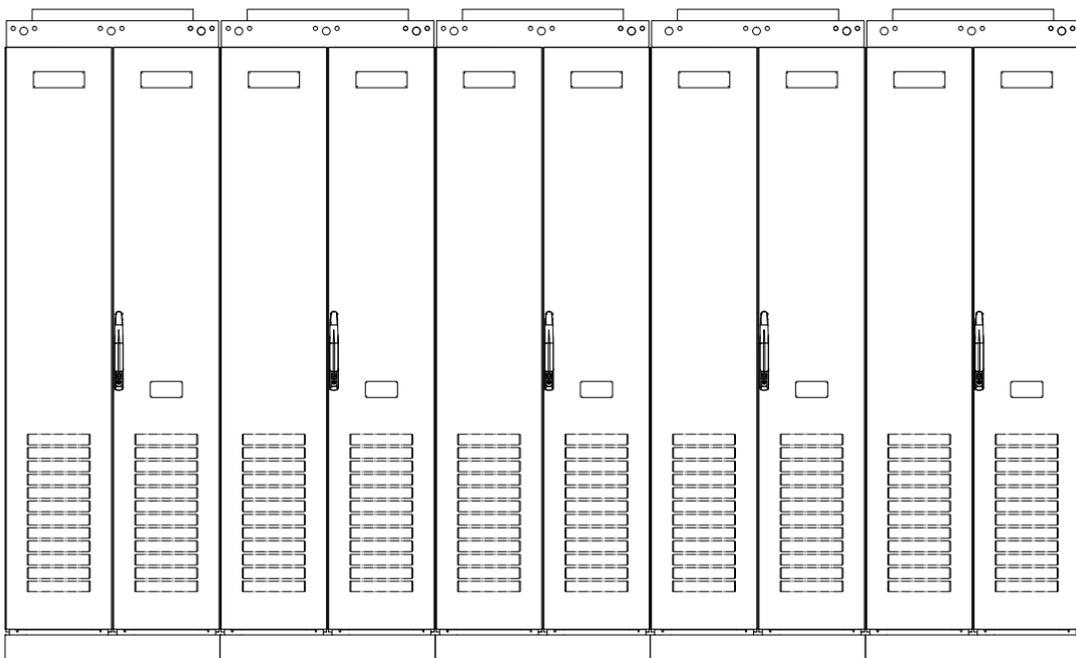# GUIDE

GUIDE multi-drive product HF680N series
Instruction manual   Version: V1.05

Please hand over this manual to the end user and keep it properly.

Wuhan Guide Technology Co.,Ltd.

Foreword

Thank you for choosing GUIDE multi-drive product! At the same time, you will enjoy the comprehensive and sincere service we provide for you!

GUIDE HF680N series is a multi-drive product developed to meet the high reliability requirements and high performance drive needs of the lifting industry, and its performance indicators have reached the world's leading level.

In order to fully utilize the excellent performance of this product and to ensure the safety of the user and the equipment, please read this manual in detail before use.

This instruction manual is an accessory sent with the product. After use, please be sure to keep it in a safe place for future overhaul and maintenance of the multi-drive product.

If you have any questions or special requirements for the use of multi-drive product HF680N series, please feel free to contact our local offices or distributors, or directly with our headquarters after-sales service center, we will be happy to serve you.

The contents of this manual are subject to change without notice.

Wuhan Guide Technology Co.,Ltd.

CONTENTS

1. Safety Instructions

Read these instructions carefully before installation, operation, maintenance or inspection.

1.1 Description of cue symbols

⚠ DANGER

When used incorrectly, it can cause a hazardous occurrence that could result in personal injury or death.

⚠ CAUTION

When used incorrectly, it can cause a hazardous occurrence that could result in minor or moderate personal injury or equipment damage.

⚠ WARNING

(1) It is prohibited to touch the radiator with hands for a period of time after ten minutes of energization or after power failure to prevent burns;
(2) Do not operate the product frequently by energizing and de-energizing it, and do not energize it again within five minutes after de-energizing it;
(3) Do not remove the cover of the product or touch the printed circuit board while it is energized to prevent electric shock;
(4) When wiring, inspection, etc. is performed, it must be done after the power has been turned off for five minutes;
(5) The grounding terminal of the product must be well grounded;
(6) Do not allow foreign objects to fall into the product.

⚠ DANGER

(1) Installation of the product on flammable materials is prohibited;
(2) This series of multi-drive is not suitable for flammable and explosive environments, if necessary, please order special equipment from the manufacturer;
(3) It is prohibited to disassemble or modify the product privately;
(4) It is strictly prohibited to connect AC power to the output terminals U, V, and W of the inverter;
(5) Do not open the cover or perform wiring work while the product is energized.

Precaution instructions

1) Leakage protection equipment

The equipment generates large leakage currents that flow through the protective grounding conductor during operation. If using a Leakage Protection Device (RCD) or Leakage Monitor (RCM), use a Leakage Protection Device (RCD) or Leakage Monitor (RCM) that has a delayed response or filters out higher current harmonics. Please install a B-type leakage protection device (RCD) on the primary side of the power supply. When selecting a leakage protection device (RCD), consider the transient and steady state leakage currents to ground that may occur when the equipment is starting up and running, and select a special RCD with measures to inhibit high harmonics, or a general-purpose RCD with a large residual current.

2) Motor insulation check

When the motor is used for the first time or used again after a long period of time, a motor insulation check should be done to prevent damage to the multi-drive product due to insulation failure of the motor winding. When checking the insulation of the motor, please dismantle the connecting wires between the motor and the multi-drive product. It is recommended to use a 500V megohmmeter, which should ensure that the insulation resistance of the motor is not less than 5MΩ.

(3) Use other than the rated voltage value

Using the multi-drive product outside of the permissible operating voltage range specified in the manual may cause internal damage to the multi-drive product. If necessary, use a step-up or step-down device to transform the power supply before connecting it to the multi-drive product.

Warning symbols are printed on the following locations for safety and must be observed when using the product.

Regenerative rectifier HF680N02C-400-4 Example

Warning sign location
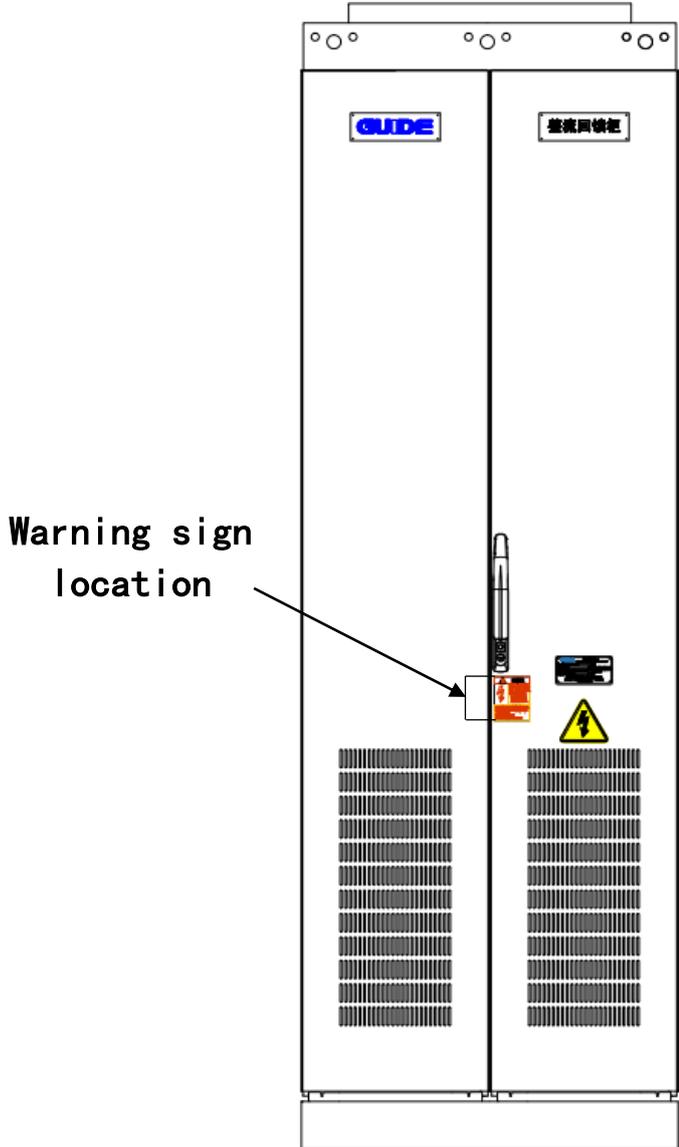
Content of warning signs
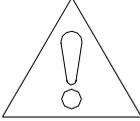
⚠ DANGER

HAZARDOUS VOLTAGE
WILL CAUSE SEVERE
INJURY OR DEATH.
电击事故会导致
人员伤害或死亡。

1.Disconnect electric power before servicing,
2.Retighten all power circuit connections
   every six month
1.维修前必须先断开电源
2.每六个月重新紧固所有电器连接处

1.2 Scope of application

(1)　This product is an industrial multi-transmission product for regenerative rectifier and three-phase AC asynchronous motor drives.

(2)　When used in equipment where personal injury or death may occur due to failure of a multi-drive product (e.g., nuclear control systems, aviation systems, safety equipment and instrumentation, etc.), it must be handled with care, and in such cases, consult the manufacturer.

(3)　This multi-drive product is manufactured under strict quality control, but if it is used in hazardous equipment, safety precautions should be taken on the equipment to prevent widening the scope of accidents in the event of a multi-drive product failure.

1.3 End-of-life considerations

Care should be taken when dealing with end-of-life multi-drive products and their components:

Electrolytic Capacitors: Electrolytic capacitors within multi-drive products can explode when incinerated.

Plastic: Plastic and rubber products on multi-drive products may produce harmful and toxic gases when burned, so please be especially careful when burning.

Disposal: Please dispose of multi-drive products as industrial waste.

2. System Overview

2.1 Overview

The HF680N series of multi-drive products consists of a regenerative rectifier module, an inverter and a LCL filter unit.
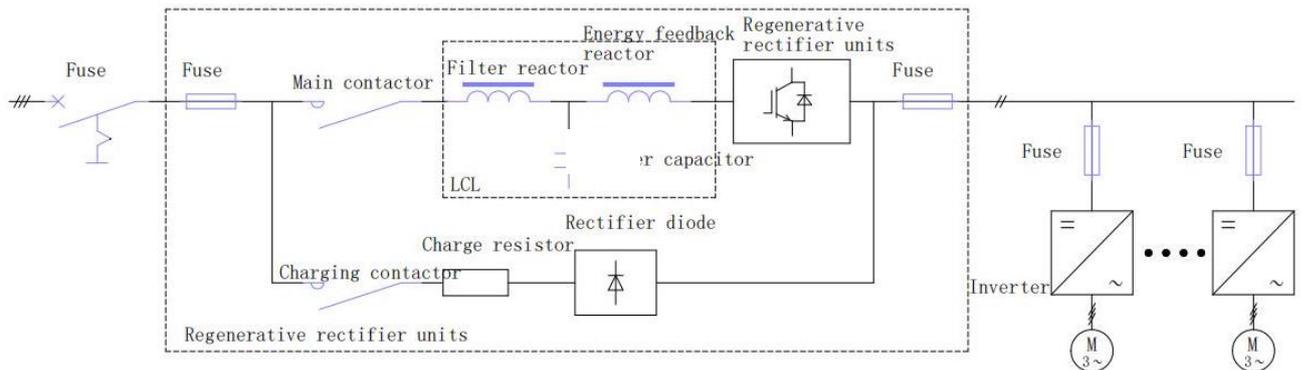
The regenerative rectifier units rectifies the power supply and feeds the energy back into the grid。 Regenerative rectifier units adopts IGBT power elements, its input is AC three-phase power supply, its output is DC voltage, also known as active front-end (AFE), which can eliminate high harmonics, improve power factor, and is not affected by the fluctuation of the grid voltage within a certain range, and has excellent dynamic characteristics.

Principle: The regenerative rectifier units is connected to the three-phase AC power, the control board is supplied with power through the external DC24V DC power supply, and the charging resistor is controlled to pre-charge the DC side circuit after obtaining the start signal, after completing the charging, the main contactor is absorbed, the main circuit is on, and the IGBT starts to work, and the bus voltage is controlled at the set value, and the DC power supply is outputted for the use of the inverter.

2.2 Functions

The regenerative rectifier units and the inverter have their own independent control boards, both of which can be independently controlled using terminals or communication.

(1) Control functions:

The regenerative rectifier units adopts the AFE control method, which can control the DC bus voltage, incoming power factor and incoming current harmonics.

The inverter provides V/F, open-loop vector and closed-loop vector control methods that can control the torque, speed, current and voltage of the motor.

(2) Software functions:

Regenerative rectifier	Regenerative rectifier self-tuning	Regenerative rectifier self-tuning to recognize the DC side capacitance value.
	Regenerative rectifier Control	Separate control of active and reactive currents
Inverter	Free function modules for user-programmable applications	logical function module Mathematical Function Module Timer Module PID modules, etc.
	motion control	Multi-curve acceleration/deceleration function Timer-controlled run/stop function other than
	Lifting-specific functions	Constant power control Position control for grab cranes Crane open holding brake function
	synchronized control	Master/slave synchronization control Speed/torque control
	Motor parameter identification	Automatic recognition of motor parameters enables quick and easy commissioning and optimization of the control performance of the inverter

2.3 System accessories

Optional accessories for multi-drive products:

Name	Model number	Descriptive
DP card	GDHF-ADPX1	The GDHF-ADPX1 DP card conforms to the international standards of the standard Profibus fieldbus, the HF680N02M series rectifier return or the HF680N03M series inverter in conjunction with it.
PG Card	GDHF-APGX1	The GDHF-APGX1 universal PG card can be used as an adapter for the encoder to access the inverter and work with the HF680N03M series inverters. (Output DC voltage 15V, no need for optional PG card for regenerative rectifier units)
PN communication card	GDHF-APNX1	The GDHF-APNX1 communication card complies with the international standards of Profinet fieldbus and can be used with the HF680N02M series regenerative rectifier or HF680N03M series inverter.
Operation Keyboard	GDHF-AKZY1	The GDHF-AKZY1 operating keypad is the same as the operating keypad that comes with the HF680N02M series regenerative rectifier or HF680N03M series inverters.
Keyboard cable 2 meters	GDHF-KL2	The GDHF-KL2 Keypad Cable 2 meters serves as the connecting cable between the operating keypad and the HF680N02M Series Regenerative rectifier or the HF680N03M Series Inverter, and is 2 meters in length.
Keyboard cable 4 meters	GDHF-KL4	The GDHF-KL4 Keypad Cable 4 meters serves as the connecting cable between the operating keypad and the HF680N02M Series Regenerative rectifier or the HF680N03M Series Inverter, and is 4 meters in length.
Parallel Fiber Optic Board Master Card	GDHF680NN4FB01A1	GDHF680NN4FB01A1 Paralleling main fiber optic board main fiber optic main board for HF680N02M series rectifier feedback or HF680N03M series inverter to realize multi-paralleling. Applicable power range 800kW~2400kW.

Parallel Fiber Optic Board Sla	GDHF680NN4FB02A1	GDHF680NN4FB02A1 Parallel Fiber Slave Board is a fiber slave board for HF680N02M series rectifier feed back or HF680N03M series inverter to realize multi-parallel. Appl
Three-phase voltage sampling	GDHF65004VS01	GDHF65004VS01 three-phase voltage sampling board for the HF680N02M series rectifier back to achieve three-phase incoming voltage sampling, complete voltage frequency
Three-phase voltage sampling	22.03.A21.96.100	HF680N02M series air-cooled multi-transmission RST three-phase caixiang line complete cable set.

Name	Model number	Descriptive
Triple-parallel fiber optic master	GDHF680NN4MFB3	GDHF680NN4MFB3 tri-parallel fiber optic master station is the fiber optic master station for HF680N series regenerative rectifier to realize tri-parallel machine, applicable to the maximum power of 1200kW. It is suitable for the maximum power of 1200kW, including: multi-parallel fiber optic base board, multi-parallel fiber optic power board, multi-parallel fiber optic main board 2 pieces.
Quadruple-parallel fiber optic master	GDHF680NN4MFB4	GDHF680NN4MFB4 quad-parallel fiber optic master station is the fiber optic master station for HF680N series regenerative rectifier to realize quad-parallel operation, which is applicable to the maximum power of 1600kW, including 3 pieces of multi-parallel fiber optic main boards. It is suitable for the maximum power of 1600kW, including: multi-parallel fiber optic base board, multi-parallel fiber optic power board, multi-parallel fiber optic main board 3 pieces.
Fiber optic master	GDHF680NN4MFB5	GDHF680NN4MFB5 five-parallel fiber optic master station is the fiber optic master station for HF680N series regenerative rectifier to realize five-parallel machines, applicable to the maximum power of 2000kW. It is suitable for the maximum power of 2000kW, including: multi-parallel fiber optic base board, multi-parallel fiber optic power board, multi-parallel fiber optic main board 4 pieces.

Six-parallel fiber optic master	GDHF680NN4MFB6	GDHF680NN4MFB6 six-parallel fiber optic master station is the fiber optic master station for HF680N series regenerative rectifier to realize six-parallel machines, applicable to the maximum power of 2400kW. It is suitable for the maximum power of 2400kW, including: multi-parallel fiber optic base board, multi-parallel fiber optic power board, multi-parallel fiber optic main board 5 pieces.

2.4 Storage and installation of multi-drive products

⚠️ WARNING

1. Working on the regenerative rectifier units and inverter devices/systems by untrained and qualified personnel or failing to comply with the relevant provisions of the WARNING may result in serious personal injury or substantial property damage. Only certified and qualified personnel trained in the design, installation, commissioning and operation of the equipment are permitted to work on this device/system.

2. Input power cords are only permitted to be permanently fastened and the unit must be reliably grounded.

3. The following terminals may carry dangerous voltages even if the device is not in operation:
   - Power terminals R, S, T
   - Terminals U, V, W for motor connection
   - DC bus terminals P, N

4. After the power switch is disconnected, you must wait 5 minutes for the product to discharge before allowing installation operations to begin.

5. The minimum cross-sectional area of the grounding conductor shall be equal to or greater than the cross-sectional area of the supply power cable.

⚠️ CAUTION

1. Hold the bottom of the body when handling.
   Holding the panel only, there is a danger of the subject falling and hitting your foot and injuring yourself.
2. Install on a board made of non-flammable material such as metal.
   Installation on flammable materials poses a fire hazard.
3. When two or more units are installed in the same control cabinet, set up a cooling fan and keep the air temperature at the air inlet below 40℃ .
   Due to overheating, it can cause fires and other accidents.
4. Allow at least 1.2 meters in front of the operating equipment to allow for maintenance and operation by site personnel or to facilitate the use of handling equipment when required.

2.4.1 Storage environment

- Must be placed in a dirt-free, dry location.

- Store at ambient temperatures in the range of -20℃ to +60℃ .

- The relative humidity of the storage environment is within 0% to 95% and free of condensation.

- The storage environment is free of corrosive gases and liquids.

- Best placed on a shelf and stored properly wrapped.

- It is better not to store the equipment for a long time, long time storage will lead to the deterioration of electrolytic capacitors, if you need to store for a long time, you must ensure that the power is energized once in 1 year, the power time is at least 5 hours or more, the voltage must be input with a voltage regulator to slowly increase to the rated voltage value.

2.4.2 Installation environment

- Install vertically in a well-ventilated electrical cabinet with good room ventilation.

- Ambient temperature - 10℃ to +40℃ . If the temperature range is between +40℃ to +50℃ , the rated output current is reduced by 2% for every 1℃ increase. For ambient temperatures above 50℃ , consult the manufacturer for instructions.

- Avoid high temperature and humidity as much as possible, humidity less than 95% RH, no condensation, no rain dripping.

- Do not install on flammable objects such as wood.

- Avoid direct sunlight.

- No flammable, corrosive gases and liquids.

- Free of dust, oily dust, floating fibers and metallic particles.

- No electromagnetic interference, away from sources of interference.

- Altitude of 1000 meters or less. If the altitude exceeds 1,000 meters, reduce the rated output current by 1% for every 100 meters of altitude. Consult the manufacturer for guidance if the altitude exceeds 3,000 meters.

Note: The environmental conditions of the installation site will affect the service life of the equipment.

2.4.3 Installation orientation and space

In order to facilitate the heat dissipation of the product, the product should be mounted vertically and the ventilation space around it should be ensured. The following table gives the clearance dimensions (recommended values) for mounting the product.
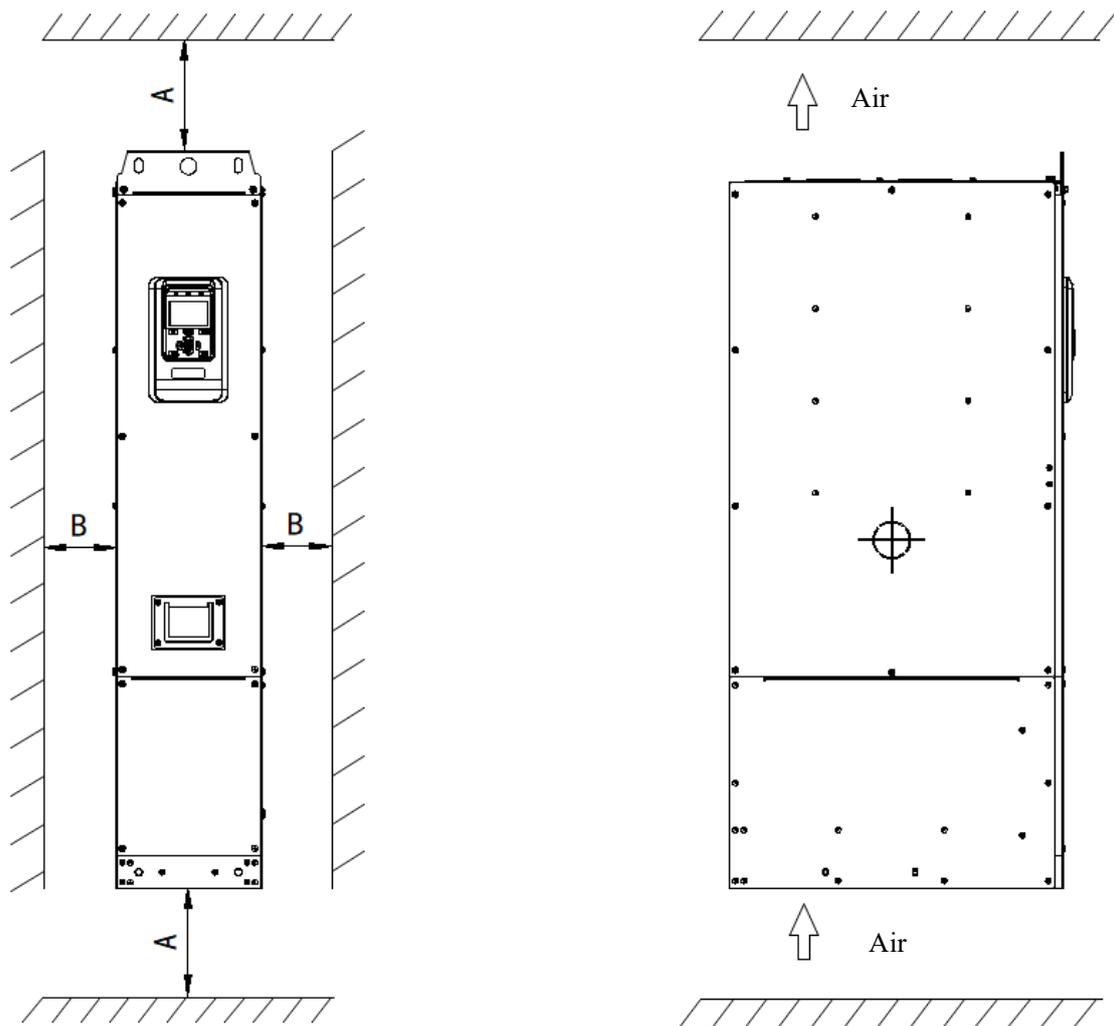
Mounting Clearance Dimension Table

Product Type	Clearance size	
wall-mounted	A≥ 200mm	B≥ 50mm

Note: For parallel installation, the recommended module spacing is not less than

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50mm.

2.4.4 Removal and installation of cover plates

Disassembly Steps:

（1） Unscrew the set screws on the front of the cover first in the direction of arrow 1.

（2） Pan the cover slightly downward in the direction of arrow 2. (Omit this step for LCL filter units)

（3） Remove the lower cover plate in the direction of arrow 3.

Install the cover plate by reversing the steps above.
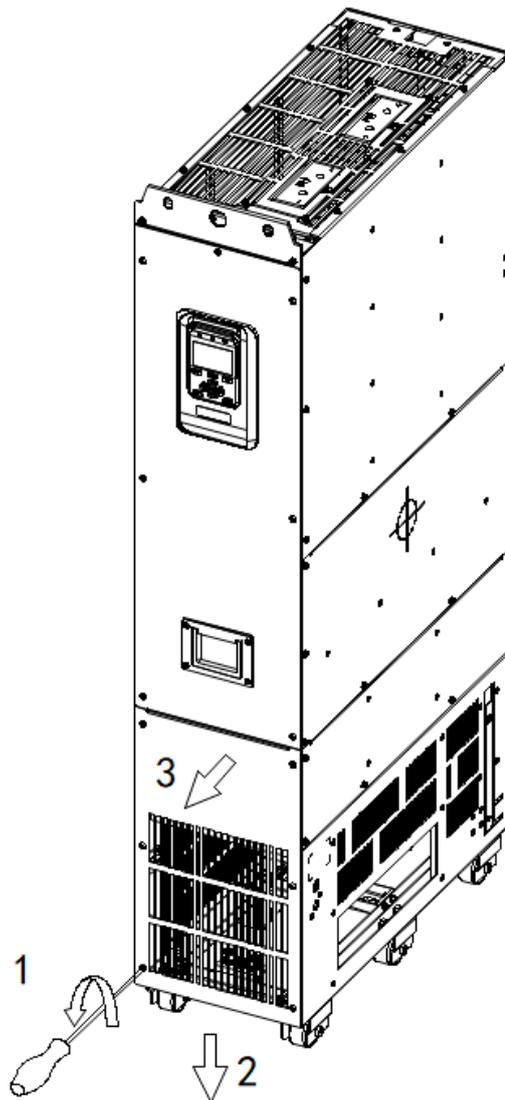
Example of regenerative rectifier units
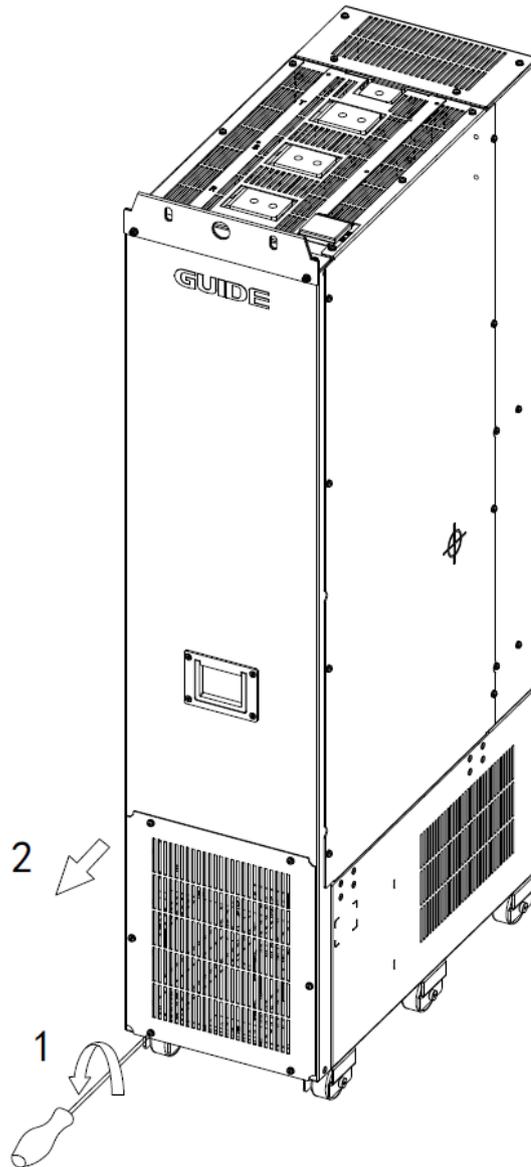
Example of LCL filter unit

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3. regenerative rectifier units

3.1 Overview

The regenerative rectifier module and the LCL filter unit form the regenerative rectifier units. The regenerative rectifier units converts the input three-phase alternating current into direct current and supplies it to the inverters in the drive system. It can be connected to only one inverter or multiple inverters. When the motor is in the power generation state, the regenerative rectifier units feeds the power back to the power grid. Among them, the LCL filter unit is used to suppress AC voltage distortion and current harmonics.

3.2 Design

(1) Main circuit terminals

Terminal Symbols	Functional Description
P (+)	DC bus voltage positive terminal
N (-)	DC bus voltage negative terminal
R, S, T	Three-phase input terminals of regenerative rectifier modules
⏚	Regenerative rectifier Module Ground Terminal or Grounding Point

Main circuit terminal diagram for B4 model:

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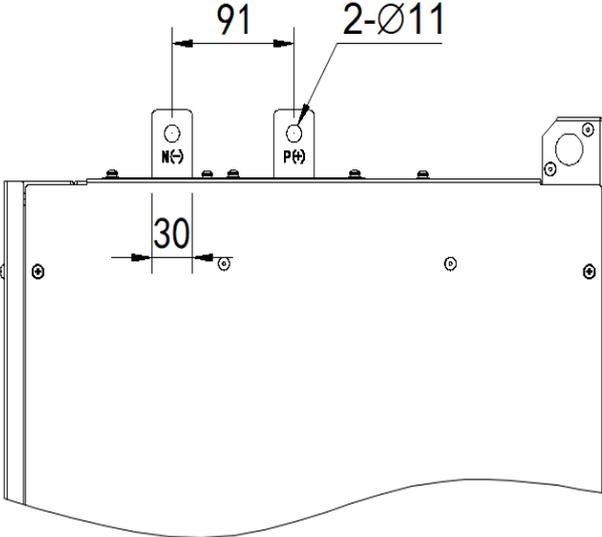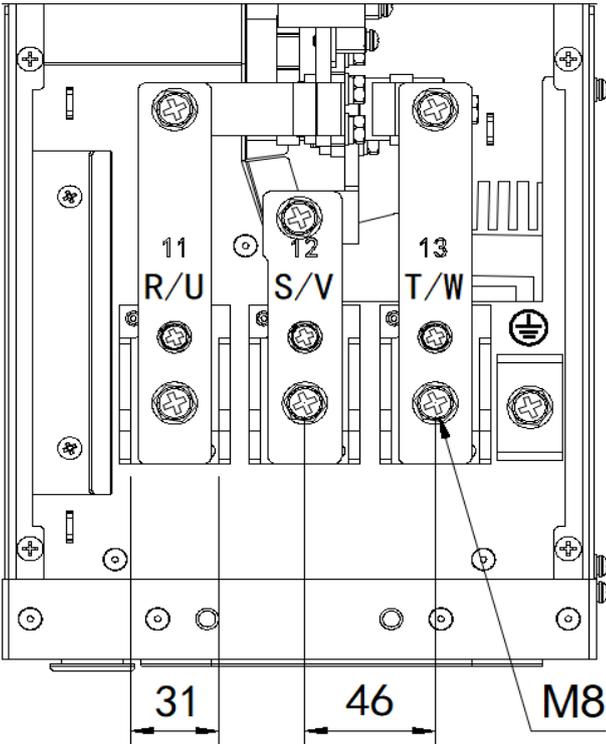
B5 Main Circuit Terminal Distribution Diagram
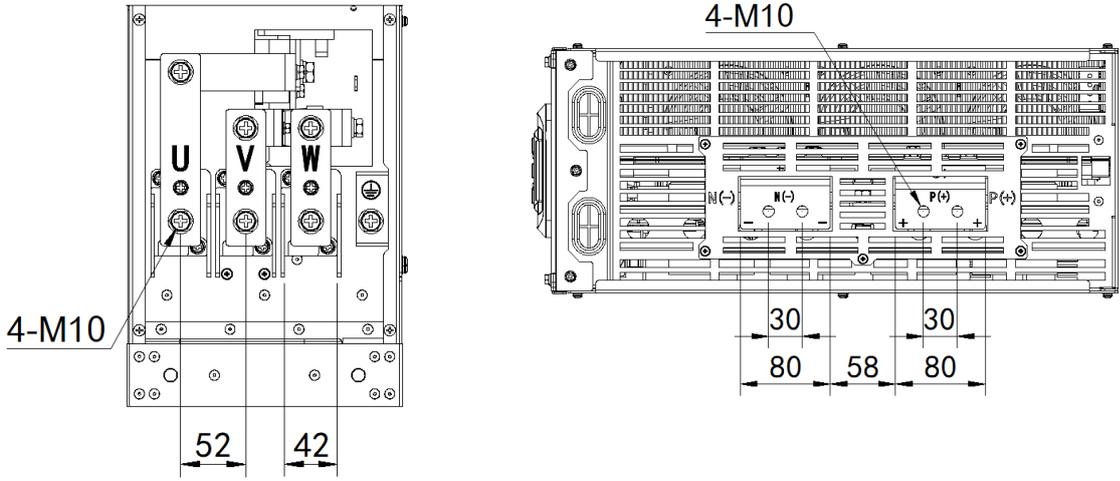
Main circuit terminal diagram for B6 model:
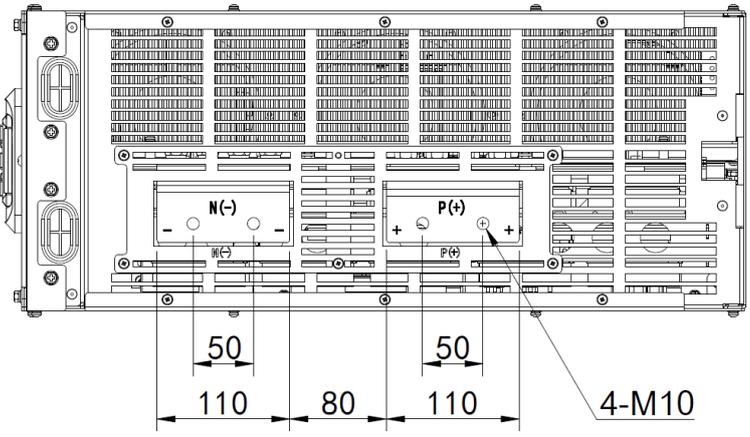
(2) LCL filter unit main circuit terminals

Terminal Symbols	Functional Description
R, S, T	Three-phase input and output terminals LCL filter unit
⏚	LCL filter unit ground terminal or grour point
P (+), N (-)	LCL DC bus voltage output terminal

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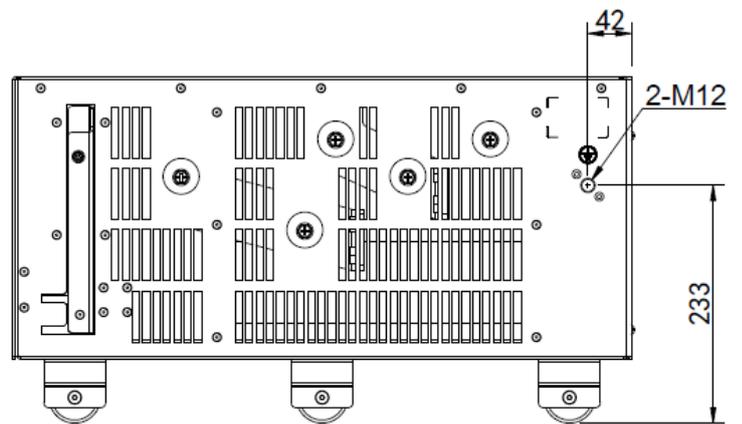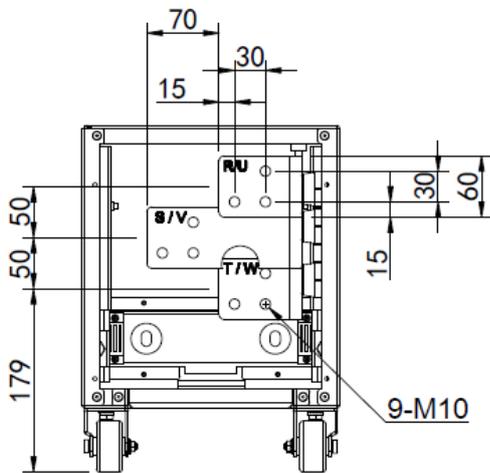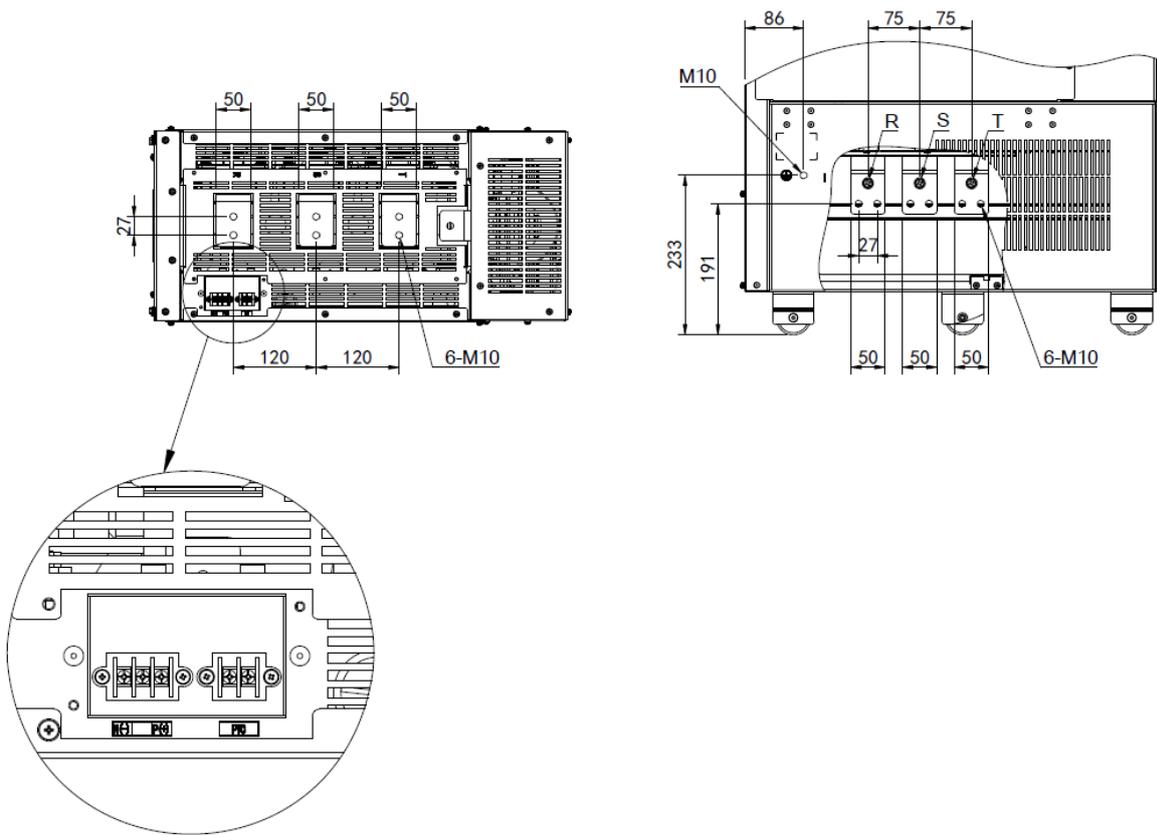
B6 model LCL

(2) Control board terminal

10V	AI1	AI2	DI1	DI2	DI3	DI4	DI5	COM
GND	AO1	AO2	24V	DO1	COM	24V	PW	COM

DO4A	DO4C	DO4B	DO5A	DO5C
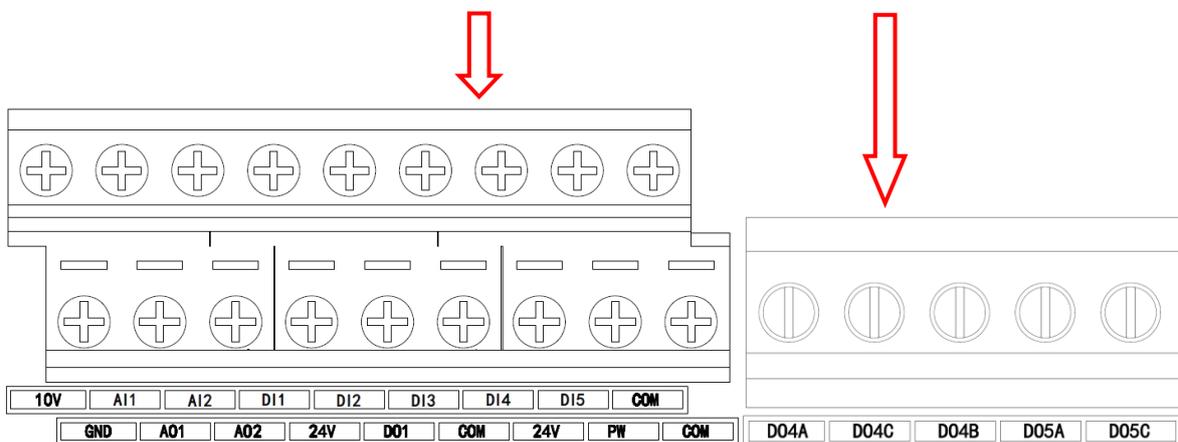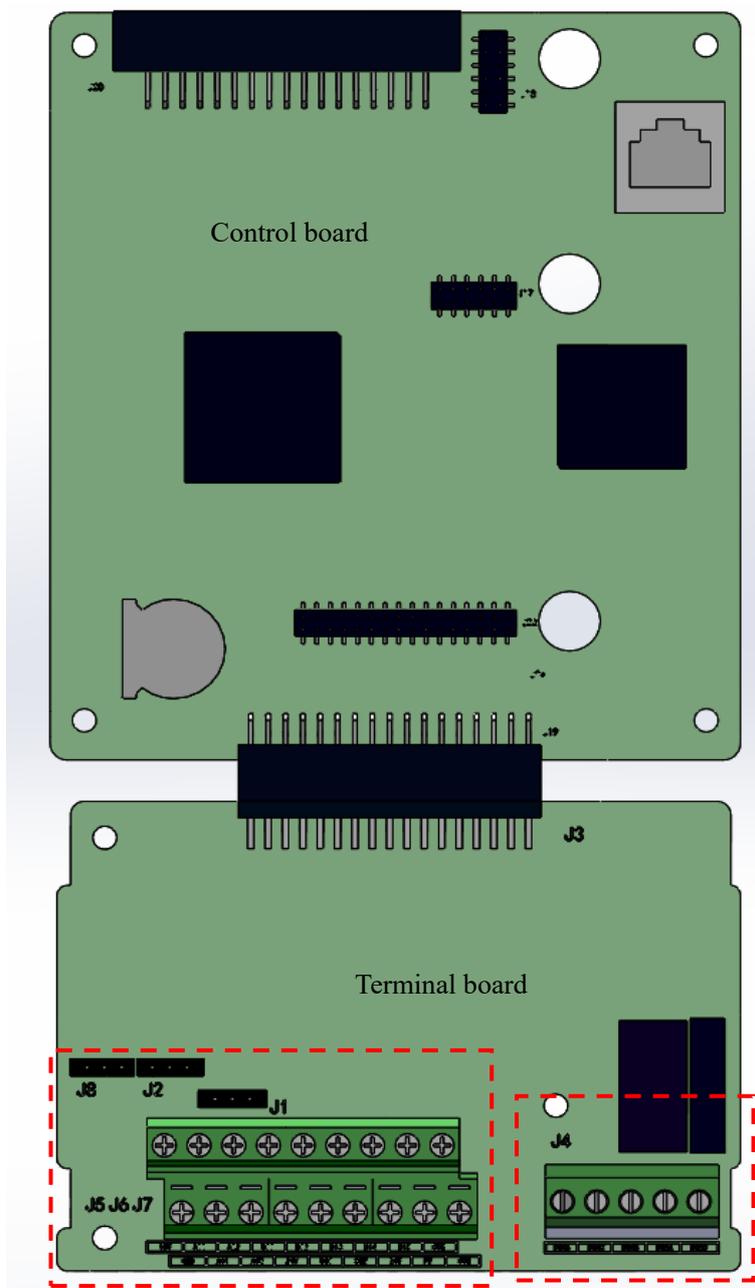
Form	Terminal symbol	Terminal Name	Functional Description
electric power source	+10V-GND	External +10V power supply	Provide +10V power supply to the outside, maximum output current: 50mA generally used as an external potentiometer power supply, potentiometer resistance range: 1kΩ~5kΩ
	+24V-COM	External +24V power supply	Provides +24V external power supply, which is generally used as the working power supply for digital input/output terminals and external sensor power supply Maximum output current: 200mA
	PW	External Input Terminal	Factory default connection to +24V via shorting tabs When external signals are used to drive DI1~DI5 and DO1, the PW must be connected to the external power supply and disconnected from the +24V power supply terminal.
analog input	AI1-GND	Analog input terminal 1	Input voltage range: DC -10V~10V Input impedance: 100kΩ
	AI2-GND	Analog input terminal 2	Input range: -10VDC~10VDC/0mA~20mA, selected by J1 jumper on terminal board to decide voltage or current input. Input impedance: 100kΩ for voltage input, 500Ω for current input.
digital input	DI1- PW	Digital Input 1	Opto-coupler isolated, compatible with bipolar inputs Input impedance: 3.3kΩ Voltage range at effective level input: 9V~30V, DI1-DI4 maximum input frequency up to 500Hz, DI5 maximum input frequency 20KHz.
	DI2- PW	Digital Inputs 2	
	DI3- PW	Digital Input 3	
	DI4- PW	Digital Inputs 4	
	DI5- PW	Digital Input 5	
analog output	AO1-GND	Analog Output 1	Voltage or current output is determined by the J2 jumper selection on the terminal block. Output voltage range: 0V~10V Output current range: 0mA~20mA
analog output	AO2-GND	Analog Output 2	Voltage or current output is determined by the J8 jumper selection on the terminal block. Output voltage range: 0V~10V Output current range: 0mA~20mA
digital output	DO1-COM	Digital output 1	Optocoupler isolated, bipolar open collector outputs Output voltage range: 0V~24V Output current range: 0mA~50mA
relay output	DO4A-DO4C	Open the terminals often 1	Contact drive capability: 250VAC, 3A, COSφ=0.4 30VDC, 1A
	DO4B-DO4C	Normally closed terminal 2	
	DO5A-DO5C	Normal open terminal 3	Contact drive capability: 250VAC, 2A, COSφ=0.4 30VDC, 1A

Form	Terminal Symbols	Terminal Name	Functional Description
Jumper	J1	AI2 Input Selection	Voltage and current input selectable, default is voltage input
	J2	AO1 Output Selection	Voltage and current outputs are selectable, the default is voltage output.
	J3	AO2 Output Selection	Voltage and current outputs are selectable, the default is voltage output.

