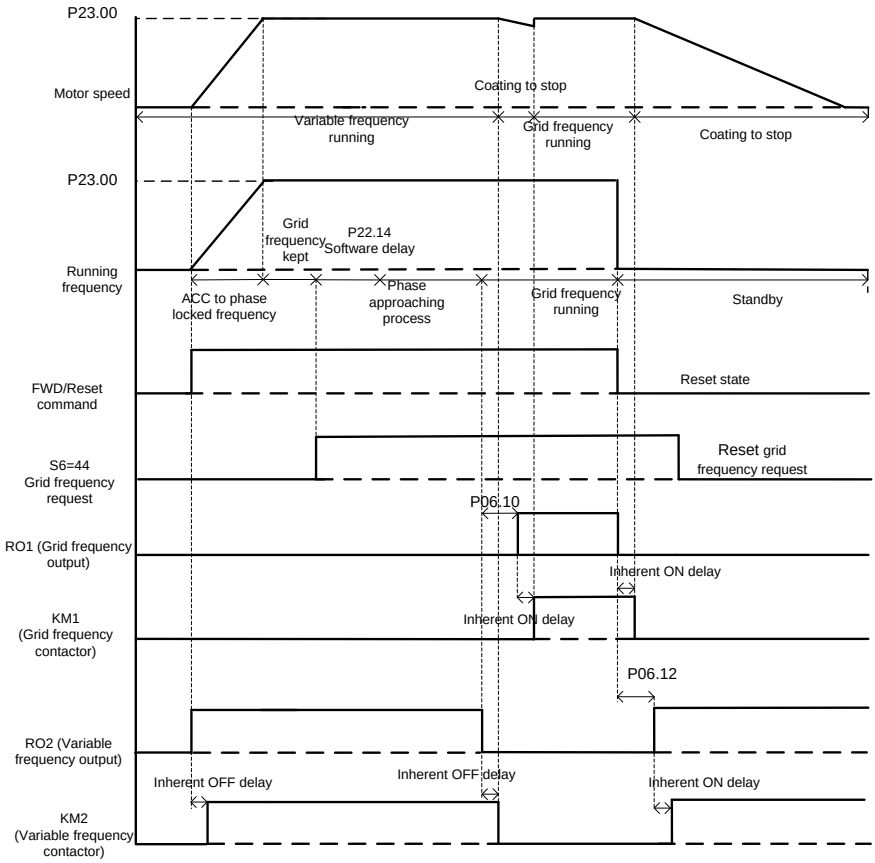


Figure 4.11 Undisturbed switching mode without reactor (contactor interlocking)

4.5 Disturbed variable/power frequency switching

4.5.1 System diagram

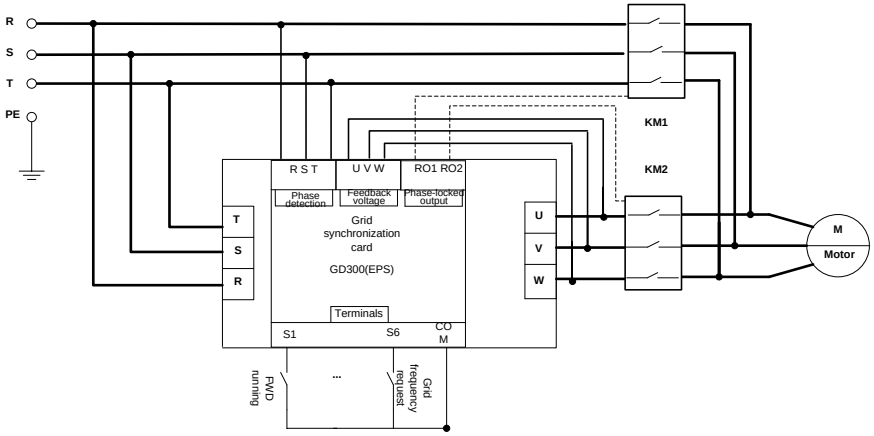


Figure 4.12 Disturbed switching diagram

4.5.2 Debugging steps for basic functions

Step 1 If the field function terminals are inconsistent with those shown in Figure 4.12, set P22.00 the application mode and then manually adjust the actual wiring input and output terminal function. In accordance with the disturbed switching topology wiring requirements, check the line, ensure that the RST terminals on the terminal block correspond to the UVW terminals of the VFD (regardless of before or after switching).

Step 2 Set P00.18=1 to restore factory settings. After setting parameters, check whether the setting of P23.00 is proper. The running direction of the VFD depends on the FWD/REV rotation reference. Set P00.13=0 (do not change the default value 0).

Step 3 Enter the motor nameplate parameters in P2 group.

Step 4 Set P22.00 = 3 the disturbed switching mode.

Step 5 Start trial running.

4.5.3 Parameters of disturbed variable/power frequency switching

Function code	Name	Default value	Description
P00.00	Speed control mode	1	For AMs, SVC mode 1 is recommended; for SMs, SVC mode 0 is recommended. **Note:**

Function code	Name	Default value	Description
			AM: Asynchronous motor SM: Synchronous motor AMs do not support SVC mode 0.
P00.01	Channel of running commands	0	The status cannot be reset during keyboard debugging, and power-off is, needed to reset the status. When the terminal mode is selected, if the FWD/REV rotation reference is 0, you can reset the status.
P00.11	ACC time 1	10	Adjust acceleration time according to the actual load. Default value: 10
P01.00	Start model	Set as required	0: Direct frequency start, P05.06=43 2: Speed tracking start, P05.06=44
P01.08	Stop model	1	Coast to stop
P05.01	S1 terminal function selection	1	FWD under terminal command channel model
P05.06	S6 terminal function selections	Set as required	Enable variable/power frequency switching. 43: Use auto switching during factory debugging 44: Use manual switching during factory debugging
P06.03	Relay RO1 output	29	29: power frequency output 30: variable frequency output
P06.04	Relay RO2 output	30	
P06.10	Relay RO1 switching-on delay time	0.000	Power frequency contactor switching-on delay
P11.00	Phase loss protection	0x0110	LED ones: 1: Enable input phase loss protection LED tens:

Function code	Name	Default value	Description
			1: Enable output phase loss protection LED hundreds: 0: Disable terminal block RST input signal phase loss (UIPL) protection LED thousands: 1: Enable terminal board UVW output signal phase loss (UOPL) protection
P22.00	VFD working mode selection	3	3: From variable frequency to power frequency (with disturbance switching)
P22.01	Power frequency synchronization mode	0x001	LED ones: 1: Power frequency synchronization mode
P22.02	Motor forward frequency adjustment	0.50Hz	Range: 0.00–10.00Hz
P22.03	Motor forward angle compensation value	10.0°	Range: 0.0–359.9°
P22.04	Motor reverse rotation adjustment frequency	0.50Hz	Range: 0.00–10.00Hz
P22.05	Motor reversal angle compensation value	10.0°	Range: 0.0–359.9°
P22.06	Work frequency switching contactor operating time	0.00s	Range: 0.00–2.00s
P22.07	Variable/power frequency switching contactor action time offset	0.00s	Range: 0.00–2.00s Slightly adjust the setting of P22.06.
P22.11	I/O inversion/phase lock failure detection protection	0x211	LED ones: 1: Terminal board RST input reverse (UIPE) protection allowed LED tens: 1: Terminal board UVW output in reverse order (UOPE)

Function code	Name	Default value	Description
			protection allowed LED hundreds: 2: Phase lock failure (PLLE) detection has been valid
P22.12	Learning time of stop at switching from variable frequency to power frequency	0.5s	0.5–10s

4.5.4 Debugging instructions and precautions

(1) After setting parameters, check whether the setting of P23.00 is proper. The running direction of the VFD depends on the FWD/REV rotation reference. If P23.00 is negative, set P00.13 = 1; otherwise, the UIPE fault is reported.

(2) D In the field debugging process, if the VFD terminal signal FWD/REV command is opposite with the actual FWD/REV direction, change the UVW phase sequence of the motor output line.

(3) During factory debugging, use automatic switching, and set the function of S6 to 43, which can learn P22.02, P22.03, P22.04, and P22.05; during actual operating, use manual switching and set the function of S6 to 44.

(4) Set P00.01 = 1, terminal control mode, only supporting forward rotation. The state is reset when the FWD/REV rotation reference is 0, and the next switching operation can be performed then.

(5) If the switching effect is not good, check the setting of P22.06. Adjust the setting of P22.06 with the consideration of the setting of P22.07. Go back to step 2. Repeat the operation until the required effect is reached.

Factory debugging steps: Before connecting to the grid, you can set P22.08 = 1 (test mode), and set the corresponding power frequency P22.09 and grid voltage P22.10, which can realize analog conversion. At this time, RO output cannot be applied to the relay; otherwise, the grid is directly accessed. In this mode, you can simulate the input power grid to check whether the phase lock and relay output signal logic is correct. Note that you must set P22.08=0 during the actual frequency switching; otherwise, the switching logic is not normal, causing damage to the motor.

Precautions:

- Vector control mode 0 is recommended for the grid/variable frequency switching for synchronous motors.
- During actual application, you need to perform electrical interlocking between the power frequency contactor and variable frequency contactor to prevent the risk of malfunction. If reset is

required after the power frequency is switched to the variable frequency, you are recommended to disconnect the power frequency contactor first, since the reset will cause VFD relay RO2 to pull in.

- Keep electrical self-locking as required after the close of RO1 lasts 0.5s.
- During the actual use, you are recommended to perform the variable/power frequency switching in this mode when the motor is empty loaded.

4.5.5 Timing sequence of disturbed variable/power frequency switching

The following shows the timing sequence when the grid phase sequence is forward, and the timing sequence is similar when the phase-locked grid phase sequence is reverse. Note that the given command is still forward running when the sequence is reverse. Note that the VFD does not output when the VFD is in the standby state and the forward rotation command is valid.

Since the reset state will cause the VFD contactor to close, it is recommended to disconnect the power frequency contactor and then reset it although there is electrical interlocking between the power frequency contactor and VFD contactor. Perform automatic switching (S = 43) during factory debugging and manual switching (S = 44) for actual running.

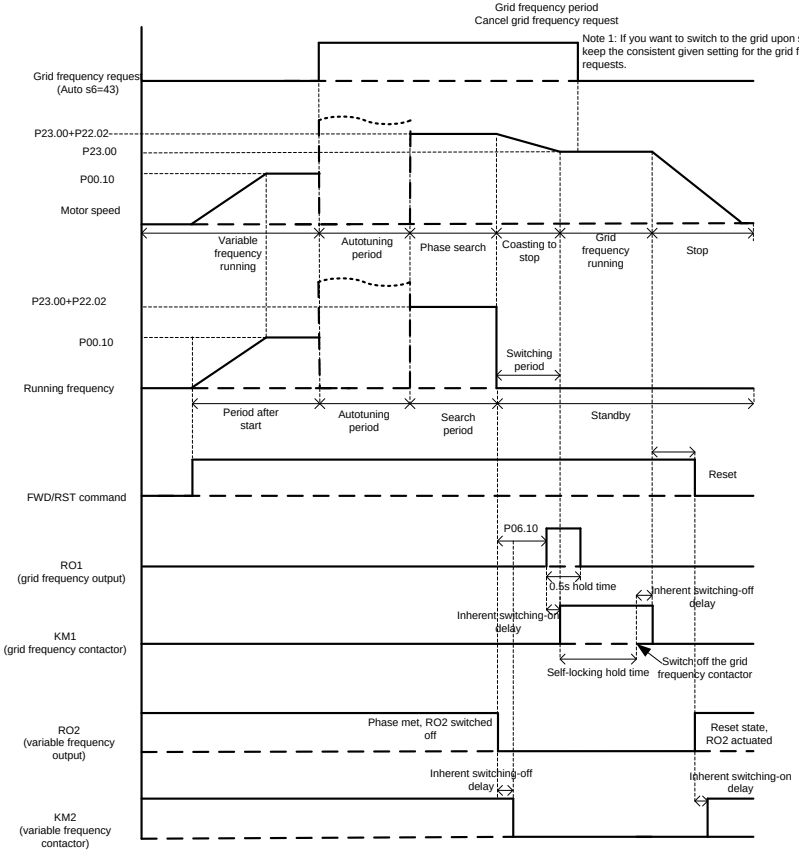


Figure 4.13 Automatic mode (variable frequency switched to power frequency)

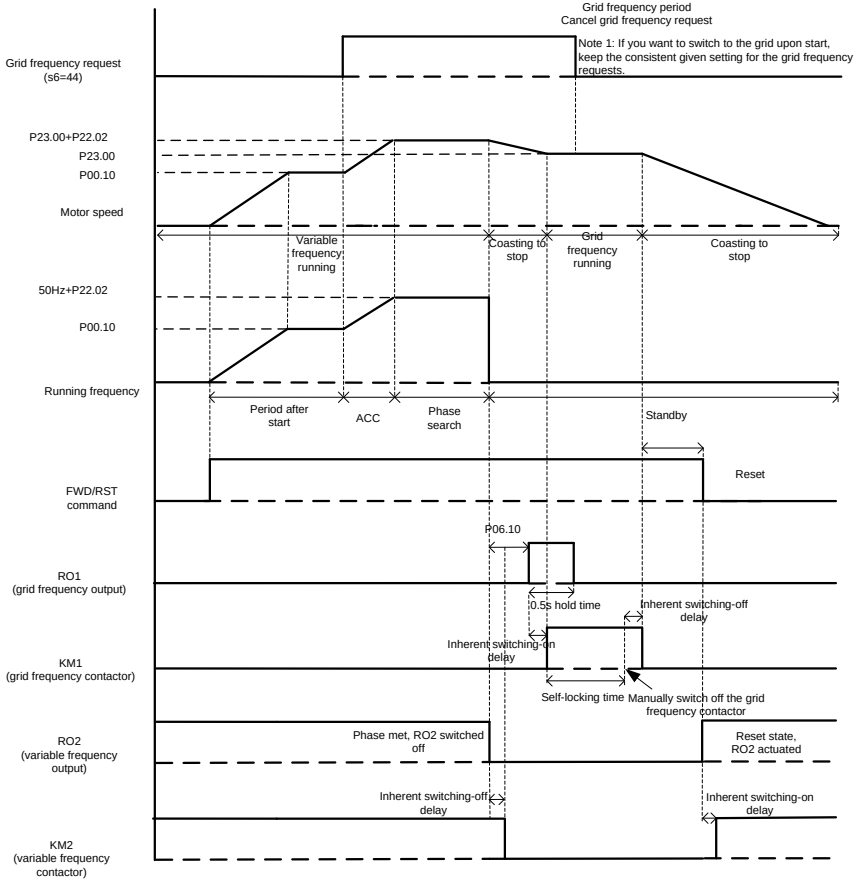


Figure 4.14 Manual mode (variable frequency switched to power frequency)

Notes:

The purpose of keeping RO1 power frequency output with a hold time of 0.5s is to allow the relay to maintain the output and the contactor to achieve self-locking state.

4.6 Comparing disturbed switching and undisturbed switching

Variable/power frequency switching mode	Advantage	Disadvantage
Disturbed switching	1. Clear logic 2. Low application cost	1. Many software control modules, complex control and debugging 2. Unstable switching effect, large inrush current 3. Narrow application scope
Undisturbed switching	1. Stable switching effect, without inrush current on the motor 2. Easy to control and debug the VFD 3. Wide application scope	1. Complex PLC control logic 2. High cost (with the need to mount the filter externally)

4.7 Grid/variable frequency switching application to escalators

4.7.1 System diagram

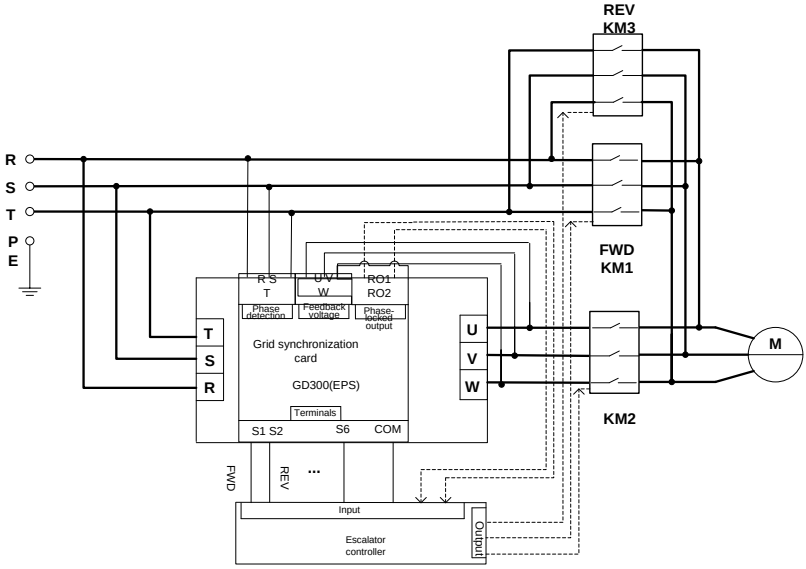


Figure 4.15 Escalator controller contactor system diagram

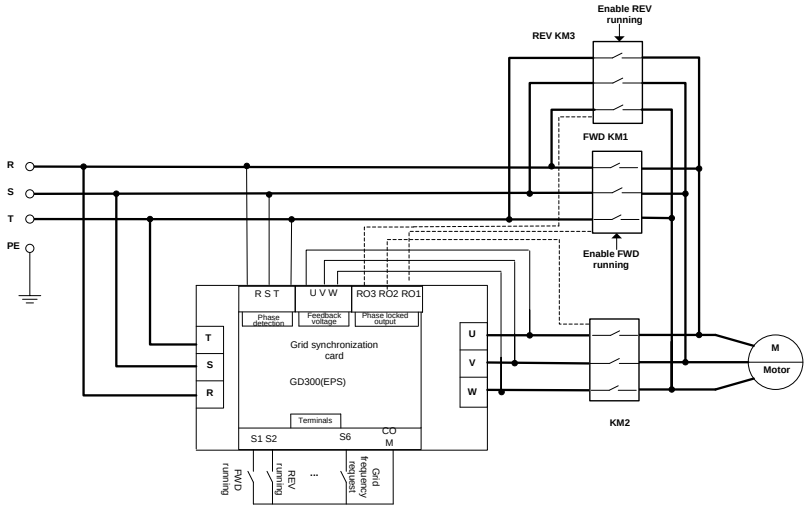


Figure 4.16 VFD control contactor system diagram

Note:

- The following debugging steps are in accordance with Figure 4-15 wiring preparation.
- Forward and reverse continuous debugging, the need for frequency contactor KM1, KM3 interlock operation, or need other protective measures to prevent KM1 and KM3 closed at the same time, KM1 and KM3 respectively KM2 interlock operation.

4.7.2 Debugging steps for basic functions

Step 1 Connect the circuit properly and ensure that the RST terminals on the terminal block correspond to the UVW terminals of the VFD (regardless of before or after switching).

Step 2 Set P00.18 = 1 to restore factory settings.

Step 3 Enter the motor nameplate parameters in P2 group, run the motor and test the normal situation speed tracking is normal.

Step 4 Set P22.00 = 4 to select the escalator frequency switching mode, and then start trial running.

