



Variable Frequency Drive (VFD)

Instruction Manual

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※ Preface

Product overview

Thank you for purchasing and using the E610-Series Variable Frequency Drive (VFD) independently developed and manufactured by Hechuan Technology Co., Ltd.

The E610 Series VFD is an economical, simple, and low-power general-purpose variable frequency drive (VFD). This product from HCFA represents a new generation of general-purpose VFDs and includes two models: the E600 economical model and the E610 simple model. It supports two field buses, Modbus and CANOpen, making it suitable for applications that require a single VFD to control equipment as well as bus-linked applications involving multiple VFDs. Each unit in the series is equipped with a standard USB interface, allowing connection to host computers and external monitoring devices, including Bluetooth keypads. Additionally, it offers standard digital and analog input/output (I/O) capabilities, along with precise fault protection functions, which ensure greater stability and reliability for both the E610 Series VFD and the motor it controls. This manual focuses primarily on the E610 simple model VFD.

This manual will provide a brief description of the products in the table:

Name	Operating voltage	E610-Series model	Power
		HDv-E610-2S0.4B-000	400W
	Cinala Dhana 220\/ 2/0\/	HDv-E610-2S0.7B-000	750W
	Single-Phase 220V~240V	HDv-E610-2S1.5B-000	1.5kW
E610-Series VFD		HDv-E610-2S2.2B-000	2.2kW
		HDv-E610-2T0.4B-000	400W
	Thurs Dhans 220\/ 2/0\/*	HDv-E610-2T0.7B-000	750W
	Three-Phase 220V~240V*	HDv-E610-2T1.5B-000	1.5kW
		HDv-E610-2T2.2B-000	2.2kW
	Three-Phase 380V~480V	HDv-E610-4T0.4B-000	400W
		HDv-E610-4T0.7B-000	750W
		HDv-E610-4T1.5B-000	1.5kW
		HDv-E610-4T2.2B-000	2.2kW
		HDv-E610-4T3.7B-000	3.7kW
		HDv-E610-4T5.5B-000	5.5kW
		HDv-E610-4T7.5B-000	7.5kW

Note: Three-phase models are compatible with single-phase models

Target reader

HCFA E610-Series VFD users can refer to this manual for wiring, installation, diagnosis, and maintenance. Users require a basic level of electrical and automation knowledge.

This manual contains essential information for using HCFA E610-Series VFDs. Read it carefully before use and operate safely with due attention to safety.

Safety guidelines

Safety icons

During product use, these safety rules must be strictly followed as specified in this manual.



Improper operation may cause minor to moderate injuries, or major injuries/death in severe cases, and potential property damage.

|--|

Improper operation may cause minor to moderate injuries or equipment damage.

CAUTION 🔨

Improper operation may cause minor injuries or equipment damage.

NOTE

Improper operation may damage the environment/equipment or cause data loss.

Note: Key points/explanations to aid better operation and product understanding.

Safety rules

DANGER /

Before installation

- · Water ingress or stains on the machine during unpacking indicate prior dampness or submersion. Do not install.
- Damaged or missing components found during unpacking. Do not install.
- · A mismatch between packaging labels and actual contents. Do not install.
- · Carry the machine gently during transportation; otherwise, damage may occur.
- · Avoid touching internal components with bare hands; otherwise, electrostatic damage may occur.

During installation

- Install on flame-retardant materials (e.g., metal) and keep away from flammable objects; otherwise, fire hazards may occur.
- Tighten mounting bolts as specified; otherwise, machine drop may occur.
- · Do not arbitrarily adjust fixed bolts, especially those marked in red.

During wiring

- It is mandatory to follow this manual's guidelines and perform the work with qualified electrical engineers; failure to do so may lead to hazards.
- A circuit breaker matching the drive's capacity must isolate the VFD from the power supply; otherwise, fire hazards may arise.
- Verify power disconnection at the wiring section before proceeding; strictly prohibit live working, as failure to comply may result in electric shock. Ensure proper grounding of the drive as per standards, as failure to comply may result in electric shock.
- Do not connect input power to the drive's U\V\W output terminals. Confirm terminal markings during wiring to prevent mis-connection; otherwise, damage may occur.
- Ensure main-circuit cable cross-sections and wiring meet standards (EMC/local safety); otherwise, latent accident risks or actual occurrences may persist.
- Do not connect braking resistors to the drive's DC bus (+, -) terminals; otherwise, fire hazards may occur.
- Configure control wiring for the drive as per standards: use shielded cables for analog and high-speed pulse I/O lines, with single-end grounding.

Before powering on

- Recheck that peripheral devices and cables are configured with recommended models as per this manual, and all wiring follows specified connection methods; otherwise, accidents or equipment damage may occur.
- Reconfirm the drive's voltage rating matches the power supply; mismatch may trigger accidents or equipment damage.

After powering on

- Do not open the cover of the VFD; otherwise, electric shock may occur.
- Do not touch or operate the VFD with wet hands; otherwise, electric shock may occur.
- Do not touch any input/output terminals of the VFD or pull/tug the connected wires and cables at any time; otherwise, electric shock or equipment damage may occur.
- Do not attempt to access or modify manufacturer parameters; otherwise, the VFD may become inoperable or even be damaged.
- Before conducting a load test run of the VFD, ensure the mechanical equipment is in a ready-to-start state and relevant personnel are within the safe area of the facility; otherwise, equipment damage or personal injury may occur.
- If motor parameter identification is required, be cautious of potential hazards or injuries to equipment and personnel that may arise when the motor is rotating.

During operation

- Do not touch components such as heat sink fans or braking resistors; otherwise, personal injury may occur.
- Detecting signals while the VFD is operating by non-professionals is strictly prohibited; otherwise, damage to the VFD or personal injury may occur.
- After the VFD is powered off, residual power remains inside. Do not perform disassembly or assembly operations within 10 minutes of power disconnection; otherwise, electric shock or equipment damage may occur.

During maintenance

- Do not perform any form of maintenance or repair on the VFD with power on; otherwise, electric shock may occur.
- Do not disassemble the interior of the VFD when all indicator lights on the panel and inside are still on; otherwise, electric shock may occur.
- Maintenance or upkeep of the VFD by non-professionals or untrained personnel is strictly prohibited; otherwise, the VFD may be damaged or personal injury may occur.
- Do not install or disassemble the standard or optional accessories of the VFD with power on; otherwise, electric shock or equipment damage may occur.

CAUTION /

Do not disassemble or modify the equipment; otherwise, malfunctions, misoperations, or fires may occur. For equipment maintenance, please consult Zhejiang Hechuan Technology Co., Ltd.

Before installation

- Do not allow wire ends, conductive debris, or other foreign objects to fall into the machine; otherwise, damage to the machine may occur.
- Install the machine in a location with low vibration, free from water splashes, and protected from direct sunlight.
- When two or more machines are installed in the same cabinet, pay attention to their installation positions and ensure proper ventilation between the cabinet and the external environment to facilitate normal heat dissipation of the machines.

During operation

- During operation, avoid moving the VFD, the VFD mounting cabinet, or allowing foreign objects to fall into the VFD; otherwise, damage to the VFD may occur.
- Start or stop the VFD using terminal functions or other control loop methods. Avoid using the VFD's power-on operation mode to initiate start/stop, and strictly prohibit using contactor switching at the VFD output terminal to control motor start/stop.

DISPOSAL PRECAUTIONS /

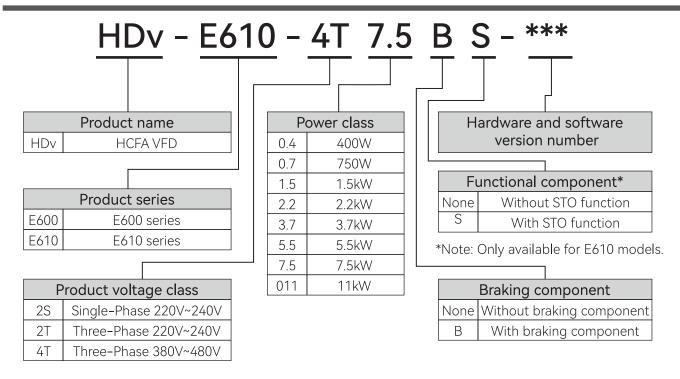
• When disposing of the product, handle it as industrial waste. For battery disposal, please dispose of it separately in accordance with the laws and regulations designated by each region.

CAUTION <u></u>

• Since the equipment is precision equipment, avoid subjecting it to impacts exceeding the general specification values specified in this manual during transportation. Otherwise, it may likely become a cause of equipment malfunction. After transportation, please confirm the operation of the equipment.

Chapter 1 Product Overview

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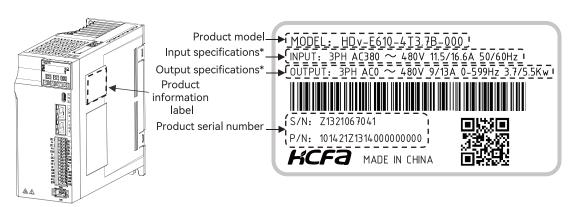


Figure 1. Model and label specifications

Item	Description
Product information label	Describe basic product information including model, and power
Product model	Display the product model
Input specifications*	Display the product input specifications
	INPUT: Rated input power supply voltage and input current
Output englifications*	Display the product output specifications
Output specifications*	OUTPUT: Rated output voltage, current, output frequency, and VFD power
Product serial number	Display the product serial number
	P/N, S/N: Product serial number

Note: Factory default is model G; users can modify via parameter settings. For details, contact HCFA technicians.

Model P: Light-duty fan/pump load model;

Model G: Heavy-duty constant torque load model.

1.2 Description of each part of E610 series (400W~3.7kW)

1.2.1 Front view interface

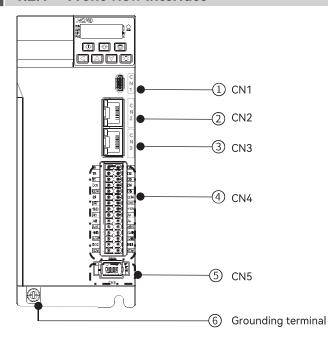


Table 1. Front view interface description

No.	Name	Description	
(1)	CN1	USB interface	
(2)	CN2	RJ45 interface, RS485/CANopen IN	
(3)	CN3	RJ45 interface, RS485/CANopen OUT/	
(3)	CIVS	Termination resistor	
(4)	CN4	30PIN terminal interface	
(5)	CN5	Reserved	
(6)	Grounding	Crounding	
(6)	terminal	Grounding	

Figure 2. Front view interface diagram

Table 2. CN2 CAN IN/RS485 IN interface description

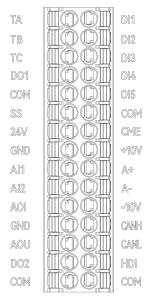
PIN	PIN1	PIN2	PIN3	PIN4	PIN5	PIN6	PIN7	PIN8
Name	CANH	CANL	CAN-GND	RS485+	RS485-	RS485-GND	NC	NC
Function	Function CANopen		CANopen ground	RS	485	RS485 ground	Reserved	Reserved

Table 3. CN3 CAN OUT/RS485 OUT interface description

PIN	PIN1	PIN2	PIN3	PIN4	PIN5	PIN6	PIN7	PIN8
Name	CANH	CANL	CAN-GND	RS485+	RS485-	RS485-GND	NC	NC
Function	CANopen		CANopen ground	RS485		RS485 ground	Reserved	Reserved

Table 4. CN4 30PIN interface description

PIN	Name	Description		
PIN1	TA	Relay common terminal		
PIN3	ТВ	Relay output NC		
PIN5	TC	Relay output NO		
PIN7	DO1	Digital output DO		
PIN9	COM*	Internal power supply DC 0V		
PIN11	SS	Digital input DI common terminal		
PIN13	24V	Internal power supply DC 24V		
PIN15	GND	Analog ground		
PIN17	Al1	Analoginaut		
PIN19	Al2	Analog input		
PIN21	AOI	Analog current output		
PIN23	GND	Analog ground		
PIN25	AOU	Analog voltage output		
PIN27	DO2	Digital output		
PIN29	COM*	Internal power supply DC 0V		



PIN	Name	Description		
PIN2	DI1	High-Speed DI/Standard DI		
PIN4	DI2			
PIN5	DI3	Digital Input (DI)		
PIN8	DI4	Digital Input (DI)		
PIN10	DI5			
PIN12	COM*	Internal power supply DC 0V		
PIN14	CME	Digital Output (DO) common terminal		
PIN16	+10V	Power supply DC +10V		
PIN18	A+	RS485		
PIN20	A-	K3400		
PIN22	-10V	Power supply DC-10V		
PIN24	CANH	CANanan		
PIN26	CANL	CANopen		
PIN28	HDI	High-Speed input (HDI)/Standard DI		
PIN30	COM*	Internal power supply DC 0V		

Note: COM terminals are internally shorted.

1.2.2 Indicator & key description

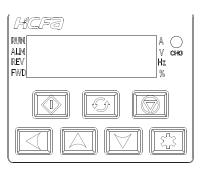


Figure 3. Indicator & key diagram

Table 5. Indicator description

Screen pri	nted label	Name	Description		
	CHG	Charge	Lit (Red): Power ON		
	СПО	Charge	Not lit: Power OFF		
	RUN	Run	Lit (Green): RUN		
	KUN	Rull	Not lit: STOP		
	AI M	Alarm	Lit (Green): Fault		
Status	ALIYI	Alami	Not lit: No fault		
indicator			Lit (Green): Indicates the rotation direc-		
	REV	Reverse rotation	tion and lights up when the equipment is		
			rotating in reverse.		
			Lit (Green): Indicates the rotation direc-		
	FWD	Forward rotation	tion and lights up when the equipment is		
			rotating forward.		
	А	Current	Lit (Green): Current unit is A.		
Unit	V	Voltage	Lit (Green): Current unit is V.		
indicator	Hz	Frequency	Lit (Green): Current unit is Hz.		
	%	Percentage	Lit (Green): Current unit is %.		

Table 6. Key description

Key	Name	Description	Key	Name	Description
	RUN	Control the motor operation in the panel control mode.		SHIFT	On the main menu, switch to display panel parameters. Under level 2 and level 3 menus, move left to cycle through the panel parameters.
	Multi-function	Default: Exit to the parameter interface. Forward jog, reverse jog, forward/reverse rotation switching, operation panel & remote switching		UP	Increase the value of parameters or function codes.
	RESET/STOP	Stop and reset		Down	Decrease the value of parameters or function codes.
_	_			Parameter settings / Confirmation / Exit	Short press: Enter the next interface. Long press: Return to the previous interface. In the third-level menu interface, short press: Save parameters.

1.2.3 Top view interface

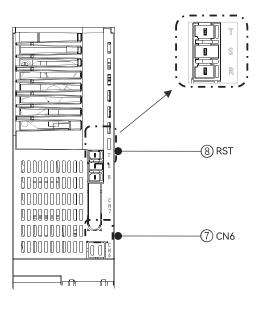


Figure 4. Top view interface diagram

Table 7. Top view interface description

No.	Name Description			
(7)	CN6*	STO		
(0)	CNIZ	Main circuit power supply input inter-		
(8)	CN7	face		

Note: The STO (Safe Torque Off) function is only optional for the E610 series.

Table 8. CN7 main circuit input power supply interface description

PIN	Name	Description
PIN1	R/L1	Main circuit
PIN2	S/L2	three-phase/single-phase power supply
PIN3	Т	input interface

1.2.4 Bottom view interface

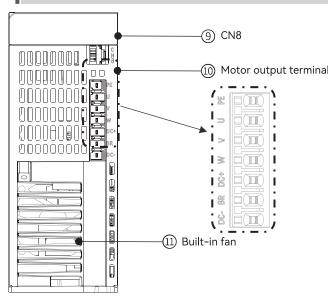


Figure 5. Bottom view interface diagram

Table 9. Bottom view interface description

	No.	Name	Description
al	(9)	CN8	External keypad interface
	(10)	Motor output	Motor power output terminal interface
		terminal	·
	(11)	Built-in fan	Cooling

Table 10. Description table of motor output terminal interfaces

PIN	Name	Description			
PIN1	PE	Grounding			
PIN2	U				
PIN3	V	Motor output cable			
PIN4	W				
PIN5	DC+	DC bus+			
PIN6	BR	Braking resistor			
PIN7	DC-	DC bus-			

1.3 Description of each part of E610 series (5.5kW~7.5kW)

1.3.1 Front view interface

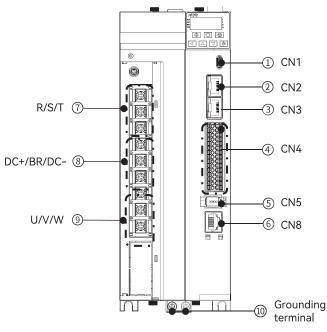


Figure 6. Front view interface diagram

Table 11. Front view interface description

No.	Name	Description		
(1)	CN1	USB interface		
(2)	CN2	RJ45 interface, RS485/CANopen IN		
(2)	CNO	RJ45 interface, RS485/CANopen OUT/		
(3)	CN3	Termination resistor		
(4)	CN4	30PIN terminal interface		
(5)	CN5	Reserved		
(6)	CN8	CN8 External keypad interface		
(7)	D/C/T	Main circuit three-phase power input		
(7)	R/S/T	interface		
	DC+	DC bus+		
(8)	BR	Braking resistor		
	DC-	DC bus-		
(9)	U/V/W	Motor output cable		
(10)	Grounding	Craunding		
(10)	terminal	Grounding		

Table 12. CN2 CAN IN/RS485 IN interface description

PIN	PIN1	PIN2	PIN3	PIN4	PIN5	PIN6	PIN7	PIN8
Name	CANH	CANL	CAN-GND	RS485+	RS485-	RS485-GND	NC	NC
Function	CAN	open	CANopen ground	RS4	485	RS485 ground	Reserved	Reserved

Table 13. CN3 CAN OUT/RS485 OUT interface description

PIN	PIN1	PIN2	PIN3	PIN4	PIN5	PIN6	PIN7	PIN8
Name	CANH	CANL	CAN-GND	RS485+	RS485-	RS485-GND	NC	NC
Function	CANopen		CANopen ground	RS485		RS485 ground	Reserved	Reserved

Table 14. CN4 30PIN interface description

PIN	Name	Description
PIN1	TA	Relay common terminal
PIN3	ТВ	Relay output NC
PIN5	TC	Relay output NO
PIN7	DO1	Digital output DO
PIN9	COM*	Internal power supply DC 0V
PIN11	SS	Digital input DI common terminal
PIN13	24V	Internal power supply DC 24V
PIN15	GND	Analog ground
PIN17	Al1	Analan innut
PIN19	Al2	Analog input
PIN21	AOI	Analog current output
PIN23	GND	Analog ground
PIN25	AOU	Analog voltage output
PIN27	DO2	Digital output
PIN29	COM*	Internal power supply DC 0V

TA	DI1
TB	DI2
TC	DI3
D01	DI4
COM	DI5
SS	COM
24V	CME
GND	+10V
AI1	A+
Al2	A-
AOI	-10V
GND	CANH
AOU	CANL
DO2	HDI
COM	COM

PIN	Name	Description			
PIN2	DI1	High-Speed DI/Standard DI			
PIN4	DI2				
PIN5	DI3	Digital Input (DI)			
PIN8	DI4	Digital Input (DI)			
PIN10	DI5				
PIN12	COM*	Internal power supply DC 0V			
PIN14	CME	Digital Output (DO) common terminal			
PIN16	+10V	Power supply DC +10V			
PIN18	A+	RS485			
PIN20	A-	K3403			
PIN22	-10V	Power supply DC-10V			
PIN24	CANH	CANICA			
PIN26	CANL	CANopen			
PIN28	HDI	High-Speed input (HDI)/Standard DI			
PIN30	COM*	Internal power supply DC 0V			

Note: COM terminals are internally shorted.

1.3.2 Indicator & key description

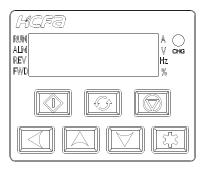


Figure 7. Indicator & key diagram

Table 15. Indicator description

Screen pri	nted label	Name	Description
	CHG	Chargo	Lit (Red): Power ON
	СПО	Charge	Not lit: Power OFF
	RUN	Run	Lit (Green): RUN
	KUN	Rull	Not lit: STOP
	AI M	Alarm	Lit (Green): Fault
Status	ALI	Alaim	Not lit: No fault
indicator	REV		Lit (Green): Indicates the rotation direc-
		Reverse rotation	tion and lights up when the equipment is
			rotating in reverse.
			Lit (Green): Indicates the rotation direc-
	FWD	Forward rotation	tion and lights up when the equipment is
			rotating forward.
	А	Current	Lit (Green): Current unit is A.
Unit	V	Voltage	Lit (Green): Current unit is V.
indicator	Hz	Frequency	Lit (Green): Current unit is Hz.
	%	Percentage	Lit (Green): Current unit is %.

Table 16. Key description

Key	Name	Description	Key	Name	Description
	RUN	Control the motor operation in the panel control mode.		SHIFT	On the main menu, switch to display panel parameters. Under level 2 and level 3 menus, move left to cycle through the panel parameters.
	Multi-function	Default: Exit to the parameter interface. Forward jog, reverse jog, forward/reverse rotation switching, operation panel & remote switching		UP	Increase the value of parameters or function codes.
	RESET/STOP	Stop and reset		Down	Decrease the value of parameters or function codes.
_	_	_		Parameter settings / Confirmation / Exit	Short press: Enter the next interface. Long press: Return to the previous interface. In the third-level menu interface, short press: Save parameters.

1.4 Product dimensions

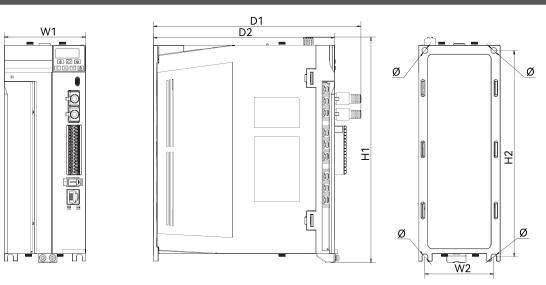


Figure 8. Dimensional drawing of E610 series products (unit: mm)

Applicable model	W1	W2	D1	D2	H1	H2	Ф	Net weight (kg)
HDv-E610-2S0.4B-000								
HDv-E610-2T0.4B-000	37	21.3						0.75
HDv-E610-4T0.4B-000								
HDv-E610-2S0.7B-000			199	170	189.2	162.8	5.5	
HDv-E610-2T0.7B-000	47	31.3						0.96
HDv-E610-2S1.5B-000	4/	31.3						
HDv-E610-2T1.5B-000								
HDv-E610-4T0.7B-000	55	39.7		100		1/2		1.17
HDv-E610-4T1.5B-000	33	39.7	209		182.9			1.17
HDv-E610-4T2.2B-000	70	54.7	209	180	102.9	163		1.38
HDv-E610-4T3.7B-000	70	54.7						1.30
HDv-E610-4T5.5B-000	90	76	220	200	243.3	227.5	,	2.07
HDv-E610-4T7.5B-000	90	/6	229	200			6	3.07

Chapter 2 Parameter Specifications

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2.1 General specifications

			Specifications							
	Item	0.4kW	0.75kW	1.5kW	2.2kW	3.7kW	5.5 kW	7.5kW		
	Operating temperature	-10° C to +50	°C (non-conde	ensing)						
	Operating temperature	(Ambient tem	perature betw	een 40° C and	50° C, derate k	by 10% for eve	ry 5° C increase	e)		
		-20°C ~+70°C								
	Storage temperature	Temperature	range: -20°C ~-	+70°C						
		Humidity ran	ge: 20%~85% (ı	non-condensir	ng)					
Operating	Ambient humidity	20% ~ 85%R	H or less (non-	condensing)						
environment	Altitude	1000m or less	s (When the alt	itude exceeds	1000m, pleas	e use the prod	ucts at the der	ating rate of		
	Aititude	2%/100m.)								
	Vibration resistance	5.88m/s²(0.6G) or less, 10~60Hz (Do not connect at the point of resonance.)								
	Shock resistance	Acceleration of 100m/s ² or less (XYZ)								
	Protection rating	IP20								
	Pollution degree	Pollution deg	ree I or II							
	Floatroatatio diagharga	Air discharge: ±8kV								
	Electrostatic discharge	Contact discharge: ±4kV								
EMC	Electrical fast transient/ burst	±2kV								
EMIC		AC power								
	Surge	DM (differential mode) 1kV								
		CM (common mode) 2kV								
	Heat dissipation	Natural air cooling								
	Main material	PPE								

2.2 Basic specifications

2.2.1 Input voltage single-phase/three-phase 220V (compatible)

E610 series VFD power (kW)	0.4	0.75	1.5	2.2		
Maximum applicable motor capacity [kW]	0.4	0.75	1.5	2.2		
Rated output current [Arms]	3.5	4.8	7.5	11		
Instantaneous maximum output current [Arms]	5.2	8.5	13.0	16.2		
Rated output voltage [V]	0~input voltage					
Maximum output frequency [Hz]	0 ~ 599					
Corrier frequency [1]-1	VF: 1.5k~16k;					
Carrier frequency [Hz]	SVC: 1.5k~10k					
Occasional and annualistic	110% rated current for 1 hour, 150% rated current for 1 minute, and 180% rated current for					
Overload capability	3 seconds					
	Three-phase AC 200 V ~ 240V, 50/60Hz (-15% ~ 10%)					
Input power supply voltage [V]	Actual allowable voltage range					
	Three-phase AC 170V ~ 264V					
Input current [Arms]	3.8	5.3	8.6	11.5		
Power capacity [kVA]	1.1	2.1	4.2	5.3		
Heat and power loss [W]	35	52	88	110		
Wide voltage [V]	Wide voltage range: 200~240V (-15%~10%)					

	External braking	Resistance value $[\Omega]$	300	170	80	55
Braking	resistor	Capacity [W]	90	160	340	500
resistor	Minimum resistance value of external		48	48	22	14
	braking resistor [Ω]		40	40	32	10

2.2.2 Standard model: Input voltage three-phase 380V

Е	610 series VFD	power (kW)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	
Maxim	Maximum applicable motor capacity [kW]		0.4	0.75	1.5	2.2	3.7	5.5	7.5	
	Rated output cur	rent [Arms]	2.0	3.5	4.8	7.2	9	13	17	
Instantar	neous maximum o	utput current [Arms]	3.6	5.2	8.5	13.0	16.2	23.4	30.6	
	Rated output vo	oltage [V]	0~input volta	age						
	laximum output fr	equency [Hz]	0 ~ 599Hz							
	Carrier frague	no. [1]	VF: 1.5kHz~1	6kHz						
	Carrier freque	ncy [nz]	SVC: 1.5kHz^	10kHz						
	Overland	a a la il itu	110% rated o	current for 1 h	our, 150% rat	ed current for	1 minute, and	d 180% rated	current for 3	
	Overload cap	Dability	seconds							
			Three-phase AC 380 ~ 480V, 50/60Hz (-15% ~ 10%)							
Į.	nput power suppl	y voltage [V]	Actual allowable voltage range							
			Three-phase AC 323V ~ 528V							
	Input current	[Arms]	2.3	3.8	5.3	8.6	11.5	16.6	21.9	
	Power capaci	ty [kVA]	2	2.8	5	6.7	12	17.5	22.6	
	Heat and powe	r loss [W]	39	46	68	80	140	200	240	
	Wide voltag	ge [V]	Wide voltage	range: 380V	~480V (-15%					
	External braking	Resistance value $[\Omega]$	1450	800	380	260	150	100	75	
Braking	resistor	Capacity [W]	80	140	300	440	750	1100	1500	
resistor Minimum resistance value of external braking resistor $[\Omega]$		96	96	96	64	32	32	32		

^{*}Note: The product is not yet released, please stay informed.

2.2.3 Selection guidelines of braking components

I. Resistance value selection

During braking, the motor's regenerative energy is almost entirely consumed by the braking resistor.

The following formula applies: U*U/R=BR

U---- System-stabilized braking voltage (varies by system; typically DC700V for AC380V systems and DC380V for AC220V systems.)

BR---- Braking power

II. Braking resistor power selection

Theoretically, the power of the braking resistor should match the braking power, but a derating factor of 70% is considered.

The following formula applies: 0.7*Pr=BR*D

Pr----Power of the resistor

D----Braking frequency (proportion of the regenerative process in the entire working cycle)

Elevators----20%~30%

Unwinding and rewinding equipment: 20%~30%

Centrifuges: 50%~60%

Occasional braking loads: 5% Generally, 10% is adopted.

2.3 Performance specifications

2.3.1 Basic function

Item	Specifications			
lanut fraguency recolution	Digital setting: 0.01Hz			
Input frequency resolution	Analogy setting: Maximum frequency×0.025%			
Motor type and control mode	Three-phase asynchronous motor: VF control, sensorless vector control (SVC)			
Motor type and control mode	Permanent magnet synchronous motor: sensorless vector control (SVC)			
Start-up torque	150% (SVC 0.5Hz)			
Chandrange	1: 50 VF control			
Speed range	1: 100 SVC control			
Coord control occursory	±1.0% VF control			
Speed control accuracy	±0.5% SV control			
Torque boost	Manual torque boost 0.1%~30.0%			
V/F curve	Linear V/F, multi-point V/F, square V/F, VF separation			
Automatic voltage regulator (AVR)	Automatically maintains a constant output voltage when the grid voltage changes			
	DC braking frequency: 0.00Hz~the maximum frequency			
DC braking	Braking time: 0.00s~30.00s			
	Braking current value: 0.00%~100.00%			
Jog control	Jog frequency range: 0.00Hz~the maximum frequency			
Jog control	Jog acceleration and deceleration time: 0.00s~600.00s			
Simple PLC, multispeed operation	Realize the maximum 16 segments of speed operation via built-in PLC and control terminals			
Built-in PID	Built-in two set of PID parameters for realizing closed-loop process control system			
LED display	LED keypad for parameter setting and status monitoring			
Protection function	Overcurrent protection, overvoltage protection, undervoltage protection, overheating protection,			
Protection function	and overload protection			

2.3.2 Customized function

Item	Specifications		
	Parameter settings allow functions including switching between the operator panel and remote com-		
Customized key	mand channels, forward/reverse rotation, forward/reverse jog, and exiting to the parameter interface		
	(factory default: exit to parameter interface function).		
Communication bus	Support Modbus communication, E610 supports CANopen communication		
STO function*1	Optional STO (Safe Torque Off) function		
Customized fault diagnosis	User-defined digital input fault diagnosis according to requirements		
Acceleration and deceleration curves	Linear acceleration/deceleration mode, S-curve acceleration/deceleration mode; Acceleration and		
Acceleration and deceleration curves	deceleration curve mode for lifting loads		
Electricity measurement	Calculate power consumption per unit time		
Display made quitab	Display mode can be set to quick menu mode or a mode different from factory settings, facilitating		
Display mode switch	debugging (factory default: quick menu mode)		

Running instruction channels	Three types of channels: Operator panel input, control terminal input, and communication input
Frequency	Eight types of frequency sources: Digital input, analog voltage input, analog current input, pulse
	input, multi-stage speed, PLC, PID, and communication input
Wireless communications*2	Optional WIFI, bluetooth, and IoT modules

*Note: 1. STO Safe Torque Off (STO) is optional for the E610 series only.

2. The product is not yet released, please stay informed.

2.4 Interface specifications

Item			Specifications			
	DC/0F	Connection device	Connecting to external communication devices			
RS485 CANopen		Communication	RS485 interface, supporting Modbus RTU CANopen interface, supporting CANopen (supported only by the E610 series)			
Communication	(CINZ CINS)	Address setting	Configurable via parameters			
function		Cable connection	Category 5e shielded twisted pair cable			
	USB communica-	Device connection	PC (host computer supported)			
tic	tion (CN1)	Communication specification	Compliant with USB 2.0 specifications			
Operation and display function		unction	The panel has a 5-digit digital tube for display, 7 keypad keys, and indicators such as CHARGE and POWER.			
External keypad interface (CN8)		ce (CN8)	Connecting to external keypad operator			
DI/DO/AI/AO input and output terminals (CN4)		terminals (CN4)	DI/DO input/output voltage range: DC 0-24V AI/AO input/output voltage range: DC ±10V / 0-20mA (10-bit resolution) Accuracy: ±20mV			
	Braking function	1	Built-in DC braking function			
	Protection function	on	Overcurrent, overvoltage, undervoltage, overload, overheating, and phase loss faults			
Auxiliary function		า	Gain adjustment, alarm recording, jog operation, and customized shortcut keys			
STO Safety	/ Input		/HWBB1, /HWBB2: Base block signal for the power module			
function*2	Out	put	EDM1: Status monitoring of built-in safety circuit (constant output)			
Optional accessories		es	Optional external keypad			

^{*}Note: 1. The CANOpen function of CN2/CN3 is supported by the E610 series only.

2. Safe Torque Off (STO) is optional for the E610 series only.

Chapter 3 Installation Instructions

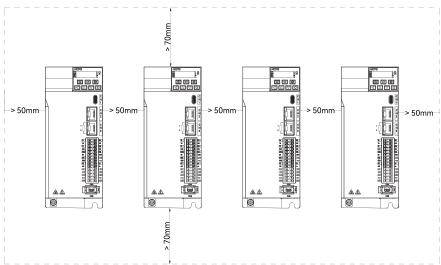
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3.1 Installation instructions

3.1.1 Installation in a control cabinet

Please pay attention to the following key points when installing the equipment in the control cabinet:

- (1) Ensure the installation direction is perpendicular to the wall. Cool the equipment via natural convection or a fan, and secure it to the control cabinet with screws.
- (2) To ensure effective cooling via natural convection or a fan, refer to the following figures for installation. Maintain sufficient clearance around the equipment to prevent localized overheating of its environment.
- (3) For side-by-side installation, leave a horizontal clearance of \geq 50 mm on both sides (clearance is optional if installation space is limited).



Note: 1. This diagram illustrates the external dimensions of the HDv-E610 (380V-3.7kW and 380V-2.2kW). For detailed appearance and installation instructions, refer to the sample manual.

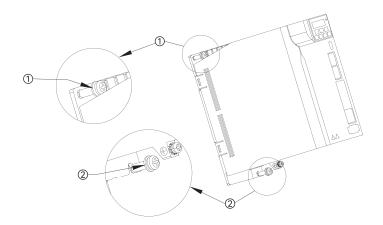
2. It is recommended to secure the drive unit with M5×25 hexagon socket head cap screws, spring washers, flat washers, and M5 hexagon nuts. Tightening torque: $3.5 \text{ N} \cdot \text{m}$.

3.1.2 VFD mounting and dismounting

I. VFD mounting

During mounting, secure the device with two M5*20 hex socket combination screws. First, pre-tighten the screw ②, slide the device's bottom base plate into the screw ②, then tighten the upper housing with the screw ①. The recommended torque is $3.5N \cdot m$.

II. VFD dismounting



During dismounting, ensure the device is powered off, pre-loosen the screw ② with a screwdriver without fully removing it. And support the housing firmly with hands while removing the screw ① to prevent dropping, then lift the device after the screw ① is detached.

3.1.3 Cable connection and disconnection I (CN4 terminal)

Cable connection	Cable disconnection
Insert the flat-blade screwdriver into the right-side unlocking tab, and press down gently. Then insert a cable into the circular wiring hole. Gently tug the cable after pulling out the screwdriver. If the cable is secured firmly, then the connection is finished.	Insert the flat-blade screwdriver into the right-side unlocking tab, and press down gently. First, unplug the cable out of the circular wiring hole. Then, pull out the screwdriver to complete the disconnection.
② Insert the cable ① Insert the flat-blade screwdriver into the right-side unlocking tab	② Unplug the cable ① Insert the flat-blade screwdriver into the right-side unlocking tab

3.1.4 Cable connection and disconnection II (motor power output/power supply input)

Cable connection	Cable disconnection		
Insert the crowbar into the right-side slot first. Press down firmly on the crowbar, then insert the cable into the left-side wiring slot. If the cable is secured firmly after pulling out the crowbar, then the connection is finished.	Insert the crowbar into the right-side slot first. Press down firmly on the crowbar, then unplug the cable from the wiring slot. Finally, remove the crowbar to complete the disconnection.		
① Insert the crowbar into the right-side slot	① Insert the crowbar into the right-side slot		

3.2 Wiring instructions

3.2.1 E610 series single-phase/three-phase 220V model

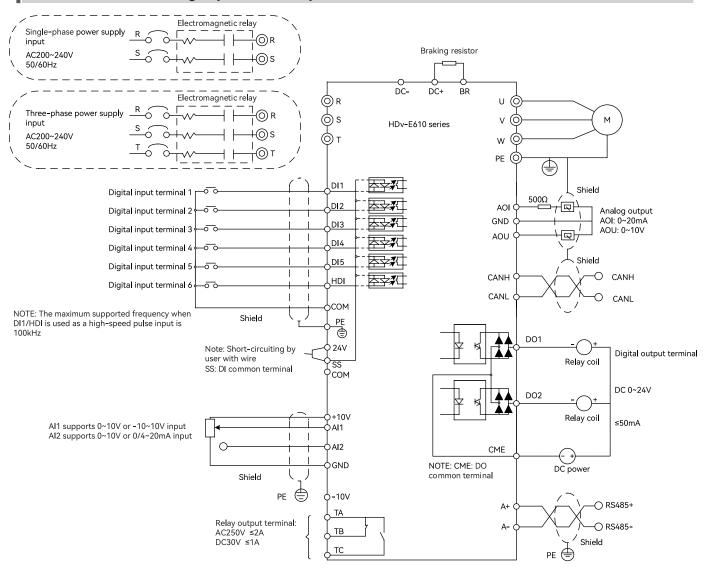


Figure 9. HDv-E610 series 220V model standard wiring diagram

Table 17. Main circuit interface description

Name	Description
R/S/T	Main circuit power input interface
DC+/BR	Regenerative braking resistor interface
U/V/W	Motor power output
DC+/DC-	DC bus terminal

3.2.2 Standard wiring of HDv-E610 series three-phase 380V model

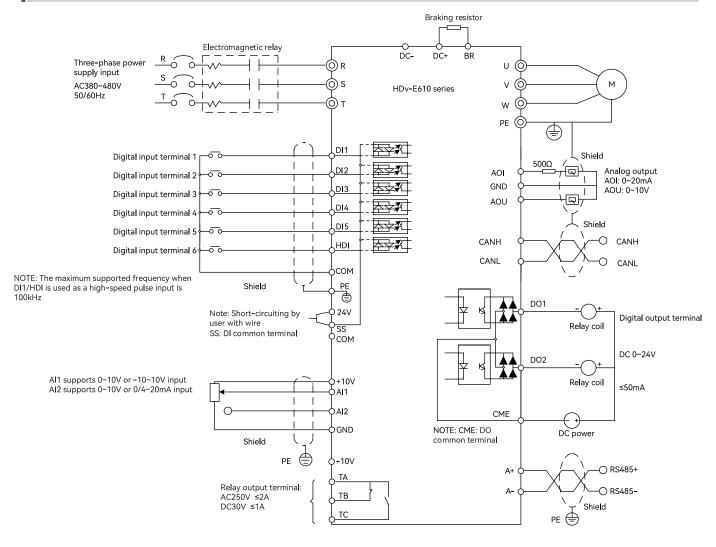


Figure 10. HDv-E610 series 380V model standard wiring diagram

Table 18. Main circuit interface description

Name	Description
R/S/T	Main circuit power input interface
DC+/BR	Regenerative braking resistor interface
U/V/W	Motor power output
DC+/DC-	DC bus terminal

3.3 Connection between VFD and peripheral devices

3.3.1 Connection diagram of VFD and peripheral devices

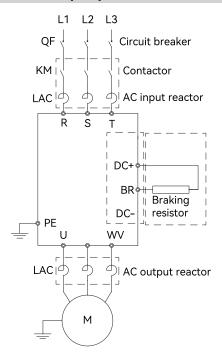


Table 19. Peripheral device description

	Between the power grid and the VFD, disconnecting devices (such as isolation switches) must be installed
Circuit breaker	to ensure personal safety during equipment maintenance.
	The rated capacity of the circuit breaker shall be 1.5 to 2 times the rated current of the VFD. Additionally,
	the time characteristics of the circuit breaker shall fully account for the time characteristics of the VFD's
	overload protection.
	Due to the high-frequency pulsed voltage output of the VFD, a high-frequency leakage current is gen-
Leakage circuit breaker (LCB)	erated. When installing an LCB at the input side of the VFD, a specialized LCB is recommended; a Type B
	LCB with a leakage current setting of 300 mA is advised.
	In North America, a time-delay fuse (with a current rating of 225% of the maximum full-load output
Time-delay fuse	current) must be used before the VFD to prevent the propagation of faults caused by downstream
	equipment failures. For fuse selection, refer to Table 20.
	Frequent closing and opening of the contactor will cause VFD malfunctions; the maximum frequency
Combonton	should not exceed 10 times per minute. When using a braking resistor, to prevent overheating damage to
Contactor	the braking resistor, install a thermal protection relay for overheat detection of the braking resistor, and
	control the opening of the power-side contactor via the relay's contacts.
	1. The power supply capacity of the VFD exceeds 600 kVA.
	2. If switched reactive power compensation capacitors or thyristor phase-controlled loads are present on
	the same power supply node, they will generate very high peak currents, which may cause damage to the
A C :	components of the converter.
AC input reactor or	3. When the voltage unbalance of the VFD's three-phase power supply exceeds 3%, it may cause damage
DC reactor	to the components of the converter.
	4. Requirement to improve the power factor on the input side of the VFD.
	In case of such a situation, install an AC reactor on the input side of the VFD or a DC reactor on the
	busbar side.
land to a land filler	It can reduce noise input to the VFD from the power supply side and also mitigate noise output from the
Input noise filter	VFD back to the power supply.
Output noise filter	Connecting a noise filter at the VFD's output terminal can reduce conducted and radiated interference.

	When the connection line between the VFD and the motor exceeds 100 meters, it is recommended to			
AC output reactor	install an AC output reactor capable of suppressing high-frequency oscillation to prevent motor insulation			
	damage, excessive leakage current, and frequent protection activation of the VFD.			
Braking assembly	Models with 22kW and below (within the dashed box) are equipped with built-in braking units.			
	There is a risk of leakage current inside the VFD. To ensure safety, both the VFD and the motor must			
	be grounded, with a grounding resistance of less than 10Ω . The grounding wire should be as short as			
Safety ground wire	possible, and its diameter must comply with the standards in Table 21.			
Safety ground wife	Note: The values in the table are only valid when the two types of conductors are made of the same met-			
	al. If not, the cross-sectional area of the protective conductor should be determined using the method of			
	equivalent conductivity coefficients.			