Power Adapter Board Terminals
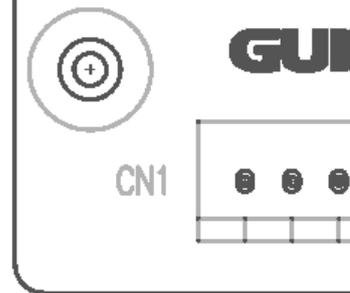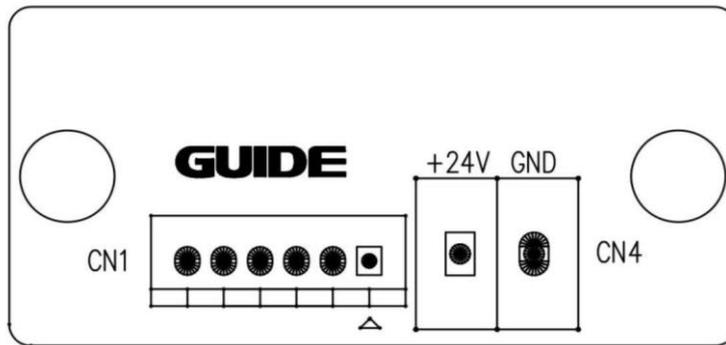
Form	Terminal symbol	Terminal Name	Functional Description
External DC+24V power supply	CN4	+24V-GND	Power to the control board must be connected.
Input Voltage Sampling	CN1	Input Voltage Sampling	L1/L2/L3 incoming voltage sampling, to be used with the input voltage detection board, must be connected.

Three-phase voltage sampling board (external)

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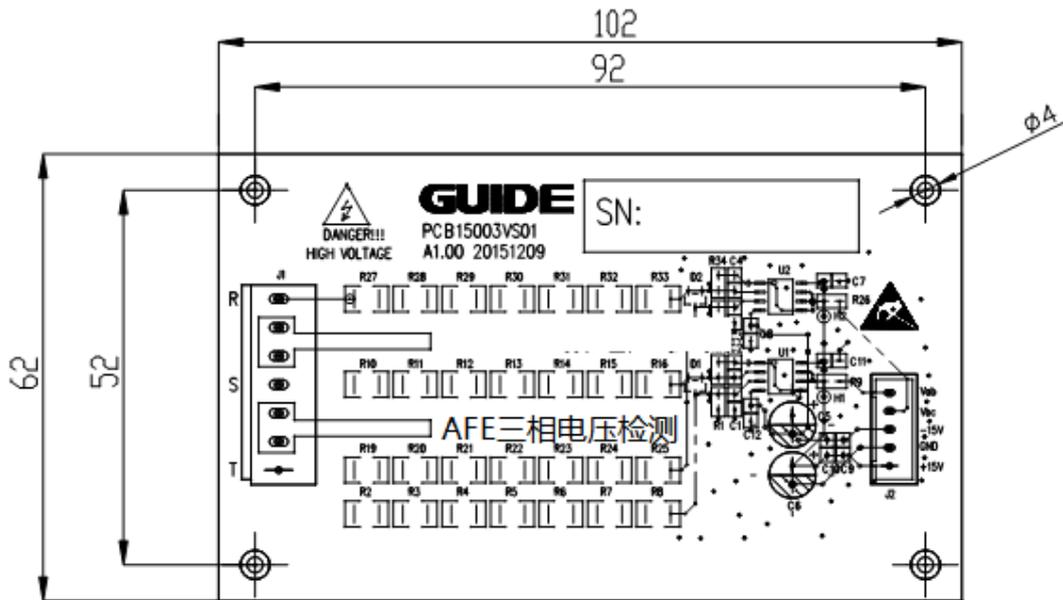
Form	Terminal Symbols	Terminal Name	Functional Description
High Voltage Sampling Terminal	J1	1121S-7P	Voltage sampling terminal on the high voltage side, connected to the buffer resistor output
Low Voltage Signal Wire Terminal Block	J2	2001S-5P(T)	Low Voltage Side Signal Connection Block, connects to control board via cable

3.3 Selection and ordering information

Model definition of the regenerative rectifier units:
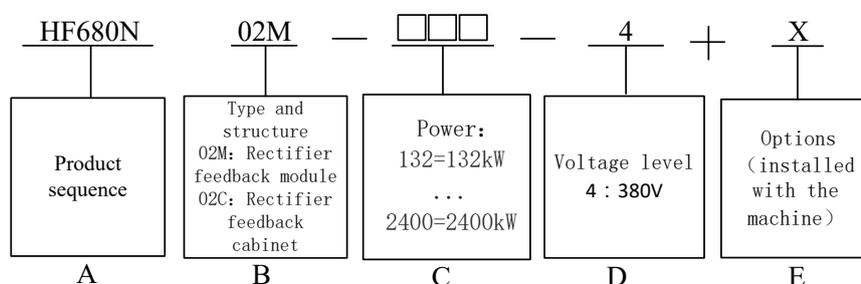
A	Product sequence
B	Type and structure 02M：Regenerative rectifier module　02C：Regenerative rectifier cabinet
C	Power 132: 132kW 2400: 2400kW
D	Voltage level　4: 380V
E	Options (installed with the machine)

Options (installed with the machine) :

Coding	Note	Coding	Note
MB01	Modbus RTU communication card	DP01	Profibus DP communication card
PN01	Profinet Communication Card	CAN01	CANopen Communication Card

Base Height Description:

Z1/None　　Available for cabinet type products only, with a base height of 100mm.

Z2　　Only available as a cabinet model with a base height of 200mm.

Z3　　Only available as a cabinet model with a base height of 250 mm.

Z4　　Available only as a cabinet model with a base height of 300 mm.

Example:

Model number HF680N02C-400-4 is the same as model number HF680N02C-400-4+Z1, indicating 400kW rectifier-fed indoor cabinet-type products with a base height of 100mm.

Model and specifications of the regenerative rectifier units (bus voltage 620V):

Model number	AC rated current lac (A)	Light overload condition		Heavy overload conditions		Overload power Pdch (kW)	Heat generation (kW)	Models
		DC output current ldc (A)	Output power Pdc (kW)	DC output current ldch (A)	Output power Pdch (kW)			
HF680N02M-132-4	265	308	191	213	132	132		B4
HF680N02M-185-4	330	384	238	298	185	185		B5
HF680N02M-250-4	485	564	350	403	250	250		B6
HF680N02M-315-4	545	634	393	508	315	315		
HF680N02M-355-4	610	710	440	573	355	355		
HF680N02M-400-4	668	777	482	645	400	400		
HF680N02M-450-4	720	838	519	726	450	450		
HF680N02C-250-4	485	564	350	403	250	250		B6 built-in cabinet
HF680N02C-315-4	545	634	393	508	315	315		
HF680N02C-355-4	610	710	440	573	355	355		
HF680N02C-400-4	668	777	482	645	400	400		
HF680N02C-450-4	720	838	519	726	450	450		
HF680N02C-500-4	840	978	606	806	500	500		B6*2 built-in cabinet
HF680N02C-630-4	1090	1268	786	1016	630	630		
HF680N02C-800-4	1440	1676	1039	1290	800	800		
HF680N02C-1200-4	2160	2514	1558	1935	1200	1200		B6*3 built-in cabinet

Model number	AC rated current Iac (A)	Light overload condition		Heavy overload conditions		Overload power Pdch (kW)	Heat generation (kW)	Models
		DC output current Idc (A)	Output power Pdc (kW)	DC output current Idch (A)	Output power Pdch (kW)			
HF680N02C-1600-4	2880	3352	2078	2581	1600	1600		B6*4 built-in cabinet
HF680N02C-2000-4	3600	4190	2597	3226	2000	2000		B6*5 built-in cabinet
HF680N02C-2400-4	4320	5027	3117	3871	2400	2400		B6*6 built-in cabinet

Note: (1) The HF680N02M module does not contain a power-on buffer circuit, so the system needs to reserve a buffer circuit mounting position when the system is built into a cabinet;

(2) The HF680N02M module does not contain a three-phase voltage sampling board, so the system needs to reserve a mounting position for the three-phase voltage sampling board when the system is built into the cabinet.

3.4 Annexes

Model specifications of the LCL filter unit and charging resistor of the regenerative rectifier units:

model number	LCL filter unit (Lf, Lb, Cf)	filtering radio waves (i.e. pick out one frequency) Reactor (Lf)	energy return Reactor (Lb)	Filter capacitance (Cf)	Charging Resistor
HF680N02M-132-4	GDHF680NN-lcl-132-4	ACL-132-4	PWM-132-4	CAP-132-4	3× 7R5
HF680N02M-185-4	GDHF680NN-lcl-185-4	ACL-185-4	PWM-185-4	CAP-185-4	3*7R5
HF680N02M-250-4	GDHF680NN-lcl-250-4	ACL-250-4	PWM-250-4	CAP-250-4	3× 4R

HF680N02M-315-4	GDHF680NN-lcl-315-4	ACL-315-4	PWM-315-4	CAP-315-4	3× 2R5
HF680N02M-355-4	GDHF680NN-lcl-355-4	ACL-355-4	PWM-355-4	CAP-355-4	3× 2R5
HF680N02M-400-4	GDHF680NN-lcl-400-4	ACL-400-4	PWM-400-4	CAP-400-4	3× 2R5
HF680N02M-450-4	GDHF680NN-lcl-450-4	ACL-400-4	PWM-400-4	CAP-400-4	3× 2R5

Note: 1.The LCL filter unit already contains the filter reactor (Lf), energy return reactor (Lb) and filter capacitor (Cf);

2.The LCL filter units above 450kW are provided by Portcullis as a complete package.

3.5 Integration

Single main circuit diagram of the regenerative rectifier units:
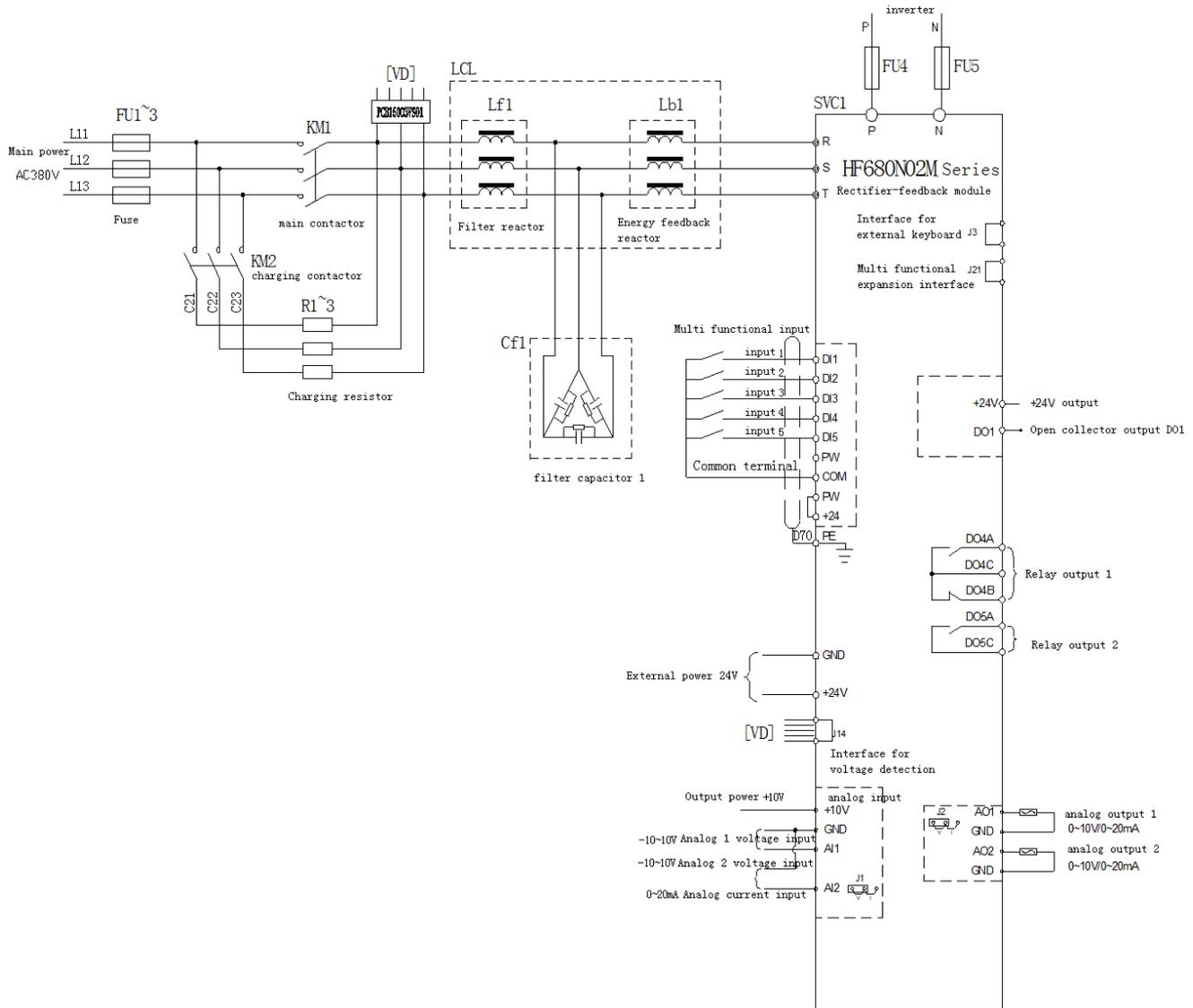
See "Appendix: Schematic Diagrams" for schematic diagrams of regenerative rectifier standard cabinet products.

Schematic diagram of the parallelization of the regenerative rectifier units:
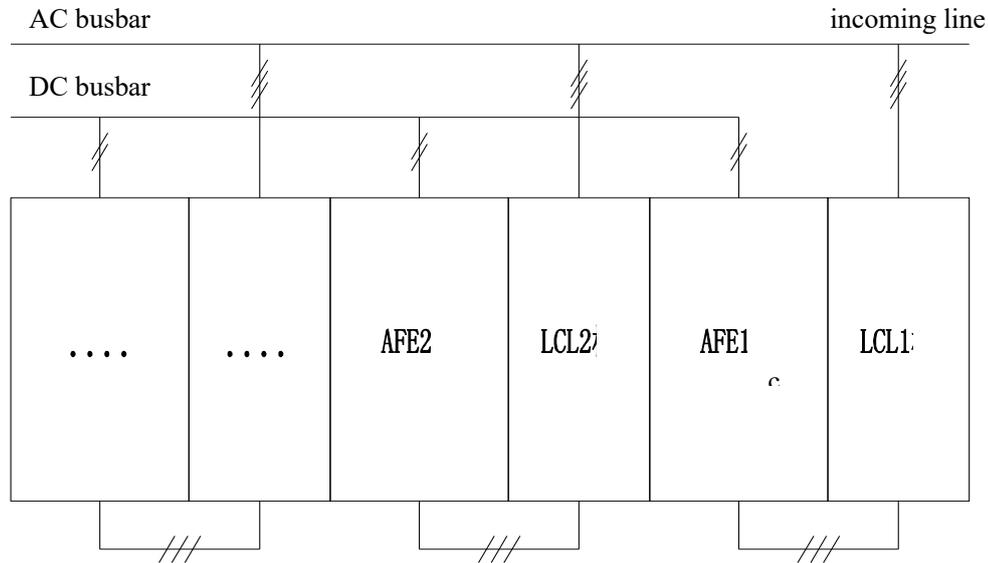
Models and power ranges

Regenerative rectifier units model number	Interrupter (A)	Input Line/Output Line (Copper core single core cable mm²with 40% cyclic loading)	Contactors Rated current (A)	AC side Fuse (A)	DC side Fuse (A)
HF680N02M-132-4	320	50	245	400	450
HF680N02M-185-4	396	70	300	500	563
HF680N02M-250-4	582	120	485	728	819
HF680N02M-315-4	654	150	545	820	951
HF680N02M-355-4	732	185	610	915	1065
HF680N02M-400-4	802	240	668	1002	1166
HF680N02M-450-4	864	300	720	1080	1257

Description of wiring specifications for regenerative rectifier units:

Note: The regenerative rectifier units above 450kW is provided by GUIDE as a complete package.

3.6 Technical data

Electrical data of the regenerative rectifier units:

power supply importation	Input Voltage	Three-phase 380V～ 480V
	rated frequency	50 / 60Hz
	Allowable voltage fluctuation	-15%～+ 10%
	Instantaneous voltage drop	Undervoltage protection after 15ms when input voltage < AC320V
containment characterization	control method	AFE control
	control connection	Digital input, digital output
	Input power factor	0.999 (at the rated current of the rectifier return product)
	Current harmonic content	Less than 3% (at the rated current of the rectifier return product)
	overload capacity	Light overload condition: 150% of output current, overload allowed for 1 minute every 5 minutes; Heavy overload condition: 180% of output current, overload allowed for 1 minute every 5 minutes.
	DC bus voltage	570V～710V (adjustable according to supply voltage)
	carrier frequency	1kHz to 10kHz

3.7 regenerative rectifier Module Heat Generation

regenerative rectifier Module + LCL Filter Module Models	Models	Heat generation (kW)
HF680N02M-132-4+GDHF680NN-lcl-132-4	B4	3.4
HF680N02M -185-4+ GDHF680NN -lcl-185-4	B5	5.6
HF680N02M -250-4+ GDHF680NN -lcl-250-4		7.5
HF680N02M -315-4+ GDHF680NN -lcl-315-4	B6	9.5
HF680N02M -355-4+ GDHF680NN -lcl-355-4		10.7
HF680N02M -400-4+ GDHF680NN -lcl-400-4		12.0
HF680N02M -450-4+ GDHF680NN -lcl-450-4		13.5

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3.8 Main technical characteristics

(1) Adopting IGBT power components, stable and reliable, realizing bidirectional flow of energy and saving power;

(2) The energy saving rate can be more than 50% under hoisting load condition;

(3) It can improve the power factor of the transmission equipment, no matter when rectifying or feeding back, the power factor of the equipment can reach 0.999;

(4) High power quality fed back to the grid, with current harmonic content less than 3% (measured at full load according to GB/T 24337-2009);

(5) Wide voltage operation range 380V～480V, fluctuation range -15%～+10%, and can output stable DC bus voltage;

(6) Support DP, PN communication protocol, can communicate with the upper computer and realize monitoring;

(7) Complete protection performance, comes with over-current, over-voltage, under-voltage, over-temperature, phase failure, overload and other protection functions to ensure the safety of the whole machine operation;

(8) Power range 75kW to 2400kW.

3.9 Regenerative rectifier cabinet product wiring terminals

(1) Regenerative rectifier standard product terminal block
(2) Regenerative rectifier 450kW and below standard cabinet products are in the form of a single cabinet, the top right AC input row can be combined with the inlet cabinet, the top left DC output row can be combined with the inverter cabinet, and the inlet cabinet terminals are as shown in the figure below. The standard regenerative rectifier products above 450kW are in the form of parallel cabinets, and the terminals inside the cabinet are as follows.

X2a, X3a

X1

X2b, X3b

X2, X3, X4
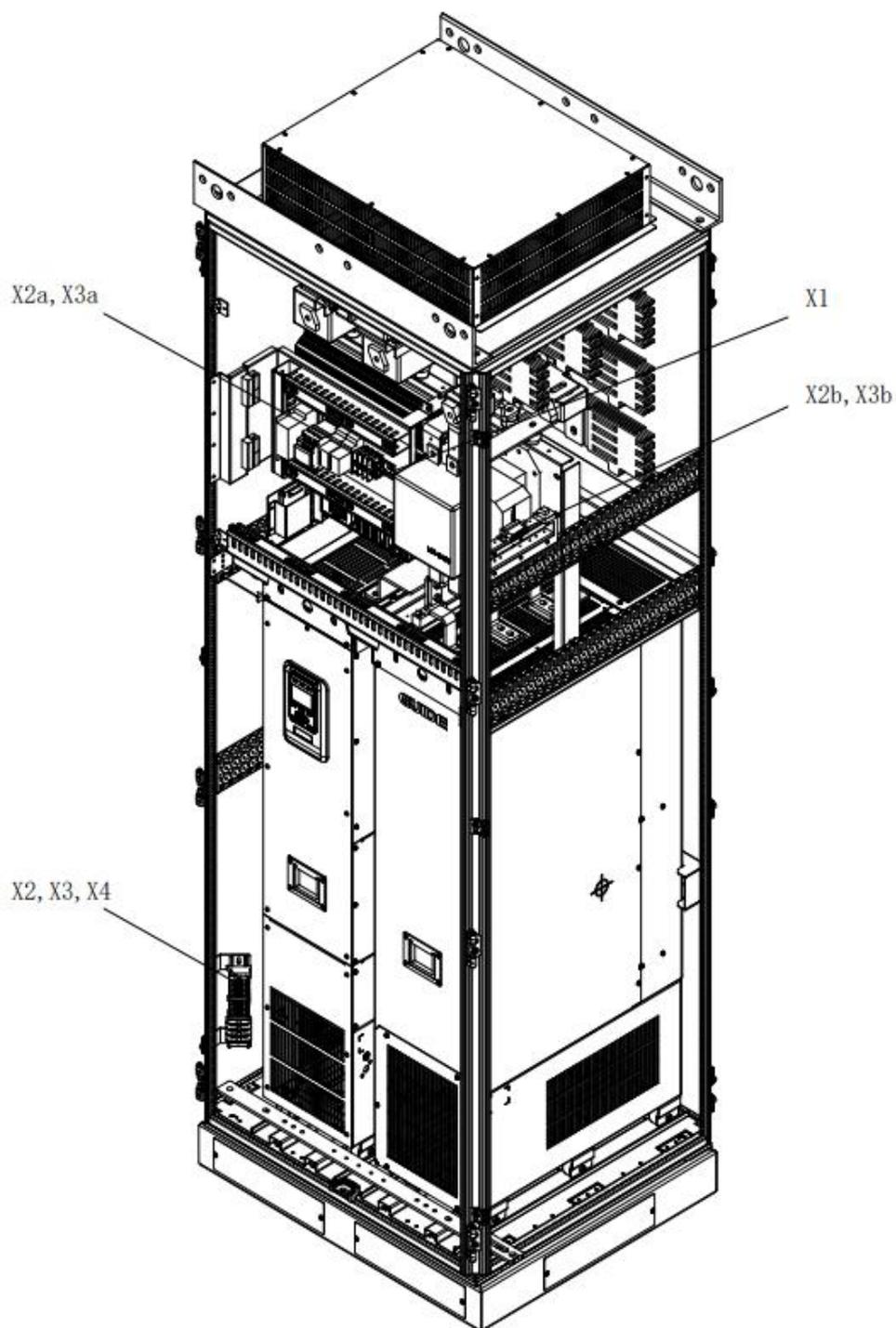
Schematic diagram of the location of the terminals of the regenerative rectifier 1
standardized cabinet (main cabinet) (a)

GUIDE Please visit the official website for more information: http://www.gdetec.com
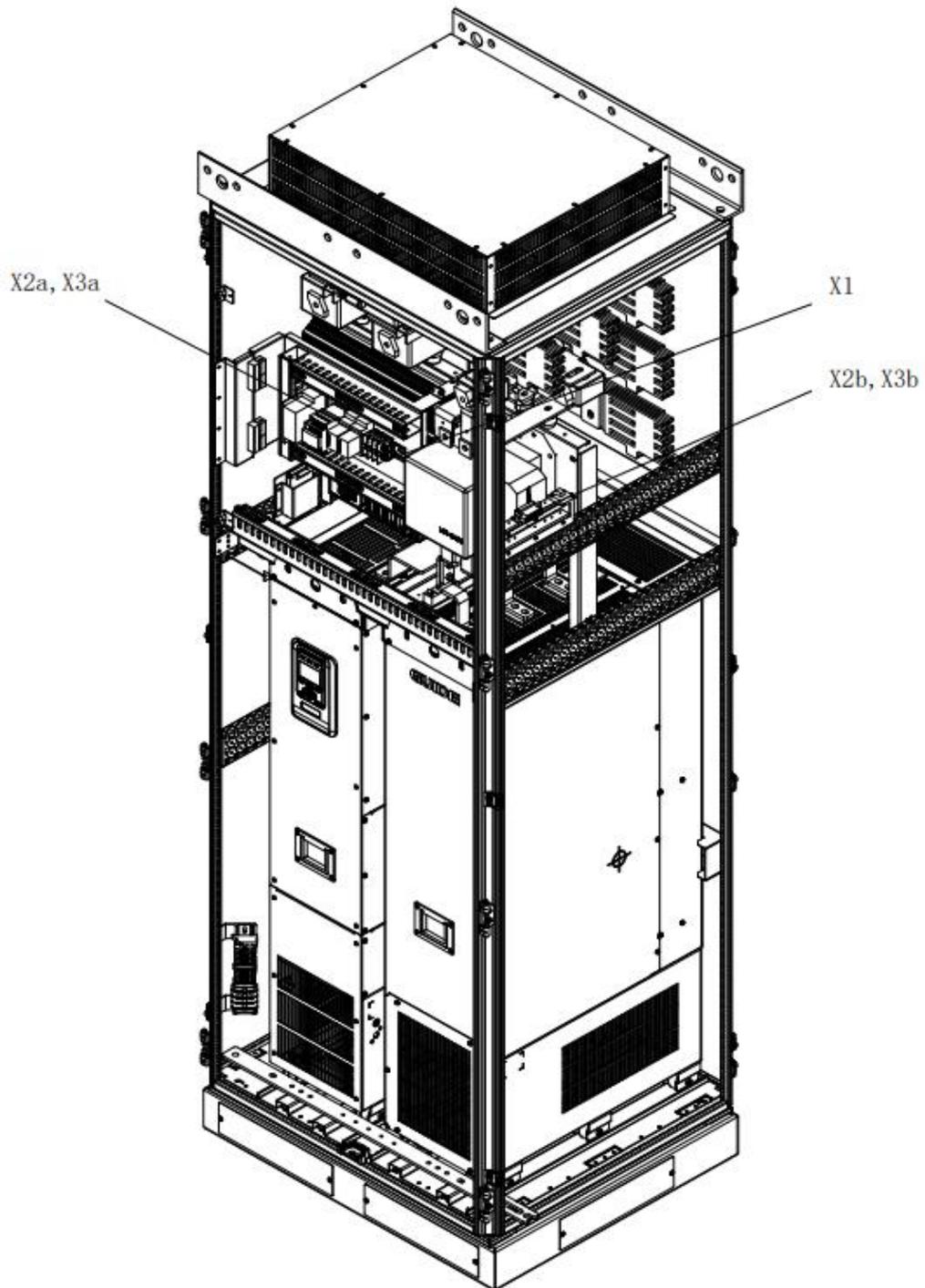
Regenerative rectifier 2 Standardized into cabinet (from cabinet) wiring terminal location schematic (b)

Regenerative rectifier system into the cabinet terminal block function definition:

Terminal Block / cabinet no.	X1	X2	X3	X1a 2 Core connector	X1b 2 Core connector	X2a 4 Core connector	X2b 4 Core connector	X3a 6 Core connector	X3b 6 Core connector
Rectification feedback cabinet 1 — N1	control power	AFE multifunctional terminal signal(Shielded wire)	External signal	Control power (Docking to N2 cabinet)		Slave fault reset signal (Docking to N2 cabinet)		External signal (Docking to N2 cabinet)	
Rectification feedback cabinet 2 — N2	Control power (adapter)	Slave fault reset signal (adapter)		Control power (Docking to N3 cabinet)	Control power (Docking to N1 cabinet)	Slave fault reset signal (Docking to N3 cabinet)	Slave fault reset signal (Docking to N1 cabinet)	External signal (Docking to N3 cabinet)	External signal (Docking to N1 cabinet)
Rectification feedback cabinet 3 — N3	Control power (adapter)	Slave fault reset signal (adapter)		Control power (Docking to N4 cabinet)	Control power (Docking to N2 cabinet)	Slave fault reset signal (Docking to N4 cabinet)	Slave fault reset signal (Docking to N2 cabinet)	External signal (Docking to N4 cabinet)	External signal (Docking to N2 cabinet)
Rectification feedback cabinet 4 — N4	Control power (adapter)	Slave fault reset signal (adapter)		Control power (Docking to N5 cabinet)	Control power (Docking to N3 cabinet)	Slave fault reset signal (Docking to N5 cabinet)	Slave fault reset signal (Docking to N3 cabinet)	External signal (Docking to N5 cabinet)	External signal (Docking to N3 cabinet)
Rectification feedback cabinet 5 — N5	Control power (adapter)	Slave fault reset signal (adapter)		Control power (Docking to N6 cabinet)	Control power (Docking to N4 cabinet)	Slave fault reset signal (Docking to N6 cabinet)	Slave fault reset signal (Docking to N4 cabinet)	External signal (Docking to N6 cabinet)	External signal (Docking to N4 cabinet)
Rectification feedback cabinet 6 — N6	Control power (adapter)	Slave fault reset signal (adapter)		Control power (Backup)	Control power (Docking to N5 cabinet)	Slave fault reset signal (Backup)	Slave fault reset signal (Docking to N5 cabinet)	External signal (Backup)	External signal (Docking to N5 cabinet)

4. Inverter

4.1 Overview

The inverter is connected to the DC bus of the regenerative rectifier units to drive a three-phase AC asynchronous motor.

4.2 Design

(1) Main circuit terminals

Terminal Symbols	Functional Description
P (+)	DC side voltage positive terminal
N (-)	DC side voltage negative terminal
U, V, W	Connecting three-phase AC motors
⏚	Inverter ground terminal or ground point

B3 Main Circuit Terminal Distribution Diagram
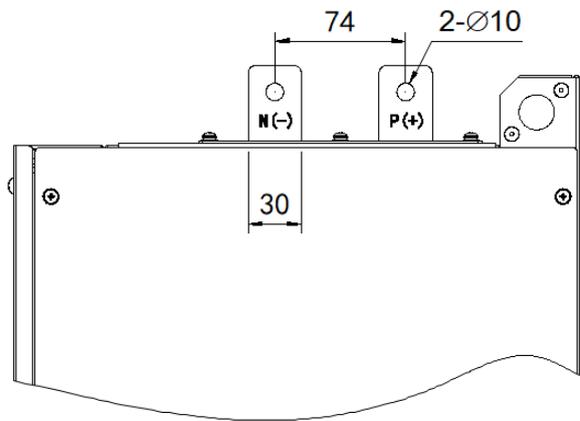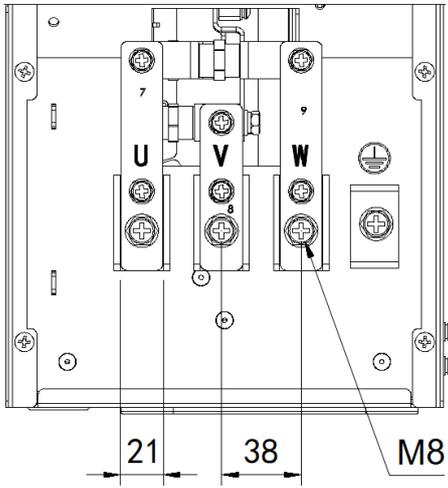
B4 Main Circuit Terminal Distribution Diagram
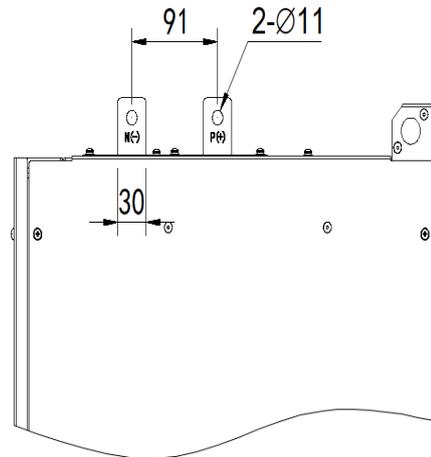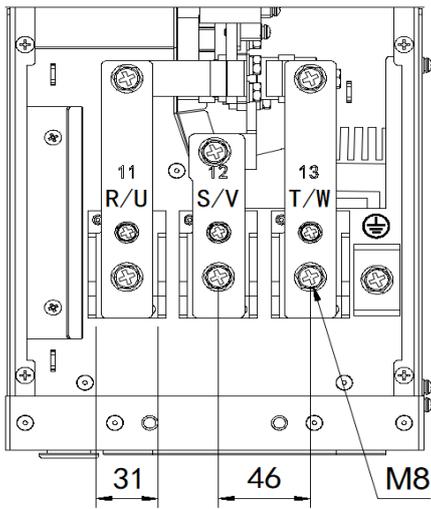
B5 Main Circuit Terminal Distribution Diagram
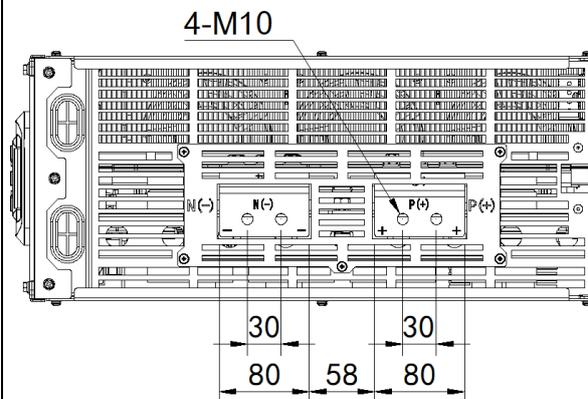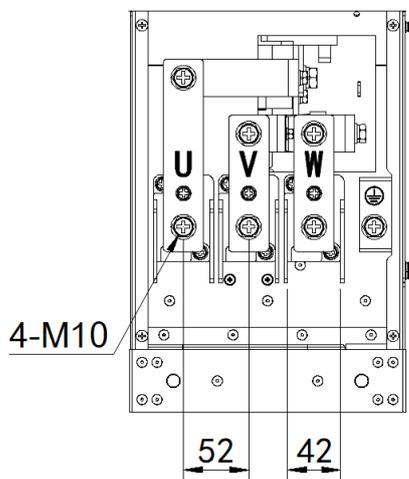
B6 Main Circuit Terminal Distribution Diagram

Control board

Terminal board

10V	AI1	AI2	DI1	DI2	DI3	DI4	DI5	COM
GND	AO1	AO2	24V	DO1	COM	24V	PW	COM

DO4A	DO4C	DO4B	DO5A	DO5C

GUIDE Please visit the official website for more information: http://www.gdetec.com
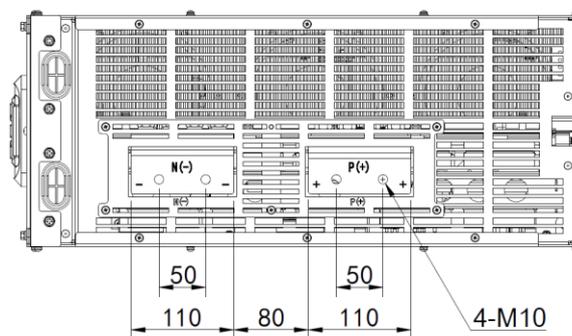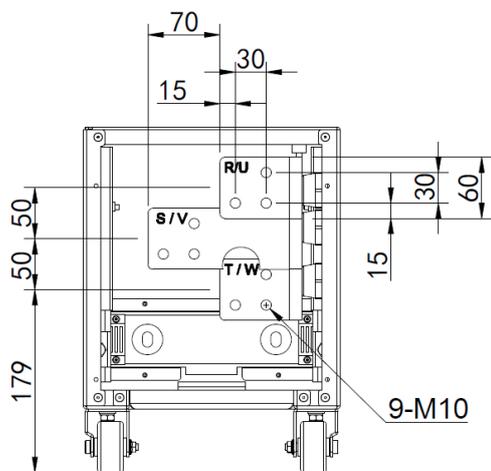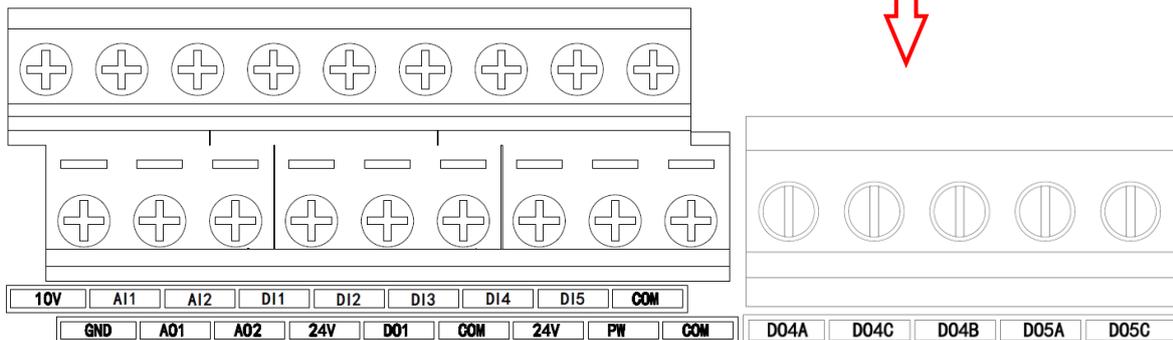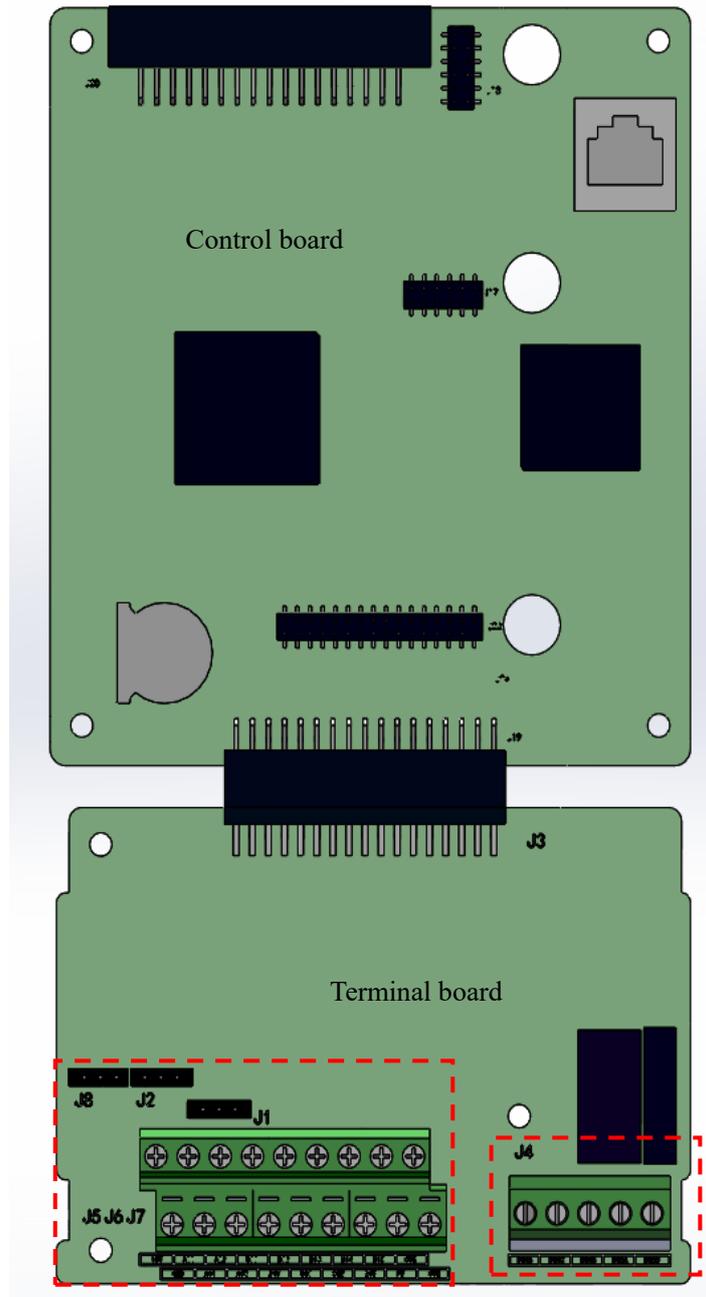
Form	Terminal Symbols	Terminal Name	Functional Description
power supply	+10V-GND	External +10V power supply	Provide +10V power supply to the outside, maximum output current: 50mA generally used as an external potentiometer power supply, potentiometer resistance range: 1kΩ~5kΩ
	+24V-COM	External +24V power supply	Provides +24V external power supply, which is generally used as the working power supply for digital input/output terminals and external sensor power supply Maximum output current: 200mA
	PW	External Input Terminal	Factory default connection to +24V via shorting tabs When external signals are used to drive DI1~DI5 and DO1, the PW must be connected to the external power supply and disconnected from the +24V power supply terminal.
analog input	AI1-GND	Analog input terminal 1	Input voltage range: DC -10V~10V Input impedance: 100kΩ
	AI2-GND	Analog input terminal 2	Input range: -10VDC~10VDC/0mA~20mA, selected by J1 jumper on terminal board to decide voltage or current input. Input impedance: 100kΩ for voltage input, 500Ω for current input.
digital input	DI1- PW	Digital Input 1	Opto-coupler isolated, compatible with bipolar inputs Input impedance: 3.3kΩ Voltage range at effective level input: 9V~30V, DI1-DI4 maximum input frequency up to 500Hz, DI5 maximum input frequency 20KHz.
	DI2- PW	Digital Inputs 2	
	DI3- PW	Digital Input 3	
	DI4- PW	Digital Inputs 4	
	DI5- PW	Digital Input 5	
analog output	AO1-GND	Analog Output 1	Voltage or current output is determined by the J2 jumper selection on the terminal block. Output voltage range: 0V~10V Output current range: 0mA~20mA
analog output	AO2-GND	Analog Output 2	Voltage or current output is determined by the J8 jumper selection on the terminal block. Output voltage range: 0V~10V Output current range: 0mA~20mA
digital output	DO1-COM	Digital output 1	Optocoupler isolated, bipolar open collector outputs Output voltage range: 0V~24V Output current range: 0mA~50mA
relay output	DO4A-DO4C	Open the terminals often 1	Contact drive capability: 250VAC, 3A, COSφ=0.4 30VDC, 1A
	DO4B-DO4C	Normally closed terminal 2	

	DO5A-DO5C	Normal open terminal 3	Contact drive capability: 250VAC, 2A, COSφ=0.4 30VDC, 1A

Form	Terminal Symbols	Terminal Name	Functional Description
jumper	J1	AI2 Input Selection	Voltage and current input selectable, default is voltage input
	J2	AO1 Output Selection	Voltage and current outputs are selectable, the default is voltage output.
	J8	AO2 Output Selection	Voltage and current outputs are selectable, the default is voltage output.

(2) Power adapter board terminals
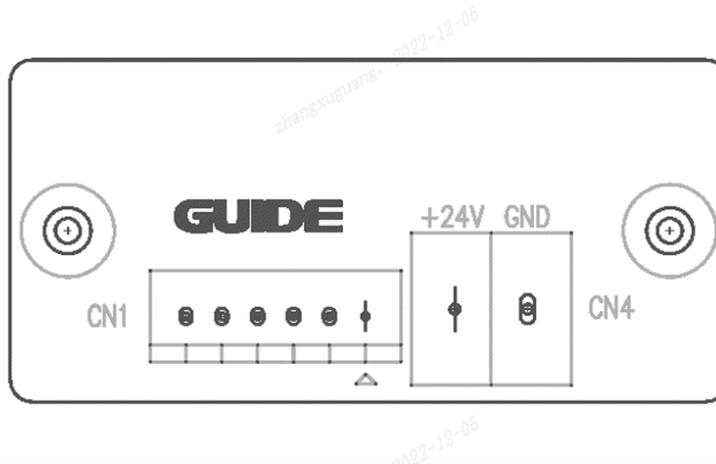
Form	Terminal symbol	Terminal Name	Functional Description
External DC+24V power supply	CN4	+24V-GND	Supplies power to the control board and can be left unconnected when used as an inverter.
Input Voltage Sampling	CN1	Input Voltage Sampling	L1/L2/L3 inlet voltage sampling, need to be used with the input voltage detection board, when used as an inverter can not be connected.

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4.3 Selection and ordering information

Inverter product model definition:

HF680N   03M — □□□ — 4 + X

A	B	C	D	E
Product sequence	Type and structure 03M Inverter module 03C: Inverter cabinet	Power: 160=160kW ... 800=800kW	Voltage level 4 : 380V	Options (installed with the machine)
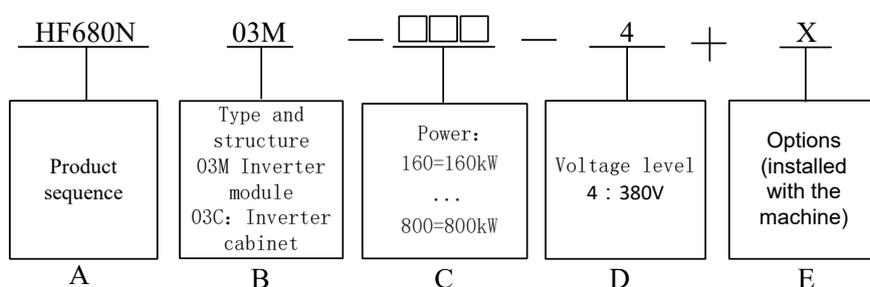
Inverter Type Description:

A	Product sequence
B	Type and structure 03M: Inverter module 03C: Inverter cabinet
C	Power 160: 160kW 800: 800kW
D	Voltage level 4: 380V
E	Options (installed with the machine)

Options (installed with the machine) :

coding	note	coding	note
MB01	Modbus RTU communication card	DP01	Profibus DP communication card
PN01	Profinet Communication Card	CAN01	CANopen Communication Card
PG02	Incremental encoder cards for standard multi-drive products		

Base Height Description:

Z1/None   Available for cabinet type products only, with a base height of 100mm.

Z2   Only available as a cabinet model with a base height of 200mm.

Z3   Only available as a cabinet model with a base height of 250 mm.

Z4   Available only as a cabinet model with a base height of 300 mm.

Example:

1. Model number HF680N03C-500-4 is the same as model number HF680N03C-500-4+Z1, which indicates that the 500kW inverter is a cabinet type product with a base height of 100mm, including: cabinet, two 250kW inverter modules, parallel master fiber optic boards, parallel slave fiber optic boards, and fiber optic cables;

2. Model number HF680N03C-500-4+Z3 indicates that the 500kW inverter is a cabinet type product with a base height of 250mm, including: cabinet, two 250kW inverter modules, parallel master fiber optic board, parallel slave fiber optic board and fiber optic cables.

Inverter product models and specifications:

Inverter Model	Light overload condition		Heavy overload conditions		Models
	Output Current [A]	Applicable motor power [kW]	Output Current [A]	Applicable motor power [kW]	
HF680N03M-037-4	75	37	71	30	B3
HF680N03M-045-4	94	45	76	37	B3
HF680N03M-055-4	115	55	96	45	B4
HF680N03M-075-4	155	75	118	55	B4

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Inverter Model	Light overload condition		Heavy overload conditions		Models
	Output Current [A]	Applicable motor power [kW]	Output Current [A]	Applicable motor power [kW]	
HF680N03M-090-4	188	90	157	75	
HF680N03M-110-4	215	110	190	90	
HF680N03M-132-4	265	132	216	110	
HF680N03M-160-4	330	160	268	132	B5
HF680N03M-185-4	365	185	332	160	
HF680N03M-200-4	415	200	367	185	
HF680N03M-220-4	438	220	418	200	
HF680N03M-250-4	485	250	440	220	
HF680N03M-280-4	545	280	487	250	B6
HF680N03M-315-4	610	315	548	280	
HF680N03M-355-4	668	355	615	315	
HF680N03M-400-4	720	400	670	355	
HF680N03M-450-4	820	450	725	400	
HF680N03C-500-4	970	500	823	450	B6*2 Cabinet
HF680N03C-560-4	1090	560	975	500	
HF680N03C-630-4	1220	630	1095	560	
HF680N03C-710-4	1336	710	1230	630	
HF680N03C-800-4	1440	800	1340	710	
HF680N03C-900-4	1620	900	1445	800	

4.4 Annexes

Inverter products three-phase AC output reactor type:

Power (output)	Output Reactor 1% output voltage drop		power (output)	Output Reactor 1% output voltage drop	
	Current (A)	Inductance (mH)		Current (A)	Inductance (mH)
37kW	75	0.09	185kW	365	0.02
45kW	94	0.07	200kW	396	0.02
55kW	115	0.06	220kW	438	0.02
75kW	155	0.05	250kW	485	0.01
90kW	188	0.04	280KW	545	0.01
110kW	215	0.03	315kW	610	0.01
132kW	265	0.03	355kW	668	0.01
160kW	303	0.02	400kW	720	0.01

Note: 1. Output reactor is optional, the connection line between inverter and motor should be less than 100m, when the wiring length is more than

For 100m, it is recommended to add output reactors and consult the manufacturer.