4.7.3 Parameters of variable/power frequency switching application to escalators

Function code	Name	Value	Description
P00.00	Speed control mode	1	For AMs, SVC mode 1 is recommended; for SMs, SVC mode 0 is recommended. **Note:**

Function code	Name	Value	Description
			AM: Asynchronous motor SM: Synchronous motor AMs do not support SVC mode 0.
P00.01	Running command channel	1	Keyboard debugging cannot reset the state, need power-down reset state; Select the terminal mode, when forward and reverse given as 0, you can reset the state;
P00.06	Setting channel of A frequency command	6	Multi–step speed running setting: Low-speed running and power frequency operation
P00.11	ACC time 1	10	According to the actual load adjustment acceleration time;
P01.00	Start model	Set as required	0: Direct frequency start, P05.06=43 2: Speed tracking start, P05.06=44
P00.13	Running direction	0	Set it to 0 when the phase sequence of the phase-locked frequency is positive, and set it to 1 when the phase-locked phase is negative. It is recommended to debug when the phase-locked frequency is in positive sequence, without setting this parameter.
P01.08	Stop mode	1	Coast stops
P05.01	S1 terminal function selection	1	Forward rotation operation
P05.02	S2 terminal function selection	2	Reverse rotation operation
P05.06	S6 terminal function selection	Set as required	43: (Learning mode) Variable/power frequency switching enabled 44: (Non-learning) Variable/power

Function code	Name	Value	Description
			frequency switching enabled
P05.04	S4 terminal function selection	16	Multi-step speed terminal 1
P06.03	Relay RO1 output	29	29: Power frequency output 30: Variable frequency output 33: Power frequency output (REV)
P06.04	Relay RO2 output	30	
P06.01	Relay RO3 output	33	
P06.10	Relay RO1 On delay time	0.050	Power frequency contactor switching-on delay time
P06.06	Relay RO3 open delay time	0.050	Power frequency contactor switching-on delay time
P10.02	Multi-step speed 0	20%	Low speed running when the escalator has no load. Set as required.
P10.04	Multi-step speed 1	100%	High speed running when the escalator has load. Set as required.
P22.00	VFD working mode selection	4	4: Variable/power frequency switching application to escalator
P22.01	Power frequency synchronization mode	0x001	LED ones place: 1: Power frequency synchronization mode
P22.02	Motor forward frequency adjustment	0.50Hz	Range: 0.00–10.00Hz
P22.03	Motor forward angle compensation value	10.0°	Range: -180–+180°
P22.04	Motor reverse rotation adjustment frequency	0.50Hz	Range: 0.00–10.00Hz
P22.05	Motor reverse rotation angle compensation	10.0°	Range: -180–+180°
P22.06	Switching contactor	0.00s	Range: 0.00–2.00s

Function code	Name	Value	Description
	operating time		
P22.07	Variable/power frequency switching contactor action time offset	0.00s	Range: 0.00–2.00s Slightly adjust the setting of P22.06.
P22.11	I/O inversion/phase lock failure detection protection	0x211	LED ones: 1: Terminal board RST input reverse order (UIPE) protection allowed LED tens: 1: Terminal board UVW output reverse order (UOPE) protection allowed LED hundreds: 2: PLLE detection is always valid

4.7.4 Debugging instructions and precautions

(1) After setting parameters, check whether the setting of P23.00 is proper. The running direction of the VFD depends on the FWD/REV rotation reference. If P23.00 is negative, set P00.13 = 1; otherwise, the UIPE fault is reported.

(2) In the field debugging process, if the VFD terminal signal FWD/REV command is opposite with the actual FWD/REV direction, change the UVW phase sequence of the motor output line.

(3) During factory debugging, use automatic switching, and set the function of S6 to 43, which can learn P22.02, P22.03, P22.04, and P22.05; during actual operating, use manual switching and set the function of S6 to 44.

(4) Set P00.01 = 1, terminal control mode, only supporting forward rotation. The state is reset when the FWD/REV rotation reference is 0, and the next switching operation can be performed then.

(5) If the switching effect is not good, check the setting of P22.06. Adjust the setting of P22.06 with the consideration of the setting of P22.07. Go back to step 2. Repeat the operation until the required effect is reached.

(6) Factory debugging steps: Before the grid power is disconnected, set the P22.08 = 1 (test mode), and set the corresponding power frequency P22.09 and grid voltage P22.10 to realize the analog switching logic, and the RO output should not be applied to the relay, Otherwise the motor cuts into the grid directly. In this mode, you can simulate the input power grid to check whether the phase lock and relay output signal logic is correct. Note that you must set P22.08=0 during the actual frequency switching; otherwise, the switching logic is not normal, causing damage to the motor.

4.7.5 Timing sequence of grid/variable frequency switching application to escalators

Escalator switch timing diagram application conditions are that the VFD contactor is controlled by the

escalator controller; if the power frequency contactor has electrical self-locking, you must first disconnect the power frequency contactor and then reset. Perform automatic switching (S = 43) during factory debugging and manual switching (S = 44) for actual running.

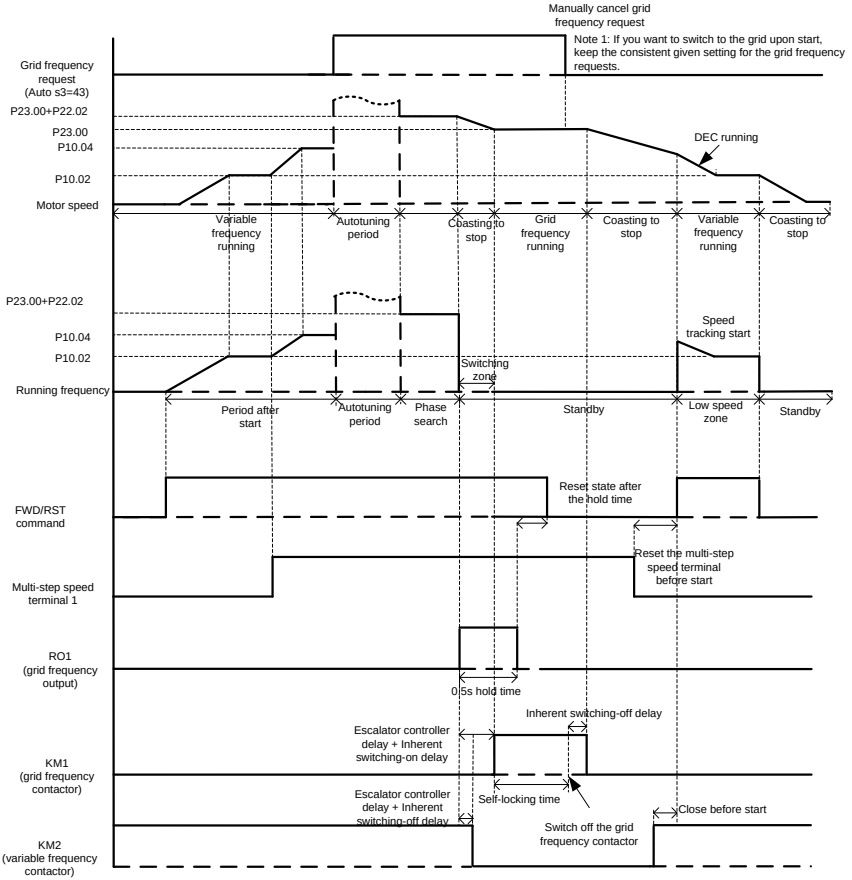


Figure 4.17 Indirect control of grid/variable frequency switching application to elevators (automatic mode)

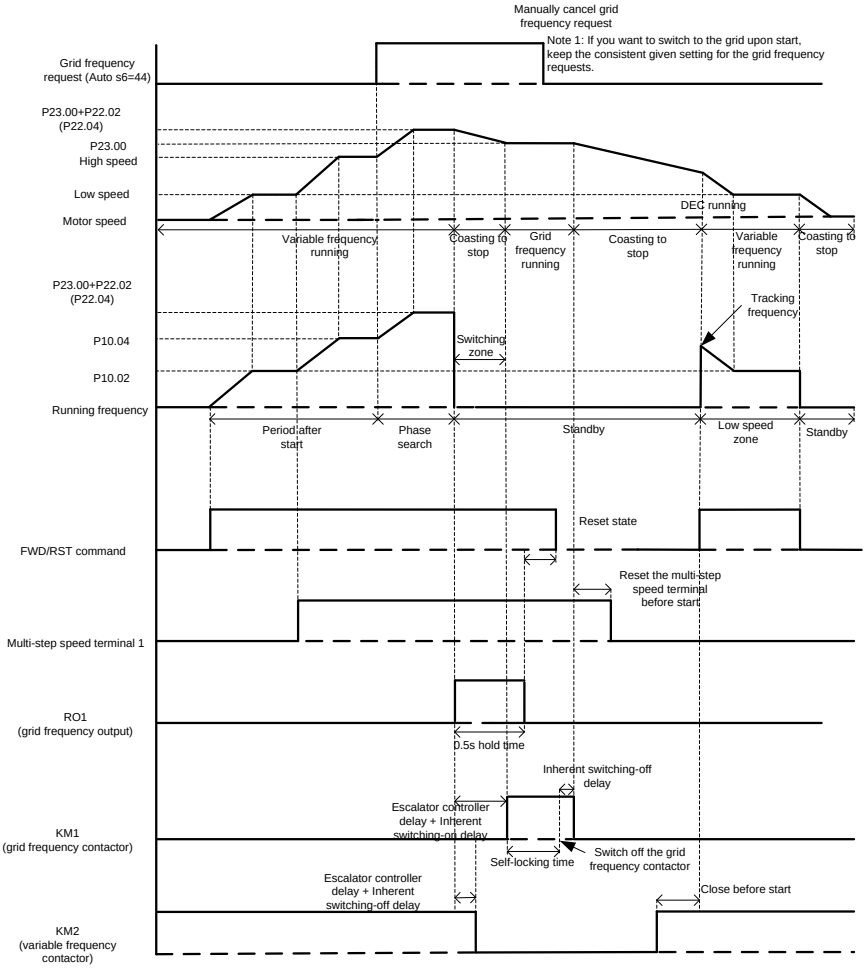


Figure 4.18 Indirect control of grid/variable frequency switching application to elevators (manual mode)

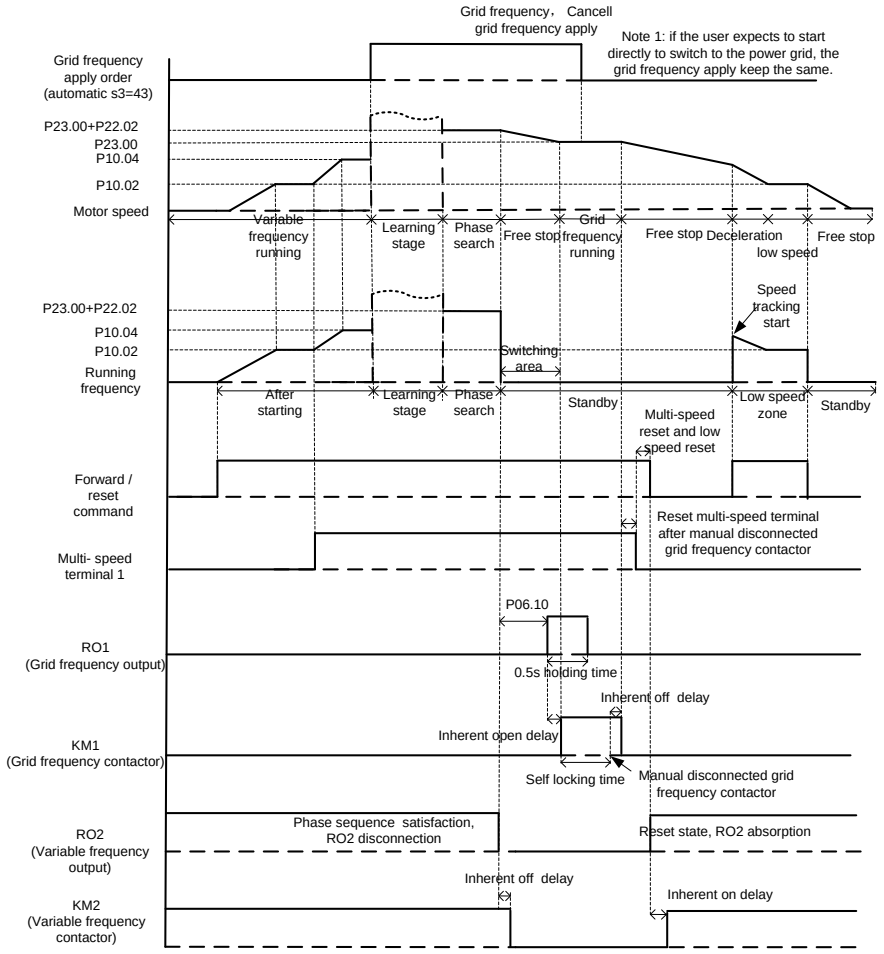


Figure 4.19 Direct control of grid/variable frequency switching application to elevators (automatic mode)

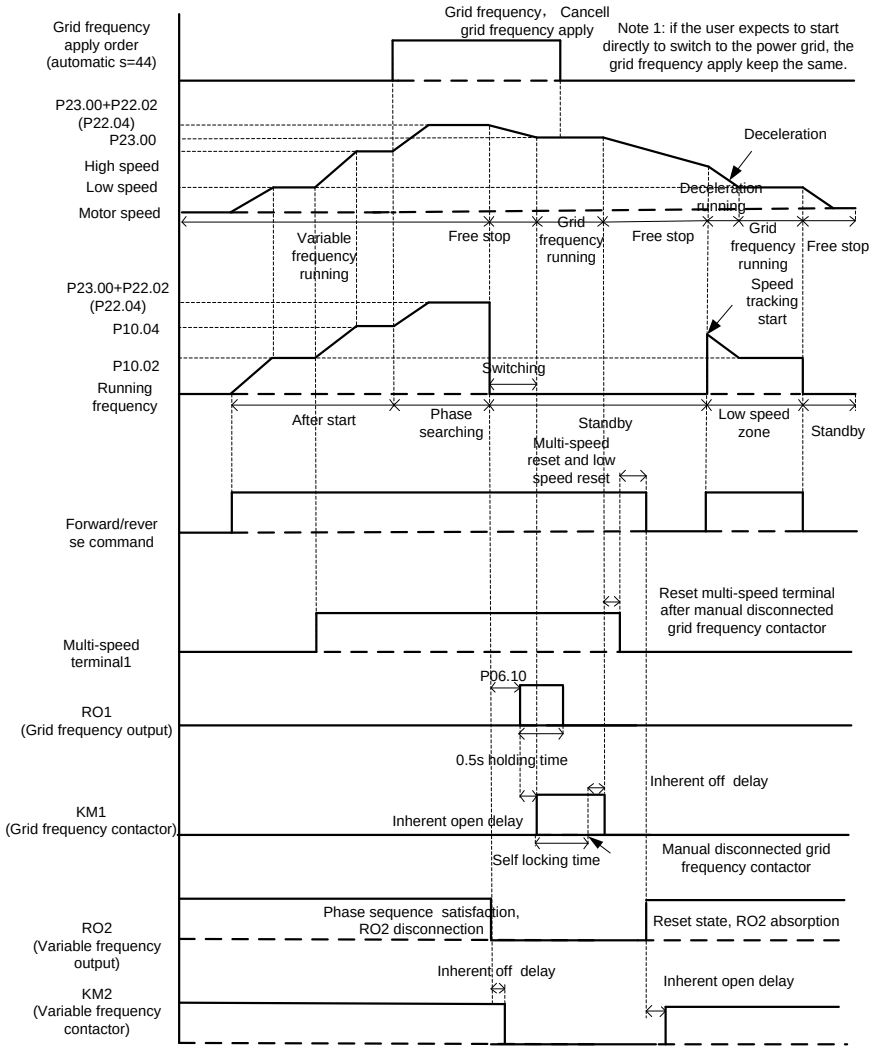


Figure 4.20 Direct control of grid/variable frequency switching application to elevators (manual mode)

4.8 Debugging steps for initial pole detection

In the application where the synchronous motor is automatically started, the motor may not be allowed to run reversely during the start and switching processes due to certain special technique requirements. The problem can be resolved by enabling the initial pole detection function.

Function code	Name	Setting	Remarks
P13.01	Initial pole detection mode	2	2: Pulse cascading
P13.06	High frequency superimposed voltage	100.0	0.0–300.0% of the motor rated current
P13.10	Angle compensation	0.0	0–359.9°, deviation angle compensation value
P17.29	Synchronous motor magnetic pole angle	0	0.0–360.0, displaying the detected initial pole position

Debugging steps:

Step 1 Enable initial pole detection. Set P13.01 = 2 and P13.06 = 40.

Step 2 Set P00.10 = 0. Perform the start and stop operations for multiple times, and check the displayed value of P17.29.

Step 3 If P17.29 fluctuation range is within 30°, the initial pole detection function is normal. If P17.29 fluctuation range exceeds 30°, properly increase the value of P13.06, and repeat Step 2.

Step 4 If P17.29 fluctuation range exceeds 30° although the value of P13.06 is creased, and the fault is reported if you continuously increase the value of P13.06, initial pole autotuning is considered incorrect, and the initial pole detection function does not meet the requirement.

Step 5 If Step 3 verifies that the initial pole detection function is normal, set P00.10 = 10Hz (greater than 0, for start testing), and perform the start and stop operations (note that you can perform the stop operation only after the motor shaft rotates and you can perform the restart operation only after the motor stops thoroughly.)

Step 6 If the motor is started only after the motor reversely rotates to a certain angle although the motor start command is given, set P13.10 by estimating the reverse angle. Repeat Step 5 until no reverse rotation occurs during motor start.

5 Fault handling

Do as follows after the VFD has a fault:

1. Ensure that the keypad works properly. If not, please contact the local INVT office.

2. If the keypad works properly, check P07 and check fault recording parameters to find out the real state when the fault occurs.

3. See the following table for detailed solutions and check the corresponding abnormal state.

4. Eliminate the fault and ask for relative help.

5. After the fault is rectified, carry out fault reset and run the VFD.

Fault code	Fault type	Possible cause	Solutions
OUt1	IGBT Ph-U fault	● The acceleration is too fast. ● IGBT module fault. ● Misaction caused by interference. ● The connection of the driving wires is not good. ● Grounding is not properly.	● Increase Acc time. ● Change the power unit. ● Check the driving wires. ● Inspect external equipment and eliminate interference.
OUt2	IGBT Ph-V fault		
OUt3	IGBT Ph-W fault		
OV1	Over-voltage when acceleration	● The input voltage is abnormal. ● There is large energy feedback.	● Check the input power. ● Check if the DEC time of the load is too short or the VFD starts during the rotation of the motor or it needs to increase the energy consumption components.
OV2	Over-voltage when deceleration		
OV3	Over-voltage when constant speed running		
OC1	Over-current when acceleration	● The acceleration or deceleration is too fast. ● The voltage of the grid is too low.	● Increase the ACC time. ● Check the input power. ● Select the VFD with a larger power.
OC2	Over-current when deceleration		

Fault code	Fault type	Possible cause	Solutions
OC3	Over-current when constant speed running	● The power of the VFD is too low. ● The load transients or is abnormal. ● The grounding is short circuited or the output is phase loss. ● There is strong external interference.	● Check if the load is short circuited (the grounding short circuited or the wire short circuited) or the rotation is not smooth. ● Check the output configuration. ● Check if there is strong interference.
Uv	DC bus Undervoltage	The voltage of the power supply is too low.	Check the input power of the supply line.
OL1	Motor overload	● The voltage of the power supply is too low. ● The motor setting rated current is incorrect. ● The motor stall or load transients is too strong.	● Check the power of the supply line. ● Reset the rated current of the motor. ● Check the load and adjust the torque lift.
OL2	VFD overload	● The acceleration is too fast. ● Reset the rotating motor. ● The voltage of the power supply is too low. ● The load is too heavy. ● Close loop vector control, reverse direction of the code panel and long low-speed operation.	● Increase the ACC time. ● Avoid the restarting after stopping. ● Check the power of the supply line. ● Select an VFD with bigger power. ● Select a proper motor.
SPI	Input phase loss	Phase loss or great fluctuation at input sides R, S, and T.	● Check input power. ● Check installation distribution.

Fault code	Fault type	Possible cause	Solutions
SPO	Output phase loss	U/V/W phase loss output (or serious asymmetrical loads in three phases)	● Check the output distribution. ● Check the motor and cable.
OH1	Rectifier overheat	● Air duct jam or fan damage ● Ambient temperature is too high. ● The time of overload running is too long.	● Redistribute. ● Dredge the wind channel or change the fan. ● Lower the ambient temperature.
OH2	IGBT overheat		
EF	External fault	SI external fault input terminals action.	Check the external device input.
CE	Communication error	● The baud rate setting is incorrect. ● Fault occurs to the communication wiring. ● The communication address is wrong. ● There is strong interference to the communication.	● Set proper baud rate. ● Check the communication connection distribution. ● Set proper communication address. ● Change or replace the connection distribution or improve the anti-interference capability.
ItE	Current detection fault	● The connection of the control board is not good. ● Hall components is broken. ● The modifying circuit is abnormal.	● Check the connector and plug wire again. ● Change the Hall. ● Change the main control panel.
tE	Autotuning fault	● The motor capacity does not comply with the VFD capability. ● The rated parameter of	● Change the VFD model. ● Set the rated parameter according to the motor name plate.