3.3.2 Peripheral device selection guide

Table 20. Circuit breaker, contactor, and conductor selection table

VFD Model	Circuit breaker (MCCB) (A)	Recommended con- tactor (A)	Recommended input main circuit conductor (mm²)	Recommended output main circuit conductor (mm²)	Recommended con- trol circuit conduc- tor (mm²)
Single-Phase 220V 50/60Hz					
HDv-E610-2S0.4B-000	10	9	0.75	0.75	0.5
HDv-E610-2S0.7B-000	10	9	0.75	0.75	0.5
HDv-E610-2S1.5B-000	16	12	1.5	1.5	0.5
HDv-E610-2S2.2B-000	20	18	2.5	2.5	0.75

VFD Model	Circuit breaker (MCCB) (A)	Recommended con- tactor (A)	Recommended input main circuit conductor (mm²)		Recommended con- trol circuit conduc- tor (mm²)
Three-Phase 220V 50/60Hz					
HDv-E610-2T0.4B-000	10	9	0.75	0.75	0.5
HDv-E610-2T0.7B-000	10	9	0.75	0.75	0.5
HDv-E610-2T1.5B-000	16	12	1.5	1.5	0.5
HDv-E610-2T2.2B-000	20	18	2.5	2.5	0.75

VFD Model	Circuit breaker (MCCB) (A)	Recommended con- tactor (A)	Recommended input main circuit conductor (mm²)		Recommended con- trol circuit conduc- tor (mm²)
		Three-Phase 380V	/ 50/60Hz		
HDv-E610-4T0.4B-000	10	10	0.75	0.75	0.5
HDv-E610-4T0.7B-000	16	10	0.75	0.75	0.5
HDv-E610-4T1.5B-000	16	10	0.75	0.75	0.5
HDv-E610-4T2.2B-000	25	16	1.5	1.5	0.5
HDv-E610-4T3.7B-000	32	25	2.5	2.5	0.5
HDv-E610-4T5.5B-000	40	32	4.0	4.0	0.75
HDv-E610-4T7.5B-000	63	40	4.0	4.0	0.75

Table 21. Input/Output AC reactor and DC reactor selection table

VFD Model	Input AC reactor		Output	AC reactor	DC reactor	
VFD Model	Current (A)	Inductance (mH)	Current (A)	Inductance (uH)	Current (A)	Inductance (mH)
HDv-E610-4T0.4B-000	5	3.8	5	1.5	=	-
HDv-E610-4T0.7B-000	5	3.8	5	1.5	-	-

HDv-E610-4T1.5B-000	7	2.5	7	1	-	-
HDv-E610-4T2.2B-000	10	1.5	10	0.6	-	-
HDv-E610-4T3.7B-000	15	1.0	15	0.25	-	-
HDv-E610-4T5.5B-000	20	0.75	20	0.13	-	-
HDv-E610-4T7.5B-000	30	0.60	30	0.087	-	-

Chapter 4 Parameter Description

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Symbol description:

- W--Indicates that the set value of the parameter can be modified during operation.
- W*--Indicates that the set value of the parameter cannot be modified during operation.
- R--Indicates that the value of the parameter is a status monitoring parameter or a reserved parameter, which cannot be modified by users.

4.1 P00 Basic parameter group

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P00.00	GP type display	1: G type (Constant torque load model)	uint16	1	R	0×0000
		2: P type (Fan and pump load models)	uiiitio			0.0000

This parameter is only intended for users to view the factory model and cannot be modified.

- 1: Applicable to constant torque loads with specified rated parameters.
- 2: Applicable to variable torque loads (fan and pump loads) with specified rated parameters.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P00.01	Control mode	0: SVC 2: V/F control	uint16	2	W*	0x0001

0: Sensorless Vector Control (SVC)

Refers to open-loop vector control, suitable for general high-performance control applications. A single VFD can only drive one motor.

2: V/F control

Suitable for applications with less demanding load requirements or where a single VFD drives multiple motors (e.g., fans, pumps). It can be used in scenarios where a single VFD drives multiple motors.

Note: When selecting the vector control mode, it is essential to perform motor parameter identification. Only with accurate motor parameters can the benefits of vector control mode be fully realized. To achieve optimal performance, adjust the speed loop parameters in the P02/P20 groups, which correspond to motor parameter groups 1 and 2, respectively.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P00.02	Command source selection	0: Operator panel control				
		1: External terminal control	uint16	0	W	0x0002
		2: Communication control				

Select the VFD control command channel.

VFD control commands include: start, stop, forward rotation, reverse rotation, jog, etc.

0: Operator panel control

Start/stop control is performed via the RUN and R/STOP buttons on the VFD operator panel.

1: External terminal control

Start/Stop control is performed via the multi-function input terminals DI1~DI5/HDI.

2: Communication control

Operation commands are sent by the upper computer via communication (supports Modbus-RTU/CANopen).

Parameter ID	D Parameter name	Setting range	Parameter	Factory	Attribute	Communication
raiailletei 1D	rafametel flame	Setting range	type	value	Attribute	address
		0: Digital setting (P00.12 non-retentive				
		during power loss)				
		1: Digital setting (P00.12 retentive during				
		power loss)				
	Main frequency source	2: Al1				
P00.03	X selection	3: AI2	uint16	0	W*	0x0003
		5: PULSE setting (DI1/HDI)				
		6: Multi-segment command				
		7: Simple PLC				
		8: PID				
		9: Communication setpoint				

Selection of the VFD main setpoint frequency input channel. There are 9 main setpoint frequency channels in total:

0: Digital setting (non-retentive during power loss)

Initial value: The value of P00.12 "Digital setting preset frequency."

The set frequency can be adjusted via the \blacktriangle and \blacktriangledown keys on the keypad or the UP/DOWN functions of the multi-function input terminals.

"Non-retentive" means that when the VFD loses power, the set frequency will reset to the value of P00.12 "Digital setting preset frequency."

1: Digital Setting (retentive during power loss)

Initial value: The value of P00.12 "Digital setting preset frequency."

The set frequency can be adjusted via the \blacktriangle and \blacktriangledown keys on the keypad or the UP/DOWN functions of the multi-function input terminals.

"Retentive" means that when the VFD is powered on again after a power loss, the set frequency will remain as it was before the last power loss (note: requires coordination with P00.19).

2: AI1

3: AI2

Refers to frequency determination via analog input terminals. The standard unit provides 2 analog input terminals: Al1 supports 0V~10V voltage-type input; Al2 supports either 0V~10V voltage input or 4mA~20mA current input (selected via the J16 jumper on the control board, with factory default set to current-type for Al2).

5: Pulse setpoint (DI1/HDI)

Frequency setpoint is decided via pulse signals from the terminal.

Pulse setpoint signal specifications: voltage range 0V~24V, frequency range 0kHz~100kHz.

Note: Pulse setpoint can only be input from the multi-function input terminal DI1/HDI.

6: Multi-segment speed

Selects multi-segment speed operation mode. Parameters in the P05 group, "Input terminal parameter group," and the P11 group, "Multi-segment speed command parameter group," must be configured to define the correspondence between the input signal and the setpoint frequency.

7: Simple PLC

Selects simple PLC mode. When using the simple PLC as the frequency source, parameters in the P11 group "Multi-segment speed command parameter group" must be set to determine the setpoint frequency.

8: PID

Selects process PID control. In this mode, parameters in the P08 group "Process PID control parameter group" must be configured. The VFD's operating frequency will be the frequency value after PID regulation. For definitions of terms such as the PID setpoint source, the setpoint quantity, and the feedback source, refer to the description of P08 group "Process PID control parameter group."

9: Communication setpoint

Refers to the main frequency source being set by the upper computer via communication (supports Modbus-RTU/CANopen).

Parameter ID	Parameter name	Setting range	Parameter	Factory	Attribute	Communication
			type	value		address
		0: Digital setting (P00.12 non-retentive				
		during power loss)				
		1: Digital setting (P00.12 retentive during				
		power loss)				
	Auxiliary frequency source Y selection	2: AI1				
P00.04		3: AI2	uint16	0	W*	0x0004
		5: Pulse setting (DI1/HDI)				
		6: Multi-segment command				
		7: Simple PLC				
		8: PID				
		9: Communication setpoint				

When the auxiliary frequency source Y is used as an independent frequency setpoint channel (i.e., when the frequency source is switched between X and Y), its usage is the same as the main frequency source X.

When the auxiliary frequency source Y is used as a superimposed setpoint (i.e., when the frequency source is selected as X+Y, switching between X and X+Y, or switching between Y and X+Y), the following special considerations apply:

When the auxiliary frequency source is a digital setpoint, the preset frequency (P00.12) does not take effect. The set frequency can be adjusted upwards or downwards based on the main setpoint frequency via the \blacktriangle and \blacktriangledown keys on the keypad (or the UP/DOWN functions of the multi-function input terminals).

When the auxiliary frequency source is an analog input setpoint (AI1, AI2) or a pulse input setpoint, 100% of the input setting corresponds to the auxiliary frequency source range (see the description of P00.06 and P00.07). If it is necessary to adjust upwards or downwards based on the main setpoint frequency, set the corresponding setting range of the analog input to -n% $\sim +n\%$ (see the AI curve settings in Group P05).

When the frequency source is a pulse input setpoint, it behaves similarly to the analog input setpoint.

Note: The selection of the auxiliary frequency source Y and the setpoint of the main frequency source X cannot be the same, meaning the main and auxiliary frequency sources cannot share the same frequency setpoint channel.

Parameter ID	Parameter name	Setting range	Parameter	Factory	Attribute	Communication
			type	value		address
		Units digit: Frequency command selection				
		0: Main frequency source X				
		1: Main-auxiliary operation result (operation				
		relationship determined by the tens digit)				
		2: Switch between main frequency source X		00	W	0x0005
	Frequency source	and auxiliary frequency source Y				
		3: Switch between main frequency source X				
P00.05		and main-auxiliary operation result	uint16			
P00.05	superposition selection	4: Switch between auxiliary frequency	uiricio	00	VV	0x0005
		source Y and main-auxiliary operation result				
		Tens digit: Main-auxiliary operation relation-				
		ship for frequency command				
		0: Main + auxiliary				
		1: Main - auxiliary				
		2: Maximum of the two				
		3: Minimum of the two				

The frequency setpoint is achieved by combining the main frequency source X and the auxiliary frequency source Y.

Units digit: Frequency source selection

0: Main frequency source X

The main frequency X serves as the target frequency.

1: Main-Auxiliary operation result

The result of the main-auxiliary operation serves as the target frequency (the operation relationship is defined by the tens digit).

2: Switch between the main frequency source X and the auxiliary frequency source Y

When the "Frequency source switching" function of the multi-function input terminal 18 is invalid, the main frequency X is the target frequency.

When the "Frequency source switching" function of the multi-function input terminal 18 is valid, the auxiliary frequency Y is the target frequency.

3: Switch between the main frequency source X and the main-auxiliary operation result

When the "Frequency source switching" function of the multi-function input terminal 18 is invalid, the main frequency X is the target frequency.

When the "Frequency source switching" function of the multi-function input terminal 18 is valid, the main-auxiliary operation result is the target frequency.

4: Switch between auxiliary frequency source Y and main-auxiliary operation result

When the "Frequency source switching" function of the multi-function input terminal 18 is invalid, the auxiliary frequency Y is the target frequency.

When the "Frequency source switching" function of the multi-function input terminal 18 is valid, the main-auxiliary operation result is the target f

Tens digit: Main-auxiliary operation relationship for frequency source

0: Main frequency source X + Auxiliary frequency source Y

The sum of the main frequency X and the auxiliary frequency Y serves as the target frequency, enabling frequency superposition setpoint.

1: Main frequency source X - Auxiliary frequency source Y

The difference between the main frequency X and the auxiliary frequency Y serves as the target frequency.

2: MAX (main frequency source X, auxiliary frequency source Y)

The target frequency is the value with the larger absolute value between the main frequency X and the auxiliary frequency Y.

3: MIN (main frequency source X, auxiliary frequency source Y)

The target frequency is the value with the smaller absolute value between the main frequency X and the auxiliary frequency Y.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
	Relative value selection					
	for auxiliary frequency	0: Relative to maximum frequency	uint16	0	W	0x0006
P00.06	source Y during	1: Relative to frequency source X	umtro	U	VV	0x0006
	superposition					
P00.07	Range of auxiliary					
	frequency source Y	0%~150%	uint16	100%	W	0x0007
	during superposition					

When the frequency source is selected as a superposition setpoint (P00.05 set to 1, 3, or 4), this parameter determines the adjustment range of the auxiliary frequency source. P00.06 is used to define the reference object for this range. If it is set to "Relative to maximum frequency X," the range will vary with changes in the main frequency X.

Parameter ID	Parameter name	Setting range	Parameter	ter Factory	Attribute	Communication
		John Stand	type	value	7100110000	address
P00.08	Maximum frequency	50.00Hz~599.00Hz	uint16	50.00Hz	W*	0x0008
		0: Set via P00.10		0	W*	
	Upper frequency limit source	1: Al1	uint16			
P00.09		2: AI2				0x0009
		4: Pulse setting				
		5: Communication setpoint				
D00.10	Upper frequency limit	Lower frequency limit (P00.11) ~ Maximum		50.00Hz	W	0x000a
P00.10		frequency (P00.08)	uint16			UXUUUA

The maximum frequency is the upper limit of all frequency-related parameter settings in the VFD.

The upper frequency limit is the highest frequency output by VFD for the operation of users' equipment system.

This parameter defines the source of the upper frequency limit. The upper frequency limit can be derived from a digital setting (P00.10) or an analog input channel. When the upper frequency limit is set via an analog input, 100% of the analog input setting corresponds to the maximum frequency.

For example, during torque control (where speed control is disabled), to prevent overspeed (uncontrolled acceleration) caused by material breakage, the upper frequency limit can be set via an analog input. When the VFD operates at the upper frequency limit value, torque control becomes invalid, and the VFD continues to operate at the upper frequency limit.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P00.11	Lower frequency limit	0.00Hz ~ Upper frequency limit (P00.10)	uint16	0.00Hz	W	0x000b

The lower frequency limit is the minimum frequency output by the VFD for the operation of users' equipment system. When the set frequency is lower than the lower frequency limit, the VFD operates in the mode selected by P01.20. Among these, the maximum output frequency \geq upper frequency limit \geq lower frequency limit.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P00.12	Preset frequency	0.00Hz ~ Maximum frequency (P00.08)	uint16	50.00Hz	W	0x000c

When the frequency source is selected as "Digital setpoint," the value of this function code is the initial digital set frequency of the VFD.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P00.13	Acceleration time 1	0.0s~6500.0s	uint16	10.0s	W	0x000d
P00.14	Deceleration time 1	0.0s~6500.0s	uint16	10.0s	W	0x000e

Acceleration time refers to the time required for the VFD to accelerate from 0Hz to the acceleration/deceleration reference frequency (determined by P00.22), as shown by t1 in Figure 11.

Deceleration time refers to the time required for the VFD to decelerate from the acceleration/deceleration reference frequency (determined by P00.22) to 0Hz, as shown by t2 in Figure 11.

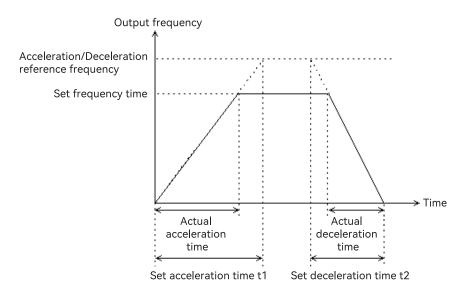


Figure 11. Acceleration/Deceleration time diagram

Note the difference between actual acceleration/deceleration time and set acceleration/deceleration time.

There are 4 groups of acceleration/deceleration time selections:

Group 1: P00.12, P00.13

Group 2: P01.41, P01.42

Group 3: P01.43, P01.44

Group 4: P01.45, P01.46

The acceleration/deceleration time can be selected via the multi-function digital input terminals (P05-00 ~ P05-06).

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P00.15	Upper frequency limit offset	0.00Hz ~ Maximum frequency (P00.08)	uint16	0.00Hz	W	0x000f

Actual upper frequency limit = Upper frequency limit (P00.10) + Upper frequency limit offset ((P00.15)

When the upper frequency limit is set via an analog input, this parameter acts as the analog offset. The offset frequency is added to the analog upper frequency limit setpoint to determine the final upper frequency limit setpoint.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P00.17	Auxiliary frequency	0.00Hz ~ Maximum frequency (P00.08)	uint16	0.00Hz	W	
	source offset frequency					0x0011
	during superposition					

When the frequency source is set to "Main-auxiliary operation," the offset frequency is summed with the main-auxiliary operation result to determine the target frequency.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P00.18	Frequency command	1: 0.1Hz	uin+17	2	\//*	0x0012
	decimal point	2: 0.01Hz	uint16		VV	0x0012

This function defines the unit for all frequency-related parameters. Note that modifying this value will change the actual frequency (the decimal position shifts, the displayed digit count remains unchanged, but the actual value changes).

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P00.19	Digital setting frequency stop retention selection	0: Non-retentive 1: Retentive	uint16	0	W	0x0013

This function is only valid when the frequency source is set to "Digital setting."

"Non-retentive": after the VFD stops, the digital set frequency resets to the value of P00.12 "Digital setting preset frequency."

"Retentive": After the VFD stops, the digital set frequency retains the value set before the last stop.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P00.20	Command source binding frequency source	Units digit: Bound frequency source for the operator panel command Tens digit: Bound frequency source for the terminal command Hundreds digit: Bound frequency source for the communication command 0: No binding 1: Digital setting (retentive during power loss) 2: Al1 3: Al2 5: PULSE setting 6: Multi-segment command 7: Simple PLC 8: PID 9: Communication setpoint	uint16	0	W	0x0014

This parameter defines binding combinations between the three operation command channels and eight frequency setpoint channels to facilitate synchronized switching.

The definitions of the above frequency setpoint channels are consistent with those in "Main frequency source X selection" (P00.03); refer to the P00.03 function code description for details.

Different operation command channels can be bound to the same frequency setpoint channel. If set to "No binding," the frequency source is determined by $P00.03 \sim P00.05$.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
	Acceleration/	0: Maximum frequency				
P00.22	Deceleration time	1: Set frequency	uint16	0	W*	0x0016
	reference frequency	2: 100.00Hz				

This parameter defines the frequency range corresponding to acceleration/deceleration time (see Figure 11. Acceleration/ Deceleration time diagram).

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P00.23	Parameter initialization	0: No operation 1: Restore factory parameters (excluding motor parameters) 2: Clear log information 3: Restore factory parameters (including motor parameters) 4: Save all current user function codes 501: Restore saved user function codes	uint16	0	W*	0x0016

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P00.24	Output phase sequence	0: Standard	uint16	0	W	0x0018
	selection	1: Reversed	uiiitio	U	VV	0x0016

Changing this function code can alter the motor's rotation direction without modifying any other parameters, equivalent to reversing the connection of any two wires (U, V, W) of the motor.

Note: After parameter initialization, the motor's operating direction will revert to its original state. Use with caution in systems where motor direction must remain fixed after commissioning.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P00.25	Carrier frequency	1.3kHz~16.0kHz	uint16	Model setting	W	0x0019

This parameter adjusts the VFD's carrier frequency. Modulating the carrier frequency can reduce motor noise, avoid mechanical system resonance points, minimize circuit leakage current to ground, and decrease VFD-generated interference.

At low carrier frequencies: Higher-order harmonic components in the output current increase, leading to greater motor losses and higher motor temperature rise.

At high carrier frequencies: Motor losses and temperature rise decrease, but VFD losses and temperature rise increase, along with enhanced interference.

Impact of carrier frequency adjustment on performance:

Table 22. Carrier frequency adjustment relationships

Carrier frequency	Low → High		
Motor electromagnetic noise	High → Low		
Output current waveform	Poor quality → Good quality		
Motor temperature rise	High → Low		
VFD temperature rise	Low → High		
VFD leakage current	Low → High		
Radiated interference	Low → High		

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P00.26	Carrier frequency adjustment with temperature	0: Automatic adjustment 1: No adjustment	uint16	1	W	0x001a

Carrier frequency adjustment with temperature

- 0: Automatic Adjustment
- 1: No Adjustment

If set to 0, the VFD automatically reduces the carrier frequency as internal temperature rises to prevent overheating. Set to 1 if PWM carrier frequency variation is not permitted.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P00.27	DPWM switching upper frequency	5.00Hz ~ Maximum frequency (P00.08)	uint16	15.00Hz	W	0x001b

The VFD employs two PWM modulation modes: CPWM (7-segment) and DPWM (5-segment).

When the operating frequency is greater than the switching frequency (P00.27), DPWM modulation is used; when the operating frequency is less than the switching frequency (P00.27), CPWM modulation is used.

DPWM modulation improves VFD efficiency, while CPWM reduces motor noise. Adjusting P00.27 to the maximum frequency (P00.08) can further minimize motor noise.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P00.28	UP/DOWN reference	0. Operating frequency				
	for operating frequency	Coperating frequency	uint16	0	W*	
	command	1. Set frequency				

- 0: Operating frequency
- 1: Set frequency

This parameter is only valid when the frequency source is set to "Digital setting." It determines whether the UP/DOWN adjustment of the set frequency is based on the current operating frequency or the current target frequency.

	Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
	P00.29	Modulation mode	0: Asynchronous modulation	uint16	0	W	0x001d
		1: Synchronous modulation					

	Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P00.30	Dead time	0: No compensation	uint16	1	W	0x001e	
	compensation mode	1: Compensation mode 1	diricio	1	V V	0,0016	

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P00.32	Overmodulation coefficient	100%~110%	uint16	105%	W*	0x0020

Increasing the voltage overmodulation coefficient can enhance the voltage output capability, effectively improving the motor's load capacity in the weak magnetic region; additionally, it will increase the distortion of the output current.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P00.33	Tuning selection	00: No operation 01: Asynchronous motor static partial tuning 02: Asynchronous motor dynamic tuning 03: Asynchronous motor static complete	uint16	0	R	0x0021
1 00.33	runing selection	tuning 11: Synchronous motor static tuning 12: Synchronous motor dynamic tuning	untro	Ü	TX.	0,0021

- 00: No operation
- 01: Asynchronous motor static partial tuning
- 02: Asynchronous motor dynamic tuning
- 03: Asynchronous motor static complete tuning
- 11: Synchronous motor static tuning
- 12: Synchronous motor dynamic tuning

Note: Before tuning, ensure the correct motor type and rated parameters (P02.00 – P02.05) are set, and set parameter P00.02 to 0 (operator panel control).

- 0: No operation (tuning is disabled.)
- 1: Asynchronous motor static partial tuning. Applicable for scenarios where the motor and load cannot be easily separated for rotational tuning.

Action instructions: Set P00.33 to 01, press the parameter save key (ENTER), and when the panel displays "FUCN," press the RUN key. The VFD will start tuning.

2: Asynchronous motor dynamic tuning

To ensure optimal dynamic control performance of the VFD, select asynchronous motor dynamic tuning. During dynamic tuning, the motor must be unloaded (no load).

After selecting dynamic tuning, the VFD first performs static tuning. Once static tuning is complete, the motor accelerates to 80% of its rated frequency using the acceleration time set in P00.13, maintains this speed for a period, then decelerates to zero speed using the deceleration time set in P00.14. Dynamic tuning concludes.

Action instructions: Set P00.33 to 02, press the parameter save key (ENTER), and when the panel displays "FUCN," press the RUN key. The VFD will start tuning.

11: Synchronous motor static tuning

Applicable for scenarios where the motor and load are difficult to separate.

Action Instructions: Set P00.33 to 11, press the parameter save key (ENTER), and when the panel displays "FUCN," press the RUN key. The VFD will start tuning.

12: Synchronous motor dynamic tuning

To ensure optimal dynamic control performance of the VFD, select synchronous motor dynamic tuning. During dynamic tuning, the motor must be unloaded (no load).

After selecting synchronous dynamic tuning, the VFD first performs static tuning. Once static tuning is complete, the motor accelerates to the preset frequency (P00.12, set to a non-zero value) using the acceleration time in P00.13, maintains this speed for a period, then decelerates to zero speed using the deceleration time in P00.14. Dynamic tuning concludes.

Action instructions: Set P00.33 to 12, press the parameter save key (ENTER), and when the panel displays "FUCN," press the RUN key. The VFD will start tuning.

Tuning operation instructions:

When P00.33 is set to 1, 2, 11, or 12 and the ENTER key is pressed, the panel displays "FUNE." Press the RUN key to begin parameter tuning, and the "TUNE" indicator will stop blinking. After tuning completes, the display returns to the stop interface. Tuning can be aborted by pressing the STOP key during the process. Once tuning is finished, the value of P00.33 automatically resets to 0.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P00.34	Motor selection	0: Motor 1 1: Motor 2	uint16	0	W	0x0022

Specify the parameters of the currently operating motor or allow switching via the DI terminals.

Note: To switch the motor parameters, the VFD must be in a stopped state.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P00.35	Dead time compensation value	0~1000	uint16	110	W	0x0023

4.2 P01 Start/Stop control parameter group

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
		0: Direct start				
P00.00	Starting mode	1: Speed tracking restart	uint16	0	W	0x0100
		2: Asynchronous motor pre excitation start				

0: Direct start

If the starting DC braking time is set to 0, the VFD starts from the starting frequency. If the starting DC braking time is set to a non-zero value, the VFD first performs DC braking before starting. This mode is suitable for applications where small inertia loads may reverse during startup.

1: Speed tracking restart

The VFD first detects the motor's speed and direction, then starts at a frequency corresponding to the detected motor speed, enabling smooth, impact-free startup for rotating motors. This mode is suitable for instant power failure restart of large inertia loads. To ensure optimal performance of speed tracking restart, accurate motor parameters must be set (refer to parameter group P02).

2: Asynchronous motor pre-excitation start

Pre-excitation current and time share function codes with DC braking current and time.

If the pre-excitation time is set to 0, the VFD starts from the starting frequency. If the pre-excitation time is set to a non-zero value, the VFD first performs pre-excitation before starting, improving dynamic response speed.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P01.01	Starting frequency	0.00Hz~10.00Hz	uint16	0.00Hz	W	0x0101
P01.02	Starting frequency holding time	0.0s~100.0s	uint16	0.0s	W*	0x0102

To ensure starting torque, set an appropriate starting frequency. Additionally, to allow the motor to establish magnetic flux during startup, the VFD will start accelerating only after maintaining the starting frequency for a specified duration.

The starting frequency value (P01.01) is not restricted by the lower limit frequency. If the frequency setpoint (frequency

source) is less than the starting frequency, the VFD remains in standby mode with an output frequency of 0Hz. The starting frequency holding time does not take effect during forward/reverse rotation switching. The holding time is not included in the acceleration time but is included in the operation time of a simple PLC.

Example 1:

- P00.03 = 0 (frequency source: digital setpoint)
- P00.12 = 2.00Hz (digital set frequency: 2.00Hz)
- P01.01 = 5.00Hz (starting frequency: 5.00Hz)
- P01.02 = 2.0s (starting frequency holding time: 2.0s)

Example 2:

- P00.03 = 0 (frequency source: digital setpoint)
- P00.12 = 10.00Hz (digital set frequency: 10.00Hz)
- P01.01 = 5.00Hz (starting frequency: 5.00Hz)
- P01.02 = 2.0s (starting frequency holding time: 2.0s)

In this case, the VFD accelerates to 5Hz, maintains this frequency for 2 seconds, and then continues accelerating to the set frequency of 10Hz.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P01.03	Starting DC braking / Pre-excitation current	0%~100%	uint16	50%	W*	0x0103
P01.04	Starting DC braking / Pre-excitation time	0.0s~100.0s	uint16	0.0s	W*	0x0104

Starting DC braking is generally used to stop the motor completely before restarting.

Pre-excitation is generally used to establish a magnetic field in the motor before starting, improving response speed.

If the starting mode is direct start, the VFD first performs DC braking with the set starting DC braking current when starting, and begins operation after the set starting DC braking time elapses. If the DC braking time is set to 0, the VFD starts directly without DC braking. The larger the DC braking current, the greater the braking force.

If the starting mode is asynchronous motor pre-excitation start, the VFD first pre-establishes a magnetic field with the set starting pre-excitation current when starting, and begins operation after the set starting pre-excitation time elapses. If the pre-excitation time is set to 0, the VFD starts directly without pre-excitation.

The starting DC braking/pre-excitation current refers to the percentage relative to the VFD's rated current.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P01.05	Stopping mode	0: Deceleration stop 1: Coast stop	uint16	0	W	0x0105

0: Deceleration stop

After the stop command is activated, the VFD reduces the output frequency according to the deceleration method and the defined acceleration/deceleration time, and stops when the frequency drops to 0. 1:

1: Coast stop

After the stop command is activated, the VFD immediately terminates the output. The load stops freely according to mechanical inertia.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P01.06	Stopping DC braking start frequency	0.00hz ~ Maximum frequency P00.08	uint16	0.00Hz	W	0x0106
P01.07	Stopping DC braking waiting time	0.0s~100.0s	uint16	0.0s	W	0x0107
P01.08	Stopping DC braking current	0%~100%	uint16	50%	W	0x0108
P01.09	Stopping DC braking time	0.0s~100.0s	uint16	0.0s	W	0x0109

Stopping DC braking start frequency: During deceleration stopping, when this frequency is reached, the stopping DC braking process begins.

Stopping DC braking waiting time: Before stopping DC braking begins, the VFD stops output, and after this delay, DC braking starts. It is used to prevent overcurrent faults caused by starting DC braking at high speeds.

Stopping DC braking current: Refers to the applied DC braking amount. The larger this value, the stronger the DC braking effect.

Stopping DC braking time: The time during which the DC braking amount is applied. If this value is 0, it indicates no DC braking process, and the VFD stops according to the set deceleration stopping process.

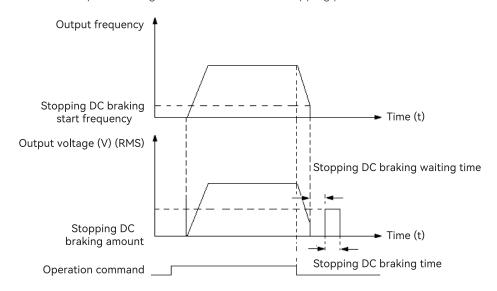


Figure 12. DC braking diagram

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P01.10	Jog operating frequency	0.00hz ~ Maximum frequency p00.08	uint16	2.00Hz	W	0x010a
P01.11	Jog acceleration time	0.0s~6500.0s	uint16	20.0s	W	0x010b
P01.12	Jog deceleration time	0.0s~6500.0s	uint16	20.0s	W	0x010c

Defines the frequency setpoint and acceleration/deceleration time of the VFD during jog.

The jog acceleration time refers to the time required for the VFD to accelerate from 0.00Hz to the maximum output frequency (P00.08).

The jog deceleration time refers to the time required for the VFD to decelerate from the maximum output frequency (P00.08) to 0.00Hz.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P01.14	Acceleration/	0: Linear acceleration/deceleration				
		1: S-Curve acceleration/deceleration A	uint16	0	W*	0x010e
		2: S-Curve acceleration/deceleration B				

Select the frequency change mode of the VFD during starting and stopping.

0: Linear acceleration/deceleration

The output frequency increases or decreases linearly. The acceleration/deceleration time changes according to the set acceleration/deceleration time. The E610 series VFD provides 4 types of acceleration/deceleration times. The acceleration/deceleration time can be selected via the multifunctional digital input terminals (P05.00 ~ P05.05).

1: S-Curve acceleration/deceleration A

The output frequency increases or decreases along an S-curve. S-curves are generally used in applications requiring smooth starting and stopping, such as elevators and conveyor belts. Function codes P01.15 and P01.16 respectively define the time ratio of the start and end segments of S-curve acceleration/deceleration A.

2: S-Curve acceleration/deceleration B

In this acceleration/deceleration curve, the motor rated frequency f_b is always the inflection point of the S-curve. It is generally used in high-speed areas above the rated frequency where short-term acceleration/deceleration is required.

When the set frequency is above the rated frequency, the acceleration/deceleration time is:

$$t = (\frac{4}{9} \times (\frac{f}{f_b})^2 + \frac{5}{9}) \times T$$

Where, f is the set frequency, f_b is the motor rated frequency, and T is the time to accelerate from 0.00Hz to the rated frequency f_b .

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P01.15	S-Curve start segment time ratio	0%~100%	uint16	30%	W*	0x010f
P01.16	S-Curve end segment time ratio	0%~100%	uint16	30%	W*	0x0110

Function codes P01.15 and P01.16 respectively define the time ratio of the start and end segments of S-curve acceleration/deceleration A, and they satisfy: $P01.16 \le 100\%$.

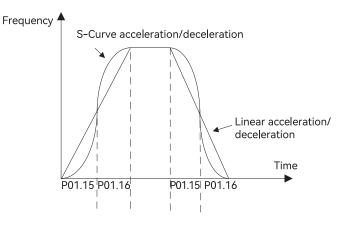


Figure 13. S-Curve acceleration/deceleration

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P01.17	Jump frequency 1	0.00Hz ~ Maximum frequency P00.08	uint16	0.00Hz	W	0x0111
P01.18	Jump frequency amplitude	0.00Hz ~ Maximum frequency P00.08	uint16	0.00Hz	W	0x0112

When the set frequency is within the jump frequency range, the actual operating frequency will be at the jump frequency boundary closest to the set frequency. By setting jump frequencies, the VFD avoids the mechanical resonance points of the load. This VFD allows setting two jump frequency points. If both jump frequencies are set to 0, this function will not take effect.

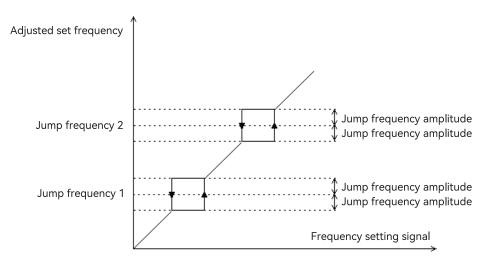


Figure 14. Jump frequency diagram

Pa	arameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
	P01.19	Forward/Reverse dead time	0s~3000.0s	uint16	0.0s	W	0x0113

Set the transition time of the VFD during forward/reverse transition at zero frequency output, as shown in the figure below:

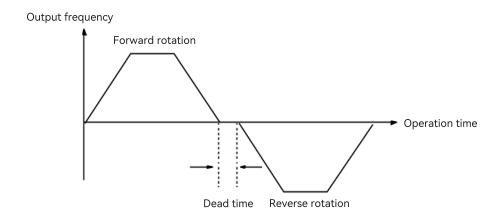


Figure 15. Dead time diagram

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P01.20	Operation at frequency below lower limit	O: Operate at the lower limit frequency Deceleration stop	uint16	0	W	0x0114
		2: Zero speed operation				

Select the operating state of the VFD when the set frequency is below the lower limit. This function can be used to select

stopping to avoid the motor running at low speed for extended periods.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P01.21	Reverse rotation control	0: Allow reverse rotation 1: Inhibit reverse rotation	uint16	0	W	0x0115

- 0: The reverse control can be performed via the keypad, terminals, or communication.
- 1: The reverse control function is active regardless of the command source selection; that is, reverse control is inactive for all keypad, terminal, and communication controls.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P01.22	Speed tracking mode	0: Start from stop frequency		_		
		1: Start from zero speed	uint16	0	W	0x0116
		2: Start from the maximum frequency				

To complete the speed tracking process in the shortest time, select the VFD's method of tracking the motor speed:

- 0: Track downward from the frequency at power outage; this method is commonly used.
- 1: Track upward from 0 Hz; this method is used when restarting after a long power outage.
- 2: Track downward from the aximum frequency; this method is generally used for generating loads.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P01.23	Speed tracking speed	1~100	uint16	20	W	0x0117

When using speed tracking restart mode, select the speed of speed tracking. A larger parameter value indicates faster tracking, but excessively large values may cause unreliable tracking.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P01.24	Braking usage rate	0%~100%	uint16	100%	W	0x0118
P01.25	Braking resistor activation time	0.0s~6500.0s	uint16	0.0s	W	0x0119

Effective for VFDs with built-in braking units. Adjust the braking effect of the braking unit.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P01.26	Demagnetization time	0.0s~500.0s	uint16	0.0s	W	0x011A

Changing P01.26 can adjust the speed of weak magnetic current adjustment, but faster adjustment may cause instability. Manual modification is generally not required.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P01.28	Terminal iog priority	Jog not allowed during operation Jog allowed during operation	uint16	0	W	0x011c

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P01.34	Instantaneous power	0: Inactive				
	failure non-stop	1: Decelerate	uint16	0	W	0x0122
	function selection	2: Deceleration stop				

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
	Instantaneous power					
P01.35	failure action pause	80%~100%	uint16	85%	W	0x0123
	judgment voltage					
P01.36	Instantaneous power					
	failure non-stop voltage	0.0s~100.0s	uint16	0.5s	W	0x0124
	recovery judgment time					
	Instantaneous power					
P01.37	failure non-stop action	60%~100%	uint16	80%	W	0x0125
	judgment voltage					
P01.38	Instantaneous power	0~100	uint16	40	W	0x0126
	failure non-stop gain	100	diricio	40	V V	0,0120
	Instantaneous power					
P01.39	failure non-stop integral	0~100	uint16	30	W	0x0127
	coefficient					
P01.40	Instantaneous power					
	failure non-stop action	0.0s~300.0s	uint16	10.0s	W	0x0128
	deceleration time					

This function refers to the VFD not stopping during instantaneous power failures. In the event of an instantaneous power failure or sudden voltage drop, the VFD reduces the output speed, uses energy fed back from the load to compensate for the voltage drop, and maintains operation for a short period.

If the instantaneous power failure non-stop function selection is active, when the bus voltage is lower than the voltage specified by the instantaneous power failure non-stop action judgment voltage (P01.37), the VFD decelerates according to the instantaneous power failure action selection. When the bus voltage recovers above the voltage specified by the instantaneous power failure action pause judgment voltage (P01.35) and remains at that level for the duration specified by the instantaneous power failure non-stop voltage recovery judgment time (P01.36), the VFD resumes operation at the set frequency; otherwise, the VFD will continue to reduce the operating frequency until it stops at 0.00Hz.

The instantaneous power failure non-stop function is shown in the figure below.

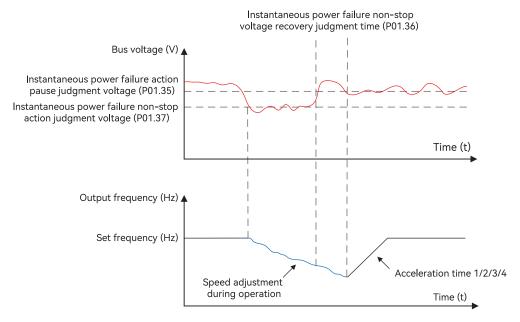


Figure 16. Instantaneous power failure non-stop action diagram

If the instantaneous power failure deceleration time is too long, the load feedback energy is small, and effective compen-

sation for low voltage cannot be achieved; if the deceleration time is too short, the load feedback energy is large, which may trigger overvoltage protection. Please appropriately adjust the deceleration time based on the load inertia and load weight conditions.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P01.41	Acceleration time 2	0s~6500s	uint16	10s	W	0x0129
P01.42	Deceleration time 2	0s~6500s	uint16	10s	W	0x012a
P01.43	Acceleration time 3	0s~6500s	uint16	10s	W	0x012b
P01.44	Deceleration time 3	0s~6500s	uint16	10s	W	0x012c
P01.45	Acceleration time 4	0s~6500s	uint16	10s	W	0x012d
P01.46	Deceleration time 4	0s~6500s	uint16	10s	W	0x012e

Acceleration/deceleration time can be selected from P00.13, P00.14, and the above three acceleration/deceleration times. Their meanings are the same; refer to the relevant instructions for P00.13 and P00.14. The acceleration/deceleration times 1-4 during VFD operation can be selected by combining different multifunctional digital input terminals (DI). Refer to function codes P05.00-P05.04.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P01.49	Jump frequency 2	0Hz ~ Maximum frequency P00.08	uint16	0Hz	W	0x0131

When the set frequency is within the jump frequency range, the actual operating frequency will run at the jump frequency boundary closest to the set frequency. By setting jump frequencies, the VFD avoids the mechanical resonance points of the load. This VFD allows setting two jump frequency points. If both jump frequencies are set to 0, this function will not take effect.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P01.50	Terminal command validity selection at power-on	0: Valid 1: Invalid	uint16	0Hz	W	0x0131

Parameter ID		Setting range	Parameter type	Factory value	Attribute	Communication address
P01.51	Jump frequency validity during acceleration/ deceleration	0: Valid 1: Invalid	uint16	0	W	0x0133

When this function code is set to valid, if the operating frequency is within the jump frequency range, the actual operating frequency will directly skip the set jump frequency boundary.

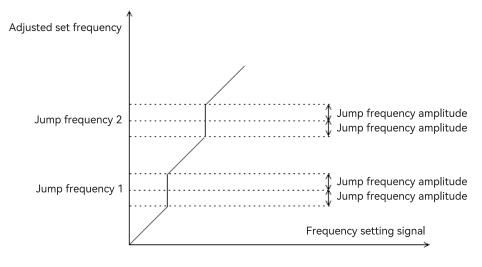


Figure 17. Jump frequency diagram

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P01.52	Jog frequency command source	0: Digital setting (P01.10) 1: Al1 2: Al2 3: Reserved 4: Pulse setting	uint16	0	W	0x0134

4.3 P02 Motor parameter group

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P02.00	Motor type selection	0: Asynchronous motor				
		1: Reserved	uint16	0	W*	0x0200
		2: Permanent magnet synchronous motor				

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P02.01	Motor rated power	0.1kw~1000kw	uint16	Model setting	W*	0x0201
P02.02	Motor rated voltage	1v~2000v	uint16	Model setting	W*	0x0202
P02.03	Motor rated current	0.01A~655.35A	uint16	Model setting	W*	0x0203
P02.04	Motor rated frequency	1hz ~ Maximum frequency P00.08	uint16	Model setting	W*	0x0204
P02.05	Motor rated speed	1rpm~65535rpm	uint16	Model setting	W*	0x0205

Note: Please set according to the motor nameplate parameters. The excellent control performance of vector control requires accurate motor parameters.

The VFD provides a parameter self-learning function.

Accurate parameter self-learning relies on the correct setting of motor nameplate parameters.

To ensure control performance, configure the motor according to the VFD's standard-matched motor. If the motor power deviates significantly from the standard-matched motor, the VFD's control performance will degrade noticeably.

Resetting the motor rated power (P02.01) will automatically update the set values of motor parameters P02.02 to P02.10.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P02.06	Asynchronous motor	0.001Ω~65.535Ω	uint16	Model	W*	0x0206
P02.00	stator resistance	0.00122~05.55522	unitro	setting	VV	
P02.07	Asynchronous motor	0.001Ω~65.535Ω	uint16	Model	W*	0x0207
	rotor resistance		unitro	setting	VV	
P02.08	Asynchronous motor	0.01mH~655.35mH	uint16	Model	W*	0x0208
PUZ.U6	leakage reactance	0.0111111111111111111111111111111111111	unitro	setting	VV.	
P02.09	Asynchronous motor	0.1mH~6553.5mH	uint16	Model	W*	0×0209
PUZ.09	mutual reactance	0.1111H~0333.3111H 	unitro	setting	VV	0x0209
P02.10	Asynchronous motor	0.01A~655.35A	uint16	Model	\\/*	0x020A
FUZ. 10	no-load current	U.UTA~033.33A	umtro	setting	W*	UXUZUA

P02.11	Synchronous motor stator resistance	0.001Ω~65.535Ω	uint16	Model setting	W*	0x020B
P02.12	Synchronous motor D-axis inductance	0.01mH~655.35mH	uint16	Model setting	W*	0x020C
P02.13	Synchronous motor Q-axis inductance	0.01mH~655.35mH	uint16	Model setting	W*	0x020D
P02.14	Synchronous motor counter-electromotive force (CEMF)	0v~6553.5v	uint16	Model setting	W*	0x020E

After the normal completion of motor parameter self-learning, the set values of P02.06 to P02.14 will be automatically updated. These parameters are the reference parameters for high-performance vector control and have a direct impact on control performance.

Note: Users should not arbitrarily modify these parameters.