2. Output reactor is mandatory for inverters above 400kW that require two parallel inverters, and is provided by GUIDE as a complete set of program.

4.5 Integration

Stand-alone wiring diagram for inverter products:
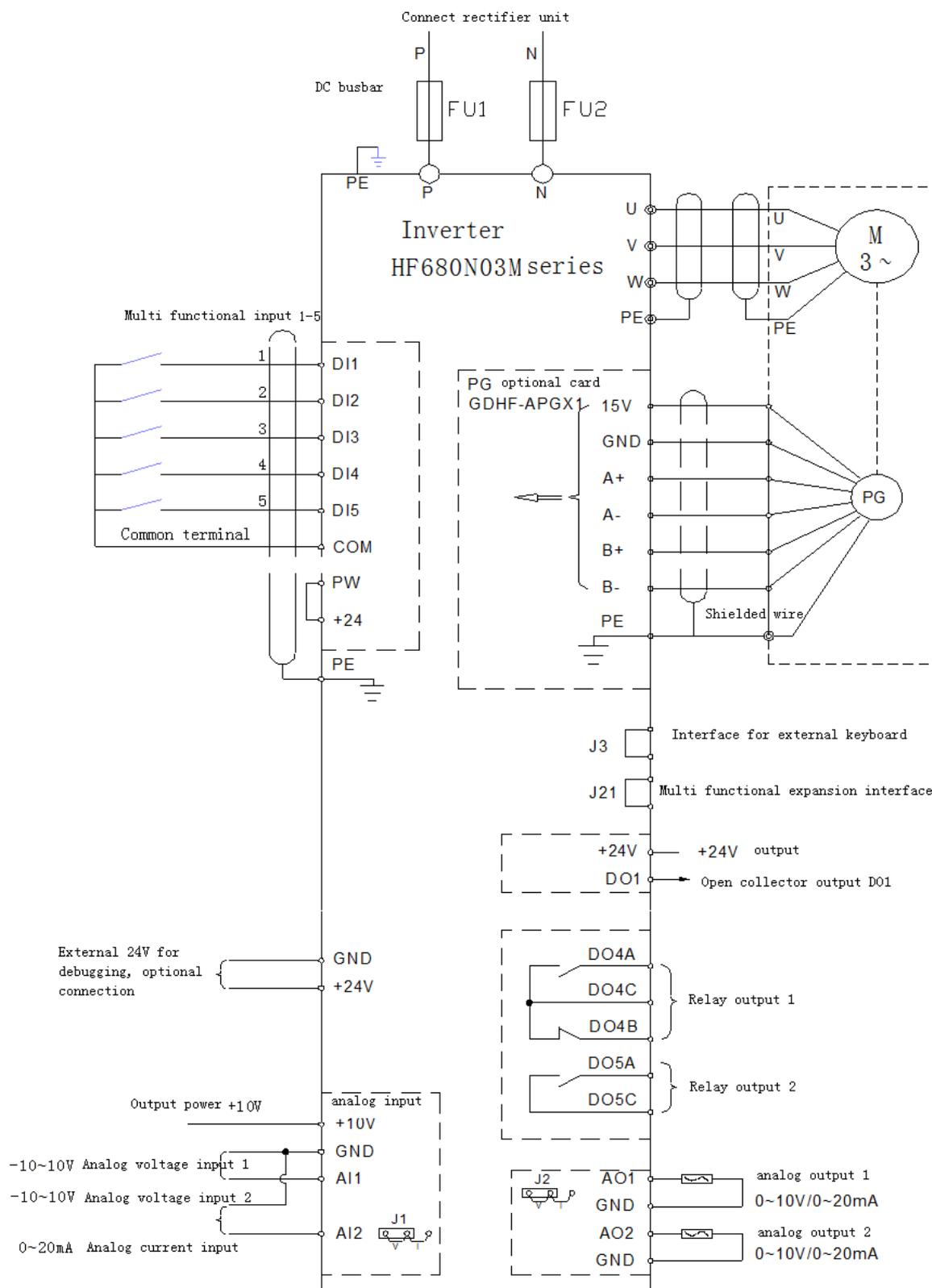
Wiring schematic of the inverter product:
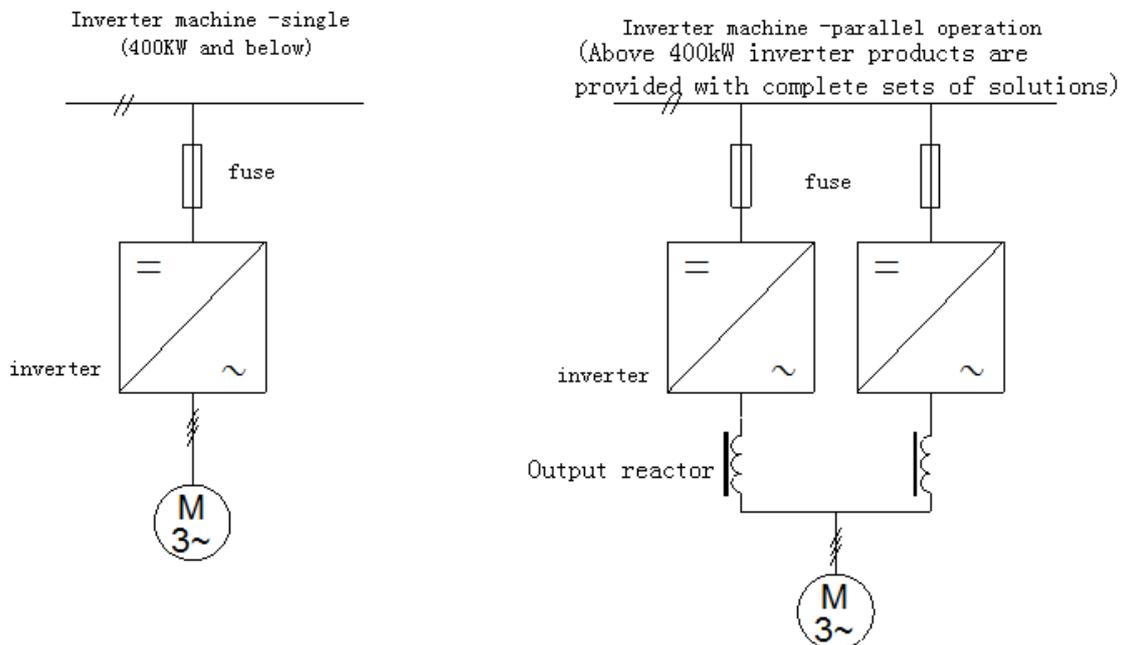
A description of the wiring specifications for the inverter product:

Inverter model number	Output line (Copper core single core cable mm²with 40% cyclic loading)	DC side fuse (A)
HF680N03M-037-4	16	117
HF680N03M-045-4	25	147
HF680N03M-055-4	25	180
HF680N03M-075-4	35	243
HF680N03M-090-4	50	294
HF680N03M-110-4	50	338
HF680N03M-132-4	70	416
HF680N03M-160-4	95	476
HF680N03M-185-4	95	572
HF680N03M-200-4	95	621
HF680N03M-220-4	120	687
HF680N03M-250-4	150	761
HF680N03M-280-4	2× 70	854
HF680N03M-315-4	2× 70	956

HF680N03M-355-4	2× 95	1047
HF680N03M-400-4	2× 95	1128

Note: 1.　　Above 400kW inverter products are provided by Gudie with complete sets of solutions;

2.　Inverter DC side fuses and wiring are selected according to connecting to the HF680N series regenerative rectifier units.

4.6 Technical data

Electrical data for inverter products:

Power supply importation	Input Power	540V～700V, DC power supply
containment characterization	control method	Closed-loop vector control (VC), open-loop vector control (SVC), V/F control
	Run command method	Digital inputs, digital outputs, relay outputs, support for Profibus DP and other communications.
	Maximum Output Voltage	380V～460V (corresponding to the input voltage), the error is less than 5%.
	output frequency	0 to 300Hz
	Starting torque	0Hz/200% (VC and SVC), 0.8Hz/150% (V/F)
	carrier frequency	1kHz to 10kHz
	overload capacity	Light overload condition: 150% of output current, overload allowed for 1 minute every 5 minutes; Heavy overload condition: 180% of output current, overload allowed for 1 minute every 5 minutes.

4.7 Inverter module heat generation

Inverter Module Model	Models	Heat generation (kW)	Inverter Module Model	Models	Heat generation (kW)
HF680N03M-037-4	B3	0.7	HF680N03M-200-4	B5	4.0
HF680N03M-045-4		0.9	HF680N03M-220-4		4.4
HF680N03M-055-4	B4	1.1	HF680N03M-250-4		5.0
HF680N03M-075-4		1.5	HF680N03M-280-4	B6	5.9
HF680N03M-090-4		1.8	HF680N03M-315-4		6.6

HF680N03M-110-4		2.2	HF680N03M-355-4		7.5
HF680N03M-132-4		2.6	HF680N03M-400-4		8.4
HF680N03M-160-4	B5	3.2	HF680N03M-450-4		9.5
HF680N03M-185-4		3.7	/	/	/

4.8 Main technical characteristics

(1)   Both open-loop vector and closed-loop vector are capable of 200% torque output at zero speed;

(2)   The load does not exceed 50% of the rated load of the motor, and the GUIDE HF680N inverter can implement self-tuning   of the motor with load, and it is consistent with the motor parameters obtained from the self-tuning   of the motor with no load;

(3)   The HF680N has a built-in constant power control module. When it enters the constant power weak magnetic speed regulation zone, the inverter automatically adjusts the output frequency according to the load size.

5. Product External Dimensions

5.1 Regenerative rectifier Module External Dimensions
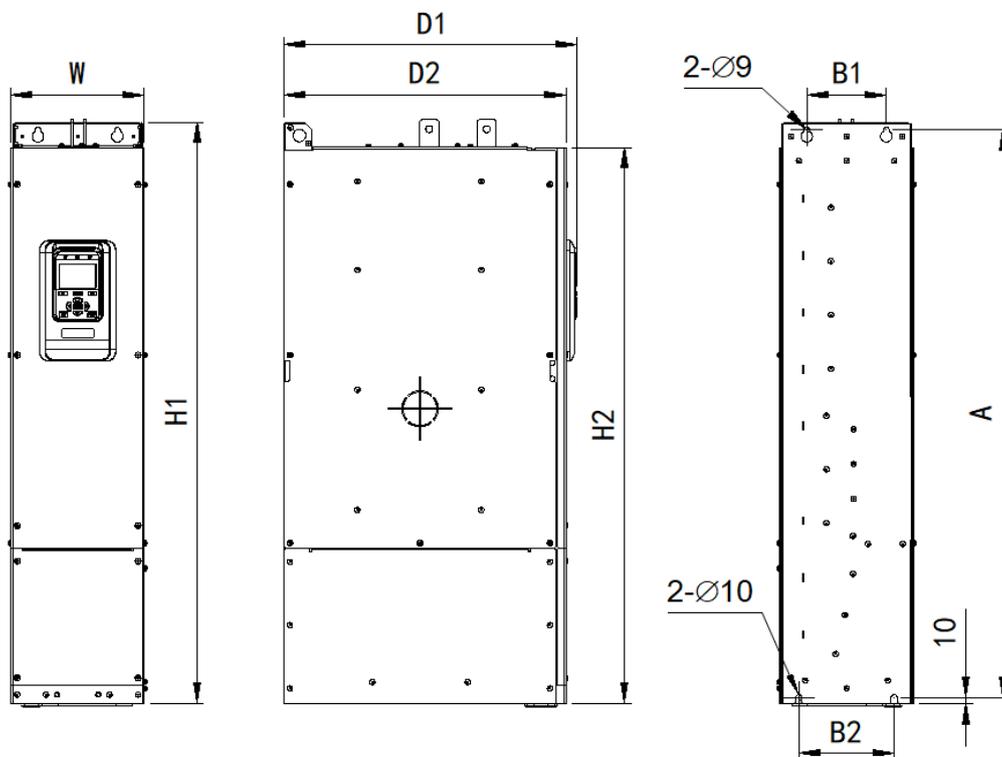
Schematic diagram of regenerative rectifier module for B4 model
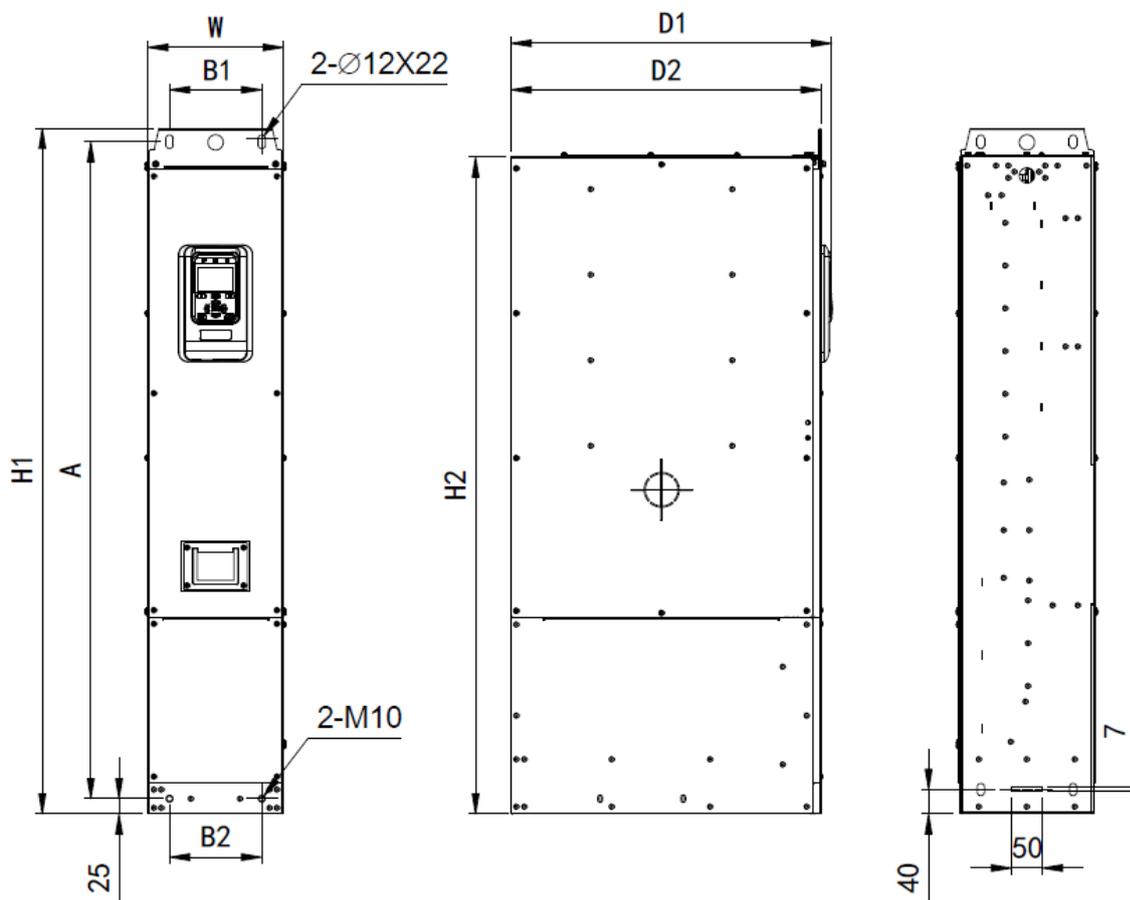
Schematic diagram of regenerative rectifier module for B5 model
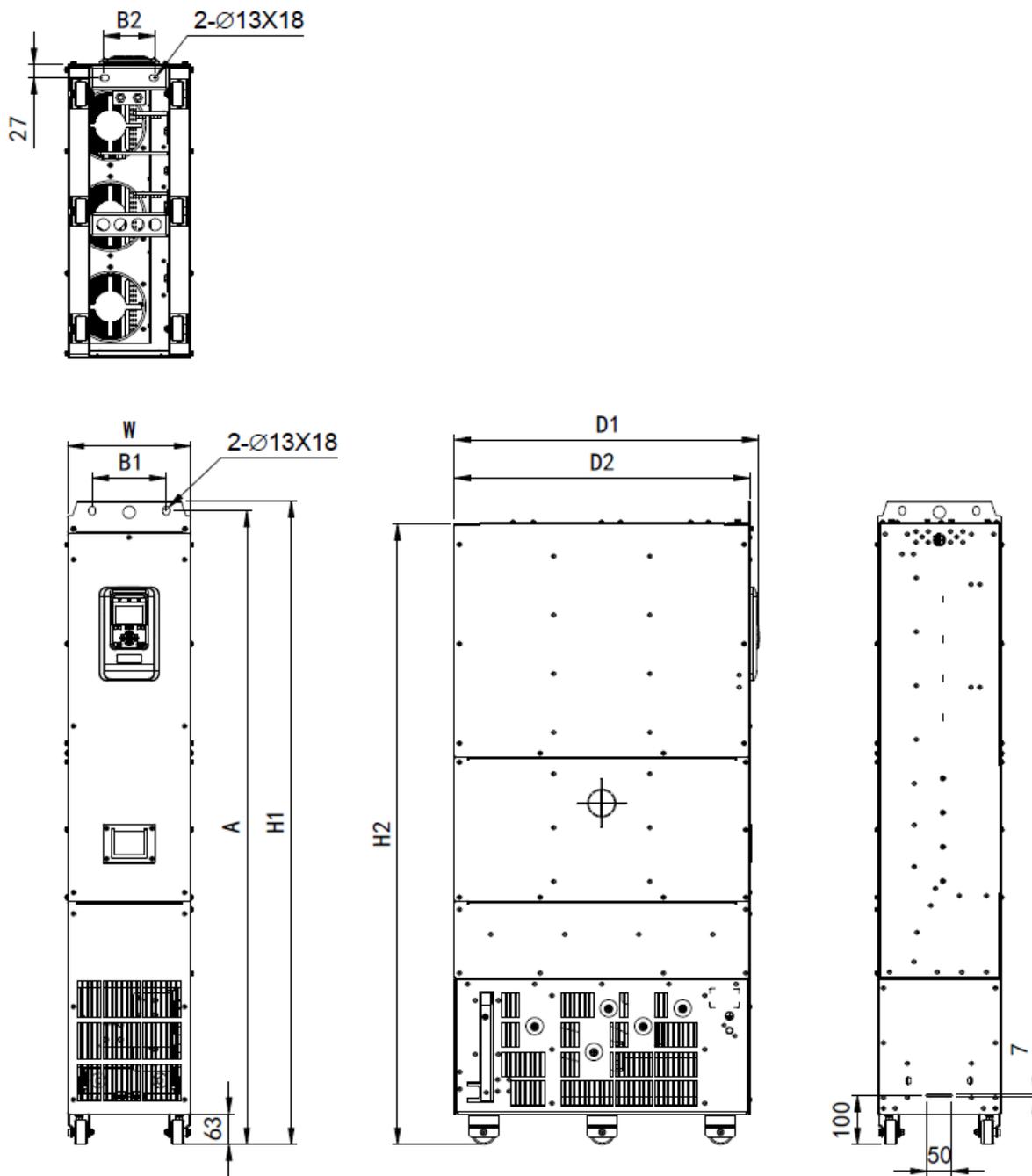
Schematic diagram of regenerative rectifier module for B6 model
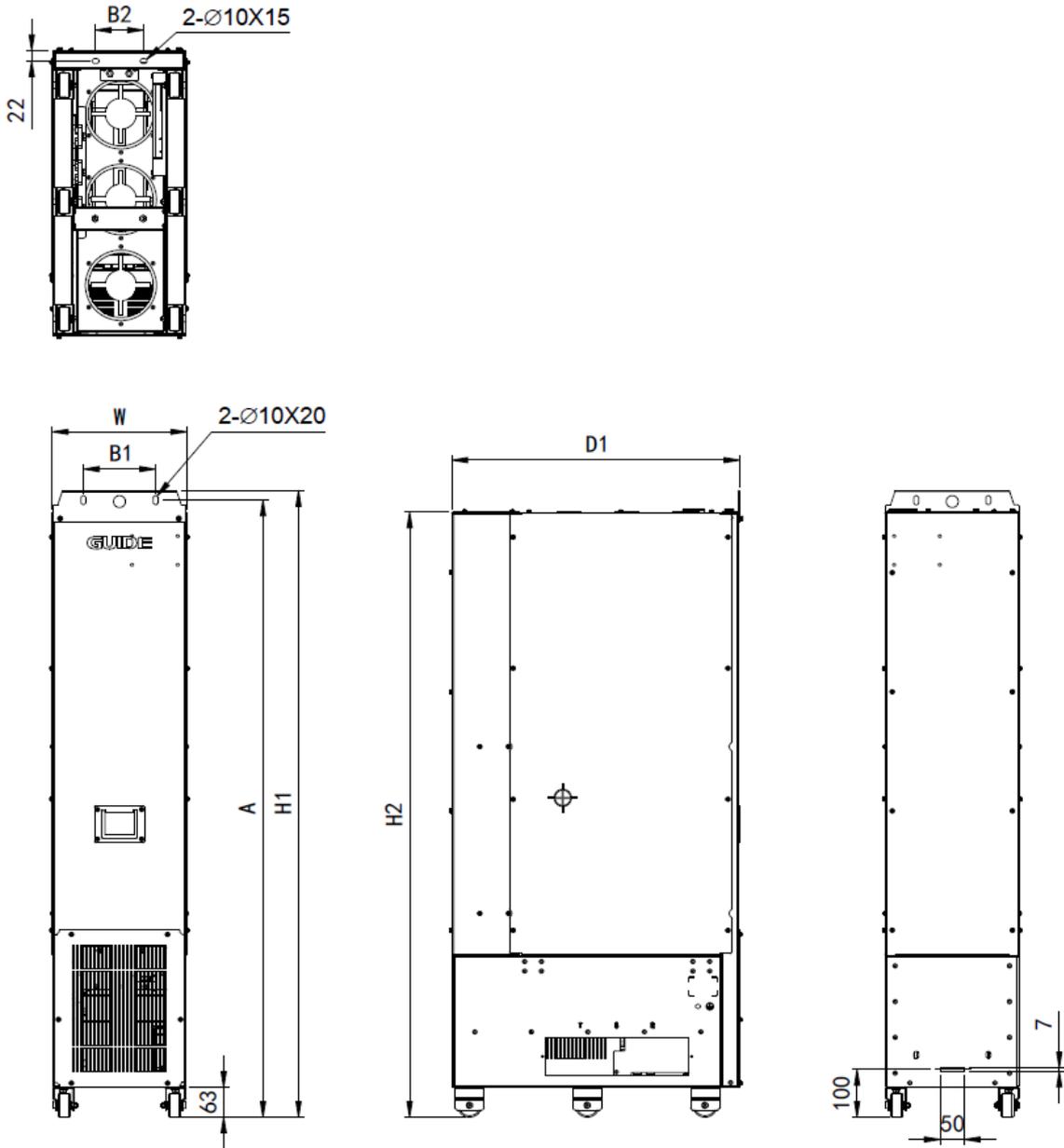
LCL Filter Unit Outline Schematic

Note: Rectangular notch is opened at the bottom of the rear end of the module, the purpose is to play a role in positioning when installing into the cabinet; the cabinet refers to the size of the notch to match.

model number	models	Overall dimensions (unit: mm)					Mounting Dimensions (Unit: mm)			Recommended mounting bolts (Grade 8.8)	weights (kg)
		H1	H2	W	D1	D2	A	B1	B2		
HF680N02M-075-4	B4	920	880	210	462	444	899	125	150	4-M8	55
HF680N02M-132-4											
HF680N02M-185-4	B5	1125	1075	220	520	505	1075	150	150	4-M10	80
HF680N02M-250-4	B6	1315	1268	250	618	600	1295	150	100	4-M12	120
HF680N02M-315-4											
HF680N02M-355-4											
HF680N02M-400-4											
HF680N02M-450-4											

LCL Unit Size Chart

model number	models	Overall dimensions (unit: mm)					Mounting Dimensions (Unit: mm)			Recommended mounting bolts (Grade 8.8)	weights (kg)
		H1	H2	W	D1	D2	A	B1	B2		
GDHF680N-lcl-250-4	/	1315	1269	280	600	/	1295	150	100	4-M8	320
GDHF680N-lcl-315-4											
GDHF680N-lcl-450-4											

5.2 regenerative rectifier standardized cabinet product external dimensions

Regenerative rectifier 250kW~2400kW products are available in standardized cabinets.
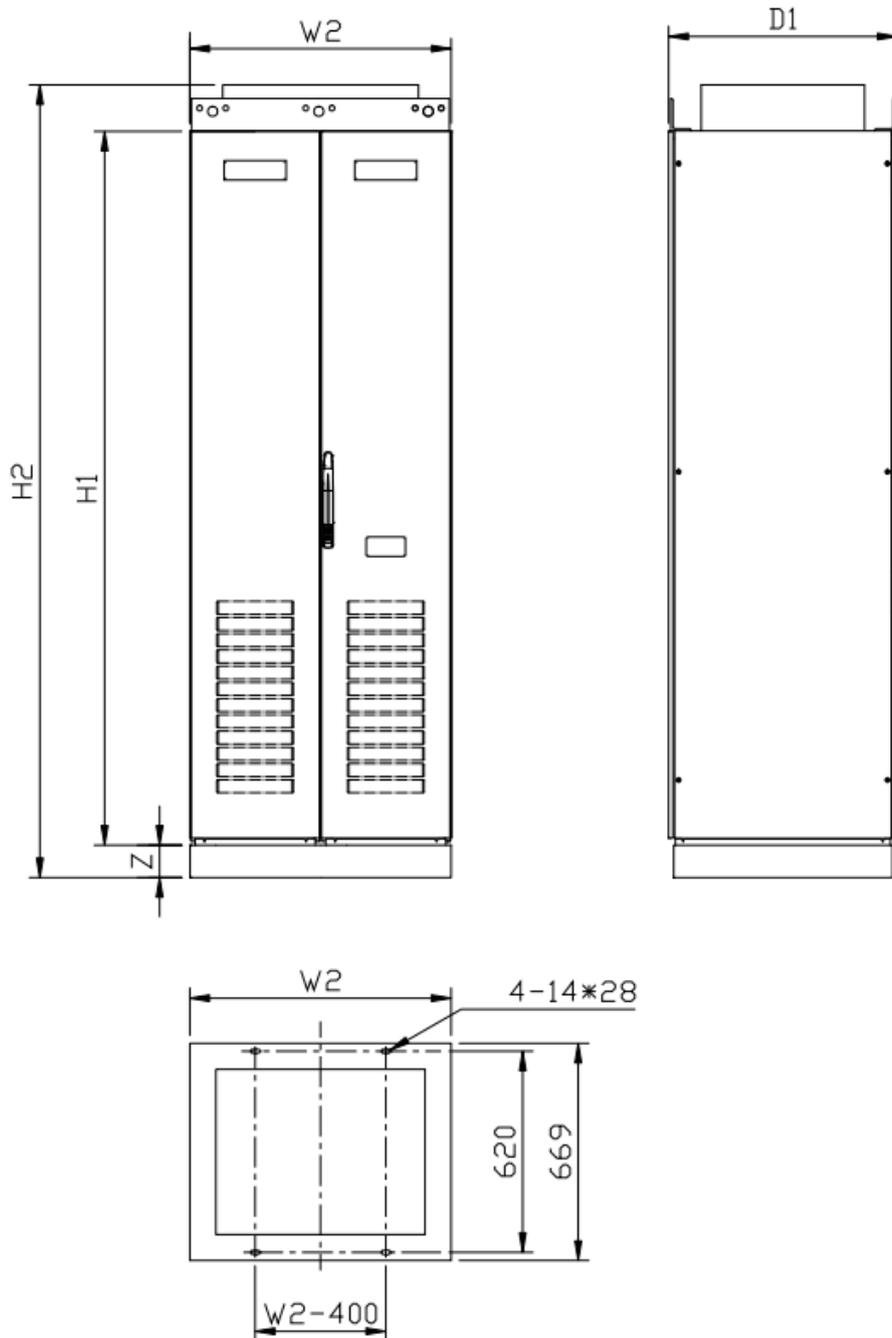
Regenerative rectifier HF680N02C-250-4, HF680N02C-315-4, HF680N02C-400-4 into the cabinet shape schematic diagram
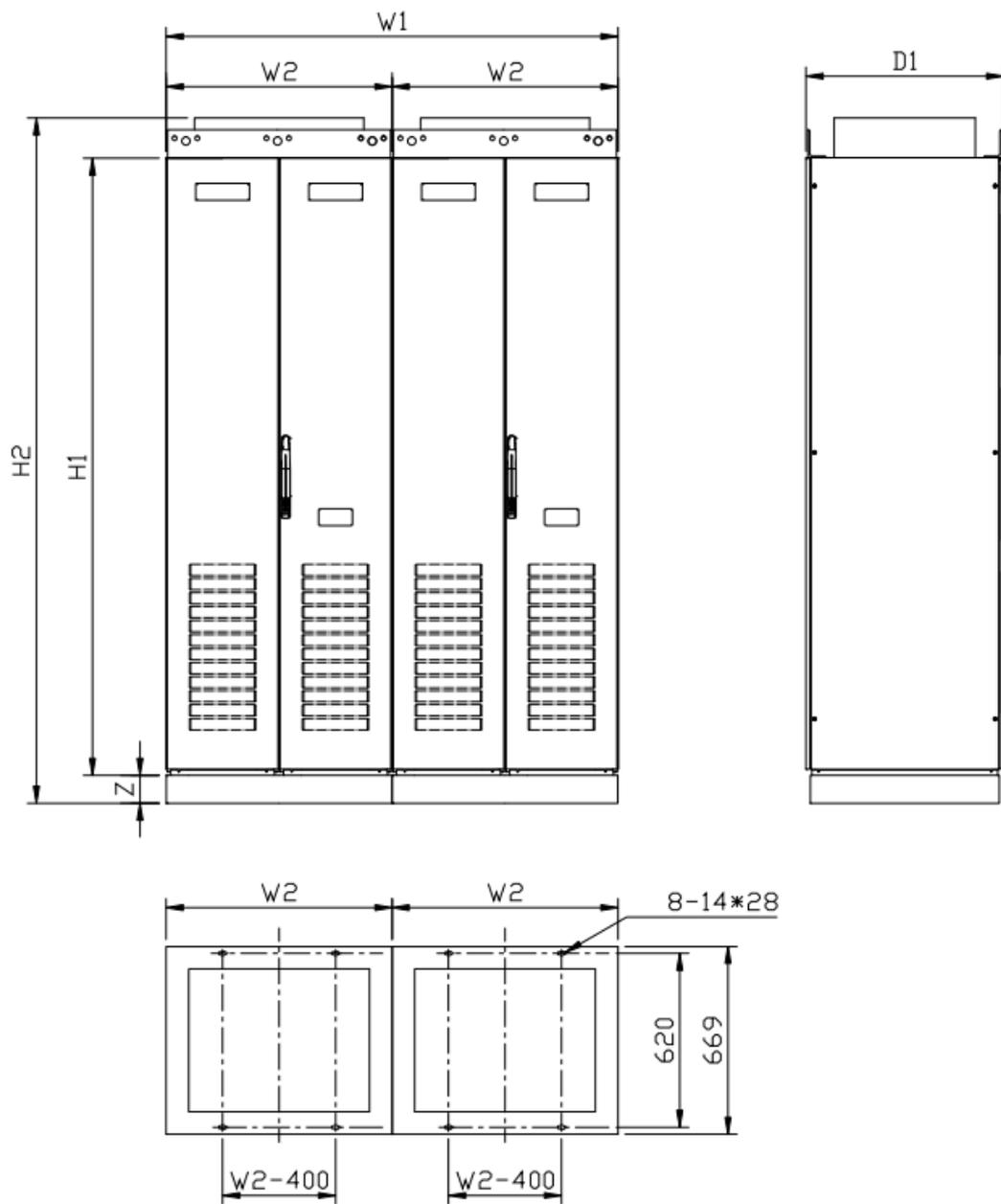
**Regenerative rectifier HF680N02C-500-4, HF680N02C-630-4, HF680N02C-800-4
into the cabinet shape schematic diagram**
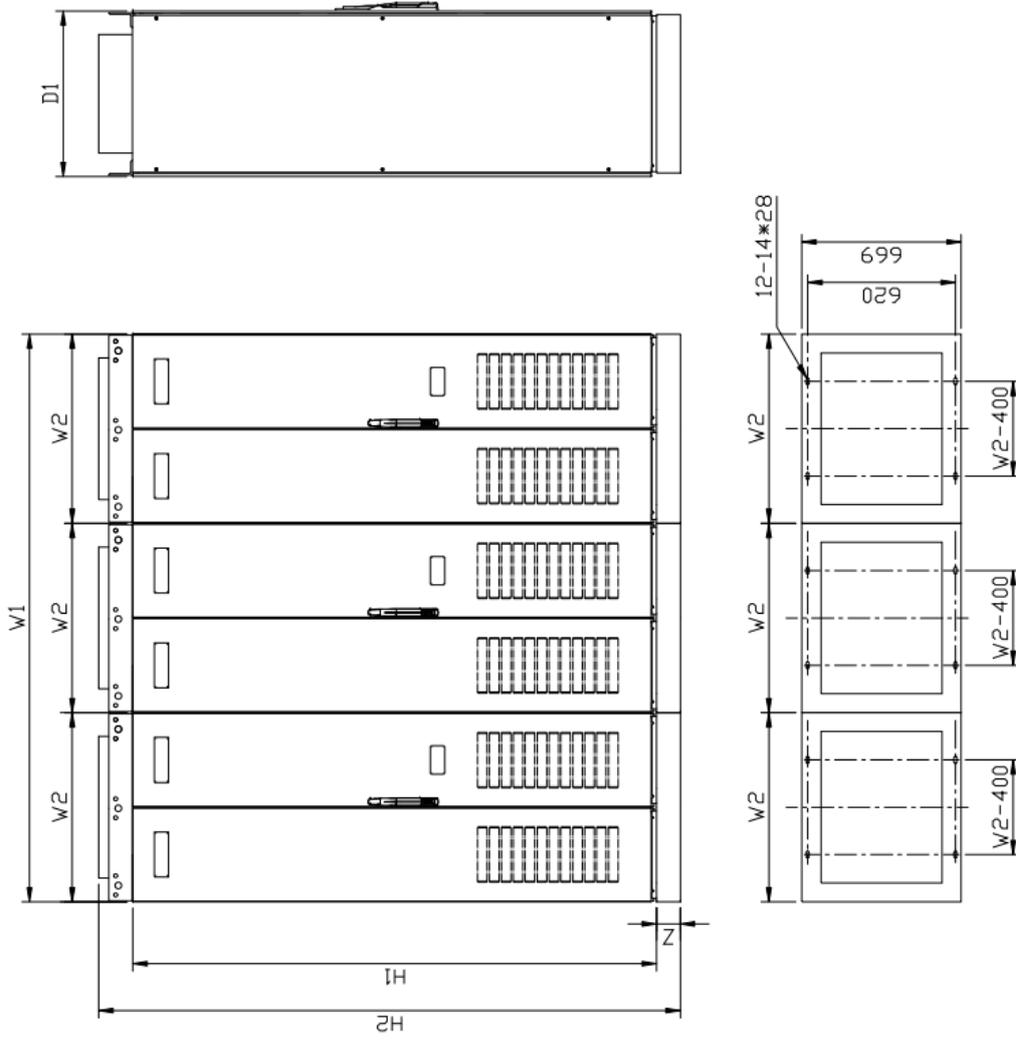
Rectifier feedback **HF680N02C-1200-4** into the cabinet shape
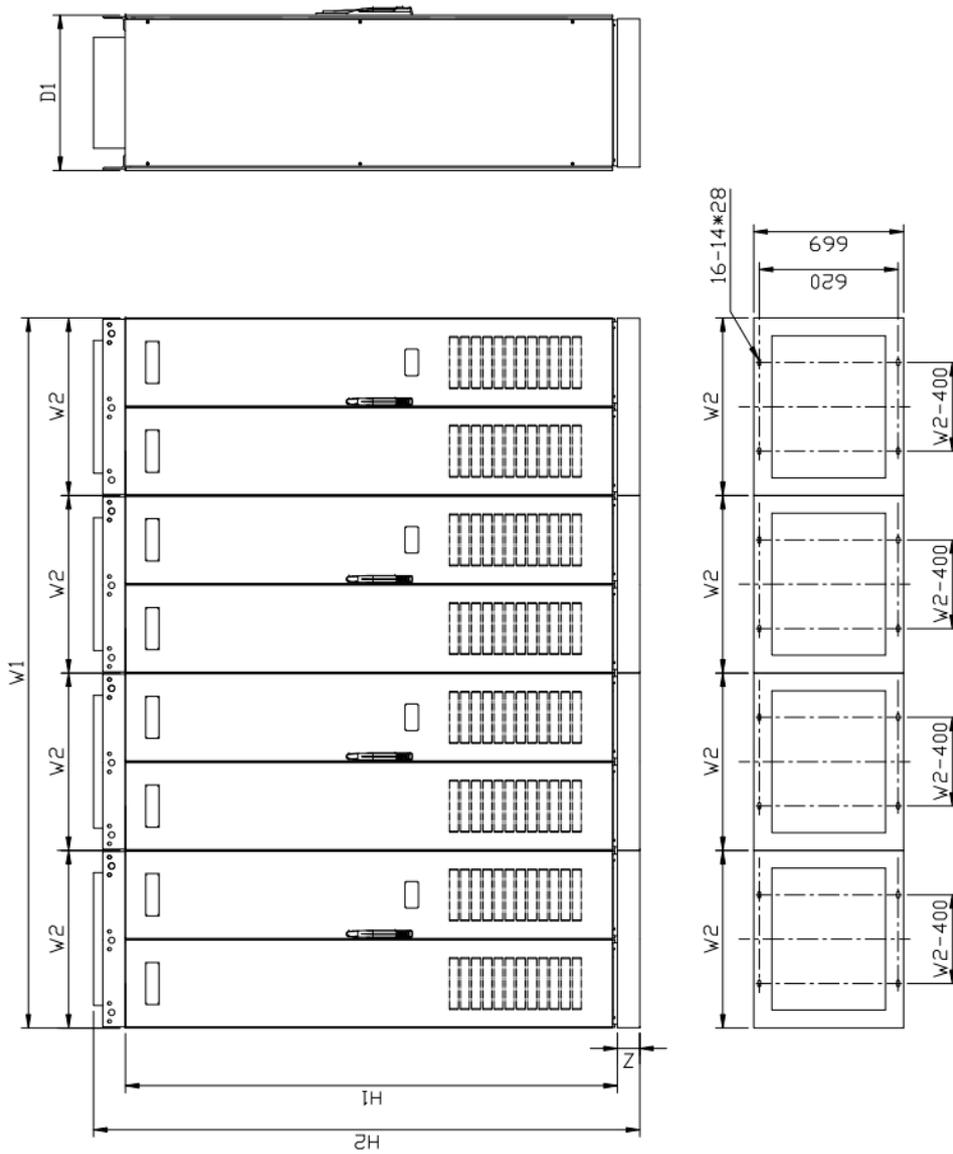
Rectifier feedback **HF680N02C-1600-4** into the cabinet shape
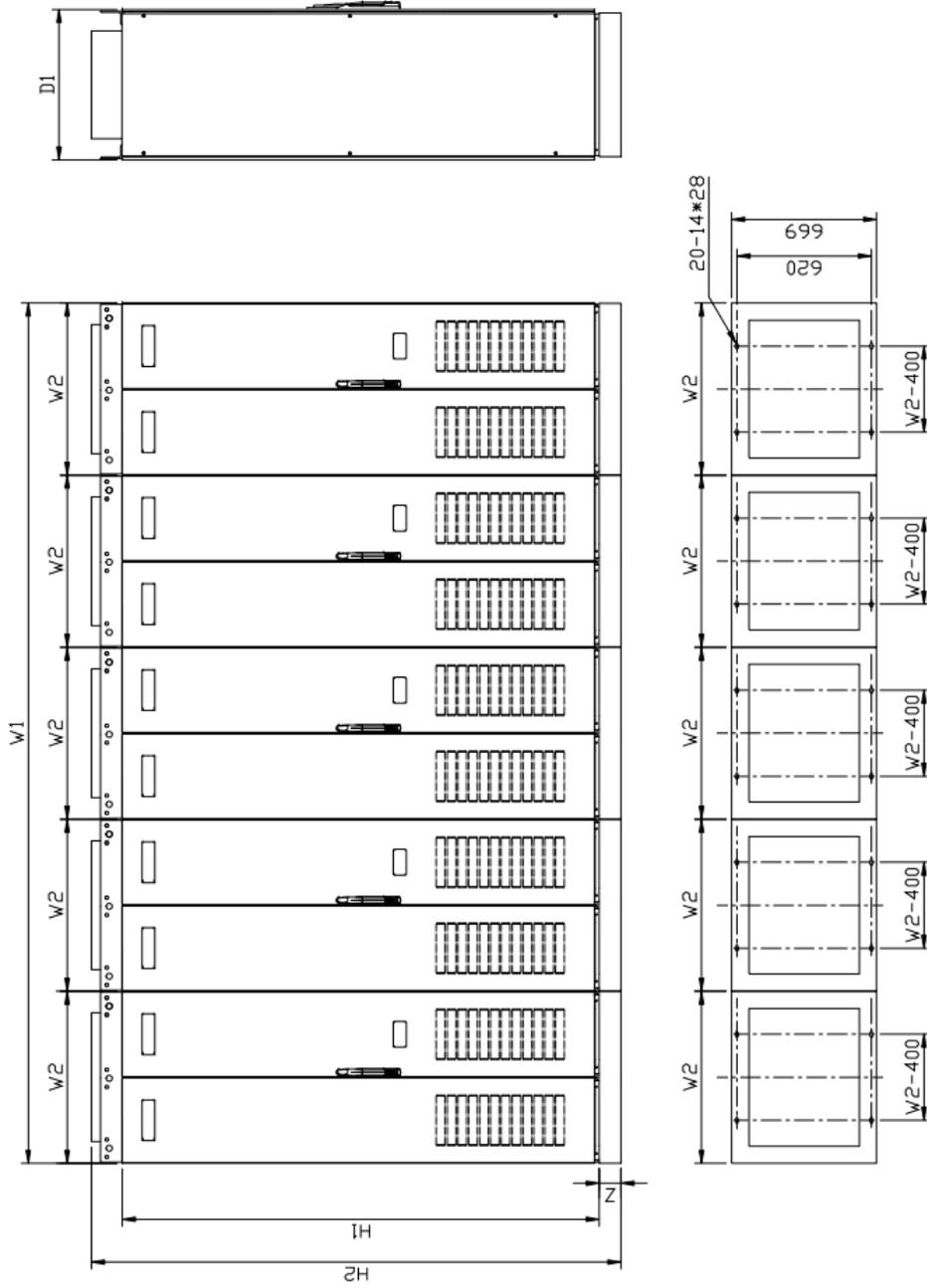
Rectifier feedback **HF680N02C-2000-4** into the cabinet shape schematic diagram

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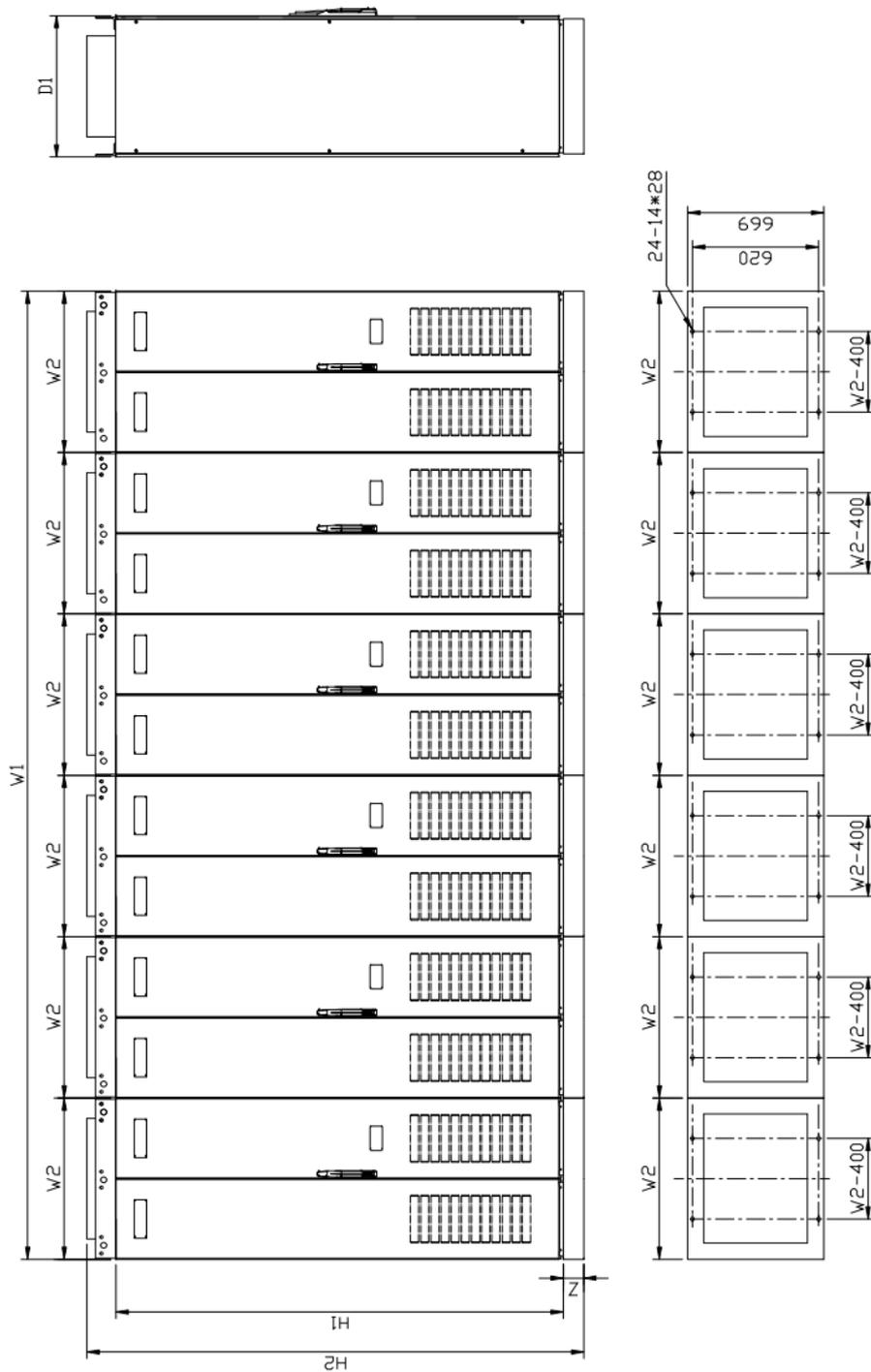
Rectifier feedback **HF680N02C-2400-4** into the cabinet shape schematic diagram