Fault code	Fault type	Possible cause	Solutions
		the motor does not set correctly. ● The offset between the parameters from autotune and the standard parameter is huge. ● Autotune overtime.	● Empty the motor load. ● Check the motor connection and set the parameter. ● Check if the upper limit frequency is above 2/3 of the rated frequency.
EEP	EEPROM fault	● Error of controlling the write and read of the parameters. ● Damage to EEPROM.	● Press STOP/RST to reset. ● Change the main control panel.
bCE	Braking unit fault	● Braking circuit fault or damage to the braking pipes. ● The external braking resistor is not sufficient.	● Check the braking unit and, change new braking pipe. ● Increase the braking resistor.
END	Time reach of factory setting	The actual running time of the VFD is above the internal setting running time.	Ask for the supplier and adjust the setting running time.
OL3	Electrical overload	The VFD will report overload pre-alarm according to the set value.	Check the load and the overload pre-alarm point.
PCE	Keypad communication error	● Keypad in poor connection or offline. ● The keypad cable is too long and there is strong interference. ● Part of the communication circuits of the keypad or main board have fault.	● Check the keypad cable and ensure it is normal. ● Check the environment and eliminate the interference source. ● Change hardware and ask for maintenance service.

Fault code	Fault type	Possible cause	Solutions
UPE	Parameter upload error	● The keypad is not in good connection or offline. ● The keypad cable is too long and there is strong interference. ● Part of the communication circuits of the keypad or main board have fault.	● Check the environment and eliminate the interference source. ● Change hardware and ask for maintenance service. ● Change hardware and ask for maintenance service.
dnE	Parameter download error	● The keypad is not in good connection or offline. ● The keypad cable is too long and there is strong interference. ● Data storage error in keypad.	● Check the environment and eliminate the interference source. ● Change hardware and ask for maintenance service. ● Backup data in the keypad again.
EtH1	Grounding shortcut fault 1	● The output of the VFD is short circuited with the ground. ● There is fault in the current detection circuit. ● There is a great difference between the actual motor power setting and the VFD power.	● Check if the connection of the motor is normal or not. ● Change the hall. ● Change the main control panel. ● Reset motor parameters and ensure those parameters are correct.
EtH2	Grounding shortcut fault 2		
dEu	Velocity deviation fault (V/F mode)	● The load is too heavy or stalled. ● VFD into the current limit state.	● Check the load and ensure it is normal. Increase the detection time (P11.15). ● Check whether there is a difference between the ramp

Fault code	Fault type	Possible cause	Solutions
			frequency and the output frequency. ● Check whether the control parameters are normal.
Sto	Maladjustment fault	● The control parameters of the synchronous motors not set properly. ● The VFD is not connected to the motor.	● Check whether the control parameter is set properly or not. ● Increase the maladjustment detection time .
LL	Electronic underload fault	The VFD will report the underload pre-alarm according to the set value.	Check the load and the underload pre-alarm point.
PLLE	Lock phase failure fault	If the deviation of the locked frequency and the power power frequency exceeds 2Hz after 250ms, or the power grid suddenly loses power and cannot run, then the PLLE fault is reported.	Check whether the terminal RST wiring is normal and whether it is on power.
UIPE	Terminal RST input reverse sequence	When the phase-locked frequency (P23.00) and the wave frequency are opposite, it reports UIPE fault.	Check whether the terminal RST three-phase input wiring is normal, and whether keyboard display forward and backward directions (directional light) and phase-locked frequency (P23.00) is consistent.
UOPE	Terminal UVW input reverse sequence	When the output frequency (P23.02) and the phase-locked loop locked frequency (P23.00) are opposite, it reports reverse sequence. And the effective value of the output voltage	Please re-check whether the phase sequence of the feedback voltage UVW phase detection signal is correct.

Fault code	Fault type	Possible cause	Solutions
		exceeds 0.25 times the rated voltage, it reports UOPE fault.	
UIPL	Terminal RST input phase loss	In the non-fault state, the RST input voltage of terminal board is unbalanced.	Check whether the terminal board RST is powered on and the wiring is normal.
UOPL	Terminal UVW output phase loss	In mode 1/2, the UVW output voltage of terminal board is unbalanced after non-fault status and synchronization are successful.	Check whether the terminal board UVW is powered on and the wiring is normal.

Appendix A Function parameters

For the convenience of function codes setting, the function group number corresponds to the first level menu, the function code corresponds to the second level menu and the function code corresponds to the third level menu when the keypad is used for operating.

Below is the instruction of the function lists:

The first column "Function code": Code of the function group and parameter

The second column "Name": Full name of the function parameter

The third column "Description": Detailed description of the function parameter

The fourth column "Default value": Initial value set in factory

The fifth column "Modify": Whether the function parameter can be modified, and conditions for the modification

"○" indicates that the value of the parameter can be modified when the VFD is in stopped or running state.

"◎" indicates that the value of the parameter cannot be modified when the VFD is in running state.

"●" indicates that the value of the parameter is detected and recorded, and cannot be modified.

(The VFD automatically checks and constrains the modification of parameters, which helps prevent incorrect modifications.)

P00 group—Basic functions

Function code	Name	Description	Default value	Modify
P00.00	Speed control mode	0: Sensorless vector control (SVC) mode 0 (applicable to AMs and SMs) 1: SVC mode 1 (applicable to AMs) 2: V/F control 3: PMSM V/F control **Note:** AM: Asynchronous motor SM: Synchronous motor; Before using a vector control mode, enable the VFD to perform motor parameter autotuning first.	2	◎
P00.01	Running command channel	0: Keypad ("LOCAL/REMOT" off) 1: Terminal ("LOCAL/REMOT" blinking) 2: Communication ("LOCAL/REMOT" on)	0	○

Function code	Name	Description	Default value	Modify
P00.02	Communication mode of running commands	0: Modbus 1: PROFIBUS/CANopen 2: Ethernet 3: CAN **Note:** The options 1, 2, and 3 are add-on functions, which are available only when corresponding expansion cards are configured.	0	○
P00.03	Max. output frequency	P00.04–600.00Hz (400.00Hz)	60.00Hz	◎
P00.04	Upper limit of the running frequency	P00.05–P00.03 (Maximum frequency)	60.00Hz	◎
P00.05	Lower limit of the running frequency	0.00Hz–P00.04 (Upper limit of the running frequency)	0.00Hz	◎
P00.06	Setting channel of A frequency command	0: Keypad data setting 1: Analog AI1 setting 2–4: Reserved 5: Simple PLC program setting 6: Multi-step speed running setting 7: PID control setting 8: Modbus communication setting 9: PROFIBUS/CANopen communication setting 10: Ethernet communication setting 11: Reserved	0	○
P00.07	Setting channel of B frequency command	0: Keypad data setting 1: Analog AI1 setting 2–4: Reserved 5: Simple PLC program setting 6: Multi-step speed running setting 7: PID control setting 8: Modbus communication setting 9: PROFIBUS/CANopen communication setting 10: Ethernet communication setting 11: Reserved	2	○

Function code	Name	Description	Default value	Modify
P00.08	B frequency command reference selection	0: Maximum output frequency 1: A frequency command	0	○
P00.09	Combination of the setting source	0: A 1: B 2: (A+B) combination 3: (A-B) combination 4: Max (A, B) combination 5: Min (A, B) combination	0	○
P00.10	Frequency set through keypad	0.00 Hz–P00.03 (Maximum frequency)	50.00Hz	○
P00.11	ACC time 1	0.0–3600.0s	Depends on model	○
P00.12	DEC time 1	0.0–3600.0s	Depends on model	○
P00.13	Running direction selection	0: Run at the default direction 1: Run at the opposite direction 2: Forbid to run in reverse direction	0	○
P00.14	Carrier frequency setting	1.0–15.0kHz	Depends on model	○
P00.15	Motor parameter autotuning	0: No operation 1: Rotation autotuning 2: Static autotuning 1 (autotune totally) 3: Static autotuning 2 (autotune part parameters)	0	◎
P00.16	AVR function selection	0: Invalid 1: Valid during the whole procedure	1	○
P00.17	VFD type	0: G type 1: P type	0	◎
P00.18	Function parameter restore	0: No operation 1: Restore the default value 2: Clear fault records	0	◎

P01 group—Start and stop control

Function code	Name	Description	Default value	Modify
P01.00	Start mode	0: Star directly 1: Start after DC braking 2: Start after speed tracking 1 3: Start after speed tracking 2 (without electromagnetic excitation)	0	◎
P01.01	Starting frequency of direct start	0.00–50.00Hz	0.50Hz	◎
P01.02	Starting frequency hold time	0.0–50.0s	0.0s	◎
P01.03	Braking current before start	0.0–100.0% (VFD rated current)	0.0%	◎
P01.04	Braking time before start	0.00–50.00s	0.00s	◎
P01.05	ACC/DEC selection	0: Linear type 1: S curve	0	◎
P01.06	ACC time of the starting step of S curve	0.0–50.0% (ACC, DEC time)	30.0%	◎
P01.07	DEC time of the ending step of S curve	0.0–50.0% (ACC, DEC time)	30.0%	◎
P01.08	Stop selection	0: Decelerate to stop 1: Coast to stop	0	○
P01.09	Starting frequency of DC braking while stop	0.00–P00.03 (maximum frequency)	0.00Hz	○
P01.10	Waiting time before DC braking while stop	0.00–50.00s	0.00s	○

Function code	Name	Description	Default value	Modify
P01.11	DC braking current while stop	0.0–100.0% (VFD rated current)	0.0%	○
P01.12	DC braking time while stop	0.00–50.00s	0.00s	○
P01.13	Dead time of FWD/REV rotation	0.0–3600.0s	0.0s	○
P01.14	Switching between FWD/REV rotation	0: Switch after zero frequency 1: Switch after the starting frequency 2: Switch after the speed reach P01.15 and delay for P01.24	0	◎
P01.15	Stop speed	0.00–100.00Hz	0.50 Hz	◎
P01.16	Detection of stop speed	0: Detect at the setting speed (no stop delay) 1: Detect at the feedback speed (only valid for vector control)	1	◎
P01.17	Detection time of the feedback speed	0.00–100.00s (only when P01.16=1,it is valid)	0.50s	◎
P01.18	Terminal-based running command protection at power-on	0: The terminal running command is invalid at power-on. 1: The terminal running command is valid at power-on.	0	○
P01.19	Action selected when running frequency less than frequency lower limit (valid when frequency lower limit greater than 0)	0: Run at the frequency lower limit 1: Stop 2: Sleep	0	◎
P01.20	Wake-up-from-sleep delay	0.0–3600.0s (valid only when P01.15=2)	0.0s	○

Function code	Name	Description	Default value	Modify
P01.21	Power-off restart selection	0: Disable 1: Enable	0	○
P01.22	Wait time for restart after power-off	0.0–3600.0s (valid only when P01.17=1)	1.0s	○
P01.23	Start delay	0.0–60.0s	0.0s	○
P01.24	Stop speed delay	0.0–100.0 s	0.0s	○
P01.25	0Hz output selection	0: Output without voltage 1: Output with voltage 2: Output with the DC braking current for stop	0	○

P02 group—Motor 1

Function code	Name	Description	Default value	Modify
P02.00	Type of motor 1	0: Asynchronous motor (AM) 1: Synchronous motor (SM)	0	◎
P02.01	Rated power of AM 1	0.1–3000.0kW	Depends on model	◎
P02.02	Rated frequency of AM 1	0.01Hz–P00.03 (maximum frequency)	50.00Hz	◎
P02.03	Rated speed of AM 1	1–36000rpm	Depends on model	◎
P02.04	Rated voltage of AM 1	0–1200V	Depends on model	◎
P02.05	Rated current of AM 1	0.8–6000.0A	Depends on model	◎
P02.06	Stator resistor of AM 1	0.001–65.535Ω	Depends on model	○
P02.07	Rotor resistor of AM 1	0.001–65.535Ω	Depends on model	○
P02.08	Leakage inductance of AM 1	0.1–6553.5mH	Depends on model	○

Function code	Name	Description	Default value	Modify
P02.09	Mutual inductance of AM 1	0.1–6553.5mH	Depends on model	○
P02.10	Non-load current of AM 1	0.1–6553.5A	Depends on model	○
P02.11	Magnetic saturation coefficient 1 for the iron core of AM1	0.0–100.0%	80.0%	○
P02.12	Magnetic saturation coefficient 2 for the iron core of AM1	0.0–100.0%	68.0%	○
P02.13	Magnetic saturation coefficient 3 for the iron core of AM1	0.0–100.0%	57.0%	○
P02.14	Magnetic saturation coefficient 4 for the iron core of AM1	0.0–100.0%	40.0%	○
P02.15	Rated power of SM 1	0.1–3000.0kW	Depends on model	◎
P02.16	Rated frequency of SM 1	0.01Hz–P00.03 (maximum frequency)	50.00Hz	◎
P02.17	Poles pairs number of SM 1	1–50	2	◎
P02.18	Rated voltage of SM 1	0–1200V	Depends on model	◎
P02.19	Rated current of SM 1	0.8–6000.0A	Depends on model	◎

Function code	Name	Description	Default value	Modify
P02.20	Stator resistor of SM 1	0.001–65.535Ω	Depends on model	○
P02.21	Direct axis inductance of SM 1	0.01–655.35mH	Depends on model	○
P02.22	Quadrature axis inductance of SM 1	0.01–655.35mH	Depends on model	○
P02.23	Back EMF constant of SM 1	0–10000	300	○
P02.24	Initial pole position of SM 1 (reserved)	0x0000–0xFFFF	0	●
P02.25	Identification current of SM 1 (reserved)	0%–50% (motor rated current)	10%	●
P02.26	Overload protection selection of motor 1	0: No protection 1: Common motor (with low speed compensation) 2: Frequency conversion motor (without low speed compensation)	2	◎
P02.27	Overload protection coefficient of motor 1	20.0%–120.0%	100.0%	○
P02.28	Power calibration factor of motor 1	0.00–3.00	1.00	○
P02.29	Parameter display of motor 1	0: Display according to the motor type 1: Display all	0	○

P03 group—Vector control

Function code	Name	Description	Default value	Modify
P03.00	Speed loop proportional gain1	0–200.0	20.0	○
P03.01	Speed loop integral time1	0.000–10.000s	0.200s	○
P03.02	Low switching frequency	0.00Hz–P03.05	5.00Hz	○
P03.03	Speed loop proportional gain 2	0–200.0	20.0	○
P03.04	Speed loop integral time 2	0.000–10.000s	0.200s	○
P03.05	High switching frequency	P03.02–P00.03 (maximum frequency)	10.00Hz	○
P03.06	Speed loop output filter	0–8 (relative to 0–2^8/10ms)	0	○
P03.07	Compensation coefficient of vector control electromotion slip (electric)	50%–200%	100%	○
P03.08	Compensation coefficient of vector control brake slip (power generation)	50%–200%	100%	○
P03.09	Current loop percentage coefficient P	0–65535	1000	○
P03.10	Current loop integral coefficient I	0–65535	1000	○

Function code	Name	Description	Default value	Modify
P03.11	Torque setting method	0: Torque control is invalid 1: Keypad (P03.12) 2: AI1 (100% corresponding to three times the motor rated current) 3–5: Reserved 6: Multi-step torque (same as above) 7: Modbus communication (same as above) 8: PROFIBUS/CANopen communication (same as above) 9: Ethernet communication (same as above) 10: Reserved	0	○
P03.12	Torque set through keypad	-300.0%–300.0% (motor rated current)	50.0%	○
P03.13	Torque reference filter time	0.000–10.000s	0.010s	○
P03.14	Setting source of forward rotation upper-limit frequency in torque control	0: keypad (P03.16) 1: AI1 (100% corresponding to the max. frequency) 2–4: Reserved 5: Multi-step setting (same as above) 6: Modbus communication (same as above) 7: PROFIBUS/CANopen communication (same as above) 8: Ethernet communication (same as above) 9: Reserved	0	○
P03.15	Setting source of reverse rotation upper-limit frequency in torque control	0: Keypad (P03.17) 1: AI1 (100% corresponding to the max. frequency) 2–4: Reserved 5: Multi-step setting (same as above) 6: Modbus communication (same as above) 7: PROFIBUS/CANopen communication (same as above) 8: Ethernet communication (same as above) 9: Reserved	0	○

Function code	Name	Description	Default value	Modify
P03.16	Forward rotation upper-limit frequency set through keypad in torque control	0.00Hz–P00.03	50.00 Hz	○
P03.17	Reverse rotation upper-limit frequency set through keypad in torque control	0.00 Hz–P00.03	50.00Hz	○
P03.18	Setting source of electromotive torque upper limit	0: Keypad (P03.20) 1: AI1 (100% corresponding to the maximum frequency) 2–4: Reserved 5: Modbus communication (same as above) 6: PROFIBUS/CANopen communication (same as above) 7: Ethernet communication (same as above) 8: Reserved	0	○
P03.19	Setting source of braking torque upper limit	0: Keypad (P03.21) 1: AI1 (100% corresponding to the maximum frequency) 2–4: Reserved 5: Modbus communication (same as above) 6: PROFIBUS/CANopen communication (same as above) 7: Ethernet communication (same as above) 8: Reserved	0	○
P03.20	Electromotive torque upper limit set through keypad	0.0–300.0% (of the motor rated current)	180.0%	○
P03.21	Braking torque upper limit set through keypad	0.0–300.0% (of the motor rated current)	180.0%	○
P03.22	Weakening	0.1–2.0	0.3	○

Function code	Name	Description	Default value	Modify
	coefficient in constant power zone			
P03.23	Lowest weakening point in constant power zone	10%–100%	20%	○
P03.24	Max. voltage limit	0.0–120.0%	100.0%	◎
P03.25	Pre-exciting time	0.000–10.000s	0.300s	○
P03.26	Weakening proportional gain	0–8000	1000	○
P03.27	Speed display selection in vector control	0: Display at the actual value 1: Display at the setting value	0	○
P03.28	Static friction compensation coefficient	0.0–100.0%	0.0%	○
P03.29	Dynamic friction compensation coefficient	0.0–100.0%	0.0%	○

P04 group—V/F control

Function code	Name	Description	Default value	Modify
P04.00	V/F curve setting of motor 1	0: Straight-line V/F curve 1: Multi-point V/F curve 2: Torque step-down V/F curve (power of 1.3) 3: Torque step-down V/F curve (power of 1.7) 4: Torque step-down V/F curve (power of 2.0) 5: Customized V/F curve (V/F separation)	0	◎
P04.01	Torque boost of motor 1	0.0%: (automatic) 0.1%–10.0%	0.0%	○
P04.02	Torque boost cut-off of motor 1	0.0%–50.0% (relative to motor 1 rated frequency)	20.0%	○
P04.03	V/F frequency point 1 of motor 1	0.00Hz–P04.05	0.00Hz	○
P04.04	V/F voltage point 1 of motor 1	0.0%–110.0% (motor 1 rated voltage)	00.0%	○
P04.05	V/F frequency point 2 of motor 1	P04.03–P04.07	00.00Hz	○
P04.06	V/F voltage point 2 of motor 1	0.0%–110.0% (motor 1 rated voltage)	00.0%	○
P04.07	V/F frequency point 3 of motor 1	P04.05–P02.02 (motor 1 rated frequency) or P04.05–P02.16 (motor 1 rated frequency)	00.00Hz	○
P04.08	V/F voltage point 3 of motor 1	0.0%–110.0% (motor 1 rated frequency)	00.0%	○
P04.09	V/F slip compensation gain of motor 1	0.0–200.0%	100.0%	○
P04.10	Low-frequency	0–100	10	○

Function code	Name	Description	Default value	Modify
	oscillation control factor of motor 1			
P04.11	High-frequency oscillation control factor of motor 1	0–100	10	○
P04.12	Oscillation control threshold of motor 1	0.00Hz–P00.03 (maximum frequency)	30.00 Hz	○
P04.13	V/F curve setting of motor 2	0: Straight-line V/F curve 1: Multi-point V/F curve 2: Torque step-down V/F curve (power of 1.3) 3: Torque step-down V/F curve (power of 1.7) 4: Torque step-down V/F curve (power of 2.0) 5: Customized V/F curve (V/F separation)	0	◎
P04.14	Torque boost of motor 2	0.0%: (automatic) 0.1%–10.0%	0.0%	○
P04.15	Torque boost cut-off of motor 2	0.0%–50.0% (relative to motor 2 rated frequency)	20.0%	○
P04.16	V/F frequency point 1 of motor 2	0.00Hz–P04.05	0.00Hz	○
P04.17	V/F voltage point 1 of motor 2	0.0%–110.0% (motor 2 rated voltage)	00.0%	○
P04.18	V/F frequency point 2 of motor 2	P04.03–P04.07	00.00Hz	○
P04.19	V/F voltage point 2 of motor 2	0.0%–110.0% (motor 2 rated voltage)	00.0%	○