4.4 P03 Motor vector parameter group

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P03.01	Speed loop proportional gain 1	1~100	uint16	Model setting	W	0x0301
P03.02	Speed loop integral time 1	0.01s~10.00s	uint16	Model setting	W	0x0302
P03.03	Speed loop switching frequency 1	0hz ~ Speed loop switching frequency 2 P03.0	uint16	5.00Hz	W	0x0303
P03.04	Speed loop proportional gain 2	1~100	uint16	Model setting	W	0x0304
P03.05	Speed loop integral time 2	0.01s~10.00s	uint16	Model setting	W	0x0305
P03.06	Speed loop switching frequency 2	Speed loop switching frequency 1 P03.03 ~ Maximum frequency P00.08	uint16	10.00Hz	W	0x0306

The above parameters are only valid for vector control and invalid for V/F control. Below switching frequency 1 (P03.03), the speed loop PI parameters are: P03.01 and P03.02. Above switching frequency 2 (P03.05), the speed loop PI parameters are: P03.04 and P03.05. Between the switching points, the PI parameters are obtained through linear interpolation of the two sets of parameters.

Two sets of parameters can be configured for the VFD's vector control speed loop PI parameters, applicable to low-frequency and high-frequency operation respectively. These two sets of parameters switch smoothly based on switching frequency 1 and switching frequency 2, as shown in the figure below:

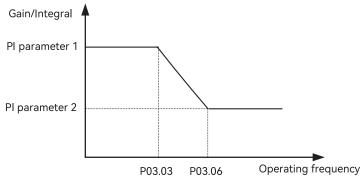


Figure 18. Speed loop parameter switching diagram

By setting the proportional coefficient and integral time of the speed regulator, the dynamic response characteristics of the vector control speed loop can be adjusted. Increasing the proportional gain or reducing the integral time can both accelerate

the dynamic response of the speed loop. However, an excessively large proportional gain or excessively small integral time may easily cause system oscillation and excessive overshoot. An excessively small proportional gain may also lead to steady-state oscillation and potential speed steady-state error. The speed loop PI parameters are closely related to the inertia of the motor system. Users need to adjust the parameters based on the default PI values according to different load characteristics to meet the requirements of various operating scenarios.

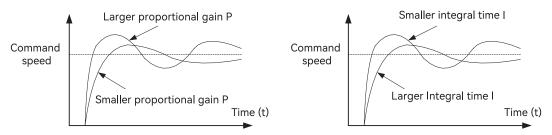


Figure 19. Speed loop parameter effect diagram

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P03.07	Speed loop filter time constant	0~0.031	uint16	0.028	W	0x0307

Set the filter time of the speed loop regulator. Do not modify unless there are special requirements.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
		0: Digital setting (P03.12)				
	Speed control (drive) torque upper limit source	1: AI1	uint16		W	0x030b
P03.11		2: AI2		0		
P03.11		4: Pulse setting		U		
		6: MIN (AI1, AI2)				
		7: MAX (AI1, AI2)				

Under vector control speed control mode, when the motor drives a load, the electromagnetic torque output by the motor must be limited. This function code sets the method for specifying the torque limit value.

0: Set by P03.12

The torque is limited by the digital set value of P03.12.

- 1: AI1
- 2: AI2

The torque limit is specified via an analog input.

4: Pulse setting

The torque limit is specified via high-speed pulse input.

- 6: MIN(AI1, AI2)
- 7: MAX(AI1, AI2)

The torque limit is set to the minimum or maximum input of Al1 and Al2, respectively.

Note: When options 1 to 7 above are set to 100.0%, they correspond to the value set by P03.12.

Parameter ID	Parameter name	Setting range	Parameter	Factory	Attribute	Communication		
			type	value	Attribute	address		

	Speed control (drive)					
P03.12	torque upper limit	0%~200%	uint16	150%	W	0x030c
	digital setting					

When P03.11 is set to 0, the torque limit under speed control is determined by P03.12. Additionally, P03.12 also serves as the set value corresponding to 100.0% input when P03.11 selects options 1–7.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P03.13	Excitation current loop	0~60000	uint16	Model setting	W	0x030d
	proportional gain		diriero	Toda secting		0,0000
P03.14	Excitation current loop	0~60000	uint16	Model setting	W	0x030e
F03.14	integral gain					0x030e
P03.15	Torque current loop	0~60000	uint16	Model setting	W	0x030f
P03.15	proportional gain	0~60000				0x0301
D02.1/	Torque current loop	0~60000	uin+14	Model setting	W	0x0310
P03.16	integral gain	0~80000	uint16	Model setting	VV	0x0310

The vector control current loop PI adjustment parameters are divided into two groups: excitation and torque. These parameters are automatically obtained after motor tuning and generally do not require modification. Increasing the current loop proportional gain or integral gain can accelerate the system's dynamic response; decreasing them can enhance system stability. Improper settings may cause system oscillation.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
		0: Digital setting (P03.18)				
	Speed control (brake) torque upper limit source	1: AI1				
P03.17		2: AI2	uint16	0	W	0x0311
F03.17		4: Pulse setting		O		
		6: MIN (AI1, AI2)				
		7: MAX (AI1, AI2)				

Under vector control speed control mode, when the motor is in a generating state, the braking torque output by the motor must be limited. This function code sets the method for specifying the torque limit value.

0: Set by P03.12

The torque is limited by the digital set value of P03.12.

- 1: AI1
- 2: AI2

The torque limit is specified via an analog input.

4: Pulse setting

The torque limit is specified via high-speed pulse input.

- 6: MIN(AI1, AI2)
- 7: MAX(AI1, AI2)

The torque limit is set to the minimum or maximum input of Al1 and Al2, respectively.

Parameter ID	Parameter name		Parameter	Factory Attribute	Communication	
Parameter ID	Parameter name	Setting range	type	value	Attribute	address

	Speed control (brake)					
P03.18	torque upper limit	0%~200%	uint16	150%	W	0x0312
	digital setting					

When P03.17 is set to 0, the torque limit under speed control is determined by P03.12. Additionally, P03.18 also serves as the set value corresponding to 100.0% input when P03.17 selects options 1–7.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
		0: Digital setting (P03.35)				
		1: Al1				
D02.27	Torque setting source	2: AI2		0	\ A /*	0.0222
P03.34	in torque control mode	4: Pulse setting	uint16	U	W*	0x0322
		6: MIN(AI1, AI2)				
		7: MAX(AI1, AI2)				

Select the torque setting command; refer to speed control mode.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P03.35	Torque digital setting in torque control mode	-200%~200%	int16	150%	W	0x0323

Digital set value in torque mode. Torque setting uses a relative value, where 100.0% corresponds to the motor rated torque. The setting range is -200% to 200%, indicating that the maximum torque of the VFD is 2 times the motor rated torque. When the torque set value is positive, the VFD operates forward; when negative, it operates in reverse.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P03.36	Maximum forward					
	frequency in torque	0.00Hz ~ Maximum frequency P00.08	uint16	50.00Hz	W	0x0324
	control					
	Maximum reverse					
P03.37	frequency in torque	0.00Hz ~ Maximum frequency P00.08	uint16	50.00Hz	W	0x0325
	control					

Under torque control mode, these are the maximum forward/reverse operating frequencies of the VFD. During torque control, if the load torque is less than the motor output torque, the motor speed will continuously increase. To prevent accidents such as overspeed, the maximum motor speed during torque control must be limited.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P03.38	Speed/Torque control	0: Speed control	uint16	0	W*	0x0326
	mode	1: Torque control	uintio		VV	0x0320

Select whether the VFD control mode is speed control or torque control. This function code needs to be determined in conjunction with terminal function 29 (torque control inhibition) and 46 (speed control/torque control switch).

When torque control prohibition is active, the VFD operates in speed control mode.

When torque control inhibition is inactive:

If speed control/torque control switch is inactive, the control mode is determined by P03.38. If speed control/torque control switch is active, the control mode is the inverse of P03.38.

In torque control mode, the VFD operating frequency is set by P03.36 and P03.37, and the acceleration/deceleration time is set by P03.39 and P03.40.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P03.39	During torque control acceleration	0s~650s	uint16	0s	W	0x0327
P03.40	During torque control deceleration	0s~650s	uint16	0s	W	0x0328

In torque control mode, the difference between the motor output torque and load torque determines the acceleration of the motor and load. Setting the acceleration/deceleration time controls the smooth variation of motor speed.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
		0: Digital setting (P03.36~P03.37)				
		1: AI1				
D02 /1	Frequency limit source	2: AI2		0	\ A /\	0.0000
P03.41	in torque control	4: Pulse setting	uint16	0	W*	0x0329
		6: MIN (AI1, AI2)				
		7: MAX (AI1, AI2)				

Select the speed setting command in torque mode; refer to speed control mode.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P03.46	Output power correction coefficient	0%~200%	uint16	100%	W	0x032e

4.5 P04 Motor V/F parameter group

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
		0: Linear V/F curve				
	VF curve setting	1: Multi-Point V/F curve				
		2: Square V/F curve				
		3: Reserved				
P04.00		4: Reserved	uint16	0	W*	0x0400
		6: Reserved				
		8: Reserved				
		10: Fully-decoupled VF mode				
		11: Semi-decoupled VF mode				

0: Linear V/F curve

Below the rated frequency, the VFD's output voltage varies linearly with the output frequency, making it suitable for general mechanical drive applications such as high-inertia fans, accelerating stamping presses, centrifuges, and water pumps.

1: Multi-Point V/F curve

Frequency point setting range: 0.00Hz ~ motor rated frequency; voltage point setting range: 0.0% ~ 100.0% (corresponding to 0V ~ motor rated voltage). The set values of the multi-point V/F curve are typically configured based on the motor's load characteristics. Ensure the following setting order: $P04.02 \le P04.04 \le P04.06$.

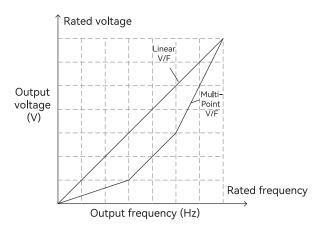


Figure 20. V/F curve diagram

10: Fully-decoupled VF mode

The VFD's output frequency and voltage are independent. The output frequency is determined by the frequency source, while the output voltage is determined by the V/F decoupled voltage source. Generally used in applications such as torque motor control.

11: Semi-decoupled VF mode

In this mode, V and F are proportional, but the proportionality can be adjusted via the voltage source. The relationship between V and F is also related to the motor's rated voltage and frequency (first group parameters). Assuming the voltage source input is X (a value between 0–100%), the relationship between the VFD's output voltage and frequency F is: $V/F = 2 \times X \times (motor rated voltage) / (motor rated frequency)$.

Parameter ID	Parameter name	Setting range	Parameter	Factory	Attribute	Communication
		John Strange	type	value	7 1001 100100	address
P04.02	Multi-Point VF	0.00Hz~P04.04	uint16	0.00Hz	W*	0x0402
	frequency point 1	0.00112**F04.04	uiiitio	0.0002	VV	
P04.03	Multi-Point VF voltage	0%~100%	uint16	0%	W*	0x0403
	point 1					
P04.04	Multi-Point VF	P04.02~P04.06	uint16	0.00Hz	W*	0x0404
P04.04	frequency point 2		unitro	0.00112		
P04.05	Multi-Point VF voltage	00/ 4000/	uint16	0%	W*	00/05
P04.05	point 2	0%~100%	ullicio	0%	VV.	0x0405
D0/ 0/	Multi-Point VF	DO/ O/ Matarastad for success DO2 O/	:	0.00Hz	W*	0.0404
P04.06	frequency point 3	P04.06 ~ Motor rated frequency P02.04	uint16			0x0406
P04.07	Multi-Point VF	00/ 4000/	:	0%	W*	0x0407
	frequency point 3	0%~100%	uint16			UXU4U7

Parameters P04.02 to P04.07 define the multi-point V/F curve. The frequency point setting range is 0.00Hz ~ motor rated frequency, and the voltage point setting range is 0.0% ~ 100% (corresponding to 0V ~ motor rated voltage). The set values are typically configured based on the motor's load characteristics. Frequency setting requirement: $P04.02 \le P04.04 \le P04.06$.

	Parameter ID	Parameter name	Setting range	Parameter	Factory	Attribute	Communication
				type	value	Accidate	address
	P04.08	VF over-excitation gain	0~200	uint16	64	W*	0x0408

A higher VF over-excitation gain enhances the suppression effect of over-voltage stall. When using a braking resistor, adding a braking unit, or employing an energy feedback unit, ensure the over-excitation gain is set to 0; otherwise, excessive operating current may occur.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P04.09	Torque boost cutoff frequency	0.00Hz ~ Maximum frequency P00.08	uint16	50.00Hz	W*	0x0409

P04.10	Torque boost	0%~30%	uint16	Model setting	W	0x040a
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The torque boost function is generally applied under low-frequency conditions of the VFD. Under V/F control, the output torque of the VFD is proportional to the frequency. At low frequencies, the motor's torque at low speeds is relatively low. Increasing this parameter can raise the output voltage, increase the current, and thereby enhance the output torque. Note that this value should not be set too high, as it may cause excessive current and trigger overload protection.

Torque boost cutoff frequency: The torque boost function is disabled when the operating frequency reaches the torque boost cutoff frequency.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P04.11	VF overcurrent stall trip current	50%~200%	uint16	150%	W*	0x040b
P04.12	VF overcurrent stall enable	0: Inactive 1: Active	uint16	1	W*	0x040c
P04.13	VF overcurrent stall suppression gain	0~100	uint16	20	W	0x040d
P04.14	VF double-speed over-current stall trip current compensation coefficient	50%~200%	uint16	50%	W*	0x040e

During VFD operation, if the current exceeds the over-current stall trip current (P04.11), overcurrent suppression will be triggered to reduce the output frequency. The frequency will only gradually increase and return to normal after the current drops below the overcurrent trip current. The over-current stall strategy increases the acceleration time. If the actual acceleration time is too long to meet requirements, the over-current stall trip current (P04.11) can be appropriately increased.

VF overcurrent stall trip current: When the motor current exceeds this value, the VFD enables the over-current stall function. The default value is 150%, i.e., 1.5 times the VFD's rated current.

VF over-current stall enable: 0: V/F over-current stall disabled; 1: V/F over-current stall enabled. Over-current stall is enabled by default.

VF overcurrent stall suppression gain: A higher set value results in greater changes in the output frequency during overcurrent and stronger overcurrent suppression.

VF double-speed over-current stall trip current compensation coefficient: Reduce the over-current stall trip current at high speeds. The compensation coefficient is ineffective at 50%; the action current in the flux-weakening region corresponds to the recommended set value of 100% for P04.11.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P04.16	V/F oscillation suppression enable	0: Inactive 1: Active	uint16	1	W*	0x0410
P04.17	Oscillation suppression gain	1~100	uint16	40	W	0x0411

Under V/F control, the motor is prone to speed and current oscillations due to load disturbances during operation. Severe oscillations may cause the system to fail to operate normally or even trigger overcurrent protection. Adjust P04.16 to enable or disable the V/F oscillation suppression function; adjust P04.17 to effectively suppress speed and current oscillations. Generally, no modification is required. If adjustment is necessary, make gradual changes around the factory default values and avoid setting excessively high values, as this may impair V/F control performance.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
		0: Digital setting				
		1: Al1				
		2: AI2		0	W	0x0414
P04.20	V/F decoupled voltage	3: Al3	uint16			
P04.20	source	4: Pulse setting	ullitio			
		5: Multi-Segment command				
		6: Simple PLC				
		7: PID				
P04.21	V/F decoupled voltage	0~2000V	uint16	0V	W	0x0415
	source digital setting	10~2000V	uiiilio	00	VV	0x0415

WF decoupled voltage source: The target voltage set channel under the condition of separated voltage and frequency.

0: Digital setting

The VFD's output voltage is set via digital setting, with the set value being the value of P04.21 (V/F decoupled voltage source digital setting).

1: AI1

The VFD's output voltage is input through analog input terminal Al1. For details, refer to the P05 group parameters. The Al1 terminal inputs current or voltage signals, and the corresponding frequency value is calculated based on the set Al curve.

- 2: Same as 1, input via analog input terminal Al2.
- 3: Same as 1, input via analog input terminal Al3.
- 4: Pulse setting (DI5)

The V/F decoupled voltage is set via high-speed pulse input. For pulse input settings, refer to the P05 group parameters.

5: Multi-Segment command

When selecting multi-segment commands as the WF decoupled voltage, different set values correspond to different combinations of states of the digital input DI terminals.

6: Simple PLC

The VFD's output voltage is set via a simple PLC. For details, refer to the simple PLC function description.

7: PID

The VFD's output voltage is set by PID operation. For PID control details, refer to the P08 group parameters.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P04.22	V/F decoupled voltage rise time	0~100s	uint16	0	W	0x0416
P04.23	V/F decoupled voltage fall time	0~100s	uint16	0	W	0x0417
P04.24	WF decoupled stopping mode selection	0: Frequency/Voltage independently decreases to 0 1: Voltage decreases to 0 first, then frequency decreases	uint16	0	W*	0x0418

The rise and fall times of the V/F decoupled voltage command are used to set the output voltage change rate in V/F decoupled mode. This time refers to the rise time from 0V to the motor rated voltage or the fall time from the motor rated voltage to 0V.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P04.25	V/F overvoltage stall trip voltage	330V~800V	uint16	Model setting	W*	0x0419
P04.26	V/F overvoltage stall enable	0: Inactive 1: Active	uint16	1	W*	0x041a
P04.27	V/F overvoltage stall suppression frequency gain	0~100	uint16	30	W	0x041b
P04.28	V/F overvoltage stall suppression frequency gain	0~100	uint16	30	W	0x041c
P04.29	Overvoltage stall maximum up-limited frequency	0~50Hz	uint16	5Hz	W*	0x041d

During VFD operation, if the bus voltage exceeds the overvoltage stall trip voltage (P04.25), the VFD enters a generating state, triggering overvoltage stall regulation to adjust the output frequency. The frequency will only gradually return to normal after the voltage drops below the overvoltage trip voltage. The overvoltage stall strategy increases the deceleration time. If the actual deceleration time is too long to meet requirements, the overvoltage stall trip voltage (P04.25) can be appropriately increased.

V/F overvoltage stall trip voltage: When the bus voltage exceeds this value, the VFD enables the overvoltage stall function. Default values vary by model.

V/F overvoltage stall enable: 0: V/F overvoltage stall disabled; 1: V/F overvoltage stall enabled. Overvoltage stall is enabled by default.

V/F overvoltage stall suppression frequency gain: Indicates the speed at which the VFD adjusts the output frequency when an overvoltage stall is triggered. Increasing this value enhances bus voltage control but may cause larger output frequency fluctuations. If output frequency fluctuations are significant when the overvoltage stall is enabled, reduce this value.

V/F overvoltage stall suppression voltage gain: Indicates the speed at which the VFD adjusts the output voltage when an overvoltage stall is triggered. Increasing this value improves bus voltage control and reduces the overshoot of the bus voltage when the overvoltage stall is enabled.

Overvoltage stall maximum upper limited frequency: After the overvoltage stall is triggered, the VFD may increase the output frequency. This value is the maximum increment of the output frequency.

Note: When using a braking resistor, adding a braking unit, or employing an energy feedback unit, please note:

- 1. Set P04.08 "V/F over-excitation gain" to "0" to avoid excessive operating current.
- 2. Set P04.26 "V/F overvoltage stall enable" to "0" to avoid extended deceleration time.

4.6 P05 Input terminal parameter group

The E610 series VFD standard unit is equipped with 6 multi-functional digital input terminals (DI1 and HDI can also serve as high-speed pulse input terminals) and 2 analog input terminals.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P05.00	DI1 terminal function		uint16	1 (Forward	W*	0x0500
	selection		diricio	operation)	VV	0,0300
P05.01	DI2 terminal function		uint16	2 (Reverse	W*	0x0501
F05.01	selection		unitro	operation)	VV	0x0301
P05.02	DI3 terminal function	3 terminal function selection Set values are detailed in the table below. selection	uint16	9 (Fault reset)	W*	0x0502
1 03.02	selection					0,0302
	DI/ terminal function		uint16	12 (Multi-		
P05.03				Speed terminal	W*	0x0503
	Selection			1)		
	DI5 terminal function			13 (Multi-		
P05.04	selection		uint16	Speed terminal	W*	0x0504
	selection			2)		
DOE 05	HDI terminal function		uin+16	0 (No Function)	W*	0x0505
P05.05	selection		uint16	(NO FUNCTION)	VV.	0x0505

This parameter is used to set the function corresponding to each multi-functional digital input terminal.

Set value	Function	Description
0	No function	Even if a signal is input to the VFD, it does not operate. Unused terminals can be set to
0	No function	no function to prevent malfunction.
1	Forward operation (FWD)	
2	Reverse operation (REV)	The VFD's forward and reverse rotation can be controlled via external terminals.
		This terminal determines whether the VFD operates in three-wire control mode. For
3	Three-wire operation control	detailed descriptions, refer to the function code introduction of P05.13 (three-wire
		control Mode).
4	Forward jog (FJOG)	FJOG indicates forward jog operation, and RJOG indicates reverse jog operation. For
5	Reverse jog (RJOG)	frequency and jog acceleration/deceleration time during jog operation, refer to the
	Reverse Jog (NJOG)	detailed descriptions of function codes P01.10, P01.11, and P01.12.
6	Terminal UP	When frequency is given by an external terminal, modify the frequency increment/dec-
7	Terminal DOWN	rement commands. If the frequency source is set to digital setting, the set frequency can
/	Terrinia DOWN	be adjusted up or down.
		The VFD blocks its output, and the motor stopping process is not controlled by the VFD.
8	Coast stop	This is a commonly used method for high-inertia loads with no requirement for stopping
0	Coast stop	time.
		This mode has the same meaning as the "coast stop" described in P01.05.
9	Fault reset (RESET)	External fault reset function. It has the same function as the RESET key on the keypad.
,	Tault reset (NESET)	This function enables remote fault reset.
		The VFD decelerates to stop, but all operating parameters (e.g., PLC parameters, swing
10	Operation pause	frequency parameters, PID parameters) remain in memory. After this signal disappears,
		the VFD resumes operation to the state before stopping.
11	External fault normally ones is suit	When an external fault signal is sent to the VFD, the VFD reports a fault and handles it
11	External fault normally open input	according to the fault protection action mode (P13.41 ~ P13.44).

12	Multi-speed terminal 1	
13	Multi-speed terminal 2	A total of 14 around pattings can be applicated through the digital state combinations of
14	Multi-speed terminal 3	A total of 16 speed settings can be achieved through the digital state combinations of these four terminals. Detailed combinations are shown in Table 25.
	<u>'</u>	triese four terminals. Detailed combinations are shown in Table 25.
15	Multi-speed terminal 4	
16	Acceleration/Deceleration time	Four acceleration (deceleration times can be calcuted through the digital state combine
	selection terminal 1 Acceleration/Deceleration time	Four acceleration/deceleration times can be selected through the digital state combinations of these two terminals. Detailed combinations are shown in Table 26.
17	selection terminal 2	tions of these two terminals. Detailed combinations are shown in Table 20.
18	Frequency source switch	When the frequency source selection (units digit of P00.05) is set to 2, this terminal is used to switch between the main frequency source X and the auxiliary frequency source Y. When the frequency source selection (units digit of P00.05) is set to 3, this terminal is used to switch between the main frequency source X and the main-auxiliary operation result. When the frequency source selection (units digit of P00.05) is set to 4, this terminal is used to switch between the auxiliary frequency source Y and the main-auxiliary operation result.
19	UP/DOWN setting clear (terminal/keypad)	When the frequency is set via digital frequency setting, this terminal can clear the frequency value changed by UP/DOWN, restoring the set frequency to the value configured by P00.12.
20	Operation command switch terminal	When the command source (P00.02) is set to 1, this terminal is used to switch between terminal control and keypad control. When the command source (P00.02) is set to 2, this terminal is used to switch between communication control and keypad control.
21	Acceleration/Deceleration inhibit	Ensures the VFD is not affected by external signals (except stop commands) and maintains the current output frequency.
22	PID pause	PID is temporarily disabled, and the VFD maintains the current frequency output.
23	PLC status reset	The PLC pauses during execution and can be restored to the initial state of the simple PLC via this terminal when operation resumes.
24	Swing frequency pause	The VFD outputs at the center frequency. Swing frequency is paused.
25	Counter input	Input terminal for counting pulses.
26	Counter reset	Resets the counter status.
27	Length count input	Input terminal for length counting.
28	Length reset	Resets the length count.
29	Torque control inhibit	Prohibits the VFD from operating in torque control mode.
30	Pulse frequency input (valid only for DI1 and HDI)	This is a pulse input terminal.
31	Reserved	
32	Immediate DC braking	When this terminal is active, the VFD directly switches to the DC braking state.
33	External fault normally closed input	After an external fault signal is sent to the VFD, the VFD reports a fault and handles it according to the fault protection action mode (P13.41 ~ P13.44).
34	Frequency setting taking effect	If this terminal function is set, when the frequency is modified, the activation timing of
35	Invert PID action direction	the modification is controlled by the effectiveness of this terminal. When this terminal is active, the PID action direction is opposite to the direction set by P08.03.
36	External stop terminal 1	During keypad control, this terminal can be used to stop the VFD, equivalent to the STOP key on the keypad.
37	Control command switch terminal 2	Used to switch between terminal control and communication control. When this terminal is active: If P00.02 is set to terminal control, it switches to communication control; If P00.02 is set to communication control, it switches to terminal control.

38	PID integration pause	When this terminal is active, the PID integral action is paused, but the proportional and
30	Tib integration pause	differential adjustments remain effective.
39	Switch frequency source X with preset	When this terminal is active, frequency source X is replaced by the preset frequency
39	frequency	(P00.12).
	Switch frequency source Y with preset	When this terminal is active, frequency source Y is replaced by the preset frequency
40	frequency	(P00.12).
		The digital state of this terminal is used to select 2 sets of motor parameters; detailed
41	Motor selection 1	combinations are shown in Table 27.
42	Motor selection 2	Reserved
		When P08.11 (PID parameter switching condition) is a DI terminal, if this terminal is
43	PID parameter switch terminal	active, the PID uses parameters P08.08 ~ P08.10. If the terminal is inactive, it uses
		parameters P08.05 ~ P08.07.
44	User-defined fault 1	After an external fault signal is sent to the VFD, the VFD reports a fault and handles it
44	User-defined fault 1	according to the fault protection action mode (P13.41 ~ P13.45).
45	User-defined fault 2	After an external fault signal is sent to the VFD, the VFD reports a fault and handles it
43	Oser-defined fault 2	according to the fault protection action mode (P13.41 ~ P13.45).
		Switches the VFD between torque control and speed control modes. When this termina
46	Speed control/torque control switch	is inactive, the VFD operates in the mode defined by P03.38 (speed/torque control
		mode); when active, it switches to the other mode.
47	Emergency stop	When this terminal is active, the VFD stops at the fastest speed.
48	External stop terminal 2	Under any control mode, this terminal can be used to stop the VFD, stopping with
40	External stop terminal 2	deceleration time 4.
49	Deceleration DC braking	When this terminal is active, the VFD first decelerates to the DC braking start frequency
47	Deceleration DC praking	and then switches to the DC braking state.
50	Reset current operation time	Clears the current operation time value of P28.01.

Table 23. Multi-speed function description

K4	К3	K2	K1	Frequency setting	Corresponding parameter
OFF	OFF	OFF	OFF	Multi-speed 0	P11.01
OFF	OFF	OFF	ON	Multi-speed 1	P11.02
OFF	OFF	ON	OFF	Multi-speed 2	P11.03
OFF	OFF	ON	ON	Multi-speed 3	P11.04
OFF	ON	OFF	OFF	Multi-speed 4	P11.05
OFF	ON	OFF	ON	Multi-speed 5	P11.06
OFF	ON	ON	OFF	Multi-speed 6	P11.07
OFF	ON	ON	ON	Multi-speed 7	P11.08
ON	OFF	OFF	OFF	Multi-speed 8	P11.09
ON	OFF	OFF	ON	Multi-speed 9	P11.10
ON	OFF	ON	OFF	Multi-speed 10	P11.11
ON	OFF	ON	ON	Multi-speed 11	P11.12
ON	ON	OFF	OFF	Multi-speed 12	P11.13
ON	ON	OFF	ON	Multi-speed 13	P11.14
ON	ON	ON	OFF	Multi-speed 14	P11.15
ON	ON	ON	ON	Multi-speed 15	P11.16

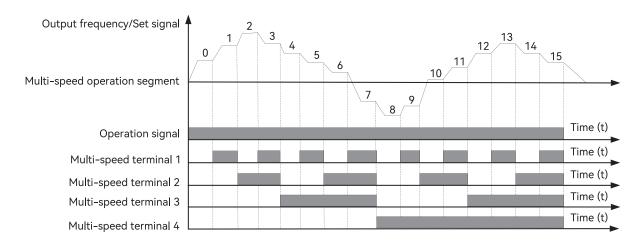


Figure 21. Terminal-Controlled multi-speed diagram

Table 24. Multi-speed function description 2

Terminal 2	Terminal1	Acceleration/Deceleration time selection	Corresponding parameter
OFF	OFF	Acceleration time 1	P00.13, P00.14
OFF	ON	Acceleration time 2	P01.41, P01.42
ON	OFF	Acceleration time 3	P01.43, P01.44
ON	ON	Acceleration time 4	P01.45, P01.46

Table 25. Multi-speed function description 3

Terminal 1	Motor selection	Corresponding parameter group
OFF	Motor 1	P02, P03 group
ON	Motor 2	P20 group

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P05.10	DI input terminal active state setting 1	Units digit: DI1 0: High level active 1: Low level active Tens digit: DI2 0: High level active 1: Low level active Hundreds digit: DI3 0: High level active 1: Low level active Thousands digit: DI4 0: High level active 1: Low level active Tens of thousands digit: DI5 0: High level active 1: Low level active	uint16	00000	W	0x050a

P05.11	DI input terminal active state setting 2	Units digit: HDI 0: High level active 1: Low level active Tens digit: Reserved 0: High level active 1: Low level active Hundreds digit: Reserved 0: High level active 1: Low level active 1: Low level active Thousands digit: Reserved 0: High level active 1: Low level active 1: Low level active 1: Low level active 1: Low level active Tens of thousands digit: Reserved 0: High level active 1: Low level active	uint16	00000	W	0x050b
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Define the active state setting of input terminals.

Select high-level active: The corresponding DI terminal and 24V terminal are active (functional) when connected (closed), and inactive (non-functional) when disconnected (open).

Select low-level active: The corresponding DI terminal and COM terminal are inactive (non-functional) when connected (closed), and active (functional) when disconnected (open).

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P05.12	DI filtering time	0s~1s	uint16	0.01s	W	0x050c
P05.13	Terminal command	0: Two-wire mode 1 1: Two-wire mode 2 2: Three-wire mode 1 3: Three-wire mode 2	uint16	0	W*	0x050d

This parameter defines four different modes for controlling VFD operation via external terminals.

◆ 0: Two-wire mode 1

This is the most commonly used two-wire mode. Short-circuit the SS and 24V terminals, set the DIn terminals to FWD and REV functions respectively, and use the FWD/REV terminal commands to determine the motor's forward/reverse rotation.

When K1 is closed and K2 is open, VFD runs forward. When K1 is open and K2 is closed, VFD runs in reverse. When K1 and K2 are in the same state (both closed or both open), VFD stops.

K1	K2	Operation command
0	0	Stop
1	0	Forward rotation
0	1	Reverse rotation
1	1	Stop

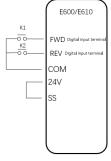


Figure 22. Two-wire mode 1

♦ 1: Two-wire mode 2

In this mode, short-circuit the SS and 24V terminals, set the DIn terminals to FWD and REV functions respectively (REV serves as the enable terminal). Direction is determined by the state of FWD. Function settings are as follows:

When K1 is open, VFD stops regardless of K2's state (open or closed). When K1 is closed and K2 is open, the VFD runs forward. When K2 is closed, VFD runs in reverse.

K1	K2	Operation command
0	0	Stop
0	1	Stop
1	0	Forward rotation
1	1	Reverse rotation

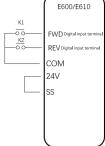


Figure 23. Two-wire mode 2

◆ 2: Three-wire mode 1

Set Dln1 and Dln2 terminals to FWD and REV functions respectively, and Dln3 to the three-wire operation control function. Use Dln3 to control operation enable; direction is controlled by FWD/REV. Function settings are as follows:

When K2 is closed and K1 is closed, VFD runs forward.

When K3 is closed, VFD runs in reverse. When K2 is open, VFD stops. During VFD operation, K2 must remain closed; forward/reverse commands take effect based on the final closing action edge of K1/K3.

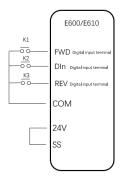


Figure 24. Three-wire mode 1

♦ 3: Three-wire mode 2

Set DIn1 and DIn2 terminals to FWD and REV functions respectively, and DIn to the three-wire operation control function. In this mode, DIn is the operation enable command, FWD is the operation command, REV is the direction command, and the stop command is triggered by disconnecting the DIn signal. Function settings are as follows:

Close and hold the K2 terminal. When the K1 terminal is closed, a closing action edge is generated, and the VFD starts running. While the VFD is running, if the K3 terminal is opened, the VFD runs forward; if the K3 terminal is closed, the VFD runs in reverse. Opening the K2 terminal stops the VFD.

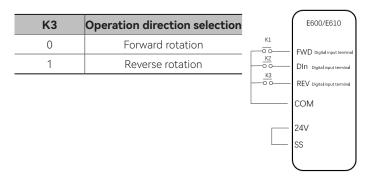


Figure 25. Three-wire mode 2

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P05.14	UP/DOWN terminal change rate per second	0.001~65.535	uint16	1	W	0x050e

The UP/DOWN terminal adjusts the change rate of the set frequency.

When P00.18 (frequency command decimal point) is set to 2, the value range is 0.001 Hz/s to 65.535 Hz/s.

When P00.18 (frequency command decimal point) is set to 1, the value range is 0.01 Hz/s to 655.35 Hz/s.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P05.15	Al curve 1 minimum input	0V~P05.17	int16	0v	W	0x050f
P05.16	Al curve 1 minimum input corresponding setting	-100%~100%	int16	0%	W	0x0510
P05.17	Al curve 1 maximum input	P05.15~10v	int16	10v	W	0x0511
P05.18	Al curve 1 maximum input corresponding setting	-100%~100%	int16	100%	W	0x0512
P05.19	Al1 filtering time	0s~10s	uint16	0.1s	W	0x0513

These function codes define the relationship between the analog input voltage and the set value represented by the analog input. When the analog input voltage exceeds the maximum input (P05.17), the analog voltage will be calculated based on the maximum input. When the analog input voltage is below the minimum input, the analog voltage will be calculated as either the minimum input or 0.0% based on the AI minimum input setting (P05.36).

When the analog input is a current input, 1mA current corresponds to 0.5V voltage. In different application scenarios, the nominal value corresponding to 100% of the analog setting may vary; refer to the specific application section descriptions for details.

The following diagrams illustrate several typical settings:

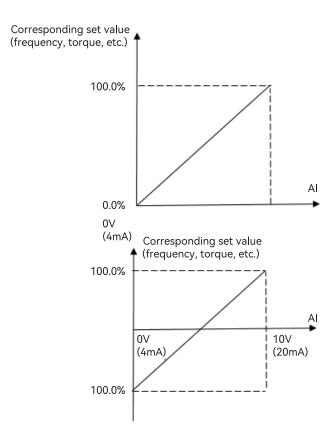


Figure 26. Correspondence between analog input and set value

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P05.20	Al curve 2 minimum input	0V~P05.22	int16	0v	W	0x0514
P05.21	Al curve 2 minimum input corresponding setting	-100%~100%	int16	0%	W	0x0515
P05.22	Al curve 2 maximum input	P05.20~10v	int16	10v	W	0x0516
P05.23	Al curve 2 maximum input corresponding setting	-100%~100%	int16	100%	W	0x0517
P05.24	Al2 filtering time	0s~10s	uint16	0.1s	W	0x0518

The functions of curve 2 are similar to the setting methods of curve 1.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P05.25	Al curve 3 minimum input	-10v~P05.27	int16	0v	W	0x0519
P05.26	Al curve 3 minimum input corresponding setting	-100%~100%	int16	0%	W	0x051a
P05.27	Al curve 3 maximum input	P05.25~10V	int16	10v	W	0x051b
P05.28	Al curve 3 maximum input corresponding setting	-100%~100%	int16	100%	W	0x051c
P05.24	Al3 filtering time	0s~10s	uint16	0.1s	W	0x0518

The functions of curve 3 are similar to the setting methods of curve 1.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P05.30	PULSE minimum input	0KHz~P05.32	uint16	0KHz	W	0x051e
P05.31	PULSE minimum input corresponding setting	-100%~100%	int16	0%	W	0x051f

P05.32	PULSE maximum input	P05.30~100KHz	uint16	50KHz	W	0x0520
P05.33	PULSE maximum input setting	-100%~100%	int16	100%	W	0x0521
P05.34	PULSE filtering time	0s~10s	uint16	0.1s	W	0x0522

This group of function codes defines the correspondence when pulses are used as the frequency setting method. Pulse frequency input can only be provided via the DI1 channel (for E610, via DI1 or HDI). The application of this group of functions is similar to that of curve 1.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P05.35	Al set curve selection	0x11~0x55	uint16	0x21	W	0x0523

It defines the set curves corresponding to AI1/AI2. The standard unit of E600/E610 VFD provides 2 analog input ports.

Setting range

Units digit: Al1 curve selection

1: Curve 1 (2 points, refer to P05.15 ~ P05.18)

2: Curve 2 (2 points, refer to P05.20 ~ P05.23)

3: Curve 3 (2 points, refer to P05.25 ~ P05.28)

4: Curve 4 (4 points, refer to P05.41 ~ P05.48)

5: Curve 5 (4 points, refer to P05.49 ~ P05.56)

Tens digit: Al2 curve selection (1~6, same as above)

Hundreds digit: Reserved

Para	ameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
F	P05.36	Al below minimum input setting selection	0x000~0x111	uint16	0x0	W	0x0524

If set to 0, when the AI input is below the minimum input, the physical quantity is set to the value corresponding to the curve's minimum input setting.

If set to 1, when the Al input is below the minimum input, the physical quantity is set to 0.0%.

Setting range

Units digit: Al1 below minimum input setting selection

0: Corresponding setting of minimum input

1: 0.0%

Tens digit: Al2 below minimum input setting selection (0~1, same as above)

Hundreds digit: Reserved

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P05.37	DI1 delay time	0s~3600s	uint16	0s	W	0x0525
P05.38	DI2 delay time	0s~3600s	uint16	0s	W	0x0526
P05.39	DI3 delay time	0s~3600s	uint16	0s	W	0x0527

Set the delay time from the change in DI terminal status to the VFD's response.

Currently, only DI1/DI2/DI3 have the function of setting delay time.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P05.40	High-speed DI selection for	0: DI1	uint16	0	W	0x0528
	frequency source	1: HDI	diricio			0,00020

When the frequency source is selected as a high-speed pulse, use this sub-function code to select DI1 or HDI as the frequency source input.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P05.41	Al curve 4 minimum input	-10v~P05.43	int16	0v	W	0x0529
P05.42	Al curve 4 minimum input corresponding setting	-100%~100%	int16	0%	W	0x052a
P05.43	Al curve 4 median value 1 input	P05.41~P05.45	int16	3v	W	0x052b
P05.44	Al curve 4 median value 1 input corresponding setting	-100%~100%	int16	30%	W	0x052c
P05.45	Al curve 4 median value 2 input	P05.43~P05.47	int16	6v	W	0x052d
P05.46	Al curve 4 median value 2 input corresponding setting	-100%~100%	int16	60%	W	0x052e
P05.47	Al curve 4 maximum input	P05.45~10v	int16	10v	W	0x052f
P05.48	Al curve 4 maximum input corresponding setting	-100%~100%	int16	100%	W	0x0530
P05.49	Al curve 5 minimum input	-10V~P05.51	int16	-10v	W	0x0531
P05.50	Al curve 5 minimum input corresponding setting	-100%~100%	int16	-100%	W	0x0532
P05.51	Al curve 5 median value 1 input	P05.49~P05.53	int16	-3v	W	0x0533
P05.52	Al curve 5 median value 1 input corresponding setting	-100%~100%	int16	-30%	W	0x0534
P05.53	Al curve 5 median value 2 input	P05.51~P05.55	int16	3v	W	0x0535
P05.54	Al curve 5 median value 2 input corresponding setting	-100%~100%	int16	30%	W	0x0536
P05.55	Al curve 5 maximum input	P05.53~10v	int16	10v	W	0x0537
P05.56	Al curve 5 maximum input corresponding setting	-100%~100%	int16	100%	W	0x0538

Curve 4 and 5 functions are similar to curves 1, 2, and 3, but curves 1, 2, and 3 are straight lines, while curves 4 and 5 add 2 inflection points to form 4-point curves, enabling flexible correspondence relationships. The following diagram illustrates the schematic of curves 4 and 5:

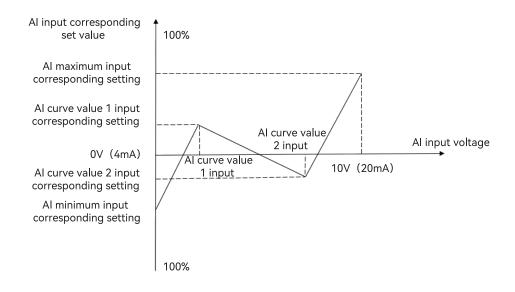


Figure 27. Al curve setting diagram

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P05.57	Al1 jump point	-100%~100%	int16	0%	W	0x0539
P05.58	Al1 jump amplitude	0%~100%	uint16	0.5%	W	0x053a
P05.59	Al2 jump point	-100%~100%	int16	0%	W	0x053b
P05.60	Al2 jump amplitude	0%~100%	uint16	0.5%	W	0x053c

Sets the Al set value jump function. If jump point - amplitude < actual value < jump point + amplitude, the Al given value is the Al set jump point.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P05.61	Al1 pre-correction voltage 1 setting	0.50~4.00	uint16	2.00	W	0x053d
P05.62	Al1 post-correction voltage 1 setting	0.50~4.00	uint16	2.00	W	0x053e
P05.62	Al1 pre-correction voltage 2 setting	6.00~9.99	uint16	8.00	W	0x053f
P05.64	Al1 post-correction voltage 2 setting	6.00~9.99	uint16	8.00	W	0x0540

When performing analog voltage correction on the Al1 terminal, a correction curve is formed using 2 points, where each point corresponds to a measured voltage and a displayed voltage. The Al1 pre-correction voltage setting is the actual measured voltage value by the instrument, and the Al1 post-correction voltage setting is the displayed Al1 pre-correction voltage (P28.30).

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P05.65	Al2 pre-correction voltage 1 setting	0.50~4.00	uint16	2.00	W	0x0541
P05.66	Al2 post-correction voltage 1 setting	0.50~4.00	uint16	2.00	W	0x0542
P05.67	Al2 pre-correction voltage 2 setting	6.00~9.99	uint16	8.00	W	0x0543

P05.68	Al2 post-correction voltage	6.00~9.99	uint16	8.00	W	0x0544
	2 setting					

When performing analog voltage correction on the Al2 terminal, a correction curve is formed using 2 points, where each point corresponds to a measured voltage and a displayed voltage. The Al2 pre-correction voltage setting is the actual measured voltage value by the instrument, and the Al2 post-correction voltage setting is the displayed Al2 pre-correction voltage (P28.31).

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P05.69	Al2 type	0: 4-20mA current type	uint16		0 W	0x0545
		1: 0-20mA current type		0		
		2: 0-10V voltage type				

Select the input type of the Al2 terminal.