Regenerative rectifier 250kW, 315kW and 400kW standard cabinet dimensions

serial number	model number	Overall dimensions (unit: mm)						weights (kg)
		H1	H2	W1	W2	D1	Z	
1	HF680N02C-250-4 HF680N02C-250-4+Z1 HF680N02C-315-4 HF680N02C-315-4+Z1 HF680N02C-400-4 HF680N02C-400-4+Z1	2200	2440	/	800	700	100	1000
2	HF680N02C-250-4+Z2 HF680N02C-315-4+Z2 HF680N02C-400-4+Z2	2200	2540	/	800	700	200	1000
3	HF680N02C-250-4+Z3 HF680N02C-315-4+Z3 HF680N02C-400-4+Z3	2200	2590	/	800	700	250	1000
4	HF680N02C-250-4+z4 HF680N02C-315-4+Z4 HF680N02C-400-4+z4	2200	2640	/	800	700	300	1000

Regenerative rectifier 500kW, 630kW and 800kW standard cabinet dimensions

Serial number	Model number	Overall dimensions (unit: mm)						Weights (kg)
		H1	H2	W1	W2	D1	Z	
1	HF680N02C-500-4 HF680N02C-500-4+Z1 HF680N02C-630-4 HF680N02C-630-4+Z1 HF680N02C-800-4 HF680N02C-800-4+Z1	2200	2440	1600	800	700	100	1800
2	HF680N02C-500-4+Z2 HF680N02C-630-4+Z2 HF680N02C-800-4+Z2	2200	2540	1600	800	700	200	1800
3	HF680N02C-500-4+Z3 HF680N02C-630-4+Z3 hf680n02c-800-4+z3	2200	2590	1600	800	700	250	1800
4	HF680N02C-500-4+Z4 HF680N02C-630-4+Z4 HF680n02c-800-4+z4	2200	2640	1600	800	700	300	1800

Regenerative rectifier 1200kW standard cabinet product external dimensions

serial number	model number	Overall dimensions (unit: mm)						weights (kg)
		H1	H2	W1	W2	D1	Z	
1	HF680N02C-1200-4 HF680n02c-1200-4+z1	2200	2440	2400	800	700	100	2800
2	HF680N02C-1200-4+Z2	2200	2540	2400	800	700	200	2800
3	HF680n02c-1200-4+z3	2200	2590	2400	800	700	250	2800
4	HF680n02c-1200-4+z4	2200	2640	2400	800	700	300	2800

Regenerative rectifier 1600kW standard cabinet product external dimensions

Serial number	model number	Overall dimensions (unit: mm)						weights (kg)
		H1	H2	W1	W2	D1	Z	
1	HF680N02C-1600-4 hf680n02c-1600-4+z1	2200	2440	3200	800	700	100	3800
2	HF680N02C-1600-4+Z2	2220	2540	3200	800	700	200	3800
3	HF680n02c-1600-4+z3	2200	2590	3200	800	700	250	3800
4	HF680n02c-1600-4+z4	2200	2640	3200	800	700	300	3800

Regenerative rectifier 2000kW standard cabinet product external dimensions

Serial	model number	Overall dimensions (unit: mm)						weights (kg)
		H1	H2	W1	W2	D1	Z	
1	HF680N02C-2000-4 HF680N02C-2000-4+Z1	2200	2440	4000	800	700	100	4800
2	HF680N02C-2000-4+Z2	2200	2540	4000	800	700	200	4800
3	HF680N02C-2000-4+Z3	2200	2590	4000	800	700	250	4800
4	HF680N02C-2000-4+Z4	2200	2640	4000	800	700	300	4800

Regenerative rectifier 2400kW standard cabinet product external dimensions

Serial number	Model number	Overall dimensions (unit: mm)						Weights (kg)
		H1	H2	W1	W2	D1	Z	
1	HF680N02C-2400-4 HF680N02C-2400-4+z1	2200	2440	4800	800	700	100	5800

2	HF680N02C-2400-4+z2	2200	2540	4800	800	700	200	5800
3	HF680N02C-2400-4+z3	2200	2590	4800	800	700	250	5800
4	HF680N02C-2400-4+z4	2200	2640	4800	800	700	300	5800

5.3 Inverter external dimensions
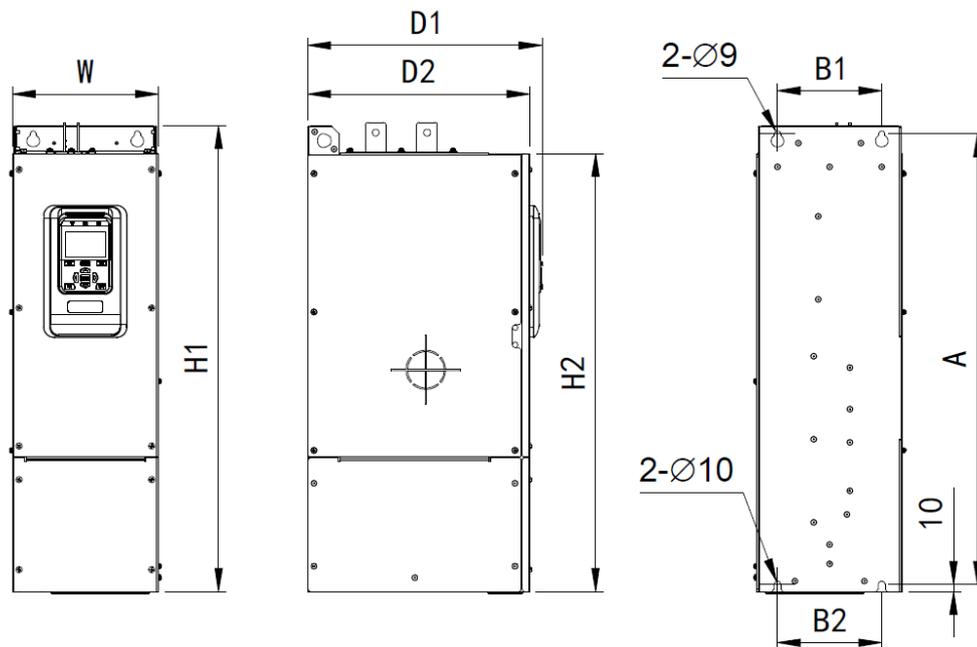
B3 Model Outline Schematic
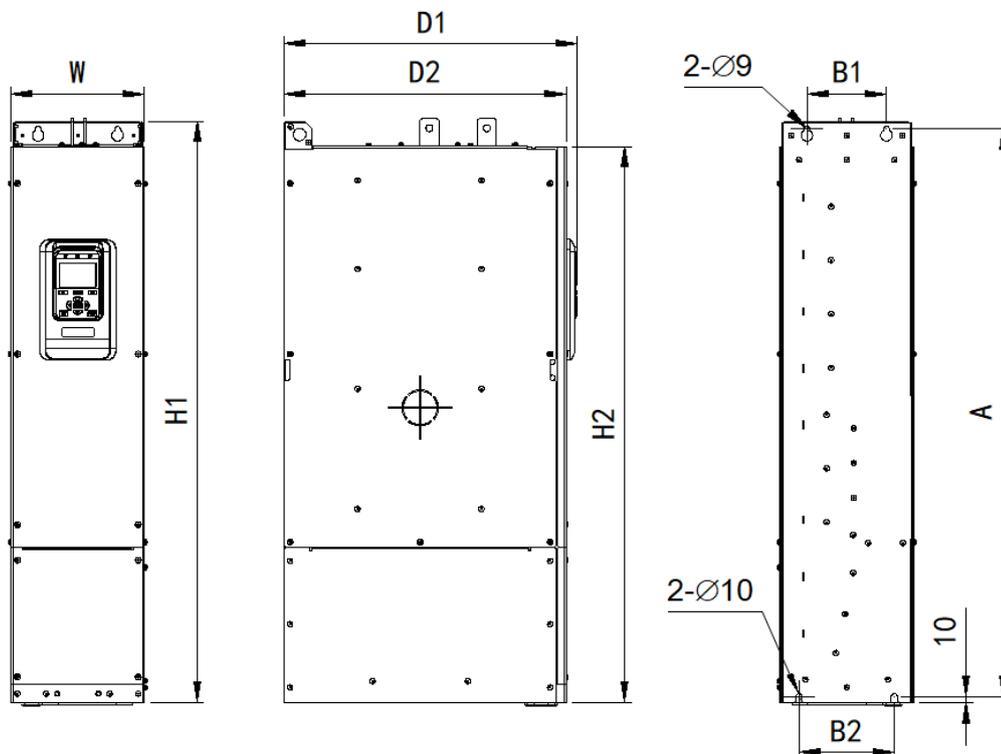
Schematic diagram of B4 model
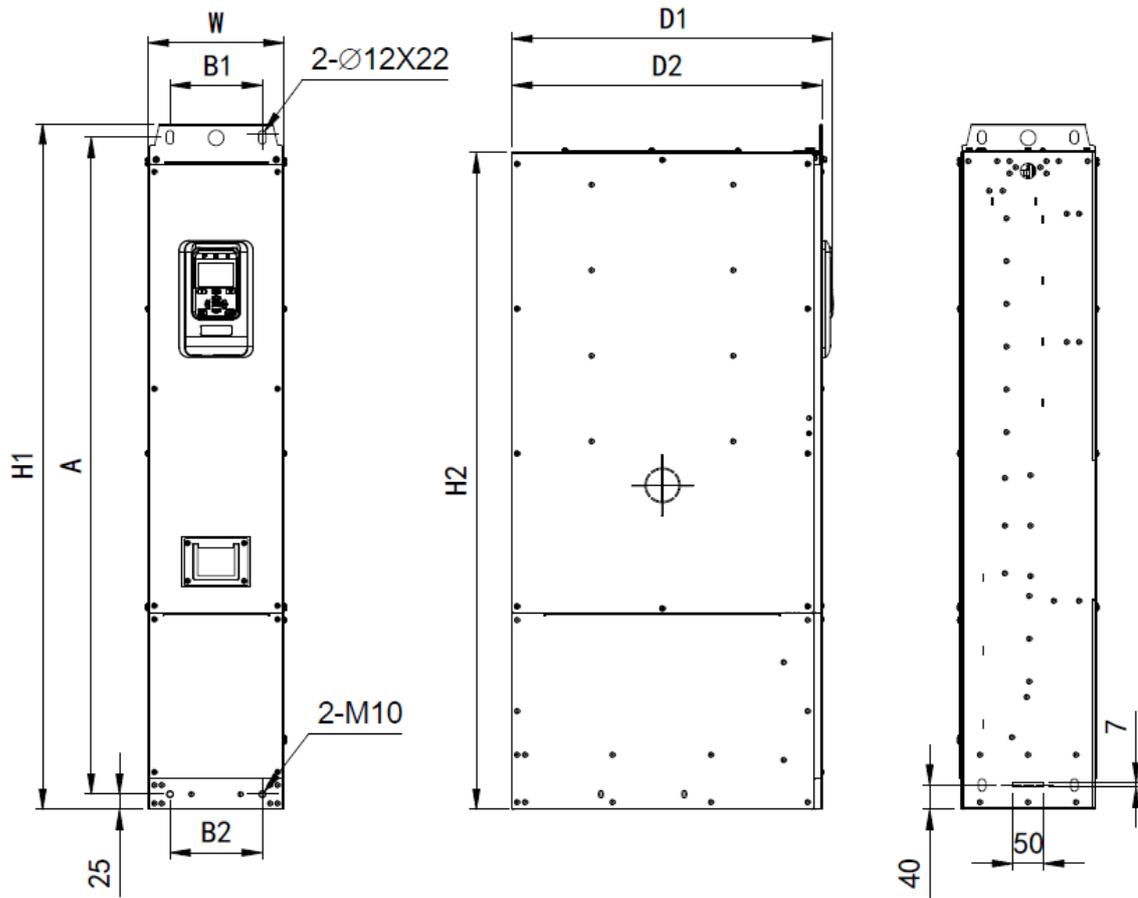
B5 Outline Schematic
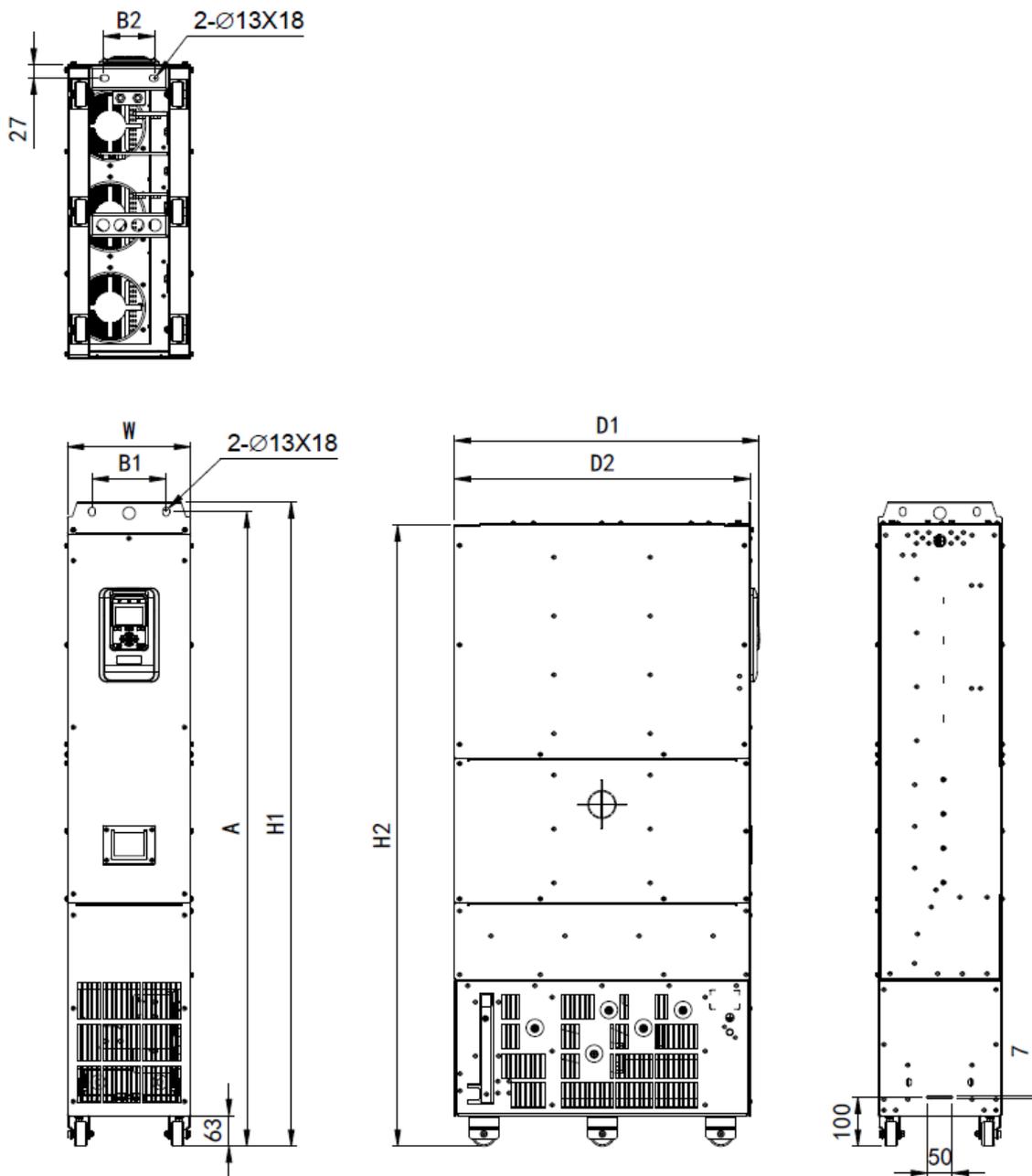
B6 Outline Schematic

Note: Rectangular notch is opened at the bottom of the rear end of the module, the purpose is to play a role in positioning when installing into the cabinet; the cabinet refers to the size of the notch to match.

Inverter product external dimensions and installation dimensions

Model number	models	Overall dimensions (unit: mm)					Mounting Dimensions (Unit: mm)			Recommended mounting bolts (Grade 8.8)	weights (kg)
		H1	H2	W	D1	D2	A	B1	B2		
HF680N03M-037-4	B3	673	633	210	337	320	652	150	150	4-M8	30
HF680N03M-045-4											
HF680N03M-055-4	B4	920	880	210	462	444	899	125	150	4-M8	55
HF680N03M-075-4											
HF680N03M-090-4											
HF680N03M-110-4											
HF680N03M-132-4											
HF680N03M-160-4	B5	1122	1075	221	522	505	1075	150	150	4-M10	80
HF680N03M-185-4											
HF680N03M-200-4											
HF680N03M-220-4											
HF680N03M-250-4											
HF680N03M-280-4	B6	1315	1268	250	618	600	1295	150	100	4-M12	120
HF680N03M-315-4											
HF680N03M-355-4											
HF680N03M-400-4											

5.4 External dimensions of inverter standardized cabinet products
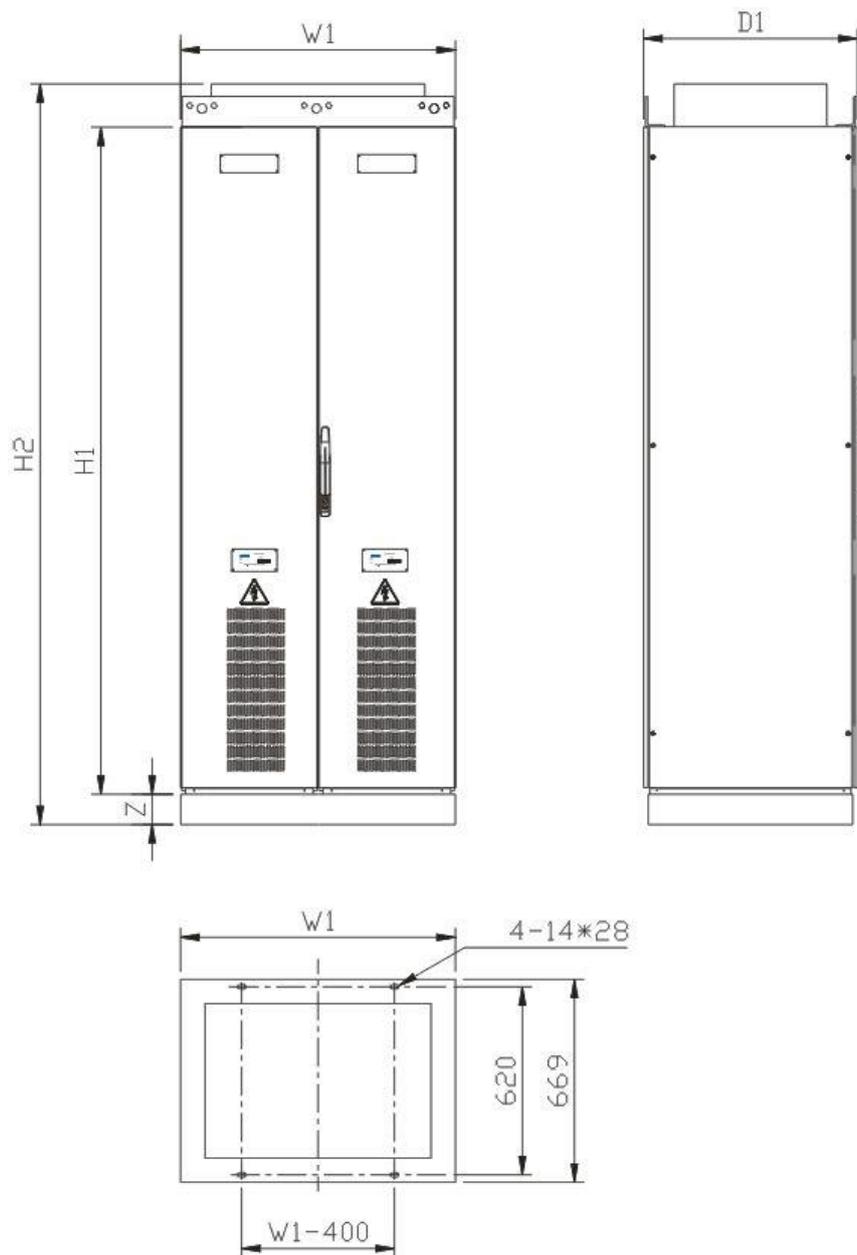
Schematic diagram of inverter cabinet

Inverter standard cabinet product external dimensions

Serial number	Model number	Overall dimensions (unit: mm)					weights (kg)
		H1	H2	W1	D1	Z	
1	HF680N03C-500-4 HF680N03C-500-4+Z1 HF680N03C-560-4 HF680N03C-560-4+Z1 HF680N03C-630-4 HF680N03C-630-4+Z1 HF680N03C-800-4 HF680N03C-800-4+Z1	2200	2440	800	700	100	900
2	HF680N03C-500-4+Z2 HF680N03C-560-4+Z2 HF680N03C-630-4+Z2 HF680N03C-800-4+Z2	2200	2540	800	700	200	900
3	HF680N03C-500-4+Z3 HF680N03C-560-4+Z3 HF680N03C-630-4+Z3 hf680n03c-800-4+Z3	2200	2590	800	700	250	900
4	HF680N03C-500-4+Z4 HF680N03C-560-4+Z4 HF680N03C-630-4+Z4 HF680n03C-800-4+Z4	2200	2640	800	700	300	900

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6. Operating instructions

6.1 Description of the operating panel

The operation panel (also known as the operator) of the HF680N series multi-drive product is shown below. It contains F1 key, LOCAL/REMOTE key, F2 key, RUN key, STOP key, UP/ DOWN key, LEFT/RESET key, RIGHT key and ENTER key, which can be utilized by the user to set the parameters of the multi-drive products, monitor the operation status, control the motor running and stopping and so on.

6.2 Key operation

The data value of the key is composed of the main menu and the lower menu. To move from the upper menu to the lower menu, press the▼ lower key. To go back to the upper menu from the lower menu, press the▲ upper key. It is also possible to increase or decrease the data value by using the up and down keys, and to confirm by using the ENTER key once the data value has been determined. Use the◄► key to move the digits of a number when setting a parameter. When running the multi-drive with the operator keyboard, use the RUN and STOP keys to start and stop the motor (please set the parameters first and switch to local mode) and the LOCAL/REMOTE key to switch between local and remote mode.

6.3 Initial Interface

The initial interface consists of two functional areas, "Status Bar" and "Monitor Window".

Status Bar: Display "Operation Frequency", "Busbar Voltage", "Output Current", "Warning | Fault" in order.

Status line	Functional Description
Operating frequency	Frequency of motor rotation, preceded by a "-" sign for reverse rotation

Busbar voltage	Voltage at the busbar in V
Motor Current	Current output current, unit: A
Warning | Failure	No warning or alarm: N|N Warning: W Fault: E When there is a warning or fault output, the letter identifies the

Monitoring window: 4 monitoring data are displayed on one page, press up and down keys to slide the monitoring data to view different operating parameters;

In the initial interface, press ENTER to quickly set the motor frequency. Press F1/F2 key to exit the initial interface and enter the main menu interface.

6.4 Description of the composition of the Main Menu

The "Main Menu" screen contains the submenus in the table, and you can enter the operation interface of each corresponding function.

Main menu		
Submenu number	Submenu	Functional Description
1	Option Set Option Settings	Setting some status and viewing some information
2	Parameter Setting parameterization	Viewing/changing parameter groups
3	Reference Set Setting reference value	Setting the parameter value for reference
4	Function Setting Function Setting	Individual performable functions
5	Fault Record malfunction log	Saved historical fault event logs, and fault details
6	Security Security settings	Enter the correct password to get advanced privileges to access and modify more multi-drive product parameters that can only be accessed by advanced privileges

6.4.1 "Option Settings" submenu

The Options Setting screen contains the submenus in the table, and you can access the operation screen of each corresponding function.

Options (as in computer software settings)		
Submenu number	Submenu	Functional Description
1	Choose Direction running direction	In local mode, change the direction of motor operation
2	Reset Error fault reset	Reset the current fault status and clear the fault code
3	Menu Language menu language	Menu Language Settings
4	Monitor Setting Monitoring Interface Settings	Setting observation data in the monitoring screen
5	LCD Contrast liquid crystal contrast ratio	Setting the LCD screen brightness
6	Time Setting time setting	Setting the current time
7	Version Firmware version	Displays the control board firmware version number and the operation panel firmware version number

参数设置

P00　参数控制
P02　并机和面板设置
P03　数字输入端子组
P04　数字输出端子组

8　　　　　　　　　　　　　　　　　　　to the host computer

"Parameter Settings"

men
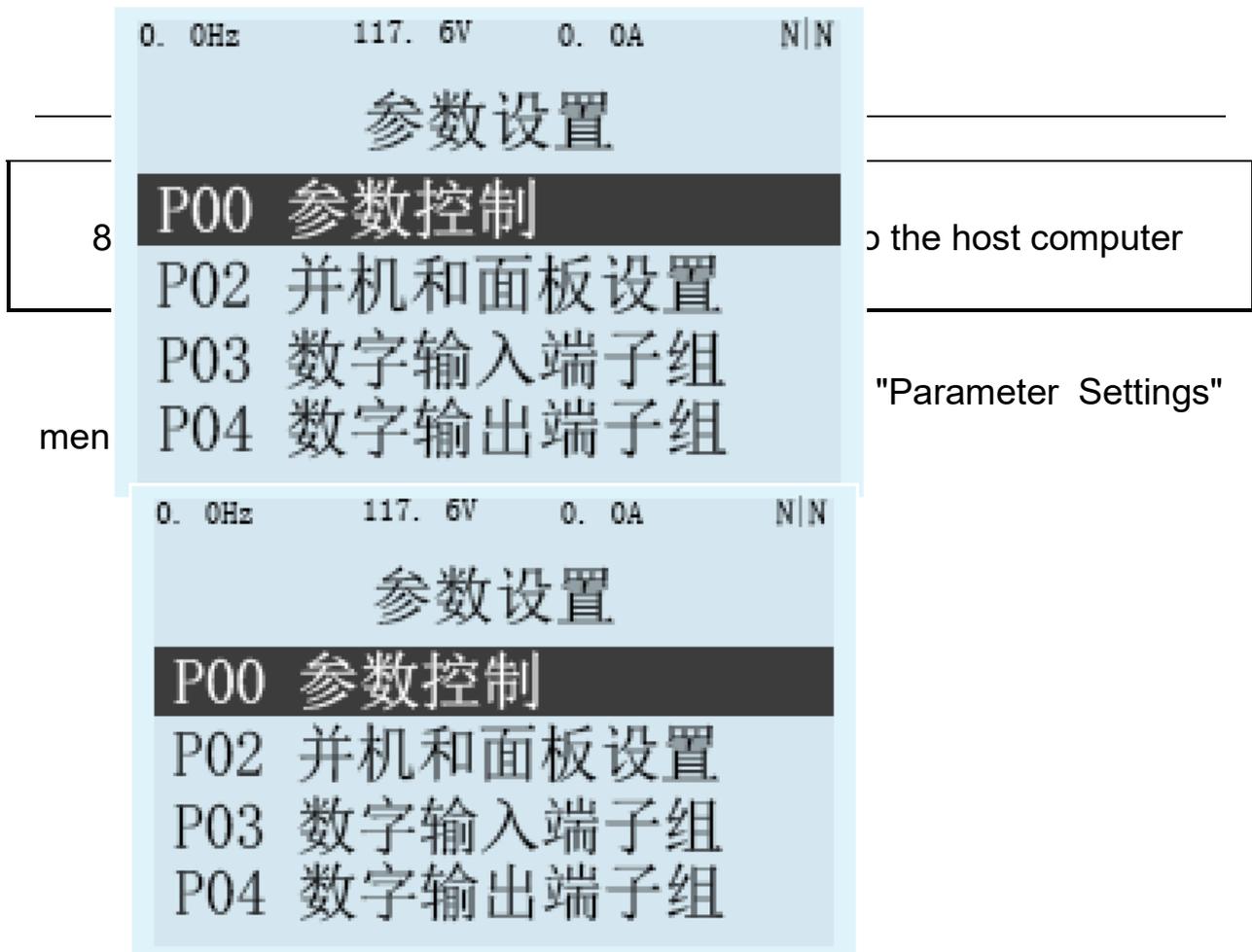
Parameter Setting

Enter this menu to view or modify various parameters of the multi-drive product.

6.4.3 Explanation of the composition of the Set Reference Values menu

0. 0Hz　　117. 6V　　0. 0A　　N|N

设定参考值

[1]　给定速度　　[Hz]
[2]　给定速度　　[%]
[3]　转矩设定　　[%]
[4]　转矩限制值设定
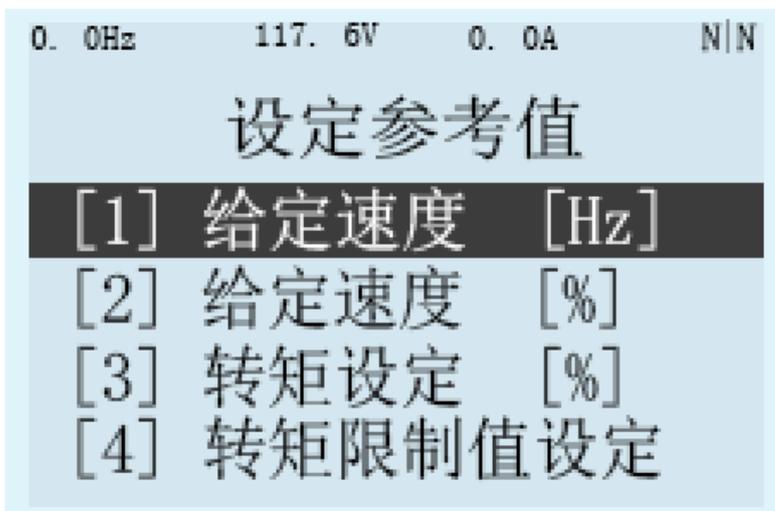
Set Reference Set

Sets various set values for the multi-drive product operation.

Type of model	Categorization	Unit (of measure)	Parameter description
Reference Set Setting reference value	Speed tempo	[Hz]	Speed in Hz
		[%]	Speed in %
	Torque Torque Setting	[%]	Torque in %
	Torque limiter Torque Limit	[%]	Torque limit value %
	Analog output 1	[%]	Given analog 1 output
	Analog output 2	[%]	Given analog 2 outputs

6.4.4 Explanation of the composition of the Function Settings menu

Function Setting
Contains executable functions.

Options (as in computer software settings)		
Submenu number	Submenu	Functional Description

1	MotoTuning I Static self-tuning	Motor static self-tuning
2	MotoTuning II Dynamic self-tuning	Self-tuning of motor dynamics
3	MotoTuning III Moment of inertia self-tuning	Self-tuning of the moment of inertia of a machine
4	DC-Link Tuning Capacitive s self-tuning (AFE)	Effective only in AFE control mode
5	Shortcut Paras Setting Quick Setup Parameters	Quick setup of common parameters
6	Parameter initialization	Parameter initialization is restored to the initially set value.
7	Delete Fault Records Clearing the fault log	Clear Fault Marker
8	System Restart system reboot	System reset for multi-drive products, equivalent to re-power-up
9	Backup Parameter Backup all parameters	Backup all current parameters
10	Recover Parameter Restore all parameters	Restore previously backed up parameters
11	Compare Parameter Comparative parameters	Compare the existing parameters with the backed-up parameters, and then list the modified parameters (when the backed-up parameters are the initialized factory values, the parameters compared at this time are the parameters whose factory values have been changed)
12	Backup Para DSP Parameter backup to	Backup of panel parameters to DSP

	DSP	
13	Restore Para DSP Parameter reduction within DSP	Restore DSP parameters

Backup Parameters can be used to backup all the parameters of the current multi-drive product (including self-tuning parameters), using this function you can restore the backed up values to the same type of multi-drive product. Note: Do not power down or disconnect the panel in the meantime!

Restore Parameters, which can be used to restore the backed up parameters, can be unrestricted to the original backed up multi-drive product, as long as the version number is matched you can perform the restore operation. If the prompt of failure appears, please check whether the version is consistent and whether it is correctly backed up. Note: (1) Please operate after stopping the car, do not cut off the power or disconnect the panel during the process, the restore operation will cause the multi-drive product to reset! (2) Please do not disconnect the power immediately after restoring the parameters successfully. If you need to disconnect the power, please wait for 5 minutes!

Restore Parameters, which can be used to restore the backed up parameters, can be unrestricted to the original backed up multi-drive product, as long as the version number is matched you can perform the restore operation. If the prompt of failure appears, please check whether the version is consistent and whether it is backed up correctly.

Comparison of parameters, if you have successfully backed up the parameters, you can use this function to view the modified parameters, by pressing the▼ down key,▲ up key to switch the display of inconsistent parameters, directly press the "Enter" key to enter the modified parameters. Note: The first step of comparing parameters will query all the parameters and compare the backup values, please do not power off or disconnect the communication!

6.4.5 Description of the composition of the Fault Record menu
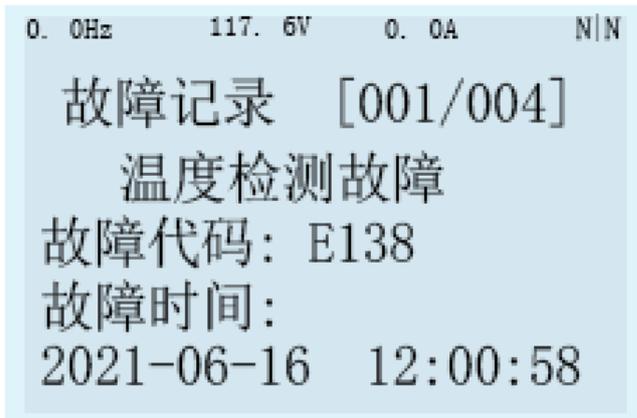
Fault Record

Fault record, you can view the information of abnormal events recorded by this machine. Click Fault Code to view the detailed information of the fault event, including, date, time, and various operation status data when the fault occurred.

6.4.6 Explanation of the composition of the Security Settings menu
Security Settings (Access Permissions)

This menu allows you to authenticate users and set parameter access levels.
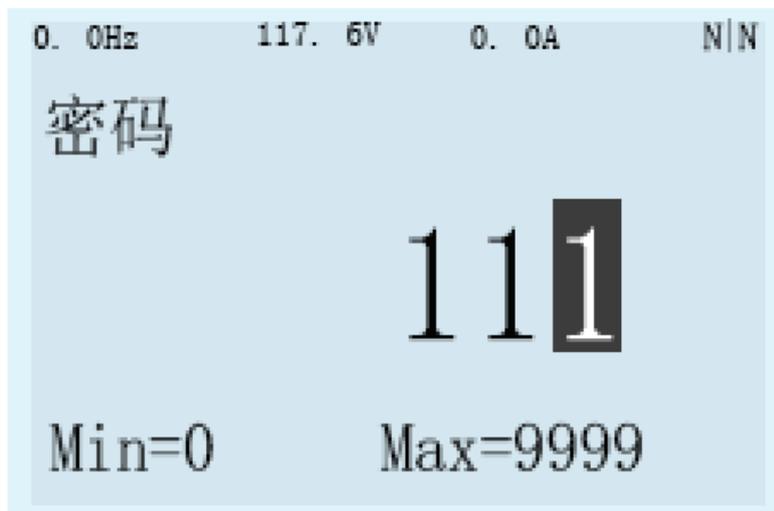
7. Commissioning of multi-drive products

7.1 Sequence of test runs for multi-drive products

Please perform a trial run based on the flowchart shown below.
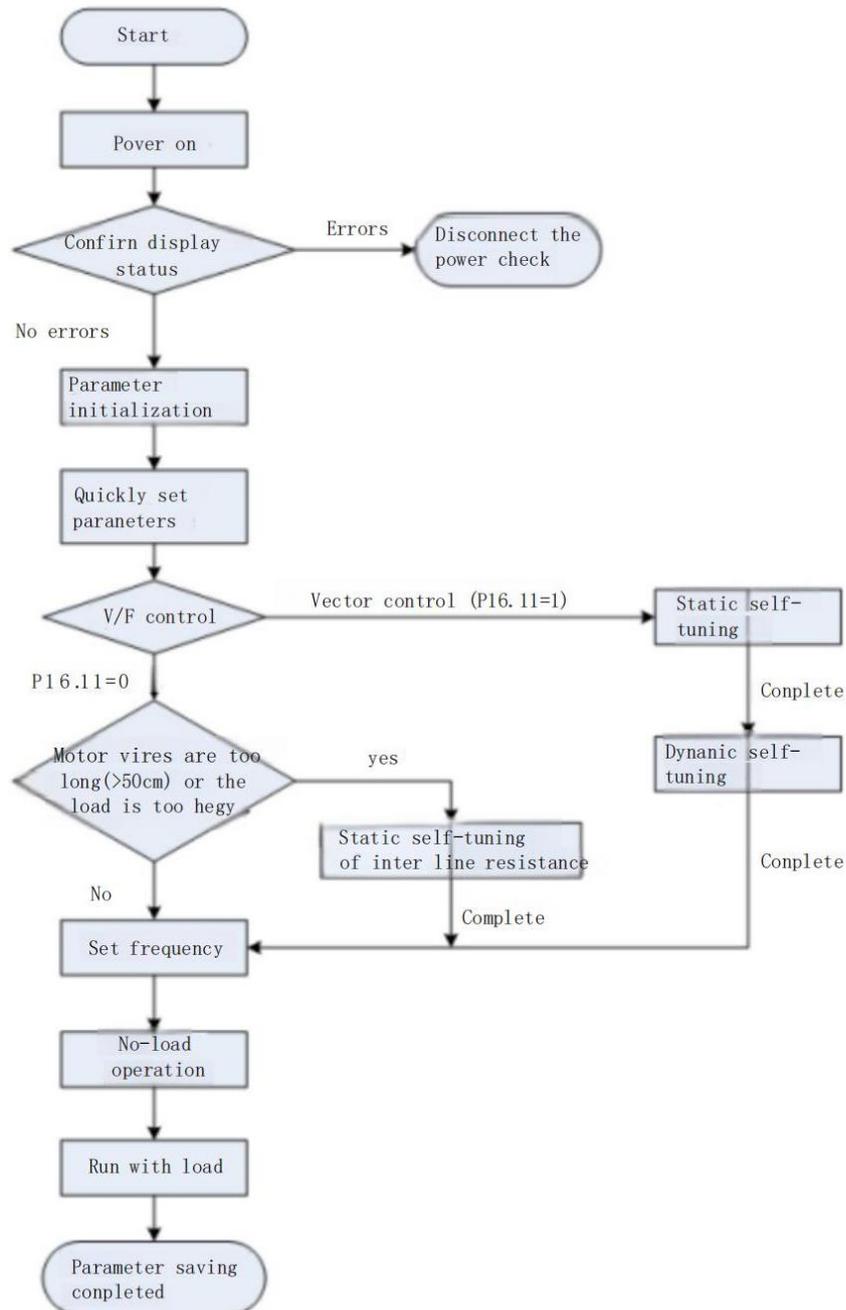
Trial Run Flowchart

Attention:

Before using the operation panel for self-tuning , be sure to select the Local/Remote key as Local.

The initial value of the control mode is V/F control (P16.11 = 0). In order to get better control performance, it is recommended to do static self-tuning for the V/F control as well.

Vector control is divided into closed-loop vector control (P16.11=2) and open-loop vector control (P16.11=1). The motor parameters obtained from static self-tuning and dynamic self-tuning accomplished in the open-loop vector control mode are also applicable to the closed-loop vector control mode. It is recommended to do static self-tuning and dynamic self-tuning with closed-loop vector as much as possible when conditions permit.

7.2 Multi-drive product test run operation

(1) Turn on the power

(2) Be sure to check the following items before turning on the power.

(3) Whether the power supply voltage is within the permissible range;

(4) Three-phase AC380~480V 50/60Hz

(5) Are the output terminals (U,V,W) of the motor and the motor well connected;

(6) The control terminals of the multi-drive product are well connected to other control devices;

(7) When using a PG encoder card, is the PG encoder card well connected to the motor encoder?

(8) Whether the motor is in the no-load state (not connected mechanically).

(9) Confirmation of display status

(10) When the power is turned on, operate the display of the keypad, the normal situation is shown below.

When a fault occurs, it is different from that shown above. A corresponding icon will be displayed at Warring/Error in the upper right corner, with N | E displayed for a fault, or W | E if there is also a warning.

7.2.1 Parameter initialization

Initialize the parameters and restore the parameter values to the default values. For details, see Section 5.4, "Function Settings".

7.2.2 Quick parameterization

Quickly set the following parameters to be able to test run the motor.

Function code	Name	Clarification	Setpoint
P16.2	Motor rated power	Refer to the motor nameplate to set the motor rated power	
P16.3	Motor rated voltage	Set the rated motor voltage with reference to the motor nameplate	
P16.4	Motor rated current	Set the rated motor current by referring to the motor nameplate.	
P16.5	Motor rated frequency	Refer to the motor nameplate to set the rated motor frequency	
P16.6	Rated motor speed	Refer to the motor nameplate to set the rated motor speed	
P16.7	Motor rated poles	Setting according to rated speed (120× P16.5 / P16.6) rounded to the nearest whole number.	
P16.9	Motor synchronous	Set according to rated speed (120×	

	speed	P16.5/P16.7)	
P16.11	Control mode selection	[0] V/F control [1] Open-loop vectors [2] Closed-loop vectors Set on demand	0
P16.14	V/F curve setting	[0] Linear V/F curve [1] Multi-point V/F curves [2] Quadratic power curves	0
P16.24	Maximum frequency	Setting the maximum frequency (this parameter is only valid in V/F control mode)	50 [Hz]
P8.16	Acceleration time 1	Acceleration time from the stop state to the set value of P8.15	3
P8.35	Deceleration time 1	Deceleration time from P8.34 set value to stop	3
P8.0	Startup method selection	[0] Digital input terminal [1] Operation panel [2] DP communication [3] MODBUS [4] Free function module	1
P8.10	Velocity feed source	[0] I/O terminal [1] Analog input 1 [2] Analog Input 2 [3] Operation panel [4] DP communication [5] MODBUS [6] Free function module	3
P8.3	Parking	[0] Ramp parking [1] Free parking	1
P7.0	Current limit value [motor 1]	0~300[%]	180%
P7.4	Overcurrent protection [motor 1]	0~300[%]	235%
P7.19	Overspeed fault [motor 1]	100.0 to 720.0 [%]	120%

7.2.3 Self-tuning of motor parameters

Self-tuning is necessary when the motor wires are too long or when vector control is selected. Please perform self-tuning in the following order to automatically recognize the motor parameters.

（1） Select Control Mode

Set the value of P16.11. If [1] or [2] is selected, it is vector control and requires static and dynamic self-tuning . If [0] is selected, it is V/F control and only static self-tuning   is required.

（2） Static self-tuning

Static self-tuning in V/F control mode can also be referred to as interline resistance self-tuning , which recognizes only the value of the stator resistance. Static self-tuning   in vector control mode recognizes stator and rotor resistance as well as inductance parameters.

Select Static self-tuning in the function settings and press the confirmation button to proceed with self-tuning . During the self-tuning process, "Static self-tuning   in progress!" is displayed. When self-tuning is completed, "Static self-tuning completed!" is displayed. When the self-tuning is finished, it shows "Static self-tuning is in progress!".

（3） Dynamic self-tuning

Dynamic self-tuning   is performed in vector control mode. Dynamic self-tuning optimizes the values of some of the motor inductance parameters and identifies the values of the mutual inductance parameters. The static self-tuning in vector control mode must be completed before the dynamic self-tuning starts.

Select Dynamic self-tuning in the function settings and press the confirmation button to proceed with self-tuning. During the self-tuning process, "Dynamic self-tuning is in progress!" is displayed. When self-tuning is completed, "Dynamic self-tuning completed!" is displayed. When the self-tuning is finished, it shows "Dynamic self-tuning is in progress!

（4） Moment of inertia self-tuning

After completing dynamic self-tuning in vector control mode, and always with the motor shaft connected to the load, perform rotational inertia self-tuning . The motor must not be loaded with more than 50% of the rated load when self-tuning of the moment of inertia is performed. The rotational inertia self-tuning optimizes only the mechanical rotational inertia. After the dynamic self-tuning is completed, the rotational inertia is used as the default value, and the vector control can operate normally, or the rotational inertia self-tuning is carried out if better control performance is pursued.

7.2.4 Considerations before implementing a self-tuning model

The HF680N series of multi-drive products offers a self-tuning parameterization function. Accurate self-tuning of parameters comes from the correct setting of motor nameplate parameters. In order to ensure the control performance, please configure the motor according to the standard adapted motor of the multi-drive product, if the difference between the motor power and the standard adapted motor is too large, the control performance of the multi-drive product will be significantly reduced.

Please check the following four things before motor self-tuning:

Inspection items	Inspection matters
Whether the motor shaft is connected to other mechanical equipment	During motor dynamic self-tuning, the motor will rotate at 7.5% of the rated speed. It is recommended to carry out dynamic self-tuning without load, if the motor is connected with other mechanical equipment, please make sure the load is more than 50% of the rated load, if the load is more than 50% of the rated load dynamic self-tuning may not be successful.
Is there a big difference between the motor capacity and the capacity of multi-drive products	Motor self-tuning may not be accomplished properly when the motor power is too small compared to the power of the multi-drive product (the motor power requirement is not less than 1

	/5 of the power of the multi-drive product).
Confirm that the motor parameters are entered correctly	Whether the P16 group parameters are consistent with the motor nameplate parameters, such as rated power, voltage, current, speed, number of poles, synchronous speed. If the input is incorrect it may lead to self-tuning failure or the motor may not operate normally.
Whether an encoder is mounted on the motor	If closed-loop vector control is used, an encoder should be installed on the motor. If V/F control or open-loop vector control is used, the presence or absence of an installed encoder does not affect motor self-tuning .

7.2.7 Trial operation under no load condition

The following explains how to test run the motor under no load.

Before operation, confirm the safety around the motor and machinery, and confirm that the emergency stop circuit and mechanical safety devices operate correctly. During operation, confirm that the motor rotates normally (whether there is abnormal sound and vibration), and confirm that the acceleration and deceleration of the motor are normal.

The procedure for using the operation panel is described below:

（1） Turn on the power and display the initial screen;

（2） Selected for local control, press LOC/REM to select LOCAL, the LOCAL indicator lights;

（3） Press the ENTER key of the operation panel, set the reference value [1] given speed, press the RUN key, run the multi-drive product, the RUN indicator lights up and the motor turns positively; (it is recommended that the given frequency is 5Hz)

8. Regenerative rectifier Commissioning and Commissioning

8.1 Regenerative rectifier Commissioning

8.1.1 Stand-alone Regenerative rectifier Commissioning Procedure

The terminals are exemplified by the wiring below:

DI1:   Start signal;   DI2:   Operation confirmation signal;

DI3: [14] Remote emergency stop fault DI4: Fault reset;

DO2:   Fault; DO3: Operation;

DO4:   Controls the main contactor (fixed in the program, the main contactor cannot be controlled by another DO);

DO5:   Controls the charging resistor.