Function code	Name	Description	Default value	Modify
P04.20	V/F frequency point 3 of motor 2	P04.05–P02.02 (motor 2 rated frequency) or P04.05–P02.16 (motor 2 rated frequency)	00.00Hz	○
P04.21	V/F voltage point 3 of motor 2	0.0%–110.0% (motor 2 rated frequency)	00.0%	○
P04.22	V/F slip compensation gain of motor 2	0.0–200.0%	100.0%	○
P04.23	Low-frequency oscillation control factor of motor 2	0–100	10	○
P04.24	High-frequency oscillation control factor of motor 2	0–100	10	○
P04.25	Oscillation control threshold of motor 2	0.00Hz–P00.03 (maximum frequency)	30.00 Hz	○
P04.26	Energy-saving run	0: Disable 1: Automatic energy-saving run	0	◎
P04.27	Voltage setting channel	0: Keypad (the output voltage is determined by P04.28) 1: AI1 2–4: Reserved 5: Multi-step speed (The setting value is determined by multi-steps speed parameters in P10 group) 6: PID 7: Modbus communication 8: PROFIBUS/CANopen communication 9: Ethernet communication 10: Reserved	0	○
P04.28	Voltage set	0.0%–100.0%	100.0%	○

Function code	Name	Description	Default value	Modify
	through keypad	**Note:** 100% corresponds to the motor rated voltage.		
P04.29	Voltage increase time	0.0–3600.0s	5.0s	○
P04.30	Voltage decrease time	0.0–3600.0s	5.0s	○
P04.31	Max. output voltage	P04.32–100.0% (motor rated voltage)	100.0%	◎
P04.32	Min. output voltage	0.0%–P04.31 (motor rated voltage)	0.0%	◎
P04.33	Weakening coefficient in constant power zone	1.00–1.30	1.00	○
P04.34	Pull-in current of start	0–100.0% **Note:** Valid when P00.00=3	60.0%	○
P04.35	Dynamic inductance compensation coefficient	0.2–4.0	1.0	○
P04.36	Reactive closed loop proportional coefficient	0–3000	80	○
P04.37	Reactive closed loop integral coefficient	0–3000	20	○

P05 group—Input terminals

Function code	Name	Description	Default value	Modify
P05.00	HDI input type selection	0–1 0: HDI is high-speed pulse input 1: HDI is digital input		
P05.01	S1 terminal function	0: No function 1: Run forward	1	◎

Function code	Name	Description	Default value	Modify
	selection	2: Run reversely 3: Three-wire running control 4: Jog forward 5: Jog reversely 6: Coast to stop 7: Reset faults 8: Pause running 9: External fault input 10: Increase frequency setting (UP) 11: Decrease frequency setting (DOWN) 12: Clear the frequency increase/decrease setting 13: Switch between A setting and B setting 14: Switch between combination setting and A setting 15: Switch between combination setting and B setting 16: Multi-step speed terminal 1 17: Multi-step speed terminal 2 18: Multi-step speed terminal 3 19: Multi- stage speed terminal 4 20: Pause multi-step speed running 21: ACC/DEC time 1 22: ACC/DEC time 2 23–24: Reserved 25: Pause PID control 26: Pause wobble frequency (stop at the current frequency) 27: Reset wobble frequency (return to the center frequency) 28: Reset the counter 29: Disable torque control 30: Disable ACC/DEC 31: Trigger the counter 32: Reset the length 33: Clear the frequency increase/decrease setting temporarily 34: DC braking		
P05.02	S2 terminal function selection		4	◎
P05.03	S3 terminal function selection		7	◎
P05.04	S4 terminal function selection		0	◎
P05.05	S5 terminal function selection		0	◎
P05.06	S6 terminal function selection		0	◎

Function code	Name	Description	Default value	Modify
		35: Switch from motor 1 to motor 2 36: Switch the running command channel to keypad 37: Switch the running command channel to terminal 38: Switch the running command channel to communication 39: Pre-exciting command 40: Clear electricity consumption 41: Keep electricity consumption 42: Second DC undertvoltage point 43: (Learning mode) Enable power/variable frequency switching 44: (Non-learning mode) Enable power/variable frequency switching 45: Variable frequency running request 46: Coast to stop after synchronous output (switching with reactor) 47–60: Reserved 61: Switch PID polarities 62–63: Reserved		
P05.07	Reserved			
P05.08	Reserved			
P05.09	Reserved			
P05.10	Input terminal polarity	0x000–0x1FF	0x000	○
P05.11	Switch filter time	0.000–1.000s	0.010s	○
P05.12	Virtual terminal setting	0x000–0x1FF (0: Disable, 1: Enable) BIT0: S1 virtual terminal BIT1: S2 virtual terminal BIT2: S3 virtual terminal BIT3: S4 virtual terminal BIT4: S5 virtual terminal BIT5: S6 virtual terminal **Note:** After a virtual terminal is enabled, the state of the terminal can be changed only in	0x000	◎

Function code	Name	Description	Default value	Modify
		communication mode. The communication address is 0x200A.		
P05.13	Terminal control mode	0: 2-wire control 1 1: 2-wire control 2 2: 3-wire control 1 3: 3-wire control 2 4: Reserved	0	◎
P05.14	S1 switch-on delay	0.000–50.000s	0.000s	○
P05.15	S1 switch-off delay	0.000–50.000s	0.000s	○
P05.16	S2 switch-on delay	0.000–50.000s	0.000s	○
P05.17	S2 switch-off delay	0.000–50.000s	0.000s	○
P05.18	S3 switch-on delay	0.000–50.000s	0.000s	○
P05.19	S3 switch-off delay	0.000–50.000s	0.000s	○
P05.20	S4 switch-on delay	0.000–50.000s	0.000s	○
P05.21	S4 switch-off delay	0.000–50.000s	0.000s	○
P05.22	S5 switch-on delay	0.000–50.000s	0.000s	○
P05.23	S5 switch-off delay	0.000–50.000s	0.000s	○
P05.24	S6 switch-on delay	0.000–50.000s	0.000s	○
P05.25	S6 switch-off delay	0.000–50.000s	0.000s	○
P05.26	Reserved			
P05.27	Reserved			

Function code	Name	Description	Default value	Modify
P05.28	Reserved			
P05.29	Reserved			
P05.30	Reserved			
P05.31	Reserved			
P05.32	Lower limit of AI1	0.00V–P05.34	0.00V	○
P05.33	Corresponding setting of the lower limit of AI1	-100.0%–100.0%	0.0%	○
P05.34	Upper limit of AI1	P05.32–10.00V	10.00V	○
P05.35	Corresponding setting of the upper limit of AI1	-100.0%–100.0%	100.0%	○
P05.36	AI1 input filter time	0.000s–10.000s	0.100s	○
P05.37–P05.54	Reserved			

P06 group—Output terminals

Function code	Name	Description	Default value	Modify
P06.00	Reserved			
P06.01	Relay RO3 output type selection	0: Invalid 1: In operation 2: Forward rotation operation 3: Reverse rotation operation 4: Jogging operation 5: VFD fault 6: Frequency degree test FDT1 7: Frequency degree test FDT2 8: Frequency arrival 9: Zero speed running 10: Upper limit frequency arrival	00	○
P06.02	Reserved			
P06.03	Relay RO1 output selection		01	○
P06.04	Relay RO2 output selection		05	○

Function code	Name	Description	Default value	Modify
		11: Lower limit frequency arrival 12: Ready for operation 13: Pre-magnetizing 14: Overload pre-alarm 15: Underload pre-alarm 16: Completion of simple PLC stage 17: Completion of simple PLC cycle 18: Setting count value arrival 19: Defined count value arrival 20: External fault valid 21: Length arrival 22: Running time arrival 23: Modbus communication virtual terminal output 24: PROFIBUS/CANopen communication virtual terminal output 25: Ethernet communication virtual terminal output 26: Establishment of DC bus voltage 27: Locking phase is successful (Phase-locked loop locks power frequency and phase), and it can be used to observe the working state of VFD phase-locked loop when commissioning. 28: Synchronization is successful (indicates that VFD output tracking is fully synchronized with power power frequency and phase), and it can be used to observe the working status of the VFD when commissioning. 29: Power frequency output Shift switching application: synchronization has been completed and used to control the frequency contactor. Power application: check the power of the power grid, close the frequency contactor. 30: Variable frequency output Switching application: synchronization has been completed and used to control the VFD. Power application: check the power loss of the power grid, and close the VFD.		

Function code	Name	Description	Default value	Modify
		31: Bus voltage undervoltage warning output 32: Lock phase synchronization success signal (logic and output of lock phase success and synchronous successful signal) 33: Power frequency output (REV) Variable/power frequency switching application: Synchronization has been completed, for controlling the power frequency contactor 34–63: Reserved		
P06.05	Polarity selection of output terminals	0–F	0	○
P06.06	RO3 switch-on delay	0.000–50.000s (Valid only when P06.00=1)	0.000s	○
P06.07	RO3 switch-off delay	0.000–50.000s (Valid only when P06.00=1)	0.000s	○
P06.08	Reserved			
P06.09	Reserved			
P06.10	RO1 switch-on delay	0.000–50.000s	0.000s	○
P06.11	RO1 switch-off delay	0.000–50.000s	0.000s	○
P06.12	RO2 switch-on delay	0.000–50.000s	0.000s	○
P06.13	RO2 switch-off delay	0.000–50.000s	0.000s	○
P06.14	AO1 output selection	0: Running frequency 1: Setting frequency 2: Ramp reference frequency 3: Running rotation speed 4: Output current (relative to the rated current of the VFD) 5: Output current (relative to the rated current of the motor) 6: Output voltage	0	○

Function code	Name	Description	Default value	Modify
		7: Output power 8: Set torque value 9: Output torque 10: Analog AI1 input value 11–13: Reserved 14: Value 1 set through Ethernet communication 15: Value 2 set through Ethernet communication 16–30: Reserved		
P06.15	Reserved			
P06.16	Reserved			
P06.17	Lower limit of AO1 output	-100.0%–P06.19	0.0%	○
P06.18	Corresponding AO1 output to the lower limit	0.00V–10.00V	0.00V	○
P06.19	Upper limit of AO1 output	P06.17–100.0%	100.0%	○
P06.20	The corresponding AO1 output to the upper limit	0.00V–10.00V	10.00V	○
P06.21	AO1 output filter time	0.000s–10.000s	0.000s	○
P06.22–P06.31	Reserved			

P07 group—Human-machine interface

Function code	Name	Description	Default value	Modify
P07.00	User password	0–65535	0	○
P07.01	Parameter copy	0: No operation 1: Upload the local function parameter to the keypad 2: Download the keypad function parameter to local address (including the motor parameters)	0	◎

Function code	Name	Description	Default value	Modify
		3: Download the keypad function parameter to local address (excluding the motor parameter of P02 and P12 group) 4: Download the keypad function parameters to local address (only for the motor parameter of P02 and P12 group) **Note:** After the operation specified by option 1–4, the parameter restores to 0, and the uploading and downloading functions are not applicable to P29.		
P07.02	QUICK/JOG function selection	0: No function 1: Jog 2: Switch displayed function codes from right to left by the shift key 3: Switch between forward and reverse rotating 4: Clear the UP/DOWN setting 5: Coast to stop 6: Switch command channels in sequence 7: Quick commissioning mode (based on non-factory parameter settings)	1	◎
P07.03	Sequence of switching running-command channels by pressing QUICK	0: Keypad→Terminal→Communication 1: Keypad←→Terminal 2: Keypad←→Communication 3: Terminal←→Communication	0	○
P07.04	Stop function validity of STOP/RST	0: Valid only for keypad control 1: Valid both for keypad and terminal control 2: Valid both for keypad and communication control 3: Valid for all control modes	0	○
P07.05	Displayed parameter selection 1 of running state	0x0000–0xFFFF BIT0: running frequency (Hz on) BIT1: set frequency (Hz blinking) BIT2: bus voltage (Hz on) BIT3: output voltage (V on)	0x03FF	○

Function code	Name	Description	Default value	Modify
		BIT4: output current (A on) BIT5: running rotation speed (rpm on) BIT6: output power (% on) BIT7: output torque (% on) BIT8: PID reference (% blinking) BIT9: PID feedback value (% on) BIT10: input terminals state BIT11: output terminals state BIT12: torque set value (% on) BIT13: AI1 value (% on) BIT14: Motor overload percentage (% on) BIT15: VFD overload percentage (% on)		
P07.06	Displayed parameter selection 2 of running state	0x0000–0xFFFF BIT0: Ramp frequency reference value (Hz on) BIT1: Linear speed BIT2: AC inlet current BIT3: Frequency upper limit (Hz on) BIT4: Terminal block UVW voltage valid display value (V on) BIT5: Terminal block UVW frequency display value (Hz on) BIT6: Terminal block RST voltage valid display value (V on) BIT7: Terminal block RST frequency display value (Hz on) BIT8–9: Reserved	0x0000	
P07.07	Parameter selection of the stop state	0x0000–0xFFFF BIT0: Set frequency (Hz on, frequency blinking slowly) BIT1: Bus voltage (V on) BIT2: Input terminal status BIT3: Output terminal status BIT4: PID reference value (% blinking) BIT5: PID feedback value (% on) BIT6: Torque setting (% on) BIT7: AI1 value (V on) BIT8: Frequency upper limit (Hz on)	0x00FF	○

Function code	Name	Description	Default value	Modify
		BIT9–15: Reserved		
P07.08	Frequency display coefficient	0.01–10.00 Displayed frequency = Running frequency * P07.08	1.00	○
P07.09	Rotational speed display coefficient	0.1–999.9% Mechanical rotation speed = 60 * (Displayed running frequency) * P07.09/ (Number of motor pole pairs)	100.0%	○
P07.10	Linear speed displayed coefficient	0.1–999.9% Linear speed= Mechanical rotation speed * P07.10	1.0%	○
P07.11	Rectifier bridge module temperature	0–100.0°C		●
P07.12	Converter module temperature	0–100.0°C		●
P07.13	Software version	1.00–655.35		●
P07.14	Local accumulative running time	0–65535h		●
P07.15	High bit of power consumption	0–65535 kWh (*1000)		●
P07.16	Low bit of power consumption	0.0–999.9 kWh		●
P07.17	VFD type	0: G type 1: P type		●
P07.18	VFD rated power	0.4–3000.0kW		●
P07.19	VFD rated voltage	50–1200V		●
P07.20	VFD rated current	0.1–6000.0A		●

Function code	Name	Description	Default value	Modify
P07.21	Factory bar code 1	0x0000–0xFFFF		●
P07.22	Factory bar code 2	0x0000–0xFFFF		●
P07.23	Factory bar code 3	0x0000–0xFFFF		●
P07.24	Factory bar code 4	0x0000–0xFFFF		●
P07.25	Factory bar code 3	0x0000–0xFFFF		●
P07.26	Factory bar code 4	0x0000–0xFFFF		●
P07.27	Present fault type	0: No fault 1: OUt1 2: OUt2 3: OUt3 4: OC1 5: OC2 6: OC3 7: OV1 8: OV2 9: OV3 10: UV 11: Motor overload (OL1) 12: The VFD overload (OL2) 13: Input side phase loss (SPI) 14: Output side phase loss (SPO) 15: Overheat of the rectifier module (OH1) 16: Overheat fault of the VFD module (OH2) 17: External fault (EF) 18: 485 communication fault (CE) 19: Current detection fault (ItE) 20: Motor autotune fault (tE) 21: EEPROM operation fault (EEP) 22: PID response offline fault (PIDE) 23: bCE		●
P07.28	Last fault type			●
P07.29	2nd-last fault type			●
P07.30	3rd-last fault type			●
P07.31	4th-last fault type			●
P07.32	5th-last fault type			●

Function code	Name	Description	Default value	Modify
		24: Running time arrival (END) 25: Electrical overload (OL3) 26: PCE 27: UPE 28: DNE 29–31: Reserved 32: ETH1 33: ETH2 34: Speed deviation fault (dEu) 35: Maladjustment (STo) 36: Underload fault (LL) 37: Lock phase failure (PLLE) 38: Sync card input in reverse sequence (UIPE) 39: Sync card output in reverse sequence (UOPE) 40: Sync card input phase loss (UIPL) 41: Sync card output phase loss (UOPL)		
P07.33	Running frequency at present fault		0.00Hz	●
P07.34	Ramp reference frequency at current fault		0.00Hz	●
P07.35	Output voltage at present fault		0V	●
P07.36	Output current at present fault		0.0A	●
P07.37	Bus voltage at present fault		0.0V	●
P07.38	Max. temperature at present fault		0.0°C	●
P07.39	Input terminal state at present fault		0	●
P07.40	Output terminal		0	●

Function code	Name	Description	Default value	Modify
	state at present fault			
P07.41	Reference frequency at last fault		0.00Hz	●
P07.42	Ramp reference frequency at last fault		0.00Hz	●
P07.43	Output voltage at last fault		0V	●
P07.44	Output current at last fault		0.0A	●
P07.45	Bus voltage at last fault		0.0V	●
P07.46	Max. temperature at last fault		0.0°C	●
P07.47	Input terminal state at last fault		0	●
P07.48	Output terminal state at last fault		0	●
P07.49	Reference frequency at 2nd-last fault		0.00Hz	●
P07.50	Ramp reference frequency at 2nd-last fault		0.00Hz	●
P07.51	Output voltage at 2nd-last fault		0V	●
P07.52	Output current at 2nd-last fault		0.0A	●
P07.53	Bus voltage at 2nd-last fault		0.0V	●

Function code	Name	Description	Default value	Modify
P07.54	Max. temperature at 2nd-last fault		0.0°C	●
P07.55	Input terminal state at 2nd-last fault		0	●
P07.56	Output terminal state at 2nd-last fault		0	●

P08 group—Enhanced functions

Function code	Name	Description	Default value	Modify
P08.00	ACC time 2	0.0–3600.0s	Depends on model	○
P08.01	DEC time 2	0.0–3600.0s	Depends on model	○
P08.02	ACC time 3	0.0–3600.0s	Depends on model	○
P08.03	DEC time 3	0.0–3600.0s	Depends on model	○
P08.04	ACC time 4	0.0–3600.0s	Depends on model	○
P08.05	DEC time 4	0.0–3600.0s	Depends on model	○
P08.06	Running frequency of jog	0.00–P00.03 (max. frequency)	5.00Hz	○
P08.07	ACC time for jogging	0.0–3600.0s	Depends on model	○
P08.08	DEC time for jogging	0.0–3600.0s	Depends on model	○
P08.09	Jump frequency 1	0.00–P00.03 (max. frequency)	0.00Hz	○
P08.10	Jump frequency	0.00–P00.03 (max. frequency)	0.00Hz	○

Function code	Name	Description	Default value	Modify
	amplitude 1			
P08.11	Jump frequency 2	0.00–P00.03 (max. frequency)	0.00Hz	○
P08.12	Jump frequency amplitude 2	0.00–P00.03 (max. frequency)	0.00Hz	○
P08.13	Jump frequency 3	0.00–P00.03 (max. frequency)	0.00Hz	○
P08.14	Jump frequency amplitude 3	0.00–P00.03 (max. frequency)	0.00Hz	○
P08.15	Amplitude of wobbling frequency	0.0–100.0% (relative to the set frequency)	0.0%	○
P08.16	Amplitude of sudden jump frequency	0.0–50.0% (relative to the amplitude of wobbling frequency)	0.0%	○
P08.17	Rise time of wobbling frequency	0.1–3600.0s	5.0s	○
P08.18	Fall time of wobbling frequency	0.1–3600.0s	5.0s	○
P08.19	Set length	0–65535m	0m	○
P08.20	Actual length	0–65535m	0m	●
P08.21	Pulse per rotation	1–10000	1	○
P08.22	Axis perimeter	0.01–100.00cm	10.00cm	○
P08.23	Length ratio	0.001–10.000	1.000	○
P08.24	Length calibration coefficient	0.001–1.000	1.000	○
P08.25	Set counting value	P08.26–65535	0	○
P08.26	Given counting	0–P08.25	0	○