- 0: 4-20mA current type
- 1: 0-40mA current type
- 2: 0-10V voltage type

4.7 P06 Output terminal parameter group

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P06.01	Relay output selection (TA/ TB/TC)	0: No output 1: The VFD is running 2: Fault output (fault shutdown) 3: Frequency level detection FDT1 output 4: Frequency reached 5: Zero speed operation (no output when stopped) 6: Motor overload pre-alarm 7: VFD overload pre-alarm 8: Set count value reached 9: Specified count value reached	uint16	2	W	0x0601
P06.02	DO1 output selection	10: Length reached 11: PLC cycle completed 12: Operation time reached 13: Frequency limited 14: Torque limited 15: Operation ready 16: Al1 > Al2 17: Upper frequency reached 18: Lower frequency reached (related to operation) 19: Undervoltage status output 20: Communication setting	uint16	1	W	0x0602
P06.03	DO2 output selection	21: Positioning completed (reserved) 22: Positioning approaching (reserved) 23: Zero Speed operation 2 (output when stopped) 24: Power-on time reached 25: Frequency level detection FDT2 output 26: Frequency reached 1 output 27: Frequency reached 2 output 28: Current reached 1 output 29: Current reached 1 output 30: Timer reached output 31: Al1 input exceeds upper/lower limit 32: Load shedding 33: Operation direction 34: Zero current detection 35: Module temperature reached 36: Software overcurrent output 37: Lower frequency reached (unrelated to operation) 38: Fault output (keep running) 39: Motor over-temperature pre-alarm 40: Current operation time reached 41: Fault output	uint16	0	W	0x0603

Used to select the function of digital output, where T/A-T/B-T/C are relays on the VFD.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P06.04	AO1 output selection	0: Operating frequency 1: Set frequency 2: Output current (Maximum output value is twice the motor rated current.) 3: Output torque (Maximum output value is twice the motor rated torque.) 4: Output power 5: Output voltage (Maximum output value is 1.2 times the VFD rated voltage.) 6: PULSE input 7: Al1 8: Al2 10: Length 11: Count value	uint16	0	W	0x0604

The standard analog output (zero offset = 0, gain = 1) ranges from 0mA to 20mA (or 0V to 10V).

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P06.06	AO1 zero offset coefficient	-100~100	int16	0	W	0x0606
P06.07	AO1 gain	-10~10	int16	1	W	0x0607

If the zero offset is denoted as "b", the gain as "k", the actual output as "Y", and the standard output as "X", then the actual output is Y = kX + b; 100% of the AO1 zero offset coefficient corresponds to 10V (20mA). The standard output refers to the analog output range where 0V to 10V (20mA) corresponds to 0 to the maximum of the measured quantity. It is generally used to correct zero drift and output amplitude deviation of the analog output. Custom output curves can also be defined: For example, if the analog output content is operating frequency, and users want to output 8V (16.8mA) when the frequency is 0 and 3V (8.8mA) when the frequency is maximum, set the gain to "-0.50" and the zero offset to "80%".

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P06.08	Relay output delay time	0s~3600s	uint16	0s	W	0x0608
P06.09	DO1 output delay time	0s~3600s	uint16	0s	W	0x0609
P06.10	DO2 output delay time	0s~3600s	uint16	0s	W	0x060a

Set the delay time from the change in the status of the output relay, DO1, and DO2 to the change in their output.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P06.11	DO output terminal active state selection	Units digit: Relay 0: Positive logic 1: Negative logic Tens digit: DO1 0: Positive logic 1: Negative logic Hundreds digit: DO2	uint16	000	W	0x060b
		0: Positive logic 1: Negative logic				

Define the positive/negative logic of the output relay, DO1, and DO2.

Positive logic: The digital output terminal is active (functional) when connected to the corresponding common terminal,

and inactive (non-functional) when disconnected.

Negative logic: The digital output terminal is inactive (non-functional) when connected to the corresponding common terminal, and active (functional) when disconnected.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P06.12	AO1 pre-correction voltage 1 setting	0.5~4V	uint16	2	W	0x060c
P06.13	AO1 post-correction voltage 1 setting	0.5~4V	uint16	2	W	0x060d
P06.14	AO1 pre-correction voltage 2 setting	6~9.999V	uint16	8	W	0x060e
P06.15	AO1 post-correction voltage 2 setting	6~9.999V	uint16	8	W	0x060f

When performing analog voltage correction on the AO1 terminal, a correction curve is formed using 2 points, where each point corresponds to a target voltage and a measured voltage. The AO1 pre-correction voltage setting is the expected output voltage, and the AO1 post-correction voltage setting is the actual measured output voltage.

4.8 P07 Synchronous machine control parameter group

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P07.04	Initial position detection	0: Detection 1: No detection	uint16	0	W	0x0704

Initial position angle detection prevents reverse rotation during startup.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
	Synchronous machine					
P07.05	SVC low-speed carrier	8.0kHz~P00.25	uint16	1.5kHz	W	0x0705
	frequency					

It controls the carrier frequency in the low-speed range of the motor to reduce module heating at low speeds.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P07.06	Synchronous machine field	0: No field weakening	uin+14	1	W	0×0706
	weakening mode	1: Automatic adjustment mode	uint16	'	VV	0x0706

0: No field weakening mode: The maximum speed the motor can reach is related to the VFD bus voltage. If the set speed exceeds the upper limit, the set speed cannot be achieved, but the output current will be smaller.

1: Automatic adjustment mode: The output current will increase in this mode. If a higher speed is desired, select this mode.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P07.07	Synchronous machine field weakening coefficient	1~50	uint16	5	W	0x0707

Increase P07.07 appropriately for scenarios requiring rapid field weakening, but excessive settings may cause current loop oscillation.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P07.08	Synchronous machine SVC					
	initial excitation current	0%~80%	uint16	30%	W	0x0708
	amplitude limiting					

In SVC mode, increase this value appropriately for applications requiring low-speed heavy-load starting.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
	Synchronous machine					
P07.09	inductance identification	50%~180%	uint16	80%	W*	0x0709
	current					

For applications requiring adjustment of the current for synchronous machine inductance tuning, increase this value appropriately for high-speed motors.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P07.10	Initial position detection current	50%~180%	uint16	120%	W*	0x070a

Initial position angle detection prevents reverse rotation during startup. Enable this function for applications with strict startup requirements.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P07.14	Field weakening depth	0%~50%	uint16	5%	W	0x070e

Increasing this value improves response speed, but excessive values may cause current loop oscillation.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P07.15	Maximum output adjustment coefficient	50~500	uint16	100	W	0x070f

This value adjusts the output under MTPA (Maximum Torque Per Ampere) for salient-pole motors.

Parameter I	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P07.20	Synchronous machine SVC speed filtering level	10~1000	uint16	100	W*	0x0714

Increase this value appropriately if the motor speed exhibits abnormal fluctuations.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
	Synchronous machine					
P07.21	SVC speed estimation	5~200	uint16	40	W*	0x0715
	proportional gain					
	Synchronous machine SVC					
P07.22	speed estimation integral	5~200	uint16	30	W	0x0716
	gain					

The synchronous machine SVC observer gain is generally not modified.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P07.36	Initial position compensation angle	0° ~359.9°	uint16	0°	W	0x0724

It compensates for the motor's initial position. When initial position detection is disabled, appropriately selecting this value improves motor startup performance. A setting of 0° means no compensation.

4.9 P08 Process PID control parameter group

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
		0: Numerical setpoint (P08.01)	uint16	0 W		
	PID setpoint source	1: Al1				0x0800
D00 00		2: AI2				
P08.00		4: PULSE			VV	
		5: Communication				
		6: Multi-segment command				

When the frequency source is set to PID (i.e., P00.03 or P00.04 is set to 8), this parameter group becomes active (refer to function codes P00.03 and P00.04). This parameter determines the target quantity setpoint channel for the process PID. The set target quantity of the process PID is a relative value, where 100% corresponds to 100% of the feedback signal from the controlled system. The PID range (P08.04) is not mandatory, as the system operates based on relative values (0–100%) regardless of the range setting. However, if the PID range is configured, the actual values of the PID setpoint and feedback signals can be visually observed via the keypad-displayed parameters.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P08.01	PID numerical setpoint	0%~100%	uint16	50%	W	0x0801

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P08.02	PID feedback source	0: Al1 1: Al2 3: Al1-Al2 4: PULSE 5: Communication 6: Al1+Al2 7: Maximum absolute value of Al1 and Al2 8: Minimum absolute value of Al1 and	uint16	0	W	0x0802
		Al2				

This parameter selects the feedback signal channel for the process PID. The feedback quantity of the process PID is also a relative value, with a set range of 0.0%–100.0%.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P08.03	PID action direction	0: Forward 1: Reverse	uint16	0	W	0x0803

Positive action: When the feedback signal exceeds the PID setpoint, the VFD output frequency must decrease to balance the PID (e.g., tension PID control in winding applications).

Reverse action: When the feedback signal exceeds the PID setpoint, the VFD output frequency must increase to balance

the PID (e.g., tension PID control in unwinding applications).

The effect of this function is influenced by terminal function 35: PID Action Direction Inversion.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P08.04	PID setpoint-feedback range	0~65535	uint16	1000	W	0x0804

The PID setpoint-feedback range is a dimensionless unit used for PID setpoint display (P28.39) and PID feedback display (P28.40).

A relative value of 100.0% for the PID setpoint-feedback corresponds to the setpoint-feedback range P08.04. For example, if P08.04 is set to 2000, the PID setpoint display (P28.39) will show 2000 when the PID setpoint is 100.0%.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P08.05	Proportional gain P	0~100	uint16	20	W	0x0805
P08.06	Integral time I	0.01~10.00	uint16	2	W	0x0806
P08.07	Derivative time D	0~10	uint16	0	W	0x0807

Proportional gain P:

It determines the adjustment strength of the entire PID regulator. A larger P value indicates stronger adjustment strength. When the deviation between the PID feedback quantity and setpoint is 100%, a P value of 100 means the PID regulator will adjust the output frequency command to its maximum frequency (ignoring integral and derivative actions).

Integral time I:

It determines the speed at which the PID regulator performs integral adjustment on the deviation between the PID feed-back quantity and the setpoint. Integral time refers to the duration required for the integral regulator (ignoring proportional and derivative actions) to continuously adjust and reach the maximum frequency (P00.08) when the deviation between feed-back and setpoint is 100%. A shorter integral time corresponds to a stronger adjustment strength.

Derivative time D:

It determines the adjustment strength of the PID regulator in response to the rate of change of the deviation between the PID feedback quantity and the setpoint. Derivative time refers to the time interval during which a 100% change in the feedback quantity (relative to the setpoint) will cause the derivative regulator to adjust the output to the maximum frequency (P00.08) (ignoring proportional and integral actions). A longer derivative time corresponds to a stronger adjustment strength.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P08.08	PID Proportional gain P2	0~100	uint16	20	W	0x0808
P08.09	PID Integral time I2	0.01~10.00	uint16	2.00	W	0x0809
P08.10	PID Derivative time D2	0.0~10.0	uint16	0.0	W	0x080a

These parameters are applicable in scenarios where a single set of PID parameters cannot meet the operational requirements throughout the entire process, necessitating different PID parameter sets for varying conditions.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P08.11	PID Parameter switching	No switching DI terminal switching Automatic switching based on deviation	uint16	0	W	0x080b
P08.12	PID Parameter switching deviation 1	0%~P08.13	uint16	20%	W	0x080c

P08.13 PID Parameter switching deviation 2 P08.12~100%	uint16	80%	W	0x080d
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When "No switching" is selected, the PID parameters remain fixed as parameter group 1.

When "DI terminal switching" is selected, if the multifunctional terminal function is set to 43 (PID parameter switching terminal) and the terminal is active, parameter group 2 is used; otherwise, parameter group 1 is used.

When "Automatic switching based on deviation" is selected, if the deviation between the setpoint and feedback is less than PID parameter switching deviation 1 (P08.12), P08.05, P08.06, and P08.07 are used as PID adjustment parameters. If the deviation exceeds PID parameter switching deviation 2 (P08.13), P08.08, P08.09, and P08.10 are used as PID adjustment parameters. For deviations between switching deviation 1 and switching deviation 2, the PID parameters transition linearly between the two groups, as shown in the figure below:

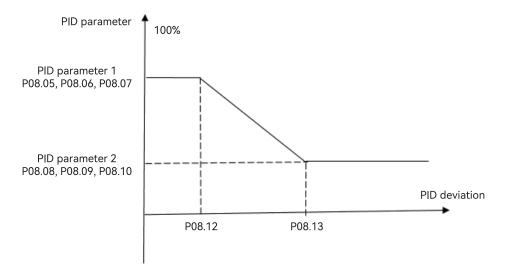


Figure 28. PID parameter switching

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P08.14	PID initial value	0%~100%	uint16	0%	W	0x080e
P08.15	PID initial value hold time	0.0s~650.0s	uint16	0.0s	W	0x080f

During VFD startup, the PID output is fixed at the PID initial value (P08.14) and remains so for the duration specified by the PID initial value hold time (P08.15) before the PID begins closed-loop regulation calculations. Figure 29 illustrates the functional schematic of the PID initial value.

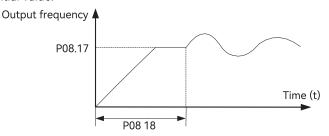


Figure 29. PID initial value function

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P08.16	PID feedback loss detection value	0%~100%	uint16	0%	W	0x0810
P08.17	PID feedback loss detection time	0.0s~20.0s	uint16	0.0s	W	0x0811

This function code is used to determine if the PID feedback is lost. When the PID feedback is less than the feedback loss detection value (P08.16) and the duration reaches the feedback loss detection time (P08.17), the VFD triggers a fault and operates according to the fault handling method.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P08.18	PID operation mode	No operation when stopped Operation when stopped	uint16	0	W	0x0812

This parameter selects whether the PID continues to operate when the VFD is stopped. In most applications, the PID should stop operating when stopped.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P08.19	PID PID reverse rotation cutoff frequency	0.00Hz ~ Maximum frequency	uint16	2.00Hz	W	0x0813

In some cases, the PID can only control the setpoint and feedback quantity to the same state when the PID output frequency is negative (i.e., VFD reverse rotation). However, excessively high reverse rotation frequencies are unacceptable in certain applications. P08.19 is used to determine the upper limit of the reverse rotation frequency.

P08.19 description: When the frequency source is PID, the PID reverse rotation cutoff frequency is the current minimum PID output value. When the frequency source is main + PID, P08.19 acts on the entire main + PID system, meaning the minimum output frequency of the main + PID system is determined by P08.19.

Frequency source as PID:

Output upper/lower limits and range (e.g., frequency source is PID or main + PID):

1) Reverse rotation cutoff frequency is 0 or reverse rotation is inhibited (i.e., any of the following three conditions):

(1) P08.19 = 0, P01.21 = 0;

(2) P08.19 = 0, P01.21 = 1;

(3) $P08.19 \neq 0$, P01.21 = 1

Output upper limit: Upper frequency

Output lower limit: Lower frequency

Output range: Lower frequency ~ Upper frequency (i.e., P00.11 ~ P00.10)

2) Reverse rotation cutoff frequency is non-zero and reverse rotation is not inhibited (i.e., P08.19 ≠ 0, P01.21 = 0):

Output upper limit: Upper frequency

Output lower limit: -Reverse rotation cutoff frequency

Output Range: -Reverse rotation cutoff frequency ~ Upper frequency

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P08.20	PID deviation limit	0%~100%	uint16	0%	W	0x0814

When the deviation between the PID setpoint and feedback quantity is less than P08.20, the PID stops adjusting. This stabilizes the output frequency when the setpoint-feedback deviation is small, which is effective for certain closed-loop control scenarios.

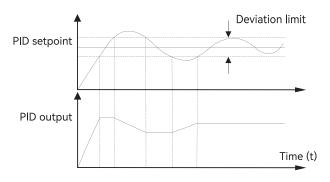


Figure 30. PID deviation limit

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P08.21	PID derivative amplitude limiting	0%~100%	uint16	0.1%	W	0x0815

The derivative action in the PID regulator is highly sensitive and can easily cause system oscillation. Thus, the derivative effect is generally limited to a small range. P08.21 is used to set the range of the PID derivative output.

Parameter ID	Parameter name	Setting range		Factory value		
			type	·		address
P08.22	PID setpoint change time	0.0s~650.0s	uint16	0.0s	W	0x0816

PID setpoint change time refers to the time required for the PID setpoint to change from 0.0% to 100.0%. When the PID setpoint changes, the setpoint value changes linearly over the time specified by P08.22, reducing the adverse effects of sudden setpoint changes on the system.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P08.23	PID feedback filtering time	0s~60.0s	uint16	0.0s	W	0x0817
P08.24	PID output filtering time	0s~60.0s	uint16	0.0s	W	0x0818

P08.23 is used to filter the PID feedback quantity, which helps reduce the impact of interference on the feedback but may degrade the response performance of the closed-loop system.

P08.24 is used to filter the PID output frequency, weakening sudden changes in the VFD output frequency but similarly potentially degrading the response performance of the closed-loop system.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P08.26	Maximum deviation between two PID outputs	0%~100%	uint16	1%	W	0x081a
P08.27	Minimum deviation between two PID outputs	0%~100%	uint16	1%	W	0x081b

This function code limits the difference between PID outputs in consecutive control cycles (2ms per cycle) to suppress excessively rapid changes in PID output.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P08.28	PID integral attributes	Units digit: 0: Inhibit integral pause 1: Allow integral pause Tens digit: 0: Continue integral operation when integral output reaches a limit 1: Stop integral operation when integral output reaches a limit	uint16	0	W	0x081c

If the units digit is set to 1, the PID integral stops operating when the multifunctional digital DI integral pause (Function 22) is active, leaving only proportional and derivative actions effective. If the units digit is set to 0, integral pause is prohibited regardless of the effectiveness of the multifunctional digital DI.

After the PID operation output reaches its maximum or minimum value, the integral operation can be optionally stopped. Stopping the integral operation may help reduce PID overshoot.

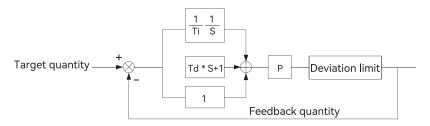


Figure 31. Process PID principle

4.10 P09 Special function control parameter group

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P09.00	FDT1	0.00Hz~P00.08	uint16	50.00Hz	W	0x0900
P09.01	Frequency detection hysteresis value	0%~100%	uint16	5%	W	0x0901

After selecting the frequency level FDT1 output function for the DO output function, when the operating frequency is higher than the frequency detection value, the VFD's multifunctional output DO sends an ON signal. When the frequency drops below the set detection value, the DO ON signal is canceled.

These parameters are used to set the detection value of the output frequency and the hysteresis value for releasing the output action. Among them, P09.01 represents the percentage of the hysteresis frequency relative to the frequency detection value P09.00. The figure below illustrates the schematic of the FDT1 function.

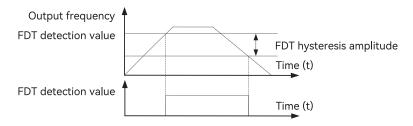


Figure 32. Frequency arrival detection amplitude

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P09.02	FDT2	0.00Hz~P00.08	uint16	50.00Hz	W	0x0902
P09.03	Frequency detection 1 hysteresis value	0%~100%	uint16	5%	W	0x0903

This frequency detection function is identical to the FDT1 function. For details, refer to the descriptions of FDT1 (i.e., function codes P09.00 and P09.01).

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P09.04	Frequency arrival detection amplitude	0%~100%	uint16	0%	W	0x0904

When the VFD's operating frequency is within a certain range of the target frequency, the multifunctional DO outputs an ON signal.

This parameter sets the detection range for frequency arrival, which is a percentage of the maximum frequency. The figure below illustrates the frequency arrival detection.

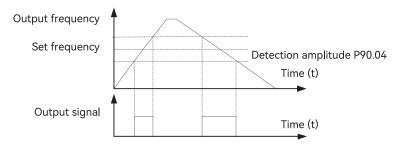


Figure 33. Frequency arrival detection amplitude

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P09.05	Swing frequency setting	0: Relative to center frequency	uint16	0	W	0x0905
	method	1: Relative to maximum frequency	uintio		V V	0x0703

This parameter determines the reference quantity for the swing amplitude.

0: Relative to the center frequency (frequency source superposition selection P00.05), forming a variable swing amplitude system. The swing amplitude changes with the center frequency (set frequency).

1: Relative to the maximum frequency (P00.08), forming a fixed swing amplitude system with a constant swing amplitude.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P09.06	Swing amplitude	0%~100%	uint16	0%	W	0x0906
P09.07	Jump frequency amplitude	0%~50%	uint16	0%	W	0x0907

These parameters are used to determine the swing amplitude value and the jump frequency value.

When the swing amplitude is set relative to the center frequency (P09.05=0), the swing amplitude AW = Set frequency P28.05 \times Swing amplitude P09.06.

The jump frequency amplitude is the frequency percentage of the jump frequency relative to the swing amplitude during swing frequency operation, i.e., Jump frequency = Swing amplitude AW \times Jump frequency amplitude P09.07. If the swing amplitude is set relative to the center frequency (P09.05=0), the jump frequency is a variable value. If set relative to the maximum frequency (P09.05=1), the jump frequency is a fixed value.

The swing frequency operating frequency is constrained by the upper frequency and lower frequency limits.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P09.08	Swing period	0.15~3000.0S	uint16	10.0S	W	0x0908
P09.09	Triangular wave rise time coefficient	0.0%~100%	uint16	50%	W	0x0909

Swing period: The time value of a complete swing frequency cycle.

Triangular wave rise time coefficient P09.09: The time percentage of the triangular wave rise time relative to the swing period P09.08.

Triangular wave rise time = Swing period P09.08 × Triangular wave rise time coefficient P09.09 (unit: s)

Triangular wave fall time = Swing period P09.08 × (1 - Triangular wave rise time coefficient P09.09) (unit: s)

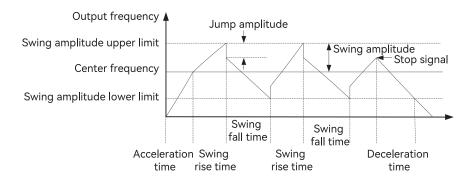


Figure 34. Swing frequency operation principle

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P09.10	Set length	0m~65535m	uint16	1000m	W	0x090a
P09.11	Actual length	0m~65535m	uint16	0m	W	0x090b
P09.12	Pulses per meter (PPM)	0~6553.5	uint16	100	W	0x090c

These function codes are used for fixed-length control.

Length information needs to be collected via a multifunctional digital input terminal. The actual length P09.11 is calculated by dividing the number of pulses sampled by the terminal by the PPM P09.12. When the actual length exceeds the set length P09.10, the multifunctional digital DO outputs an "Length reached" ON signal.

During fixed-length control, length reset operations can be performed via a multifunctional DI terminal (DI function set to 28; refer to P5.00~P5.05 for details). In applications, the corresponding input terminal function must be set to "Length counting input" (Function 27). When the pulse frequency is high, DI1 or the HDI port must be used.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P09.13	Set count value	0~65535	uint16	1000	W	0x090d
P09.14	Specified count value	0~65535	uint16	1000	W	0x090e

The count value needs to be collected via a multifunctional digital input terminal. In applications, the corresponding input terminal function must be set to "Counter input" (Function 25). When the pulse frequency is high, DI1 or the HDI port must be used.

When the count value reaches the set count value P09.13, the multifunctional digital DO outputs a "Set count value reached" ON signal, and the counter stops counting thereafter.

When the count value reaches the specified count value P09.14, the multifunctional DO outputs an "Specified count value reached" ON signal. At this point, the counter continues to count until it stops when reaching the "Set count value."

The specified count value P09.14 should not exceed the set count value P09.13. Figure 32 illustrates the schematic diagram of the set count value reached and the specified count value reached functions.

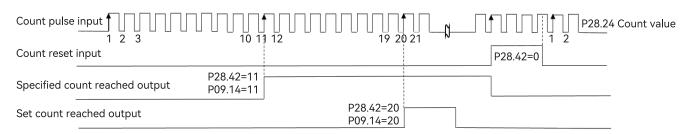


Figure 35. Set count value reached and specified count value reached

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P09.15	Droop control	0.00~10.00Hz	uint16	0.00Hz	W	0x090f

The droop rate allows a small speed difference between the master station and slave station, thereby avoiding conflicts between them. The default value of this parameter is 0.

The droop rate only needs adjustment when both the master and slave adopt speed control mode. For each drive process, an appropriate droop rate must be determined through practical testing. It is recommended not to set P09.15 too high, as excessive droop may cause a significant drop in steady-state speed under heavy loads. Both the master and slave must have the droop rate configured.

Droop speed = Synchronous frequency × Output torque × Droop rate ÷ 10

Example: If P09.15 = 1.00, synchronous frequency = 50Hz, and output torque = 50%, then:

Droop speed = $50Hz \times 50\% \times 1.00 \div 10 = 2.5Hz$

Actual VFD frequency = 50Hz - 2.5Hz = 47.5Hz

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P09.16	Set operation reach time	0h~65000h	uint16	0h	W	0x0910

It is used to set the operation time of the VFD.

When the cumulative operation time (P10.07) reaches this set operation time, the multifunctional digital DO outputs an ON signal.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P09.17	Set power-on reach time	0h~65000h	uint16	0h	W	0x0911

It presets the power-on time of the VFD. When the cumulative power-on time (P10.11) reaches this set power-on time, the multifunctional digital DO outputs an operation time reached signal.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P09.20	Acceleration time 1/2 switching frequency point	0.00Hz~P00.08	uint16	0.00Hz	W	0x0914
P09.21	Deceleration time 1/2 switching frequency point	0.00Hz~P00.08	uint16	0.00Hz	W	0x0915

This function is active when the motor is selected as Motor 1 and the acceleration/deceleration time is not switched via a DI terminal. It allows the VFD to automatically select different acceleration/deceleration times based on the operating frequency range during operation, without relying on DI terminals.

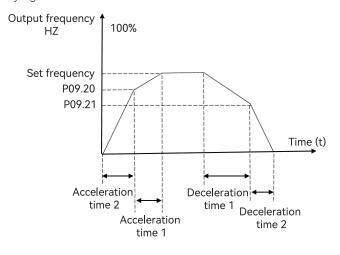


Figure 36. Acceleration/Deceleration time switching

During acceleration: If the operating frequency is less than P9.20, select acceleration time 2; if greater than P9.20, select acceleration time 1.

During deceleration: If the operating frequency is greater than P9.21, select deceleration time 1; if less than P9.21, select deceleration time 2.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P09.22	Frequency arrival detection value 1	0.00Hz~P00.08	uint16	50.00Hz	W	0x0916
P09.23	Frequency arrival detection 1 amplitude	0%~100%	uint16	0%	W	0x0917
P09.24	Frequency arrival detection value 2	0.00Hz~P00.08	uint16	50.00Hz	W	0x0918
P09.25	Frequency arrival detection 2 amplitude	0%~100%	uint16	0%	W	0x0919

When the VFD's output frequency falls within the positive/negative detection amplitude range of any arrival frequency detection value, the multifunctional DO outputs an ON signal.

E610 provides two sets of arbitrary arrival frequency detection parameters, which are used to set the frequency value and frequency detection range respectively. Figure 34 illustrates the schematic diagram of this function.

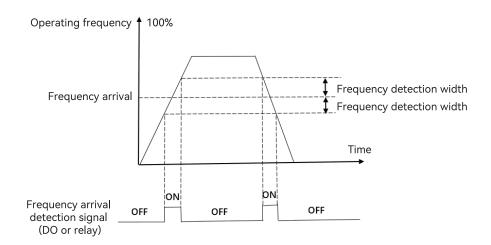


Figure 37. Frequency arrival detection

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P09.26	Timer function selection	0: Inactive 1: Active	uint16	0	W*	0x091a
P09.27	Timer time setting selection	0: Set timer operation time (P09.28) 1: Al1 2: Al2	uint16	0	W*	0x091b
P09.28	Set operation time	0Min~6500Min	uint16	0Min	W*	0x091c

This parameter group is used to implement the VFD's timer operation function.

When the timer function selection (P09.26) is active, the VFD starts timing upon startup. After reaching the set timer operation time, the VFD automatically stops, and the multifunctional DO outputs an ON signal.

Each time the VFD starts, timing begins from 0. The remaining timer operation time can be viewed via P28.47. The timer operation time is set by P09.27 and P09.28, with the time unit in minutes. When P09.27 selects analog input, 100% of the analog input range corresponds to the set time in P09.28.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P09.29	Wake-up frequency	P09.31~P00.08	uint16	0.00Hz	W	0x091d
P09.30	Wake-up delay time	0.0s~6500.0s	uint16	0.0s	W	0x091e
P09.31	Sleep frequency	0.00Hz~P00.08	uint16	0.00Hz	W	0x091f
P09.32	Sleep delay time	0.0s~6500.0s	uint16	0.0s	W	0x0920

This parameter group is used to implement sleep and wake-up functions in water supply applications.

During VFD operation, when the set frequency is less than or equal to the sleep frequency (P09.31), after a delay time (P09.32), the VFD enters sleep mode and automatically stops.

If the VFD is in sleep mode and the current operation command is active, when the set frequency is greater than or equal to the wake-up frequency (P09.29), after a delay time (P09.30), the VFD starts up.

Under normal circumstances, set the wake-up frequency to be greater than or equal to the sleep frequency. If both the set wake-up frequency and sleep frequency are 0.00Hz, the sleep and wake-up functions are inactive.

When the sleep function is enabled and the frequency source uses PID, whether the PID operates in sleep mode is affected by function code P08.18. In this case, PID operation when stopped (P08.18=1) must be selected.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P09.33	Current operation reach time	0~6500Min	uint16	0Min	W*	0x0921

When the operation time of the current startup reaches this time, the multifunctional digital DO outputs an "Operation time reached" ON signal.

4.11 P10 Keypad and display parameter group

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P10.01	STOP key function	O: Only active under keypad control Active for all control modes	uint16	1	W	0x0a01

Configure whether the STOP key function is active.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
		0: MF.K key inactive				
	MF.K key function selection	1: Switch between operator panel				
		commands and remote commands				
P10.02		2: Forward/reverse rotation switching	uint16	5	W*	0x0a02
		3: Forward jog				
		4: Reverse jog				
		5: Exit parameter interface				

The MF.K key is multifunctional. Its function can be configured via this parameter. This key can be used for switching in both stopped and running states.

- 0: No function assigned to this key
- 1: Switch between keypad commands and remote operation

Switch between the current command source and local keypad control. If the current command source is keypad control, this key function is inactive.

2: Forward/Reverse rotation switching

Switch the direction of the frequency command via the MF.K key. This function is only active when the command source is the operator panel command channel.

3: Forward jog

Implement forward jog (FJOG) via the MF.K key on the keypad.

4: Reverse jog

Implement reverse jog (RJOG) via the MF.K key on the keypad.

5: Exit parameter interface via the MF.K key on the keypad.

Parameter ID	Parameter name	Setting range	Parameter	Factory value	Attributo	Communication
raiailletei 1D	rafameter mame	Setting range	type	actory value	Attribute	address
		Bit 0: Operating frequency				
		Bit 1: Bus voltage				
		Bit 2: Output voltage				
		Bit 3: Output current				
		Bit 4: Output power				
		Bit 5: Output torque				
		Bit 6: Feedback frequency				
P10.03	LED operation display	Bit 7: Detection frequency	uint16	0	W	0x0a03
F 10.03	parameter 1	Bit 8: DI input status	unitro		W	0x0a03
		Bit 9: DO output status				
		Bit 10: Radiator temperature				
		Bit 11: Output torque				
		Bit 12: Motor temperature				
		Bit 13: Al1 voltage				
		Bit 14: Al2 voltage				
		Bit 15: Speed				
		Bit 0: Pulse input frequency (unit:				
		0.01kHz)				
		Bit 1: Pulse input frequency (unit: 1kHz)				
		Bit 2: Communication set value				
		Bit 3: Main frequency display				
		Bit 4: Auxiliary frequency Y display				
		Bit 5: Current power-on time				
	LED operation display	Bit 6: Current operation time				
P10.04		Bit 7: Remaining operation time	uint16	0	W	0x0a04
	parameter 2	Bit 8: Linear speed				
		Bit 9: Count value input				
		Bit 10: Length value input				
		Bit 11: Load speed				
		Bit 12: PID set value				
		Bit 13: PID feedback value				
		Bit 14: PLC stage				
		Bit 15: Fault information				

Operation display parameters are used to configure the parameters visible when the VFD is in operation.

Up to 32 status parameters can be viewed. The specific parameters to display are selected based on the binary bits of parameters P10.03 and P10.04, with the display order starting from the least significant bit of P10.03. During operation, set the corresponding bit of the parameter to be displayed to 1, convert the final binary number to hexadecimal, and input it into P10.03 and P10.04. For example, if the running frequency, DO output status, current power-on time, and fault information need

to be displayed during operation, set P10.03 = H.0101 and P10.04 = H.8020.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P10.05	LED display parameters when stopped	Bit 0: Set frequency Bit 1: Bus voltage Bit 2: DI input status Bit 3: DO input status Bit 4: Al1 voltage Bit 5: Al2 voltage Bit 6: Reserved Bit 7: Count value Bit 8: Length value Bit 9: PLC stage Bit 10: Load speed display Bit 11: PID set value Bit 12: Pulse input Bit 13: Radiator temperature Bit 14: Motor temperature value Bit 15: Fault information	uint16	0	W	0x0a05

It is used to set the parameters that can be viewed when the VFD is in a stopped state. Up to 16 status parameters can be viewed. The specific parameters to display are selected based on the binary bits of the P10.05 parameter value, with the display order starting from the least significant bit (LSB) of P10.05. During stopping, set the corresponding bit of the parameter to be displayed to 1, convert the final binary number to hexadecimal, and input it into P10.05. For example, if the set frequency and fault information need to be displayed during stopping, set P10.05 to hexadecimal H.8001.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P10.06	Load speed display coefficient	0.0001~6.5	uint16	1	W	0x0a06

When load speed display is required, this parameter adjusts the correspondence between the VFD's output frequency and the load speed. For specific correspondence, refer to the description of P10.10.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P10.07	Cumulative operation time	0h~65535h	uint16	0h	R	0x0a07

It displays the cumulative operation time of the VFD. When the operation time reaches the set operation time P9.16, the multifunctional digital output function (12) of the VFD outputs an ON signal.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P10.08	Non-Standard function version number	0~655.35	uint16	Model setting	R	0x0a08
P10.09	Software function version number	0~655.35	uint16	Model setting	R	0x0a09

P10.08 displays the special machine number of the display function and the sub-version number of the function software.

P10.09 displays the function software version number.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P10.10	Load speed display decimal places	0: 0 decimal places 1: 1 decimal place 2: 2 decimal places 3: 3 decimal places	uint16	Model setting	W	0x0a0a

Units digit: Used to set the number of decimal places for load speed display. Below is an example of load speed calculation:

If the load speed display coefficient P10.06 is 2.000, and the load speed decimal places P10.10 is 2 (2 decimal places), when the VFD operating frequency is 40.00Hz, the load speed is: $40.00 \times 2.000 = 80.00$ (displayed with 2 decimal places).

If the VFD is in stopped state, the load speed displays the speed corresponding to the set frequency, i.e., "set load speed." For example, with a set frequency of 50.00Hz, the stopped state load speed is: $50.00 \times 2.000 = 100.00$ (displayed with 2 decimal places).

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P10.11	Cumulative power-on time	0h~65535h	uint16	Model setting	R	0x0a0b

It displays the cumulative power-on time of the VFD since leaving the factory. When this time reaches the set power-on time (P9.17), the multifunctional digital output function (24) of the VFD outputs an ON signal.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P10.12	Cumulative power consumption	0~65535	uint16	0	R	0x0a0c
P10.13	Panel up/down key jog switching	O: Panel up/down keys modify frequency or parameters 1: When the panel is in the 0 menu interface, press the UP key to jog forward and the DOWN key to jog reverse	uint16	0	W	0x0a0d
P10.14	Non-Standard performance version number	0~655.35	uint16	0	R	0x0a0e
P10.15	External keypad type selection	0: Select connection to HDv-KC2-CS0 keypad 1: Select connection to HDv-KC1-BS0 keypad 2: Select connection to HDv-KC1-AS0 keypad	uint16	0	W	0x0a0f

4.12 P11 Multi-speed command parameter group

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
		0: Numerical input (P11.01)				
		1: Al1 input				
D11 00	Multi-segment command 0	2: AI2 input			14/	001.00
P11.00	input method	4: PULSE input	uint16	0	W	0x0b00
		5: PID input				
		6: Preset frequency input (P00.12)				

This parameter determines the input channel for multi-segment command 0.

In addition to selecting P11.01, multi-segment command 0 offers multiple other options, facilitating switching between multi-segment commands and other given methods. Whether multi-segment commands serve as the frequency source or a simple PLC acts as the frequency source, easy switching between the two frequency sources can be achieved.

Parameter ID	Parameter name	Setting range	Parameter	Factory	Attribute	Communication
		getting range	type	value	7100110010	address
P11.01	Multi-segment command 0	-100%~100%	uint16	5%	W	0x0b01
P11.02	Multi-segment command 1	-100%~100%	uint16	30%	W	0x0b02
P11.03	Multi-segment command 2	-100%~100%	uint16	50%	W	0x0b03
P11.04	Multi-segment command 3	-100%~100%	uint16	80%	W	0x0b04
P11.05	Multi-segment command 4	-100%~100%	uint16	100%	W	0x0b05
P11.06	Multi-segment command 5	-100%~100%	uint16	0%	W	0x0b06
P11.07	Multi-segment command 6	-100%~100%	uint16	0%	W	0x0b07
P11.08	Multi-segment command 7	-100%~100%	uint16	0%	W	0x0b08
P11.09	Multi-segment command 8	-100%~100%	uint16	0%	W	0x0b09
P11.10	Multi-segment command 9	-100%~100%	uint16	0%	W	0x0b0a
P11.11	Multi-segment command 10	-100%~100%	uint16	0%	W	0x0b0b
P11.12	Multi-segment command 11	-100%~100%	uint16	0%	W	0x0b0c
P11.13	Multi-segment command 12	-100%~100%	uint16	0%	W	0x0b0d
P11.14	Multi-segment command 13	-100%~100%	uint16	0%	W	0x0b0e
P11.15	Multi-segment command 14	-100%~100%	uint16	0%	W	0x0b0f
P11.16	Multi-segment command 15	-100%~100%	uint16	0%	W	0x0b10

Multi-segment commands can be used in three scenarios: as a frequency source, as a voltage source for voltage-frequency (VF) separation, or as a setpoint source for process PID.

In all three application scenarios, the dimension of the multi-segment command is a relative value ranging from -100.0% to 100.0%. When serving as a frequency source, it represents the percentage of the maximum relative frequency; when acting as a VF separation voltage source, it represents the percentage of the motor's rated voltage; and since PID setpoints are inherently relative values, no dimension conversion is required when multi-segment commands serve as PID setpoint sources.

Switching selection for multi-segment commands is performed based on the different states of the multifunctional digital DI. For specific details, refer to the relevant description of parameter group P05.

4.13 P12 Simple PLC parameter croup

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
		0: Stop after a single operation completes				
P12.00	PLC operation modes	Maintain the final value after a single operation completes Continuous cycling	uint16	0	W	0x0c00

When serving as a frequency source, the PLC has three operation modes; it does not support these three modes when acting as a voltage-frequency separated voltage source. Details are as follows:

0: Stop after a single operation completes

After the VFD completes a single cycle, it automatically stops. A new operation command is required for the next startup.

1: Maintain the final value after a single operation completes

After completing one single cycle, the VFD automatically maintains the operating frequency and direction of the last segment.

2: Continuous cycling

After completing one cycle, the VFD automatically starts the next cycle and continues until a stop command is issued.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
		Units digit: Power loss memory selection				
		0: Non-retentive during power loss				
P12.01	PLC power loss memory	1: Retentive during power loss	uint16	0	W	0x0c01
P12.01	selection	Tens digit: Stopped memory selection	ullicio	0	VV	UXUCU I
		0: Non-retentive during stopping				
		1: Retentive during stopping				

PLC retentive during power loss refers to storing the PLC's operating stage and operating frequency before power loss, allowing resumption from the stored stage upon subsequent power-up. If "non-retentive" is selected, the PLC process restarts every time power is applied.

PLC stopped memory refers to recording the PLC's operating stage and operating frequency at the time of stopping, enabling resumption from the stored stage during the next operation. If "non-retentive" is selected, the PLC process restarts every time it is started.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P12.02	PLC operation time unit	0: Second 1: Hour	uint16	0	W	0x0c01

Select the time unit for each PLC stage's operation time.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P12.03	PLC segment 0 operation time	0s(h)~6500s(h)	uint16	0	W	0x0c03
P12.04	PLC segment 0 acceleration/ deceleration time selection	0~3	uint16	0	W	0x0c04
P12.05	PLC segment 1 operation time	0s(h)~6500s(h)	uint16	0	W	0x0c05
P12.06	PLC segment 1 acceleration/ deceleration time selection	0~3	uint16	0	W	0x0c06
P12.07	PLC segment 2 operation time	0s(h)~6500s(h)	uint16	0	W	0x0c07
P12.08	PLC segment 2 acceleration/ deceleration time selection	0~3	uint16	0	W	0x0c08
P12.09	PLC segment 3 operation time	0s(h)~6500s(h)	uint16	0	W	0x0c09
P12.10	PLC segment 3 acceleration/ deceleration time selection	0~3	uint16	0	W	0x0c0a
P12.11	PLC segment 4 operation time	0s(h)~6500s(h)	uint16	0	W	0x0c0b
P12.12	PLC segment 4 acceleration/ deceleration time selection	0~3	uint16	0	W	0x0c0c
P12.13	PLC segment 5 operation time	0s(h)~6500s(h)	uint16	0	W	0x0c0d
P12.14	PLC segment 5 acceleration/ deceleration time selection	0~3	uint16	0	W	0x0c0e
P12.15	PLC segment 6 operation time	0s(h)~6500s(h)	uint16	0	W	0x0c0f
P12.16	PLC segment 6 acceleration/ deceleration time selection	0~3	uint16	0	W	0x0c10
P12.17	PLC segment 7 operation time	0s(h)~6500s(h)	uint16	0	W	0x0c11
P12.18	PLC segment 7 acceleration/ deceleration time selection	0~3	uint16	0	W	0x0c12

P12.19	PLC segment 8 operation time	0s(h)~6500s(h)	uint16	0	W	0x0c13
P12.20	PLC segment 8 acceleration/	0~3	uint16	0	W	0x0c14
P12.20	deceleration time selection	0~3	uintro	U	VV	0x0014
P12.21	PLC segment 9 operation time	0s(h)~6500s(h)	uint16	0	W	0x0c15
P12.22	PLC segment 9 acceleration/	0~3	uint16	0	W	0x0c16
PIZ.ZZ	deceleration time selection	0~3	differo	U	VV	UXUCTO
P12.23	PLC segment 10 operation time	0s(h)~6500s(h)	uint16	0	W	0x0c17
P12.24	PLC segment 10 acceleration/	0~3	47	0) A /	0.0.40
P12.24	deceleration time selection	0~3	uint16	0	W	0x0c18
P12.25	PLC segment 11 operation time	0s(h)~6500s(h)	uint16	0	W	0x0c19
D10.07	PLC segment 11 acceleration/	0~3	.:-11/	0	14/	0.0.1.
P12.26	deceleration time selection	0~3	uint16	0	W	0x0c1a
P12.27	PLC segment 12 operation time	0s(h)~6500s(h)	uint16	0	W	0x0c1b
D10 00	PLC segment 12 acceleration/	0~3	:-+1/	0	W	00-1-
P12.28	deceleration time selection	0~3	uint16	U	VV	0x0c1c
P12.29	PLC segment 13 operation time	0s(h)~6500s(h)	uint16	0	W	0x0c1d
P12.30	PLC segment 13 acceleration/	0~3	uint16	0	W	0x0c1e
P12.30	deceleration time selection	0~3	uintro	U	VV	UXUCTE
P12.31	PLC segment 14 operation time	0s(h)~6500s(h)	uint16	0	W	0x0c1f
D10 00	PLC segment 14 acceleration/	0~3		0	14/	00-20
P12.32	deceleration time selection	0~3	uint16	0	W	0x0c20
P12.33	PLC segment 15 operation time	0s(h)~6500s(h)	uint16	0	W	0x0c21
D10.07	PLC segment 15 acceleration/	0.2		0) A /	0.0.00
P12.34	deceleration time selection	0~3	uint16	0	W	0x0c22

The simple PLC function has two roles: serving as a frequency source or as a voltage-frequency separated voltage source.