   (1) Commissioning procedure using the operation panel

Step 1：**Do not turn on the 380V main power, turn on the 220V control power**. Select P0.1 as the nameplate power of regenerative rectifier module, and then enter "Function Setting" and select "Parameter Initialization";

Step 2：Check the control signal wire.

Short the control board terminals "DO4A" and "DO4C", the main contactor is absorbed; short the terminals "DO5A" and "DO5C", the charging resistor contactor is absorbed; short the DO2 external relay contact, observe whether the corresponding point is set to 1 in PLC. Short terminal "DO5A" and "DO5C", the charging resistor contactor will absorb; short DO2 external relay contact, observe whether the corresponding point is set to 1 in PLC.

Set P3.0-P3.7 to [0] and check the DI signal line with PLC. Check whether the corresponding DI bit of "Digital Input H:L" is 1 in "Monitor Mode" of the panel.

Step 3：Setting parameters.

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Parameter number	Set value	Clarification
P3.0	[1] Positive rotation operation	Setting of the operating feed signal according to the actual wiring
P3.1	[20] Main contactor engagement confirmation	Setting the main contactor confirmation signal according to the actual wiring
P3.2	[14] Remote emergency stop malfunction	Access to LCL overheat fault signal
P3.3	[5] Fault reset	Setting the fault reset according to the actual wiring
P4.1 DO2	[2] Fault output	Setting the fault output signal according to the actual wiring
P4.2 DO3	[1] Operation Signal	Setting the operation signal according to the actual wiring
P4.3 DO4	[0] Disable	Controls the main contactor; it is fixed in the program and cannot be controlled by another DO
P4.4 DO5	[32] Pre-charging completion signal	Control Charge Resistor
P7.0	180%	Current Limit Value
P7.4	200%	overcurrent value
P7.12	730V	Overvoltage value (if the incoming voltage is higher than 430V, set this value to 800V)
P8.6	300s	This value is set to 300s for commissioning and 0.5s for normal operation.

P16.0	380V	Setting according to actual input voltage (Measured value of incoming voltage when not in operation)
P16.2	Power on nameplate of regenerative rectifier module	Take 400kW as an example, here it is set to 400kW
P16.4	Input Current on Regenerative rectifier Module Nameplate	In the case of a 400kW system, this is set to 640A.
P16.11	[3] Rectification Feedback	Control mode selection
P16.12	3	Minimum carrier frequency of 3K in regenerative rectifier module
P24.7	Default is 0V	DC bus voltage ADJ, set the adjustment value of DC bus voltage, usually the default value, no need to modify.

Notes: The output voltage of the DC bus is determined by P16.0 and P24.7, and the value of the DC bus output voltage = the value of the DC bus voltage of the reference determined by P16.0 + the adjustment value set by P24.7. The correspondence between parameter P16.0 and the DC bus voltage of the reference is as follows:

P16.0≤ at 375V:　　　　　The DC bus voltage of the reference is 580V;

375V < P16.0≤ At 400V:　　The DC bus voltage of the reference is 600V;

400V < P16.0≤ 430V when: The DC bus voltage of the reference is 630V;

430V < P16.0≤ At 450V:　　The DC bus voltage of the reference is 665V;

450V < P16.0≤ At 460V:　　The DC bus voltage of the reference is 680V;

When P16.0 > 460V:　　　　　The DC bus voltage of the reference is 700V.

Example:　 If you need 620V DC bus voltage value for example, then set P16.0 to 380V and P24.7 to 20V to make the DC bus output 620V.

Step 4：**Turn on the 380V main power.** Select Local/Remote as Local, and then

press Run, the charging resistor contactor will be closed, the DC voltage will be charged to a certain voltage and the main contactor will be closed, at this time, the IGBT will not work (it will work after 300s), and observe whether the value of "Frequency (AFE)" in the monitoring menu is 49-51Hz, and whether the value of "Voltage Value (AFE)" is consistent with the incoming voltage, and then press Stop to shut down. Observe whether the value of "Frequency (AFE)" in the monitoring menu is between 49-51Hz, whether the value of "Voltage (AFE)" is the same as the inlet voltage, and then press Stop to stop the machine.

Step 5：**P8.6 is set to 0.5s**, and then press Run. After normal operation, observe whether the bus voltage reaches the set DC bus output voltage, and observe whether the values of A-phase current, B-phase current, and C-phase current are balanced, and then press Stop to stop the machine.

Step 6：**Check that the P and N of the regenerative rectifier module are connected to the P and N of all the inverters**. Select Local/Remote as Local, **make sure the value of P24.21 has been set to [0] to prohibit, and** then select "Capacitor Self-tuning " in "Function Setting", and the Stop lamp will light up after the self-tuning   is completed. The value of P24.28 will be changed after successful self-tuning . Then **change the value of P24.21 to [1] to enable.**

　　Note: If there is a change in the inverter connected to the DC bus, redo the capacitor self-tuning .

Step 7：Select Local/Remote as Remote to leave the start and stop of the regenerative rectifier module to PLC control. Regenerative rectifier module debugging is completed, can be used normally.

　　(2) Steps for debugging using the host computer

Step 1：**Please do not connect the 380V main power, connect the 220V control**

power and connect the upper computer software. The upper computer software can be obtained by contacting Wuhan Guide Technology Co., Ltd. or from the official website of Wuhan Guide Technology Co., Ltd. at http://www.guide-edrive.com 下载获得.

Step 2：Select P0.1 as the nameplate power of the regenerative rectifier module, and then initialize the parameters;

Step 3：Check the control signal wire.

Select P16.11 as [0] V/F. Select P4.1 as [57], P4.3 as [58], and P4.4 as [59].

Set 100.15, 100.16 and 100.17 to 1 respectively in the main interface to check whether each control point is controlled correctly (the point of DO2 is looked at in the PLC program; the point of DO4 controls the main contactor; the point of DO5 controls the charging resistor). Then set 100.15, 100.16, 100.17 to 0 respectively to see if each control point is disconnected.

参数	名称	值	单位
100.15	DO 功能本地测试 1	1	
100.16	DO 功能本地测试 2	0	
100.17	DO 功能本地测试 3	0	

Set all P3.0-P3.7 to [0], and work with PLC to view the DI signal lines. Click [icon] to enter DI monitor screen, see the following figure: check whether the corresponding DI bit is 1.

参数	名称	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
101.5	数字量输入端子 [01 ~ 16]																
101.6	数字量输出端子 [01 ~ 16]																

Step 4：Setting parameters.

Parameter number	Set value	Clarification
P3.0	[1] Positive rotation operation	Setting of the operating feed signal according to the actual wiring
P3.1	[20] Main contactor engagement confirmation	Setting the main contactor confirmation signal according to the actual wiring

P3.2	[14] Remote emergency stop malfunction	Access to LCL overheat fault signal
P3.3	[5] Fault reset	Setting the fault reset according to the actual wiring
P4.1 DO2	[2] Fault output	Setting the fault output signal according to the actual wiring
P4.2 DO3	[1] Operation Signal	Setting the operation signal according to the actual wiring
P4.3 DO4	[0] Disable	Controls the main contactor; it is fixed in the program and cannot be controlled by another DO
P4.4 DO5	[32] Pre-charging completion signal	Control Charge Resistor
P7.0	180%	Current Limit Value
P7.4	200%	overcurrent value
P7.12	730V	Overvoltage value (if the incoming voltage is higher than 430V, set this value to 800V)
P8.6	300s	This value is set to 300s for commissioning and 0.5s for normal operation.
P16.0	380V	Setting according to actual input voltage (actual value of incoming voltage when not in operation)
P16.2	Power on nameplate of regenerative rectifier module	Take 400kW as an example, here it is set to 400kW
P16.4	Input Current on Regenerative rectifier Module Nameplate	In the case of a 400kW system, this is set to 640A.
P16.11	[3] Rectification Feedback	Control mode selection

| P16.12 | 3 | Minimum carrier frequency of 3K in regenerative rectifier module |
| P24.7 | Default is 0V | DC bus voltage ADJ, set the adjustment value of DC bus voltage, usually the default value, no need to modify. |

Notes: The output voltage of the DC bus is determined by P16.0 and P24.7, and the value of the DC bus output voltage = the value of the DC bus voltage of the reference determined by P16.0 + the adjustment value set by P24.7. The correspondence between parameter P16.0 and the DC bus voltage of the reference is as follows:

P16.0≤ at 375V: The DC bus voltage of the reference is 580V;

375V < P16.0≤ At 400V: The DC bus voltage of the reference is 600V;

400V < P16.0≤ 430V when: The DC bus voltage of the reference is 630V;

430V < P16.0≤ At 450V: The DC bus voltage of the reference is 665V;

450V < P16.0≤ At 460V: The DC bus voltage of the reference is 680V;

When P16.0 > 460V: The DC bus voltage of the reference is 700V.

Example: If you need 620V DC bus voltage value for example, then set P16.0 to 380V and P24.7 to 20V to make the DC bus output 620V.

Step 5：**Turn on the 380V main power.** Go back to the main interface of the host computer, select "Local/Remote" as "Local", and then click 运行 , the charging resistor contactor will absorb, 103.23 DC voltage will be charged to a certain voltage and the main contactor will absorb, at this time, the IGBT won't work (it will work after 300s). At this time, the IGBT will not work (it will work after 300s), observe whether the value of 103.31 Frequency (AFE) is between 49-51Hz, and whether the value of 103.30 Inlet Voltage (AFE) is the same as the Inlet Voltage. Then press 停止 to stop the machine.

Step 6：**P8.6 is set to 0.5s**, press 运行 , after normal operation, use the upper computer to observe whether the DC voltage of 103.23 reaches the set DC bus output voltage, and whether the three-phase current values of 102.54, 102.55, and 102.56 are balanced or not, and then press 停止 to stop the

machine.

Step 7：**Check that the P and N of the regenerative rectifier module are connected to the P and N of all the inverters**. Select "Local/Remote" in the main interface of the host computer as "Local", **make sure the value of P24.21 is set to [0], and** then click 电容自学习 for capacitor self-tuning , and the light behind the 停止 button will be on after the self-tuning is completed. The value of P24.28 will be changed after successful self-tuning . Then **change the value of P24.21 to [1] enable.**

Note: If there is a change in the inverter connected to the DC bus, redo the capacitor self-tuning .

Step 8：Select "Local/Remote" as "Remote" in the main interface of the upper computer, and hand over the start and stop of the regenerative rectifier module to the PLC for control. Regenerative rectifier module debugging is completed, can be used normally.

8.1.2 Steps for commissioning two-parallel regenerative rectifiers

Two-parallel regenerative rectifier consists of two regenerative rectifiers of the same power in parallel, connected by optical fiber. The commissioning procedure of two parallel regenerative rectifier is suitable for 500kW, 630kW and 800kW regenerative rectifier products.

The main unit terminals are wired as an example below:

DI1:　　Start signal;　　　　　DI2:　　Operation confirmation signal;　　　DI4: Fault reset;

DO2:　　Fault output;

DO4:　　Controls the main contactor (fixed in the program, the main contactor cannot be controlled by another DO);

DO5:　　Controls the charging resistor.

　(1) Commissioning procedure using the operation panel

Step 1：**Check the main wire connections.** The connecting wires between the two

rectifier return modules and the reactor should be of the same length and the phase sequence should be consistent.
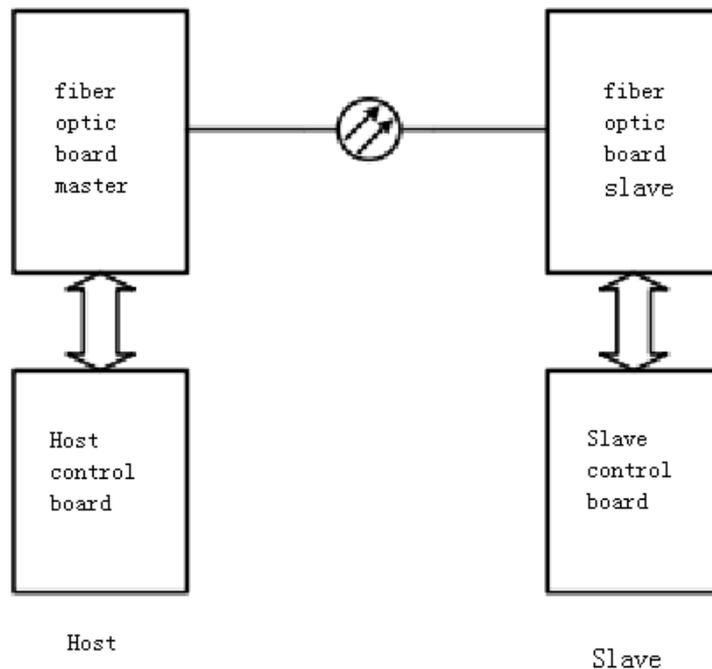
Step 2：**Do not turn on the 380V main power, turn on the 220V control power**, set the power of P0.1 (the power of single regenerative rectifier module), and then initialize the parameters of two regenerative rectifier modules respectively.

Step 3：Check the terminal control wires of the two regenerative rectifier modules separately. The DI input terminal and DO output terminal of the master are wired, and only the DO output terminal of the slave is wired.

Short the control board terminals "DO4A" and "DO4C", the main contactor is absorbed; short the terminals "DO5A" and "DO5C", the charging resistor contactor is absorbed; short the DO2 external relay contact, observe whether the corresponding point is set to 1 in PLC. Short terminal "DO5A" and "DO5C", the charging resistor contactor will absorb; short DO2 external relay contact, observe whether the corresponding point is set to 1 in PLC.

Set P3.0-P3.7 to [0] and check the DI signal line with PLC. Check whether the corresponding DI bit of "Digital Input H:L" is 1 in "Monitor Mode"

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of the panel.

Step 4：Connect the optical fiber between the master and the slave. The connection schematic is shown in the following figure:
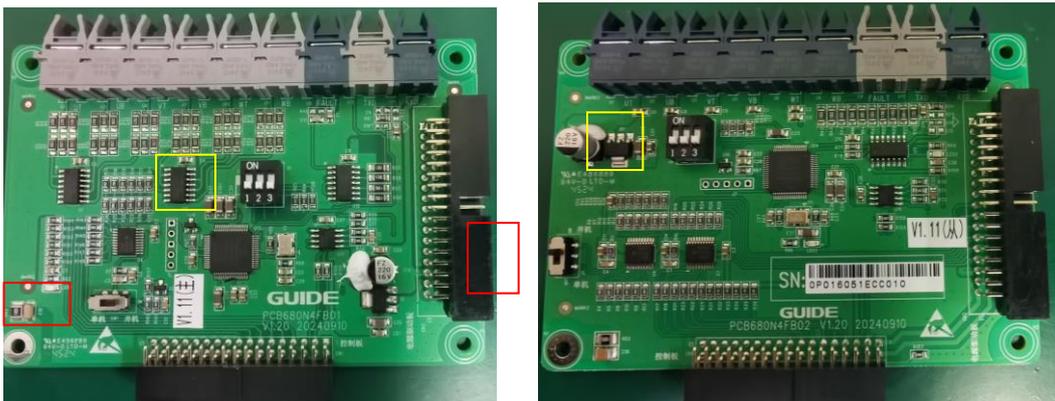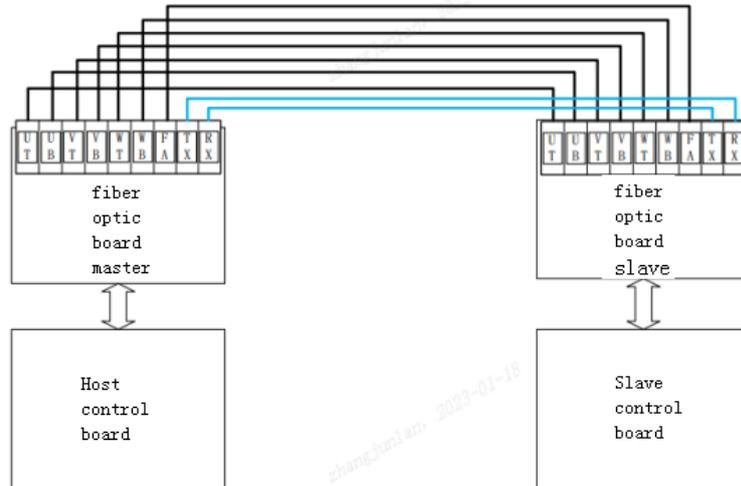
Note: The left picture above is the two-parallel fiber optic board master, and the right picture is the two-parallel fiber optic board slave. The single PIN dip switches **(red marked position)** of the fiber optic board master and the fiber optic board slave **must be played to the "Parallel" position**; and the triple PIN dip switches **(yellow marked position)** of the fiber optic board master and the fiber optic board slave **must be played to the position shown in the picture**.

Step 5：Set the slave parameters.

Parameter number	Set value	Instructions
P2.0	[2] From	pragmatic
P3.2	[14] Remote emergency stop malfunction	Access to LCL overheat fault signal

P4.3 DO4	[0] Disable	Controls the main contactor; it is fixed in the program and cannot be controlled by another DO
P4.4 DO5	[32] Pre-charging completion signal	Control Charge Resistor
P4.1 DO2	[2] Fault output	Setting the fault output signal according to the actual wiring
P7.0	180%	Current Limit Value
P7.4	200%	overcurrent value
P7.12	730V	Overvoltage value (if the incoming voltage is higher than 430V, set this value to 800V)
P16.0	380V	Setting according to actual input voltage (actual value of incoming voltage in non-operational state, consistent with the main unit)
P16.2	1/2 of total rectified return power	In the case of an 800kW system, this is set to 400kW.
P16.4	Rectifier returns 1/2 of the total input current	In the case of an 800kW system, this is set to 608A.
P16.11	[3] Rectification Feedback	Control mode selection
P16.12	3	Minimum carrier frequency of 3K in regenerative rectifier module

Step 6：Set the host parameters.

Parameter number	Set value	Clarification
P2.0	[1] Main	hosts
P2.3	1	Number of slaves

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P3.0	[1] Positive rotation operation	Setting of the operating feed signal according to the actual wiring
P3.1	[20] Main contactor engagement confirmation	Setting the main contactor confirmation signal according to the actual wiring
P3.2	[14] Remote emergency stop malfunction	Access to LCL overheat fault signal
P3.3	[5] Fault reset	Setting the fault reset according to the actual wiring
P4.1 DO2	[2] Fault output	Setting the fault output signal according to the actual wiring
P4.2 DO3	[1] Operation Signal	Setting the operation signal according to the actual wiring
P4.3 DO4	[0] Disable	Controls the main contactor; it is fixed in the program and cannot be controlled by another DO
P4.4 DO5	[32] Pre-charging completion signal	Control Charge Resistor
P7.0	180%	Current Limit Value
P7.4	200%	overcurrent value
P7.12	730V	Overvoltage value (if the incoming voltage is higher than 430V, set this value to 800V)
P8.6	300s	This value is set to 300s for commissioning and 0.5s for normal operation.
P16.0	380V	Setting according to actual input voltage (actual value of the incoming voltage in the non-operating state, consistent with the slave)

P16.2	Total rectified return power	In the case of an 800kW system, this is set to 800kW.
P16.4	Rectifier return total input current	In the case of an 800kW system, this is set to 1216A.
P16.11	[3] Regenerative rectifier	Control mode selection
P16.12	3	Minimum carrier frequency of 3K in regenerative rectifier module
P24.7	Default is 0V	DC bus voltage ADJ, set the adjustment value of DC bus voltage, usually the default value, no need to modify.

Notes: The output voltage of the DC bus is determined by P16.0 and P24.7, and the value of the DC bus output voltage = the value of the DC bus voltage of the reference determined by P16.0 + the adjustment value set by P24.7. The correspondence between parameter P16.0 and the DC bus voltage of the reference is as follows:

P16.0≤ at 375V: The DC bus voltage of the reference is 580V;
375V < P16.0≤ At 400V: The DC bus voltage of the reference is 600V;
400V < P16.0≤ 430V when: The DC bus voltage of the reference is 630V;
430V < P16.0≤ At 450V: The DC bus voltage of the reference is 665V;
450V < P16.0≤ At 460V: The DC bus voltage of the reference is 680V;
When P16.0 > 460V: The DC bus voltage of the reference is 700V.

Example: If you need 620V DC bus voltage value for example, then set P16.0 to 380V and P24.7 to 20V to make the DC bus output 620V.

Step 7：After the parameter setting, **disconnect the 220V control power, and then reconnect the 220V control power** to confirm whether the fiber is communicating normally. Observe the warning of the host computer with the operation panel as [W1] only.

Step 8：**Turn on the 380V main power.** Use the operation panel of the host to select Local/Remote as Local, and then press Run, the charging resistor contactor of the host and the slave machine will be absorbed, and the main contactor

of the host and the slave machine will be absorbed respectively when the bus voltage reaches a certain voltage. At this time, IGBT will not work (it will work after 300s), observe whether the value of "Frequency (AFE)" in the monitoring menu of the host is between 49-51Hz, and whether the value of "Voltage (AFE)" is the same as that of the incoming voltage, and then press Then press Stop to stop the machine.

Step 9：Set the host **P8.6 to 0.5s**, then press Run, after normal operation up, observe whether the bus voltage reaches the set DC bus output voltage, observe whether the A-phase current, B-phase current and C-phase current are balanced, and observe the slave current, which should be half of the host current. Then press Stop.

Step 10：**Check that the P and N of the regenerative rectifier module are connected to the P and N of all the inverters**. Select Local/Remote as Local, **make sure the value of P24.21 has been set to [0] to disable, and** then select "Capacitor Self-tuning " in "Function Setting", and the Stop light will be on after the self-tuning is completed. The value of P24.28 will be changed after successful self-tuning . Then **change the value of P24.21 to [1] to enable.**

Note: If there is a change in the inverter connected to the DC bus, redo the capacitor self-tuning .

Step 11：Select Local/Remote as Remote to leave the start and stop of the regenerative rectifier module to PLC control. The Regenerative rectifier Module is ready for normal operation.

（2）Steps for debugging using the host computer
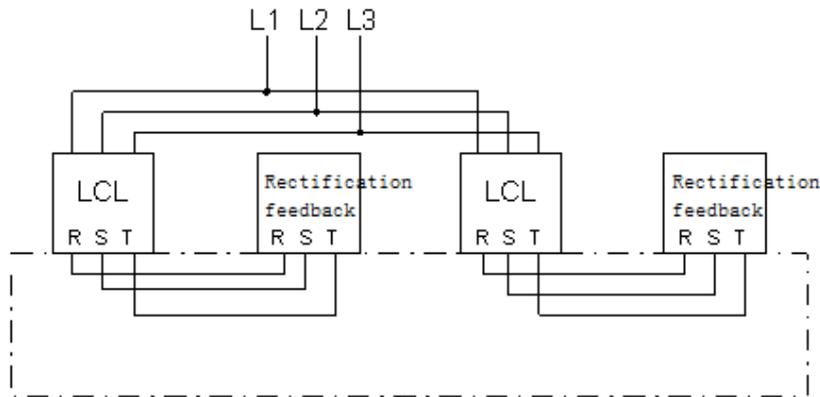
The length of the connection here is the same, and the phase sequence is consistent

Step 1: **Check the main wire connection.** The connecting wires between the two regenerative rectifier modules and the reactor should be of the same length and the phase sequence should be consistent.

Step 2: **Do not turn on the 380V main power, turn on the 220V control power**, set the power of P0.1 (the power of a single regenerative rectifier module), and then initialize the parameters of the two regenerative rectifier modules respectively.

Step 3: Check the terminal control wires of the two regenerative rectifier modules respectively. The DI input terminal and DO output terminal of the host have wires, and only the DO output terminal of the slave has wires.

Select P16.11 as [0] V/F. Select P4.1 as [57], P4.3 as [58], and P4.4 as [59]. Set 100.15, 100.16 and 100.17 to 1 respectively in the main interface to check whether each control point is controlled correctly. Then set 100.15, 100.16, 100.17 to 0 respectively to see if each control point is disconnected. (The point of DO2 is looked at in the PLC program; the point of DO4 controls the main contactor; the point of DO5 controls the charging resistor).

参数	名称	值	单位
100.15	DO 功能本地测试 1	1	
100.16	DO 功能本地测试 2	0	
100.17	DO 功能本地测试 3	0	

Set all P3.0-P3.7 to [0], and work with PLC to view the DI signal lines.

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Click to enter DI monitor screen, see the following figure: check whether the corresponding DI bit is 1.

参数	名称	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
101.5	数字量输入端子 [01 ~ 16]																
101.6	数字量输出端子 [01 ~ 16]																

Step 4: Connect the optical fiber between the master and the slave. The connection schematic is shown in the figure below:

Step 5: Set the slave parameters.

Parameter number	Set value	Iinstructions
P2.0	[2] From	pragmatic
P3.2	[14] Remote emergency stop malfunction	Access to LCL overheat fault signal
P4.3 DO4	[0] Disable	Controls the main contactor; it is fixed in the program and cannot be controlled by another DO
P4.4 DO5	[32] Pre-charging completion signal	Control Charge Resistor
P4.1 DO2	[2] Fault output	Setting the fault output signal according to the actual wiring
P7.0	180%	Current Limit Value
P7.4	200%	overcurrent value
P7.12	730V	Overvoltage value (if the incoming voltage is higher than 430V, set this value to 800V)

P16.0	380V	Setting according to actual input voltage (actual value of incoming voltage in non-operational state, consistent with the main unit)
P16.2	1/2 of total rectified return power	In the case of an 800kW system, this is set to 400kW.
P16.4	Rectifier returns 1/2 of the total input current	In the case of an 800kW system, this is set to 608A.
P16.11	[3] Rectification Feedback	Control mode selection
P16.12	3	Minimum carrier frequency of 3K in regenerative rectifier module

Step 6: Set the host parameters.

Parameter number	Set value	Clarification
P2.0	[1] Main	hosts
P2.3	1	Number of slaves
P3.0	[1] Positive rotation operation	Setting of the operating feed signal according to the actual wiring
P3.1	[20] Main contactor engagement confirmation	Setting the main contactor confirmation signal according to the actual wiring
P3.2	[14] Remote emergency stop malfunction	Access to LCL overheat fault signal
P3.3	[5] Fault reset	Setting the fault reset according to the actual wiring
P4.1 DO2	[2] Fault output	Setting the fault output signal according to the actual wiring
P4.2 DO3	[1] Operation Signal	Setting the operation signal according to the actual wiring
P4.3 DO4	[0] Disable	Controls the main contactor; it is fixed in the program and cannot be controlled by another DO
P4.4 DO5	[32] Pre-charging completion signal	Control Charge Resistor
P7.0	180%	Current Limit Value
P7.4	200%	overcurrent value
P7.12	730V	Overvoltage value (if the incoming voltage is higher than 430V, set this value to 800V)
P8.6	300s	This value is set to 300s for commissioning and 0.5s for normal operation.

P16.0	380V	Setting according to actual input voltage (actual value of the incoming voltage in the non-operating state, consistent with the slave)
P16.2	Total rectified return power	In the case of an 800kW system, this is set to 800kW.
P16.4	Rectifier return total input current	In the case of an 800kW system, this is set to 1216A.
P16.11	[3] Rectification Feedback	Control mode selection
P16.12	3	Minimum carrier frequency of 3K in regenerative rectifier module
P24.7	Default is 0V	DC bus voltage ADJ, set the adjustment value of DC bus voltage, usually the default value, no need to modify.

Note: The output voltage of the DC bus is determined by P16.0 and P24.7, and the value of the DC bus output voltage = the value of the DC bus voltage of the reference determined by P16.0 + the adjustment value set by P24.7. The correspondence between parameter P16.0 and the DC bus voltage of the reference is as follows:

P16.0≤ at 375V: The DC bus voltage of the reference is 580V;
375V < P16.0≤ At 400V: The DC bus voltage of the reference is 600V;
400V < P16.0≤ 430V when: The DC bus voltage of the reference is 630V;
430V < P16.0≤ At 450V: The DC bus voltage of the reference is 665V;
450V < P16.0≤ At 460V: The DC bus voltage of the reference is 680V;
When P16.0 > 460V: The DC bus voltage of the reference is 700V.

Example: If you need 620V DC bus voltage value for example, then set P16.0 to 380V and P24.7 to 20V to make the DC bus output 620V.

Step 7: After the parameter setting, **disconnect the 220V control power and reconnect the 220V control power** to confirm whether the optical fiber communicates normally. Observe with the host computer that 101.2

(Warning) is only [W1], 101.77 (CAN: Transmit Failure Count @ Host) and 101.80 (CAN: Transmit Failure Count @ Slave) of the host computer are always zero.

Step 8: **Turn on the 380V main power and connect the host computer with the upper computer**. Select "Local/Remote" as "Local", then press 运行 , the charging resistor contactor of the host and the slave will be engaged, and the main contactor of the host and the slave will be engaged when the bus voltage reaches a certain voltage. At this time, IGBT will not work (it will work after 300s), observe whether the value of 103.31 is between 49-51Hz, and whether the value of 103.30 inlet voltage (AFE) is consistent with the inlet voltage. Then press 停止 to stop the machine.

Step 9: **Set the P8.6 of the host computer to 0.5s**, then press 运行 , after it runs normally, use the host computer to observe whether the 103.23 DC voltage of the host computer reaches the set DC bus output voltage, observe whether the three-phase current values of 102.54, 102.55, 102.56 are balanced, and observe the A-phase current of the 113.11 slave, which should be half of that of 102.54. Then press 停止 .

Step 10: **Check that the P and N of the regenerative rectifier module are connected to the P and N of all the inverters**. Select "Local/Remote" in the main interface of the host computer as "Local", **make sure the value of P24.21 has been set to [0] to disable, and** then press 电容自学习 for capacitor self-tuning , and after the self-tuning is completed, the light behind the 停止 button will be on. The value of P24.28 will be changed after successful self-tuning . Then **change the value of P24.21 to [1] enable**.

Note: If there is a change in the inverter connected to the DC bus, redo the capacitor self-tuning .

Step 11: Select "Local/Remote" in the main interface of the host computer as

"Remote", and leave the starting and stopping of the regenerative rectifier module to the PLC control. The regenerative rectifier module can run normally.

8.1.3 Multiple Parallel Regenerative rectifier Commissioning Procedure

Multi-parallel regenerative rectifier consists of multiple regenerative rectifiers of the same power in parallel, connected by optical fiber. Multi-parallel regenerative rectifier commissioning steps are suitable for 1200KW and above regenerative rectifier products.

The fiber optic box connection diagram for a multi-parallel machine is shown below:

从机5

光纤板

控制板

从机4

光纤板

控制板

从机3

光纤板

控制板

从机2

光纤板

控制板

从机1

光纤板

控制板

从机5
从机4
从机3
从机2
从机1
主机

多并机光纤主站

主机

光纤板

控制板

Multi parallel fiber optic main station

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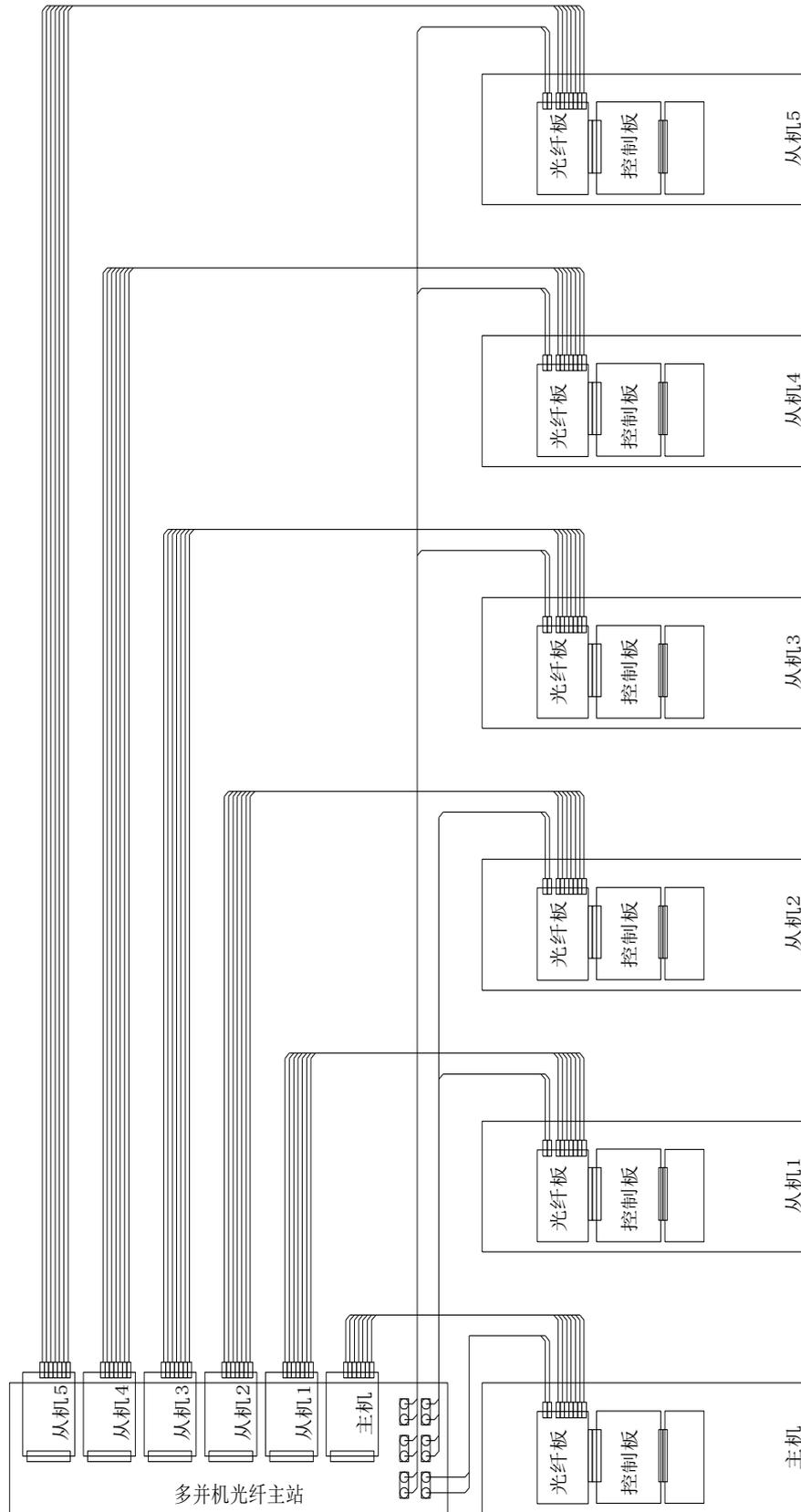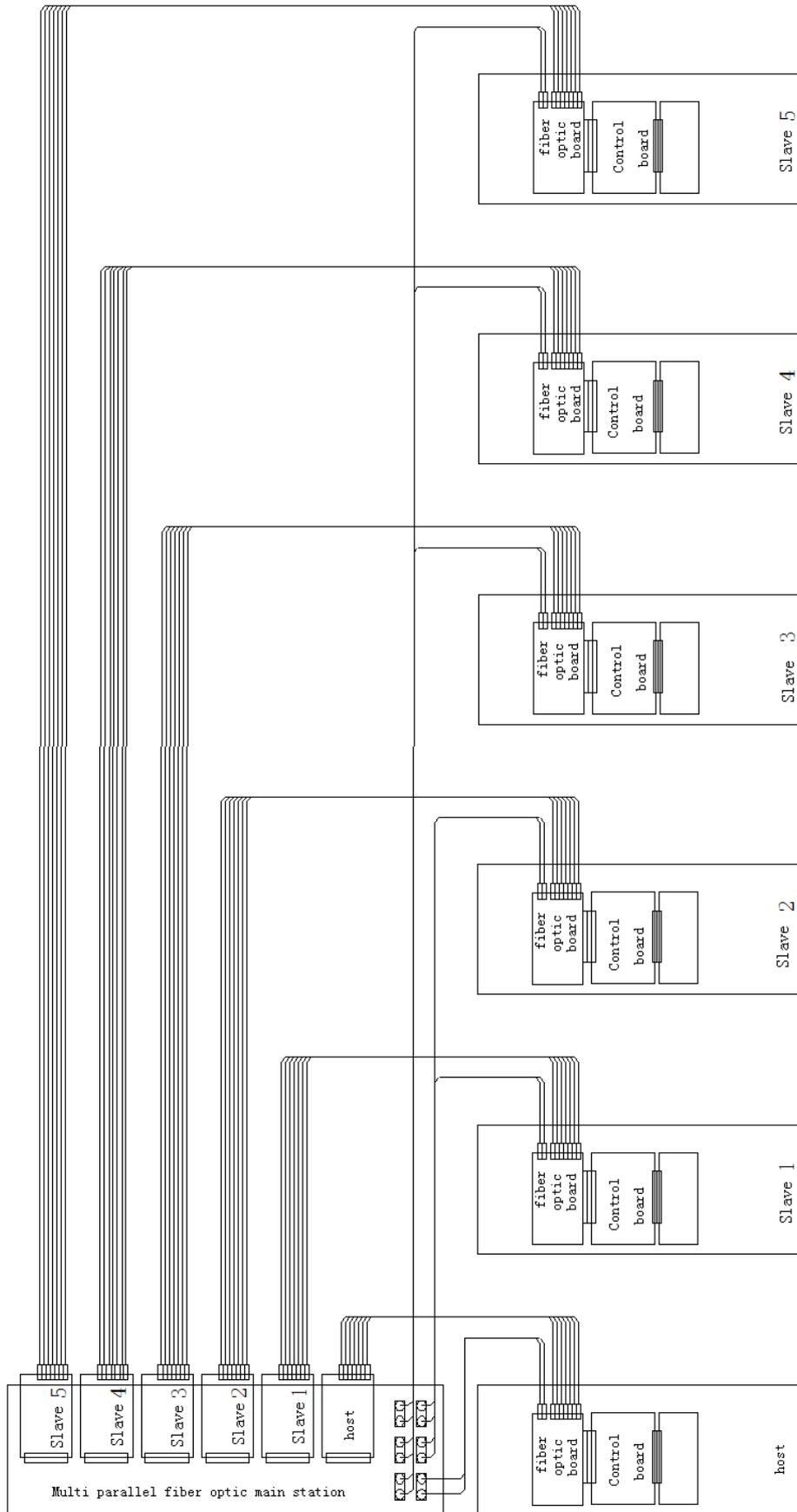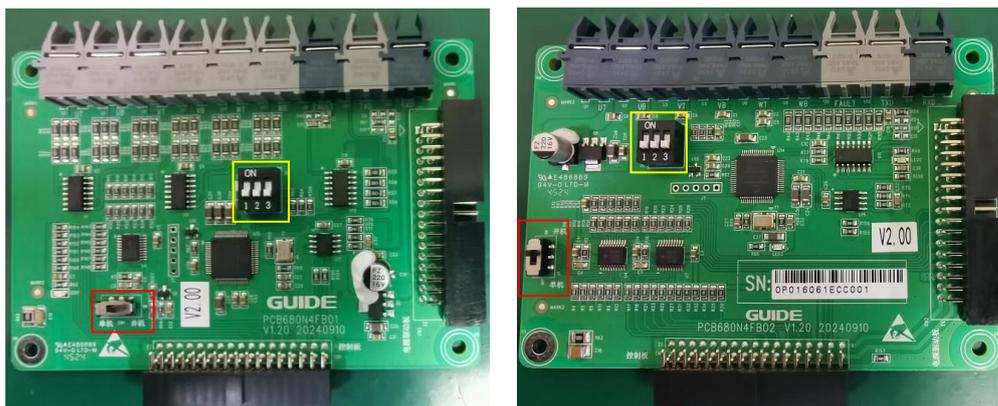
Note: The left picture above is a multi-parallel fiber optic board master, and the right picture is a multi-parallel fiber optic board slave. The single PIN dip switches **(red marked position)** of the fiber optic board master and the fiber optic board slave **must be played to the "Parallel" position**; and the three PIN dip switches **(yellow marked position)** of the fiber optic board master and the fiber optic board slave **must be played to the position shown in the picture**.

The terminals are exemplified by the wiring below:

Host:

DI1: Start signal;   DI2:Operation confirmation signal;   DI4:Fault reset;

DO2: Fault output;

DO4: Controls the main contactor (fixed in the program, cannot be controlled by another DO);

DO5: Controls the charging resistor contactor.

Each slave:

DI2:Operation confirmation signal;

DO4: Controls the main contactor (fixed in the program, cannot be controlled by another DO);

DO5: Controls the charging resistor contactor.

commissioning procedure

Step 1: **Check the main wire connections.** Multi-parallel regenerative rectifier wiring is complex, so please follow the drawings for a careful wire check.

Step 2: **Do not turn on the 380V main power, turn on the 220V control power**.

Check whether parameter P0.1 matches the power of the regenerative rectifier module (400KW). If the power matches, there is no need to initialize

the parameters; if the power does not match, please select parameter P0.1 as the power of the regenerative rectifier module and initialize the parameters.

Step 3: Check the terminal control wires of all rectifier return modules individually.

Short the control board terminals "DO4A" and "DO4C" of the regenerative rectifier module 1, and the main contactor in the filter cabinet 1 will be connected; short the terminals "DO5A" and "DO5C" of the regenerative rectifier module 1, and the charging resistor contactor in the filter cabinet 1 will be connected. "DO5A" and "DO5C", the charging resistor contactor in filter cabinet 1 will be engaged. And so on for other modules.

Short the host DO2 external relay contacts and observe in the PLC whether the corresponding point is set to 1.

Set all P3.0-P3.7 to [0], and cooperate with PLC to check the DI signal line of the host computer. Click ⊨ to enter DI monitor screen, see the following figure: check whether the corresponding DI bit is 1.

参数	名称	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
101.5	数字量输入端子　[01 ~ 16]																
101.6	数字量输出端子　[01 ~ 16]																

Step 4: Disconnect the 220V control power and connect the fiber optic cable between the host fiber optic master module and the fiber optic box, as well as the fiber optic cable between the fiber optic box and each slave.

Step 5: Set the parameters for slaves 1, 2, 3, 4, and 5.

The parameter settings are identical for each slave of the AFE, and the parameters are set as follows:

Parameter number	Set value	Clarification
P2.0	[2] From	Pragmatic
P3.1	[20] Main contactor engagement confirmation	Setting the main contactor confirmation signal according to the actual wiring
P3.2	[14] Remote emergency	Access to LCL overheat fault signal

	stop malfunction	
P4.1 DO2	[2] Fault output	Setting the fault output signal according to the actual wiring
P4.3 DO4	[0] Disable	Controls the main contactor; it is fixed in the program and cannot be controlled by another DO
P4.4 DO5	[32] Pre-charging completion signal	Control charging resistor contactor
P7.0	180%	Current Limit Value
P7.4	200%	overcurrent value
P7.12	730V	Overvoltage value (**if the incoming voltage is higher than 430V, set this value to 800V**)
P16.0	380V	Setting according to actual input voltage (actual value of incoming voltage in non-operational state, consistent with the main unit)
P16.2	400kW	400kW
P16.4	608A	608A
P16.11	[3] Rectification Feedback	Control mode selection
P16.12	3	Minimum carrier frequency of 3K in regenerative rectifier module

Step 6: Set the host parameters.

The AFE host parameters are set as follows:

parameter number	set value	instructions
P2.0	[1] Main	hosts

P2.3	(2 or 3 or 4 or 5)	Number of slaves (set according to the actual number of slaves, e.g., if there are only 2 slaves, set to 2)
P3.0	[1] Positive rotation operation	Setting of the operating feed signal according to the actual wiring
P3.1	[20] Main contactor engagement confirmation	Setting the main contactor confirmation signal according to the actual wiring
P3.2	[14] Remote emergency stop malfunction	Access to LCL overheat fault signal
P3.3	[5] Fault reset	Setting the fault reset according to the actual wiring
P4.1 DO2	[2] Fault output	Setting the fault output signal according to the actual wiring
P4.2 D03	[1] Operation Signal	Setting the operation output signal according to the actual wiring
P4.3 DO4	[0] Disable	Controls the main contactor; it is fixed in the program and cannot be controlled by another DO
P4.4 DO5	[32] Pre-charging completion signal	Control charging resistor contactor
P7.0	180%	Current Limit Value
P7.4	200%	overcurrent value
P7.12	730V	Overvoltage value (if the incoming voltage is higher than 430V, set this value to 800V)
P8.06	300s	This value is set to 300s for commissioning and 0.5s for normal operation.

P16.0	380V	Setting according to actual input voltage (actual value of the incoming voltage in the non-operating state, consistent with the slave)
P16.2	(1200kW, 1600kW, 2000kW, 2400kW)	Setting based on the sum of actual master and each slave module's power
P16.4	(1824a, 2432a, 3040a, 3648a)	Setting according to the actual power used
P16.11	[3] Regenerative rectifier	Control mode selection
P16.12	3	Minimum carrier frequency of 3K in regenerative rectifier module
P24.7	Default is 0V	DC bus voltage ADJ, set the adjustment value of DC bus voltage, usually the default value, no need to modify. V1.12 or later versions are used.

Note: The output voltage of the DC bus is determined by P16.0 and P24.7, and the DC bus output voltage value = the DC bus voltage value of the reference determined by P16.0 + the adjustment value set by P24.7.

(1) P16.0≤ At 375V, the DC bus voltage of the reference is 580V;

(2) At 375V < P16.0≤ 400V, the dc bus voltage of the reference is 600V;

(3) At 400V < P16.0≤ 430V, the dc bus voltage of the reference is 630V;

(4) 430V < P16.0≤ At 450V, the dc bus voltage of the reference is 665V;

(5) 450V < P16.0≤ At 460V, the dc bus voltage of the reference is 680V;

(6) For P16.0 > 460V, the DC bus voltage of the reference is 700V.

Take the example of needing a DC bus voltage value of 620V: P16.0 is set to 380V and P24.7 is set to 20V to make the DC bus output 620V.

Step 7: After the parameter setting, **disconnect the 220V control power and**

reconnect the 220V control power to confirm whether the fiber is communicating normally. Observe the 101.2 warning of the host computer with the upper computer, only for [W1], 101.77 CAN: 发送失败计数@主机和 101.80 CAN: Send Failure Count @ Slave is always 0.

Step 8: **Turn on the 380V main power and connect the host computer with the upper computer**. Select "Local/Remote" as "Local", and then press⬚运行⬚ , the charging resistor contactor of the host and the slave will be engaged, and the main contactor of the host and the slave will be engaged after the bus voltage reaches a certain voltage.

After the AFE precharge is completed, the main contactor is absorbed and after a delay of 2s, the contactor of the charging resistor is disconnected.

At this time, the IGBT will not work (since **P8.06 is set to 300, note that the IGBT will operate after 300s**), observe whether the value of 103.31 is between 49-51Hz, and whether the value of **103.30 inlet voltage (AFE)** is consistent with the inlet voltage. Then press⬚停止⬚ to stop the machine.