Function code	Name	Description	Default value	Modify
	value			
P08.27	Set running time	0–65535min	0min	○
P08.28	Auto fault reset count	0–10	0	○
P08.29	Auto fault reset interval	0.1–3600.0s	1.0s	○
P08.30	Frequency decrease ratio in drop control	0.00–50.00Hz	0.00Hz	○
P08.31	Switching between motor 1 and motor 2	0x00–0x14 LED ones: Switching channel selection 0: Terminal 1: Modbus communication 2: PROFIBUS/CANopen communication 3: Ethernet communication 4: Reserved LED tens: indicates whether to enable switchover during running 0: Disable 1: Enable	0x00	◎
P08.32	FDT1 electrical level detection value	0.00–P00.03 (max. frequency)	50.00Hz	○
P08.33	FDT1 lagging detection value	0.0–100.0% (FDT1 electrical level)	5.0%	○
P08.34	FDT2 electrical level detection value	0.00–P00.03 (max. frequency)	50.00Hz	○
P08.35	FDT2 lagging detection value	0.0–100.0% (FDT2 electrical level)	5.0%	○
P08.36	Frequency arrival detection value	0.0–P00.03 (max. frequency)	0.00Hz	○
P08.37	Enabling	0: Disable	0	○

Function code	Name	Description	Default value	Modify
	energy-consumption braking	1: Enable		
P08.38	Energy-consumption braking threshold voltage	200.0–2000.0V	220V voltage: 380.0V 380V voltage: 700.0V 660V voltage: 1120.0V	○
P08.39	Cooling-fan running mode	0: Rate running mode 1: The fan keeps on running after power on 2: The fan runs when the VFD output current reaches half of the rated current of the motor **Note:** The fan runs automatically when the VFD temperature is higher than 55 degree.	0	○
P08.40	PWM selection	0x00–0x21 LED ones: PWM mode selection 0: PWM mode 1, 3PH commission and 2-phase commission 1: PWM mode 2, 3PH commission LED tens: PWM low-speed carrier limit 0: Low-speed carrier limit, carrier limited mode 1 1: Low-speed carrier limit, carrier limited mode 2 2: Low-speed carrier is not limited	01	◎
P08.41	Overmodulation selection	0x00–0x11 LED ones 0: Invalid 1: Valid LED tens 0: Mild over commission 1: Heavy over commission	01	◎
P08.42	Keypad data	0x000–0x1223	0x0000	○

Function code	Name	Description	Default value	Modify
	control setting	LED ones: frequency enable selection 0: ∧/∨ keys and digital potentiometer adjustments are effective 1: Only ∧/∨ keys adjustments is effective 2: Only digital potentiometer adjustments is effective 3: Neither ∧/∨ keys nor digital potentiometer adjustments are effective LED tens: frequency control selection 0: Only effective when P00.06=0 or P00.07=0 1: Effective for all frequency setting manner 2: Ineffective for multi-step speed when multi-stage speed has the priority LED hundreds: action selection during stopping 0: Setting is valid 1: Valid during running, cleared after stopping 2: Valid during running, cleared after receiving the stop command LED thousands: ∧/∨ keys and digital potentiometer integral function 0: The Integral function is valid 1: The Integral function is invalid		
P08.43	Keypad data potentiometer integral ratio	0.01–10.00s	0.10s	○
P08.44	UP/DOWN terminal control setting	0x00–0x221 LED ones: frequency control selection 0: UP/DOWN terminal setting effective 1: UP/DOWN terminal setting ineffective LED tens: frequency control selection 0: Only effective when P00.06=0 or P00.07=0 1: All frequency means are effective 2: When the multi-stage are priority, it is ineffective to the multi-stage LED hundreds: action selection when stop 0: Setting effective 1: Effective in the running, clear after stop	0x000	○

Function code	Name	Description	Default value	Modify
		2: Effective in the running, clear after receiving the sop commands		
P08.45	UP terminal frequency increase change rate	0.01–50.00Hz/s	0.50Hz/s	○
P08.46	DOWN terminal frequency change rate	0.01–50.00Hz/s	0.50Hz/s	○
P08.47	Action selection at power-off during frequency setting	0x000–0x111 LED ones: The action selection when the digital adjusting the frequency is off 0: Save when the power is off 1: Clear when the power is off LED tens: The action selection when Modbus set frequency is off 0: Save when the power is off 1: Clear when the power is off LED tens: The action selection when the other frequency set frequency is off 0: Save when the power is off 1: Clear when the power is off	0x000	○
P08.48	Initial electricity consumption high-order bits	0–59999 kWh (k)	0°	○
P08.49	Initial electricity consumption low-order bits	0.0–999.9 kWh	0.0°	○
P08.50	Magnetic flux braking	0: Invalid 100–150: A greater coefficient indicates greater braking strength.	0	○
P08.51	Input-side current adjustment factor	0.00–1.00	0.56	○

P09 group—PID control parameters

Function code	Name	Description	Default value	Modify
P09.00	PID given source selection	0: Keypad (P09.01) 1: AI1 2–4: Reserved 5: Multi-stage speed 6: Modbus communication 7: PROFIBUS/CANopen communication 8: Ethernet communication 9: Reserved	0	○
P09.01	PID reference preset through keypad	-100.0%–100.0% (Frequency control: relative to motor frequency; Voltage control: relative to motor rated voltage)	0.0%	○
P09.02	PID feedback source selection	0: AI1 1–3: Reserved 4: Modbus communication 5: PROFIBUS/CANopen communication 6: Ethernet communication 7: Reserved 8: Synchronous card UVW voltage feedback (RMS)	0	○
P09.03	PID output feature selection	0: PID output is positive 1: PID output is negative	0	○
P09.04	Proportional gain (Kp)	0.00–100.00	1.00	○
P09.05	Interval time (Ti)	0.00–10.00s	0.10s	○
P09.06	Differential time (Td)	0.00–10.00s	0.00s	○
P09.07	Sampling cycle (T)	0.001–10.000s	0.100s	○
P09.08	PID control deviation limit	0.0–100.0%	0.0%	○
P09.09	Output upper limit of PID	P09.10–100.0% (Max frequency or max voltage)	100.0%	○
P09.10	Output lower limit of PID	-100.0%–P09.09 (Max frequency or max voltage)	0.0%	○

Function code	Name	Description	Default value	Modify
P09.11	Feedback offline detection value	0.0–100.0%	0.0%	○
P09.12	Feedback offline detection time	0.0–3600.0s	1.0s	○
P09.13	PID adjustment selection	0x0000–0x1111 LED ones: 0: Keep on integral adjustment when the frequency achieves the upper and low limit 1: Stop integral adjustment when the frequency achieves the upper and low limit LED tens: 0: The same with the setting direction 1: Opposite to the setting direction LED hundreds: 0: According to the Max frequency limit 1: According to the A frequency limit LED thousands: 0: A+B frequency, setting A frequency source butter Acc/Dec is invalid 1: A+B frequency, setting A frequency source butter Acc/Dec is valid, Acc/Dec is depend on P08.04 Acc time	0x0001	○
P09.14	Low frequency proportional gain (Kp)	0.00–100.00	1.00	○
P09.15	PID command ACC/DEC time	0.0–1000.0s	0.0s	○
P09.16	PID output filter time	0.000–10.000s	0.000s	○

P10 group—Simple PLC and multi-step speed control

Function code	Name	Description	Default value	Modify
P10.00	Simple PLC	0: Stop after running once	0	○

Function code	Name	Description	Default value	Modify
	mode	1: Run at the final value after running once 2: Cycle running		
P10.01	Simple PLC memory selection	0: Power loss without memory 1: Power loss memory	0	○
P10.02	Multi-step speed 0	-100.0–100.0%	0.0%	○
P10.03	Running time of step 0	0.0–6553.5s (m)	0.0s	○
P10.04	Multi-step speed 1	-100.0–100.0%	0.0%	○
P10.05	Running time of step 1	0.0–6553.5s (m)	0.0s	○
P10.06	Multi-step speed 2	-100.0–100.0%	0.0%	○
P10.07	Running time of step 2	0.0–6553.5s (m)	0.0s	○
P10.08	Multi-step speed 3	-100.0–100.0%	0.0%	○
P10.09	Running time of step 3	0.0–6553.5s (m)	0.0s	○
P10.10	Multi-step speed 4	-100.0–100.0%	0.0%	○
P10.11	Running time of step 4	0.0–6553.5s (m)	0.0s	○
P10.12	Multi-step speed 5	-100.0–100.0%	0.0%	○
P10.13	Running time of step 5	0.0–6553.5s (m)	0.0s	○
P10.14	Multi-step speed 6	-100.0–100.0%	0.0%	○
P10.15	Running time of step 6	0.0–6553.5s (m)	0.0s	○

Function code	Name	Description	Default value	Modify
P10.16	Multi-step speed 7	-100.0–100.0%	0.0%	○
P10.17	Running time of step 7	0.0–6553.5s (m)	0.0s	○
P10.18	Multi-step speed 8	-100.0–100.0%	0.0%	○
P10.19	Running time of step 8	0.0–6553.5s (m)	0.0s	○
P10.20	Multi-step speed 9	-100.0–100.0%	0.0%	○
P10.21	Running time of step 9	0.0–6553.5s (m)	0.0s	○
P10.22	Multi-step speed 10	-100.0–100.0%	0.0%	○
P10.23	Running time of step 10	0.0–6553.5s (m)	0.0s	○
P10.24	Multi-step speed 11	-100.0–100.0%	0.0%	○
P10.25	Running time of step 11	0.0–6553.5s (m)	0.0s	○
P10.26	Multi-step speed 12	-100.0–100.0%	0.0%	○
P10.27	Running time of step 12	0.0–6553.5s (m)	0.0s	○
P10.28	Multi-step speed 13	-100.0–100.0%	0.0%	○
P10.29	Running time of step 13	0.0–6553.5s (m)	0.0s	○
P10.30	Multi-step speed 14	-100.0–100.0%	0.0%	○
P10.31	Running time of step 14	0.0–6553.5s (m)	0.0s	○
P10.32	Multi-step speed	-100.0–100.0%	0.0%	○

Function code	Name	Description	Default value	Modify
	15			
P10.33	Running time of step 15	0.0–6553.5s (m)	0.0s	○
P10.34	ACC/DEC time selection for steps 0–7 in simple PLC running	0x0000–0xFFFF	0x0000	○
P10.35	ACC/DEC time selection for steps 8–15 in simple PLC running	0x0000–0xFFFF	0x0000	○
P10.36	PLC restart mode	0: Restart from the first stage 1: Continue to run from the stop frequency	0	◎
P10.37	Multi-step time unit selection	0: Seconds 1: Minutes	0	◎

P11 group—Protective parameters

Function code	Name	Description	Default value	Modify
P11.00	Phase loss protection	0x00–0x11 LED ones: whether to enable input phase loss protection (SPI) (shielded software phase loss protection) 0: Disable 1: Enable LED tens: whether to enable output phase loss protection (SPO) 0: Disable 1: Enable LED hundreds: whether to enable terminal board RST input signal phase loss protection (UIPL) 0: Disable 1: Enable LED thousands: whether to enable terminal board	0x1111	○

Function code	Name	Description	Default value	Modify
		UVW output signal phase loss protection (UOPL) 0: Disable 1: Enable		
P11.01	Frequency decreasing at sudden power loss	0: Disable 1: Enable	0	○
P11.02	Frequency decreasing rate at sudden power loss	0.00Hz–P00.03/s (max. frequency)	10.00Hz/s	○
P11.03	Overvoltage stall protection	0: Disable 1: Enable	1	○
P11.04	Overvoltage stall protection threshold	120–150% (standard bus voltage) (380V)	140%	○
		120–150% (standard bus voltage) (220V)	120%	
P11.05	Current limit action selection	0x00–0x11 Ones: current limit action selection 0: current limit invalid 1: current limit valid Tens: hardware current limit overload alarm selection 0: hardware current limit overload alarm selection valid 1: hardware current limit overload alarm selection invalid	01	◎
P11.06	Automatic current limit level	50.0–200.0%	G type: 160.0% P type: 120.0%	◎
P11.07	Frequency decreasing rate during current limit	0.00–50.00Hz/s	10.00Hz/s	◎

Function code	Name	Description	Default value	Modify
P11.08	VFD/motor OL/UL pre-alarm selection	0x000–0x131 LED ones: 0: Overload pre-alarm of the motor, comply with the rated current of the motor 1: Overload pre-alarm of the VFD, comply with the rated current of the VFD LED tens: 0: The VFD continues to work after underload pre-alarm 1: The VFD continues to work after underload pre-alarm and the VFD stops to run after overload fault 2: The VFD continues to work after overload pre-alarm and the VFD stops to run after underload fault 3: The VFD stops when overloading or underloading LED hundreds: 0: Detection all the time 1: Detection in constant running	0x000	○
P11.09	Overload pre-alarm detection threshold	P11.11–200%	G type: 150% P type: 120%	○
P11.10	Overload pre-alarm detection time	0.1–3600.0s	1.0s	○
P11.11	Underload pre-alarm detection threshold	0%–P11.09	50%	○
P11.12	Underload pre-alarm detection time	0.1–3600.0s	1.0s	○
P11.13	Output terminal action selection	0x00–0x11 LED ones:	0x00	○

Function code	Name	Description	Default value	Modify
	during fault	0: Action during the automatic reset 1: No action during the automatic reset LED tens: 0: Action during the automatic reset 1: No action during the automatic reset		
P11.14	Speed deviation detection	0.0–50.0%	10.0%	○
P11.15	Speed deviation detection time	0.0–10.0s (No speed deviation protection at 0.0)	0.5s	○
P11.16	Automatic frequency decreasing selection for voltage drop	0: Invalid 1: Valid	0	○

P12 group—Motor 2 parameters

Function code	Name	Description	Default value	Modify
P12.00	Type of motor 2	0: Asynchronous motor (AM) 1: Synchronous motor (SM)	0	◎
P12.01	Rated power of AM 2	0.1–3000.0kW	Depends on model	◎
P12.02	Rated frequency of AM 2	0.01Hz–P00.03 (Max. frequency)	50.00Hz	◎
P12.03	Rated speed of AM 2	1–36000rpm	Depends on model	◎
P12.04	Rated voltage of AM 2	0–1200V	Depends on model	◎
P12.05	Rated current of AM 2	0.8–6000.0A	Depends on model	◎
P12.06	Stator resistance of AM 2	0.001–65.535Ω	Depends on model	○
P12.07	Rotor resistance of AM 2	0.001–65.535Ω	Depends on model	○
P12.08	Leakage	0.1–6553.5mH	Depends	○

Function code	Name	Description	Default value	Modify
	inductance of AM 2		on model	
P12.09	Mutual inductance of AM 2	0.1–6553.5mH	Depends on model	○
P12.10	No-load current of AM 2	0.1–6553.5A	Depends on model	○
P12.11	Magnetic saturation coefficient 1 of iron core of AM 2	0.0–100.0%	80.0%	○
P12.12	Magnetic saturation coefficient 2 of iron core of AM 2	0.0–100.0%	68.0%	○
P12.13	Magnetic saturation coefficient 3 of iron core of AM 2	0.0–100.0%	57.0%	○
P12.14	Magnetic saturation coefficient 4 of iron core of AM 2	0.0–100.0%	40.0%	○
P12.15	Rated power of SM 2	0.1–3000.0kW	Depends on model	◎
P12.16	Rated frequency of SM 2	0.01Hz–P00.03 (max. frequency)	50.00Hz	◎
P12.17	Number of pole pairs of SM 2	1–50	2	◎
P12.18	Rated voltage of SM 2	0–1200V	Depends on model	◎

Function code	Name	Description	Default value	Modify
P12.19	Rated current of SM 2	0.8–6000.0A	Depends on model	◎
P12.20	Stator resistance of SM 2	0.001–65.535Ω	Depends on model	○
P12.21	Direct-axis inductance of SM 2	0.01–655.35mH	Depends on model	○
P12.22	Quadrature-axis inductance of SM 2	0.01–655.35mH	Depends on model	○
P12.23	Counter-emf constant of SM 2	0–10000V	300	○
P12.24	Original magnetic pole position of SM 2 (Reserved)	0–FFFFH	0x0000	●
P12.25	Identification current of SM 2 (Reserved)	0%–50% (rated current of the motor)	10%	●
P12.26	Overload protection selection of motor 2	0: No protection 1: Common motor (with low speed compensation) 2: Variable-frequency motor (without low speed compensation)	2	◎
P12.27	Overload protection coefficient of motor 2	20.0%–120.0%	100.0%	○
P12.28	Power calibration coefficient of motor 2	0.00–3.00	1.00	○
P12.29	Parameter display selection of motor 2	0: Display according to the motor type 1: Display all parameters	0	○

P13 group—PID Synchronous motor control

Function code	Name	Description	Default value	Modify
P13.00	Source current reduction coefficient	0.0–100.0%	80.0%	○
P13.01	Initial pole angle identified mode	0: No detection 1: High frequency superimposed (reserved) 2: Pulse superimposed (reserved)	0	◎
P13.02	Source current 1	0.0%–100.0% (of the motor rated current)	20.0%	○
P13.03	Source current 2	0.0%–100.0% (of the motor rated current)	10.0%	○
P13.04	Source current shift frequency	0.00Hz–P00.03 (max. frequency)	10.00 Hz	○
P13.05	High frequency superimposed frequency (reserved)	200Hz–1000Hz	500Hz	◎
P13.06	High frequency superimposed voltage	0.0–300.0% the rated voltage of the motor	40.0%	◎
P13.08	Control parameter 1	0–65535	0	○
P13.09	Control parameter 2	0–655.35	2.00	○
P13.11	Maladjustment detection time	0.0–10.0s	0.5s	○
P13.12	Weakening coefficient	0–100.0%	0.0%	○
P13.13	Braking current of shirt circuit	0.0–150.0% (relative to the VFD)	0.0%	○
P13.14	Hold time of short circuit braking at start	0.00–50.00s	0.00s	○
P13.15	Hold time of short circuit braking at stop	0.00–50.00s	0.00s	○

P14 group—Serial communication

Function code	Name	Description	Default value	Modify
P14.00	Local communication address	1–247 The broadcast address is 0.	1	○
P14.01	Communication baud rate	0: 1200BPS 1: 2400BPS 2: 4800BPS 3: 9600BPS 4: 19200BPS 5: 38400BPS 6: 57600BPS 7: 115200BPS	4	○
P14.02	Data bit check setting	0: No check (N, 8, 1) for RTU 1: Odd check (E, 8, 1) for RTU 2: Even check (O, 8, 1) for RTU 3: No check (N, 8, 2) for RTU 4: Odd check E, 8, 2) for RTU 5: Even check (O, 8, 2) for RTU	1	○
P14.03	Communication response delay	0–200ms	5	○
P14.04	Communication timeout time	0.0 (invalid) , 0.1–60.0s	0.0s	○
P14.05	Transmission fault processing	0: Alarm and stop freely 1: No alarm and continue to run 2: No alarm and stop according to the stop means (only under the communication control) 3: No alarm and stop according to the stop means (under all control modes)	0	○
P14.06	Communication processing action selection	0x00–0x11 LED ones: writing command response 0: writing command with response 1: writing command without response LED tens: communication encryption processing 0: communication encryption setting invalid 1: communication encryption setting valid	0x00	○

P15 group—PROFIBUS function

Function code	Name	Description	Default value	Modify
P15.00	Module type	0: Profibus 1: CAN	0	◎
P15.01	Module address	0–127	2	◎
P15.02	Received PZD2	0: Invalid 1: Set frequency (0–Fmax; unit: 0.01Hz) 2: Given PID, range (0–1000, 1000 corresponds to 100.0%) 3: PID feedback, range (0–1000, 1000 corresponds to 100.0%) 4: Torque set value (-3000–3000, 1000 corresponds to 100.0% of the motor rated current) 5: Upper-limit frequency of forward (0–Fmax; unit: 0.01Hz) 6: Upper-limit frequency of reverse (0–Fmax; unit: 0.01Hz) 7: Electromotion torque upper limit (0–3000, 1000 corresponds to 100.0% of the motor rated current) 8: Braking torque upper limit (0–2000, 1000 corresponds to 100.0% of the motor rated current) 9: Virtual input terminals command, range: 0x000–0x1FF 10: Virtual output terminals command, range: 0x00–0x0F 11: Voltage setting value (specialized for V/F separation) (0–1000, 1000 corresponds to 100.0% of the motor rated voltage) 12: Output of the AO1 (-1000–1000, 1000 corresponds to 100.0%) 13: Output of AO2 (-1000–1000, 1000 corresponds to 100.0%)	0	○
P15.03	Received PZD3		0	○
P15.04	Received PZD4		0	○
P15.05	Received PZD5		0	○
P15.06	Received PZD6		0	○
P15.07	Received PZD7		0	○
P15.08	Received PZD8		0	○
P15.09	Received PZD9		0	○
P15.10	Received PZD10		0	○
P15.11	Received PZD11		0	○
P15.12	Received PZD12		0	○
P15.13	Sent PZD2	0: Invalid 1: Running frequency (*100, Hz) 2: Set frequency (*100, Hz) 3: Bus voltage (*10, V)	0	○