Figure 38 is a schematic diagram of the simple PLC when acting as a frequency source. When serving as a frequency source, the positive/negative values of P11.01 to P11.16 determine the operation direction; negative values indicate reverse operation of the VFD.

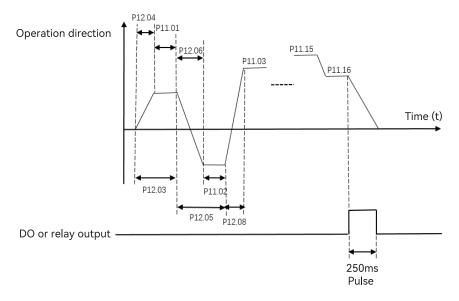


Figure 38. Simple PLC diagram

4.14 P13 Fault and protection setting parameter group

Paramete	er ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P13.01	Motor overload software	0: Disabled	uin+14	1	W	0x0d01	
	protection selection	1: Enabled	uint16	'	VV	UXUUU I	

^{0:} The VFD does not provide overload protection for the load motor; a thermal relay should be installed before the motor in this case.

1: The VFD provides overload protection for the motor. For protection values, refer to P13.02.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P13.02	Motor overload software protection gain	0.20~10.00	uint16	1.00	W	0x0d02

To effectively protect different load motors, the motor overload protection gain must be set based on the motor's overload capability. Motor overload protection follows an inverse-time curve, as shown in the figure below.

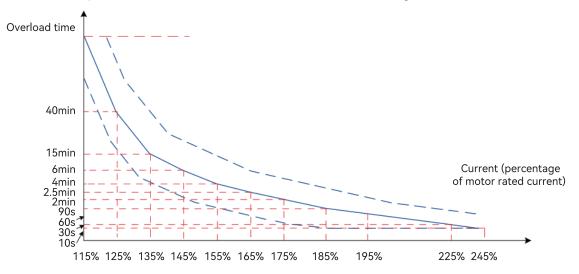


Figure 39. Protection inverse-time curve

Under the condition that the motor's operating current reaches 175% of the motor's rated current, the VFD will report a motor overload fault (Err11) after continuous operation for 2 minutes. When the motor's operating current reaches 115% of the motor's rated current, the VFD will report a motor overload fault (Err11) after continuous operation for 80 minutes.

- If the motor's rated current is 100A and P13.02 is set to 1.00, according to the curve, when the motor's operating current reaches 125% of 100A (125A), the VFD will report a "motor overload fault (Err11)" after continuous operation for 40 minutes.
- If P13.02 is set to 1.20, when the motor's operating current reaches 125A (125% of 100A), the VFD will report a "motor overload fault (Err11)" after continuous operation for 40 × 1.2 = 48 minutes.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P13.03	Motor overload pre-alarm coefficient	50%~100%	uint16	80%	W	0x0d03

The motor overload pre-alarm coefficient indicates: When the motor overload detection level reaches the value set by this parameter, the multifunctional output terminal (DO or relay) will output a "motor overload pre-alarm signal." This parameter is calculated based on the time percentage during which the motor can operate continuously at a specific overload point without triggering an overload fault.

When the VFD detects that the output current reaches $P13.03 \times motor$ overload current and continues for the time specified by the inverse-time curve, a pre-alarm signal will be output via the DO or relay.

	Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
	P13.04	Input phase loss protection		uint16	11	W	0x0d04
	selection	Units digit: Input phase loss protection Tens digit: Reserved					

Select whether to enable protection for output phase loss.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P13.05	Load shedding protection	0: Inactive	uint16	0	W	0x0d05
	selection	1: Active	diriero	Ŭ	* *	0,0005
P13.06	Load shedding detection	0%~100%	uint16	10%	W	0x0d06
P 13.00	level	0.76. 100.76	ullitio	10%	VV	UXUUUU
P13.07	Load shedding detection	00400	uin+1/	10	W	0.0007
	time	0s~60s	uint16	1s	VV	0x0d07

After load shedding, the VFD defaults to coast stop. If this function is active, when the VFD sheds load, its output frequency will be 7% of the rated frequency; if the load is restored, the VFD will resume operation at the set frequency. The load shedding detection level and time can be configured.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P13.08	Output phase loss	0: Disabled	uint16	1	W	0x0d08
	protection selection	1: Enabled	uint16		V V	0x0008

Select whether to enable protection for output phase loss.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P13.09	Power-on ground short-	0: Inactive	uint16	1	W	0x0d09
	circuit protection selection	1: Active	ullicio	'	l vv	UXUUU9

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P13.10	Brake unit start action voltage	330v~800v	uint16	Model setting	W	0x0d0a

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P13.17	Cooling fan control	0: Fan runs during VFD operation 1: Fan runs when VFD is powered on 2: Fan operation determined by temperature	uint16	0	W*	0x0d11

Fan operation control modes:

- $0{:}\ \mbox{Fan runs}$ when the VFD is operating; fan stops when the VFD stops.
- 1: Fan runs immediately when the VFD is powered on; fan stops when the VFD loses power.
- 2: Fan runs when the VFD temperature is \geq P13.46 (fan start temperature); fan stops when the VFD temperature is \leq P13.46 (fan start temperature); fan stops when the VFD temperature is \leq P13.46 (fan start temperature); fan stops when the VFD temperature is \leq P13.46 (fan start temperature); fan stops when the VFD temperature is \leq P13.46 (fan start temperature); fan stops when the VFD temperature is \leq P13.46 (fan start temperature); fan stops when the VFD temperature is \leq P13.46 (fan start temperature); fan stops when the VFD temperature is \leq P13.46 (fan start temperature); fan stops when the VFD temperature is \leq P13.46 (fan start temperature); fan stops when the VFD temperature is \leq P13.46 (fan start temperature); fan stops when the VFD temperature is \leq P13.46 (fan start temperature); fan stops when the VFD temperature is \leq P13.46 (fan start temperature); fan stops when the VFD temperature is \leq P13.46 (fan start temperature); fan stops when the VFD temperature is \leq P13.46 (fan start temperature); fan stops when the VFD temperature is \leq P13.46 (fan start temperature); fan stops when the VFD temperature is \leq P13.46 (fan start temperature); fan stops when the VFD temperature is \leq P13.46 (fan start temperature); fan stops when the VFD temperature is \leq P13.46 (fan start temperature); fan stops when the VFD temperature is \leq P13.46 (fan start temperature); fan stops when the VFD temperature is \leq P13.46 (fan start temperature); fan stops when the VFD temperature is \leq P13.46 (fan start temperature); fan stops when the VFD temperature is \leq P13.46 (fan start temperature); fan stops when the VFD temperature is \leq P13.46 (fan start temperature); fan stops when the VFD temperature is \leq P13.46 (fan start temperature); fan start temperature is \leq P13.46 (fan start temperature); fan start temperature is \leq P13.46 (fan start temperature); fan start temperature is \leq P13.46 (fan start temperature); fan start temperature is \leq P13.46 (fan start temperature); fan start temperature i

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P13.18	DC bus overvoltage threshold	330v~810v	uint16	810	W*	0x0d12

When the VFD detects that the bus voltage is greater than or equal to the value set by this parameter during operation, it will determine a DC bus overvoltage fault, immediately stop, and report an undervoltage fault (Err07).

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P13.19	DC bus undervoltage threshold	140v~420v	uint16	350	W*	0x0d13

When the VFD detects that the bus voltage is less than or equal to the value set by this parameter during operation, it will determine a DC bus undervoltage fault, immediately stop, and report an undervoltage fault (Err09).

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P13.20	Number of automatic fault resets	0~20	uint16	0	W	0x0d14

It sets the number of times the VFD can automatically reset when a fault occurs. If the number of resets exceeds the set value, the VFD remains in the fault state.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P13.21	Fault DO action selection	0: No action	uin+16	0	W	0x0d15
	during automatic fault reset	1: Action	uint16	0	VV	0x0015

This parameter sets whether the fault DO (digital output) will operate during the VFD's fault reset period.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P13.22	Automatic fault reset interval time	0.1~100	uint16	1	W	0x0d16

The waiting time interval from the fault alarm to the fault reset.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
		0: Operate at the current operating				
		frequency				
	Frequency selection for	1: Operate at the set frequency				
P13.28	continued operation during	2: Operate at the upper limit frequency	uint16	0	W	0x0d1c
	fault	3: Operate at the lower limit frequency				
		4: Operate at the abnormal standby				
		frequency				
P13.29	Abnormal standby	0%~100%	uin+16	100%	W	0x0d1d
F 13.29	frequency setting	0 /6 100 /6	uint16			UXUUTU

If a fault occurs during VFD operation and the fault protection is configured to continue operation, the VFD will display $^{*}A^{***}$ and operate at the frequency set by P13.28.

When the abnormal standby frequency is selected for operation, the value of P13.29 is a percentage of the maximum frequency.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P13.30	Zero current detection level	0%~300%	uint16	5%	W	0x0d1e
P13.31	Zero current detection delay time	0.0s~600.0s	uint16	0.1s	W	0x0d1f

When the VFD's output current is less than or equal to the zero current detection level and lasts longer than the zero current detection delay time, the multifunctional DO of the VFD outputs an ON signal.

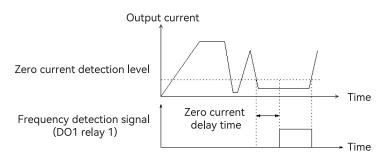


Figure 40. Zero current detection

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P13.34	Arbitrary arrival current 1	0%~300%	uint16	100%	W	0x0d22
P13.35	Arbitrary arrival current 1 width	0%~300%	uint16	0%	W	0x0d23
P13.36	Arbitrary arrival current 2	0%~300%	uint16	100%	W	0x0d24
P13.37	Arbitrary arrival current 2 width	0%~300%	uint16	0%	W	0x0d25

When the VFD's output current falls within the set positive/negative detection width of the arbitrary arrival current, the multifunctional DO of the VFD outputs an ON signal.

E610 provides two sets of arbitrary arrival current and detection width parameters. The figure below shows the functional schematic diagram.

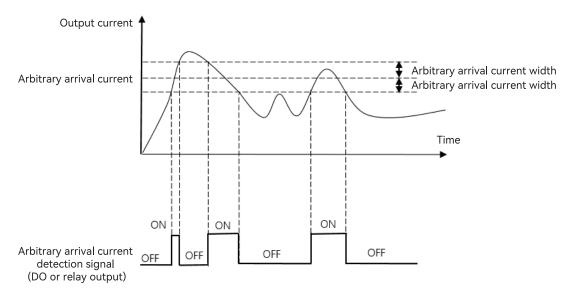


Figure 41. Arbitrary arrival frequency detection

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P13.38	Al1 input voltage protection lower limit	0v~10v	uint16	3.1v	W	0x0d26
P13.39	Al1 input voltage protection upper limit	0v~11v	uint16	6.8v	W	0x0d27

When the value of the analog input Al1 is greater than P13.39 or less than P13.38, the multifunctional DO of the VFD outputs an ON signal for "Al1 input out of range" to indicate whether the input voltage of Al1 is within the set range.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P13.41	Fault protection action selection 1	Units digit: Motor overload (Err11) 0: Continue running 1: Stop according to stop mode 2: Coast stop Tens digit: Input phase loss (Err12) 0: Continue running 1: Stop according to stop mode 2: Coast stop Hundreds digit: Output phase loss (Err13) 0: Continue running 1: Stop according to stop mode 2: Coast stop Thousands digit: External fault (Err15) 0: Continue running 1: Stop according to stop mode 2: Coast stop Thousands digit: External fault (Err15) 0: Continue running 1: Stop according to stop mode 2: Coast stop Ten-thousands digit: Communication abnormality (Err16) 0: Continue running 1: Stop according to stop mode 2: Coast stop	uint16	01211	W	0x0d29

		,		1	,	
		Units digit: Encoder/PG card fault (Err20)				
		0: Continue running				
		1: Stop according to stop mode				
		2: Coast stop				
		Tens digit: Parameter read/write				
		abnormality (Err21)				
		0: Continue running				
		1: Stop according to stop mode				
		2: Coast stop				
		Hundreds digit: Software overcurrent				
		(Err24)				
P13.42	Fault protection action	0: Continue running	uint16	01201	W	0x0d2a
	selection 2	1: Stop according to stop mode				
		2: Coast stop				
		Thousands digit: Reserved (Err25)				
		0: Continue running				
		1: Stop according to stop mode				
		2: Coast stop				
		Ten-thousands digit: Operation time				
		reached (Err26)				
		0: Continue running				
		1: Stop according to stop mode				
		2: Coast stop				
		Units digit: User-Defined fault 1 (Err27)				
		0: Continue running				
		1: Stop according to stop mode				
		2: Coast stop				
		Tens digit: User-Defined fault 2 (Err28)				
		0: Continue running				
		1: Stop according to stop mode				
		2: Coast stop				
		Hundreds digit: Power-on time reached				
		(Err29)				
		0: Continue running				
		1: Stop according to stop mode				
P13.43	Fault protection action	2: Coast stop	uint16	01000	W	0x0d2b
	selection 3	Thousands digit: Load shedding (Err30)				
		0: Directly jump to 7% of motor rated				
		frequency and continue running; if load				
		is not shed, automatically resume opera-				
		tion at set frequency				
		1: Stop according to stop mode				
		2: Coast stop				
		Ten-thousands digit: PID feedback loss				
		during operation (Err31)				
		0: Continue running				
		1: Stop according to stop mode				
		2: Coast stop				
	1	1	I	I.		<u> </u>

P13.44	Fault protection action selection 4	Units digit: Excessive speed deviation (Err42) 0: Continue running 1: Stop according to stop mode 2: Coast stop Tens digit: Motor overspeed (Err43) 0: Continue running 1: Stop according to stop mode 2: Coast stop Hundreds digit: Initial position error (Err51) 0: Continue running 1: Stop according to stop mode 2: Coast stop Hundreds digit: Reserved Ten-thousands digit: Reserved	uint16	02022	W	0x0d2c
P13.45	Fault protection action selection 5	Reserved	uint16	10120	W	0x0d2d

When "Coast stop" is selected, the VFD displays "Err**" and stops immediately.

When "Stop according to stop mode" is selected: The VFD displays "A**" and stops according to the stop mode, then displays "Err**" after stopping. When "Continue running" is selected: The VFD continues running and displays "A**", with the operating frequency set by P13.28.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P13.46	Fan start temperature	0~100°C	uint16	60	W	0x0d2e

If the cooling fan control (P13.17) is set to operate based on temperature, the fan will turn on when the VFD temperature reaches or exceeds the fan start temperature (P13.46). It will turn off when the VFD temperature falls below (P13.46 – 5° C).

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P13.47	Over-torque detection action selection	No action Detects over-torque during constant speed operation and continues running Detects over-torque during constant speed operation and stops running Detects over-torque during operation and continues running Detects over-torque during operation and stops running	uint16	0	W	0x0d2f
P13.48	Over-torque detection value	10~250%	uint16	120	W	0x0d30
P13.49	Over-torque detection time	0.1~60S	uint16	0.1	W	0x0d31

When the output current (P28.08) / VFD rated current reaches or exceeds the over-torque detection value (P13.48) and lasts longer than the over-torque detection time (P13.49), the VFD operates according to the action method selected in P13.47 for over-torque detection.

4.15 Fault information parameter group

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P14.00	Fault type 1	0: No Fault 1: Reserved 2: Accelerating overcurrent (ERR02)	uint16	0	R	0x0e00
P14.01	Fault type 2	3: Decelerating overcurrent (ERR03) 4: Constant speed overcurrent (ERR04) 5: Accelerating overvoltage (ERR05)	uint16	0	R	0x0e01
P14.02	Fault type 3	6: Decelerating overvoltage (ERR06) 7: Constant speed overvoltage (ERR07) 8: Buffer resistor overload fault (ERR08)	uint16	0	R	0x0e02
P14.03	Fault type 4	9: Undervoltage fault (ERR09) 10: VFD overload (ERR10) 11: Motor overload (ERR11) 12: Input phase loss (ERR12)	uint16	0	R	0x0e03
P14.04	Fault type 5	13: Output phase loss (ERR13) 14: Module overheat (ERR14) 15: External fault (ERR15)	uint16	0	R	0x0e04
P14.05	Fault type 6	16: Communication abnormality (ERR16) 17: Contactor abnormality (ERR17) 18: Current detection fault (ERR18)	uint16	0	R	0x0e05
P14.06	Fault type 7	19: Motor tuning fault (ERR19) 20: Encoder/PG card fault (ERR20) 21: Parameter read/write abnormality	uint16	0	R	0x0e06
P14.07	Fault type 8	(ERR21) 22: VFD hardware fault (ERR22) 23: Motor ground short circuit fault (ERR23)	uint16	0	R	0x0e07
P14.08	Fault type 9	24: Software overcurrent (ERR24) 25: Reserved (ERR25) 26: Operation time reached (ERR26)	uint16	0	R	0x0e08
P14.09	Fault type 10	27: User-Defined fault 1 (ERR27) 28: User-Defined fault 2 (ERR28) 29: Power-on time reached (ERR29) 30: Load shedding (ERR30) 31: PID feedback loss during operation (ERR31) 40: Fast current limit timeout fault (ERR40) 41: Motor switching during operation fault (ERR41) 42: Excessive speed deviation (ERR42) 43: Motor overspeed (ERR43) 45: Motor overtemperature (ERR45) 51: Initial position error (ERR51)	uint16	0	R	0x0e09

The last ten fault types are recorded. For specific fault code names and solutions, refer to the fault code table.

Parameter	Parameter name	Setting range	Parameter	Factory	Attribute	Communication
ID	r drameter mame	getting runge	type	value	, teer ib a co	address
P14.10	Subcode for fault type 1	0~65535	uint16	0	R	0x0e0a
P14.11	Subcode for fault type 2	0~65535	uint16	0	R	0x0e0b
P14.12	Subcode for fault type 3	0~65535	uint16	0	R	0x0e0c
P14.13	Subcode for fault type 4	0~65535	uint16	0	R	0x0e0d
P14.14	Subcode for fault type 5	0~65535	uint16	0	R	0x0e0e
P14.15	Subcode for fault type 6	0~65535	uint16	0	R	0x0e0f
P14.16	Subcode for fault type 7	0~65535	uint16	0	R	0x0e10
P14.17	Subcode for fault type 8	0~65535	uint16	0	R	0x0e11
P14.18	Subcode for fault type 9	0~65535	uint16	0	R	0x0e12
P14.19	Subcode for fault type 10	0~65535	uint16	0	R	0x0e13

The last ten subcodes of fault types are recorded. For specific fault code names and solutions, refer to the fault code table.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P14.20	Fault type 1 frequency during fault	0Hz~655.35Hz	uint16	0Hz	R	0x0e14
P14.21	Fault type 1 current during fault	0A~655.35A	uint16	0A	R	0x0e15
P14.22	Fault type 1 bus voltage during fault	0V~6553.5V	uint16	0V	R	0x0e16
P14.23	Fault type 1 input terminal status during fault	0~9999	uint16	0	R	0x0e17
P14.24	Fault type 1 output terminal status during fault	0~9999	uint16	0	R	0x0e18
P14.25	Fault type 1 VFD status during fault	0~65535	uint16	0	R	0x0e19
P14.26	Fault type 1 time during fault (counted from power-on start)	0Min~65535Min	uint16	0Min	R	0x0e1a
P14.27	Fault type 1 time during fault (counted from operation start)	0Min~6553.5Min	uint16	0Min	R	0x0e1b
P14.28	Fault type 2 frequency during fault	0Hz~655.35Hz	uint16	0Hz	R	0x0e1c
P14.29	Fault type 2 current during fault	0A~655.35A	uint16	0A	R	0x0e1d
P14.30	Fault type 2 bus voltage during fault	0V~6553.5V	uint16	0V	R	0x0e1e
P14.31	Fault type 2 input terminal status during fault	0~9999	uint16	0	R	0x0e1f
P14.32	Fault type 2 output terminal status during fault	0~9999	uint16	0	R	0x0e20
P14.33	Fault type 2 VFD status during fault	0~65535	uint16	0	R	0x0e21
P14.34	Fault type 2 time during fault (counted from power-on start)	0Min~65535Min	uint16	0Min	R	0x0e22
P14.35	Fault type 2 time during fault (counted from operation start)	0Min~6553.5Min	uint16	0Min	R	0x0e23
P14.36	Fault type 3 frequency during fault	0Hz~655.35Hz	uint16	0Hz	R	0x0e24
P14.37	Fault type 3 current during fault	0A~655.35A	uint16	0A	R	0x0e25
P14.38	Fault type 3 bus voltage during fault	0V~6553.5V	uint16	0V	R	0x0e26
P14.39	Fault type 3 input terminal status during fault	0~9999	uint16	0	R	0x0e27
P14.40	Fault type 3 output terminal status during fault	0~9999	uint16	0	R	0x0e28
P14.41	Fault type 3 VFD status during fault	0~65535	uint16	0	R	0x0e29
P14.42	Fault type 3 time during fault (counted from power-on start)	0Min~65535Min	uint16	0Min	R	0x0e2a
P14.43	Fault type 3 time during fault (counted from operation start)	0Min~6553.5Min	uint16	0Min	R	0x0e2b
P14.44	Fault type 4 frequency during fault	0Hz~655.35Hz	uint16	0Hz	R	0x0e2c

P14.45	Fault type 4 current during fault	0A~655.35A	uint16	0A	R	0x0e2d
P14.46	Fault type 4 bus voltage during fault	0V~6553.5V	uint16	0v	R	0x0e2e
P14.47	Fault type 4 input terminal status during fault	0~9999	uint16	0	R	0x0e2f
P14.48	Fault type 4 output terminal status during fault	0~9999	uint16	0	R	0x0e30
P14.49	Fault type 4 VFD status during fault	0~65535	uint16	0	R	0x0e31
P14.50	Fault type 4 time during fault (counted from power-on start)	0Min~65535Min	uint16	0Min	R	0x0e32
P14.51	The 7th fault time (counted from operation start)	0Min~6553.5Min	uint16	0Min	R	0x0e33
P14.52	Fault type 5 frequency during fault	0Hz~655.35Hz	uint16	0Hz	R	0x0e34
P14.53	Fault type 5 current during fault	0A~655.35A	uint16	0A	R	0x0e35
P14.54	Fault type 5 bus voltage during fault	0V~6553.5V	uint16	0V	R	0x0e36
P14.55	Fault type 5 input terminal status during fault	0~9999	uint16	0	R	0x0e37
P14.56	Fault type 5 output terminal status during fault	0~9999	uint16	0	R	0x0e38
P14.57	Fault type 5 VFD status during fault	0~65535	uint16	0	R	0x0e39
P14.58	Fault type 5 time during fault (counted from power-on start)	0Min~65535Min	uint16	0Min	R	0x0e3a
P14.59	Fault type 5 time during fault (counted from operation start)	0Min~6553.5Min	uint16	0Min	R	0x0e3b
P14.60	Fault type 6 frequency during fault	0Hz~655.35Hz	uint16	0Hz	R	0x0e3c
P14.61	Fault type 6 current during fault	0A~655.35A	uint16	0A	R	0x0e3d
P14.62	Fault type 6 bus voltage during fault	0V~6553.5V	uint16	0V	R	0x0e3e
P14.63	Fault type 6 input terminal status during fault	0~9999	uint16	0	R	0x0e3f
P14.64	Fault type 6 output terminal status during fault	0~9999	uint16	0	R	0x0e40
P14.65	Fault type 6 VFD status during fault	0~65535	uint16	0	R	0x0e41
P14.66	Fault type 6 time during fault (counted from power-on start)	0Min~65535Min	uint16	0Min	R	0x0e42
P14.67	Fault type 6 time during fault (counted from operation start)	0Min~6553.5Min	uint16	0Min	R	0x0e43
P14.68	Fault type 7 frequency during fault	0Hz~655.35Hz	uint16	0Hz	R	0x0e44
P14.69	Fault type 7 current during fault	0A~655.35A	uint16	0A	R	0x0e45
P14.70	Fault type 7 bus voltage during fault	0V~6553.5V	uint16	0V	R	0x0e46
P14.71	Fault type 7 input terminal status during fault	0~9999	uint16	0	R	0x0e47
P14.72	Fault type 7 output terminal status during fault	0~9999	uint16	0	R	0x0e48
P14.73	Fault type 7 VFD status during fault	0~65535	uint16	0	R	0x0e49
P14.74	Fault type 7 time during fault (counted from power-on start)	0Min~65535Min	uint16	0Min	R	0x0e4a
P14.75	Fault type 7 time during fault (counted from operation start)	0Min~6553.5Min	uint16	0Min	R	0x0e4b
P14.76	Fault type 8 frequency during fault	0Hz~655.35Hz	uint16	0Hz	R	0x0e4c
P14.77	Fault type 8 current during fault	0A~655.35A	uint16	0A	R	0x0e4d
P14.78	Fault type 8 bus voltage during fault	0V~6553.5V	uint16	0V	R	0x0e4e
P14.79	71	0~9999	uint16	0	R	0x0e4f
P14.80	Fault type 8 output terminal status during	0~9999	uint16	0	R	0x0e50

P14.81	Fault type 8 VFD status during fault	0~65535	uint16	0	R	0x0e51
P14.82	Fault type 8 time during fault (counted from power-on start)	0Min~65535Min	uint16	0Min	R	0x0e52
P14.83	Fault type 8 time during fault (counted from operation start)	0Min~6553.5Min	uint16	0Min	R	0x0e53
P14.84	Fault type 9 frequency during fault	0Hz~655.35Hz	uint16	0Hz	R	0x0e54
P14.85	Fault type 9 current during fault	0A~655.35A	uint16	0A	R	0x0e55
P14.86	Fault type 9 bus voltage during fault	0V~6553.5V	uint16	0V	R	0x0e56
P14.87	Fault type 9 input terminal status during fault	0~9999	uint16	0	R	0x0e57
P14.88	Fault type 9 output terminal status during fault	0~9999	uint16	0	R	0x0e58
P14.89	Fault type 9 VFD status during fault	0~65535	uint16	0	R	0x0e59
P14.90	Fault type 9 time during fault (counted from power-on start)	0Min~65535Min	uint16	0Min	R	0x0e5a
P14.91	Fault type 9 time during fault (counted from operation start)	0Min~6553.5Min	uint16	0Min	R	0x0e5b
P14.92	Fault type 10 frequency during fault	0Hz~655.35Hz	uint16	0Hz	R	0x0e5c
P14.93	Fault type 10 current during fault	0A~655.35A	uint16	0A	R	0x0e5d
P14.94	Fault type 10 bus voltage during fault	0V~6553.5V	uint16	0	R	0x0e5e
P14.95	Fault type 10 input terminal status during fault	0~9999	uint16	0	R	0x0e5f
P14.96	Fault type 10 output terminal status during fault	0~9999	uint16	0	R	0x0e60
P14.97	Fault type 10 VFD status during fault	0~65535	uint16	0	R	0x0e61
P14.98	Fault type 10 time during fault (counted from power-on start)	0Min~65535Min	uint16	0Min	R	0x0e62
P14.99	Fault type 10 time during fault (counted from operation start)	0Min~6553.5Min	uint16	0Min	R	0x0e63

Record the frequency, current, busbar voltage, input terminal status, output terminal status, VFD status, time from power-on to fault occurrence, and time from operation start to fault occurrence corresponding to the last ten fault occurrences of the VFD to facilitate fault cause analysis.

4.16 P15 Communication setting parameter group

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P15.00	Communication type	0: Modbus-RTU 2: CAN	uint16	0	W	0x0f00

Communication type selection

- 0: Select Modbus-RTU communication.
- 2: CAN communication protocol. The internal CAN protocol or CANopen slave protocol is selected based on the value of parameter P24.13. The internal CAN protocol supports control by the host computer and the external keypad.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P15.01	CANopen node	0~0x1ff	uint16	2	W*	0x0f01

P15.00: Used to set the CAN communication node number when CAN communication is selected.

Parameter ID	Parameter name	Setting range	Parameter	Factory value	Attribute	Communication address
P15.02	Baud rate	Hexadecimal units digit: Modbus baudrate 0: 300BPS 1: 600BPS 2: 1200BPS 3: 2400BPS 4: 4800BPS 5: 9600BPS 6: 19200BPS 7: 38400BPS 8: 57600BPS 9: 115200BPS Hexadecimal tens digit: CANopen baudrate 0: 50K 1: 100K 2: 125K 3: 250K 4: 500K 5: 800K 6: 1M	uint16	3	W	0x0f03

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P15.03	Data format	0: No parity (8-N-2) 1: Even parity (8-E-1) 2: Odd parity (8-O-1) 3: No parity (8-N-1)	uint16	3	W	0x0f03

When P15.00 selects Modbus communication, the required data format must be chosen. The data format must match the host's selected format; otherwise, normal communication cannot be established.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P15.04	Local address	0~249	uint16	1	W	0x0f04

A local address setting of 0 is a broadcast address. When the host sets the slave communication address to 0 in the data frame, it indicates a broadcast communication address. All slaves on the Modbus bus will receive this frame but will not respond. The local communication address must be unique in the communication network, which is the basis for point-to-point communication between the host computer and the VFD.

Note: When reading the VFD's operating data, the slave address must not be set to 0.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P15.05	Response delay	0ms~20ms	uint16	2ms	W	0x0f05

After receiving data from the host, the VFD delays sending a response to the host by the time set in P15.05.

If the response delay is less than the system processing time, the response delay shall be based on the system processing time. If the response delay exceeds the system processing time, the VFD will process the data and then delay for the time set in P15.05 before starting to send data to the host.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P15.06	Communication timeout	0.0s~60.0s	uint16	0.0s	W	0x0f06

When P15.06 = 0, the communication timeout is invalid.

When P15.06 is greater than 0 and less than or equal to 60, if the time between two communications exceeds the communication timeout, the VFD will display an Err16/A16 alarm. In continuously communicating systems, the communication status can be monitored by setting the communication timeout.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
		0: Non-standard Modbus-RTU (response				
	Data transmission format selection	to read = 2-byte data length)	uint16	1	W	0.007
D1 <i>E</i> 07		1: Standard Modbus-RTU (response to				
P15.07		read = 1-byte data length)				0×0f07
		Units digit: Modbus data format				
		Tens digit: Reserved				

When P15.00 selects Modbus communication, set the units digit of P15.07 to choose between the standard Modbus protocol or non-standard Modbus format.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P15.08	Current resolution read via	0: 0.01A	uint16	0	W	0x0f08
	communication	1: 0.1A	ullicio	0	VV	0x0106

The number of decimal places for current-related parameter values read via communication.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P25.00	User password	00000~65535	uint16	00000	W*	0x1900

When this parameter value is non-zero, the user password set in parameter P25.00 must be entered when accessing the parameter group from the main interface.

When this parameter value is 0, the user password is disabled.

4.17 P28 Communication setting parameter group

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P28.00	Current power-on time	0Min~65535Min	uint16	0Min	R	0x1C00

It displays the elapsed time since the VFD was powered on.

Parameter ID	Parameter name	Setting range		Factory value	Attribute	Communication
			type			address
P28.01	Current running time	0Min~6553.5Min	uint16	0Min	R	0x1C01

It displays the elapsed running time since the VFD started; it automatically resets to zero after stopping.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P28.02	VFD operating status	0~65535	uint16	0	R	0x1C02

It indicates the current operating status of the VFD. Data definitions are as follows:

	Bit0	0: Stopped
	Dia1	1: Forward rotation
	Bit1	2: Reverse rotation
P28.02	Bit2	0: Constant speed
P28.02	Duo	1: Accelerate
	Bit3	2: Decelerate
	Bit4	0: Normal
		1: Undervoltage

Example: When the VFD is running forward and accelerating, P28.02 = 5; when running forward and decelerating, P28.02 = 9.

Parameter ID	Parameter name	Setting range		Factory value		
			type			address
P28.03	Fault information	0~65535	uint16	0	R	0x1C03

It displays the current fault code.

Parameter ID	Parameter name	Setting range	Parameter	Factory value	Attribute	Communication
	r drameter name	Cotting runge	type	r detory value	, teer ibace	address
P28.04	Operating frequency	0Hz~655.35Hz	uint16	0Hz	R	0x1C04

It displays the absolute value of the VFD's current theoretical operating frequency.

Parameter ID	Parameter name	Setting range	Parameter	Factory value		Communication
r drdineter 1D	r dramotor mamo	gotting range	type	ractory value	, teer ib a co	address
P28.05	Set frequency	0Hz~655.35Hz	uint16	0Hz	R	0x1C05

It displays the absolute value of the currently set frequency.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P28.06	Bus voltage	0v~6553.5v	uint16	0v	R	0x1C06

It displays the current bus voltage of the VFD.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P28.07	Output voltage	0v~65535v	uint16	0v	R	0x1C07
P28.08	Output current	0A~655.35A	uint16	0A	R	0x1C08
P28.09	Output power	0kW~6553.5kW	uint16	0kW	R	0x1C09

It displays the output voltage, output current, and output power values during VFD operation.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P28.10	Target torque	0%~6553.5%	uint16	0%	R	0x1C0a

It shows the percentage of the VFD's current torque upper limit setting.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P28.11	Output torque	0%~655.35%	uint16	0%	R	0x1C0b

It shows the percentage of the motor's rated torque.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P28.12	Feedback frequency	0.0HZ~3276.7HZ 0.00HZ~327.67HZ	uint16	0.00Hz	R	0x1C0c

It displays the actual output frequency of the VFD, with the number of decimal places determined by the frequency command decimal point setting in P00.18.

When P00.18 = 1, the range of P28.12 is 0.0Hz to 3276.7Hz;

When P00.18 = 2, the range of P28.12 is 0.0Hz to 327.67Hz.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P28.13	Detected frequency	0.0HZ~3276.7HZ	uint16	0.00Hz	R	0x1C0d
		0.00HZ~327.67HZ				UXTCUU

It displays the actual measured motor operating frequency from the encoder, with the number of decimal places determined by the frequency command decimal point setting in P00.18.

When P00.18 = 1, the range of P28.12 is 0.0Hz to 3276.7Hz;

When P00.18 = 2, the range of P28.12 is 0.0Hz to 327.67Hz.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P28.14	Resolver position	0~65535	uint16	0	R	0x1C0e

It displays the current position signal of the resolver.

Parameter ID	Parameter name	Setting range	Parameter	Factory value		Communication
			type			address
P28.15	ABZ position	0~65535	uint16	0	R	0x1C0f

It displays the number of AB-phase pulses from the current ABZ encoder; the current value represents $4\times$ frequency pulse count. When the current value is 4000, the actual encoder pulses passed are 4000/4 = 1000.

The value of P28.15 increases automatically when the encoder rotates forward and decreases automatically when rotating backward. The maximum value of P28.15 is 65535. When the pulse count exceeds 65535, it resets to 0 and starts recounting.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P28.16	Z-Signal counter	0~65535	uint16	0	R	0x1C10

It displays the current count of Z-phase pulses from the ABZ encoder.

When the encoder rotates forward one full turn, P28.16 increases by 1; when rotating backward one full turn, P28.16 decreases by 1. P28.16 can be used to check if the encoder is installed correctly.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P28.17	Synchronous machine rotor position	0.0° ~6553.5°	uint16	0.0°	R	0x1C11

It displays the current position of the synchronous machine rotor.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P28.18	Power factor angle	0.0° ~6553.5°	uint16	0.0°	R	0x1C12

It displays the current operating power factor angle.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P28.19	Controller temperature	0.0°C ~6553.5°C	uint16	0.0℃	R	0x1C13

It displays the current temperature of the VFD, used for temperature-related pre-alarm and control functions.

When the cooling fan control parameter P13.17 is set to 2 (temperature-based control), the fan operation is determined by the following logic:

If P28.19 is greater than or equal to the fan start temperature P13.46, the fan will operate.

If P28.19 is less than (P13.46 minus 5°C), the fan will stop operating.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P28.20	Motor temperature value	0.0°C ~6553.5°C	uint16	0.0℃	R	0x1C14

Reserved.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P28.21	DI input status	0~65535	uint16	0	R	0x1C15

It displays the input status of DI1~5 and HDI.



From left to right: DI1~HDI. A lit digital tube indicates a high level; an unlit digital tube indicates a low level.

Parameter ID	Parameter name	Setting range	Parameter	Factory value	Attribute	Communication
			type	actory value Attribute	address	
P28.22	DO output status	0~65535	uint16	0	R	0x1C16

It displays the output status of DO1~DO2 and relay outputs.



From left to right: Relay, DO1, DO2. A lit digital tube indicates the output is active; an unlit digital tube indicates no output.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P28.27	Al1 voltage	0.00v~655.35v	int16	0.00v	R	0x1C1b
P28.28	Al2 voltage	0.00v~655.35v	uint16	0.00v	R	0x1C1c

P28.27 displays the sampled voltage value of AI1; P28.28 displays the sampled voltage value of AI2.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P28.30	Al1 uncorrected voltage	0.00v~655.35v	uint16	0.00v	R	0x1C1e
P28.31	Al2 uncorrected voltage	0.00v~655.35v	uint16	0.00v	R	0x1C1f

It displays the actual sampled input voltage values of the analog signals. In practical use, linear correction is applied to minimize the deviation between the sampled analog voltage and the actual input voltage.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P28.33	VF decoupled target voltage	0v~65535v	uint16	0v	R	0x1C21
P28.34	VF decoupled output voltage	0v~65535v	uint16	0v	R	0x1C22

It displays the target decoupled voltage and actual output voltage of the VF during VF decoupled operation.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P28.35	Communication set value	0%~655.35%	uint16	0%	R	0x1C23

It is the frequency percentage value given via communication. The set frequency = $P28.35 \times P00.08$ (maximum frequency).

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P28.36	Main frequency X display	0.00Hz~655.35Hz	uint16	0.00Hz	R	0x1C24
P28.37	Auxiliary frequency Y display	0.00Hz~655.35Hz	uint16	0.00Hz	R	0x1C25

P28.36 displays the setting of the main frequency source X; P28.37 displays the setting of the auxiliary frequency Y.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P28.38	Load speed display	0~65535	uint16	0	R	0x1C26

For details, refer to P10.10.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P28.39	PID setting	0~65535	uint16	0	R	0x1C27
P28.40	PID feedback	0~65535	uint16	0	R	0x1C28

P28.39 displays the PID set value; P28.40 displays the PID feedback value.

PID set value = PID setpoint (percentage) × P08.04

PID feedback value = PID feedback (percentage) × P08.04

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P28.41	PLC stage	0~65535	uint16	0	R	0x1C29

It displays the current operating stage of the simplified PLC (16 speed segments in total).

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P28.42	Count value	0~65535	uint16	0	R	0x1C2a

It displays the count value in the counting function.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P28.43	Length value	0~65535	uint16	0	R	0x1C2b

It displays the length value in the fixed-length function.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P28.44	PULSE input pulse frequency	0Hz~65535Hz	uint16	0Hz	R	0x1C2c

It displays the sampling frequency of the HDI high-speed pulse, in Hz.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value	Attribute	Communication address
P28.45	PULSE input pulse frequency	0kHz~655.35kHz	uint16	0kHz	R	0x1C2d

It displays the sampling frequency of the HDI high-speed pulse, in kHz.

Parameter ID	Parameter name	Setting range	Parameter type	Factory value		Communication address
P28.46	Linear speed	0m/Min~65535m/Min	uint16	0m/Min	R	0x1C2e

It displays the linear speed sampled by the HDI high-speed pulse, in m/min.

P28.46 = Actual sampled pulses per minute / P09.12 (pulses per meter).

Parameter ID	Parameter name	Setting range	Parameter	Factory value		Communication
Tarameter 15	r drameter mame	Jetting runge	type		rttinbate	address
P28.47	Remaining running time	0Min~6553.5Min	uint16	0Min	R	0x1C2f

It displays the remaining running time during timed operation.

For details on the timed operation function, refer to P09.26~P09.28.

Chapter 5 EMC Electromagnetic Compatibility

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5.1 Definition

Electromagnetic compatibility (EMC) refers to the ability of electrical equipment to operate in an electromagnetic interference environment without interfering with the electromagnetic environment itself and stably performing its functions.

5.2 Introduction to EMC standards

Some products in the E-series have passed CE testing and certification, complying with the requirements of IEC/EN 61800-3:2004.

IEC/EN 61800-3 primarily evaluates VFDs from two aspects: electromagnetic interference (EMI) and immunity to electromagnetic interference. EMI testing mainly includes radiated interference, conducted interference, and harmonic interference tests (required for civil-use VFDs). Immunity testing focuses on conducted immunity, radiated immunity, surge immunity, fast transient burst immunity, ESD immunity, and power supply low-frequency immunity.

5.3 EMC precautions

During the installation and operation of the VFD, follow the precautions in this section to ensure good electromagnetic compatibility in general industrial environments.

5.3.1 Impact of harmonics

High-order harmonics in the power supply can damage the VFD. Therefore, in areas with poor grid quality, it is recommended to install AC input reactors.

5.3.2 Electromagnetic interference and installation precautions

There are two types of electromagnetic interference: interference from ambient electromagnetic noise to the VFD, and interference from the VFD to surrounding equipment.

- 1) Installation precautions:
- 2) The grounding wires of the VFD and other electrical products should be properly grounded.
- 3) Power input/output lines and low-voltage signal lines (e.g., control lines) of the VFD should avoid parallel routing; vertical routing is preferred if possible.
- 4) Shielded cables are recommended for the VFD's output power lines, or steel-pipe shielding for power lines, with the shielding layer reliably grounded. For signal lines of interference-prone equipment, twisted-pair shielded control lines are recommended, with the shielding layer reliably grounded.
 - 5) For motor cables longer than 100m, output filters or reactors are required.

5.3.3 Solutions for interference from surrounding electromagnetic devices to the VFD

Electrical interference to the VFD is often caused by nearby relays, contactors, or electromagnetic brakes. If the VFD malfunctions due to such interference, consider using the following methods:

- 1) Install surge suppressors on interfering devices.
- 2) Add filters to the VFD's input terminal (refer to Section 6.3.6 for details).
- 3) Use shielded cables for control signal lines and detection lines of the VFD, with the shielding layer reliably grounded.

5.3.4 Solutions for interference from the VFD to surrounding equipment

This interference is categorized into two types: radiated interference and conducted interference from the VFD, both of which can induce electromagnetic or electrostatic effects on surrounding electrical equipment, potentially leading to malfunctions. Solutions vary depending on the specific scenario:

- 1) Measuring instruments, receivers, sensors, and similar devices often operate with weak signals, making them susceptible to interference when positioned near a VFD or within the same control cabinet. To mitigate this interference, consider the following methods: Keeping a safe distance from the interference source; Avoiding parallel routing of signal lines and power lines (especially parallel bundling); Using shielded lines for signal and power lines with reliable grounding. Adding ferrite cores to the VFD's output side (select cores with suppression frequency range 30–1000MHz) and winding 2–3 turns in the same direction; for severe cases, install an EMC output filter.
- 2) If the interfered equipment shares a power supply with the VFD, it may encounter conducted interference. If the above methods fail, install an EMC filter between the VFD and the power supply (refer to Section 7.3.6 for selection).
- 3) Grounding peripheral equipment separately can help eliminate interference caused by leakage currents from the VFD's grounding line in a common ground system.