Step 9: **Set the P8.06 of the host computer to 0.5s**, then press⬚运行⬚ , after it runs normally, use the host computer to observe whether the 103.23 DC voltage of the host computer reaches the set DC bus output voltage, whether the three-phase current values of 102.54, 102.55, 102.56 are balanced, and whether all the slaves have the same current. Then press⬚停止⬚ .

The slave monitoring parameters are shown in the following table:

	Monitoring parameter number of the upper computer connected to the host computer			
	Phase A current	B-phase current	Phase C current	malfunctions
hosts	102.54	102.55	102.56	
Slave 1	113.11	113.12	113.13	113.8
Slave 2	113.30	113.31	113.32	113.27
Slave 3	113.49	113.50	113.51	113.46
Slave 4	113.68	113.69	113.70	113.65
Slave 5	113.87	113.88	113.89	113.84

Step 10: **Check that the P and N of the regenerative rectifier module are connected to the P and N of all the inverters**. Select "Local/Remote" in the main interface of the host computer as "Local", **make sure the value of P24.21 has been set to [0] to disable, and** then press 电容自学习 for capacitor self-tuning , and after the self-tuning is completed, the light behind the 停止 button will be on. The value of P24.28 will be changed after successful self-tuning . Then **change the value of P24.21 to [1] enable**.

Note: If there is a change in the inverter connected to the DC bus, redo the capacitor self-tuning .

Step 11: Select "Local/Remote" in the main interface of the host computer as "Remote", and leave the starting and stopping of the regenerative rectifier module to the PLC control. The regenerative rectifier module can run normally.

8. 2 Inverter commissioning process

Please perform a trial run based on the flowchart shown below.

8.2 Inverter commissioning process

Trial Run Flowchart

GUIDE Please visit the official website for more information: http://www.gdetec.com

Attention:

Before using the operation panel for self-tuning , be sure to select the Local/Remote key as Local.

The initial value of the control mode is V/F control (P16.11 = 0). In order to get better control performance, it is recommended to do static self-tuning for the V/F control as well.

Vector control is divided into closed-loop vector control (P16.11=2) and open-loop vector control (P16.11=1). The motor parameters obtained from static self-tuning and dynamic self-tuning   accomplished in the open-loop vector control mode are also applicable to the closed-loop vector control mode. It is recommended to do static self-tuning   and dynamic self-tuning   with closed-loop vector as much as possible when conditions permit.

8.3 Inverter commissioning operation

8.3.1 Turning on the power

Be sure to check the following items before turning on the power.

（1） Whether the DC voltage is the value set by the regenerative rectifier units (± 5V range);

（2） Are the output terminals (U,V,W) of the inverter and the motor well connected;

（3） The control terminals of the inverter are well connected to other controls;

（4） When using a PG encoder card, is the PG encoder card well connected to the motor encoder.

8.3.2 Confirmation of display status

When the power is turned on, the display of the operation panel under normal conditions is shown below.

```
0.0Hz          560.5V        0A        N/N

电机速度[Hz] ：        0 Hz
给定频率[Hz] ：        0 Hz
母线电压 ：            560 V
电机电流 ：            0 A
```

When a fault occurs, it is different from that shown above. The following figure shows the legend of the display when a fault occurs, using the undervoltage fault as an example:

```
0.0Hz          300V        0A        W/E


故障 E：[105] ！！！
欠压
```

8.3.3 Parameter initialization

The parameters are initialized and the parameter values are restored to the default values. See Chapter 6, Function Setup, for a detailed description.

8.3.4 Setting parameters

Set the start/stop control parameters.

Function code	Name	Explanation	setpoint
P8.0	Startup Source Selection	[0] Digital input terminal [1] Operation panel [2] DP communication [3] MODBUS [4] Free function module	1
P8.3	Parking	[0] Ramp parking [1] Free parking	1
P8.6	runtime delay	0-300s	0
P8.7	Torque holding after zero speed	Holding time of zero speed state when stopping 0～300s	0

		[0] I/O terminal [1] Analog input 1 [2] Analog inputs 2	
P8.10	Velocity feed source	[3] Operation panel [4] DP communication [5] MODBUS [6] Free function module	3
P8.14	Acceleration Time Multiplier	0.1 to 10.0	1
P8.15	Acceleration zone 1	Setting the first accelerated gradient pattern	100
P8.16	Acceleration time 1	Acceleration time from the stop state to the set value of P8.15	3
P8.17	Acceleration zone 2	Setting the second acceleration gradient mode	200
P8.18	Acceleration time 2	Acceleration time from P8.15 set value to P8.17 set value	4
P8.33	Deceleration Time Multiplier	0.1 to 10.0	1
P8.34	Deceleration zone 1	Setting the first deceleration gradient pattern	100
P8.35	Deceleration time 1	Deceleration time from P8.34 set value to stop	3
P8.36	Deceleration zone 2	Setting the second deceleration gradient mode	200
P8.37	Deceleration time 2	Deceleration time from P8.34 set value to P8.36 set value	4

Setting motor nameplate parameters

Function code	Parameter name	Setpoint
P16.0	Input voltage setting	380V
P16.2	Motor rated power	Refer to the motor nameplate
P16.3	Motor rated voltage	Refer to the motor nameplate
P16.4	Motor rated current	Refer to the motor nameplate

P16.5	Motor rated frequency	Refer to the motor nameplate
P16.6	Rated motor speed	Refer to the motor nameplate
P16.7	Motor rated poles	Setting according to rated speed (120× P16.5 / P16.6) rounded to the nearest whole number.
P16.9	Motor synchronous speed	Setting according to rated speed (120× P16.5 / P16.7)
P16.11	Control mode selection	[0] V/F control [1] Open-loop vectors [2] Closed-loop vectors Set on demand

8.3.5 Self-tuning of motor parameters

Self-tuning is necessary when the motor wires are too long or when vector control is selected. Please perform self-tuning in the following order to automatically recognize the motor parameters.

（5） Select Control Mode

Set the value of P16.11. If [1] or [2] is selected, it is vector control and requires static and dynamic self-tuning . If [0] is selected, it is V/F control and only static self-tuning is required.

（6） Static self-tuning

Static self-tuning in V/F control mode, which can also be referred to as interline resistance self-tuning , recognizes only the value of the stator resistance (P20.74). Static self-tuning in vector control mode recognizes the stator and rotor resistance as well as the inductance parameters (P20.74, P20.78, P20.79, P20.84).

Select Static self-tuning in the function settings and press the confirmation button to proceed with self-tuning . During the self-tuning process, "Static self-tuning in progress!" is displayed. When self-tuning is completed, "Static self-tuning completed!" is displayed. When the self-tuning is finished, it shows "Static self-tuning is in progress!".

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（7） Dynamic self-tuning

Dynamic self-tuning is performed in vector control mode, and dynamic self-tuning optimizes the values of the P20.79 and P20.84 parameters and identifies the values of the P20.85 to P20.97 parameters. Before the dynamic self-tuning starts, the static self-tuning in vector control mode must be completed first.

Select Dynamic self-tuning in the function settings and press the confirmation button to proceed with self-tuning . During the self-tuning process, "Dynamic self-tuning is in progress!" is displayed. When self-tuning is completed, "Dynamic self-tuning completed!" is displayed. When the self-tuning is finished, it shows "Dynamic self-tuning is in progress!

（8） Self-tuning moment of inertia

After completing dynamic self-tuning in vector control mode, and always with the motor shaft connected to the load, perform rotational inertia self-tuning . The motor must not be loaded with more than 50% of the rated load when self-tuning of the moment of inertia is performed. The rotational inertia self-tuning optimizes only the mechanical rotational inertia (P20.98). After the dynamic self-tuning is completed, P20.98 uses the default value, and the vector control can operate normally, or rotational inertia self-tuning is performed if better control performance is sought.

8.3.6 Pre-self-tuning Considerations

The HF680N series inverters provide a parameter self-tuning function. The accurate self-tuning of parameters comes from the correct setting of motor nameplate parameters. In order to ensure the control performance, please configure the motor according to the standard adapted motor of the inverter. If the difference between the motor power and the standard adapted motor is too large, the control performance of the inverter will be significantly reduced.

Please check the following four things before motor self-tuning:

Inspection items	Inspection matters
Whether the motor shaft is connected to other mechanical equipment	During motor dynamic self-tuning , the motor will rotate at 7.5% of the rated speed. It is recommended to carry out dynamic self-tuning without load, if the motor is connected with other mechanical equipment, please make sure the load is more than 50% of the rated load, if the load is more than 50% of the rated load dynamic self-tuning may not be successful.
Is there a big difference between motor capacity and inverter capacity	Motor self-tuning may not be completed properly when the motor power is too small compared to the inverter power (motor power requirement is not less than 1/5 of the inverter power).
Confirm that the motor parameters are entered correctly	Whether the P16 group parameters are consistent with the motor nameplate parameters, such as rated power, voltage, current, speed, number of poles, synchronous speed. If the input is incorrect it may lead to self-tuning failure or the motor may not operate normally.
Whether an encoder is mounted on the motor	If closed-loop vector control is used, an encoder should be installed on the motor. If V/F control or open-loop vector control is used, the presence or absence of an installed encoder does not affect motor self-tuning .

8.3.7 Trial operation under no-load condition

The following describes the method of trial operation of the motor under no-load condition.

Before operation, make sure that the motor and mechanical surroundings are safe and that the emergency stop circuit and mechanical safety devices operate correctly. During operation, make sure that the motor rotates properly (no abnormal sound or vibration) and that the motor accelerates and decelerates properly.

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The procedure for using the operation panel is described below:

（1） Turn on the power and display the initial screen;

（2） Selected as local control, press LOCAL/REMOTE to select LOCAL and the LOCAL indicator lights up;

（3） Press the RUN button on the operation panel to run the inverter, the RUN indicator lights up and the motor rotates positively; (it is recommended that the given frequency is 5Hz)

（4） Verify that the motor is rotating in the correct direction and that the inverter is not indicating a fault;

（5） If there is no fault in step 4, please gradually increase the given value of frequency to 50Hz and confirm the output current through the operation panel to make sure that the current does not exceed the rated current of the motor;

（6） After confirming, press the STOP button to stop the operation.

8.3.8 Commissioning under load

The following describes the method of trial operation of the motor under load.

Please note the following when connecting the mechanical system:

（1） Make sure that the area around the motor and machinery is safe;

（2） Make sure the motor stops completely;

（3） Please connect the mechanical system;

（4） Make sure the mounting screws are not loose, and secure the motor shaft and mechanical system firmly;

（5） Make sure that the emergency stop circuit and the safety devices on the mechanical side operate correctly;

（6） To prevent abnormalities, be prepared to press the operation panel STOP button at any time.

Please check the following items when running:

（1） Whether the direction of action of the machinery is correct (whether the direction of rotation of the motor is correct);

（2） The motor accelerates and decelerates properly.

After connecting the mechanical system to the motor, perform a test run following the same procedure as for no-load operation.

（1） Confirm that the output current is not too high;

（2） Change the frequency given value and direction of rotation to confirm that there are no abnormal sounds and vibrations.

8.3.9 Parameter saving

Select Backup Parameters in the Function Setting menu to copy the parameter values of the inverter to the storage area of the operation panel. If the inverter needs to replace the control board, copy the data recorded in the operation panel to the new control board, then the operation can be resumed. (The software version in the control panel when restoring parameters must be the same as the previous one, otherwise the restoration of parameters cannot be successful)

9. Parameter Setting description

9.1 Regenerative rectifier Parameters

9.1.1 Parallel Settings

Function code	Name	Explanation	Setting range	Default value	Explanation
P2.0	parallel setup	[0] Stand-alone mode; [1] Main, indicating use as a host in a concurrent machine; [2] slave, indicating use as a slave in a parallel machine	0 to 2	0	450kW and below option [0]; Set master-slave selection [1] or [2] for 450kW or more.
P2.2	Language Selection	[0]Chinese [1]English	0 to 1	0	
P2.3	Number of slaves	Set the number of slaves according to the total power	0 to 5	1	

9.1.2 Digital inputs

Function code	Name	Explanation	Setting range	Default value	Explanation
P3.0	Digital input terminal 1	Programmable Multi-Function Terminals	0 to 32	1	
P3.1	Digital input terminal 2	Programmable Multi-Function Terminals	0 to 32	2	
P3.2	Digital input terminal 3	Programmable Multi-Function	0 to 32	5	

		Terminals			
P3.3	Digital input terminals 4	Programmable Multi-Function Terminals	0 to 32	6	
P3.4	Digital Input Terminal 5	Programmable Multi-Function Terminals	0 to 32	7	
P3.5	Digital input terminal 6	Programmable Multi-Function Terminals	0 to 32	8	
P3.6	Digital input terminal 7	Programmable Multi-Function Terminals	0 to 32	0	
P3.7	Digital Input Terminal 8	Programmable Multi-Function Terminals	0 to 32	0	

This parameter is used to set the function corresponding to the input terminals of the regenerative rectifier units.

Setpoint	Functions	Explanation
0	prohibit the use of sth.	The regenerative rectifier units does not operate even if a signal is input. Unused terminals can be set to no function to prevent malfunction.
1	forward motion (e.g. of a ship)	Input terminal high level regenerative rectifier units starts, input terminal low level regenerative rectifier units stops
5	fault reset	External fault reset function. Same function as the </RST key on the operation panel. Remote fault reset can be realized with this function.

	14	Remote emergency stop signal (High level)	Valid when input terminal is high
	15	Remote emergency stop signal.NC (Low level)	Valid when input terminal is low
	20	Main contactor control point feedback signal	A high input terminal indicates that the main contactor is engaged, a low input terminal indicates that the main contactor is disengaged.

9.1.3 Digital outputs

Function code	Name	Explanation	Setting range	Default value	Particular
P4.0	Digital output terminal 1	Multi-function switching output terminal	0 to 64	0	
P4.1	Digital output terminal 2	Multi-function switching output terminal	0 to 64	0	
P4.2	Digital output terminal 3	Multi-function switching output terminal	0 to 64	0	
P4.3	Digital output terminals 4	Multi-function switching output terminal	0 to 64	0	Control of the main contactor in the regenerative rectifier units
P4.4	Digital output terminal 5	Multi-function switching output terminal	0 to 64	0	Set this terminal to [32] in the regenerative rectifier unit to control the charging resistor contactor

The functions of the multifunction switching output terminals are shown in the table

below:

Setpoint	Functions	Explanation
0	prohibit the use of sth.	This terminal has no function
1	operating signal	Valid for normal operation
2	fault output	Output ON signal when the regenerative rectifier unit fails
32	Pre-charge completion signal	Control of the regenerative rectifier units charging resistor contactor

9.1.4 Protection parameter sets

Function code	Name	Explanation	Setting range	Default value	Particular
P7.0	Current limit value [motor 1]	Setting the regenerative rectifier units current limit value	0.0 to 300.0 [%]	180.0 [%]	
P7.4	Overcurrent protection [motor 1]	Setting the overcurrent protection value of the regenerative rectifier units	0.0 to 300.0 [%]	235.0 [%]	
P7.12	Busbar overvoltage	Setting the regenerative rectifier units bus overvoltage value	600 to 820 [V]	800 [V]	
P7.13	Busbar undervoltage	Setting the regenerative rectifier units bus undervoltage value	300-500 [V]	350 [V]	
P7.14	overtemperature fault	Setting the regenerative rectifier units over-temperature fault value	60.0 to 100.0 [ ]℃	87.5 [ ]℃	

P7.47	continuous current	Setting the current value that allows long time operation	0.0 to 300.0 [%]	100.0 [%]	
P7.48	Overload current 1	Setting the value of the regenerative rectifier unit overload current 1	0.0 to 300.0 [%]	150.0 [%]	
P7.49	Overload time 1	Setting the permissible overload current of the regenerative rectifier units 1 time	0.00 to 60.00 [s]	60.00 [s]	
P7.50	Overload current 2	Setting the value of the regenerative rectifier unit overload current 2	0.0 to 300.0 [%]	200.0 [%]	
P7.51	Overload time 2	Setting the regenerative rectifier units allowable overload current 2 time	0.00 to 5.00 [s]	5.00 [s]	
P7.95	Pre-charge failure time	Setting the permissible time for pre-charging the regenerative rectifier units	0.0 to 20.0 [s]	15.00 [s]	

9.1.5 Start-stop control parameters

Function code	Name	Explanation	Setting range	Default value	Explanation
P8.0	Startup Source Selection	[0] Digital input terminal [1] Operation panel [2] DP communication [3] MODBUS [4] Free function module	0 to 4	0	Regenerative rectifier Start Source Selection
P8.6	runtime delay	Setting the runtime delay time	0.00 to 300.00 [s]	0.00 [s]	Time from main contactor suction to IGBT operation

9.1.6 Rated parameters

Function code	Name	Explanation	Setting range	Default value	Particular
P16.0	Input voltage setting	Setting according to actual grid voltage	320-460 [V]	380 [V]	
P16.2	Motor rated power	Setting according to the nameplate parameters of the regenerative rectifier units	0.0 to 4000.0 [kW]	Model Determination [kW]	
P16.4	Motor rated current	Setting according to the nameplate parameters of the regenerative rectifier units	0.0 to 6500.0 [A]	Model Determination [A]	

Function code	Name	Explanation	Setting range	Default value	Explanation
P16.11	Control mode selection	[0] V/F control [1] Open-loop vectors [2] Closed-loop vectors [3] Regenerative rectifier [4] linear filter	0 to 4	0	Selection in regenerative rectifier [3]
P16.12	Carrier frequency setting	Set carrier frequency	3 to 8 [kHz]	3 [kHz]	Set to 3 to 8 kHz in the regenerative rectifier

9.1.7 AFE control settings

Function code	Name	Explanation	Setting range	Default value	Explanation
P24.0	Active power control sources	[0] Bus voltage control [1] Analog input 1 [2] Analog inputs 2 [3] Local Settings [4] DP communication [5] MODBUS [6] Free function blocks	0 to 6	0	In AFE control mode this value is selected as [0].
P24.1	Active power control source @ self block	Free Function Block	0 to 347	0	
P24.2	Reactive power control sources	[0] Local Settings [1] Analog input 1 [2] Analog inputs 2 [3] DP communication [4] MODBUS [5] Free function blocks	0 to 5	0	In AFE control mode this value is selected as [0].

P24.3	Reactive power control source @ self block	Free Function Block	0 to 347	0	
P24.7	DC bus voltage ADJ	DC bus voltage adjustment value	-30 to 30 [V]	0[V]	
P24.12	DC bus voltage control Kp	Bus voltage regulation proportional gain	0 to 1000 [%]	100 [%]	
P24.13	DC bus voltage control Ki	Bus voltage regulation integral gain	0 to 1000 [%]	100 [%]	
P24.14	Active Current Limit @ Rectifier	Active current limit value during rectification	0 to 1000 [%]	200 [%]	
P24.15	Active Current Limit @ Feedback	Active current limit value at feedback	0 to 1000 [%]	200 [%]	
P24.16	Current control Kp	Current Regulation Proportional Gain	0 to 1000 [%]	100 [%]	
P24.17	Current control Ki	Current Regulated Integral Gain	0 to 1000 [%]	100 [%]	
P24.21	Load Detect Enable	[0] Prohibition [1] Enable	0 to 1	0	This function is enabled when the regenerative rectifier units completes self-tuning .
P24.22	Load Detection Filter Time	Load observation time	0 to 300 [ms]	30[ms]	
P24.25	filtering compensation	[0] Prohibition [1] Enable	0 to 1	1	

P24.26	Resonance suppression factor	Suppression of high-frequency resonance coefficients	0 to 150 [%]	100 [%]	
P24.27	PWM Reactor LB	Reactor LB	0 to 65 [mH]	0	Default value varies with AFE power
P24.28	DC side capacitance capacity	DC side capacitance value	0 to 6500 [mF]	0[mF]	The regenerative rectifier units automatically recognizes this value after self-tuning .
P24.29	filter capacitor	filter capacitor	0 to 6500 [mF]	0	Default value varies with AFE power
P24.30	Filter Inductors	Filter Inductors	0 to 6.5 [mH]	0	Default value varies with AFE power

10. Inverter parameters

10.1 Parallel and Panel Observation Settings P2

Function	Name	Explanation	Setting range	Default value	Explanation
P2.0	parallel setup	[0] Stand-alone mode: Indicates that it is used as a stand-alone machine; [1] Main: Indicates that it is used as the host in a concurrent machine; [2] Slave: Indicates use as a slave in a parallel machine.	0 to 2	0	
P2.1	Motor switching settings	Select motor switching source [0] Digital input: Indicates that the switching motor is controlled by the terminal; [1] DP communication: Indicates that the switching motor is controlled by communication.	0 to 1	0	
P2.2	Language Selection	[0] Chinese; [1] English.	0 to 1	0	
P2.3	Number of slaves	Setting the number of slaves in case of parallel operation	0 to 5	1	

10.2 Digital Input Terminal Block P3

Function	Name	Explanation	Setting range	Default value	Particular
P3.0	Digital input terminal 1	Programmable Multi-Function Terminals	0 to 32	1	
P3.1	Digital Input Terminal 2	Programmable Multi-Function Terminals	0 to 32	2	
P3.2	Digital Input Terminal 3	Programmable Multi-Function Terminals	0 to 32	5	

P3.3	Digital Input Terminal 4	Programmable Multi-Function Terminals	0 to 32	6	
P3.4	Digital Input Terminal 5	Programmable Multi-Function Terminals	0 to 32	7	
P3.5	Digital Input Terminal 6	Programmable Multi-Function Terminals	0 to 32	8	
P3.6	Digital Input Terminal 7	Programmable Multi-Function Terminals	0 to 32	0	
P3.7	Digital Input Terminal 8	Programmable Multi-Function Terminals	0 to 32	0	
P3.12	Power-on automatic operation control	[0] disable; [1] enable	0 to 1	0	

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

Setpoint	Functions	Explanation
0	prohibit the use of sth.	Multi-drive products do not operate even if a signal is input. Unused terminals can be disabled to prevent malfunction.
1	forward motion (e.g. of a ship)	Forward and reverse motor control via external terminals
2	invert the operation	
3	driver enable (High level)	Enable when this terminal is high.
4	Driver Enable.NC (Low level)	Enable when this terminal is low.
5	fault reset	External fault reset function. Same function as the </RST key on the operation keypad. Remote fault reset is possible with this function.
6	Multi-Segment Speed 1 (Bit 0)	
7	Multi-speed 2 (bit 1)	Multi-speed command input terminal (see 8.2 for details)
8	Multi-speed 3 (bit 2)	

9	Multi-speed 4 (bit 3)	
10	Hook mode	This function is enabled when there is a signal on this terminal.
11	Direction change signal	Changing the direction of operation when there is a signal on this terminal
12	Local emergency stop signal (High level)	Valid when input terminal is high
13	Local emergency stop signal.NC (Low level)	Valid when input terminal is low
14	Remote emergency stop signal (High level)	Valid when input terminal is high
15	Remote emergency stop signal.NC (Low level)	Valid when input terminal is low
16	Slave ready signal	Slave ready when signal is present on this terminal
17	Select motor 0	Motor selection bit 1 and motor selection bit 0 combine to form a motor selection signal, with 00 indicating that the target motor is 1, 01 indicating that the target motor is 2, 10 indicating that the target motor is 3, and 11 indicating that the target motor is 4.
18	Select motor 1	
19	anti-handling function	This function is enabled when there is a signal on this terminal.
20	Main contactor suction confirmation	Main contactor suction confirmation in AFE control mode.
21	Strong magnetic fields do not energize	Not enabled when there is a signal on this terminal
22	FUNC 22	standby
23	FUNC 23	standby
24	free parking	This function is enabled when there is a signal on this terminal.
25	FUNC 25	standby

26	Dynamic torque control	Torque control mode when there is a signal on this terminal, otherwise speed control mode
27	FUNC 27	standby
28	Zero Torque Signal	The torque is set to zero when there is a signal at this terminal.
29	FUNC 29	standby

10.3 Digital output terminal block P4

Function code	Name	Explanation	Setting range	Default value	Particular
P4.0	Digital output terminal 1	Multi-function switching output terminal	0 to 64	0	
P4.1	Digital output terminal 2	Multi-function switching output terminal	0 to 64	0	
P4.2	Digital output terminal 3	Multi-function switching output terminal	0 to 64	0	
P4.3	Digital output terminal 4	Multi-function switching output terminal	0 to 64	0	
P4.4	Digital output terminal 5	Multi-function switching output terminal	0 to 64	0	
P4.16	Free function block digital output 1	Free function module settings	0 to 500	0	
P4.17	Free function block digital output 2	Free function module settings	0 to 500	0	
P4.18	Free Function Block Digital Output 3	Free function module settings	0 to 500	0	
P4.19	Free function block digital output 4	Free function module settings	0 to 500	0	

The functions of the multifunction switching output terminals are shown in the table below:

Setpoint	Functions	Explanation
0	prohibit the use of sth.	This terminal has no function

1	operating signal	Valid for normal operation (see 8.3 for details)
2	fault output	Output ON signal in case of malfunction of multi-drive product
3	Brake Brake	Valid when the brake meets the conditions for opening (see 8.3 for details)
4	run request (computing)	Valid when run signal is input
5	ready run	Valid when multi-drive products are ready for completion
6	Multi-speed 1	[6] to [9] are valid when a multi-segment number instruction is input.
7	Multi-speed 2	
8	Multi-speed 3	
9	Multi-speed 4	
10	FUNC 10	standby
11	orientations	Effective when there is a signal in the input direction
12	warnings	Effective in the event of a warning
13	overtemperature warning	Effective when overheating occurs
14	overload warning	Effective when an overload warning occurs
15	overspeed warning	Effective when an overspeed warning occurs
16	FUNC 16	standby
17	Motor Selection 0	This signal is active when motor 1 is selected
18	Motor option 1	This signal is active when motor 2 is selected
19	Motor option 2	This signal is active when motor 3 is selected
20	Motor Selection 3	This signal is active when motor 4 is selected
21	FUNC 21	standby
22	low-speed limit	Effective when low speed limit occurs
23	High Speed Limit	Effective when high speed limit occurs
24-31	FUNC 24 to FUNC 31	standby
32	Pre-charge completion signal	This terminal is signaled when there is a run signal in the AFE control mode.
33-48	FUNC 33 to FUNC 48	standby
49	PROFIBUS Function 1	PROFIBUS function 1 is selected when there is a signal at this terminal.

50	PROFIBUS Function 2	PROFIBUS function 2 is selected when there is a signal at this terminal.
51	PROFIBUS Function 3	PROFIBUS function 3 is selected when there is a signal at this terminal.
52	PROFIBUS Function 4	PROFIBUS function 4 is selected when there is a signal at this terminal.
53	PROFIBUS Function 5	PROFIBUS function 5 is selected when there is a signal at this terminal.
54-56	FUNC 54 to FUNC 56	standby
57	Local function 1	
58	Local Function 2	
59	Local Function 3	
60	Local function 4	
61	Free Function Module 1	Free function module 1 is selected when there is a signal at this terminal.
62	Free Function Module 2	Free function module 2 is selected when there is a signal at this terminal.
63	Free Function Module 3	Free function module 3 is selected when there is a signal at this terminal.
64	Free function module 4	Free function module 4 is selected when there is a signal at this terminal.

10.4 Analog Input Terminal Block P5

Function	Name	Explanation	Setting range	Default value	Particular
P5.0	AI1 type	[0] Prohibition [1] 0 to +10V [2] -10 to +10V [3] 0-20mA	0 to 3	1	
P5.1	AI1 filter time	Set the filter time corresponding to the analog terminal AI1 analog. Use when the set value fluctuates greatly due to interference from the surrounding environment. Setting the filter time to a larger value will reduce the setting up and down but the response will be slower.	0.0 to 1000.0 [ms]	25.0 [ms]	
P5.2	AI1 voltage bias	Setting the AI1 voltage bias	-10.00 to 10.00 [V]	0.000 [V]	
P5.3	AI1 current bias	Setting the AI1 current bias	-20.00 to 20.00 [mA]	0.000 [mA]	
P5.4	AI1 minimum voltage	Setting AI1 minimum voltage	-10.00 to 10.00 [V]	0.000 [V]	
P5.5	AI1 Minimum current	Setting AI1 minimum current	0.00 to 20.00 [mA]	0.000 [mA]	
P5.6	AI1 Minimum given value	Setting the minimum given value of AI1	-300.0 to 300.0 [%]	0.0 [%]	
P5.7	AI1 Maximum Voltage	Setting the maximum voltage of AI1	-10.00 to 10.00 [V]	10.000 [V]	
P5.8	AI1 Maximum current	Setting AI1 maximum current	0.00 to 20.00 [mA]	20.000 [mA]	
P5.9	AI1 Maximum given value	Setting the maximum given value of AI1	-300.0 to 300.0 [%]	100.0 [%]	

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P5.18	AI2 type	[0] Prohibition [1]0 to +10V [2] -10 to +10V [3] 0-20mA	0 to 3	3	
P5.19	AI2 Filter Time	Set the filter time corresponding to the analog terminal AI2 analog. Use when the set value fluctuates greatly due to interference from the surrounding environment. Setting a larger value for the filtering time reduces the fluctuation up and down of the set value, but the response will be slower.	0.0 to 1000.0 [ms]	25.0 [ms]	
P5.20	AI2 voltage bias	Setting the AI2 voltage bias	-10.00 to 10.00 [V]	0.000 [V]	
P5.21	AI2 current bias	Setting the AI2 current bias	-20.00 to 20.00 [mA]	0.000 [mA]	
P5.22	AI2 Minimum Voltage	Setting AI2 minimum voltage	-10.00 to 10.00 [V]	0.000 [V]	
P5.23	AI2 Minimum Current	Setting AI2 minimum current	0.00 to 20.00 [mA]	0.000 [mA]	
P5.24	AI2 Minimum given value	Setting the AI2 minimum given value	-300.0 to 300.0 [%]	0.0 [%]	
P5.25	AI2 Maximum Voltage	Setting AI2 maximum voltage	-10.00 to 10.00 [V]	10.000 [V]	
P5.26	AI2 Maximum Current	Setting AI2 maximum current	0.00 to 20.00 [mA]	20.000 [mA]	
P5.27	AI2 Maximum given value	Setting the maximum given value of AI2	-300.0 to 300.0 [%]	100.0 [%]	

10.5 Analog Output Terminal Block P6

Function	Name	Explanation	Setting range	Default value	Explanation
P6.0	AO1 output setting	See Table 7-1	0 to 14	2	
P6.1	Free function block analog output 1	Free Function Module Analog Output Values	0 to 1000	0	
P6.2	AO1 Output Min.	Setting AO1 output minimum value	-300.0 to 300.0 [%]	0.0 [%]	
P6.3	AO1 output max.	Setting the maximum value of AO1 output	-300.0 to 300.0 [%]	100.0 [%]	
P6.4	AO1 Minimum Output [mA, V]	Setting AO1 minimum output	0.0 to 100.0 [%]	0.0 [%]	
P6.5	AO1 maximum output [mA, V]	Setting the maximum output of AO1	0.0 to 100.0 [%]	100.0 [%]	
P6.6	AO1 deviation value	Setting the AO1 deviation value	-100.00 to 100.00 [%]	0.00 [%]	
P6.7	AO1 fixed output	Setting AO1 fixed output (this setting is valid when P6.0 is set to [13])	0.0 to 100.0 [%]	0.0 [%]	
P6.8	AO1 filter time	Set the filter time corresponding to the analog terminal AO1 analog. Use when the output value fluctuates greatly due to interference from the surrounding environment. Setting the filter time to a larger value reduces the up and down fluctuation of the output value but slows down the response.	0.0 to 1000.0 [ms]	10.0 [ms]	
P6.14	AO2 output setting	See Table 7-1	0 to 14	4	

P6.15	Free function block analog output 2	Free Function Module Analog Output Values	0 to 1000	0	
P6.16	AO2 Output Min.	Setting the AO2 output minimum	-300.0 to 300.0 [%]	0.0 [%]	
P6.17	AO2 output max.	Setting the AO2 output maximum value	-300.0 to 300.0 [%]	100.0 [%]	
P6.18	AO2 Minimum Output [mA, V]	Setting the AO2 Minimum Output	0.0 to 100.0 [%]	0.0 [%]	
P6.19	AO2 Maximum Output [mA, V]	Setting the AO2 maximum output	0.0 to 100.0 [%]	100.0 [%]	
P6.20	AO2 deviation value	Setting the AO2 deviation value	-100.00 to 100.00 [%]	0.00 [%]	
P6.21	AO2 fixed output	Setting the AO2 fixed output (This setting is valid when P6.14 is set to [13].)	0.0 to 100.0 [%]	0.0 [%]	
P6.22	AO2 filter time	Set the filter time corresponding to the analog terminal AO1 analog. Use when the output value fluctuates greatly due to interference from the surrounding environment. Setting the filter time to a larger value reduces the up and down fluctuation of the output value but slows down the response.	0.0 to 1000.0 [ms]	10.0 [ms]	

Table 7-1 Analog Output Description

Setpoint	Name	Instructions
0	Unsigned output frequency	Unsigned multi-drive product output frequency
1	Signed Output Frequency	Signed Multi-Drive Product Output Frequency

2	Unsigned motor speed	Unsigned motor speed
3	Symbolized motor speed	Symbolized motor speed
4	Output Current	Output Current
5	Unsigned motor torque	Unsigned motor torque
6	Signed motor torque	Signed motor torque
7	Motor Load	Motor Load
8	Busbar voltage (%)	Bus voltage (percentage output)
9	output power	output power
10	output voltage	output voltage
11	Multi-transmission product temperature (%)	Multi-Drive Product Temperature (Maximum Temperature 150℃ Percentage Output)
12	DP communication setting	Profibus setting
13	parameterization	Output with parameter P6.7 or P6.21 set value
14	local setting	Set value on the host computer software to output

10.6 Protection parameter group P7

Function code	Name	Explanation	Setting range	Default value	Explanation
P7.0	Current limit value [motor 1]	Setting the motor 1 current limit value	0.0 to 300.0 [%]	180.0 [%]	
P7.1	Current limit value [motor 2]	Setting the motor 2 current limit value	0.0 to 300.0 [%]	180.0 [%]	
P7.2	Current limit value [motor 3]	Setting the motor 3 current limit value	0.0 to 300.0 [%]	180.0 [%]	
P7.3	Current limit value [motor 4]	Setting the motor 4 current limit value	0.0 to 300.0 [%]	180.0 [%]	
P7.4	Overcurrent protection [motor 1]	Setting the motor 1 overcurrent protection value	0.0 to 300.0 [%]	235.0 [%]	
P7.5	Overcurrent protection [motor 2]	Setting the motor 2 overcurrent protection value	0.0 to 300.0 [%]	235.0 [%]	
P7.6	Overcurrent protection [motor 3]	Setting the motor 3 overcurrent protection value	0.0 to 300.0 [%]	235.0 [%]	
P7.7	Overcurrent protection [motor 4]	Setting the motor 4 overcurrent protection value	0.0 to 300.0 [%]	235.0 [%]	
P7.8	Zero sequence current overcurrent [motor 1]	Setting motor 1 zero sequence current overcurrent	0.0 to 100.0 [%]	20.0 [%]	
P7.9	Zero sequence current overcurrent [motor 2]	Setting motor 2 zero sequence current overcurrent	0.0 to 100.0 [%]	20.0 [%]	
P7.10	Zero sequence current overcurrent [motor 3]	Setting motor 3 zero sequence current overcurrent	0.0 to 100.0 [%]	20.0 [%]	
P7.11	Zero sequence current overcurrent [motor 4]	Setting motor 4 zero sequence current overcurrent	0.0 to 100.0 [%]	20.0 [%]	
P7.12	Busbar overvoltage	Setting the bus overvoltage value	600 to 820 [V]	800 [V]	
P7.13	Busbar undervoltage	Setting the bus undervoltage value	300-500 [V]	350 [V]	
P7.14	overtemperature fault	Setting the over-temperature fault value	60.0 to 100.0 [ ]℃	87.5 [ ]℃	
P7.15	Over Temperature Alarm	Setting the over-temperature alarm value	50.0 to 100.0 [ ]℃	80.0 [ ]℃	

P7.19	Overspeed fault [motor 1]	Setting the motor 1 overspeed fault value	100.0 to 720.0 [%]	120.0 [%]	
P7.20	Overspeed fault [motor 2]	Setting the motor 2 overspeed fault value	100.0 to 720.0 [%]	120.0 [%]	
P7.21	Overspeed fault [motor 3]	Setting the motor 3 overspeed fault value	100.0 to 720.0 [%]	120.0 [%]	
P7.22	Overspeed fault [motor 4]	Setting the motor 4 overspeed fault value	100.0 to 720.0 [%]	120.0 [%]	
P7.23	Open-loop vector protection 1 time M1	Setting the motor 1 open-loop vector protection time	0.00 to 3.00 [s]	0.50 [s]	
P7.24	Open-loop vector protection 1 time M2	Setting the motor 2 open-loop vector protection time	0.00 to 3.00 [s]	0.50 [s]	
P7.25	Open-loop vector protection 1 time M3	Setting the motor 3 open-loop vector protection time	0.00 to 3.00 [s]	0.50 [s]	
P7.26	Open-loop vector protection 1 time M4	Setting the motor 4 open-loop vector protection time	0.00 to 3.00 [s]	0.50 [s]	
P7.27	Motor 1 blocking detection time	Setting the motor 1 blocking protection detection time	0.00 to 3.00 [s]	2.00 [s]	
P7.28	Motor 2 blocking detection time	Setting the motor 2 blocking protection detection time	0.00 to 3.00 [s]	2.00 [s]	
P7.29	Motor 3 blocking detection time	Setting the motor 3 blocking protection detection time	0.00 to 3.00 [s]	2.00 [s]	
P7.30	Motor 4 blocking detection time	Setting the motor 4 blocking protection detection time	0.00 to 3.00 [s]	2.00 [s]	
P7.31	Speed anomaly range	Setting the abnormal speed protection percentage value	0.0 to 100.0 [%]	25.0 [%]	
P7.32	Speed anomaly detection time	Setting the abnormal speed protection detection time	0.00 to 5.00 [s]	1 [s]	
P7.33	self-tuning failure time	Setting the self-tuning failure detection time	0.0 to 1000.0 [s]	360.0 [s]	
P7.47	continuous current	Setting the current value that allows long time operation	0.0 to 300.0 [%]	100.0 [%]	
P7.48	Overload current1	Setting the value of overload current 1	0.0 to 300.0 [%]	150.0 [%]	
P7.49	Overload time1	Setting the permissible overload current 1 time	0.00 to 60.00 [s]	60.00 [s]	
P7.50	Overload current2	Setting the value of overload current 2	0.0 to 300.0 [%]	200.0 [%]	

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P7.51	Overload time2	Setting the permissible overload current 2 time	0.00 to 5.00 [s]	5.00 [s]	
P7.55	Input phase loss protection enable	[0] Prohibition [1] Enable	0 to 1	0	
P7.56	Input phase loss preset		0.0 to 200.0 [%]	120.0 [%]	
P7.57	Input phase failure detection time		0.0 to 12.0 [s]	5 [s]	
P7.59	Output out-of-phase protection enable	[0] Prohibition [1] Enable	0 to 1	1	
P7.60	Output out-of-phase detection time		0.10 to 3.00 [s]	0.30 [s]	
P7.64	braking mode	[0] Prohibition [1] Enable	0 to 1	0	
P7.65	Brake Start Deviation Voltage	Setting the brake start voltage deviation value	-25 to 100 [V]	0 [V]	
P7.66	Brake operating deviation voltage	Setting the brake turn-on holding voltage deviation value	-25 to 100 [V]	0 [V]	
P7.69	Overvoltage Suppression Enable	[0] Prohibition [1] Enable	0 to 1	0	
P7.70	Overvoltage suppression deviation value	Setting overvoltage suppression value deviation	-25 to 100 [V]	0 [V]	
P7.73	Undervoltage Limit Enable	[0] Prohibition [1] Enable	0 to 1	0	
P7.74	Undervoltage limit value		300-500 [V]	460 [V]	
P7.75	Undervoltage Controller Gain		0.0 to 1000.0 [%]	100.0 [%]	
P7.76	Undervoltage recovery time		0.00 to 300.00 [s]	1.00 [s]	
P7.77	Undervoltage dropout value		0.0 to 200.0 [%]	15.0 [%]	
P7.94	Thyristor Action Options	[0] Operation control [1] Bus voltage control	0 to 1	1	
P7.95	Pre-charge failure time	Setting the pre-charge failure time in AFE control mode	0.0 to 3000.0 [s]	15.0 [s]	
P7.96	Thyristor Off Delay	Thyristor Off Delay	0.00 to 300.00 [s]	0.00 [s]	

10.7 Motor 1 start/stop control group P8

Function code	Name	Explanation	Setting range	Default value	Explanation
P8.0	Startup Source Selection	[0] Digital input terminal [1] Operation panel [2] DP communication [3] MODBUS [4] Free function module	0 to 4	0	
P8.1	Free block startup source selection	Free function module source for setting up the startup method			
P8.2	Free Block Orientation Selection	Setting the direction of the free function module source			
P8.3	Parking	[0] Ramp parking [1] Free parking	0 to 1	0	
P8.6	runtime delay	Setting the runtime delay time	0.00 to 300.00 [s]	0.00 [s]	
P8.7	Torque holding after zero speed	Holding time of zero speed state at stop	0.00 to 300.00 [s]	0.00 [s]	
P8.10	Velocity feed source	[0] I/O terminal [1] Analog input 1 [2] Analog inputs 2 [3] Operation panel [4] DP communication [5] MODBUS [6] Free function module	0 to 6	0	
P8.11	Free Block Velocity Source	Free function module source for a given speed			
P8.13	Acceleration time control source	[0] Disable [1] PROFIBUS [2] MODBUS [3] Local Settings	0 to 3	0	
P8.14	Acceleration Time Multiplier		0.1 to 10.0	1.0	

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P8.15	Acceleration zone 1	Setting the first accelerated gradient pattern	0.0 to 300.0 [%]	100.0 [%]	
P8.16	Acceleration time 1	Acceleration time from the stop state to the set value of P8.15	0.0 to 300.0 [s]	3.00 [s]	
P8.17	Acceleration zone 2	Setting the second acceleration gradient mode	0.0 to 300.0 [%]	200.0 [%]	
P8.18	Acceleration time 2	Acceleration time from P8.15 set value to P8.17 set value	0.0 to 300.0 [s]	4.00 [s]	
P8.19	Acceleration zone 3	Setting the third acceleration gradient mode	0.0 to 300.0 [%]	240.0 [%]	
P8.20	Acceleration time 3	Acceleration time from P8.17 set value to P8.19 set value	0.0 to 300.0 [s]	7.00 [s]	
P8.21	Acceleration zone 4	Setting the fourth acceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P8.22	Acceleration time 4	Acceleration time from P8.19 set value to P8.21 set value	0.0 to 300.0 [s]	10.00 [s]	
P8.23	Acceleration zone 5	Setting the fifth acceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P8.24	Acceleration time 5	Acceleration time from P8.21 set value to P8.23 set value	0.0 to 300.0 [s]	10.00 [s]	
P8.25	Acceleration zone 6	Setting the sixth acceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P8.26	Acceleration time 6	Acceleration time from P8.23 set value to P8.25 set value	0.0 to 300.0 [s]	10.00 [s]	
P8.27	Acceleration zone 7	Setting the seventh acceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P8.28	Acceleration time 7	Acceleration time from P8.25 set value to P8.27 set value	0.0 to 300.0 [s]	10.00 [s]	
P8.29	Acceleration zone 8	Setting the eighth acceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P8.30	Acceleration time 8	Acceleration time from set value P8.27 to set value P8.29	0.0 to 300.0 [s]	10.00 [s]	
P8.32	Deceleration time control source	[0] Disable [1] PROFIBUS [2] MODBUS [3] Local Settings	0 to 3	0	

P8.33	Deceleration Time Multiplier		0.1 to 10.0	1.0
P8.34	Deceleration zone 1	Setting the first deceleration gradient pattern	0.0 to 300.0 [%]	100.0 [%]
P8.35	Deceleration time 1	Deceleration time from P8.34 set value to stop	0.0 to 300.0 [s]	3.00 [s]
P8.36	Deceleration zone 2	Setting the second deceleration gradient mode	0.0 to 300.0 [%]	200.0 [%]
P8.37	Deceleration time 2	Deceleration time from P8.34 set value to P8.36 set value	0.0 to 300.0 [s]	4.00 [s]
P8.38	Deceleration zone 3	Setting the third deceleration gradient mode	0.0 to 300.0 [%]	240.0 [%]
P8.39	Deceleration time 3	Deceleration time from P8.36 set value to P8.38 set value	0.0 to 300.0 [s]	7.00 [s]
P8.40	Deceleration zone 4	Setting the fourth deceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]
P8.41	Deceleration time 4	Deceleration time from set value P8.38 to set value P8.40	0.0 to 300.0 [s]	10.00 [s]
P8.42	Deceleration zone 5	Setting the fifth deceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]
P8.43	Deceleration time 5	Deceleration time from set value P8.40 to set value P8.42	0.0 to 300.0 [s]	10.00 [s]
P8.44	Deceleration zone 6	Setting the sixth deceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]
P8.45	Deceleration time 6	Deceleration time from P8.42 set value to P8.44 set value	0.0 to 300.0 [s]	10.00 [s]
P8.46	Deceleration zone 7	Setting the seventh deceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]
P8.47	Deceleration time 7	Deceleration time from P8.44 set value to P8.46 set value	0.0 to 300.0 [s]	10.00 [s]
P8.48	Deceleration zone 8	Setting the eighth deceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]

P8.49	Deceleration time 8	Deceleration time from set value P8.46 to set value P8.48	0.0 to 300.0 [s]	10.00 [s]	
P8.54	Free-running start speed		0.0 to 300.0 [%]	0.0 [%]	
P8.55	Variable direction deceleration enable	[0] Prohibition [1] Enable	0 to 1	0	
P8.56	Change of direction deceleration time		0.00 to 300.00 [s]	3.00 [s]	
P8.57	Emergency stop method	[0] Ramp parking [1] Free parking	0 to 1	1	
P8.58	Emergency stop deceleration time		0.00 to 300.00 [s]	1.50 [s]	

10.8 Motor 2 start/stop control group P9

Function code	Name	Explanation	Setting range	Default value	Explanation
P9.0	Startup Source Selection	[0] Digital input terminal [1] Operation panel [2] DP communication [3] MODBUS [4] Free function module	0 to 4	0	
P9.1	Free block startup source selection	Free function module source for setting up the startup method			
P9.2	Free Block Orientation Selection	Setting the direction of the free function module source			
P9.3	Parking	[0] Ramp parking [1] Free parking	0 to 1	0	
P9.6	runtime delay	Setting the runtime delay time	0.00 to 300.00 [s]	0.00 [s]	
P9.7	Torque holding after zero speed	Holding time of zero speed state when stopping	0.00 to 300.00 [s]	0.00 [s]	
P9.10	Velocity feed source	[0] I/O terminal [1] Analog input 1 [2] Analog inputs 2 [3] Operation panel [4] DP communication [5] MODBUS [6] Free function module	0 to 6	0	
P9.11	Free Block Speed Source	Free function module source for a given speed			
P9.13	Acceleration time control source	[0] Disable [1] PROFIBUS [2] MODBUS [3] Local Settings	0 to 3	0	
P9.14	Acceleration Time Multiplier		0.1 to 10.0	1.0	