Function code	Name	Description	Default value	Modify
P15.14	Sent PZD3	4: Output voltage (*1, V) 5: Output current (*10, A) 6: Output torque actual value (*10, %) 7: Output power actual value (*10, %) 8: Running rotating speed (*1, RPM) 9: Running linear speed (*1, m/s) 10: Ramp reference frequency 11: Fault code 12: AI1 value (*100, V) 13: AI2 value (*100, V) 14: AI3 value (*100, V) 15: PULSE frequency value (*100, kHz) 16: Terminals input state 17: Terminals output state 18: PID given (*100, %) 19: PID feedback (*100, %) 20: Motor rated torque 21: Control word	0	○
P15.15	Sent PZD4		0	○
P15.16	Sent PZD5		0	○
P15.17	Sent PZD6		0	○
P15.18	Sent PZD7		0	○
P15.19	Sent PZD8		0	○
P15.20	Sent PZD9		0	○
P15.21	Sent PZD10		0	○
P15.22	Sent PZD11		0	○
P15.23	Sent PZD12		0	○
P15.24	Temporarily variable 1 for PZD sending	0–65535	0	○
P15.25	DP communication overtime downtime	0.0 (invalid) , 0.1–60.0s	0.0s	○
P15.26	CANopen communication overtime fault time	0.0 (invalid) , 0.1–60.0s	0.0s	○
P15.27	CANopen communication on baud ratio	0: 1000k 1: 800k 2: 500k 3: 250k 4: 125k 5: 100k 6: 50k 7: 20k	0	○

P16 group—Ethernet function

Function code	Name	Description	Default value	Modify
P16.00	Speed setting of the Ethernet communication	0: Self-adapting 1: 100M full duplex 2: 100M semi-duplex 3: 10M full duplex 4: 10M semi-duplex	0	◎
P16.01	IP address 1	0–255	192	◎
P16.02	IP address 2	0–255	168	◎
P16.03	IP address 3	0–255	0	◎
P16.04	IP address 4	0–255	1	◎
P16.05	Subnet mask 1	0–255	255	◎
P16.06	Subnet mask 2	0–255	255	◎
P16.07	Subnet mask 3	0–255	255	◎
P16.08	Subnet mask 4	0–255	0	◎
P16.09	Gateway 1	0–255	192	◎
P16.10	Gateway 2	0–255	168	◎
P16.11	Gateway 3	0–255	1	◎
P16.12	Gateway 4	0–255	1	◎

P17 group—Monitoring functions

Function code	Name	Description	Default value	Modify
P17.00	Set frequency	0.00Hz–P00.03	0.00Hz	●
P17.01	Output frequency	0.00Hz–P00.03	0.00Hz	●
P17.02	Ramp reference frequency	0.00Hz–P00.03	0.00Hz	●
P17.03	Output voltage	0–1200V	0V	●
P17.04	Output current	0.0–3000.0A	0.0A	●
P17.05	Motor rotation speed	0–65535RPM	0 RPM	●
P17.06	Torque current	-3000.0–3000.0A	0.0A	●
P17.07	Magnetized	-3000.0–3000.0A	0.0A	●

Function code	Name	Description	Default value	Modify
	current			
P17.08	Motor power	-300.0–300.0% (of the motor rated current)	0.0%	●
P17.09	Output torque	-250.0–250.0%	0.0%	●
P17.10	Estimated motor frequency	0.00–P00.03	0.00Hz	●
P17.11	DC bus voltage	0.0–2000.0V	0V	●
P17.12	Digital input terminal status	0000–00FF	0	●
P17.13	Digital output terminal status	0000–000F	0	●
P17.14	Digital adjustment	0.00Hz–P00.03	0.00V	●
P17.15	Torque reference	-300.0%–300.0% (of the motor rated current)	0.0%	●
P17.16	Linear speed	0–65535	0	●
P17.17	Length	0–65535	0	●
P17.18	Counting value	0–65535	0	●
P17.19	AI1 input voltage	0.00–10.00V	0.00V	●
P17.23	PID given value	-100.0–100.0%	0.0%	●
P17.24	PID response value	-100.0–100.0%	0.0%	●
P17.25	Power factor of the motor	-1.00–1.00	0.0	●
P17.26	Current running time	0–65535m	0m	●
P17.27	Simple PLC and the current stage of the multi-stage speed	0–15	0	●
P17.28	ASR controller output	-300.0%–300.0% (of the motor rated current)	0.0%	●

Function code	Name	Description	Default value	Modify
P17.29	Synchronous motor magnetic pole angle	0.0–360.0	0.0	●
P17.30	Synchronous motor phase compensation	-180.0–180.0	0.0	●
P17.31	Synchronous motor high-frequency superimposed current	0.0%–200.0% (of the motor rated current)	0.0	●
P17.32	Magnetic flux linkage	0.0%–200.0%	0.0%	●
P17.33	Exciting current reference	-3000.0–3000.0A	0.0A	●
P17.34	Torque current reference	-3000.0–3000.0A	0.0A	●
P17.35	AC input current	0.0–5000.0A	0.0A	●
P17.36	Output torque	-3000.0Nm–3000.0Nm	0.0Nm	●
P17.37	Motor overload counting value	0–100 (when it is 100, the OL1 fault is reported)	0	●
P17.38	PID output value	-100.00–100.00%	0.00%	●
P17.39	Parameter download error function parameters	0.00–99.99	0.00	●

P20 group—Power-specific control

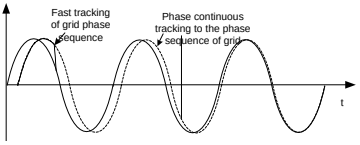
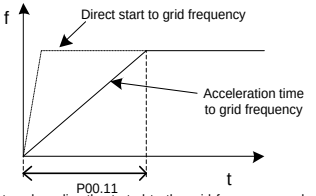
Function code	Name	Description	Default value	Modify
P20.00	PWM selection	0: Three-phase SVPWM 1: Three-phase SPWM **Note:** P20.01–P20.03 the voltage regulation coefficient is only applicable to SPWM mode	0	◎

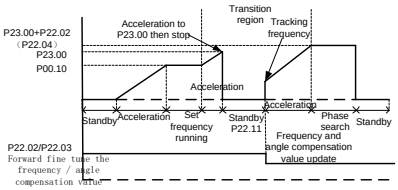
Function code	Name	Description	Default value	Modify
P20.01	U phase voltage coefficient	0–120.0%	100.0%	○
P20.02	V phase voltage coefficient	0–120.0%	100.0%	○
P20.03	W phase voltage coefficient	0–120.0%	100.0%	○
P20.04	Output voltage display correction coefficient	0.0–200.0% **Note:** Output voltage correction coefficient (three-phase)	100.0%	○
P20.05	Undervoltage alarm delay	1. In running, the bus voltage is below the undervoltage point +40V, the alarm delay starts. If the bus voltage is below the undervoltage point and the delay time is over, the VFD reports undervoltage fault. 2. If the VFD is not in running and the bus voltage is below the undervoltage point, it reports POFF.	0.0S	○
P20.06	Software undervoltage point 1	0.0V–2000.0V For 380 voltage class, default value: 420V	420V	◎
P20.07	Software undervoltage recovery point 1	0.0V–2000.0V For 380 voltage class, default value: 480V	480	◎
P20.08	Software undervoltage point 2	0.0V–2000.0V For 380 voltage class, default value: 380V	380	◎
P20.09	Software undervoltage recovery point 2	0.0V–2000.0V For 380 voltage class, default value: 480V	480	◎
P20.10	Voltage compensation gain	0–200 (invalid in voltage PID closed loop) Applied to open loop control: mainly in heavy-duty running, voltage compensation required	0	○
P20.11	Output angle compensation value	-180.0°–180.0° (Valid only when P22.00=1/2 and the ones place of P22.01 is 1) **Note:** 0.0° indicates automatic phase	0.0°	○

Function code	Name	Description	Default value	Modify
		compensation (closed loop phase regulation); a value but not 0.0° indicates manual phase compensation.		

P22 group—Grid/variable frequency switching

Function code	Name	Description	Default value	Modify
P22.00	VFD working mode selection	0–4 0: Normal mode 1: EPS mode 2: Undisturbed switching (variable frequency switch to power frequency), only support VIM mode **Note:** The frequency size is locked in the power frequency P23.00, the operation direction is determined by the frequency. It is forbidden to adjust the setting direction of P00.13. It is necessary to change the direction of the motor and adjust the UVW output line. 3: Interference switching (variable frequency switch to power frequency), support VF, vector control mode. Note: same as above (mode 2) 4: variable frequency switch to power frequency escalator applications **Note:** At the elevator application, during the upward (forward) running, the output frequency is in the positive sequence, grid/variable frequency switching is performed in forward order. Therefore, it is required that the power grid phase sequence is positive. During downward (reverse) running, the output frequency is inverse, grid/variable frequency switching is performed in reverse order, and phase lock is performed after the grid input voltage phase is inversed, and at the same time, the power frequency contactor also needs to be in reverse connection.	0	◎

Function code	Name	Description	Default value	Modify
P22.01	Power frequency synchronization mode selection	0x000–0x111 LED ones: frequency control selection 0: Non-power frequency synchronization mode: Variable frequency output and power frequency phase are out of sync. 1: Power frequency synchronization mode: Variable frequency output and power frequency phase synchronization (in this mode, the slip compensation and automatic torque lift are invalid) LED tens: Power grid lock phase action selection. 0: Fast tracking mode (phase discontinuity)  1: Phase continuous mode LED hundreds: Synchronous mode frequency acceleration action selection. 0: Speed up to the power frequency. 1: Direct start to power frequency (commonly used for resistive load)  Note: when directly started to the grid frequency mode, the frequency is not the direct jump to the grid frequency, and there is a certain acceleration time. The time is set by P11.07.	0x000	◎
P22.02	Positive sequence adjustment frequency	P22.02 range: 0.00–10.00Hz P22.03 range: -180.0–180.0° P22.04 range: 0.00–10.00Hz P22.05: -180.0–180.0°	0.50Hz	○
P22.03	Positive sequence phase angle	If S=43, it is automatic learning mode, and P22.02–P22.05 is automatically updated according to the learning situation.	10.0°	○

Function code	Name	Description	Default value	Modify
	compensation	If S=44, P22.02–P22.05 manual input or direct use of the update value obtained when S=43.		
P22.04	Negative sequence fine tuning frequency		0.50Hz	○
P22.05	Negative sequence phase angle compensation		10.0°	○
P22.06	Work frequency switching contactor operating time	0.00–2.00s	0.10s	●
P22.07	Variable/power frequency switching contactor action time offset	-2.00–2.00s Slightly adjust the setting of P22.06.	0.00	○
P22.08	Phase lock test mode selection	Only manufacturers use features 0: Test mode is invalid 1: Test mode is valid Test mode is valid (it can simulate grid voltage input according to the set value of P22.07 – P22.08, the actual grid input will be shielded)	0	◎
P22.09	Analog power frequency	-60.0–60.0Hz	50.00Hz	○
P22.10	Analog grid voltage value	0–1500V	380V	○
P22.11	I/O inversion/phase lock failure detection protection	0x00–0x11 LED ones: terminal board RST input inversion (UIPE) 0: Input inversion protection prohibited 1: Input inversion protection allowed LED tens: terminal board RST output inversion	0x211	○

Function code	Name	Description	Default value	Modify
		(UOPE) 0: Output inversion protection prohibited 1: Output inversion protection allowed LED hundreds: terminal board UVW phase failure (PLLE) 0: Phase lock failure (PLLE) detection is always invalid 1: Phase lock failure (PLLE) detection is valid at stop 2: Phase lock failure (PLLE) detection is always valid		
P22.12	Learning time of stop at switching from variable frequency to power frequency	0.500–10.000s **Note:** It is recommended that the last two decimal places to be zero.	0.500	◎
P22.13	Terminal board type	0: Support 380V voltage class 1: Support 660V voltage class	1	◎
P22.14	Software delay after power frequency request	0–65535s The frequency or phase is adjusted after software delay is added since the power frequency is requested.	0	○
P22.15	Synchronization output filter times	0–16 Used to adjust the phase approximation coefficient of the synchronization output.	8	○

P23 group—EPS-specific status view

Function code	Name	Description	Default value	Modify
P23.00	Power frequency	-60.00–60.00Hz Sampling through terminal block RST	0.00Hz	●
P23.01	Grid voltage value	0–2000V Sampling through terminal block RST	0V	●
P23.02	Output side frequency	-60.00–60.00Hz Sampling through terminal block UVW	0.00Hz	●

Function code	Name	Description	Default value	Modify
P23.03	Output voltage valid value	0–2000V Sampling through terminal block UVW	0V	●
P23.04	Grid phase-locked output status	0x0000–0x1111 LED ones: grid power-on signal 0: Grid power on 1: Grid power off LED tens: initialization flag of the phase-locked loop 0: The initialization is completed. 1: The initialization is incomplete. LED hundreds: 50/60HZ grid display 0: 50HZ grid 1: 60Hz grid LED thousands: phase locking success flag 0: failed 1: successful	0	●
P23.05	Switching signal	0x0–0x1 LED ones: switching signal 0: Switching signal not output 1: Switching signal already output	0	●

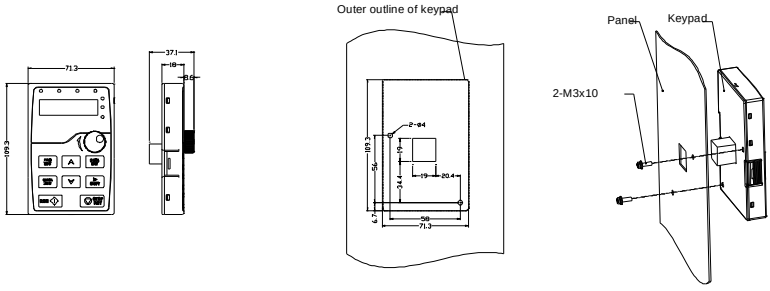
Appendix B Product dimensions

B.1 What this chapter contains

This chapter describes the dimension drawings of the VFD. The dimension unit used in the drawings is mm.

B.2 Keypad structure

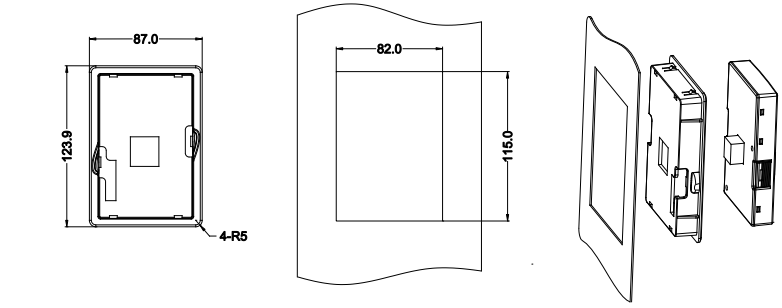
B.2.1 Structure diagram



Installing the keypad without a bracket

B.2.2 Keypad installation bracket (optional)

Note: The keypad can be externally connected to the VFD, which requires a network cable with a standard RJ45 crystal head as the connection cable. When connecting the keypad externally, you can directly use M3 threaded screws or a keypad bracket. Keypad installation brackets are optional parts for the VFD models of 380V 1.5–30kW and 500V 4–18.5kW, but they are standard configuration for the VFD models of 380V 37–500kW, 500V 22–500kW, and 660V.



Keypad installation bracket Installation dimensions

B.3 Dimensions for AC 3PH 380V (-15%)–440V (+10%)

B.3.1 Wall mounting

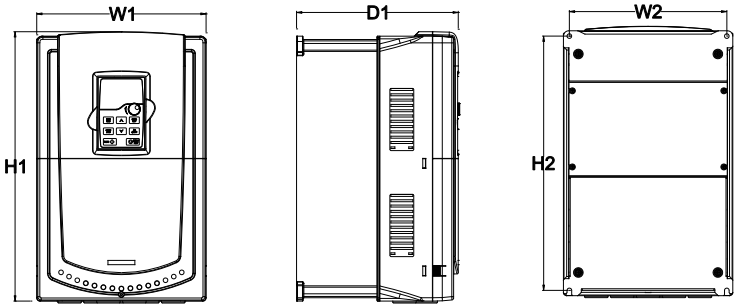


Figure B.1 380V 4–30kW VFD wall-mounting diagram

VFD model	W1	W2	H1	H2	D1	Installation hole diameter
4kW–5.5kW	146	131	263	243.5	181	6
7.5kW–11kW	170	151	331.5	303.5	216	6
15kW–18.5kW	230	210	342	311	216	6
22kW–30kW	255	237	407	384	245	7

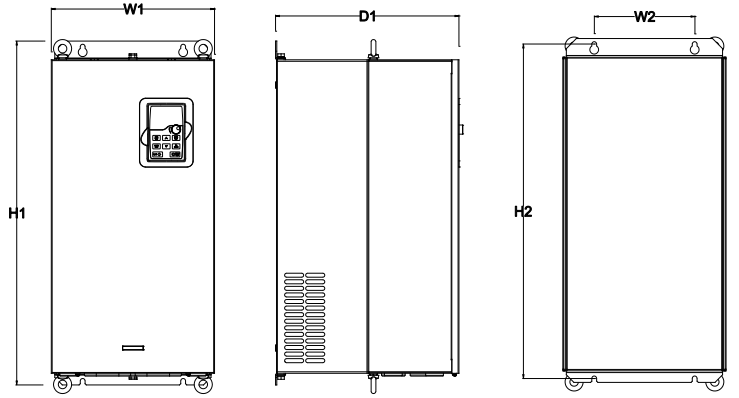


Figure B.2 380V 37–110kW VFD wall-mounting diagram

VFD model	W1	W2	H1	H2	D1	Installation hole diameter
37kW–55kW	270	130	555	540	325	7
75kW–110kW	325	200	680	661	365	9.5

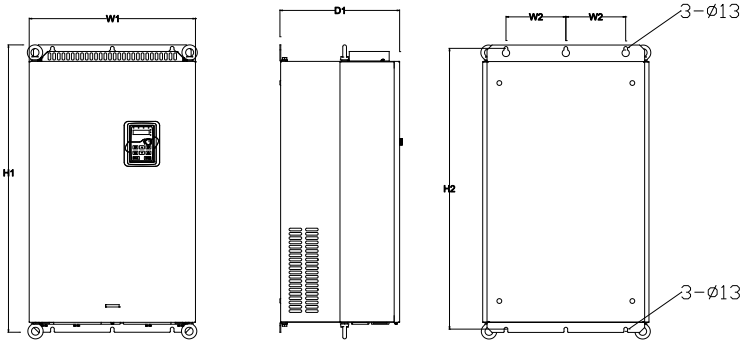


Figure B.3 380V 132–200kW VFD wall-mounting diagram

VFD model	W1	W2	H1	H2	D1	Installation hole diameter
132kW–200kW	500	180	870	850	360	11

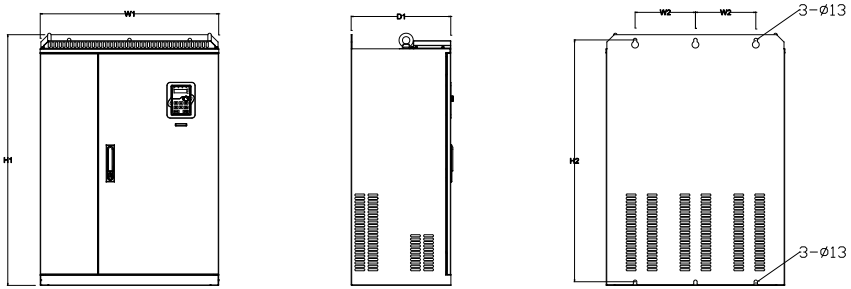


Figure B.4 380V 220–315kW VFD wall-mounting diagram

VFD model	W1	W2	H1	H2	D1	Installation hole diameter
220kW–315kW	680	230	960	926	380	13