5.3.5 Leakage current and mitigation

There are two types of leakage current when using a VFD: ground leakage current and line-to-line leakage current.

Factors and solutions for ground leakage current:

Stray capacitance between wires and the ground increases with larger capacitance, leading to higher leakage current. Reduce the distance between the VFD and motor to minimize stray capacitance. Higher carrier frequencies increase leakage current; lowering the carrier frequency reduces leakage current but may increase motor noise. Installing reactors is also an effective solution.

Leakage current increases with loop current, so larger motors exhibit higher leakage current.

2) Factors and solutions for line-to-line leakage current:

Stray capacitance between the VFD's output wiring, combined with high-order harmonic currents, may cause resonance and leakage current. This can lead to the malfunction of thermal relays.

Solutions include lowering the carrier frequency or installing output reactors. It is recommended to avoid using thermal relays between the VFD and motor; instead, use the VFD's electronic overcurrent protection function.

5.3.6 Precaution for installing EMC input filters at the power input terminal

CAUTION /

Use filters according to their specified ratings. For Class I electrical equipment, the metal enclosure ground of the filter must have a secure and continuous connection to the metal ground of the installation cabinet. Poor contact can lead to electric shock hazards and severely impair EMC performance.

EMC testing confirms that the filter's ground must be connected to the same common ground as the VFD's PE terminal; otherwise, EMC performance is significantly degraded.

Install the filter as close as possible to the VFD's power input terminal.

Chapter 6 Communication Protocol

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6.1 Modbus RTU communication

6.1.1 Overview

The E610 series is equipped with an RS485 communication interface and supports the Modbus-RTU slave communication protocol. Users can achieve centralized control via a computer or PLC, set VFD operation commands, modify or read parameters, and access the VFD's operating status and fault information through this protocol.

This serial communication protocol specifies the content and format of the information transmitted during serial communication. It includes the master polling (or broadcasting) format and the encoding methods used by the master, which cover parameters requiring action, transmitted data, and error checking. Slave responses adhere to the same structure, including confirmation of actions, returned data, and error checking. If a slave encounters an error while receiving information or is unable to complete the action requested by the master, it will generate a fault message as a response to the master.

6.1.2 Application mode

The VFD is connected to a "single-master, multi-slave" PC/PLC control network with an RS485 bus, acting as a communication slave.

6.1.3 Topology structure

A single-master, multi-slave system is a network configuration where each communication device has a unique slave address. In this setup, one device is designated as the master, typically a PC host computer, PLC, or HMI. The master initiates communication by reading from or writing to the parameters of the slave devices. The other devices in the network act as communication slaves, responding to the master's requests or operations. At any given time, only one device can transmit data, while all other devices remain in a receiving state.

Slave addresses range from 1 to 247, with 0 reserved as the broadcast communication address. Slave addresses on the network must be unique.

6.1.4 Communication transmission mode

Asynchronous serial, half-duplex transmission. During asynchronous serial communication, data is transmitted in frames (one frame per transmission). The Modbus-RTU protocol specifies that when the idle time on the communication data line exceeds 3.5 times the byte transmission time, it indicates the start of a new communication frame.

The built-in communication protocol of the E610 series is the Modbus-RTU slave protocol, which can respond to the master's "queries/commands" or perform corresponding actions based on the master's "queries/commands" and respond to communication data.

The master may refer to a personal computer (PC), industrial control device, or programmable logic controller (PLC). The master can communicate with a single slave individually or broadcast messages to all slaves. For individual "queries/commands" from the master to a specific slave, the addressed slave must return a response frame; for broadcast messages sent by the master, slaves do not need to provide feedback to the master.

6.1.5 Electrical connection



Figure 42. RS485 connection topology structure

- 1: A 120Ω termination resistor must be connected at each end of the bus:
- 2: Up to 32 nodes can be connected.

6.1.6 Communication protocol

The Modbus-RTU protocol communication data format of the E610 series VFD is as follows. The VFD only supports reading/writing Word-type parameters, with corresponding communication read and write operation commands: 0x03 (read), 0x06 (write), and 0x10 (multi-write). Byte or bit-level read/write operations are not supported:

Frame header	Slave address	Function code	Data	CRC CHK	CRC CHK	Frame tail
Frame neader	Slave address	2*N-byte d		Low byte	High byte	Frame tall
3.5-byte transmission time	Communication address: 0-247 (0 = broadcast address)	03H: Read slave parameters 06H/10H: Write slave parameters	Data exchange (high byte → low byte)	CRC check v	alue (16-bit)	3.5-byte transmission time

Example 1: For a VFD with slave address 01H, if the memory starting address is 0008H (maximum output frequency address) and 1 consecutive Word is to be read, the frame structure is as follows:

Frame header	Slave address	Function code	address (pa-	High byte of starting ad- dress (parame- ter number)	Data unit High byte	Data unit Low byte	CRC CHK Low byte	CRC CHK High byte	Frame tail
3.5-byte									3.5-byte
transmission	01H	03H	00H (P00 group)	08H (i.e., P00.08)	00H	01H	05H	C8H	transmission
time									time

Example 2: To write 5000 (1388H) to the digital set frequency (address 000CH) of a VFD with slave address 01H, the frame structure is described as follows:

Frame header	Slave address	Function code	address (pa-	High byte of starting ad- dress (parame- ter number)	Data unit High byte	Data unit Low byte	CRC CHK Low byte	CRC CHK High byte	Frame tail
3.5-byte									3.5-byte
transmission	01H	06H	00H (P00 group)	0CH (i.e., P00.0C)	13H	88H	44H	9FH	transmission
time									time

6.1.7 Parameter configuration description

Address definition	Function description	Data meaning description	R/W property	
		0001H: Forward rotation operation		
		0002H: Reverse rotation operation		
		0003H: Forward jog		
6000H	VFD control word	0004H: Reverse jog	W	
0000H		0005H: Coast stop	VV	
		0006H: Deceleration stop		
		0007H: Fault reset		
		0008H: Forward/reverse rotation switching		

		Bit0: Relay control output		
6001H	DO control	Bit1: DO1 control output	W	
		Bit2: DO2 control output		
6002H	AOI/U control	0~0x7FF (0v~10v)	W	
5000H	Communication set	0-100.00% corresponds to 0Hz-frequency set by parameter	W	
3000H	frequency	P00.08	VV	
		0001H: Forward rotation in progress		
4000H	VED approximately	0002H: Reverse rotation in progress	R	
4000H	VFD operation status	0003H: VFD stopped		
		0004H: VFD in fault		

6.2 CANopen communication

6.2.1 Electrical connection

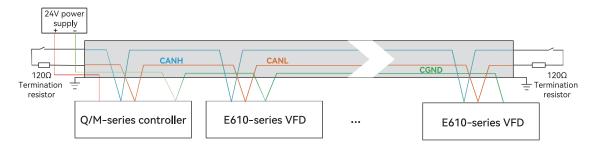


Figure 43. CANopen bus connection topology structure

- 1: Shielded twisted pair is recommended for CANopen bus connections, with CANH and CANL connected via twisted pairs.
- $2{:}\;A\;120\Omega$ terminal resistor must be connected at each end of the bus.
- 3: The reference ground of all nodes' CAN signals must be connected together.
- 4: Up to 64 nodes can be connected, with each node's branch distance less than 0.3m.

6.2.2 Communication protocol

The CANopen protocol defines the correspondence between functional parameters and the object dictionary, facilitating intuitive parameter operation by users.

SDO request/response code data frame format

Write command	Write command data	Read command	Read command data
Write 1 byte	0x2f	Read 1 byte	0x4f
Write 2 bytes	0x2b	Read 2 bytes	0x4b
Write 3 bytes	0x27	Read 3 bytes	0x47
Write 4 bytes	0x23	Read 4 bytes	0x43
Write success acknowledgment	0x60	Read	0x40
Abnormality response		0x80	

Request: Client → VFD

COB-ID	0 bytes	1 bytes	2 bytes	3 bytes	4 bytes	5 bytes	6 bytes	7 bytes
16#600+	Dogwoot ondo	Object	index	Object sub-		Reque	st data	
Node-ID	Request code	Index low byte	Index high byte	index	Data low byte	Data high byte	Reser	ved 0

Request: Client \leftarrow VFD

COB-ID	0 bytes	1 bytes	2 bytes	3 bytes	4 bytes	5 bytes	6 bytes	7 bytes
16#580+	Dospopso sodo		index	Object sub-		Response data		
Node-ID	Response code		Index high byte	index		Respon	se data	

Note: Node-ID is the slave address.

PDO only supports 4 RxPDOs and 4 TxPDOs.

Name		COB-ID	Communication parameter	Mapped parameter
	1	180H+NODE-ID	1800H	1A00H
T.DD0	2	280H+NODE-ID	1801H	1A01H
TxPDO	3	380H+NODE-ID	1802H	1A02H
	4	480H+NODE-ID	1803H	1A03H
	1	200H+NODE-ID	1400H	1600H
0.000	2	300H+NODE-ID	1401H	1601H
RxPDO	3	400H+NODE-ID	1402H	1602H
	4	500H+NODE-ID	1403H	1603H

Request: Client \rightarrow VFD

COB-ID	0 bytes	1 bytes	2 bytes	3 bytes	4 bytes	5 bytes	6 bytes	7 bytes
16#280+	Vari	able	Vari	able	Vari	able	Varia	able
Node-ID	Index low byte	Index high byte	Index low byte	Index high byte	Data low byte	Data high byte	Index low byte	Index high byte

 $\textbf{Request: Client} \leftarrow \textbf{VFD}$

COB-ID	0 bytes	1 bytes	2 bytes	3 bytes	4 bytes	5 bytes	6 bytes	7 bytes
16#280+	Varia	able	Vari	able	Varia	able	Vari	able
Node-ID	Index low byte	Index high byte	Index low byte	Index high byte	Data low byte	Data high byte	Index low byte	Index high byte

Note: Node-ID is the slave address.

E610 requires setting the relevant parameters in the table below during initial communication.

Parameter code	Set value	Function description
P00.02	2	Control command source: Communication control
P00.03	9	Frequency command source: Communication setpoint
P15.00	2	Communication type: CANopen
P15.01	1~110	CANopen station number (hexadecimal)
		Baud rate:
		Hexadecimal units digit: Modbus baud rate
		0: 300BPS
		1: 600BPS
		2: 1200BPS
		3: 2400BPS
		4: 4800BPS
		5: 9600BPS
		6: 19200BPS
P15.02	0x095~0x695	7: 38400BPS
F 13.02		8: 57600BPS
		9: 115200BPS
		Hexadecimal tens digit: CANopen baud rate
		0: 50K
		1: 100K
		2: 125K
		3: 250K
		4: 500K
		5: 800K
		6: 1M

Universal standard model CANopen object dictionary:

I. Start/Stop Control Word

Index	Sub-index	Parameter description
0x6040	0x00	Start/Stop Control Word
	Start/Stop Control Word	data format
	1	Forward rotation operation
	2	Reverse rotation operation
	3	Forward jog
0x6040: Start/Stop Control Word (W)	4	Reverse jog
0x0040. Start/Stop Control Word (W)	5	Coast stop
	6	Stop according to set stop mode (default: deceleration stop)
	7	Fault reset
	8	Forward/Reverse rotation switching

II. Frequency address

Index	Sub-index	Parameter description		
0x60FF	0x00	Frequency address		
Frequency address data format				
0x60FF: Frequency Address Word (W)	0~100.00%	0-100.00% corresponds to 0.00Hz-frequency set by parameter P00.08		

III. Acceleration/Deceleration time

Index	Sub-index	Parameter description
0x3000	0x0E	Acceleration time
0x3000	0x0F	Deceleration time

IV. DO Control Word

Index	Sub-index	Parameter description
0x60FE	0x00	DO Control Word
	DO Control Word data format	
	Bit0	Relay terminal
	Bit1	DO1
	Bit2	DO2
Ove OFF. DO Control Mard (M)	Bit3	Reserved
0x60FE: DO Control Word (W)	Bit4	Reserved
	Bit5	Reserved
	Bit6	Reserved
	Bit7~Bit15	Reserved

V. Operation Status Word

Index	Sub-index	Parameter description
0x6041	0x00	Operation Status Word
	Operation Status Word data forma	at
	1	Forward rotation operation
0,4041, Operation Status Word (D)	2	Reverse rotation operation
0x6041: Operation Status Word (R)	3	Stopped
	4	In fault

VI. DI Status Word

Index	Sub-index	Parameter description
0x301C	0x00	DI Status Word
	DI Status Word data format	
	Bit0	DI1
	Bit1	DI2
	Bit2	DI3
0x301C: 16: DI Status Word (R)	Bit3	DI4
	Bit4	DI5
	Bit5	HDI
	Bit6~Bit15	Reserved

VII. Fault Word

Index	Sub-index	Parameter description
0x603F	0x16	Fault Word
	Fault Word data form	nat
	0	None
	1	Inverter unit protection
	2	Accelerating overcurrent
	3	Decelerating overcurrent
	4	Constant speed overcurrent
	5	Accelerating overvoltage
	6	Decelerating overvoltage
	7	Constant speed overvoltage
	8	Control power supply fault
	9	Undervoltage fault
	10	VFD overload
	11	Motor overload
	12	Input phase loss
	13	Output phase loss
0 (005 5 10)4(1(50)	14	Radiator overheating
0x603F: Fault Word (RO)	15	External fault
	16	Communication fault
	17	Contactor fault
	18	Current detection fault
	19	Motor tuning fault
	20	Encoding disk fault
	21	Data overflow
	22	VFD hardware fault
	23	Motor ground short circuit fault
	24	Reserved
	25	Reserved
	26	Operation time reached
	31	Software overcurrent
	40	Fast current limit timeout fault
	41	Motor switching during operation

Chapter 7 Fault Diagnosis and Troubleshoot-ing

7.1	Fault table	1	2	ļ
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7.1 Fault table

During product operation, the following types of faults may occur. Please refer to the fault diagnosis and troubleshooting methods described below.

Fault code	Fault name	Fault diagnosis	Troubleshooting
ERR00	Reserved	-	-
ERR01	Reserved	-	-
		Acceleration time set too short	Extend the acceleration time.
	A L t	Starting a rotating motor	Stop the motor from rotating before restarting.
ERR02	Accelerating	VFD capacity too small	Select a VFD with appropriate capacity.
	overcurrent	Inappropriate V/F curve settings or excessively	
		high torque boost value	Reset the V/F curve or torque boost value.
		Deceleration time set too short	Extend the deceleration time.
ERR03	Decelerating	Potential energy load or excessive load inertia	Select a suitable braking resistor.
	overcurrent	VFD capacity too small	Select a VFD with appropriate capacity.
		Motor burnout or insulation aging	Check the motor's insulation resistance.
		3 3	Measure the current flowing through the motor.
		Excessive load (brake not opened)	Verify if the motor brake is open during operation.
		Long wiring length of the motor cable	Increase the VFD capacity.
		Using a special motor or a motor exceeding the	Confirm if the motor model, power, and VFD are
ERR04	Constant speed	maximum applicable capacity	compatible.
2.11.0	overcurrent	плажтат аррисавте сарастсу	Check if the motor parameters match the VFD
			settings.
		Incorrect parameter settings	Review the motor protection parameter configura-
			tions.
		Hardware fault	Inspect the IGBT for malfunctions.
	Accelerating	Power supply voltage fluctuation exceeds limits	Check the grid voltage.
ERR05	overvoltage	Starting a rotating motor	Stop the motor from rotating before restarting.
	oververtage	Short deceleration time with excessive regenera-	Stop the motor from rotating before restarting.
	Decelerating overvoltage	tive energy from the motor to the VFD	Increase deceleration time (P00.14).
ERR06		ave energy from the motor to the VID	Reduce the load, increase VFD capacity, or select a
LITTOO		Potential energy load or excessive load inertia	suitable braking unit and braking resistor.
		Power supply voltage fluctuation limit exceeded	Check the grid voltage.
		Potential energy load or excessive load inertia	Increase the braking resistor power.
		Total tild energy load of excessive load mertid	Install a DC reactor.
			In the same power system, switching phase-ad-
			vancing capacitors or thyristor converters may
		Jourge voltage mixed in the input power supply	cause a brief, abnormal, sharp rise (surge) in input
			voltage.
ERR07	Constant speed		Check the voltage.
LINU/	overvoltage	Excessively high power supply voltage	Reduce it to within the VFD's power supply specifi-
		Excessively flight power supply voltage	
			cation range.
		Incorrect wiring of the braking resistor or braking	Verify if the wiring to the braking resistor or unit is
		resistor unit	incorrect.
			Reconnect correctly.
		Incorrect parameter settings	Motor misalignment or vibration.
EDD63	Buffer resistor	Multiple starts/stops of the rectifier unit within 1	Confirm power supply stability.
ERR08	overload fault	second	Check the rectifier unit's start DI connection.

		Phase loss in input power supply	Check if the main circuit power supply wiring is disconnected or incorrectly connected.	
			Ensure correct wiring.	
		Loose terminal of the input power supply	Confirm if the terminal is loose or the fuse is blown.	
		Rectifier unit start failed	Confirm if the rectifier unit has started.	
		Power outage	Improve the power supply.	
ERR09	Undervoltage fault	Relay or contactor malfunction in the VFD's	Toggle the power supply to check for faults.	
		internal surge prevention circuit	If faults persist, replace the circuit board or VFD.	
			Check the voltage.	
			Adjust the voltage to within the VFD's power supply	
		Voltage supply failure	specification range.	
			If the main circuit power supply is normal, check for	
			faults in the main circuit MC.	
		Excessive load	Select a VFD matching the motor capacity.	
		Acceleration time set too short	Extend the acceleration time.	
ERR10	VFD overload	Starting a rotating motor	Stop the motor from rotating before restarting.	
		Inappropriate V/F curve settings or excessively	Reset the V/F curve or torque boost value.	
		high torque boost value		
			Measure the current flowing through the motor.	
		Excessive load (brake not opened)	Verify if the motor brake is open during operation.	
		Short acceleration/deceleration time or cycle time	Increase the deceleration time or use a larger VFD.	
ERR11	Motor overload		Check if motor parameters match VFD settings.	
		Incorrect parameter settings	Review motor protection parameters.	
		Using a special motor or a motor exceeding the	Confirm if the motor model, power, and VFD are	
		maximum applicable capacity	compatible.	
			Check if the main circuit power supply wiring is	
		Phase loss in input power supply	disconnected or incorrectly connected.	
			Refer to wiring instructions for the correct connec-	
			tion.	
ERR12		Loose terminal of the input power supply	Confirm if the terminal is loose.	
			Confirm the power supply voltage.	
		Imbalanced phase-to-phase voltage	Take measures to stabilize the power supply.	
		Excessive voltage fluctuation in the input power	Confirm the power supply voltage.	
		supply	Take measures to stabilize the power supply.	
		Зарріу	Confirm if the output cable wiring is disconnected	
50040	Output phase loss	Output cable disconnected	or incorrectly connected.	
		Motor coil disconnected	Measure the motor's line-to-line resistance.	
		Loose output terminal	Confirm if the terminal is loose.	
ERR13		Single-phase motor connected	This VFD cannot be used with single-phase motors	
		Motor capacity below 5% of the VFD's rated	Adjust the VFD capacity or motor capacity.	
		output current.	,	
		Open-circuit damage to the VFD's output		Replace the circuit board or VFD.
		transistor.		

			Confirm the ambient temperature.
			Improve ventilation in the control cabinet.
		Ambient temperature too high	Install cooling devices (e.g., cooling fans or air
	Carrie as a sat		conditioners) to reduce temperature.
ERR14	Equipment		Remove nearby heat sources.
	overheating		Measure the output current.
		Heavy load	Reduce the load.
			Lower the carrier frequency.
		Built-in cooling fan of the VFD stops	Replace the cooling fan.
ERR15	External fault	External DI fault input	Check the external DI fault input.
ERR16	Communication abnormality	Modbus communication timeout	Check the Modbus communication.
ERR18	Current detection fault	Excessive zero drift detection	Check the current sampling circuit.
		Motor detection timeout	Inspect motor wiring.
		Significant capacity difference between the	0.1
EDD40		motor and the VFD	Select a VFD with appropriate capacity.
ERR19	Motor tuning fault	Motor detected under load	Dismantle the load and re-detect.
			Set motor parameters again according to the motor
		Incorrect motor parameter settings	nameplate.
EDD04	Parameter Read/	Electromagnetic interference during storage	Re-enter and store parameters.
ERR21	Write abnormality	EPROM damage	Contact the manufacturer's technical support.
		Motor burnout or insulation aging	Confirm the motor's insulation resistance.
	Motor ground short circuit fault	Cable damage causing contact or short circuit	Inspect the motor's power cable.
			If the cable length exceeds 100m, lower the carrier
ERR23		Large distributed capacitance between the cable	frequency.
		and the grounding terminal	Take measures to reduce distributed capacitance.
		Hardware fault	Replace the circuit board or VFD.
	Software	Current exceeds the set software overcurrent	
ERR24	overcurrent	threshold.	Check the software overcurrent threshold settings.
	Operation time		
ERR26	reached	Cumulative operation time reaches the set limit.	
ERR27	User-Defined fault 1	User-Defined fault 1 DI input is active.	
ERR28	User-Defined fault 2	User-Defined fault 2 DI input is active.	
	Power-on time		
ERR29	reached	Cumulative power-on time reaches the set limit.	
55500	Load shedding	Asynchronous motor operation with output	
ERR30		current less than 5% of the motor's rated current	Check the motor's operating status.
		Incorrect parameter settings	Adjust parameters.
	PID feedback loss	Incorrect PID feedback wiring	Check for wiring errors in PID control.
ERR31	during operation		Check the sensor status on the controlled machine
		Faulty feedback sensor	side.
ERR40	Fast current limit	Single-tube continuous wave-by-wave current	
	timeout fault	limiting time exceeds 500ms.	Contact the manufacturer's technical support.
	Excessive speed deviation	Incorrect parameter settings	Increase the speed deviation parameters P03.32 and P03.33.
ERR42		Excessive potential energy load or load inertia	Extend acceleration/deceleration time and select a motor/VFD matching the load.
	Initial position error	Unable to identify the initial magnetic pole	Inspect the motor.

Chapter 8 Host Computer Software

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8.1 Software installation

8.1.1 Introduction

The VFD host computer software HDv-Studio supports full-series VFDs from HCFA, such as E600, E610, and E630. It supports functions such as parameter commissioning and waveform acquisition for devices.

8.1.2 Installation

I. Software acquisition

Initial access: HCF official website

Download address for VFD host computer software: https://www.hcfa.cn/service/

II. Installation requirements

Hardware environment: Windows PC

Operating system: Windows 10 or later

8.2 Quick start

8.2.1 Function overview

The entire interface is divided into a function area, a workspace, and a monitoring area.

Function area: Manages global operations, including the creation of new projects.

Workspace: Selects the device and functional points to debug.

Monitoring area: Expands the functional points to enable parameter read/write and oscilloscope acquisition.

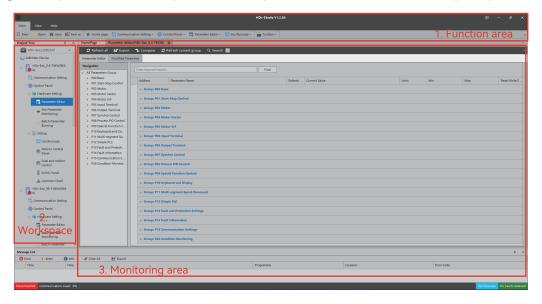


Figure 44. Overall interface

8.2.2 Getting started

I. Linking device

Communication with the device is achieved through projects. There are two ways to create or open a project.

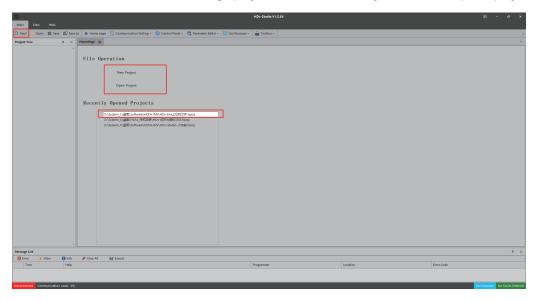


Figure 45. Software startup interface

II. Creating a new project

Click the "New Project" button in the function area or homepage of Figure 45. After successfully creating the project, a new device will appear in the "Project Tree" on the left. Select the corresponding device model, as shown in Figure 46.

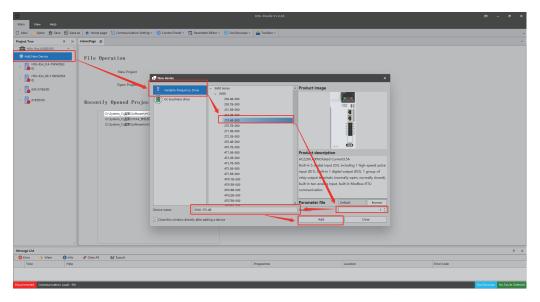


Figure 46. Adding a device

III. Opening an existing project

Users can open historical projects in the following three ways:

Click the "Open Project" button in the function area of Figure 45, then select and open the historical project.

Click the "Open Project" button on the homepage of Figure 45, then select and open the historical project.

Select the historical project to open from the list box of recently opened projects on the homepage.

After opening the project, the interface appears as shown in Figure 47.

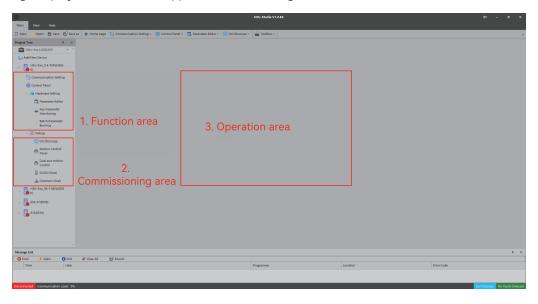


Figure 47. Project interface

After opening the project, select "Communication Settings". In the Communication Settings interface, configure parameters related to communication. Click "Connect" to confirm a successful connection, indicated by "Device Connected" on the right. Currently, VFD-host computer communication only supports Modbus and CAN protocols.

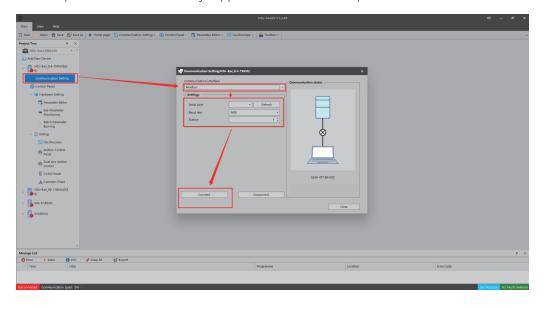


Figure 48. Communication settings interface

8.3 Functional description

8.3.1 Hardware configuration

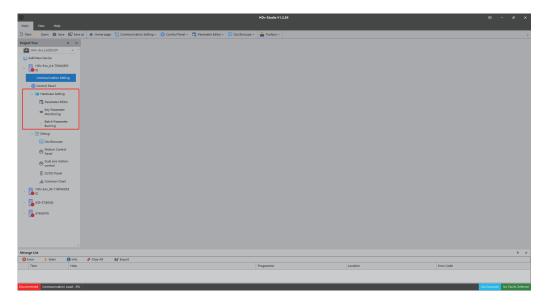


Figure 49. Hardware configuration

8.3.2 Parameter editor

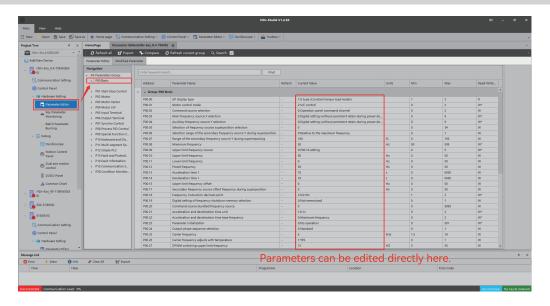


Figure 50. Parameter editor

As shown in Figure 50, parameters can be modified or viewed directly in this interface.

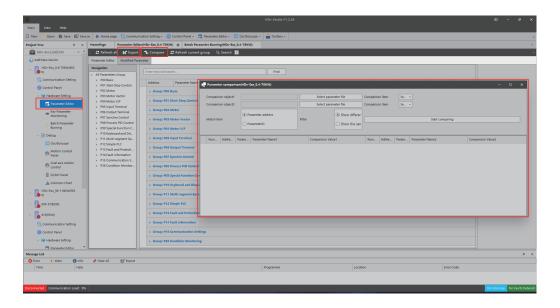


Figure 51. Parameter export and comparison

Parameter export and comparison:

- (1) Parameter export: Refresh all parameters first, then export.
- (2) Parameter comparison: Select the exported parameter file as the comparison object and click "Start Comparison."

8.3.3 Key parameter detection

The host computer supports real-time detection of key parameters. Select up to 10 parameters in "Parameter Selection," and the selected parameters will be detected in real time in "Parameter Detection."

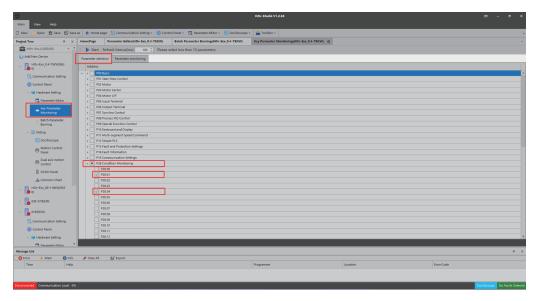


Figure 52. Key parameter detection

Batch parameter burning

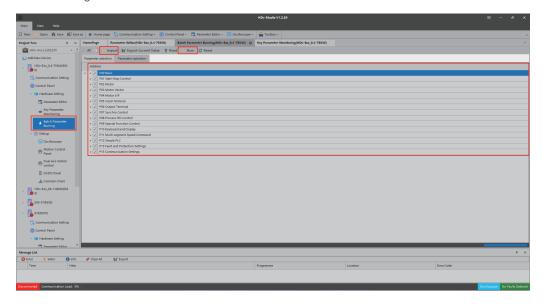


Figure 53. Batch parameter burning

Parameter copying: 1. Select the desired parameter group \rightarrow 2. Click "Read" \rightarrow 3. Select "Export Current Values."

Parameter burning: 1. Click "Import" \rightarrow 2. Select the exported parameter file \rightarrow 3. Click "Burn." The burning is complete when the progress bar in the lower right corner is full.

8.4 Debugging

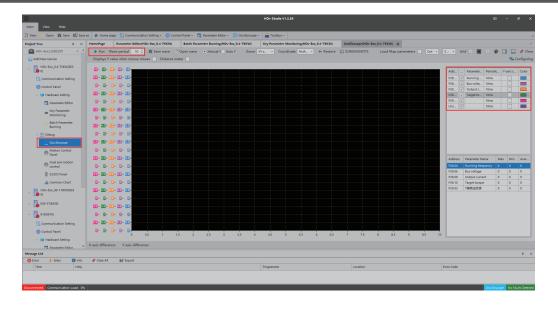


Figure 54. Oscilloscope interface

Oscilloscope: Select parameters on the right, click "Clear" or "Configure" in the upper right corner, and finally click "Start" to plot the waveform.

The oscilloscope supports various functions, including saving and opening waveforms, manual/automatic Y-axis switching, and single/multi-coordinate switching.

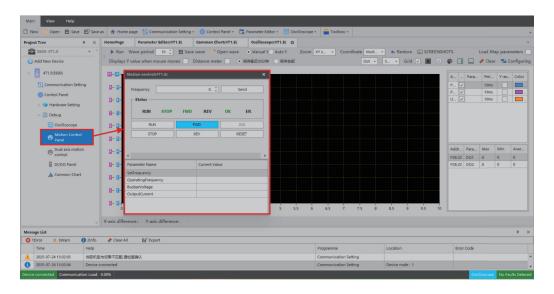


Figure 55. Motion control panel

Motion control panel: Sends frequency, start/stop, and forward/reverse commands to the VFD, and supports simple debugging of the VFD.

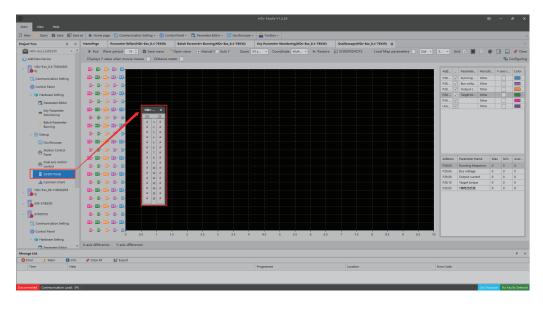


Figure 56. DI/DO panel

DI/DO panel: Monitors the real-time status of the VFD's DI/DO signals.

Appendix 1 HDv-KC1-AS0-000

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Preface

Thank you for purchasing and using the KC1-AS0 smart operation keypad independently developed and manufactured by Hechuan Technology Co., Ltd.

The KC1-AS0 smart operation keypad is a new-generation general-purpose variable frequency speed regulation component from HCFA, supporting VFD series such as the E600 economical model, E610 simple model, and E630. Equipped with an LED display, the KC1-AS0 supports optional RS485, CAN, and Bluetooth wired or wireless communication methods, as well as functions including parameter setting, variable frequency control, and status monitoring.

Target reader

For wiring, installation, diagnosis, post-maintenance, and other tasks related to the HCFA KC1-AS0 smart operation key-pad, users can refer to this manual. However, users are required to have a basic foundation in electrical and automation knowledge.

This manual contains essential information for using the HCFA KC1-AS0 smart operation keypad. Please read the manual carefully before use and ensure safe and correct operation under proper safety precautions.

For customers using the product for the first time who have questions about its functions, please consult the company's technical support team for assistance.

Version history				
Date	Version number	Changes		
2025-03	V1.0	First version release		

Safety guidelines

Safety icons

During product use, these safety rules must be strictly followed as specified in this manual.

During product use, these safety rules must be strictly followed as specified in this manual.				
Improper operation may cause minor to moderate injuries, or major injuries/death in severe cases, and potential property damage.				
Improper operation may cause minor to moderate injuries or equipment damage.				
Improper operation may cause minor injuries or equipment damage.				
Improper operation may damage the environment/equipment or cause data loss.				

Note: Key points/explanations to aid better operation and product understanding.

DANGER /!\

Before installation

- · Water ingress or stains on the machine during unpacking indicate prior dampness or submersion. Do not install.
- · Damaged or missing components found during unpacking. Do not install.
- A mismatch between packaging labels and actual contents. Do not install.
- · Carry the machine gently during transportation; otherwise, damage may occur.
- · Avoid touching internal components with bare hands; otherwise, electrostatic damage may occur.

During installation

- Install on flame-retardant materials (e.g., metal) and keep away from flammable objects; otherwise, fire hazards may occur.
- Tighten mounting bolts as specified; otherwise, machine drop may occur.
- · Do not arbitrarily adjust fixed bolts, especially those marked in red.

During wiring

- It is mandatory to follow this manual's guidelines and perform the work with qualified electrical engineers; failure to do so may lead to hazards.
- The KC1-AS0 smart operation keypad connects to VFD series such as E600, E610, and E630 via a standard Ethernet cable.
- If using the KC1-AS0 smart operation keypad with HCFA drive products other than those listed above, consult the manufacturer in advance. Otherwise, it may cause malfunction or damage to the KC1-AS0 smart operation keypad or the drive product.
- Do not use crossover Ethernet cables or damaged Ethernet cables, as this may cause malfunction or damage to the KC1-AS0 smart operation keypad.
- Avoid routing power cables, Ethernet cables, or USB cables through the same conduit or bundling them together. During wiring, power supply cables should be separated from signal cables by at least 30 cm.
- In the following environments, take appropriate shielding measures to avoid equipment abnormalities:
- ① Areas with strong electric or magnetic fields;
- 2 Areas with potential radioactive radiation.

CAUTION /

Maintenance and care precautions

- · Do not disassemble or modify the equipment; otherwise, malfunctions, misoperations, or fires may occur.
- · Do not use gasoline, alcohol, thinner, acidic, or alkaline detergents to avoid discoloration or corrosion of the casing.
- · Avoid scratching the LED display screen with sharp objects to prevent affecting display performance.
- · For equipment maintenance, please consult Zhejiang Hechuan Technology Co., Ltd.

CAUTION /

Daily/Regular inspection

Daily inspection

- Check ambient temperature, humidity, dust, foreign objects, etc.;
- · Check for abnormal noise;
- Check if the USB dust plug and battery cover are installed properly;
- · Check if the keys function properly;
- · Check if the LED display is functioning properly.

Regular inspection

- Annually inspect fastening components for looseness;
- · Annually inspect for signs of overheating.

CAUTION /

Disposal precautions

• When disposing of the product, handle it as industrial waste. For battery disposal, please dispose of it separately in accordance with the laws and regulations designated by each region.

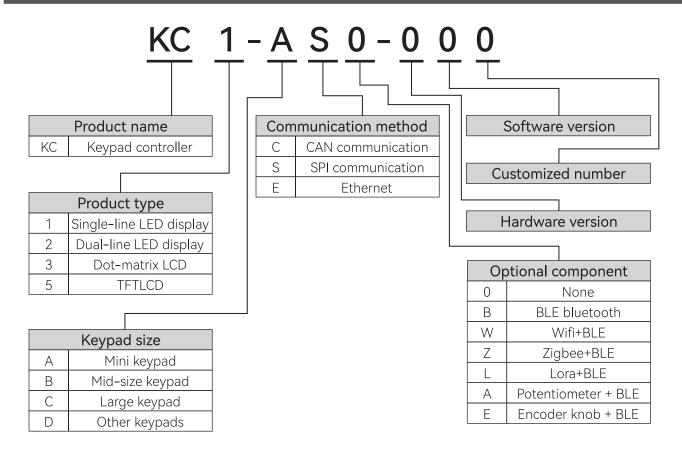
CAUTION /!\

• Since the equipment is precision equipment, avoid subjecting it to impacts exceeding the general specification values specified in this manual during transportation. Otherwise, it may likely become a cause of equipment malfunction. After transportation, please confirm the operation of the equipment.

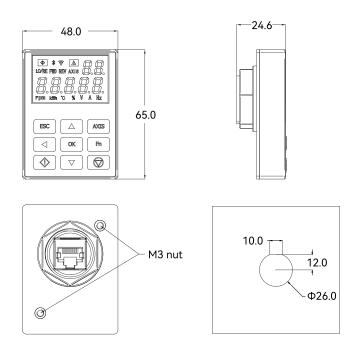
Chapter 1 Product Overview

The KC1-AS0 smart operation keypad is a commissioning component of HCFA general-purpose variable frequency speed regulation system, supporting VFD series such as E600, E610, and E630. Equipped with an LED display, the KC1-AS0 supports functions including parameter setting, variable frequency control, and status monitoring.

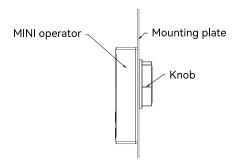
1.1 Model name denotation



1.2 Dimensional specifications



1.3 Installation example



The operator is secured to the mounting plate via the knob.

1.4 KC1-AS0 composition

Table 26. Keypad components

Name	Description
Display	
Key	
USB port	Reserved
	Used to connect the KC1-AS0 to the VFD
Fastening screw	
Knob	Used to secure the KC1-AS0 to the base
Battery cover	
Nameplate	Used to record product model and serial number

1.5 Interface display introduction

KC1-AS0 uses an LED digital tube display.

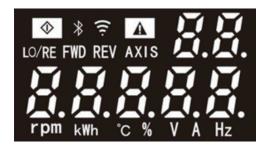


Figure 57. Display interface

Table 27. Display content

No.	Display content	Description
1	Status display	Display current VFD status information
2	Unit	Display current parameter unit being acquired
3	Content	Display current parameter name or value

1.6 Key description

Table 28. Key description

Key	Name	Description
AXIS	AXIS	Axis number selection (reserved)
FN	FN	Multi-function Key, used to implement function of P10.02.
	Up	Adjust the selected parameter value or group number upward; scroll up to select functions in special function interfaces.
	Dn	Adjust the selected parameter value or group number downward; scroll down to select functions in special function interfaces.
	Left	Move the cursor leftward
OK	OK	Confirm parameter group/special function selection or parameter value settings.
ESC	ESC	Short press to enter parameter settings mode or exit.
	Run	Control VFD start-up during panel operation.
	Stop	Controls the VFD to stop during operation; the stop mode follows the settings defined in parameter P01.05.

1.7 General specifications

No.	Category	Operation	Storage	Transportation	
1	Operating	-20~+55℃	-40~+70°C	-40~+70°C	
ı	temperature range	-20~+55 C	-40~+70 C	-40~+70 C	
2	Altitude	<4000m	-	-	
3	Relative humidity	95% (non-condensing)			
4	Pollution degree	3C3 (IEC 60721-3-3, IEC 60721-3-2, IEC 60721 -1-1-3-1)			
5	Vibration	61800-5-1 ed 2 EN 60082-2-6 test Fc(1g)	-	2M3 class (per EN 60082-2-6)	
6	Shock	3M4 class (per EN 60062-2-27)	-	2M2 class (per EN 60062-2-27)	
7	Free fall	IEC 60068-2-32 (drop height 1m)	-	-	
8	Protection rating	Connected to drive equipment: IP54 (with IP54 accessories selected); Standalone: IP20			
9	Electromagnetic		IEC /1000 2		
9	compatibility	IEC 61800-3			
10	Material	Disposal: All materials of the unit are recycla	ble to protect the environme	nt and conserve resources. For more	
10	imaterial	detailed recycling instructions and handl	ing methods, comply with int	ernational and local regulations.	

Chapter 2 Installation and Wiring

The KC1-AS0 smart operation keypad is applicable to multiple VFD series. This manual uses the installation of the E610 as an example to illustrate the installation and wiring methods of the KC1-AS0 smart operation keypad.

2.1 Connection of KC1-AS0 to equipment

The KC1-AS0 connects to the VFD's CN8 port via its rear RJ45 port. The connecting Ethernet cable must comply with the EIA/TIA-568A or 568B standard, and the maximum total communication length must not exceed 130 meters.



Figure 58. Keypad connection diagram

Chapter 3 Functions and Applications

3.1 Overview

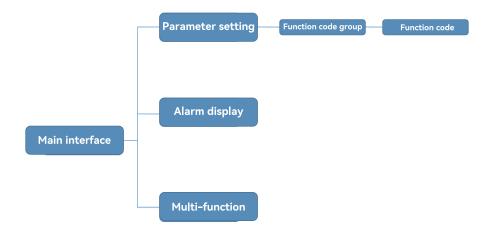


Figure 59. Functional overview

3.1.1 Main interface

The main interface is used to display monitored parameter values and the status of VFD. Its display functions are as follows:

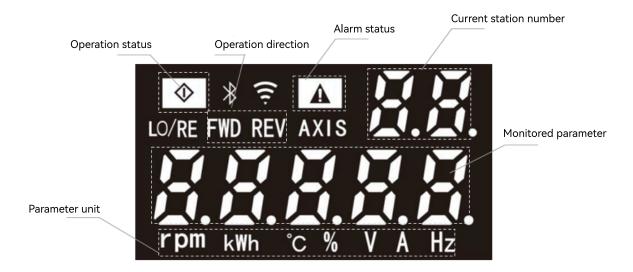


Figure 60. Main interface display functions

- * Operation status: Displays the current operation status of the VFD. A steady on indicates the VFD is running; a steady off indicates stopping.
- * Operation direction: Displays the current operation direction of the VFD. A steady "FWD" indicates forward operation; a steady "REV" indicates reverse operation.
- * Alarm status: A steady on indicates an active alarm message.
- * Monitored parameter: Real-time displays the value of the first currently monitored parameter.
- * Parameter unit: Displays the unit corresponding to the first currently monitored parameter.