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P9.15	Acceleration zone 1	Setting the first accelerated gradient pattern	0.0 to 300.0 [%]	100.0 [%]	
P9.16	Acceleration time 1	Acceleration time from the stop state to the set value of P9.15	0.0 to 300.0 [s]	3.00 [s]	
P9.17	Acceleration zone 2	Setting the second acceleration gradient mode	0.0 to 300.0 [%]	200.0 [%]	
P9.18	Acceleration time 2	Acceleration time from P9.15 set value to P9.17 set value	0.0 to 300.0 [s]	4.00 [s]	
P9.19	Acceleration zone 3	Setting the third acceleration gradient mode	0.0 to 300.0 [%]	240.0 [%]	
P9.20	Acceleration time 3	Acceleration time from P9.17 set value to P9.19 set value	0.0 to 300.0 [s]	7.00 [s]	
P9.21	Acceleration zone 4	Setting the fourth acceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P9.22	Acceleration time 4	Acceleration time from P9.19 set value to P9.21 set value	0.0 to 300.0 [s]	10.00 [s]	
P9.23	Acceleration zone 5	Setting the fifth acceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P9.24	Acceleration time 5	Acceleration time from P9.21 set value to P9.23 set value	0.0 to 300.0 [s]	10.00 [s]	
P9.25	Acceleration zone 6	Setting the sixth acceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P9.26	Acceleration time 6	Acceleration time from P9.23 set value to P9.25 set value	0.0 to 300.0 [s]	10.00 [s]	
P9.27	Acceleration zone 7	Setting the seventh acceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P9.28	Acceleration time 7	Acceleration time from P9.25 set value to P9.27 set value	0.0 to 300.0 [s]	10.00 [s]	
P9.29	Acceleration zone 8	Setting the eighth acceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P9.30	Acceleration time 8	Acceleration time from set value P9.27 to set value P9.29	0.0 to 300.0 [s]	10.00 [s]	

P9.32	Deceleration time control source	[0] Disable [1] PROFIBUS [2] MODBUS [3] Local Settings	0 to 3	0	
P9.33	Deceleration Time Multiplier		0.1 to 10.0	1.0	
P9.34	Deceleration zone 1	Setting the first deceleration gradient pattern	0.0 to 300.0 [%]	100.0 [%]	
P9.35	Deceleration time 1	Deceleration time from P9.34 set value to stop	0.0 to 300.0 [s]	3.00 [s]	
P9.36	Deceleration zone 2	Setting the second deceleration gradient mode	0.0 to 300.0 [%]	200.0 [%]	
P9.37	Deceleration time 2	Deceleration time from P9.34 set value to P9.36 set value	0.0 to 300.0 [s]	4.00 [s]	
P9.38	Deceleration zone 3	Setting the third deceleration gradient mode	0.0 to 300.0 [%]	240.0 [%]	
P9.39	Deceleration time 3	Deceleration time from set value P9.36 to set value P9.38	0.0 to 300.0 [s]	7.00 [s]	
P9.40	Deceleration zone 4	Setting the fourth deceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P9.41	Deceleration time4	Deceleration time from set value P9.38 to set value P9.40	0.0 to 300.0 [s]	10.00 [s]	
P9.42	Deceleration zone 5	Setting the fifth deceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P9.43	Deceleration time 5	Deceleration time from set value P9.40 to set value P9.42	0.0 to 300.0 [s]	10.00 [s]	
P9.44	Deceleration zone 6	Setting the sixth deceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P9.45	Deceleration time 6	Deceleration time from set value P9.42 to set value P9.44	0.0 to 300.0 [s]	10.00 [s]	
P9.46	Deceleration zone 7	Setting the seventh deceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	

P9.47	Deceleration time 7	Deceleration time from set value P9.44 to set value P9.46	0.0 to 300.0 [s]	10.00 [s]	
P9.48	Deceleration zone 8	Setting the eighth deceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P9.49	Deceleration time 8	Deceleration time from set value P9.46 to set value P9.48	0.0 to 300.0 [s]	10.00 [s]	
P9.54	Free-running start speed		0.0 to 300.0 [%]	0.0 [%]	
P9.55	Change direction deceleration enable	[0] Prohibition [1] Enable	0 to 1	0	
P9.56	Vertical deceleration time		0.00 to 300.00 [s]	3.00 [s]	
P9.57	Emergency stop method	[0] Ramp parking [1] Free parking	0 to 1	1	
P9.58	Emergency stop deceleration time		0.00 to 300.00 [s]	1.50 [s]	

10.9 Motor 3 start-stop control group P10

Function code	Name	Explanation	Setting range	Default value	Explanation
P10.0	Startup Source Selection	[0] Digital input terminal [1] Operation panel [2] DP communication [3] MODBUS [4] Free function module	0 to 4	0	
P10.1	Free block startup source selection	Free function module source for setting up the startup method			
P10.2	Free Block Orientation Selection	Setting the direction of the free function module source			
P10.3	Parking	[0] Ramp parking [1] Free parking	0 to 1	0	
P10.6	runtime delay	Setting the runtime delay time	0.00 to 300.00 [s]	0.00 [s]	
P10.7	Torque holding after zero speed	Holding time of zero speed state when stopping	0.00 to 300.00 [s]	0.00 [s]	
P10.10	Velocity feed source	[0] I/O terminal [1] Analog input 1 [2] Analog inputs 2 [3] Operation panel [4] DP communication [5] MODBUS [6] Free function module	0 to 6	0	
P10.11	Free Block Velocity Source	Free function module source for a given speed			
P10.13	Acceleration time control source	[0] Disable [1] PROFIBUS [2] MODBUS [3] Local Settings	0 to 3	0	
P10.14	Acceleration Time Multiplier		0.1 to 10.0	1.0	

P10.15	Acceleration zone 1	Setting the first accelerated gradient pattern	0.0 to 300.0 [%]	100.0 [%]	
P10.16	Acceleration time 1	Acceleration time from the stop state to the set value of P10.15	0.0 to 300.0 [s]	3.00 [s]	
P10.17	Acceleration zone 2	Setting the second acceleration gradient mode	0.0 to 300.0 [%]	200.0 [%]	
P10.18	Acceleration time 2	Acceleration time from P10.15 set value to P10.17 set value	0.0 to 300.0 [s]	4.00 [s]	
P10.19	Acceleration zone 3	Setting the third acceleration gradient mode	0.0 to 300.0 [%]	240.0 [%]	
P10.20	Acceleration time 3	Acceleration time from P10.17 set value to P10.19 set value	0.0 to 300.0 [s]	7.00 [s]	
P10.21	Acceleration zone 4	Setting the fourth acceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P10.22	Acceleration time 4	Acceleration time from P10.19 set value to P10.21 set value	0.0 to 300.0 [s]	10.00 [s]	
P10.23	Acceleration zone 5	Setting the fifth acceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P10.24	Acceleration time 5	Acceleration time from P10.21 set value to P10.23 set value	0.0 to 300.0 [s]	10.00 [s]	
P10.25	Acceleration zone 6	Setting the sixth acceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P10.26	Acceleration time 6	Acceleration time from P10.23 set value to P10.25 set value	0.0 to 300.0 [s]	10.00 [s]	
P10.27	Acceleration zone 7	Setting the seventh acceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P10.28	Acceleration time 7	Acceleration time from P10.25 set value to P10.27 set value	0.0 to 300.0 [s]	10.00 [s]	
P10.29	Acceleration zone 8	Setting the eighth acceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	

P10.30	Acceleration time 8	Acceleration time from P10.27 set value to P10.29 set value	0.0 to 300.0 [s]	10.00 [s]	
P10.32	Deceleration time control source	[0] Disable [1] PROFIBUS [2] MODBUS [3] Local Settings	0 to 3	0	
P10.33	Deceleration Time Multiplier		0.1 to 10.0	1.0	
P10.34	Deceleration zone 1	Setting the first deceleration gradient pattern	0.0 to 300.0 [%]	100.0 [%]	
P10.35	Deceleration time 1	Deceleration time from P10.34 set value to stop	0.0 to 300.0 [s]	3.00 [s]	
P10.36	Deceleration zone 2	Setting the second deceleration gradient mode	0.0 to 300.0 [%]	200.0 [%]	
P10.37	Deceleration time 2	Deceleration time from P10.34 set value to P10.36 set value	0.0 to 300.0 [s]	4.00 [s]	
P10.38	Deceleration zone 3	Setting the third deceleration gradient mode	0.0 to 300.0 [%]	240.0 [%]	
P10.39	Deceleration time 3	Deceleration time from set value P10.36 to set value P10.38	0.0 to 300.0 [s]	7.00 [s]	
P10.40	Deceleration zone 4	Setting the fourth deceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P10.41	Deceleration time 4	Deceleration time from set value P10.38 to set value P10.40	0.0 to 300.0 [s]	10.00 [s]	
P10.42	Deceleration zone 5	Setting the fifth deceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P10.43	Deceleration time 5	Deceleration time from set value P10.40 to set value P10.42	0.0 to 300.0 [s]	10.00 [s]	
P10.44	Deceleration zone 6	Setting the sixth deceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P10.45	Deceleration time 6	Deceleration time from set value P10.42 to set value P10.44	0.0 to 300.0 [s]	10.00 [s]	

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P10.46	Deceleration zone 7	Setting the seventh deceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P10.47	Deceleration time 7	Deceleration time from set value P10.44 to set value P10.46	0.0 to 300.0 [s]	10.00 [s]	
P10.48	Deceleration zone 8	Setting the eighth deceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P10.49	Deceleration time 8	Deceleration time from set value P10.46 to set value P10.48	0.0 to 300.0 [s]	10.00 [s]	
P10.54	Free-running start speed		0.0 to 300.0 [%]	0.0 [%]	
P10.55	Change direction deceleration enable	[0] Prohibition [1] Enable	0 to 1	0	
P10.56	Change of direction deceleration time		0.00 to 300.00 [s]	3.00 [s]	
P10.57	Emergency stop method	[0] Ramp parking [1] Free parking	0 to 1	1	
P10.58	Emergency stop deceleration time		0.00 to 300.00 [s]	1.50 [s]	

10.10 Motor 4 start/stop control group P11

Function	Name	Explanation	Setting range	Default value	Explanation
P11.0	Startup Source Selection	[0] Digital input terminal [1] Operation panel [2] DP communication [3] MODBUS [4] Free function module	0 to 4	0	
P11.1	Free Block Startup Source Selection	Free function module source for setting up the startup method			
P11.2	Free Block Orientation	Setting the direction of the free function module source			
P11.3	Parking	[0] Ramp parking [1] Free parking	0 to 1	0	
P11.6	runtime delay	Setting the runtime delay time	0.00 to 300.00 [s]	0.00 [s]	
P11.7	Torque holding after zero speed	Holding time of zero speed state at stop	0.00 to 300.00 [s]	0.00 [s]	
P11.10	Velocity feed source	[0] I/O terminal [1] Analog input 1 [2] Analog inputs 2 [3] Operation panel [4] DP communication [5] MODBUS [6] Free function module	0 to 6	0	
P11.11	Free Block Speed Source	Free function module source for a given speed			
P11.13	Acceleration time control source	[0] Disable [1] PROFIBUS [2] MODBUS [3] Local Settings	0 to 3	0	
P11.14	Acceleration Time Multiplier		0.1 to 10.0	1.0	

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P11.15	Acceleration zone 1	Setting the first accelerated gradient pattern	0.0 to 300.0 [%]	100.0 [%]	
P11.16	Acceleration time 1	Acceleration time from the stop state to the set value of P11.15	0.0 to 300.0 [s]	3.00 [s]	
P11.17	Acceleration zone 2	Setting the second acceleration gradient mode	0.0 to 300.0 [%]	200.0 [%]	
P11.18	Acceleration time 2	Acceleration time from P11.15 set value to P11.17 set value	0.0 to 300.0 [s]	4.00 [s]	
P11.19	Acceleration zone 3	Setting the third acceleration gradient mode	0.0 to 300.0 [%]	240.0 [%]	
P11.20	Acceleration time 3	Acceleration time from P11.17 set value to P11.19 set value	0.0 to 300.0 [s]	7.00 [s]	
P11.21	Acceleration zone 4	Setting the fourth acceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P11.22	Acceleration time 4	Acceleration time from P11.19 set value to P11.21 set value	0.0 to 300.0 [s]	10.00 [s]	
P11.23	Acceleration zone 5	Setting the fifth acceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P11.24	Acceleration time 5	Acceleration time from P11.21 set value to P11.23 set value	0.0 to 300.0 [s]	10.00 [s]	
P11.25	Acceleration zone 6	Setting the sixth acceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P11.26	Acceleration time 6	Acceleration time from P11.23 set value to P11.25 set value	0.0 to 300.0 [s]	10.00 [s]	
P11.27	Acceleration zone 7	Setting the seventh acceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P11.28	Acceleration time 7	Acceleration time from P11.25 set value to P11.27 set value	0.0 to 300.0 [s]	10.00 [s]	
P11.29	Acceleration zone 8	Setting the eighth acceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P11.30	Acceleration time 8	Acceleration time from set value P11.27 to set value P11.29	0.0 to 300.0 [s]	10.00 [s]	
P11.32	Deceleration time control source	[0] Disable [1] PROFIBUS [2] MODBUS [3] Local Settings	0 to 3	0	

P11.33	Deceleration Time Multiplier		0.1 to 10.0	1.0	
P11.34	Deceleration zone 1	Setting the first deceleration gradient pattern	0.0 to 300.0 [%]	100.0 [%]	
P11.35	Deceleration time 1	Deceleration time from P11.34 set value to stop	0.0 to 300.0 [s]	3.00 [s]	
P11.36	Deceleration zone 2	Setting the second deceleration gradient mode	0.0 to 300.0 [%]	200.0 [%]	
P11.37	Deceleration time 2	Deceleration time from P11.34 set value to P11.36 set value	0.0 to 300.0 [s]	4.00 [s]	
P11.38	Deceleration zone 3	Setting the third deceleration gradient mode	0.0 to 300.0 [%]	240.0 [%]	
P11.39	Deceleration time 3	Deceleration time from P11.36 set value to P11.38 set value	0.0 to 300.0 [s]	7.00 [s]	
P11.40	Deceleration zone 4	Setting the fourth deceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P11.41	Deceleration time 4	Deceleration time from set value P11.38 to set value P11.40	0.0 to 300.0 [s]	10.00 [s]	
P11.42	Deceleration zone 5	Setting the fifth deceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P11.43	Deceleration time 5	Deceleration time from set value P11.40 to set value P11.42	0.0 to 300.0 [s]	10.00 [s]	
P11.44	Deceleration zone 6	Setting the sixth deceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P11.45	Deceleration time 6	Deceleration time from P11.42 set value to P11.44 set value	0.0 to 300.0 [s]	10.00 [s]	
P11.46	Deceleration zone 7	Setting the seventh deceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P11.47	Deceleration time 7	Deceleration time from set value P11.44 to set value P11.46	0.0 to 300.0 [s]	10.00 [s]	
P11.48	Deceleration zone 8	Setting the eighth deceleration gradient mode	0.0 to 300.0 [%]	300.0 [%]	
P11.49	Deceleration time 8	Deceleration time from set value P11.46 to set value P11.48	0.0 to 300.0 [s]	10.00 [s]	

P11.54	Free-running start speed		0.0 to 300.0 [%]	0.0 [%]	
P11.55	Change direction deceleration enable	[0] Prohibition [1] Enable	0 to 1	0	
P11.56	Vertical deceleration time		0.00 to 300.00 [s]	3.00 [s]	
P11.57	Emergency stop method	[0] Ramp parking [1] Free parking	0 to 1	1	
P11.58	Emergency stop deceleration time		0.00 to 300.00 [s]	1.50 [s]	

10.11 Motor 1-stage speed brake group P12

Function code	Name	Explanation	Setting range	Default value	Particular
P12.0	Multi-speed mode selection	[0] Direct Input [1] Binary	0 to 1	1	
P12.1	Multi-band speed unit selection	[0][%] [1][Hz] [2][rpm]	0 to 2	1	
P12.2	Multi-speed 1		0.0 to 3000.0	10.0	
P12.3	Multi-speed 2		0.0 to 3000.0	20.0	
P12.4	Multi-speed 3		0.0 to 3000.0	35.0	
P12.5	Multi-speed 4		0.0 to 3000.0	50.0	
P12.6	Multi-speed 5		0.0 to 3000.0	50.0	
P12.7	Multi-speed 6		0.0 to 3000.0	50.0	
P12.8	Multi-Speed 7		0.0 to 3000.0	50.0	
P12.9	Multi-Segment Speed 8		0.0 to 3000.0	50.0	
P12.10	Multi-speed 9		0.0 to 3000.0	50.0	
P12.11	Multi-speed 10		0.0 to 3000.0	50.0	
P12.12	Multi-speed 11		0.0 to 3000.0	50.0	
P12.13	Multi-speed 12		0.0 to 3000.0	50.0	
P12.14	Multi-speed 13		0.0 to 3000.0	50.0	

P12.15	Multi-speed 14		0.0 to 3000.0	50.0	
P12.16	Multi-speed 15		0.0 to 3000.0	50.0	
P12.17	Multi-speed 16		0.0 to 3000.0	50.0	
P12.22	Open gate forward speed value	Setting the open gate forward speed value	0.0 to 20.0 [%]	2.0 [%]	
P12.23	Open gate reverse speed value	Setting the open gate reverse speed value	0.0 to 20.0 [%]	0.0 [%]	
P12.24	Open gate positive torque	Setting the positive opening torque	0.0 to 200.0 [%]	30.0 [%]	
P12.25	Open gate reverse torque	Setting the opening reverse torque	0.0 to 200.0 [%]	20.0 [%]	
P12.26	Positive gate opening delay	Setting the forward gate opening delay time	0.00 to 2.00 [s]	0.00 [s]	
P12.27	Reverse gate opening delay	Setting the reverse gate opening delay time	0.00 to 2.00 [s]	0.00 [s]	
P12.28	Positive gate opening control delay	Setting the positive gate opening time	0.00 to 2.00 [s]	0.07 [s]	
P12.29	Reverse gate opening control delay	Setting the reverse gate opening time	0.00 to 2.00 [s]	0.07 [s]	
P12.32	Forward Braking Speed	Setting the holding speed in forward direction	0.0 to 20.0 [%]	0.0 [%]	
P12.33	Reverse Braking Speed	Setting the brake speed in reverse	0.0 to 20.0 [%]	0.0 [%]	
P12.34	Positive Brake Delay Time	Setting the forward brake delay time	0.00 to 2.00 [s]	0.00 [s]	
P12.35	Reverse Brake Delay Time	Setting the delay time for the reverse holding brake	0.00 to 2.00 [s]	0.00 [s]	
P12.36	Positive holding time	Setting the forward hold time	0.00 to 2.00 [s]	0.50 [s]	

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Function	Name	Explanation	Setting range	Default value	Particular
P12.37	Reverse holding time	Setting the reverse holding time	0.00 to 2.00 [s]	0.50 [s]	

10.12 Motor 2-stage speed brake group P13

Function	Name	Explanation	Setting range	Default value	Particular
P13.0	Multi-speed mode selection	[0] Direct Input [1] Binary	0 to 1	1	
P13.1	Multi-band speed unit selection	[0][%] [1][Hz] [2][rpm]	0 to 2	1	
P13.2	Multi-speed 1		0.0 to 3000.0	10.0	
P13.3	Multi-speed 2		0.0 to 3000.0	20.0	
P13.4	Multi-speed 3		0.0 to 3000.0	35.0	
P13.5	Multi-speed 4		0.0 to 3000.0	50.0	
P13.6	Multi-speed 5		0.0 to 3000.0	50.0	
P13.7	Multi-speed 6		0.0 to 3000.0	50.0	
P13.8	Multi-Speed 7		0.0 to 3000.0	50.0	
P13.9	Multi-Segment Speed 8		0.0 to 3000.0	50.0	
P13.10	Multi-speed 9		0.0 to 3000.0	50.0	
P13.11	Multi-speed 10		0.0 to 3000.0	50.0	
P13.12	Multi-speed 11		0.0 to 3000.0	50.0	
P13.13	Multi-speed 12		0.0 to 3000.0	50.0	
P13.14	Multi-speed 13		0.0 to 3000.0	50.0	
P13.15	Multi-speed 14		0.0 to 3000.0	50.0	
P13.16	Multi-speed 15		0.0 to 3000.0	50.0	

P13.17	Multi-speed 16		0.0 to 3000.0	50.0	
P13.22	Open gate forward speed value	Setting the open gate forward speed value	0.0 to 20.0 [%]	2.0 [%]	
P13.23	Open gate reverse speed value	Setting the open gate reverse speed value	0.0 to 20.0 [%]	0.0 [%]	
P13.24	Open gate positive torque	Setting the positive opening torque	0.0 to 200.0 [%]	30.0 [%]	
P13.25	Open gate reverse torque	Setting the opening reverse torque	0.0 to 200.0 [%]	20.0 [%]	
P13.26	Positive gate opening delay	Setting the forward gate opening delay time	0.00 to 2.00 [s]	0.00 [s]	
P13.27	Reverse gate opening delay	Setting the reverse gate opening delay time	0.00 to 2.00 [s]	0.00 [s]	
P13.28	Positive gate opening control delay	Setting the positive gate opening time	0.00 to 2.00 [s]	0.07 [s]	
P13.29	Reverse gate opening control delay	Setting the reverse gate opening time	0.00 to 2.00 [s]	0.07 [s]	
P13.32	Forward Braking Speed	Setting the holding speed in forward direction	0.0 to 20.0 [%]	0.0 [%]	
P13.33	Reverse Braking Speed	Setting the brake speed in reverse	0.0 to 20.0 [%]	0.0 [%]	
P13.34	Positive Brake Delay Time	Setting the forward brake delay time	0.00 to 2.00 [s]	0.00 [s]	
P13.35	Reverse Brake Delay Time	Setting the delay time for the reverse holding brake	0.00 to 2.00 [s]	0.00 [s]	
P13.36	Positive holding time	Setting the forward hold time	0.00 to 2.00 [s]	0.50 [s]	
P13.37	Reverse holding time	Setting the reverse holding time	0.00 to 2.00 [s]	0.50 [s]	

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10.13 Motor 3-stage speed brake group P14

Function	Name	Explanation	Setting range	Default value	Explanation
P14.0	Multi-speed mode selection	[0] Direct Input [1] Binary	0 to 1	1	
P14.1	Multi-band speed unit selection	[0][%] [1][Hz] [2][rpm]	0 to 2	1	
P14.2	Multi-speed 1		0.0 to 3000.0	10.0	
P14.3	Multi-speed 2		0.0 to 3000.0	20.0	
P14.4	Multi-speed 3		0.0 to 3000.0	35.0	
P14.5	Multi-speed 4		0.0 to 3000.0	50.0	
P14.6	Multi-speed 5		0.0 to 3000.0	50.0	
P14.7	Multi-speed 6		0.0 to 3000.0	50.0	
P14.8	Multi-Speed 7		0.0 to 3000.0	50.0	
P14.9	Multi-Segment Speed 8		0.0 to 3000.0	50.0	
P14.10	Multi-speed 9		0.0 to 3000.0	50.0	
P14.11	Multi-speed 10		0.0 to 3000.0	50.0	
P14.12	Multi-speed 11		0.0 to 3000.0	50.0	
P14.13	Multi-speed 12		0.0 to 3000.0	50.0	
P14.14	Multi-speed 13		0.0 to 3000.0	50.0	
P14.15	Multi-speed 14		0.0 to 3000.0	50.0	
P14.16	Multi-speed 15		0.0 to 3000.0	50.0	
P14.17	Multi-speed 16		0.0 to 3000.0	50.0	

P14.2 2	Open gate forward speed value	Setting the open gate forward speed value	0.0 to 20.0 [%]	2.0 [%]	
P14.2 3	Open gate reverse speed value	Setting the open gate reverse speed value	0.0 to 20.0 [%]	0.0 [%]	
P14.2 4	Open gate positive torque	Setting the positive opening torque	0.0 to 200.0 [%]	30.0 [%]	
P14.2 5	Open gate reverse torque	Setting the opening reverse torque	0.0 to 200.0 [%]	20.0 [%]	
P14.2 6	Positive gate opening delay	Setting the positive gate opening delay time	0.00 to 2.00 [s]	0.00 [s]	
P14.2 7	Reverse gate opening delay	Setting the reverse gate opening delay time	0.00 to 2.00 [s]	0.00 [s]	
P14.2 8	Positive gate opening control delay	Setting the positive gate opening time	0.00 to 2.00 [s]	0.07 [s]	
P14.2 9	Reverse gate opening control delay	Setting the reverse gate opening time	0.00 to 2.00 [s]	0.07 [s]	
P14.3 2	Forward Braking Speed	Setting the holding speed in forward direction	0.0 to 20.0 [%]	0.0 [%]	
P14.3 3	Reverse Braking Speed	Setting the brake speed in reverse	0.0 to 20.0 [%]	0.0 [%]	
P14.3 4	Positive Brake Delay Time	Setting the forward brake delay time	0.00 to 2.00 [s]	0.00 [s]	
P14.3 5	Reverse Brake Delay Time	Setting the delay time for the reverse holding brake	0.00 to 2.00 [s]	0.00 [s]	
P14.3 6	Positive holding time	Setting the forward hold time	0.00 to 2.00 [s]	0.50 [s]	
P14.3 7	Reverse holding time	Setting the reverse holding time	0.00 to 2.00 [s]	0.50 [s]	

10.14 Motor 4-stage speed brake group P15

Function	Name	Explanation	Setting range	Default value	Explanation
P15.0	Multi-speed mode selection	[0] Direct Input [1] Binary	0 to 1	1	
P15.1	Multi-band speed unit selection	[0][%] [1][Hz] [2][rpm]	0 to 2	1	
P15.2	Multi-speed 1		0.0 to 3000.0	10.0	
P15.3	Multi-speed 2		0.0 to 3000.0	20.0	
P15.4	Multi-speed 3		0.0 to 3000.0	35.0	
P15.5	Multi-speed 4		0.0 to 3000.0	50.0	
P15.6	Multi-speed 5		0.0 to 3000.0	50.0	
P15.7	Multi-speed 6		0.0 to 3000.0	50.0	
P15.8	Multi-Speed 7		0.0 to 3000.0	50.0	
P15.9	Multi-Segment Speed 8		0.0 to 3000.0	50.0	
P15.10	Multi-speed 9		0.0 to 3000.0	50.0	
P15.11	Multi-speed 10		0.0 to 3000.0	50.0	
P15.12	Multi-speed 11		0.0 to 3000.0	50.0	
P15.13	Multi-speed 12		0.0 to 3000.0	50.0	
P15.14	Multi-speed 13		0.0 to 3000.0	50.0	
P15.15	Multi-speed 14		0.0 to 3000.0	50.0	
P15.16	Multi-speed 15		0.0 to 3000.0	50.0	
P15.17	Multi-speed 16		0.0 to 3000.0	50.0	

P15.22	Open gate forward speed value	Setting the open gate forward speed value	0.0 to 20.0 [%]	2.0 [%]	
P15.23	Open gate reverse speed value	Setting the open gate reverse speed value	0.0 to 20.0 [%]	0.0 [%]	
P15.24	Open gate positive torque	Setting the positive opening torque	0.0 to 200.0 [%]	30.0 [%]	
P15.25	Open gate reverse torque	Setting the opening reverse torque	0.0 to 200.0 [%]	20.0 [%]	
P15.26	Positive gate opening delay	Setting the forward gate opening delay time	0.00 to 2.00 [s]	0.00 [s]	
P15.27	Reverse gate opening delay	Setting the reverse gate opening delay time	0.00 to 2.00 [s]	0.00 [s]	
P15.28	Positive gate opening control delay	Setting the positive gate opening time	0.00 to 2.00 [s]	0.07 [s]	
P15.29	Reverse gate opening control delay	Setting the reverse gate opening time	0.00 to 2.00 [s]	0.07 [s]	
P15.32	Forward Braking Speed	Setting the holding speed in forward direction	0.0 to 20.0 [%]	0.0 [%]	
P15.33	Reverse Braking Speed	Setting the brake speed in reverse	0.0 to 20.0 [%]	0.0 [%]	
P15.34	Positive Brake Delay Time	Setting the forward brake delay time	0.00 to 2.00 [s]	0.00 [s]	
P15.35	Reverse Brake Delay Time	Setting the delay time for the reverse holding brake	0.00 to 2.00 [s]	0.00 [s]	
P15.36	Positive holding time	Setting the forward hold time	0.00 to 2.00 [s]	0.50 [s]	
P15.37	Reverse holding time	Setting the reverse holding time	0.00 to 2.00 [s]	0.50 [s]	

10.15 Motor 1 parameter V/F group P16

Function	Name	Explanation	Setting range	Default value	Explanation
P16.0	Input voltage setting	Set according to actual input voltage	320-460 [V]	380 [V]	
P16.2	Motor rated power	Setting according to motor nameplate parameters	0.0 to 4000.0 [kW]	Model Determination [kW]	
P16.3	Motor rated voltage	Setting according to motor nameplate parameters	320-460 [V]	380 [V]	
P16.4	Motor rated current	Setting according to motor nameplate parameters	0.0 to 6500.0 [A]	Model Determination [A]	
P16.5	Motor rated frequency	Setting according to motor nameplate parameters	0.0 to 300.0 [Hz]	50.0 [Hz]	
P16.6	Rated motor speed	Setting according to motor nameplate parameters	0 to 6000 [rpm]	1465 [rpm]	
P16.7	Motor rated poles	Setting according to motor nameplate parameters	2 to 12 [pole]	4 [pole]	
P16.9	Motor synchronous speed	Setting according to motor nameplate parameters	0 to 7200 [rpm]	1500 [rpm]	
P16.11	Control mode selection	[0] V/F control [1] Open-loop vectors [2] Closed-loop vectors [3] Regenerative rectifier [4] linear filter	0 to 4	0	
P16.12	Carrier frequency setting	Set carrier frequency	1.00 to 10.00 [kHz]	3.00 [kHz]	
P16.14	V/F curve setting	[0] Linear V/F curve [1] Multi-point V/F curves [2] Quadratic power curves	0 to 3	0	
P16.15	torque compensation	[0] Prohibition [1] Enable	0 to 1	0	

P16.16	Torque compensation time	Setting torque compensation time	2 to 500 [ms]	500 [ms]	
P16.17	V/F control mode	[0] Frequency control [1] Slip control	0 to 1	0	
P16.18	Slippage compensation time	Setting the slip compensation time	10 to 1000 [ms]	200 [ms]	
P16.19	Stator resistance self-tuning option	[0] Online [1] Offline	0 to 1	0	
P16.22	Start-up delay time	Setting the start-up delay time	0.00 to 100.00 [s]	0.00 [s]	
P16.23	minimum frequency	Setting the minimum frequency (this parameter is only valid in V/F control mode)	0.00 to 300.00 [Hz]	0.00 [Hz]	
P16.24	Maximum frequency	Setting the maximum frequency (this parameter is only valid in V/F control mode)	0.00 to 300.00 [Hz]	50.00 [Hz]	
P16.25	Maximum modulation rate	Setting the maximum modulation rate	0.0 to 120.0 [%]	100.0 [%]	
P16.26	V/F startup voltage bias	Set V/F startup voltage bias	0.00 to 10.00 [%]	0.75 [%]	
P16.27	Rated Frequency Output Voltage	Output voltage at set rated frequency	0.0 to 200.0 [%]	100.0 [%]	
P16.30	Power-of-two starting voltage compensation	Setting the power-of-two curve to start voltage compensation	0.0 to 100.0 [%]	0.0 [%]	
P16.33	Multi-point V/F curves	Setting the number of points in a multi-point V/F curve	0 to 6	2	
P16.34	V/F frequency point 1		0.0 to 300.0 [Hz]	5.0 [Hz]	
P16.35	V/F voltage point 1		0.0 to 125.0 [%]	11.5 [%]	

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P16.3 6	V/F frequency point 2		0.0 to 300.0 [Hz]	50.0 [Hz]	
P16.3 7	V/F voltage point 2		0.0 to 125.0 [%]	100.0 [%]	
P16.3 8	V/F frequency point 3		0.0 to 300.0 [Hz]	50.0 [Hz]	
P16.3 9	V/F voltage point 3		0.0 to 125.0 [%]	100.0 [%]	
P16.4 0	V/F frequency point 4		0.0 to 300.0 [Hz]	50.0 [Hz]	
P16.4 1	V/F voltage point 4		0.0 to 125.0 [%]	100.0 [%]	
P16.4 2	V/F frequency point 5		0.0 to 300.0 [Hz]	50.0 [Hz]	
P16.4 3	V/F voltage point 5		0.0 to 125.0 [%]	100.0 [%]	
P16.4 4	V/F frequency point 6		0.0 to 300.0 [Hz]	50.0 [Hz]	
P16.4 5	V/F voltage point 6		0.0 to 125.0 [%]	100.0 [%]	
P16.4 6	V/F Curve @ Free Block		0 to 300	0	
P16.4 7	Voltage regulation @ free block		0 to 300	0	
P16.4 8	frequency modulation source	[0] Prohibition [1] PID module 1 [2] PID module 2 [3] Free function blocks	0 to 3	0	
P16.4 9	Frequency Adjustment Source @ Free Block		0 to 300	0	
P16.5 0	Start DC braking time	Setting the start DC braking time	0.00 to 300.00 [s]	0.00 [s]	

P16.51	Starting DC braking current	Setting the starting DC braking current	0.0 to 150.0 [%]	70.0 [%]	
P16.52	Starting DC braking frequency	Setting the starting DC braking frequency	0.00 to 5.00 [Hz]	0.00 [Hz]	
P16.54	Stop DC braking time	Setting the stop DC braking time	0.00 to 300.00 [s]	0.00 [s]	
P16.55	Stop DC braking current	Setting the stopping DC braking current	0.0 to 150.0 [%]	75.0 [%]	
P16.56	Stop DC braking frequency	Setting the stop DC braking frequency	0.00 to 5.00 [Hz]	0.00 [Hz]	
P16.59	Overcurrent protection proportional gain	Setting the overcurrent protection ratio	0.0 to 1000.0 [%]	100.0 [%]	
P16.60	Integral gain for overcurrent protection	Setting overcurrent protection points	0.0 to 1000.0 [%]	100.0 [%]	
P16.61	Overpressure limiting ratio	Setting the overvoltage limiting ratio	0.0 to 1000.0 [%]	100.0 [%]	
P16.62	Overvoltage Limit Points	Setting overvoltage limit points	0.0 to 1000.0 [%]	100.0 [%]	
P16.64	V/F stabilizing action gain	Setting the V/F stabilizing action gain	0.0 to 1000.0 [%]	100.0 [%]	
P16.66	Current Limit Proportional Gain	Setting the current limit loop ratio in V/F mode	0.0 to 1000.0 [%]	100.0 [%]	
P16.67	Start DC braking ratio	Setting the starting DC braking ratio	0.0 to 1000.0 [%]	100.0 [%]	
P16.68	Initiate DC braking credit	Setting the startup DC braking integral	0.0 to 1000.0 [%]	100.0 [%]	
P16.69	Stop DC braking ratio	Setting the stop DC braking ratio	0.0 to 1000.0 [%]	100.0 [%]	
P16.70	Stop DC Brake Integration	Setting the stopping DC braking integral	0.0 to 1000.0 [%]	100.0 [%]	

10.16 Motor 2 Parameter V/F Group P17

Function code	Name	Explanation	Setting range	Default value	Explanation
P17.0	Input voltage setting	Set according to actual input voltage	320-460 [V]	380 [V]	
P17.2	Motor rated power	Setting according to motor nameplate parameters	0.0 to 4000.0 [kW]	Model Determination [kW]	
P17.3	Motor rated voltage	Setting according to motor nameplate parameters	320-460 [V]	380 [V]	
P17.4	Motor rated current	Setting according to motor nameplate parameters	0.0 to 6500.0 [A]	Model Determination [A]	
P17.5	Motor rated frequency	Setting according to motor nameplate parameters	0.0 to 300.0 [Hz]	50.0 [Hz]	
P17.6	Rated motor speed	Setting according to motor nameplate parameters	0 to 6000 [rpm]	1465 [rpm]	
P17.7	Motor rated poles	Setting according to motor nameplate parameters	2 to 12 [pole]	4 [pole]	
P17.9	Motor synchronous speed	Setting according to motor nameplate parameters	0 to 7200 [rpm]	1500 [rpm]	
P17.11	Control mode selection	[0] V/F control [1] Open-loop vectors [2] Closed-loop vectors [3] Regenerative rectifier [4] linear filter	0 to 4	0	
P17.12	Carrier frequency setting	Set carrier frequency	1.00 to 10.00 [kHz]	3.00 [kHz]	
P17.14	V/F curve setting	[0] Linear V/F curve [1] Multi-point V/F curves [2] Quadratic power curves	0 to 3	0	

P17.15	torque compensation	[0] Prohibition [1] Enable	0 to 1	0	
P17.16	Torque compensation time	Setting torque compensation time	2 to 500 [ms]	500 [ms]	
P17.17	V/F control mode	[0] Frequency control [1] Slip control	0 to 1	0	
P17.18	Slippage compensation time	Setting the slip compensation time	10 to 1000 [ms]	200 [ms]	
P17.19	Stator resistance self-tuning option	[0] Online [1] Offline	0 to 1	0	
P17.22	Start-up delay time	Setting the start-up delay time	0.00 to 100.00 [s]	0.00 [s]	
P17.23	minimum frequency	Setting the minimum frequency (this parameter is only valid in V/F control mode)	0.00 to 300.00 [Hz]	0.00 [Hz]	
P17.24	Maximum frequency	Setting the maximum frequency (this parameter is only valid in V/F control mode)	0.00 to 300.00 [Hz]	50.00 [Hz]	
P17.25	Maximum modulation rate	Setting the maximum modulation rate	0.0 to 120.0 [%]	100.0 [%]	
P17.26	V/F startup voltage bias	Set V/F startup voltage bias	0.00 to 10.00 [%]	0.75 [%]	
P17.27	Rated Frequency Output Voltage	Output voltage at set rated frequency	0.0 to 200.0 [%]	100.0 [%]	
P17.30	Power-of-two starting voltage compensation	Setting the power-of-two curve to start voltage compensation	0.0 to 100.0 [%]	0.0 [%]	
P17.33	Multi-point V/F curves	Setting the number of points in a multi-point V/F curve	0 to 6	2	

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P17.34	V/F frequency point 1		0.0 to 300.0 [Hz]	5.0 [Hz]	
P17.35	V/F voltage point 1		0.0 to 125.0 [%]	11.5 [%]	
P17.36	V/F frequency point 2		0.0 to 300.0 [Hz]	50.0 [Hz]	
P17.37	V/F voltage point 2		0.0 to 125.0 [%]	100.0 [%]	
P17.38	V/F frequency point 3		0.0 to 300.0 [Hz]	50.0 [Hz]	
P17.39	V/F voltage point 3		0.0 to 125.0 [%]	100.0 [%]	
P17.40	V/F frequency point 4		0.0 to 300.0 [Hz]	50.0 [Hz]	
P17.41	V/F voltage point 4		0.0 to 125.0 [%]	100.0 [%]	
P17.42	V/F frequency point 5		0.0 to 300.0 [Hz]	50.0 [Hz]	
P17.43	V/F voltage point 5		0.0 to 125.0 [%]	100.0 [%]	
P17.44	V/F frequency point 6		0.0 to 300.0 [Hz]	50.0 [Hz]	
P17.45	V/F voltage point 6		0.0 to 125.0 [%]	100.0 [%]	
P17.46	V/F Curve @ Free Block		0 to 300	0	
P17.47	Voltage regulation @ free block		0 to 300	0	
P17.48	frequency modulation source	[0] Prohibition [1] PID module 1 [2] PID module 2 [3] Free function blocks	0 to 3	0	

P17.49	Frequency Adjustment Source @ Free Block		0 to 300	0	
P17.50	Start DC braking time	Setting the start DC braking time	0.00 to 300.00 [s]	0.00 [s]	
P17.51	Starting DC braking current	Setting the starting DC braking current	0.0 to 150.0 [%]	70.0 [%]	
P17.52	Starting DC braking frequency	Setting the starting DC braking frequency	0.00 to 5.00 [Hz]	0.00 [Hz]	
P17.54	Stop DC braking time	Setting the stop DC braking time	0.00 to 300.00 [s]	0.00 [s]	
P17.55	Stop DC braking current	Setting the stopping DC braking current	0.0 to 150.0 [%]	75.0 [%]	
P17.56	Stop DC braking frequency	Setting the stop DC braking frequency	0.00 to 5.00 [Hz]	0.00 [Hz]	
P17.59	Overcurrent protection proportional gain	Setting the overcurrent protection ratio	0.0 to 1000.0 [%]	100.0 [%]	
P17.60	Integral gain for overcurrent protection	Setting of overcurrent protection points	0.0 to 1000.0 [%]	100.0 [%]	
P17.61	Overpressure limiting ratio	Setting the overvoltage limiting ratio	0.0 to 1000.0 [%]	100.0 [%]	
P17.62	Overvoltage Limit Points	Setting overvoltage limit points	0.0 to 1000.0 [%]	100.0 [%]	
P17.64	V/F stabilizing action gain	Setting the V/F stabilizing action gain	0.0 to 1000.0 [%]	100.0 [%]	
P17.66	Current Limit Proportional Gain	Setting the current limit loop ratio in V/F mode	0.0 to 1000.0 [%]	100.0 [%]	
P17.67	Start DC braking ratio	Setting the starting DC braking ratio	0.0 to 1000.0 [%]	100.0 [%]	

Function	Name	Explanation	Setting range	Default value	Explanation
P17.68	Initiate DC braking credit	Setting the startup DC braking integral	0.0 to 1000.0 [%]	100.0 [%]	
P17.69	Stop DC braking ratio	Setting the stop DC braking ratio	0.0 to 1000.0 [%]	100.0 [%]	
P17.70	Stop DC Brake Integration	Setting the stopping DC braking integral	0.0 to 1000.0 [%]	100.0 [%]	

10.17 Motor 3 Parameter V/F Group P18

Function	Name	Explanation	Setting range	Fefault value	Explanation
P18.0	Input voltage setting	Set according to actual input voltage	320-460 [V]	380 [V]	
P18.2	Motor rated power	Setting according to motor nameplate parameters	0.0 to 4000.0 [kW]	Model Determination [kW]	
P18.3	Motor rated voltage	Setting according to motor nameplate parameters	320-460 [V]	380 [V]	
P18.4	Motor rated current	Setting according to motor nameplate parameters	0.0 to 6500.0 [A]	Model Determination [A]	
P18.5	Motor rated frequency	Setting according to motor nameplate parameters	0.0 to 300.0 [Hz]	50.0 [Hz]	
P18.6	Rated motor speed	Setting according to motor nameplate parameters	0 to 6000 [rpm]	1465 [rpm]	
P18.7	Motor rated poles	Setting according to motor nameplate parameters	2 to 12 [pole]	4 [pole]	
P18.9	Motor synchronous speed	Setting according to motor nameplate parameters	0 to 7200 [rpm]	1500 [rpm]	
P18.11	Control mode selection	[0] V/F control [1] Open-loop vectors [2] Closed-loop vectors [3] Regenerative rectifier [4] linear filter	0 to 4	0	

P18.1 2	Carrier frequency setting	Set carrier frequency	1.00 to 10.00 [kHz]	3.00 [kHz]	
P18.1 4	V/F curve setting	[0] Linear V/F curve [1] Multi-point V/F curves [2] Quadratic power curves	0 to 3	0	
P18.1 5	torque compensation	[0] Prohibition [1] Enable	0 to 1	0	
P18.1 6	Torque compensation time	Setting torque compensation time	2 to 500 [ms]	500 [ms]	
P18.1 7	V/F control mode	[0] Frequency control [1] Slip control	0 to 1	0	
P18.1 8	Slippage compensation time	Setting the slip compensation time	10 to 1000 [ms]	200 [ms]	
P18.1 9	Stator resistance self-tuning option	[0] Online [1] Offline	0 to 1	0	
P18.2 2	Start-up delay time	Setting the start-up delay time	0.00 to 100.00 [s]	0.00 [s]	
P18.2 3	minimum frequency	Setting the minimum frequency (this parameter is only valid in V/F control mode)	0.00 to 300.00 [Hz]	0.00 [Hz]	
P18.2 4	Maximum frequency	Setting the maximum frequency (this parameter is only valid in V/F control mode)	0.00 to 300.00 [Hz]	50.00 [Hz]	
P18.2 5	Maximum modulation rate	Setting the maximum modulation rate	0.0 to 120.0 [%]	100.0 [%]	
P18.2 6	V/F startup voltage bias	Set V/F startup voltage bias	0.00 to 10.00 [%]	0.75 [%]	
P18.2 7	Rated frequency Output voltage	Output voltage at set rated frequency	0.0 to 200.0 [%]	100.0 [%]	

P18.30	Power-of-two starting voltage compensation	Setting the power-of-two curve to start voltage compensation	0.0 to 100.0 [%]	0.0 [%]	
P18.33	Multi-point V/F curves	Setting the number of points in a multi-point V/F curve	0 to 6	2	
P18.34	V/F frequency point 1		0.0 to 300.0 [Hz]	5.0 [Hz]	
P18.35	V/F voltage point 1		0.0 to 125.0 [%]	11.5 [%]	
P18.36	V/F frequency point 2		0.0 to 300.0 [Hz]	50.0 [Hz]	
P18.37	V/F voltage point 2		0.0 to 125.0 [%]	100.0 [%]	
P18.38	V/F frequency point 3		0.0 to 300.0 [Hz]	50.0 [Hz]	
P18.39	V/F voltage point 3		0.0 to 125.0 [%]	100.0 [%]	
P18.40	V/F frequency point 4		0.0 to 300.0 [Hz]	50.0 [Hz]	
P18.41	V/F voltage point 4		0.0 to 125.0 [%]	100.0 [%]	
P18.42	V/F frequency point 5		0.0 to 300.0 [Hz]	50.0 [Hz]	
P18.43	V/F voltage point 5		0.0 to 125.0 [%]	100.0 [%]	
P18.44	V/F frequency point 6		0.0 to 300.0 [Hz]	50.0 [Hz]	
P18.45	V/F voltage point 6		0.0 to 125.0 [%]	100.0 [%]	
P18.46	V/F Curve @ Free Block		0 to 300	0	
P18.47	Voltage regulation @ free block		0 to 300	0	

P18.48	frequency modulation source	[0] Prohibition [1] PID module 1 [2] PID module 2 [3] Free function blocks	0 to 3	0	
P18.49	Frequency Adjustment Source @ Free Block		0 to 300	0	
P18.50	Start DC braking time	Setting the start DC braking time	0.00 to 300.00 [s]	0.00 [s]	
P18.51	Starting DC braking current	Setting the starting DC braking current	0.0 to 150.0 [%]	70.0 [%]	
P18.52	Starting DC braking frequency	Setting the starting DC braking frequency	0.00 to 5.00 [Hz]	0.00 [Hz]	
P18.54	Stop DC braking time	Setting the stop DC braking time	0.00 to 300.00 [s]	0.00 [s]	
P18.55	Stop DC braking current	Setting the stopping DC braking current	0.0 to 150.0 [%]	75.0 [%]	
P18.56	Stop DC braking frequency	Setting the stop DC braking frequency	0.00 to 5.00 [Hz]	0.00 [Hz]	
P18.59	Overcurrent protection proportional gain	Setting the overcurrent protection ratio	0.0 to 1000.0 [%]	100.0 [%]	
P18.60	Integral gain for overcurrent protection	Setting of overcurrent protection points	0.0 to 1000.0 [%]	100.0 [%]	
P18.61	Overpressure limiting ratio	Setting the overvoltage limiting ratio	0.0 to 1000.0 [%]	100.0 [%]	
P18.62	Overvoltage Limit Points	Setting overvoltage limit points	0.0 to 1000.0 [%]	100.0 [%]	
P18.64	V/F stabilizing action gain	Setting the V/F stabilizing action gain	0.0 to 1000.0 [%]	100.0 [%]	
P18.66	Current Limit Proportional Gain	Setting the current limit loop ratio in V/F mode	0.0 to 1000.0 [%]	100.0 [%]	