B.3.2 Flange mounting

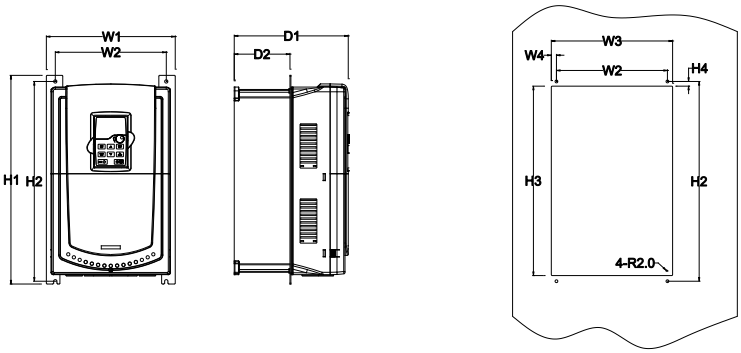


Figure B.5 380V 4–30kW VFD flange-mounting diagram

VFD model	W1	W2	W3	W4	H1	H2	H3	H4	D1	D2	Installation hole diameter
4kW–5.5kW	170	131	150	9.5	292	276	260	10	181	79.5	6
7.5kW–11kW	191	151	174	11.5	370	351	324	15	216.2	113	6
15kW–18.5kW	250	210	234	12	375	356	334	10	216	108	6
22kW–30kW	275	237	259	11	445	426	404	10	245	119	7

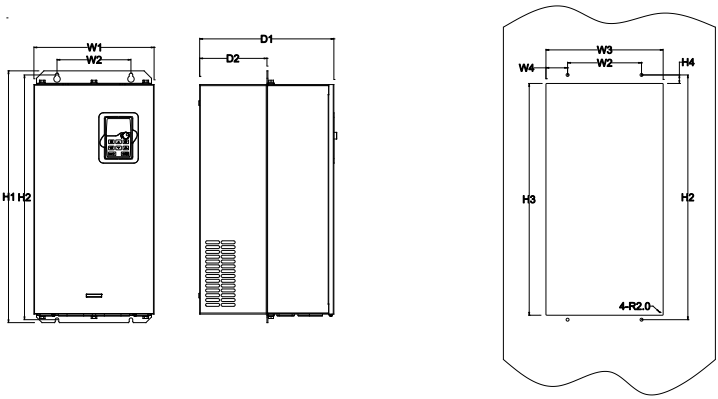


Figure B.6 380V 37–110kW VFD flange-mounting diagram

VFD model	W1	W2	W3	W4	H1	H2	H3	H4	D1	D2	Installation hole diameter
37kW–55kW	270	130	261	65.5	555	540	516	17	325	167	7
75kW–110kW	325	200	317	58.5	680	661	626	23	363	182	9.5

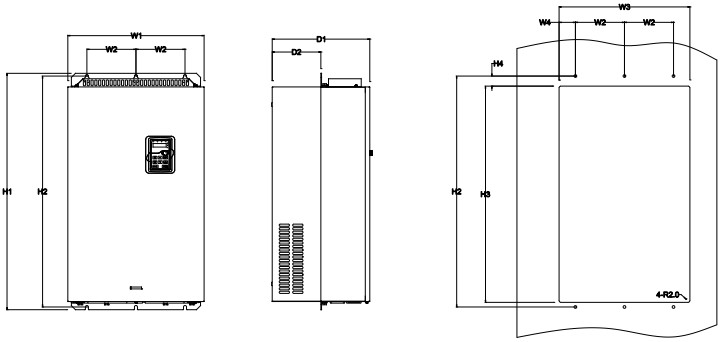


Figure B.7 380V 132–200kW VFD flange-mounting diagram

VFD model	W1	W2	W3	W4	H1	H2	H3	H4	D1	D2	Installation hole diameter
132kW–200kW	500	180	480	60	870	850	796	37	358	178.5	11

B.3.3 Floor mounting

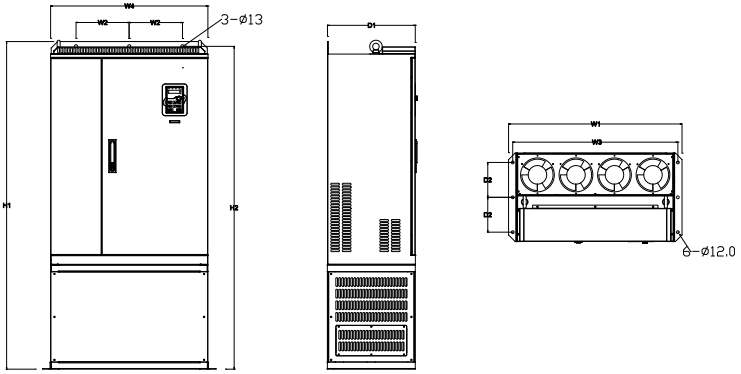


Figure B.8 380V 220–315kW VFD floor-mounting diagram

VFD model	W1	W2	W3	W4	H1	H2	D1	D2	Installation hole diameter
220kW–315kW	750	230	714	680	1410	1390	380	150	13/12

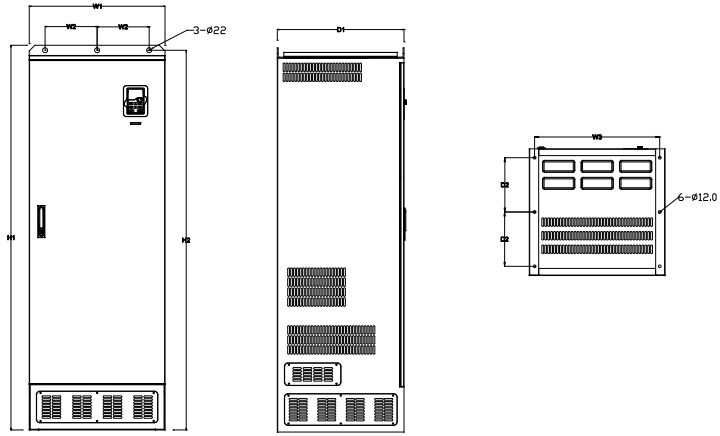


Figure B.9 380V 350–500kW VFD floor-mounting diagram

VFD model	W1	W2	W3	W4	H1	H2	D1	D2	Installation hole diameter
350kW–500kW	620	230	573	/	1700	1678	560	240	22/12

B.4 Dimensions for AC 3PH 520V (-15%)–690V (+10%)

B.4.1 Wall mounting

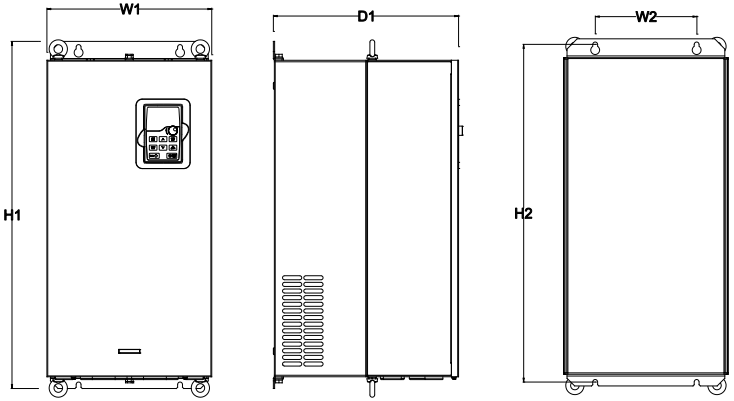


Figure B.10 660V 22–132kW VFD wall-mounting diagram

VFD model	W1	W2	H1	H2	D1	Installation hole diameter
22kW–45kW	270	130	555	540	325	7
55kW–132kW	325	200	680	661	365	9.5

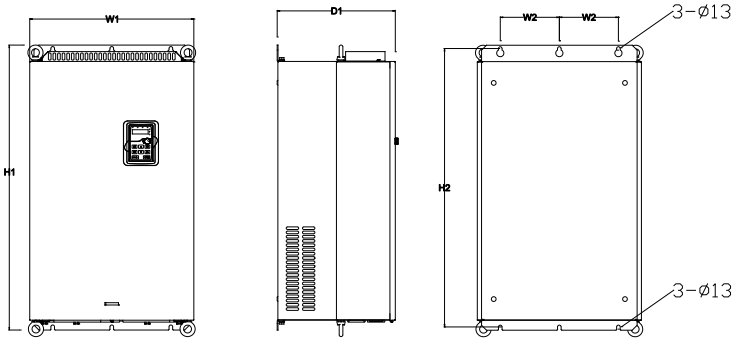


Figure B.11 660V 160–220kW VFD wall-mounting diagram

VFD model	W1	W2	H1	H2	D1	Installation hole diameter
160kW–220kW	500	180	870	850	360	11

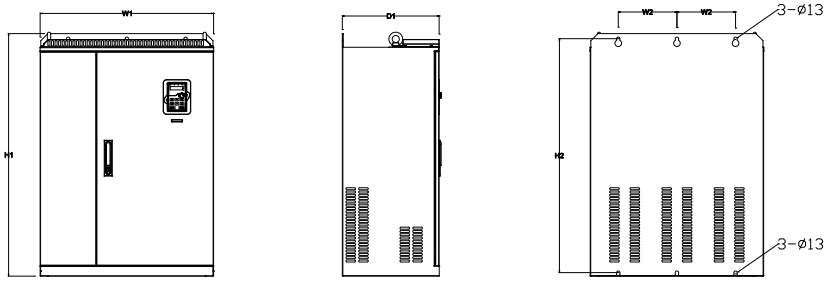


Figure B.12 660V 250–350kW VFD wall-mounting diagram

VFD model	W1	W2	H1	H2	D1	Installation hole diameter
250kW–350kW	680	230	960	926	380	13

B.4.2 Flange mounting

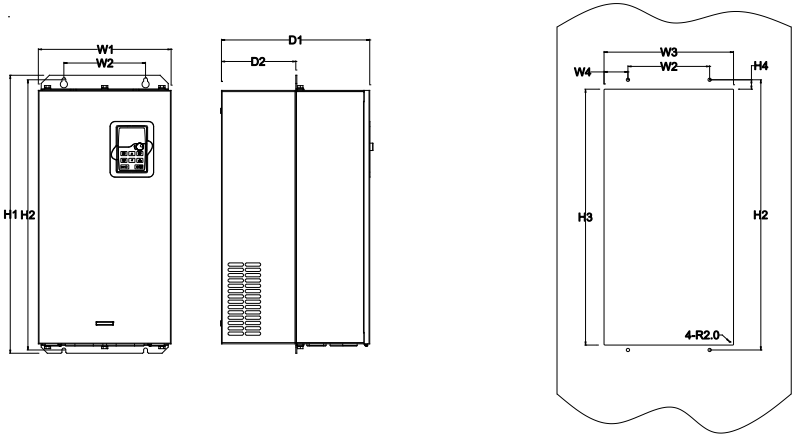


Figure B.13 660V 22–132kW VFD flange-mounting diagram

VFD model	W1	W2	W3	W4	H1	H2	H3	H4	D1	D2	Installation hole diameter
22kW–45kW	270	130	261	65.5	555	540	516	17	325	167	7
55kW–132kW	325	200	317	58.5	680	661	626	23	363	182	9.5

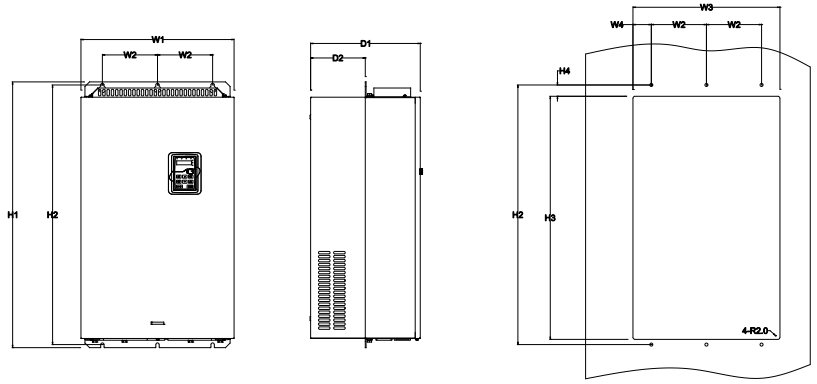


Figure B.14 660V 160–220kW VFD flange-mounting diagram

VFD model	W1	W2	W3	W4	H1	H2	H3	H4	D1	D2	Installation hole diameter
160kW–220kW	500	180	480	60	870	850	796	37	358	178.5	11

B.4.3 Floor mounting

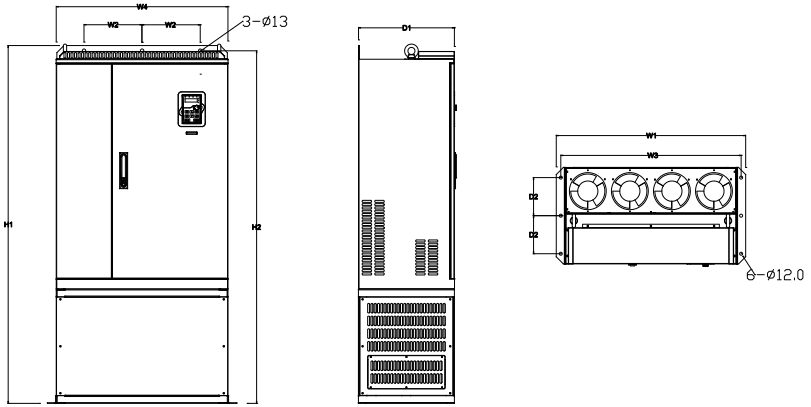


Figure B.15 660V 250–350kW VFD floor-mounting diagram

VFD model	W1	W2	W3	W4	H1	H2	D1	D2	Installation hole diameter
250kW–350kW	750	230	714	680	1410	1390	380	150	13/12

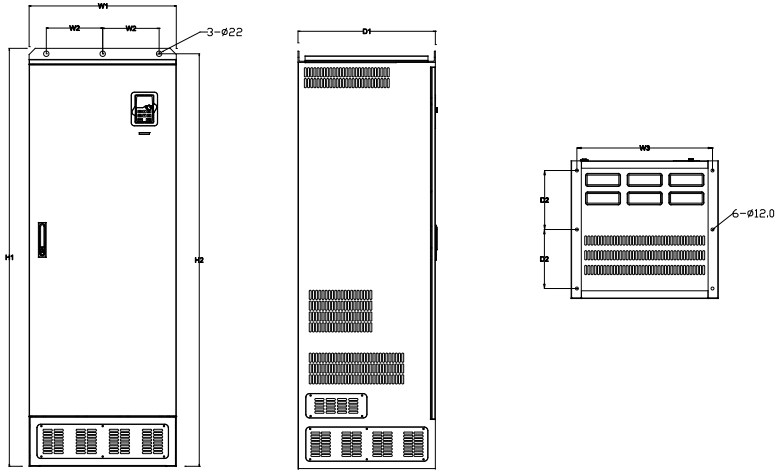


Figure B.16 660V 400–630kW VFD floor-mounting diagram

VFD model	W1	W2	W3	W4	H1	H2	D1	D2	Installation hole diameter
400kW–630kW	620	230	573	/	1700	1678	560	240	22/12

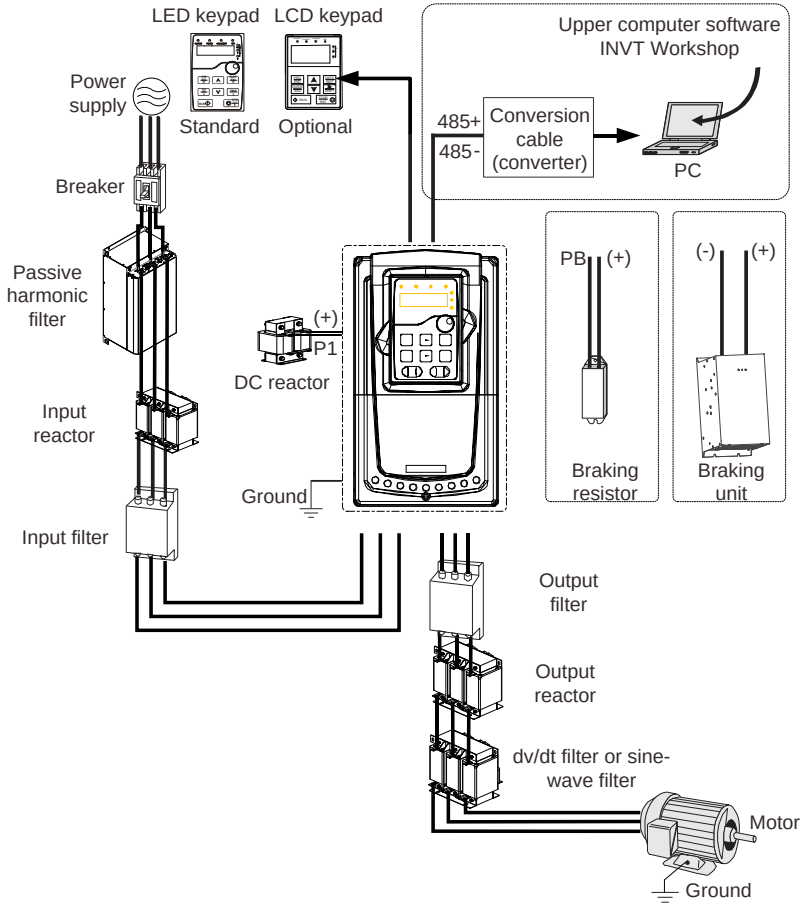
Appendix C Optional peripheral accessories

C.1 What this chapter contains

This chapter describes how to select optional accessories of the VFD.

C.2 Peripheral wiring

The following figure shows the peripheral wiring of the VFD.



Note:

- The VFD models of 380V 30kW and lower are equipped with built-in braking units.
- P1 terminals are equipped for all 660V VFD models and the VFD models of 380V 37kW and higher, which enable the VFD models to be directly connected to external DC reactors.

- The braking units are INVT DBU series standard braking units. For details, see the DBU operation manual.

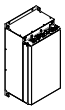
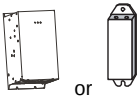
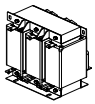
Image	Name	Description
	Cable	Accessory for electrical signal transmission.
	Breaker	Accessory used to prevent electric shock accidents and protect against to-ground short circuits that may cause leakage current and fire. Select a residual-current circuit breaker (RCCB) with the function of suppressing high-order harmonics for VFD devices. The rated sensitive current of the selected breaker must be greater than 30mA for one VFD device.
	Passive harmonic filter	Accessory used to reduce the current distortion rate and harmonic content, thereby improving the power factor.
	Input reactor	Accessory that prevents inrush current from damaging rectifier components when high voltage is applied from the grid. It is connected to the input side and also helps improve power factor. The VFD models of 380V 37kW and higher and all 660V VFD models can be directly connected to external DC reactors.
	Input filter	Accessory that restricts the electromagnetic interference generated by the VFD and transmitted to the public grid through the power cable. Try to install the input filter near the input terminal side of the VFD.
	DC reactor	Accessory used to improve the input-side power factor of the VFD, and thus suppress high-order harmonic currents. The VFD models of 380V 37kW and higher and all 660V VFD models can be directly connected to external DC reactors.
 or	Braking unit or braking resistor	Accessory used to consume the regenerative energy of the motor to reduce the DEC time. The VFD models of 380V 30kW and lower only need to be configured with braking resistors, while all 660V VFD models and the VFD models of 380V 37kW and higher additionally need to be

Image	Name	Description
		configured with braking units.
	Output filter	Accessory used to restrict interference generated in the wiring area on the output side of the VFD. Try to install the output filter near the output terminal side of the VFD.
	Output reactor	Accessory used to lengthen the valid transmission distance of the VFD, which effectively restricts the transient high voltage generated during the switch-on and switch-off of the IGBT module of the VFD.
	dv/dt filter	Accessory used to suppress voltage spikes, reduce traveling waves in long cables, and reflect dv/dt transient voltages, thereby reducing motor eddy current losses and noise, and providing motor insulation protection.
	Sine-wave filter	Accessory used to suppress and absorb high-order harmonic currents derived from switching frequency ripple currents, correcting the waveform to approximate a sine wave, significantly extending the length of the output cable, reducing motor eddy current losses and noise, and protecting motor insulation.

C.3 Harmonic filter

C.3.1 Reactor model selection

To enhance grid protection, reduce harmonic interference from the VFD to the grid, and improve input power factor, consider configuring external DC reactors, input reactors, or passive harmonic filters based on your specific application needs.