The main interface can monitor the VFD's operation status (e.g., start/stop, forward/reverse rotation) and operation or stopping parameters (e.g., operating frequency, set frequency, radiator temperature).

Upon startup, the interface automatically enters the main screen. The monitored parameter under stopped conditions flashes; under running conditions, the monitored parameter stays on.

3.1.2 Equipment start/stop control

Table 29. Start control functions

Name	Function	Key	Description
	Start control		Effective when the control mode is in panel control mode: Pressing the key starts
DUN			the VFD.
RUN			Ineffective when the control mode is in other modes: Pressing the key has no
			effect.
STOP	Stop control		Effective when the control mode is in panel control mode: Pressing the key stops
			the VFD.
			Ineffective when the control mode is in other modes: Pressing the key has no
			effect.

Up	Speed increment	Effective when the frequency source is set via communication: Pressing the key increases the frequency. Ineffective when the frequency source is not set via communication: Pressing the key has no effect.
Down	Speed decrement	Effective when the frequency source is set via digital input: Pressing the key increases the frequency. Ineffective when the frequency source is not set via digital input: Pressing the key has no effect.

3.2 Parameter settings

Table 30. Parameter setting functions

Name	Function	Key	Description
ESC	ESC Exit	ESC	Short-press the key in the main interface to enter the parameter group interface;
			Short-press the key in other interfaces to return to the previous level.
			In the parameter group interface: Short press to increase the parameter group
Up	Value increment		number; long press to continuously increase the parameter group.
ОР			In the parameter setting interface: Short press to increase the flashing cursor
			value; long press to continuously increase the flashing cursor value.
	Down Value decrement		In the parameter group interface: Short press to decrease the parameter group
Down			number; long press to continuously decrease the parameter group.
DOWII			In the parameter setting interface: Short press to decrease the flashing cursor
			value; long press to continuously decrease the flashing cursor value.
Left	Cursor left shift		In the parameter setting interface, shift the flashing cursor value to the left.

To view or modify parameters:

- 1. Short-press the "ESC" key to enter parameter group selection.
- 2. Press the "Up" or "Down" key to select the target parameter group.
- 3. Press the "OK" key to enter the selected parameter group.

To modify a parameter ID:

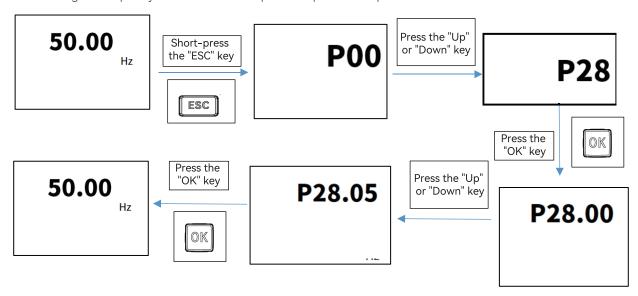
- 1. Use the "Up" or "Down" keys to adjust the parameter ID.
- 2. Use the "Left" key to move the editing position of the parameter ID; the corresponding digit flashes when the cursor is aligned.

In the parameter ID editing interface:

Press the "OK" key to enter the parameter value display/modification page, where "H." precedes the value to indicate hexadecimal format.

I. Parameter viewing

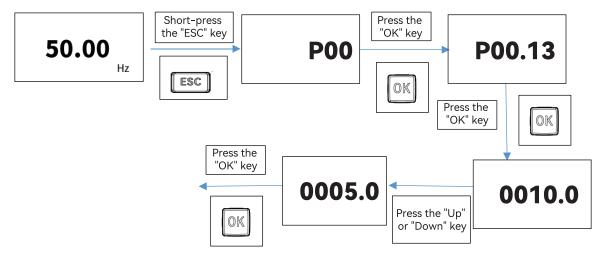
Take "Viewing set frequency P28.05" as an example. The operation steps are as follows:



In the parameter interface, the parameter ID is displayed at the top, and the parameter value, along with its corresponding unit, is shown at the bottom. After viewing, long-press or short-press the "ESC" key to return to the previous level until exiting to the main interface.

II. Parameter modification

Take "Modifying acceleration time 1 P00.13" as an example. The operation steps are as follows:



After modifying the parameter, press the "OK" key to confirm, ensuring the parameter value is written to the VFD and saved.

If the "OK" key is not pressed to confirm after modification and the "ESC" key is directly short-pressed to exit, the parameter value cannot be written to the VFD. Rechecking will display the previously saved value.

3.3 FN multi-function

The "FN" multi-function key executes functions based on the settings of parameter P10.2 of the VFD.

P10.02 parameter value	Key status	FN operation description
MF.K invalid	No operation	N/A
Switching between operator		
panel commands and remote	No operation	Function disabled
commands		
		When the VFD is running forward, short-pressing the "FN" key switches the VFD to
Switching between forward and	Short-press	reverse operation.
reverse rotation		When the VFD is running in reverse, short-pressing the "FN" key switches the VFD to
		forward operation.
Farward in a	Short-press/	Pressing the "FN" key starts the VFD in forward jog operation; releasing the "FN" key
Forward jog	Long-press	stops the jog operation.
Daversaine	Short-press/	Pressing the "FN" key starts the VFD in reverse jog operation; releasing the "FN" key stops
Reverse jog	Long-press	the jog operation.
Exit parameter interface	Short-press	In the parameter setting interface, press the "FN" key to exit the previous level.

3.4 Alarm display and reset



Figure 61. Alarm display

When an alarm occurs, the interface automatically jumps to the alarm display interface, the alarm status indicator lights up, and the alarm code is displayed.

Short-press the "STOP" key to clear the alarm message.

Name	Function	Key	Description
STOP	Stop control		When the control mode is in panel control mode, short-press the key in the alarm interface to clear the alarm.

Appendix 2 HDv-KC1-ACE-000

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Preface

Thank you for purchasing and using the KC1-ACE smart operation keypad independently developed and manufactured by Hechuan Technology Co., Ltd.

The KC1-ACE smart operation keypad is a new-generation general-purpose variable frequency speed regulation component from HCFA, supporting VFD series such as the E600 economical model, E610 simple model, and E630. Equipped with an LED display, the KC1-ACE supports optional RS485, CAN, and Bluetooth wired or wireless communication methods, as well as functions including parameter setting, variable frequency control, parameter copying, and status monitoring.

Target reader

For wiring, installation, diagnosis, post-maintenance, and other tasks related to the HCFA KC1-ACE smart operation key-pad, users can refer to this manual. However, users are required to have a basic foundation in electrical and automation knowledge.

This manual contains essential information for using the HCFA KC1-ACE smart operation keypad. Please read the manual carefully before use and ensure safe and correct operation under proper safety precautions.

For customers using the product for the first time who have questions about its functions, please consult the company's technical support team for assistance.

Version historyDateVersion numberChanges2025-03V1.0First version release

Safety guidelines

Safety icons

During product use, these safety rules must be strictly followed as specified in this manual.

DANGER <u></u>	Improper operation may cause minor to moderate injuries, or major injuries/death in severe cases, and potential property damage.
WARNING /	Improper operation may cause minor to moderate injuries or equipment damage.
CAUTION <u></u>	Improper operation may cause minor injuries or equipment damage.
NOTE	Improper operation may damage the environment/equipment or cause data loss.

Note: Key points/explanations to aid better operation and product understanding.

DANGER /!\

Before installation

- · Water ingress or stains on the machine during unpacking indicate prior dampness or submersion. Do not install.
- · Damaged or missing components found during unpacking. Do not install.
- A mismatch between packaging labels and actual contents. Do not install.
- · Carry the machine gently during transportation; otherwise, damage may occur.
- · Avoid touching internal components with bare hands; otherwise, electrostatic damage may occur.

During installation

- Install on flame-retardant materials (e.g., metal) and keep away from flammable objects; otherwise, fire hazards may occur.
- Tighten mounting bolts as specified; otherwise, machine drop may occur.
- · Do not arbitrarily adjust fixed bolts, especially those marked in red.

During wiring

- It is mandatory to follow this manual's guidelines and perform the work with qualified electrical engineers; failure to do so may lead to hazards.
- The KC1-ACE smart operation keypad connects to VFD series such as E600, E610, and E630 via a standard Ethernet cable.
- If using the KC1-ACE smart operation keypad with HCFA drive products other than those listed above, consult the manufacturer in advance. Otherwise, it may cause malfunction or damage to the KC1-ACE smart operation keypad or the drive product.
- Do not use crossover Ethernet cables or damaged Ethernet cables, as this may cause malfunction or damage to the KC1-ACE smart operation keypad.
- Avoid routing power cables, Ethernet cables, or USB cables through the same conduit or bundling them together. During wiring, power supply cables should be separated from signal cables by at least 30 cm.
- In the following environments, take appropriate shielding measures to avoid equipment abnormalities:
- ① Areas with strong electric or magnetic fields;
- 2 Areas with potential radioactive radiation.

CAUTION /

Maintenance and care precautions

- · Do not disassemble or modify the equipment; otherwise, malfunctions, misoperations, or fires may occur.
- · Do not use gasoline, alcohol, thinner, acidic, or alkaline detergents to avoid discoloration or corrosion of the casing.
- · Avoid scratching the LED display screen with sharp objects to prevent affecting display performance.
- · For equipment maintenance, please consult Zhejiang Hechuan Technology Co., Ltd.

CAUTION /

Daily/Regular inspection

Daily inspection

- Check ambient temperature, humidity, dust, foreign objects, etc.;
- · Check for abnormal noise;
- Check if the USB dust plug and battery cover are installed properly;
- · Check if the keys function properly;
- · Check if the LED display is functioning properly.

Regular inspection

- Annually inspect fastening components for looseness;
- · Annually inspect for signs of overheating.

CAUTION /

Disposal precautions

• When disposing of the product, handle it as industrial waste. For battery disposal, please dispose of it separately in accordance with the laws and regulations designated by each region.

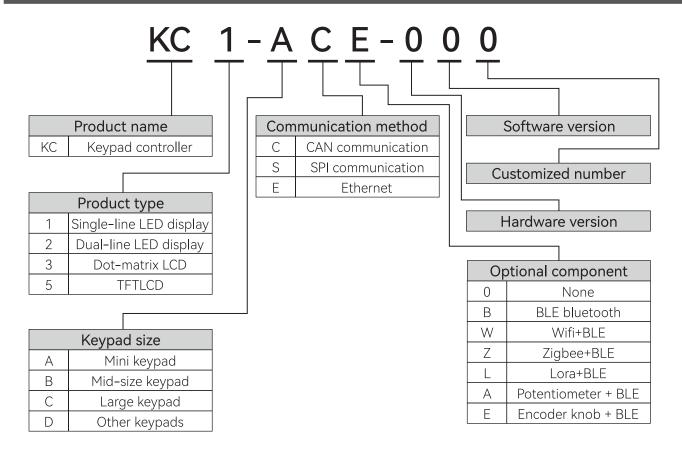
CAUTION /!\

• Since the equipment is precision equipment, avoid subjecting it to impacts exceeding the general specification values specified in this manual during transportation. Otherwise, it may likely become a cause of equipment malfunction. After transportation, please confirm the operation of the equipment.

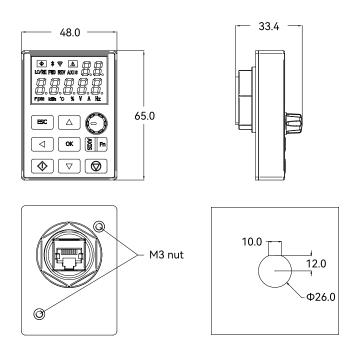
Chapter 1 Product Overview

The KC1-ACE smart operation keypad is a commissioning component of HCFA general-purpose variable frequency speed regulation system, supporting VFD series such as E600, E610, and E630. Equipped with an LED display, the KC1-ACE supports functions including parameter setting, variable frequency control, and status monitoring.

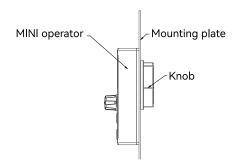
1.1 Model name denotation



1.2 Dimensional specifications



1.3 Installation example



The operator is secured to the mounting plate via the knob.

1.4 KC1-ACE composition

Table 31. Keypad components

Name	Description
Display	
Key	
USB port	Used to connect the KC1-ACE to a PC for firmware upgrades of the KC1-ACE
RJ45	Used to connect the KC1-ACE to the VFD
Fastening screw	
Snap fit	Used to secure the KC1-ACE to the base
Battery cover	
Nameplate	Used to record product model and serial number

1.5 Interface display introduction

KC1-ACE uses an LED digital tube display.

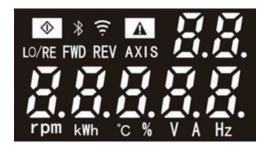


Figure 62. Display interface

Table 32. Display content

No.	Display content	Description
1	Status display	Display current VFD status information
2	Unit	Display current parameter unit being acquired
3	Content	Display current parameter name or value
4	Content	Display current parameter value

1.6 Key description

Table 33. Key description

Key	Name	Description
	knob	Adjust the preset frequency value on the main interface; switch the parameter group number up/down on the parameter group interface.
AXIS	AXIS	Axis number selection (reserved)
FN	FN	Multi-function Key, used to implement function of P10.02.
	Up	Adjust the selected parameter value or group number upward; scroll up to select functions in special function interfaces.
	Dn	Adjust the selected parameter value or group number downward; scroll down to select functions in special function interfaces.
	Left	Move the cursor leftward
OK	OK	Confirm parameter group/special function selection or parameter value settings.
ESC	ESC	Short press to enter parameter settings mode or exit.
	Run	Control VFD start-up during panel operation.
	Stop	Controls the VFD to stop during operation; the stop mode follows the settings defined in parameter P01.05.

1.7 General specifications

No.	Category	Operation	Storage	Transportation		
1	Operating	-20~+55℃	-40~+70°C	-40~+70°C		
I	temperature range	-20~+55 C	-40~+70 C	-40~+70 C		
2	Altitude	<4000m	-	-		
3	Relative humidity	9	5% (non-condensing)			
4	Pollution degree	3C3 (IEC 60721-3-3, IEC 60721-3-2, IEC 60721 -1-1-3-1)				
5	Vibration	61800-5-1 ed 2 EN 60082-2-6 test Fc(1g)	-	2M3 class (per EN 60082-2-6)		
6	Shock	3M4 class (per EN 60062-2-27)	-	2M2 class (per EN 60062-2-27)		
7	Free fall	IEC 60068-2-32 (drop height 1m)	-	-		
8	Protection rating	Connected to drive equipment: IP54 (with IP54 accessories selected); Standalone: IP20				
9	Electromagnetic	JEC (4000-2				
9	compatibility	IEC 61800-3				
10	Material	Disposal: All materials of the unit are recycla	ble to protect the environmen	nt and conserve resources. For more		
10	i*iateriai	detailed recycling instructions and handling methods, comply with international and local regulations.				

Chapter 2 Installation and Wiring

The KC1-ACE smart operation keypad is applicable to multiple VFD series. This manual uses the installation of the E610 as an example to illustrate the installation and wiring methods of the KC1-ACE smart operation keypad.

2.1 Connection of KC1-ACE to equipment

The KC1-ACE connects to the VFD's CN8 port via its rear RJ45 port. The connecting Ethernet cable must comply with the EIA/TIA-568A or 568B standard, with a termination resistor inserted into the VFD at the communication end. The maximum total connection length must not exceed 150 meters.



Figure 63. Keypad connection diagram

Chapter 3 Functions and Applications

3.1 Overview

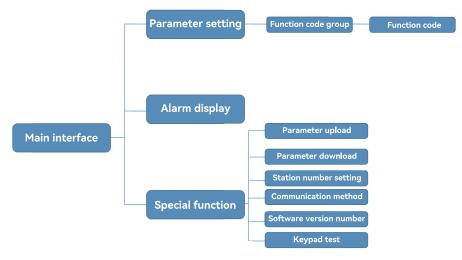


Figure 64. Functional overview

3.1.1 Main interface

The main interface is used to display monitored parameter values and the status of VFD. Its display functions are as follows:

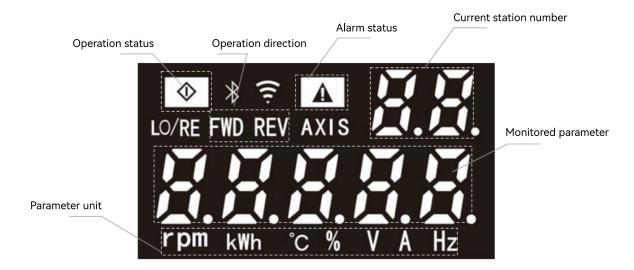


Figure 65. Main interface display functions

- * Operation status: Displays the current operation status of the VFD. A steady on indicates the VFD is running; a steady off indicates stopping.
- * Operation direction: Displays the current operation direction of the VFD. A steady "FWD" indicates forward operation; a steady "REV" indicates reverse operation.
- * Alarm status: A steady on indicates an active alarm message.
- * Monitored parameter: Real-time displays the value of the first currently monitored parameter.
- * Parameter unit: Displays the unit corresponding to the first currently monitored parameter.

The main interface can monitor the VFD's operation status (e.g., start/stop, forward/reverse rotation) and operation or stopping parameters (e.g., operating frequency, set frequency, radiator temperature).

Upon startup, the interface automatically enters the main screen. The monitored parameter under stopped conditions flashes; under running conditions, the monitored parameter stays on.

3.1.2 Equipment start/stop control

Table 34. Start control functions

Name	Function	Key	Description
	Start control		Effective when the control mode is in communication control mode: Pressing the
DUN			key starts the VFD.
RUN			Ineffective when the control mode is in other modes: Pressing the key has no
			effect.
STOP	Stop control		Effective when the control mode is in panel control mode: Pressing the key stops
			the VFD.
			Ineffective when the control mode is in other modes: Pressing the key has no
			effect.

Up	Speed increment	Effective when the frequency source is set via communication: Pressing the key increases the frequency. Ineffective when the frequency source is not set via communication: Pressing the key has no effect.
Down	Speed decrement	Effective when the frequency source is set via digital input: Pressing the key increases the frequency. Ineffective when the frequency source is not set via digital input: Pressing the key has no effect.

3.2 Parameter settings

Table 35. Parameter setting functions

Name	Function	Key	Description
ESC	ESC Exit	ESC	Short-press the key in the main interface to enter the parameter group interface;
			Short-press the key in other interfaces to return to the previous level.
			In the parameter group interface: Short press to increase the parameter group
Up	Value increment		number; long press to continuously increase the parameter group.
Ор			In the parameter setting interface: Short press to increase the flashing cursor
			value; long press to continuously increase the flashing cursor value.
			In the parameter group interface: Short press to decrease the parameter group
Down	Value decrement		number; long press to continuously decrease the parameter group.
DOWIT			In the parameter setting interface: Short press to decrease the flashing cursor
			value; long press to continuously decrease the flashing cursor value.
Left	Cursor left shift		In the parameter setting interface, shift the flashing cursor value to the left.

To view or modify parameters:

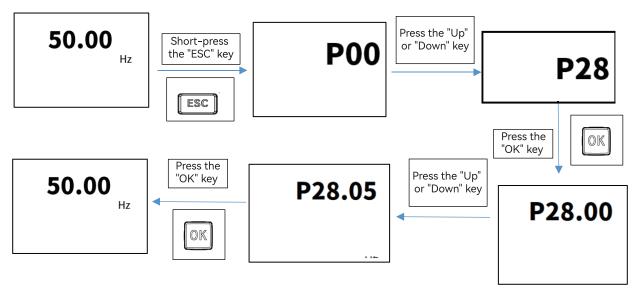
- 1. Short-press the "ESC" key to enter the parameter group selection interface.
- 2. Press the "Up" or "Down" key to select the target parameter group.
- 3. Press the "OK" key to enter the selected parameter group interface where the parameter ID is displayed.
- 4. Press the "OK" key again to enter the sub-parameter group display interface.
- 5. Press the "OK" key a third time to display the parameter value, entering the parameter monitoring and modification interface.

To modify a parameter ID:

- 1. Use the "Up" or "Down" keys to adjust the parameter ID.
- 2. Use the "Left" key to move the editing position of the parameter ID; the corresponding digit flashes when the cursor is aligned.

I. Parameter viewing

Take "Viewing set frequency P28.05" as an example. The operation steps are as follows:

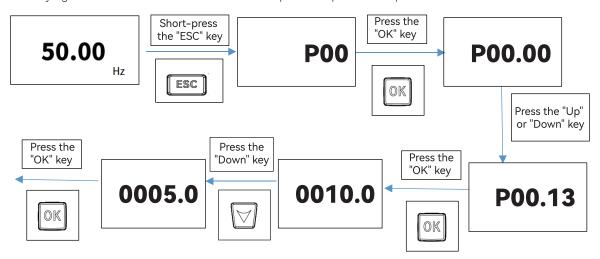


The parameter viewing interface displays parameter values and their corresponding units.

After viewing, short-press the "ESC" key to return to the previous level until exiting to the main interface.

II. Parameter modification

Take "Modifying acceleration time 1 P00.13" as an example. The operation steps are as follows:



After modifying the parameter, press the "OK" key to confirm, then short-press the "ESC" key to exit. Only then will the parameter value be written to the VFD and saved.

If the "OK" key is not pressed to confirm after modification and the "ESC" key is directly short-pressed to exit, the parameter value will not be written to the VFD. Rechecking will display the previously saved value.

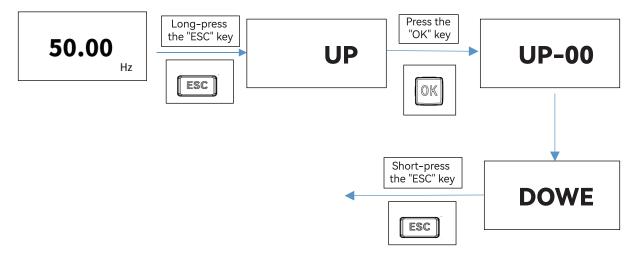
3.3 Special functions

Long-press the "ESC" key to enter the special function selection interface. In this interface, short-press the "Up" or "Down" key to select a specific function. Short-press the "ESC" key to exit the special function selection interface.

I. Parameter upload

The parameter upload function is used to upload all key parameters of the connected VFD to the keypad and save them.

The KC1-ACE supports four storage slots: "up-00", "up-01", "up-02", and "up-03", allowing simultaneous storage of four sets of parameters.



- 1. Select the "UP" (Parameter upload) function, then short-press the "OK" key to confirm.
- 2. Use the "Up" or "Down" key to select a storage slot. After selecting the target slot, press "OK" to start uploading.
- 3. Upon completion, "DONE" will be displayed. Press "ESC" or "OK" to exit to the main interface.

II. Parameter download

The parameter download function is used to download parameter group information saved in the keypad to the connected VFD. The KC1-ACE supports four download storage slots: "dn-00", "dn-01", "dn-02", and "dn-03". Ensure the target download slot has been correctly uploaded and saved before downloading.

Follow the same steps as parameter upload, but select the "dn" (parameter download) function in step 1.

III. CAN station number selection

- 1. Long-press the "ESC" key to enter the special functions interface.
- 2. Use the "Up" or "Down" key to find the "Nb" function, then press "OK" to enter the device station number selection.
- 3. Use the "Up" or "Down" key to select the connected station number, then press "OK" to confirm.

The KC1-ACE retains the function for selecting connection methods.

IV. Connection method selection

- 1. Long-press the "ESC" key to enter the special functions interface.
- 2. Use the "Up" or "Down" key to find the "C7" function, then press "OK" to enter the communication method selection.
- 3. Use the "Up" or "Down" key to select the corresponding communication method, then press "OK" to confirm.

The KC1-ACE retains the function for selecting connection methods.

V. CAN baud rate selection

- 1. Long-press the "ESC" key to enter the special functions interface.
- 2. Use the "Up" or "Down" key to find the "CAN" function, then press "OK" to enter the CAN communication baud rate selection.
 - 3. Use the "Up" or "Down" key to select the corresponding baud rate, then press "OK" to confirm.

The KC1-ACE retains the function for selecting connection methods.

VI. Software version number

- 1. Long-press the "ESC" key to enter the special functions interface.
- 2. Use the "Up" or "Down" key to find the "VS" function, then press "OK" to enter the software version number query. The first line displayed shows the current software version number.

I. Communication fault



Figure 66. Communication fault

When a communication fault occurs, the alarm fault indicator lights up, and the panel displays the communication fault message "FAL01".

If a communication fault occurs when the KC1-ACE is powered on, the keypad will automatically cycle through different station numbers and baud rates to match the VFD until a successful connection is established.

Troubleshooting:

Check if the station number and baud rate set for the connected VFD and KC1-ACE are consistent during a communication fault.

Verify that the keypad's termination resistor is enabled (operation details refer to Maintenance and Inspection).

Ensure hardware connections are correct.

Confirm the VFD is in "Internal CAN" communication mode.

II. Upload/Download fault



Figure 67. Upload/Download fault

Name	Definition	Description
FAL01	Communication error	Communication error occurs during parameter upload or download.
FAL03	Keypad write error	Keypad storage write error occurs during parameter upload.
FAL04	Keypad read error	Keypad storage read error occurs during parameter download.

An alarm error occurs during parameter upload or download.

III. VFD fault



Figure 68. VFD fault

The panel displays "ERR+ Fault code" to indicate a current fault alarm of the VFD.

Chapter 4 Maintenance and Inspection

4.1 Termination resistor switch

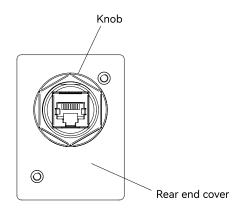


Figure 69. End cover diagram

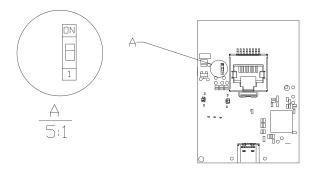


Figure 70. Termination resistor DIP switch

Loosen the knob as shown in Figure 8, and use a tool to open the rear end cover.

As shown in Figure 9, set the DIP switch to the "ON" position to activate the 120Ω CAN communication ternimation resistor.

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Preface

Thank you for purchasing and using the KC1-BS0 smart operation keypad independently developed and manufactured by Hechuan Technology Co., Ltd.

The KC1-BS0 smart operation keypad is a new-generation general-purpose variable frequency speed regulation component from HCFA, supporting VFD series such as the E600 economical model, E610 simple model, and E630. Equipped with an LED display, the KC1-BS0 supports functions including parameter setting, variable frequency control, and status monitoring.

Target reader

For wiring, installation, diagnosis, post-maintenance, and other tasks related to the HCFA KC1-BS0 smart operation key-pad, users can refer to this manual. However, users are required to have a basic foundation in electrical and automation knowledge.

This manual contains essential information for using the HCFA KC1-BS0 smart operation keypad. Please read the manual carefully before use and ensure safe and correct operation under proper safety precautions.

For customers using the product for the first time who have questions about its functions, please consult the company's technical support team for assistance.

Version history		
Date	Version number	Changes
2025-02-21	V1.0	First version release

Safety guidelines

Safety icons

During product use, these safety rules must be strictly followed as specified in this manual.

DANGER <u></u>	Improper operation may cause minor to moderate injuries, or major injuries/death in severe cases, and potential property damage.
WARNING <u></u>	Improper operation may cause minor to moderate injuries or equipment damage.
CAUTION 🗘	Improper operation may cause minor injuries or equipment damage.
NOTE	Improper operation may damage the environment/equipment or cause data loss.

Note: Key points/explanations to aid better operation and product understanding.

DANGER /!\

Before installation

- · Water ingress or stains on the machine during unpacking indicate prior dampness or submersion. Do not install.
- · Damaged or missing components found during unpacking. Do not install.
- A mismatch between packaging labels and actual contents. Do not install.
- · Carry the machine gently during transportation; otherwise, damage may occur.
- · Avoid touching internal components with bare hands; otherwise, electrostatic damage may occur.

During installation

- Install on flame-retardant materials (e.g., metal) and keep away from flammable objects; otherwise, fire hazards may occur.
- Tighten mounting bolts as specified; otherwise, machine drop may occur.
- · Do not arbitrarily adjust fixed bolts, especially those marked in red.

During wiring

- It is mandatory to follow this manual's guidelines and perform the work with qualified electrical engineers; failure to do so may lead to hazards.
- The KC1-BS0 smart operation keypad connects to VFD series such as E600, E610, and E630 via a standard Ethernet cable.
- If using the KC1-BS0 smart operation keypad with HCFA drive products other than those listed above, consult the manufacturer in advance. Otherwise, it may cause malfunction or damage to the KC1-BS0 smart operation keypad or the drive product.
- Do not use crossover Ethernet cables or damaged Ethernet cables, as this may cause malfunction or damage to the KC1-BS0 smart operation keypad.
- Avoid routing power cables, Ethernet cables, or USB cables through the same conduit or bundling them together. During wiring, power supply cables should be separated from signal cables by at least 30 cm.
- In the following environments, take appropriate shielding measures to avoid equipment abnormalities:
- ① Areas with strong electric or magnetic fields;
- 2 Areas with potential radioactive radiation.

CAUTION /

Maintenance and care precautions

- · Do not disassemble or modify the equipment; otherwise, malfunctions, misoperations, or fires may occur.
- · Do not use gasoline, alcohol, thinner, acidic, or alkaline detergents to avoid discoloration or corrosion of the casing.
- · Avoid scratching the LED display screen with sharp objects to prevent affecting display performance.
- · For equipment maintenance, please consult Zhejiang Hechuan Technology Co., Ltd.

CAUTION /

Daily/Regular inspection

Daily inspection

- Check ambient temperature, humidity, dust, foreign objects, etc.;
- · Check for abnormal noise;
- Check if the USB dust plug and battery cover are installed properly;
- · Check if the keys function properly;
- · Check if the LED display is functioning properly.

Regular inspection

- Annually inspect fastening components for looseness;
- · Annually inspect for signs of overheating.

CAUTION /

Disposal precautions

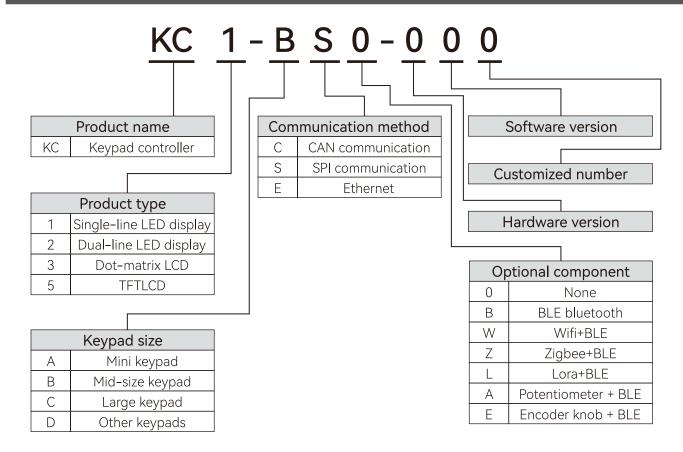
• When disposing of the product, handle it as industrial waste. For battery disposal, please dispose of it separately in accordance with the laws and regulations designated by each region.



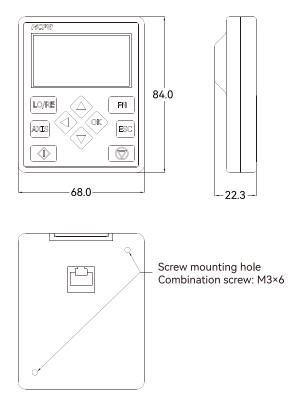
• Since the equipment is precision equipment, avoid subjecting it to impacts exceeding the general specification values specified in this manual during transportation. Otherwise, it may likely become a cause of equipment malfunction. After transportation, please confirm the operation of the equipment.

Chapter 1 Product Overview

1.1 Model name denotation



1.2 Dimensional specifications



1.3 KC1-BS0 composition

Table 36. Keypad components

Name	Description
Display	
Key	
Status indicator	
USB port	Reserved
RJ45	Used to connect the KC1-BS0 to the VFD
Fastening screw	
Snap fit	Used to secure the KC1-BS0 to the base
Battery cover	
Nameplate	Used to record product model and serial number

1.4 Interface display introduction

KC1-BS0 uses an LED digital tube display.



Figure 71. Display interface

Table 37. Display content

No.	Name	Status display
1	Status display	Display current VFD status information
2	Unit	Display current parameter unit being acquired
3	Content	Display current parameter name or value

1.5 Key description

Table 38. Key description

Key	Name	Description
LO/RE	LO/RE	Local/Remote operation switch (reserved)
AXIS	AXIS	Axis number selection (reserved)
FN	FN	Multi-function key, used to implement function of P10.02.

	Up	Adjust the selected parameter value or group number upward; scroll up to select functions in special function interfaces.
	Dn	Adjust the selected parameter value or group number downward; scroll down to select functions in special function interfaces.
	Left	Move the cursor leftward
OK	OK	Confirm parameter group/special function selection or parameter value settings.
ESC	ESC	Short press to enter parameter settings mode or exit.
	Run	Control VFD start-up during panel operation.
	Stop	Controls the VFD to stop during operation; the stop mode follows the settings defined in parameter

1.6 General specifications

No.	Category	Operation	Storage	Transportation		
1	Operating	-20~+55℃	-40~+70°C	-40~+70°C		
ı	temperature range	-20*+55 C	-40%+70 C	-40%+70 C		
2	Altitude	<4000m	-	_		
3	Relative humidity	9	5% (non-condensing)			
4	Pollution degree	3C3 (IEC 60721-3-3, IEC 60721-3-2, IEC 60721 -1-1-3-1)				
5	Vibration	61800-5-1 ed 2 EN 60082-2-6 test Fc(1g)	-	2M3 class (per EN 60082-2-6)		
6	Shock	3M4 class (per EN 60062-2-27)	-	2M2 class (per EN 60062-2-27)		
7	Free fall	IEC 60068-2-32 (drop height 1m)	-			
8	Protection rating	Connected to drive equipment: IP54 (with IP54 accessories selected); Standalone: IP20				
9	Electromagnetic	JEC (1000.0				
9	compatibility	IEC 61800-3				
10	Material	Disposal: All materials of the unit are recyclable to protect the environment and conserve resources. For more				
10	i*iateriai	detailed recycling instructions and handling methods, comply with international and local regulations.				

Chapter 2 Installation and Wiring

The KC1-BS0 smart operation keypad is applicable to multiple VFD series. This manual uses the installation of the E610 as an example to illustrate the installation and wiring methods of the KC1-BS0 smart operation keypad.

2.1 Connection of KC1-BS0 to equipment

The KC1-BS0 connects to the VFD's CN8 port via its rear RJ45 port. The connecting Ethernet cable must comply with the EIA/TIA-568A or 568B standard, and the maximum total communication length must not exceed 130 meters.



Figure 72. Keypad connection diagram

Chapter 3 Functions and Applications

3.1 Overview

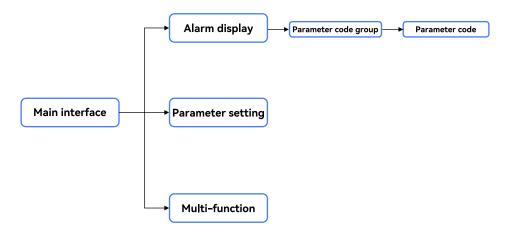


Figure 73. Functional overview

3.1.1 Main interface

The main interface is used to display monitored parameter values and the status of VFD. Its display functions are as follows:

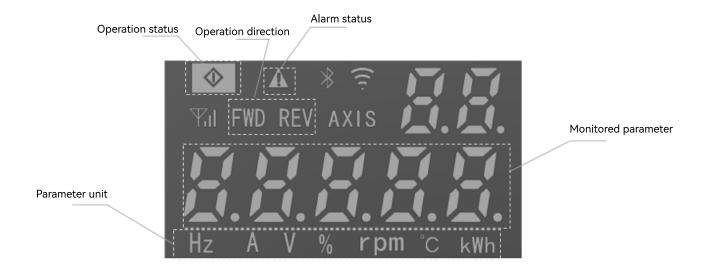


Figure 74. Main interface display functions

- * Operation status: Displays the current operation status of the VFD. A steady on indicates the VFD is running; a steady off indicates stopping.
- * Operation direction: Displays the current operation direction of the VFD. A steady "FWD" indicates forward operation; a steady "REV" indicates reverse operation.
- * Alarm status: A steady on indicates an active alarm message.
- * Monitored parameter: Real-time displays the value of the first currently monitored parameter.
- * Parameter unit: Displays the unit corresponding to the first currently monitored parameter.

The main interface can monitor the VFD's operation status (e.g., start/stop, forward/reverse rotation) and operation or stopping parameters (e.g., operating frequency, set frequency, radiator temperature).

Upon startup, the interface automatically enters the main screen. The monitored parameter under stopped conditions flashes; under running conditions, the monitored parameter stays on.

3.1.2 Equipment start/stop control

Table 39. Start control functions

Name	Function	Key	Description
LO/RE	Remote/Local switching	LO/RE	Function reserved
RUN	Start control		Effective when the control mode is in panel control mode: Pressing the key starts the VFD. Ineffective when the control mode is in other modes: Pressing the key has no effect.
STOP	Stop control		Effective when the control mode is in panel control mode: Pressing the key stops the VFD. Ineffective when the control mode is in other modes: Pressing the key has no effect.

Up	Speed increment	Effective when the frequency source is set via digital input: Pressing the key increases the frequency. Ineffective when the frequency source is not set via digital input: Pressing the key has no effect.
Down	Speed decrement	Effective when the frequency source is set via digital input: Pressing the key increases the frequency. Ineffective when the frequency source is not set via digital input: Pressing the key has no effect.

3.2 Parameter settings

Table 40. Parameter setting functions

Name	Function	Key	Description	
ESC	Exit	ESC	Short-press the key in the main interface to enter the parameter group interface;	
ESC	EXIL		Short-press the key in other interfaces to return to the previous level	
			In the parameter group interface: Short press to increase the parameter group	
Up	Value increment		number; long press to continuously increase the parameter group.	
Ор	value increment		In the parameter setting interface: Short press to increase the flashing cursor	
			value; long press to continuously increase the flashing cursor value.	
			In the parameter group interface: Short press to decrease the parameter group	
Down	Value decrement		number; long press to continuously decrease the parameter group.	
DOWII			In the parameter setting interface: Short press to decrease the flashing cursor	
			value; long press to continuously decrease the flashing cursor value.	
Left	Cursor left shift		In the parameter setting interface, shift the flashing cursor value to the left.	

To view or modify parameters:

- 1. Short-press the "ESC" key to enter parameter group selection.
- 2. Press the "Up" or "Down" key to select the target parameter group.
- 3. Press the "OK" key to enter the selected parameter group.

To modify a parameter ID:

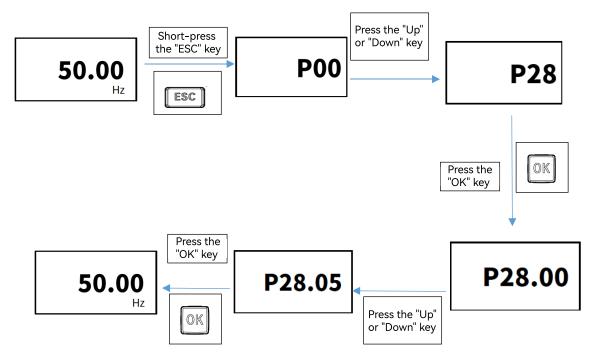
- 1. Use the "Up" or "Down" keys to adjust the parameter ID.
- 2. Use the "Left" key to move the editing position of the parameter ID; the corresponding digit flashes when the cursor is aligned.

In the parameter ID editing interface:

Press the "OK" key to enter the parameter value display/modification page, where "H." precedes the value to indicate hexadecimal format.

I. Parameter viewing

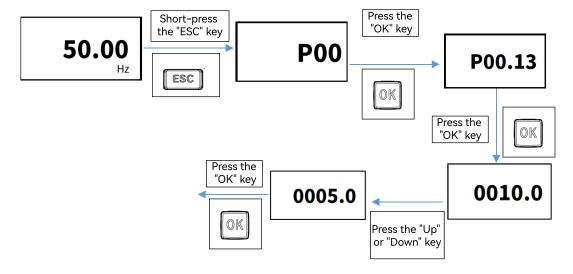
Take "Viewing set frequency P28.05" as an example. The operation steps are as follows:



In the parameter interface, the parameter ID is displayed at the top, and the parameter value, along with its corresponding unit, is shown at the bottom. After viewing, long-press or short-press the "ESC" key to return to the previous level until exiting to the main interface.

II. Parameter modification

Take "Modifying acceleration time 1 P00.13" as an example. The operation steps are as follows:



After modifying the parameter, press the "OK" key to confirm, ensuring the parameter value is written to the VFD and saved.

If the "OK" key is not pressed to confirm after modification and the "ESC" key is directly short-pressed to exit, the parameter value cannot be written to the VFD. Rechecking will display the previously saved value.

3.3 FN multi-function

The "FN" multi-function key executes functions based on the settings of parameter P10.2 of the VFD.

P10.02 parameter value	Key status	FN operation description	
0: FN invalid	No operation	N/A	
1: Switching between operator			
panel commands and remote	No operation	Reserved	
commands			
		When the VFD is running forward, short-pressing the "FN" key switches the VFD	
2: Switching between forward and	Short-press	to reverse operation.	
reverse rotation		When the VFD is running in reverse, short-pressing the "FN" key switches the	
		VFD to forward operation.	
2: Farward in a	Chart proce/Lang proce	Pressing the "FN" key starts the VFD in forward jog operation; releasing the "FN"	
3: Forward jog	Short-press/Long-press	key stops the jog operation.	
/. Deverse is a	Chart range / Language	Pressing the "FN" key starts the VFD in reverse jog operation; releasing the "FN"	
4: Reverse jog	Short-press/Long-press	key stops the jog operation.	
5: Exit parameter interface Short-press		In the parameter setting interface, press the "FN" key to exit the previous level.	

3.4 Alarm display and reset

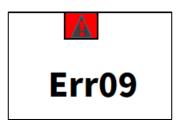


Figure 75. Alarm display

When an alarm occurs, the interface automatically jumps to the alarm display interface, the alarm status indicator lights up, and the alarm code is displayed.

Short-press the "STOP" key to clear the alarm message.

Name	Function	Key	Description
STOP	Stop control		When the control mode is in panel control mode, short-press the key in the alarm interface to clear the alarm.

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Preface

Thank you for purchasing and using the KC2-CC0 smart operation keypad independently developed and manufactured by Hechuan Technology Co., Ltd.

The KC2-CC0 smart operation keypad is a new-generation general-purpose variable frequency speed regulation component from HCFA, supporting VFD series such as the E600 economical model, E610 simple model, and E630. Equipped with a dual-line LED display, the KC2-CC0 supports optional RS485, CAN, and Bluetooth wired or wireless communication methods, as well as functions including parameter setting, variable frequency control, parameter copying, status monitoring, black box fault analysis and positioning, and RTC timing.

Target reader

For wiring, installation, diagnosis, post-maintenance, and other tasks related to the HCFA KC2-CC0 smart operation key-pad, users can refer to this manual. However, users are required to have a basic foundation in electrical and automation knowledge.

This manual contains essential information for using the HCFA KC2-CC0 smart operation keypad. Please read the manual carefully before use and ensure safe and correct operation under proper safety precautions.