If you want to use long cables between the VFD and the motor, select external output reactors, dv/dt attenuation filters, or sine-wave filters based on the motor cable length. This helps mitigate excessive dv/dt, reducing voltage stress on the motor windings as well as protecting them, and extending the motor's lifespan. Refer to the table below for recommended output filter selections according to motor cable length.

Recommended output filter selections according to motor cable length:

Non-shielded cable length	50m–150m	150m–450m	450m–1000m
Shielded cable length	30m–100m	100m–230m	230m–500m
Output reactor category	Output reactor (1%)	/	/
	/	dv/dt filter	/
	/	/	Sine-wave filter

Table C-1 Reactor model selection for AC 3PH 380V(-15%)–440V(+10%)

VFD model	Input reactor	DC reactor	Output reactor
GD300-004G-4-EP	GDL-ACL0014-4CU	-	GDL-OCL0010-4CU
GD300-5R5G-4-EP	GDL-ACL0020-4CU	-	GDL-OCL0014-4CU
GD300-7R5G-4-EP	GDL-ACL0025-4CU	-	GDL-OCL0020-4CU
GD300-011G-4-EP	GDL-ACL0035-4AL	-	GDL-OCL0025-4CU
GD300-015G-4-EP	GDL-ACL0040-4AL	-	GDL-OCL0035-4AL
GD300-018G-4-EP	GDL-ACL0051-4AL	-	GDL-OCL0040-4AL
GD300-022G-4-EP	GDL-ACL0051-4AL	-	GDL-OCL0050-4AL
GD300-030G-4-EP	GDL-ACL0070-4AL	-	GDL-OCL0060-4AL
GD300-037G-4-EP	GDL-ACL0090-4AL	GDL-DCL0100-4AL	GDL-OCL0075-4AL
GD300-045G-4-EP	GDL-ACL0110-4AL	GDL-DCL0125-4AL	GDL-OCL0092-4AL
GD300-055G-4-EP	GDL-ACL0150-4AL	GDL-DCL0160-4AL	GDL-OCL0115-4AL
GD300-075G-4-EP	GDL-ACL0150-4AL	GDL-DCL0210-4AL	GDL-OCL0150-4AL
GD300-090G-4-EP	GDL-ACL0220-4AL	GDL-DCL0210-4AL	GDL-OCL0220-4AL
GD300-110G-4-EP	GDL-ACL0220-4AL	GDL-DCL0255-4AL	GDL-OCL0220-4AL
GD300-132G-4-EP	GDL-ACL0265-4AL	GDL-DCL0300-4AL	GDL-OCL0265-4AL
GD300-160G-4-EP	GDL-ACL0330-4AL	GDL-DCL0365-4AL	GDL-OCL0330-4AL
GD300-185G-4-EP	GDL-ACL0390-4AL	GDL-DCL0455-4AL	GDL-OCL0400-4AL
GD300-200G-4-EP	GDL-ACL0390-4AL	GDL-DCL0455-4AL	GDL-OCL0400-4AL
GD300-220G-4-EP	GDL-ACL0450-4AL	GDL-DCL0505-4AL	GDL-OCL0450-4AL
GD300-250G-4-EP	GDL-ACL0500-4AL	GDL-DCL0550-4AL	GDL-OCL0500-4AL
GD300-280G-4-EP	GDL-ACL0500-4AL	GDL-DCL0675-4AL	GDL-OCL0560-4AL
GD300-315G-4-EP	GDL-ACL0580-4AL	GDL-DCL0675-4AL	GDL-OCL0660-4AL

Table C-2 Reactor model selection for AC 3PH 520V(-15%)–690V(+10%)

VFD model	Input reactor	DC reactor	Output reactor
GD300-022G-6-EP	GDL-ACL0045-6CU	GDL-DCL0045-6CU	GDL-OCL0045-6CU
GD300-030G-6-EP	GDL-ACL0045-6CU	GDL-DCL0050-6CU	GDL-OCL0045-6CU
GD300-037G-6-EP	GDL-ACL0050-6CU	GDL-DCL0080-6CU	GDL-OCL0045-6CU
GD300-045G-6-EP	GDL-ACL0060-6CU	GDL-DCL0080-6CU	GDL-OCL0060-6CU
GD300-055G-6-EP	GDL-ACL0090-6CU	GDL-DCL0080-6CU	GDL-OCL0090-6CU
GD300-075G-6-EP	GDL-ACL0090-6CU	GDL-DCL0165-6CU	GDL-OCL0090-6CU
GD300-090G-6-EP	GDL-ACL0110-6CU	GDL-DCL0165-6CU	GDL-OCL0110-6CU
GD300-110G-6-EP	GDL-ACL0150-6CU	GDL-DCL0165-6CU	GDL-OCL0150-6CU
GD300-132G-6-EP	GDL-ACL0150-6CU	GDL-DCL0265-6CU	GDL-OCL0150-6CU
GD300-160G-6-EP	GDL-ACL0200-6CU	GDL-DCL0265-6CU	GDL-OCL0200-6CU

VFD model	Input reactor	DC reactor	Output reactor
GD300-185G-6-EP	GDL-ACL0200-6CU	GDL-DCL0265-6CU	GDL-OCL0200-6CU
GD300-200G-6-EP	GDL-ACL0250-6CU	GDL-DCL0330-6CU	GDL-OCL0250-6CU
GD300-220G-6-EP	GDL-ACL0250-6CU	GDL-DCL0330-6CU	GDL-OCL0250-6CU
GD300-250G-6-EP	GDL-ACL0300-6CU	GDL-DCL0330-6CU	GDL-OCL0300-6CU
GD300-280G-6-EP	GDL-ACL0300-6CU	GDL-DCL0475-6CU	GDL-OCL0300-6CU
GD300-315G-6-EP	GDL-ACL0400-6CU	GDL-DCL0475-6CU	GDL-OCL0400-6CU
GD300-350G-6-EP	GDL-ACL0400-6CU	GDL-DCL0475-6CU	GDL-OCL0400-6CU
GD300-400G-6-EP	GDL-ACL0480-6CU	GDL-DCL0600-6CU	GDL-OCL0480-6CU
GD300-500G-6-EP	GDL-ACL0480-6CU	GDL-DCL0600-6CU	GDL-OCL0480-6CU
GD300-560G-6-EP	GDL-ACL0600-6CU	GDL-DCL0750-6CU	GDL-OCL0600-6CU
GD300-630G-6-EP	GDL-ACL0600-6CU	GDL-DCL0750-6CU	GDL-OCL0600-6CU

Note:

- The rated input voltage drop of input reactors is ≥1.5%.
- The rated output voltage drop of output reactors is 1%.
- All the accessories in the preceding tables are externally configured and must be explicitly specified during purchasing.
- For optional accessories with material requirements different from the recommended tables above, please refer to the GDL series low-voltage VFD filter accessory brochure.

C.3.2 Filter model selection

Table C-3 Filter model selection for AC 3PH 380V(-15%)–440V(+10%)

VFD model	Input filter	Output filter	
	Passive harmonic filter	dv/dt filter	Sine-wave filter
GD300-004G-4-EP	GDL-H0014-4AL	GDL-DUL0010-4CU	GDL-OSF0010-4AL
GD300-5R5G-4-EP	GDL-H0020-4AL	GDL-DUL0014-4CU	GDL-OSF0014-4AL
GD300-7R5G-4-EP	GDL-H0025-4AL	GDL-DUL0020-4CU	GDL-OSF0020-4AL
GD300-011G-4-EP	GDL-H0032-4AL	GDL-DUL0025-4CU	GDL-OSF0025-4AL
GD300-015G-4-EP	GDL-H0040-4AL	GDL-DUL0032-4CU	GDL-OSF0032-4AL
GD300-018G-4-EP	GDL-H0047-4AL	GDL-DUL0040-4AL	GDL-OSF0040-4AL
GD300-022G-4-EP	GDL-H0056-4AL	GDL-DUL0045-4AL	GDL-OSF0045-4AL
GD300-030G-4-EP	GDL-H0070-4AL	GDL-DUL0060-4AL	GDL-OSF0060-4AL
GD300-037G-4-EP	GDL-H0080-4AL	GDL-DUL0075-4AL	GDL-OSF0075-4AL
GD300-045G-4-EP	GDL-H0100-4AL	GDL-DUL0100-4AL	GDL-OSF0095-4AL

VFD model	Input filter	Output filter	
	Passive harmonic filter	dv/dt filter	Sine-wave filter
GD300-055G-4-EP	GDL-H0130-4AL	GDL-DUL0120-4AL	GDL-OSF0120-4AL
GD300-075G-4-EP	GDL-H0160-4AL	GDL-DUL0150-4AL	GDL-OSF0150-4AL
GD300-090G-4-EP	GDL-H0190-4AL	GDL-DUL0180-4AL	GDL-OSF0180-4AL
GD300-110G-4-EP	GDL-H0225-4AL	GDL-DUL0220-4AL	GDL-OSF0220-4AL
GD300-132G-4-EP	GDL-H0265-4AL	GDL-DUL0260-4AL	GDL-OSF0260-4AL
GD300-160G-4-EP	GDL-H0320-4AL	GDL-DUL0320-4AL	GDL-OSF0320-4AL
GD300-185G-4-EP	GDL-H0014-4AL	GDL-DUL0400-4AL	GDL-OSF0400-4AL
GD300-200G-4-EP	GDL-H0020-4AL	GDL-DUL0400-4AL	GDL-OSF0400-4AL
GD300-220G-4-EP	GDL-H0025-4AL	GDL-DUL0480-4AL	GDL-OSF0480-4AL
GD300-250G-4-EP	GDL-H0032-4AL	GDL-DUL0480-4AL	GDL-OSF0480-4AL
GD300-280G-4-EP	GDL-H0040-4AL	GDL-DUL0540-4AL	GDL-OSF0600-4AL
GD300-315G-4-EP	GDL-H0047-4AL	GDL-DUL0600-4AL	GDL-OSF0600-4AL

Note:

- The applicable voltage range for the passive harmonic filters is 380–400V 50Hz.
- All the accessories in the preceding table are externally configured and must be explicitly specified during purchasing.
- For optional accessories with material requirements different from the recommended table above, please refer to the GDL series low-voltage VFD filter accessory brochure.

Table C-4 Filter model selection for AC 3PH 520V(-15%)–690V(+10%)

VFD model	Input filter	Output filter	
	Passive harmonic filter	dv/dt filter	Sine-wave filter
GD300-022G-6-EP	GDL-H0035-6AL	GDL-DUL0030-6CU	GDL-OSF0030-6CU
GD300-030G-6-EP	GDL-H0047-6AL	GDL-DUL0045-6CU	GDL-OSF0045-6CU
GD300-037G-6-EP	GDL-H0047-6AL	GDL-DUL0045-6CU	GDL-OSF0045-6CU
GD300-045G-6-EP	GDL-H0060-6AL	GDL-DUL0065-6CU	GDL-OSF0065-6CU
GD300-055G-6-EP	GDL-H0090-6AL	GDL-DUL0065-6CU	GDL-OSF0065-6CU
GD300-075G-6-EP	GDL-H0090-6AL	GDL-DUL0090-6CU	GDL-OSF0090-6CU
GD300-090G-6-EP	GDL-H0110-6AL	GDL-DUL0110-6CU	GDL-OSF0110-6CU
GD300-110G-6-EP	GDL-H0150-6AL	GDL-DUL0150-6CU	GDL-OSF0150-6CU
GD300-132G-6-EP	GDL-H0150-6AL	GDL-DUL0150-6CU	GDL-OSF0150-6CU
GD300-160G-6-EP	GDL-H0200-6AL	GDL-DUL0220-6CU	GDL-OSF0200-6CU
GD300-185G-6-EP	GDL-H0200-6AL	GDL-DUL0220-6CU	GDL-OSF0200-6CU

VFD model	Input filter	Output filter	
	Passive harmonic filter	dv/dt filter	Sine-wave filter
GD300-200G-6-EP	GDL-H0250-6AL	GDL-DUL0220-6CU	GDL-OSF0250-6CU
GD300-220G-6-EP	GDL-H0250-6AL	GDL-DUL0260-6CU	GDL-OSF0250-6CU
GD300-250G-6-EP	GDL-H0300-6AL	GDL-DUL0320-6CU	GDL-OSF0300-6CU
GD300-280G-6-EP	GDL-H0300-6AL	GDL-DUL0320-6CU	GDL-OSF0300-6CU
GD300-315G-6-EP	GDL-H0400-6AL	GDL-DUL0400-6CU	GDL-OSF0400-6CU
GD300-350G-6-EP	GDL-H0400-6AL	GDL-DUL0400-6CU	GDL-OSF0400-6CU
GD300-400G-6-EP	GDL-H0480-6AL	GDL-DUL0480-6CU	GDL-OSF0480-6CU
GD300-500G-6-EP	GDL-H0480-6AL	GDL-DUL0480-6CU	GDL-OSF0480-6CU
GD300-560G-6-EP	GDL-H0600-6AL	GDL-DUL0600-6CU	GDL-OSF0600-6CU
GD300-630G-6-EP	GDL-H0600-6AL	GDL-DUL0600-6CU	GDL-OSF0600-6CU

Note:

- The applicable voltage range for the passive harmonic filters is 660–690V 50Hz.
- All the accessories in the preceding table are externally configured and must be explicitly specified during purchasing.
- For optional accessories with material requirements different from the recommended table above, please refer to the GDL series low-voltage VFD filter accessory brochure.

Appendix D Model selection guideline

D.1 VFD model selection for EPS and regulated power supply applications

Connecting to an external battery pack is required in the EPS application so that the battery pack can supply power to the load when the grid power is off. The VFD power class is selected according to the undervoltage points of the battery voltage (that is, the bus voltage in this manual). To be specific, select the first and second undervoltage points according to your needs, calculate the inverter current according to the undervoltage points, and then select the VFD power according to the inverter current.

The inverter voltage calculation formula is as follows:

$$U_{INV} = \frac{U_{DC} * k}{\sqrt{2}}$$

The inverter current calculation formula is as follows:

$$I_{INV} = \frac{S_O}{\sqrt{3} * \eta_T * U_{INV}}$$

After conversion, the following inverter current formula is obtained:

$$I_{INV} = \frac{S_O * \sqrt{2}}{\sqrt{3} * \eta_T * U_{DC} * k}$$

In the formula:

S_O	Load apparent power.
η_T	Working efficiency of the filter and transformer.
U_{DC}	Bus undervoltage point.
U_{INV}	Inverter voltage.
k	Inverter duty ratio utilization.

According to the formula, inverter current calculation is related to load apparent power, working efficiency of the filter and the transformer, bus undervoltage point, and inverter duty ratio utilization.

The following is an example of how to choose a VFD model for a 37KVA load:

(1) Select the first voltage undervoltage point (420V) in SVPWM working mode:

S_O	37KVA
η_T	98%
U_{DC}	420V
k	99%

When the DC input voltage is 420V, the inverter current is as follows:

$$I_{INV} = \frac{S_O * \sqrt{2}}{\sqrt{3} * \eta_T * U_{DC} * k} = \frac{37000 * \sqrt{2}}{\sqrt{3} * 98\% * 420 * 99\%} = 74.1A$$

The rated output current of the 37kW VFD model is 75A. You can select the 37kW VFD model. If the load contains a motor load, you need to select the VFD power according to the inrush current.

(2) Select the second voltage undervoltage point (380V) in SVPWM working mode:

S_O	37KVA
η_T	98%
U_{DC}	380V
k	99%

When the DC input voltage is 420V, the inverter current is as follows:

$$I_{INV} = \frac{S_O * \sqrt{2}}{\sqrt{3} * \eta_T * U_{DC} * k} = \frac{37000 * \sqrt{2}}{\sqrt{3} * 98\% * 380 * 99\%} = 82A$$

The rated output current of the 37kW VFD model is 75A, and the rated output current of the 45kW VFD model is 92A. You can select the 45kW VFD model. If the load contains a motor load, you need to select the VFD power according to the inrush current.

(3) Select the first voltage undervoltage point (420V) in SVPWM working mode:

S_O	37KVA
η_T	98%
U_{DC}	420V
k	86.6%

When the DC input voltage is 420V, the inverter current is as follows:

$$I_{INV} = \frac{S_O * \sqrt{2}}{\sqrt{3} * \eta_T * U_{DC} * k} = \frac{37000 * \sqrt{2}}{\sqrt{3} * 98\% * 420 * 86.6\%} = 84.7A$$

The rated output current of the 37kW VFD model is 75A, and the rated output current of the 45kW VFD model is 92A. You can select the 45kW VFD model. If the load contains a motor load, you need to select the VFD power according to the inrush current.

(4) Select the second voltage undervoltage point (380V) in SVPWM working mode:

S_O	37KVA
η_T	98%
U_{DC}	380V
k	86.6%

When the DC input voltage is 420V, the inverter current is as follows:

$$I_{INV} = \frac{S_O * \sqrt{2}}{\sqrt{3} * \eta_T * U_{DC} * k} = \frac{37000 * \sqrt{2}}{\sqrt{3} * 98\% * 380 * 86.6\%} = 93.7A$$

The rated output current of the 45kW VFD model is 92A, and the rated output current of the 55kW VFD model is 115A. You can select the 55kW VFD model. If the load contains a motor load, you need to select the VFD power according to the inrush current.

D.2 Battery model selection for EPS and regulated power supply applications

There are many calculation methods for the VFD backup time and required battery capacity. This section describes only the max. discharge current method. The max. battery discharge current is calculated by using the following formula:

$$I_{\max} = \frac{S * \cos\varphi}{\eta * U_{DC} * k}$$

In the formula:

S	Load apparent power.
$\cos\varphi$	Load power factor.
η	Overall efficiency of the inverter, filter, and transformer. (You can set it to 0.95.)
U_{DC}	Battery undervoltage point. It is usually the critical operating voltage point of the battery. At the room temperature of 25°C, the critical operating voltage point of a 12V battery under the condition of high current discharge is generally 10.5V, and the critical operating voltage point of a 40-battery pack is 420V.
k	Battery discharge efficiency. (You can set it to 0.95.)

For example, the apparent power of the load is 90KVA, the power factor of the load is 0.8, the required backup time is 30 minutes, the rated working voltage under inverter DC input is 480Vdc, the battery pack is composed of 40 batteries in series, and the overall efficiency of the inverter, filter, and transformer is 0.95.

If the first undervoltage point 420V is used, the max. battery discharge current is as follows:

$$I_{\max} = \frac{S * \cos\varphi}{\eta * U_{DC} * k} = \frac{90000 * 0.8}{0.95 * 420 * 0.95} = 190A$$

If the required backup time is 30 minutes, and the existing battery capacity is taken into account, you can connect 40 batteries in series, each of which has a capacity of 100AH.

D.3 VFD model selection for variable/power frequency switching applications

After starting the motor in soft manner, the VFD switches to power frequency for supplying. The soft startup current of the VFD is equal to the motor no-load running current. The soft startup time lasts about 1–1.5 minutes, the 141% overload of the VFD lasts 3 minutes, and the motor no-load current is about 0.4–0.5 times the rated current. According to the data, you can select the VFD models and motor models for variable/power frequency switching applications:

VFD				Motor		
Model	Output power (kW)	Output current (A)	Overload current (1.4 times rated current) (A)	Rated power (kW)	Rated current (A)	No-load current (A)
GD300-004G-4-EP	4	9.5	13.3	7.5	18.5	9.25
				11	25	12.5
GD300-5R5G-4-EP	5.5	14	19.6	15	32	16
				18.5	38	19
GD300-7R5G-4-EP	7.5	18.5	25.9	22	45	22.5
GD300-011G-4-EP	11	25	35	30	60	30
GD300-015G-4-EP	15	32	44.8	37	75	37.5
GD300-018G-4-EP	18.5	38	53.2	45	92	46
GD300-022G-4-EP	22	45	63	55	115	57.5
GD300-030G-4-EP	30	60	84	75	150	75
GD300-037G-4-EP	37	75	105	90	180	90
GD300-045G-4-EP	45	92	128.8	110	215	107.5
GD300-055G-4-EP	55	115	161	132	260	130
				160	305	152.5
GD300-075G-4-EP	75	150	210	185	340	170
				200	380	190
GD300-090G-4-EP	90	180	252	220	425	212.5
				250	480	240
GD300-110G-4-EP	110	215	301	280	530	265
				315	600	300
GD300-132G-4-EP	132	260	364	350	650	325
				400	720	360
GD300-185G-4-EP	185	340	476	500	860	430

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