For customers using the product for the first time who have questions about its functions, please consult the company's technical support team for assistance.

Version historyDateVersion numberChanges2025-02-21V1.0First version release

Safety guidelines

Safety icons

During product use, these safety rules must be strictly followed as specified in this manual

burning product use, these surety rules must be strictly rollowed as specified in this manual.				
DANGER 🔨	Improper operation may cause minor to moderate injuries, or major injuries/death in severe cases, and potential property damage.			
WARNING <u></u>	Improper operation may cause minor to moderate injuries or equipment damage.			
CAUTION <u></u>	Improper operation may cause minor injuries or equipment damage.			
NOTE	Improper operation may damage the environment/equipment or cause data loss.			
Note: Key points/explanations to aid better exerction and product understanding				

Note: Key points/explanations to aid better operation and product understanding.

DANGER /

Before installation

- · Water ingress or stains on the machine during unpacking indicate prior dampness or submersion. Do not install.
- Damaged or missing components found during unpacking. Do not install.
- · A mismatch between packaging labels and actual contents. Do not install.
- · Carry the machine gently during transportation; otherwise, damage may occur.
- · Avoid touching internal components with bare hands; otherwise, electrostatic damage may occur.

During installation

- Install on flame-retardant materials (e.g., metal) and keep away from flammable objects; otherwise, fire hazards may occur.
- Tighten mounting bolts as specified; otherwise, machine drop may occur.
- · Do not arbitrarily adjust fixed bolts, especially those marked in red.

During wiring

- It is mandatory to follow this manual's guidelines and perform the work with qualified electrical engineers; failure to do so may lead to hazards.
- The KC2-CC0 smart operation keypad connects to VFD series such as E600, E610, and E630 via a standard Ethernet cable.
- If using the KC2-CC0 smart operation keypad with HCFA drive products other than those listed above, consult the manufacturer in advance. Otherwise, it may cause malfunction or damage to the KC2-CC0 smart operation keypad or the drive product.
- Do not use crossover Ethernet cables or damaged Ethernet cables, as this may cause malfunction or damage to the KC2–CC0 smart operation keypad.
- Avoid routing power cables, Ethernet cables, or USB cables through the same conduit or bundling them together. During wiring, power supply cables should be separated from signal cables by at least 30 cm.
- In the following environments, take appropriate shielding measures to avoid equipment abnormalities:
- ① Areas with strong electric or magnetic fields;
- 2 Areas with potential radioactive radiation.

CAUTION /

Maintenance and care precautions

- Do not disassemble or modify the equipment; otherwise, malfunctions, misoperations, or fires may occur.
- Do not use gasoline, alcohol, thinner, acidic, or alkaline detergents to avoid discoloration or corrosion of the casing.
- · Avoid scratching the LED display screen with sharp objects to prevent affecting display performance.
- For equipment maintenance, please consult Zhejiang Hechuan Technology Co., Ltd.

CAUTION /

Daily/Regular inspection

Daily inspection

- Check ambient temperature, humidity, dust, foreign objects, etc.;
- · Check for abnormal noise;
- Check if the USB dust plug and battery cover are installed properly;
- · Check if the keys function properly;
- · Check if the LED display is functioning properly.

Regular inspection

- Annually inspect fastening components for looseness;
- · Annually inspect for signs of overheating.

CAUTION /

Disposal precautions

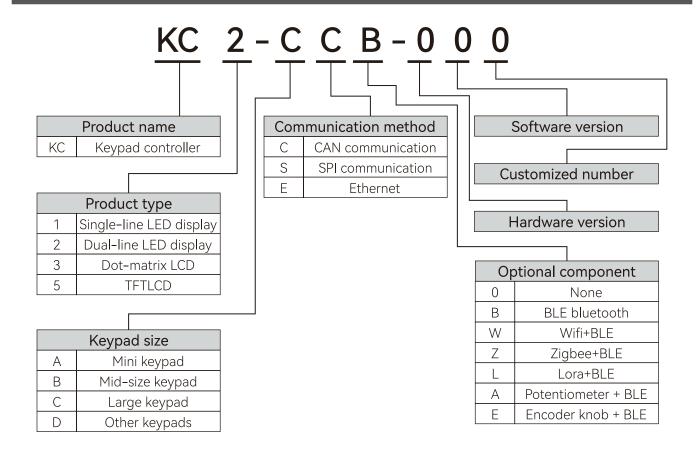
• When disposing of the product, handle it as industrial waste. For battery disposal, please dispose of it separately in accordance with the laws and regulations designated by each region.

CAUTION /!\

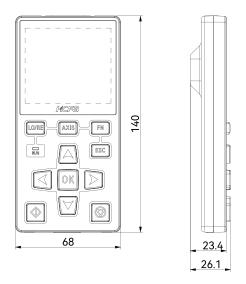
• Since the equipment is precision equipment, avoid subjecting it to impacts exceeding the general specification values specified in this manual during transportation. Otherwise, it may likely become a cause of equipment malfunction. After transportation, please confirm the operation of the equipment.

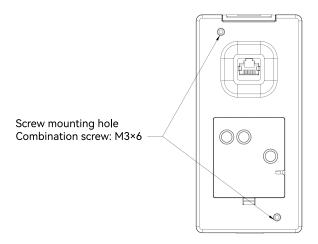
Chapter 1 Product Overview

1.1 Model name denotation



1.2 Dimensional specifications





1.3 KC2-CC0 composition

Table 41. Keypad components

Name	Description	
Display		
Key		
Status indicator		
USB port	Used to connect the KC2-CC0 to a PC for firmware upgrades of the KC2-CC0	
RJ45	Used to connect the KC2-CC0 to the VFD	
Fastening screw		
Snap fit	Used to secure the KC2-CC0 to the base	
Battery cover		
Nameplate	Used to record product model and serial number	

1.4 Interface display introduction

KC2-CC0 uses an LED digital tube display.



Figure 76. Display interface

Table 42. Display content

No.	Display content	Description	
1	Status display	Display current VFD status information	
2	Unit	Display current parameter unit being acquired	
3	Content	Display current parameter name or value	
4	Content	Display current parameter value	

1.5 Key description

Table 43. Key description

Key Name		Description	
LO/RE	LO/RE	Local/Remote operation switch (reserved)	
AXIS	AXIS	Axis number selection (reserved)	
FN	FN	Multi-function key, used to implement function of P10.02.	
	Up	Adjust the selected parameter value or group number upward; scroll up to select functions in special function interfaces.	
	Dn	Adjust the selected parameter value or group number downward; scroll down to select functions in special function interfaces.	
	Left	Move the cursor leftward	
	Right	Move the cursor rightward	
OK	OK	Confirm parameter group/special function selection or parameter value settings.	
ESC	ESC	Short press to enter parameter settings mode or exit.	
	Run	Control VFD start-up during panel operation.	
	Stop	Controls the VFD to stop during operation; the stop mode follows the settings defined in parameter P01.05.	

1.6 Indicator description

Status	Description	
Lit (green)	Black box operating Black box sleeping	
Not lit		

1.7 General specifications

No.	Category	Operation	Storage	Transportation
1	Operating	-20~+55°C	-40~+70°C	-40~+70°C
'	temperature range			
2	Altitude	<4000m	-	-
3	Relative humidity	95% (non-condensing)		

4	Pollution degree	3C3 (IEC 60721-3-3, IEC 60721-3-2, IEC 60721 -1-1-3-1)				
5	Vibration	61800-5-1 ed 2 EN 60082-2-6 test Fc(1g)	-	2M3 class (per EN 60082-2-6)		
6	Shock	3M4 class (per EN 60062-2-27)	-	2M2 class (per EN 60062-2-27)		
7	Free fall	IEC 60068-2-32 (drop height 1m)				
8	Protection rating	Connected to drive equipment: IP54 (with IP54 accessories selected); Standalone: IP20				
9	Electromagnetic	IFC (1000 2				
9	compatibility	IEC 61800-3				
10	Material	Disposal: All materials of the unit are recyclable to protect the environment and conserve resources. For more				
	Material	detailed recycling instructions and handling methods, comply with international and local regulations.				

Chapter 2 Installation and Wiring

The KC2-CC0 smart operation keypad is applicable to multiple VFD series. This manual uses the installation of the E610 as an example to illustrate the installation and wiring methods of the KC2-CC0 smart operation keypad.

2.1 Connection of KC2-CC0 to equipment

The KC2-CC0 connects to the VFD's CN3 port via its rear RJ45 port. The connecting Ethernet cable must comply with the EIA/TIA-568A or 568B standard, with a termination resistor inserted into the VFD at the communication end. The maximum total connection length must not exceed 150 meters.

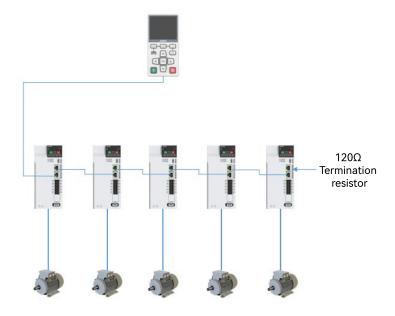


Figure 77. Keypad connection diagram

Chapter 3 Functions and Applications

3.1 Overview

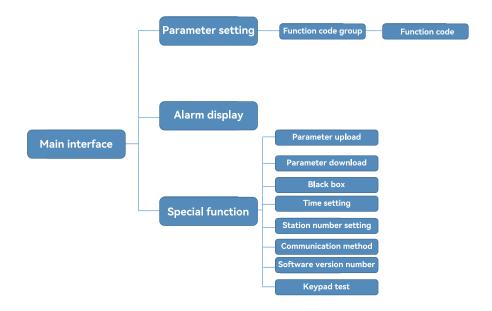


Figure 78. Functional overview

3.1.1 Main interface

The main interface is used to display monitored parameter values and the status of VFD. Its display functions are as follows:

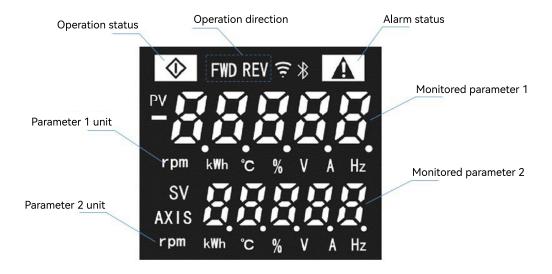


Figure 79. Main interface display functions

- * Operation status: Displays the current operation status of the VFD. A steady on indicates the VFD is running; a steady off indicates stopping.
- * Operation direction: Displays the current operation direction of the VFD. A steady "FWD" indicates forward operation; a steady "REV" indicates reverse operation.

- * Alarm status: A steady on indicates an active alarm message.
- * Monitored parameter 1: Real-time display of the value of the first currently monitored parameter;
- * Parameter 1 unit: Displays the unit corresponding to the first currently monitored parameter;
- * Monitored parameter 2: Real-time display of the value of the second currently monitored parameter;
- * Parameter 2 unit: Displays the unit corresponding to the second currently monitored parameter;

The main interface can monitor the VFD's operation status (e.g., start/stop, forward/reverse rotation) and operation or stopping parameters (e.g., operating frequency, set frequency, radiator temperature).

Upon startup, the interface automatically enters the main screen. The monitored parameter under stopped conditions flashes; under running conditions, the monitored parameter stays on.

3.1.2 Equipment start/stop control

Name	Function	Key	Description
			Switch between remote and local control operation authority via LO/RE;
	Remote/Local		When the "LO/RE" button is pressed, the display shows "LO SUCCESS," indicating
LO/RE	switching	LO/RE	that the VFD has switched to local terminal control;
	Switching		When the "LO/RE" button is pressed, the display shows "RE SUCCESS," indicating
			that the VFD has switched to remote keypad control;
			Effective when the control mode is in communication control mode: Pressing the
RUN	Start control		key starts the VFD.
KUN	Start control		Ineffective when the control mode is in other modes: Pressing the key has no
			effect.
			Effective when the control mode is in panel control mode: Pressing the key stops
STOP	Ctoro combuel		the VFD.
310P	Stop control		Ineffective when the control mode is in other modes: Pressing the key has no
			effect.
	Speed increment		Effective when the frequency source is set via digital input: Pressing the key
I I -			increases the frequency.
Up			Ineffective when the frequency source is not set via digital input: Pressing the
			key has no effect.
			Effective when the frequency source is set via digital input: Pressing the key
5			increases the frequency.
Down	Speed decrement		Ineffective when the frequency source is not set via digital input: Pressing the
			key has no effect.

3.2 Parameter settings

Table 44. Parameter setting functions

Name	Function	Key	Description
ESC	Exit	ESC	Short-press the key in the main interface to enter the parameter group interface;
			Short-press the key in other interfaces to return to the previous level.
			In the parameter group interface: Short press to increase the parameter group
Llo	Value in gram ent		number; long press to continuously increase the parameter group.
Up	Value increment		In the parameter setting interface: Short press to increase the flashing cursor
			value; long press to continuously increase the flashing cursor value.

Down	Value decrement	In the parameter group interface: Short press to decrease the parameter group number; long press to continuously decrease the parameter group. In the parameter setting interface: Short press to decrease the flashing cursor value; long press to continuously decrease the flashing cursor value.
Left Cursor left shift		In the parameter setting interface, shift the flashing cursor value to the left.
Right	Cursor right shift	In the parameter setting interface, shift the flashing cursor value to the right.

To view or modify parameters:

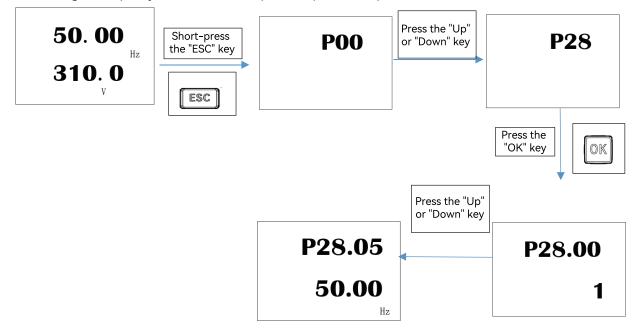
- 1. Short-press the "ESC" key to enter the parameter group selection interface.
- 2. Press the "Up" or "Down" key to select the target parameter group.
- 3. Press the "OK" key to enter the selected parameter group interface, where the parameter ID is displayed at the top and the corresponding parameter value (under this ID) is shown at the bottom.

To modify a parameter ID:

- 1. Use the "Up" or "Down" keys to adjust the parameter ID.
- 2. Use the "Left" or "Right" key to move the editing position of the parameter ID; the corresponding digit flashes when the cursor is aligned.

I. Parameter viewing

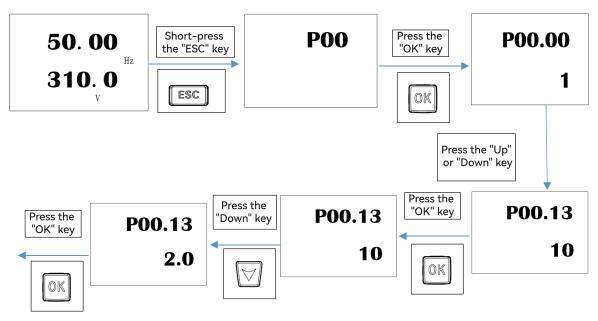
Take "Viewing set frequency P28.05" as an example. The operation steps are as follows:



In the parameter interface, the parameter ID is displayed at the top, and the parameter value, along with its corresponding unit, is shown at the bottom. After viewing, long-press or short-press the "ESC" key to return to the previous level until exiting to the main interface.

II. Parameter modification

Take "Modifying acceleration time 1 P00.13" as an example. The operation steps are as follows:



After modifying the parameter, press the "OK" key to confirm, ensuring the parameter value is written to the VFD and saved.

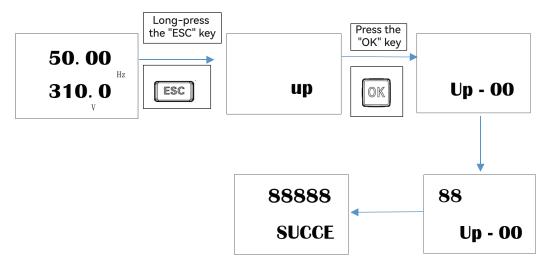
If the "OK" key is not pressed to confirm after modification and the "ESC" key is directly short-pressed to exit, the parameter value cannot be written to the VFD. Rechecking will display the previously saved value.

3.3 Special functions

Long-press the "ESC" key to enter the special function selection interface. In this interface, short-press the "Up" or "Down" key to select a specific function. Short-press the "ESC" key to exit the special function selection interface.

I. Parameter upload

The parameter upload function is used to upload all key parameters of the connected VFD to the keypad and save them. The KC2-CC0 supports four storage slots: "up-00", "up-01", "up-02", and "up-03", allowing simultaneous storage of four sets of parameters.



1. Select the "UP" (Parameter upload) function, then short-press the "OK" key to confirm.

- 2. Use the "Up" or "Down" key to select a storage slot. After selecting the target slot, press "OK" to start uploading.
- 3. During upload, the first line displays a digital tube to represent the upload progress, and the second line displays the storage location. After upload completion, the first line displays five "8"s, and the second line displays "SUCCE" to indicate successful upload completion.
 - 4. Upon completion, press "ESC" or "OK" to exit to the main interface.

II. Parameter download

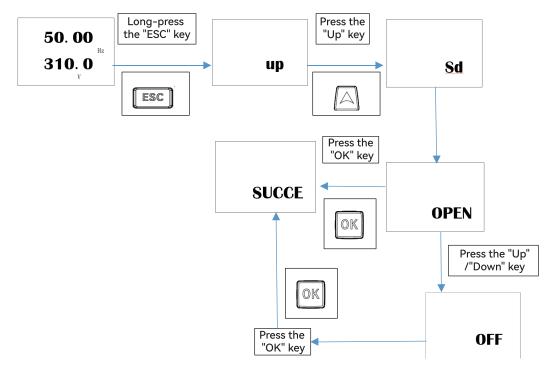
The parameter download function is used to download parameter group information saved in the keypad to the connected VFD. The KC2-CC0 supports four download storage slots: "dn-00", "dn-01", "dn-02", and "dn-03". Ensure the target download slot has been correctly uploaded and saved before downloading.

Follow the same steps as parameter upload, but select the "dn" (parameter download) function in step 1.

III. Black box function

The black box function enables monitoring and recording of the VFD's bus voltage, operating frequency, output voltage, output current, fault status, VFD status, DI status, DO status, power-on time, and operation time via KC2-CC0. KC2-CC0 records data every 10ms and saves it to an SD card.

Before activating the black box function, ensure the SD card is properly inserted into KC2-CC0 and verify that the time settings are correct.



After activating the black box function, the keypad automatically creates a folder and a text file. The folder name is the current date 2023-10-17 (year-month-day) from the keypad's clock, and the text file name is the current time 15-23-29.txt (hour-minute-second) from the keypad's clock. During recording, a new text file is automatically created every hour, and a new folder is created every 24 hours.

```
15:23:29:BV:309.8V OF:0.0HZ OV:230V OA:0.0A FS:0 MS:16 DI:32 DO:0 PT:43min RT:0.0min 15:23:29:BV:309.9V OF:0.0HZ OV:230V OA:0.0A FS:0 MS:16 DI:32 DO:0 PT:43min RT:0.0min 15:23:29:BV:309.9V OF:0.0HZ OV:230V OA:0.0A FS:0 MS:16 DI:32 DO:0 PT:43min RT:0.0min 15:23:29:BV:309.4V OF:0.0HZ OV:230V OA:0.0A FS:0 MS:16 DI:32 DO:0 PT:43min RT:0.0min 15:23:29:BV:309.8V OF:0.0HZ OV:230V OA:0.0A FS:0 MS:16 DI:32 DO:0 PT:43min RT:0.0min 15:23:29:BV:309.8V OF:0.0HZ OV:230V OA:0.0A FS:0 MS:16 DI:32 DO:0 PT:43min RT:0.0min 15:23:29:BV:309.8V OF:0.0HZ OV:230V OA:0.0A FS:0 MS:16 DI:32 DO:0 PT:43min RT:0.0min 15:23:29:BV:309.9V OF:0.0HZ OV:230V OA:0.0A FS:0 MS:16 DI:32 DO:0 PT:43min RT:0.0min 15:23:29:BV:309.7V OF:0.0HZ OV:230V OA:0.0A FS:0 MS:16 DI:32 DO:0 PT:43min RT:0.0min 15:23:29:BV:309.8V OF:0.0HZ OV:230V OA:0.0A FS:0 MS:16 DI:32 DO:0 PT:43min RT:0.0min 15:23:29:BV:309.8V OF:0.0HZ OV:230V OA:0.0A FS:0 MS:16 DI:32 DO:0 PT:43min RT:0.0min 15:23:29:BV:309.8V OF:0.0HZ OV:230V OA:0.0A FS:0 MS:16 DI:32 DO:0 PT:43min RT:0.0min 15:23:29:BV:309.7V OF:0.0HZ OV:230V OA:0.0A FS:0 MS:16 DI:32 DO:0 PT:43min RT:0.0min 15:23:29:BV:309.7V OF:0.0HZ OV:230V OA:0.0A FS:0 MS:16 DI:32 DO:0 PT:43min RT:0.0min 15:23:29:BV:309.7V OF:0.0HZ OV:230V OA:0.0A FS:0 MS:16 DI:32 DO:0 PT:43min RT:0.0min
```

IV. Time setting

- 1. Long-press the "ESC" key to enter the special functions interface.
- 2. Use the "Up" or "Down" key to find the "TE" function, then press the "OK" key to enter the time query and setting interface.
 - 3. In the time setting interface, press the "OK" key, then the first digital tube will blink.
 - 4. Use the "Left"/"Right" keys to move the blinking digital tube and adjust the time.
 - 5. After modification, press the "OK" key to save the settings.

V. CAN station number selection

- 1. Long-press the "ESC" key to enter the special functions interface.
- 2. Use the "Up" or "Down" key to find the "Nb" function, then press "OK" to enter the device station number selection.
- 3. Use the "Up" or "Down" key to select the connected station number, then press "OK" to confirm.

VI. Connection method selection

- 1. Long-press the "ESC" key to enter the special functions interface.
- 2. Use the "Up" or "Down" key to find the "C7" function, then press "OK" to enter the communication method selection.
- 3. Use the "Up" or "Down" key to select the corresponding communication method, then press "OK" to confirm.

The KC2-CC0 retains the function for selecting connection methods; prior to software version 015 (inclusive), only CAN communication is supported.

VII. CAN baud rate selection

- 1. Long-press the "ESC" key to enter the special functions interface.
- 2. Use the "Up" or "Down" key to find the "CAN" function, then press "OK" to enter the CAN communication baud rate selection.
 - 3. Use the "Up" or "Down" key to select the corresponding baud rate, then press "OK" to confirm.

VIII. Software version number

- 1. Long-press the "ESC" key to enter the special functions interface.
- 2. Use the "Up" or "Down" key to find the "VS" function, then press "OK" to enter the software version number

I. Communication fault

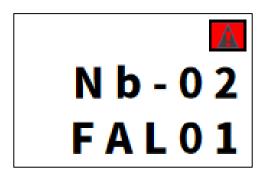


Figure 80. Communication fault

When a communication fault occurs, the alarm indicator lights up. The first line of the panel displays the currently set station number, and the second line displays the "FAL01" communication fault alarm message.

If a communication fault occurs when the KC2-CC0 is powered on, the keypad will automatically cycle through different station numbers and baud rates to match the VFD until a successful connection is established.

Troubleshooting:

Check if the station number and baud rate set for the connected VFD and KC2-CC0 are consistent during a communication fault.

Verify that the keypad's termination resistor is enabled (operation details refer to Maintenance and Inspection).

Ensure hardware connections are correct.

Confirm the VFD is in "Internal CAN" communication mode.

II. Upload/Download fault

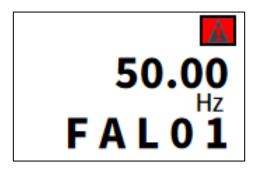


Figure 81. Upload/Download fault

Name	Definition	Description
FAL01	Communication error	Communication error occurs during parameter upload or download.
FAL03	Keypad write error	Keypad storage write error occurs during parameter upload.
FAL04	Keypad read error	Keypad storage read error occurs during parameter download.

Alarm errors occur during parameter upload or download.

III. SD card fault



Figure 82. SD card fault

An alarm occurs when using the black box function.

The SD card malfunctions or is not inserted when the black box is activated.

The SD card malfunctions or is removed when the black box is activated.

IV. VFD fault



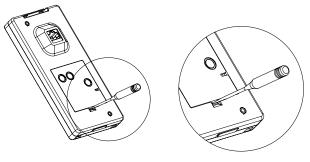
Figure 83. VFD fault

The panel displays "ERR+ Fault code" to indicate a current fault alarm of the VFD.

Chapter 4 Maintenance and Inspection

4.1 Battery replacement

I. Use a tool or fingers to pry up the rear cover of the keypad.



Use a flathead screwdriver to lift it up.

Figure 84. Opening the rear cover

II. Use a tool to remove the battery from the battery compartment.

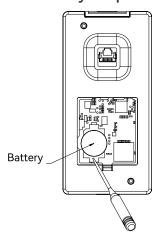


Figure 85. Removing the battery

III. First, snap the battery into position A at the bottom of the battery compartment, then gently press end B of the battery into the compartment with hands.

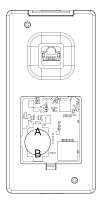


Figure 86. Inserting the battery

IV. Close the battery cover to complete the replacement.

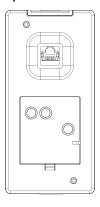
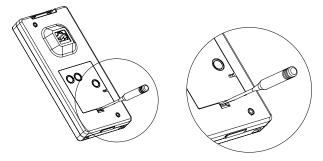


Figure 87. Battery replacement

I. Use a tool or fingers to pry up the rear cover of the keypad.



Use a flathead screwdriver to lift it up.

Figure 88. Opening the rear cover

II. Use a tool or fingers to move the metal shell downward in the direction of the arrow to remove the SD card.

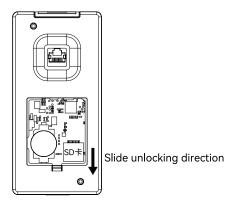


Figure 89. Removing the SD card

III. Insert the SD card into the card slot, close the metal holder, and move it upward to lock the metal holder.

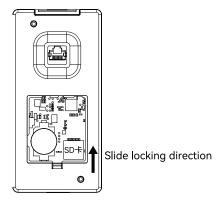


Figure 90. Inserting the SD card

IV. Close the rear cover to complete the SD card replacement.

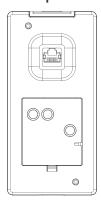


Figure 91. SD card replacement completed

Do not hot-swap the SD card during power-on. Ensure the KC2-CC0 is powered off when removing or inserting the SD card.

4.3 Termination resistor switch

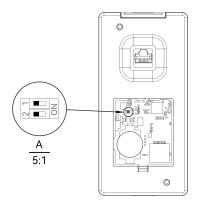


Figure 92. Termination resistor DIP switch

Use a tool or fingers to toggle switch 2 to the "ON" position on the right to activate the 120Ω CAN communication termination resistor.

Appendix 5 HDv-KC2-CS0-000

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Preface

Thank you for purchasing and using the KC2-CS0 smart operation keypad independently developed and manufactured by Hechuan Technology Co., Ltd.

The KC2-CS0 smart operation keypad is a new-generation general-purpose variable frequency speed regulation component from HCFA, supporting VFD series such as the E600 economical model, E610 simple model, and E630. Equipped with a dual-line LED display, the KC2-CS0 supports functions including parameter setting, variable frequency control and status monitoring.

Target reader

For wiring, installation, diagnosis, post-maintenance, and other tasks related to the HCFA KC2-CS0 smart operation key-pad, users can refer to this manual. However, users are required to have a basic foundation in electrical and automation knowledge.

This manual contains essential information for using the HCFA KC2-CS0 smart operation keypad. Please read the manual carefully before use and ensure safe and correct operation under proper safety precautions.

For customers using the product for the first time who have questions about its functions, please consult the company's technical support team for assistance.

Version history

Date	Version number	Changes
2025-02-21	V1.0	First version release

Safety guidelines

Safety icons

During product use, these safety rules must be strictly followed as specified in this manual.

Burning product use, these surety rules must be strictly rollowed us specified in this manual.					
DANGER 🔨	Improper operation may cause minor to moderate injuries, or major injuries/death in severe cases, and potential property damage.				
WARNING <u>(</u>	Improper operation may cause minor to moderate injuries or equipment damage.				
CAUTION <u></u>	Improper operation may cause minor injuries or equipment damage.				
NOTE	Improper operation may damage the environment/equipment or cause data loss.				

Note: Key points/explanations to aid better operation and product understanding.

DANGER /

Before installation

- · Water ingress or stains on the machine during unpacking indicate prior dampness or submersion. Do not install.
- · Damaged or missing components found during unpacking. Do not install.
- · A mismatch between packaging labels and actual contents. Do not install.
- · Carry the machine gently during transportation; otherwise, damage may occur.
- · Avoid touching internal components with bare hands; otherwise, electrostatic damage may occur.

During installation

- Install on flame-retardant materials (e.g., metal) and keep away from flammable objects; otherwise, fire hazards may occur.
- Tighten mounting bolts as specified; otherwise, machine drop may occur.
- · Do not arbitrarily adjust fixed bolts, especially those marked in red.

During wiring

- It is mandatory to follow this manual's guidelines and perform the work with qualified electrical engineers; failure to do so may lead to hazards.
- The KC2-CS0 smart operation keypad connects to VFD series such as E600, E610, and E630 via a standard Ethernet cable.
- If using the KC2-CS0 smart operation keypad with HCFA drive products other than those listed above, consult the manufacturer in advance. Otherwise, it may cause malfunction or damage to the KC2-CS0 smart operation keypad or the drive product.
- Do not use crossover Ethernet cables or damaged Ethernet cables, as this may cause malfunction or damage to the KC2–CS0 smart operation keypad.
- Avoid routing power cables, Ethernet cables, or USB cables through the same conduit or bundling them together. During wiring, power supply cables should be separated from signal cables by at least 30 cm.
- · In the following environments, take appropriate shielding measures to avoid equipment abnormalities:
- 3 Areas with strong electric or magnetic fields;
- 4 Areas with potential radioactive radiation.

CAUTION /

Maintenance and care precautions

- · Do not disassemble or modify the equipment; otherwise, malfunctions, misoperations, or fires may occur.
- Do not use gasoline, alcohol, thinner, acidic, or alkaline detergents to avoid discoloration or corrosion of the casing.
- · Avoid scratching the LED display screen with sharp objects to prevent affecting display performance.
- For equipment maintenance, please consult Zhejiang Hechuan Technology Co., Ltd.

CAUTION /

Daily/Regular inspection

Daily inspection

- Check ambient temperature, humidity, dust, foreign objects, etc.;
- · Check for abnormal noise;
- Check if the USB dust plug and battery cover are installed properly;
- · Check if the keys function properly;
- · Check if the LED display is functioning properly.

Regular inspection

- Annually inspect fastening components for looseness;
- · Annually inspect for signs of overheating.

CAUTION /



Disposal precautions

· When disposing of the product, handle it as industrial waste. For battery disposal, please dispose of it separately in accordance with the laws and regulations designated by each region.

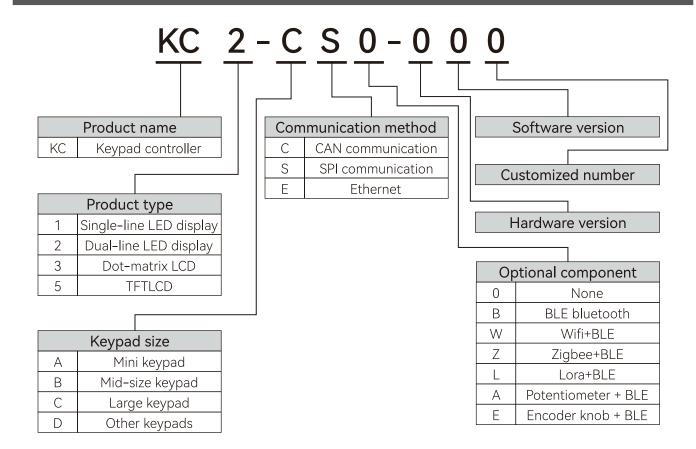
CAUTION

• Since the equipment is precision equipment, avoid subjecting it to impacts exceeding the general specification values specified in this manual during transportation. Otherwise, it may likely become a cause of equipment malfunction. After transportation, please confirm the operation of the equipment.

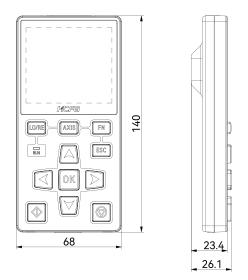
Chapter 1 Product Overview

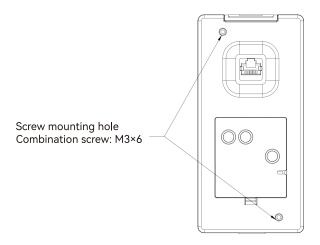
The KC2-CS0 smart operation keypad is a commissioning component of HCFA general-purpose variable frequency speed regulation system, supporting VFD series such as E600, E610, and E630. Equipped with a dual-line LED display, the KC2-CS0 supports functions including parameter setting, variable frequency control, and status monitoring.

1.1 Model name denotation



1.2 Dimensional specifications





1.3 KC2-CS0 composition

Table 45. Keypad components

Name	Description
Display	
Key	
Status indicator	
USB port	Reserved
RJ45	Used to connect the KC2-CS0 to the VFD
Fastening screw	
Snap fit	Used to secure the KC2-CS0 to the base
Battery cover	
Nameplate	Used to record product model and serial number

1.4 Interface display introduction

KC2-CS0 uses an LED digital tube display.



Figure 93. Display interface

Table 46. Display content

No.	Display content	Description
1	Status display	Display current VFD status information
2	Unit	Display current parameter unit being acquired
3	Content	Display current parameter name or value
4	Content	Display current parameter value

1.5 Key description

Table 47. Key description

Key	Name	Description
LO/RE	LO/RE	Local/Remote operation switch (reserved)
AXIS	AXIS	Axis number selection (reserved)
FN	FN	Multi-function key, used to implement function of P10.02.
	Up	Adjust the selected parameter value or group number upward; scroll up to select functions in special function interfaces.
	Dn	Adjust the selected parameter value or group number downward; scroll down to select functions in special function interfaces.
	Left	Move the cursor leftward
\triangleright	Right	Move the cursor rightward
OK	OK	Confirm parameter group/special function selection or parameter value settings.
ESC	ESC	Short press to enter parameter settings mode or exit.
	Run	Control VFD start-up during panel operation.
	Stop Controls the VFD to stop during operation; the stop the settings defined in parameter	

1.6 General specifications

No.	Category	Operation	Storage	Transportation		
1	Operating	-20~+55°C	-40~+70°C	-40~+70°C		
	temperature range	-20*+55 C		-40**+70 C		
2	Altitude	<4000m	-	-		
3	Relative humidity	95% (non-condensing)				
4	Pollution degree	3C3 (IEC 60721-3-3, IEC 60721-3-2, IEC 60721 -1-1-3-1)				
5	Vibration	61800-5-1 ed 2 EN 60082-2-6 test Fc(1g)	-	2M3 class (per EN 60082-2-6)		
6	Shock	3M4 class (per EN 60062-2-27)	-	2M2 class (per EN 60062-2-27)		
7	Free fall	IEC 60068-2-32 (drop height 1m)				
8	Protection rating	Connected to drive equipment: IP54 (with IP54 accessories selected); Standalone: IP20				
9	Electromagnetic	JEO /4000 0				
9	compatibility	IEC 61800-3				

Disposal: All materials of the unit are recyclable to protect the environment and conserve resources. For more
detailed recycling instructions and handling methods, comply with international and local regulations.

Chapter 2 Installation and Wiring

10

Material

The KC2-CS0 smart operation keypad is applicable to multiple VFD series. This manual uses the installation of the E610 as an example to illustrate the installation and wiring methods of the KC2-CS0 smart operation keypad.

2.1 Connection of KC2-CS0 to equipment

The KC2-CS0 connects to the VFD's CN3 port via its rear RJ45 port. The connecting Ethernet cable must comply with the EIA/TIA-568A or 568B standard, with a termination resistor inserted into the VFD at the communication end. The maximum total connection length must not exceed 150 meters.



Figure 94. Keypad connection diagram

Chapter 3 Functions and Applications

3.1 Overview

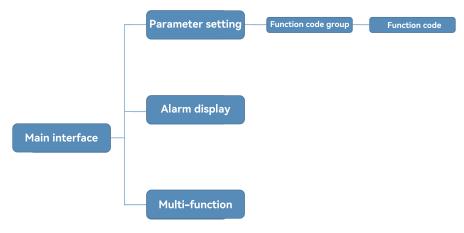


Figure 95. Functional overview

3.1.1 Main interface

The main interface is used to display monitored parameter values and the status of VFD. Its display functions are as follows:

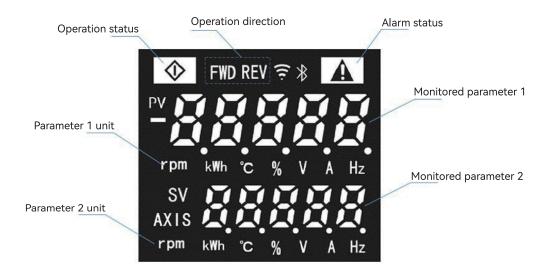


Figure 96. Functional overview

- * Operation status: Displays the current operation status of the VFD. A steady on indicates the VFD is running; a steady off indicates stopping.
- * Operation direction: Displays the current operation direction of the VFD. A steady "FWD" indicates forward operation; a steady "REV" indicates reverse operation.
- * Alarm status: A steady on indicates an active alarm message.
- * Monitored parameter 1: Real-time display of the value of the first currently monitored parameter;
- * Parameter 1 unit: Displays the unit corresponding to the first currently monitored parameter;
- * Monitored parameter 2: Real-time display of the value of the second currently monitored parameter;
- * Parameter 2 unit: Displays the unit corresponding to the second currently monitored parameter;

The main interface can monitor the VFD's operation status (e.g., start/stop, forward/reverse rotation) and operation or stopping parameters (e.g., operating frequency, set frequency, radiator temperature).

Upon startup, the interface automatically enters the main screen. The monitored parameter under stopped conditions flashes; under running conditions, the monitored parameter stays on.

3.1.2 Equipment start/stop control

Table 48. Start control functions

Name	Function	Key	Description
LO/RE	Remote/Local switching	LO/RE	Remote/Local operation switching (reserved)
RUN	Start control		Effective when the control mode is in panel control mode: Pressing the key starts the VFD. Ineffective when the control mode is in other modes: Pressing the key has no effect.

STOP	Stop control	Effective when the control mode is in panel control mode: Pressing the key stops the VFD. Ineffective when the control mode is in other modes: Pressing the key has no
		effect.
Up	Speed increment	Effective when the frequency source is set via digital input: Pressing the key increases the frequency. Ineffective when the frequency source is not set via digital input: Pressing the key has no effect.
Down	Speed decrement	Effective when the frequency source is set via digital input: Pressing the key increases the frequency. Ineffective when the frequency source is not set via digital input: Pressing the key has no effect.

3.2 Parameter settings

Table 49. Parameter setting functions

Name	Function	Key	Description
ESC	Exit	ESC	Short-press the key in the main interface to enter the parameter group interface;
			Short-press the key in other interfaces to return to the previous level.
	Value increment		In the parameter group interface: Short press to increase the parameter group
Hn			number; long press to continuously increase the parameter group.
Up			In the parameter setting interface: Short press to increase the flashing cursor
			value; long press to continuously increase the flashing cursor value.
	Value decrement		In the parameter group interface: Short press to decrease the parameter group
Down			number; long press to continuously decrease the parameter group.
DOWII			In the parameter setting interface: Short press to decrease the flashing cursor
			value; long press to continuously decrease the flashing cursor value.
Left	Cursor left shift		In the parameter setting interface, shift the flashing cursor value to the left.
Right	Cursor right shift		In the parameter setting interface, shift the flashing cursor value to the right.

To view or modify parameters:

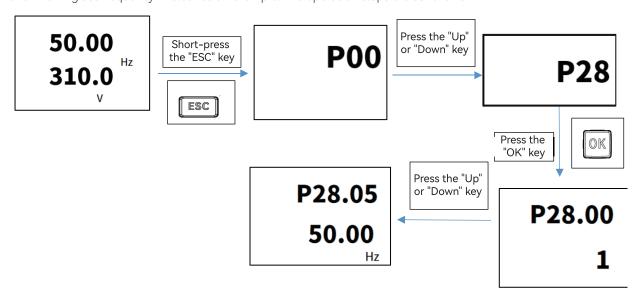
- 1. Short-press the "ESC" key to enter the parameter group selection interface.
- 2. Press the "Up" or "Down" key to select the target parameter group.
- 3. Press the "OK" key to enter the selected parameter group interface, where the parameter ID is displayed at the top and the corresponding parameter value (under this ID) is shown at the bottom.

To modify a parameter ID:

- 1. Use the "Up" or "Down" keys to adjust the parameter ID.
- 2. Use the "Left" or "Right" key to move the blinking position of the parameter ID; the corresponding digit flashes when the cursor is positioned. "H." is displayed before the parameter value to indicate hexadecimal.

I. Parameter viewing

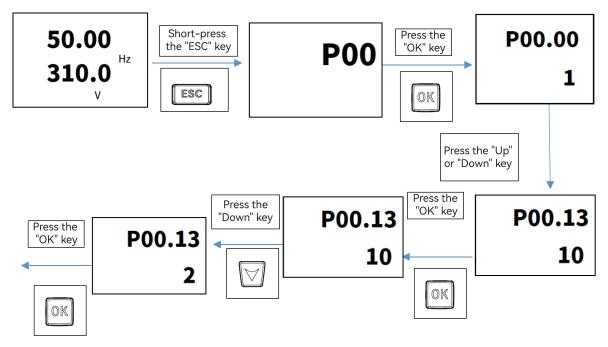
Take "Viewing set frequency P28.05" as an example. The operation steps are as follows:



In the parameter interface, the parameter ID is displayed at the top, and the parameter value, along with its corresponding unit, is shown at the bottom. After viewing, long-press or short-press the "ESC" key to return to the previous level until exiting to the main interface.

II. Parameter modification

Take "Modifying acceleration time 1 P00.13" as an example. The operation steps are as follows:



After modifying the parameter, press the "OK" key to confirm, ensuring the parameter value is written to the VFD and saved.

If the "OK" key is not pressed to confirm after modification and the "ESC" key is directly short-pressed to exit, the parameter value cannot be written to the VFD. Rechecking will display the previously saved value.

3.3 FN multi-function

The "FN" multi-function key executes functions based on the settings of parameter P10.2 of the VFD.

P10.02 parameter value	Key status	FN operation description
0: FN invalid	No operation	N/A
1: Switching between operator	No operation	
panel commands and remote		Reserved
commands		
	Short-press	When the VFD is running forward, short-pressing the "FN" key switches the VFD to
2: Switching between forward and		reverse operation.
reverse rotation		When the VFD is running in reverse, short-pressing the "FN" key switches the VFD to
		forward operation.
2. Farward in a	Short-press/	Pressing the "FN" key starts the VFD in forward jog operation; releasing the "FN" key
3: Forward jog	Long-press	stops the jog operation.
/: Dayaraa ia a	Short-press/	Pressing the "FN" key starts the VFD in reverse jog operation; releasing the "FN" key stops
4: Reverse jog	Long-press	the jog operation.
5: Exit parameter interface	Short-press	In the parameter setting interface, press the "FN" key to exit the previous level.

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