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P18.67	Start DC braking ratio	Setting the starting DC braking ratio	0.0 to 1000.0 [%]	100.0 [%]	
P18.68	Initiate DC braking credit	Setting the startup DC braking integral	0.0 to 1000.0 [%]	100.0 [%]	
P18.69	Stop DC braking ratio	Setting the stop DC braking ratio	0.0 to 1000.0 [%]	100.0 [%]	
P18.70	Stop DC Brake Integration	Setting the stopping DC braking integral	0.0 to 1000.0 [%]	100.0 [%]	

10.18 Motor 4-parameter V/F group P19

Function	Name	Explanation	Setting range	Default value	Explanation
P19.0	Input voltage setting	Set according to actual input voltage	320-460 [V]	380 [V]	
P19.2	Motor rated power	Setting according to motor nameplate parameters	0.0 to 4000.0 [kW]	Model Determination [kW]	
P19.3	Motor rated voltage	Setting according to motor nameplate parameters	320-460 [V]	380 [V]	
P19.4	Motor rated current	Setting according to motor nameplate parameters	0.0 to 6500.0 [A]	Model Determination [A]	
P19.5	Motor rated frequency	Setting according to motor nameplate parameters	0.0 to 300.0 [Hz]	50.0 [Hz]	
P19.6	Rated motor speed	Setting according to motor nameplate parameters	0 to 6000 [rpm]	1465 [rpm]	
P19.7	Motor rated poles	Setting according to motor nameplate parameters	2 to 12 [pole]	4 [pole]	
P19.9	Motor synchronous speed	Setting according to motor nameplate parameters	0 to 7200 [rpm]	1500 [rpm]	

P19.11	Control mode selection	[0] V/F control [1] Open-loop vectors [2] Closed-loop vectors [3] Regenerative rectifier [4] linear filter	0 to 4	0	
P19.12	Carrier frequency setting	Set carrier frequency	1.00 to 10.00 [kHz]	3.00 [kHz]	
P19.14	V/F curve setting	[0] Linear V/F curve [1] Multi-point V/F curves [2] Quadratic power curves	0 to 3	0	
P19.15	torque compensation	[0] Prohibition [1] Enable	0 to 1	0	
P19.16	Torque compensation time	Setting torque compensation time	2 to 500 [ms]	500 [ms]	
P19.17	V/F control mode	[0] Frequency control [1] Slip control	0 to 1	0	
P19.18	Slippage compensation time	Setting the slip compensation time	10 to 1000 [ms]	200 [ms]	
P19.19	Stator resistance self-tuning option	[0] Online [1] Offline	0 to 1	0	
P19.22	Start-up delay time	Setting the start-up delay time	0.00 to 100.00 [s]	0.00 [s]	
P19.23	minimum frequency	Setting the minimum frequency (this parameter is only valid in V/F control mode)	0.00 to 300.00 [Hz]	0.00 [Hz]	
P19.24	Maximum frequency	Setting the maximum frequency (this parameter is only valid in V/F control mode)	0.00 to 300.00 [Hz]	50.00 [Hz]	
P19.25	Maximum modulation rate	Setting the maximum modulation rate	0.0 to 120.0 [%]	100.0 [%]	

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P19.2 6	V/F startup voltage bias	Set V/F startup voltage bias	0.00 to 10.00 [%]	0.75 [%]	
P19.2 7	Rated Frequency Output Voltage	Output voltage at set rated frequency	0.0 to 200.0 [%]	100.0 [%]	
P19.3 0	Power-of-two starting voltage compensation	Setting the power-of-two curve to start voltage compensation	0.0 to 100.0 [%]	0.0 [%]	
P19.3 3	Multi-point V/F curves	Setting the number of points in a multi-point V/F curve	0 to 6	2	
P19.3 4	V/F frequency point 1		0.0 to 300.0 [Hz]	5.0 [Hz]	
P19.3 5	V/F voltage point 1		0.0 to 125.0 [%]	11.5 [%]	
P19.3 6	V/F frequency point 2		0.0 to 300.0 [Hz]	50.0 [Hz]	
P19.3 7	V/F voltage point 2		0.0 to 125.0 [%]	100.0 [%]	
P19.3 8	V/F frequency point 3		0.0 to 300.0 [Hz]	50.0 [Hz]	
P19.3 9	V/F voltage point 3		0.0 to 125.0 [%]	100.0 [%]	
P19.4 0	V/F frequency point 4		0.0 to 300.0 [Hz]	50.0 [Hz]	
P19.4 1	V/F voltage point 4		0.0 to 125.0 [%]	100.0 [%]	
P19.4 2	V/F frequency point 5		0.0 to 300.0 [Hz]	50.0 [Hz]	
P19.4 3	V/F voltage point 5		0.0 to 125.0 [%]	100.0 [%]	
P19.4 4	V/F frequency point 6		0.0 to 300.0 [Hz]	50.0 [Hz]	
P19.4 5	V/F voltage point 6		0.0 to 125.0 [%]	100.0 [%]	

P19.46	V/F Curve @ Free Block		0 to 300	0	
P19.47	Voltage regulation @ free block		0 to 300	0	
P19.48	frequency modulation source	[0] Prohibition [1] PID module 1 [2] PID module 2 [3] Free function blocks	0 to 3	0	
P19.49	Frequency Adjustment Source @ Free Block		0 to 300	0	
P19.50	Start DC braking time	Setting the start DC braking time	0.00 to 300.00 [s]	0.00 [s]	
P19.51	Starting DC braking current	Setting the starting DC braking current	0.0 to 150.0 [%]	70.0 [%]	
P19.52	Starting DC braking frequency	Setting the starting DC braking frequency	0.00 to 5.00 [Hz]	0.00 [Hz]	
P19.54	Stop DC braking time	Setting the stop DC braking time	0.00 to 300.00 [s]	0.00 [s]	
P19.55	Stop DC braking current	Setting the stopping DC braking current	0.0 to 150.0 [%]	75.0 [%]	
P19.56	Stop DC braking frequency	Setting the stop DC braking frequency	0.00 to 5.00 [Hz]	0.00 [Hz]	
P19.59	Overcurrent protection proportional gain	Setting the overcurrent protection ratio	0.0 to 1000.0 [%]	100.0 [%]	
P19.60	Integral gain for overcurrent protection	Setting of overcurrent protection points	0.0 to 1000.0 [%]	100.0 [%]	
P19.61	Overpressure limiting ratio	Setting the overvoltage limiting ratio	0.0 to 1000.0 [%]	100.0 [%]	
P19.62	Overvoltage Limit Points	Setting overvoltage limit points	0.0 to 1000.0 [%]	100.0 [%]	

P19.6 4	V/F stabilizing action gain	Setting the V/F stabilization gain	0.0 to 1000.0 [%]	100.0 [%]	
P19.6 6	Current Limit Proportional Gain	Setting the current limit loop ratio in V/F mode	0.0 to 1000.0 [%]	100.0 [%]	
P19.6 7	Start DC braking ratio	Setting the starting DC braking ratio	0.0 to 1000.0 [%]	100.0 [%]	
P19.6 8	Initiate DC braking credit	Setting the startup DC braking integral	0.0 to 1000.0 [%]	100.0 [%]	
P19.6 9	Stop DC braking ratio	Setting the stop DC braking ratio	0.0 to 1000.0 [%]	100.0 [%]	
P19.7 0	Stop DC Brake Integration	Setting the stopping DC braking integral	0.0 to 1000.0 [%]	100.0 [%]	

10.19 Motor 1 vector control group P20

Functi on	Name	Explanation	Setting range	Default value	Explanati on
P20.0	torque control	[0] Prohibition [1] Enable	0 to 1	0	
P20.1	Positive torque source selection	[0] Velocity loop outputs [1] Analog input 1 [2] Analog Input 2 [3] Operation panel [4] Parameter setting: according to the value of P20.3 [5] DP communication [6] MODBUS [7] Free function blocks	0 to 7	0	
P20.2	Negative torque source selection	ibid	0 to 7	0	
P20.3	Fixed torque value setting	Fixed torque value setting	-300.0 to 300.0 [%]	0.0 [%]	
P20.4	Torque given @ free block		0 to 300	0	

P20.5	Torque input value filtering time		0 to 1000 [ms]	0 [ms]	
P20.6	Torque setting factor		0.0 to 200.0 [%]	100.0 [%]	
P20.7	Torque limit value setting method	[0] Internal limit values [1] Parameter setting: according to P20.8 and P20.9 [2] Analog input 1 [3] Analog input 2 [4] Operation panel [5] DP communication [6] MODBUS [7] Free function blocks	0 to 7	0	
P20.8	Forward torque limit value	This value is valid if [1] is selected for P20.7.	0.0 to 300.0 [%]	200.0 [%]	
P20.9	Reverse torque limit value	This value is valid if [1] is selected for P20.7.	0.0 to 300.0 [%]	200.0 [%]	
P20.10	Torque Limit Value Free Block		0 to 300	0	
P20.11	Torque limiting filter time		0 to 1000 [ms]	0 [ms]	
P20.13	Estimating RPM Filtering Time	Setting the open-loop vector speed estimation filtering time	20.0 to 500.0 [ms]	100.0 [ms]	
P20.14	Number of encoder pulses	Setting the number of pulses for 1 revolution of the motor	0 to 60000	1024	
P20.15	Encoder phase sequence reversal	[0] Prohibition [1] Enable	0 to 1	0	
P20.16	Forward Maximum Velocity	Setting the forward maximum speed (valid only with vector control)	0.0 to 300.0 [%]	100.0 [%]	
P20.17	Reverse Maximum Speed	Setting the reverse maximum speed (valid only with vector control)	0.0 to 300.0 [%]	100.0 [%]	
P20.18	Forward Minimum Velocity	Setting the forward minimum speed (valid only with vector control)	0.0 to 300.0 [%]	0.0 [%]	

P20.19	Reverse Minimum Speed	Setting the reverse minimum speed (valid only with vector control)	0.0 to 300.0 [%]	0.0 [%]	
P20.20	Constant power speed limit enable	[0] Prohibition [1] Enable	0 to 1	0	
P20.21	Constant Power Speed Limit Curve	[0] Parabolic [1] Linear	0 to 1	0	
P20.22	Speed limit value at light load	This parameter is valid in constant power mode	0.0 to 300.0 [%]	160.0 [%]	
P20.23	Light load setting value	This parameter is valid in constant power mode	0.0 to 200.0 [%]	20.0 [%]	
P20.24	Speed limit value for heavy load	This parameter is valid in constant power mode	0.0 to 300.0 [%]	100.0 [%]	
P20.25	Overloaded set values	This parameter is valid in constant power mode	0.0 to 200.0 [%]	100.0 [%]	
P20.26	Position Loop Gain	Position Loop Gain	0.0 to 1000.0 [%]	0.0 [%]	
P20.27	Position loop velocity compensation	Position loop output limit value corresponding to maximum speed regulation	0.00 to 15.00 [%]	2.00 [%]	
P20.28	Torque control speed limit	[0] Maximum speed value: speed limited by P20.16 and P20.17 [1] Ramp Inputs [2] Ramp Outputs [3] DP communication	0 to 3	0	
P20.30	Speed Bias Setting Source (in torque mode)	[0] Speed bias value: Speed bias for P20.31 and P20.32 set values [1] Analog input 1 [2] Analog input 2 [3] Panel Settings	0 to 3	0	
P20.31	Positive speed bias	Setting the forward speed bias value	0.0 to 100.0 [%]	5.0 [%]	
P20.32	Reverse speed bias	Setting the reverse speed bias value	0.0 to 100.0 [%]	5.0 [%]	

P20.34	Synchronization Compensation Enable	[0] Prohibition [1] Enable	0 to 1	0	
P20.35	Magnetic Field Holding Time	Magnetic field holding time after stopping	0.0 to 100.0 [s]	0.0 [s]	
P20.36	Starting magnetic field current	Setting the starting magnetic field current value	50.0 to 150.0 [%]	110.0 [%]	
P20.37	starting magnetic flux	starting magnetic flux	0.0 to 150.0 [%]	100.0 [%]	
P20.38	Starting flux end speed	Starting flux end speed	0.0 to 100.0 [%]	25.0 [%]	
P20.39	fundamental magnetic flux	fundamental magnetic flux	0.0 to 120.0 [%]	100.0 [%]	
P20.40	Basic magnetic flux starting speed	Basic magnetic flux starting speed	0.0 to 150.0 [%]	100.0 [%]	
P20.41	Maximum magnetic flux	Maximum magnetic flux	0.0 to 150.0 [%]	135.0 [%]	
P20.42	Torque observation function	[0] Prohibition [1] Enable	0 to 1	1	
P20.43	Torque observation time	Load observation time	25 to 1000 [ms]	75 [ms]	
P20.44	Load observation time	Weight observation time (functioning at constant power)	25 to 1000 [ms]	250 [ms]	
P20.45	No-load positive load torque value	This parameter is valid in constant power mode (weight)	0.0 to 100.0 [%]	22.0 [%]	
P20.46	No-load reverse load torque value	This parameter is valid in constant power mode	0.0 to 100.0 [%]	18.0 [%]	
P20.47	Heavy Duty Positive Load Torque Value	This parameter is valid in constant power mode	0.0 to 200.0 [%]	92.0 [%]	
P20.48	Heavy load reverse load torque value	This parameter is valid in constant power mode	0.0 to 200.0 [%]	87.0 [%]	

P20.49	Load value at heavy load	This parameter is valid in constant power mode	0.0 to 150.0 [%]	100.0 [%]	
P20.51	Overvoltage suppression proportional gain	Bus overvoltage suppression proportional gain	0.0 to 1000.0 [%]	100.0 [%]	
P20.52	Overvoltage suppression integral	Bus overvoltage suppression integral	0.0 to 1000.0 [%]	100.0 [%]	
P20.53	Excitation control Kp	Flux Controller Proportional Gain	0.0 to 1000.0 [%]	100.0 [%]	
P20.54	Excitation Control Ki	Flux Controller Integral Gain	0.0 to 1000.0 [%]	100.0 [%]	
P20.55	Speed tracking proportional gain	Speed tracking controller proportional gain	0.0 to 1000.0 [%]	100.0 [%]	
P20.56	Speed Tracking Integral Gain	Speed Tracking Controller Integral Gain	0.0 to 1000.0 [%]	100.0 [%]	
P20.57	Degaussing Enable	[0] Prohibition [1] Enable	0 to 1	0	
P20.58	Maximum degaussing current	Setting the maximum current value for magnetic field degaussing	0.0 to 125.0 [%]	100.0 [%]	
P20.59	Excitation after degaussing stop	Setting the excitation value after the magnetic field demagnetization stops	1.0 to 25.0 [%]	2.5 [%]	
P20.60	DROOP control gain	When set to 0, DROOP control is not effective	0.0 to 100.0 [%]	0.0 [%]	
P20.61	DROOP control filter time	Adjust the DROOP control response. Increase this value when vibrations and oscillations occur	30 to 2000 [ms]	50 [ms]	
P20.62	Current Proportional Gain	Current controller proportional gain	0.0 to 1000.0 [%]	100.0 [%]	
P20.63	Current Integral Gain	Current Controller Integral Gain	0.0 to 1000.0 [%]	100.0 [%]	
P20.66	Flux Adaptive Gain1	Flux adaptive control gain1	0.0 to 1000.0 [%]	100.0 [%]	

P20.67	Flux Adaptive Gain2	Flux adaptive control gain2	0.0 to 1000.0 [%]	100.0 [%]	
P20.69	Weighted constant phase		0.00 to 2.00 [%]	1.00 [%]	
P20.70	Weighted constant amplitude		0.00 to 2.00 [%]	1.00 [%]	
P20.71	Stator resistance adaptive enable	[0] Prohibition [1] Enable	0 to 1	0	
P20.72	Rotor resistance adaptive enable	[0] Prohibition [1] Enable	0 to 1	1	
P20.73	Resistance Accuracy	[0] 1× [1]× 10	0 to 1	0	
P20.74	Stator resistance	Stator resistance	0.00 to 650.00 [mOhm]	0.00 [mOhm]	
P20.75	Stator resistance weighting	Stator resistance weighting constant	0.70 to 1.00	0.90	
P20.76	Stator resistance gain 1	Stator Resistance Online Gain 1	90.0 to 110.0 [%]	100.0 [%]	
P20.77	Stator resistance gain2	Stator resistance online gain2	90.0 to 110.0 [%]	100.0 [%]	
P20.78	Rotor resistance	Rotor resistance	0.00 to 650.00 [mOhm]	0.00 [mOhm]	
P20.79	leakage	leakage	0.00 to 65.50 [mH]	0.000 [mH]	
P20.80	Leakage inductance factor1	Leakage inductance factor1	0.800 to 1.350	1.140	
P20.81	Leakage inductance factor2	Leakage inductance factor2	0.800 to 1.350	0.940	
P20.82	Leakage inductance factor 3	Leakage inductance factor 3	0.800 to 1.350	1.080	
P20.83	Leakage inductance factor 4	Leakage inductance factor 4	0.800 to 1.350	0.950	
P20.84	Stator Inductance	Stator Inductance	0.00 to 655.00 [mH]	0.00 [mH]	

P20.8 5	Stator inductance magnetic field 85 %	Mutual inductance coefficient at 85% magnetic chain	40.0 to 150.0 [%]	108.0 [%]	
P20.8 6	Stator inductance magnetic field 87.5 %	Mutual inductance coefficient at 87.5% magnetic chain	40.0 to 150.0 [%]	106.5 [%]	
P20.8 7	Stator inductance magnetic field 90 %	Mutual inductance coefficient at 90% magnetic chain	40.0 to 150.0 [%]	105.0 [%]	
P20.8 8	Stator inductance magnetic field 92.5 %	Mutual inductance coefficient at 92.5% magnetic chain	40.0 to 150.0 [%]	103.5 [%]	
P20.8 9	Stator inductance magnetic field 95 %	Mutual inductance coefficient at 95% magnetic chain	40.0 to 150.0 [%]	102.0 [%]	
P20.9 0	Stator inductance magnetic field 102. 5%	Mutual inductance coefficient at 102.5% magnetic chain	40.0 to 150.0 [%]	99.0 [%]	
P20.9 1	Stator inductance magnetic field 105 %	Mutual inductance coefficient at 105% magnetic chain	40.0 to 150.0 [%]	96.5 [%]	
P20.9 2	Stator inductance magnetic field 110 %	Mutual inductance coefficient at 110% magnetic chain	40.0 to 150.0 [%]	93.0 [%]	
P20.9 3	Stator inductive m agnetic field 115%	Mutual inductance coefficient at 115% magnetic chain	40.0 to 150.0 [%]	88.5 [%]	
P20.9 4	Stator inductance magnetic field 120 %	Mutual inductance coefficient at 120% magnetic chain	40.0 to 150.0 [%]	83.0 [%]	
P20.9 5	Stator inductance magnetic field 125 %	Mutual inductance coefficient at 125% magnetic chain	40.0 to 150.0 [%]	77.0 [%]	

Functi on	Name	Explanation	Setting range	Default value	Explanati on
P20.96	Stator inductance magnetic field 130 %	Mutual inductance coefficient at 130% magnetic chain	40.0 to 150.0 [%]	70.5 [%]	
P20.97	Stator inductive m agnetic field 135%	Mutual inductance coefficient at 135% magnetic chain	40.0 to 150.0 [%]	63.5 [%]	
P20.98	moment of inertia (mechanics)	Moment of inertia (expressed in time)	0.01 to 300.00 [s]	0.75 [s]	
P20.99	Friction loss factor	Friction loss factor	0.00 to 10.00 [%]	0.00 [%]	

10.20 Motor 2 vector control group P21

Functi on	Name	Explanation	Setting range	Default value	Explanati on
P21.0	torque control	[0] Prohibition [1] Enable	0 to 1	0	
P21.1	Positive torque so urce selection	[0] Velocity loop outputs [1] Analog input 1 [2] Analog Input 2 [3] Operation panel [4] Parameter setting: according to the value of P21.3 [5] DP communication [6] MODBUS [7] Free function blocks	0 to 7	0	
P21.2	Negative torque so urce selection	ibid	0 to 7	0	
P21.3	Fixed torque value setting	Fixed torque value setting	-300.0 to 300.0 [%]	0.0 [%]	
P21.4	Torque given @ fr ee block		0 to 300	0	
P21.5	Torque input value filtering time		0 to 1000 [ms]	0 [ms]	
P21.6	Torque setting fact or		0.0 to 200.0 [%]	100.0 [%]	

P21.7	Torque limit value setting method	[0] Internal limit values [1] Parameter setting: according to P21.8 and P21.9 [2] Analog input 1 [3] Analog Input 2 [4] Operation panel [5] DP communication [6] MODBUS [7] Free function blocks	0 to 7	0	
P21.8	Forward torque limit value	This value is valid if [1] is selected for P21.7.	0.0 to 300.0 [%]	200.0 [%]	
P21.9	Reverse torque limit value	This value is valid if [1] is selected for P21.7.	0.0 to 300.0 [%]	200.0 [%]	
P21.10	Torque Limit Value Free Block		0 to 300	0	
P21.11	Torque limiting filter time		0 to 1000 [ms]	0 [ms]	
P21.13	Estimating RPM Filtering Time	Setting the open-loop vector speed estimation filtering time	20.0 to 500.0 [ms]	100.0 [ms]	
P21.14	Number of encoder pulses	Setting the number of pulses for 1 revolution of the motor	0 to 60000	1024	
P21.15	Encoder phase sequence reversal	[0] Prohibition [1] Enable	0 to 1	0	
P21.16	Forward Maximum Velocity	Setting the forward maximum speed (valid only with vector control)	0.0 to 300.0 [%]	100.0 [%]	
P21.17	Reverse Maximum Speed	Setting the reverse maximum speed (valid only with vector control)	0.0 to 300.0 [%]	100.0 [%]	
P21.18	Forward Minimum Velocity	Setting the forward minimum speed (valid only with vector control)	0.0 to 300.0 [%]	0.0 [%]	
P21.19	Reverse Minimum Speed	Setting the reverse minimum speed (valid only with vector control)	0.0 to 300.0 [%]	0.0 [%]	

P21.20	Constant power speed limit enable	[0] Prohibition [1] Enable		0 to 1	0	
P21.21	Constant Power Speed Limit Curve	[0] Parabolic [1] Linear		0 to 1	0	
P21.22	Speed limit value at light load	This parameter is valid in constant power mode		0.0 to 300.0 [%]	160.0 [%]	
P21.23	Light load setting value	This parameter is valid in constant power mode		0.0 to 200.0 [%]	20.0 [%]	
P21.24	Speed limit value for heavy load	This parameter is valid in constant power mode		0.0 to 300.0 [%]	100.0 [%]	
P21.25	Overloaded set values	This parameter is valid in constant power mode		0.0 to 200.0 [%]	100.0 [%]	
P21.26	Position Loop Gain	Position Loop Gain		0.0 to 1000.0 [%]	0.0 [%]	
P21.27	Position loop velocity compensation	Position loop output limit value corresponding to maximum speed regulation		0.00 to 15.00 [%]	2.00 [%]	

P21.28	Torque control speed limit	[0] Maximum speed value:
		    speed limited by P21.16
		    and P21.17
		[1] Ramp Inputs
		[2] Ramp Outputs
		[3] DP communication
				0 to 3	0	

P21.30	Speed Bias Setting Source (in torque mode)	[0] Speed bias value: Speed
		    bias for P21.31 and
		    P21.32 set values
		[1] Analog input 1
		[2] Analog input 2
		[3] Panel Settings
				0 to 3	0	

P21.31	Positive speed bias	Setting the forward speed bias value		0.0 to 100.0 [%]	5.0 [%]	
P21.32	Reverse speed bias	Setting the reverse speed bias value		0.0 to 100.0 [%]	5.0 [%]	
P21.34	Synchronization Compensation Enable	[0] Prohibition [1] Enable		0 to 1	0	

P21.3 5	Magnetic Field Holding Time	Magnetic field holding time after stopping	0.0 to 100.0 [s]	0.0 [s]	
P21.3 6	Starting magnetic field current	Setting the starting magnetic field current value	50.0 to 150.0 [%]	110.0 [%]	
P21.3 7	starting magnetic flux	starting magnetic flux	0.0 to 150.0 [%]	100.0 [%]	
P21.3 8	Starting flux end speed	Starting flux end speed	0.0 to 100.0 [%]	25.0 [%]	
P21.3 9	fundamental magnetic flux	fundamental magnetic flux	0.0 to 120.0 [%]	100.0 [%]	
P21.4 0	Basic magnetic flux starting speed	Basic magnetic flux starting speed	0.0 to 150.0 [%]	100.0 [%]	
P21.4 1	Maximum magnetic flux	Maximum magnetic flux	0.0 to 150.0 [%]	135.0 [%]	
P21.4 2	Torque observation function	[0] Prohibition [1] Enable	0 to 1	1	
P21.4 3	Torque observation time	Load observation time	25 to 1000 [ms]	75 [ms]	
P21.4 4	Load observation time	Weight observation time (functioning at constant power)	25 to 1000 [ms]	250 [ms]	
P21.4 5	No-load positive load torque value	This parameter is valid in constant power mode (weight)	0.0 to 100.0 [%]	22.0 [%]	
P21.4 6	No-load reverse load torque value	This parameter is valid in constant power mode	0.0 to 100.0 [%]	18.0 [%]	
P21.4 7	Heavy duty positive load torque value	This parameter is valid in constant power mode	0.0 to 200.0 [%]	92.0 [%]	
P21.4 8	Heavy load reverse load torque value	This parameter is valid in constant power mode	0.0 to 200.0 [%]	87.0 [%]	
P21.4 9	Load value at heavy load	This parameter is valid in constant power mode	0.0 to 150.0 [%]	100.0 [%]	

P21.51	Overvoltage suppression proportional gain	Bus overvoltage suppression proportional gain	0.0 to 1000.0 [%]	100.0 [%]	
P21.52	Overvoltage suppression integral	Bus overvoltage suppression integral	0.0 to 1000.0 [%]	100.0 [%]	
P21.53	Excitation control Kp	Flux Controller Proportional Gain	0.0 to 1000.0 [%]	100.0 [%]	
P21.54	Excitation Control Ki	Flux Controller Integral Gain	0.0 to 1000.0 [%]	100.0 [%]	
P21.55	Speed tracking proportional gain	Speed tracking controller proportional gain	0.0 to 1000.0 [%]	100.0 [%]	
P21.56	Speed Tracking Integral Gain	Speed Tracking Controller Integral Gain	0.0 to 1000.0 [%]	100.0 [%]	
P21.57	Degaussing Enable	[0] Prohibition [1] Enable	0 to 1	0	
P21.58	Maximum degaussing current	Setting the maximum current value for magnetic field degaussing	0.0 to 125.0 [%]	100.0 [%]	
P21.59	Excitation after degaussing stop	Setting the excitation value after the magnetic field demagnetization stops	1.0 to 25.0 [%]	2.5 [%]	
P21.60	DROOP control gain	When set to 0, DROOP control is not effective	0.0 to 100.0 [%]	0.0 [%]	
P21.61	DROOP control filter time	Adjust the DROOP control response. Increase this value when vibrations and oscillations occur	30 to 2000 [ms]	50 [ms]	
P21.62	Current Proportional Gain	Current controller proportional gain	0.0 to 1000.0 [%]	100.0 [%]	
P21.63	Current Integral Gain	Current Controller Integral Gain	0.0 to 1000.0 [%]	100.0 [%]	
P21.66	Flux Adaptive Gain1	Flux adaptive control gain1	0.0 to 1000.0 [%]	100.0 [%]	
P21.67	Flux Adaptive Gain2	Flux adaptive control gain2	0.0 to 1000.0 [%]	100.0 [%]	

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P21.69	Weighted constant phase		0.00 to 2.00 [%]	1.00 [%]	
P21.70	Weighted constant amplitude		0.00 to 2.00 [%]	1.00 [%]	
P21.71	Stator resistance adaptive enable	[0] Prohibition [1] Enable	0 to 1	0	
P21.72	Rotor resistance adaptive enable	[0] Prohibition [1] Enable	0 to 1	1	
P21.73	Resistance Accuracy	[0] 1× [1]× 10	0 to 1	0	
P21.74	Stator resistance	Stator resistance	0.00 to 650.00 [mOhm]	0.00 [mOhm]	
P21.75	Stator resistance weighting	Stator resistance weighting constant	0.70 to 1.00	0.90	
P21.76	Stator resistance gain 1	Stator Resistance Online Gain 1	90.0 to 110.0 [%]	100.0 [%]	
P21.77	Stator resistance gain2	Stator resistance online gain2	90.0 to 110.0 [%]	100.0 [%]	
P21.78	Rotor resistance	Rotor resistance	0.00 to 650.00 [mOhm]	0.00 [mOhm]	
P21.79	leakage	leakage	0.00 to 65.50 [mH]	0.000 [mH]	
P21.80	Leakage inductance factor1	Leakage inductance factor1	0.800 to 1.350	1.140	
P21.81	Leakage inductance factor2	Leakage inductance factor2	0.800 to 1.350	0.940	
P21.82	Leakage inductance factor 3	Leakage inductance factor 3	0.800 to 1.350	1.080	
P21.83	Leakage inductance factor 4	Leakage inductance factor 4	0.800 to 1.350	0.950	
P21.84	Stator Inductance	Stator Inductance	0.00 to 655.00 [mH]	0.00 [mH]	

P21.8 5	Stator inductance magnetic field 85 %	Mutual inductance coefficient at 85% magnetic chain	40.0 to 150.0 [%]	108.0 [%]	
P21.8 6	Stator inductance magnetic field 87.5 %	Mutual inductance coefficient at 87.5% magnetic chain	40.0 to 150.0 [%]	106.5 [%]	
P21.8 7	Stator inductance magnetic field 90 %	Mutual inductance coefficient at 90% magnetic chain	40.0 to 150.0 [%]	105.0 [%]	
P21.8 8	Stator inductance magnetic field 92.5 %	Mutual inductance coefficient at 92.5% magnetic chain	40.0 to 150.0 [%]	103.5 [%]	
P21.8 9	Stator inductance magnetic field 95 %	Mutual inductance coefficient at 95% magnetic chain	40.0 to 150.0 [%]	102.0 [%]	
P21.9 0	Stator inductance magnetic field 102. 5%	Mutual inductance coefficient at 102.5% magnetic chain	40.0 to 150.0 [%]	99.0 [%]	
P21.9 1	Stator inductance magnetic field 105 %	Mutual inductance coefficient at 105% magnetic chain	40.0 to 150.0 [%]	96.5 [%]	
P21.9 2	Stator inductance magnetic field 110 %	Mutual inductance coefficient at 110% magnetic chain	40.0 to 150.0 [%]	93.0 [%]	
P21.9 3	Stator inductive m agnetic field 115%	Mutual inductance coefficient at 115% magnetic chain	40.0 to 150.0 [%]	88.5 [%]	
P21.9 4	Stator inductance magnetic field 120 %	Mutual inductance coefficient at 120% magnetic chain	40.0 to 150.0 [%]	83.0 [%]	
P21.9 5	Stator inductance magnetic field 125 %	Mutual inductance coefficient at 125% magnetic chain	40.0 to 150.0 [%]	77.0 [%]	

Function	Name	Explanation	Setting range	Default value	Particular
P21.96	Stator inductance magnetic field 130%	Mutual inductance coefficient at 130% magnetic chain	40.0 to 150.0 [%]	70.5 [%]	
P21.97	Stator inductive magnetic field 135%	Mutual inductance coefficient at 135% magnetic chain	40.0 to 150.0 [%]	63.5 [%]	
P21.98	moment of inertia (mechanics)	Moment of inertia (expressed in time)	0.01 to 300.00 [s]	0.75 [s]	
P21.99	Friction loss factor	Friction loss factor	0.00 to 10.00 [%]	0.00 [%]	

10.21 Motor 3 vector control group P22

Function	Name	Explanation	Setting range	Default value	Particular
P22.0	torque control	[0] Prohibition [1] Enable	0 to 1	0	
P22.1	Positive torque source selection	[0] Velocity loop outputs [1] Analog input 1 [2] Analog Input 2 [3] Operation panel [4] Parameter setting: according to the value of P22.3 [5] DP communication [6] MODBUS [7] Free function blocks	0 to 7	0	
P22.2	Negative torque source selection	ibid	0 to 7	0	
P22.3	Fixed torque value setting	Fixed torque value setting	-300.0 to 300.0 [%]	0.0 [%]	
P22.4	Torque given @ free block		0 to 300	0	
P22.5	Torque input value filtering time		0 to 1000 [ms]	0 [ms]	
P22.6	Torque setting factor		0.0 to 200.0 [%]	100.0 [%]	

P22.7	Torque limit value setting method	[0] Internal limit values [1] Parameter setting: according to P22.8 and P22.9 [2] Analog input 1 [3] Analog input 2 [4] Operation panel [5] DP communication [6] MODBUS [7] Free function blocks	0 to 7	0	
P22.8	Forward torque limit value	This value is valid if [1] is selected for P22.7.	0.0 to 300.0 [%]	200.0 [%]	
P22.9	Reverse torque limit value	This value is valid if [1] is selected for P22.7.	0.0 to 300.0 [%]	200.0 [%]	
P22.10	Torque Limit Value Free Block		0 to 300	0	
P22.11	Torque limiting filter time		0 to 1000 [ms]	0 [ms]	
P22.13	Estimating RPM Filtering Time	Setting the open-loop vector speed estimation filtering time	20.0 to 500.0 [ms]	100.0 [ms]	
P22.14	Number of encoder pulses	Setting the number of pulses for 1 revolution of the motor	0 to 60000	1024	
P22.15	Encoder phase sequence reversal	[0] Prohibition [1] Enable	0 to 1	0	
P22.16	Forward Maximum Velocity	Setting the forward maximum speed (valid only with vector control)	0.0 to 300.0 [%]	100.0 [%]	
P22.17	Reverse Maximum Speed	Setting the reverse maximum speed (valid only with vector control)	0.0 to 300.0 [%]	100.0 [%]	
P22.18	Forward Minimum Velocity	Setting the forward minimum speed (valid only with vector control)	0.0 to 300.0 [%]	0.0 [%]	
P22.19	Reverse Minimum Speed	Setting the reverse minimum speed (valid only with vector control)	0.0 to 300.0 [%]	0.0 [%]	

P22.2 0	Constant power speed limit enable	[0] Prohibition [1] Enable		0 to 1	0	
P22.2 1	Constant Power Speed Limit Curve	[0] Parabolic [1] Linear		0 to 1	0	
P22.2 2	Speed limit value at light load	This parameter is valid in constant power mode		0.0 to 300.0 [%]	160.0 [%]	
P22.2 3	Light load setting value	This parameter is valid in constant power mode		0.0 to 200.0 [%]	20.0 [%]	
P22.2 4	Speed limit value for heavy load	This parameter is valid in constant power mode		0.0 to 300.0 [%]	100.0 [%]	
P22.2 5	Overloaded set values	This parameter is valid in constant power mode		0.0 to 200.0 [%]	100.0 [%]	
P22.2 6	Position Loop Gain	Position Loop Gain		0.0 to 1000.0 [%]	0.0 [%]	
P22.2 7	Position loop velocity compensation	Position loop output limit value corresponding to maximum speed regulation		0.00 to 15.00 [%]	2.00 [%]	

P22.2 8	Torque control speed limit	[0] Maximum speed value:
		    speed limited by P22.16
		    and P22.17
		[1] Ramp Inputs
		[2] Ramp Outputs
		[3] DP communication
				0 to 3	0	

P22.3 0	Speed Bias Setting Source (in torque mode)	[0] Speed bias value: Speed
		    bias for P22.31 and
		    P22.32 set values
		[1] Analog input 1
		[2] Analog input 2
		[3] Panel Settings
				0 to 3	0	

P22.3 1	Positive speed bias	Setting the forward speed bias value		0.0 to 100.0 [%]	5.0 [%]	
P22.3 2	Reverse speed bias	Setting the reverse speed bias value		0.0 to 100.0 [%]	5.0 [%]	
P22.3 4	Synchronization Compensation Enable	[0] Prohibition [1] Enable		0 to 1	0	

P22.35	Magnetic Field Holding Time	Magnetic field holding time after stopping	0.0 to 100.0 [s]	0.0 [s]	
P22.36	Starting magnetic field current	Setting the starting magnetic field current value	50.0 to 150.0 [%]	110.0 [%]	
P22.37	starting magnetic flux	starting magnetic flux	0.0 to 150.0 [%]	100.0 [%]	
P22.38	Starting flux end speed	Starting flux end speed	0.0 to 100.0 [%]	25.0 [%]	
P22.39	fundamental magnetic flux	fundamental magnetic flux	0.0 to 120.0 [%]	100.0 [%]	
P22.40	Basic magnetic flux starting speed	Basic magnetic flux starting speed	0.0 to 150.0 [%]	100.0 [%]	
P22.41	Maximum magnetic flux	Maximum magnetic flux	0.0 to 150.0 [%]	135.0 [%]	
P22.42	Torque observation function	[0] Prohibition [1] Enable	0 to 1	1	
P22.43	Torque observation time	Load observation time	25 to 1000 [ms]	75 [ms]	
P22.44	Load observation time	Weight observation time (functioning at constant power)	25 to 1000 [ms]	250 [ms]	
P22.45	No-load positive load torque value	This parameter is valid in constant power mode (weight)	0.0 to 100.0 [%]	22.0 [%]	
P22.46	No-load reverse load torque value	This parameter is valid in constant power mode	0.0 to 100.0 [%]	18.0 [%]	
P22.47	Heavy duty positive load torque value	This parameter is valid in constant power mode	0.0 to 200.0 [%]	92.0 [%]	
P22.48	Heavy load reverse load torque value	This parameter is valid in constant power mode	0.0 to 200.0 [%]	87.0 [%]	
P22.49	Load value at heavy load	This parameter is valid in constant power mode	0.0 to 150.0 [%]	100.0 [%]	

P22.51	Overvoltage suppression Proportional gain	Bus overvoltage suppression proportional gain	0.0 to 1000.0 [%]	100.0 [%]	
P22.52	Overvoltage Suppression Integral	Bus overvoltage suppression integral	0.0 to 1000.0 [%]	100.0 [%]	
P22.53	Excitation control Kp	Flux Controller Proportional Gain	0.0 to 1000.0 [%]	100.0 [%]	
P22.54	Excitation Control Ki	Flux Controller Integral Gain	0.0 to 1000.0 [%]	100.0 [%]	
P22.55	Speed tracking proportional gain	Speed tracking controller proportional gain	0.0 to 1000.0 [%]	100.0 [%]	
P22.56	Speed Tracking Integral Gain	Speed Tracking Controller Integral Gain	0.0 to 1000.0 [%]	100.0 [%]	
P22.57	Degaussing Enable	[0] Prohibition [1] Enable	0 to 1	0	
P22.58	Maximum degaussing current	Setting the maximum current value for magnetic field degaussing	0.0 to 125.0 [%]	100.0 [%]	
P22.59	Excitation after degaussing stop	Setting the excitation value after the magnetic field demagnetization stops	1.0 to 25.0 [%]	2.5 [%]	
P22.60	DROOP control gain	When set to 0, DROOP control is not effective	0.0 to 100.0 [%]	0.0 [%]	
P22.61	DROOP control filter time	Adjust the DROOP control response. Increase this value when vibrations and oscillations occur	30 to 2000 [ms]	50 [ms]	
P22.62	Current Proportional Gain	Current controller proportional gain	0.0 to 1000.0 [%]	100.0 [%]	
P22.63	Current Integral Gain	Current Controller Integral Gain	0.0 to 1000.0 [%]	100.0 [%]	
P22.66	Flux Adaptive Gain1	Flux adaptive control gain1	0.0 to 1000.0 [%]	100.0 [%]	
P22.67	Flux Adaptive Gain2	Flux adaptive control gain2	0.0 to 1000.0 [%]	100.0 [%]	

P22.69	Weighted constant phase		0.00 to 2.00 [%]	1.00 [%]	
P22.70	Weighted constant amplitude		0.00 to 2.00 [%]	1.00 [%]	
P22.71	Stator resistance adaptive enable	[0] Prohibition [1] Enable	0 to 1	0	
P22.72	Rotor resistance adaptive enable	[0] Prohibition [1] Enable	0 to 1	1	
P22.73	Resistance Accuracy	[0] 1× [1]× 10	0 to 1	0	
P22.74	Stator resistance	Stator resistance	0.00 to 650.00 [mOhm]	0.00 [mOhm]	
P22.75	Stator resistance weighting	Stator resistance weighting constant	0.70 to 1.00	0.90	
P22.76	Stator resistance gain 1	Stator Resistance Online Gain 1	90.0 to 110.0 [%]	100.0 [%]	
P22.77	Stator resistance gain2	Stator resistance online gain2	90.0 to 110.0 [%]	100.0 [%]	
P22.78	Rotor resistance	Rotor resistance	0.00 to 650.00 [mOhm]	0.00 [mOhm]	
P22.79	leakage	leakage	0.00 to 65.50 [mH]	0.000 [mH]	
P22.80	Leakage inductance factor1	Leakage inductance factor1	0.800 to 1.350	1.140	
P22.81	Leakage inductance factor2	Leakage inductance factor2	0.800 to 1.350	0.940	
P22.82	Leakage inductance factor 3	Leakage inductance factor 3	0.800 to 1.350	1.080	
P22.83	Leakage inductance factor 4	Leakage inductance factor 4	0.800 to 1.350	0.950	
P22.84	Stator Inductance	Stator Inductance	0.00 to 655.00 [mH]	0.00 [mH]	

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P22.85	Stator inductance magnetic field 85%	Mutual inductance coefficient at 85% magnetic chain	40.0 to 150.0 [%]	108.0 [%]	
P22.86	Stator inductance magnetic field 87.5%	Mutual inductance coefficient at 87.5% magnetic chain	40.0 to 150.0 [%]	106.5 [%]	
P22.87	Stator inductance magnetic field 90%	Mutual inductance coefficient at 90% magnetic chain	40.0 to 150.0 [%]	105.0 [%]	
P22.88	Stator inductance magnetic field 92.5%	Mutual inductance coefficient at 92.5% magnetic chain	40.0 to 150.0 [%]	103.5 [%]	
P22.89	Stator inductance magnetic field 95%	Mutual inductance coefficient at 95% magnetic chain	40.0 to 150.0 [%]	102.0 [%]	
P22.90	Stator inductance magnetic field 102.5%	Mutual inductance coefficient at 102.5% magnetic chain	40.0 to 150.0 [%]	99.0 [%]	
P22.91	Stator inductance magnetic field 105%	Mutual inductance coefficient at 105% magnetic chain	40.0 to 150.0 [%]	96.5 [%]	
P22.92	Stator inductance magnetic field 110%	Mutual inductance coefficient at 110% magnetic chain	40.0 to 150.0 [%]	93.0 [%]	
P22.93	Stator inductive m agnetic field 115%	Mutual inductance coefficient at 115% magnetic chain	40.0 to 150.0 [%]	88.5 [%]	
P22.94	Stator inductance magnetic field 120%	Mutual inductance coefficient at 120% magnetic chain	40.0 to 150.0 [%]	83.0 [%]	
P22.95	Stator inductance magnetic field 125%	Mutual inductance coefficient at 125% magnetic chain	40.0 to 150.0 [%]	77.0 [%]	

Functi on	Name	Explanation	Setting range	Default value	Particular
P22.96	Stator inductance magnetic field 130 %	Mutual inductance coefficient at 130% magnetic chain	40.0 to 150.0 [%]	70.5 [%]	
P22.97	Stator inductive m agnetic field 135%	Mutual inductance coefficient at 135% magnetic chain	40.0 to 150.0 [%]	63.5 [%]	
P22.98	moment of inertia (mechanics)	Moment of inertia (expressed in time)	0.01 to 300.00 [s]	0.75 [s]	
P22.99	Friction loss factor	Friction loss factor	0.00 to 10.00 [%]	0.00 [%]	

10.22 Motor 4 vector control group P23

Functi on	Name	Explanation	Setting range	Default value	Particular
P23.0	torque control	[0] Prohibition [1] Enable	0 to 1	0	
P23.1	Positive torque so urce selection	[0] Velocity loop outputs [1] Analog input 1 [2] Analog Input 2 [3] Operation panel [4] Parameter setting: according to the value of P23.3 [5] DP communication [6] MODBUS [7] Free function blocks	0 to 7	0	
P23.2	Negative torque so urce selection	ibid	0 to 7	0	
P23.3	Fixed torque value setting	Fixed torque value setting	-300.0 to 300.0 [%]	0.0 [%]	
P23.4	Torque given @ fr ee block		0 to 300	0	
P23.5	Torque input value filtering time		0 to 1000 [ms]	0 [ms]	
P23.6	Torque setting fact or		0.0 to 200.0 [%]	100.0 [%]	

P23.7	Torque limit value setting method	[0] Internal limit values [1] Parameter setting: according to P23.8 and P23.9 [2] Analog input 1 [3] Analog input 2 [4] Operation panel [5] DP communication [6] MODBUS [7] Free function blocks	0 to 7	0	
P23.8	Forward torque lim it value	This value is valid if [1] is selected for P23.7.	0.0 to 300.0 [%]	200.0 [%]	
P23.9	Reverse torque lim it value	This value is valid if [1] is selected for P23.7.	0.0 to 300.0 [%]	200.0 [%]	
P23.1 0	Torque limit value Free block		0 to 300	0	
P23.11	Torque limiting filte r time		0 to 1000 [ms]	0 [ms]	
P23.1 3	Estimating RPM Fi ltering Time	Setting the open-loop vector speed estimation filtering time	20.0 to 500.0 [ms]	100.0 [ms]	
P23.1 4	Number of encode r pulses	Setting the number of pulses for 1 revolution of the motor	0 to 60000	1024	
P23.1 5	Encoder phase se quence reversal	[0] Prohibition [1] Enable	0 to 1	0	
P23.1 6	Forward Maximum Velocity	Setting the forward maximum speed (valid only with vector control)	0.0 to 300.0 [%]	100.0 [%]	
P23.1 7	Reverse Maximum Speed	Setting the reverse maximum speed (valid only with vector control)	0.0 to 300.0 [%]	100.0 [%]	
P23.1 8	Forward Minimum Velocity	Setting the forward minimum speed (valid only with vector control)	0.0 to 300.0 [%]	0.0 [%]	
P23.1 9	Reverse Minimum Speed	Setting the reverse minimum speed (valid only with vector control)	0.0 to 300.0 [%]	0.0 [%]	

P23.20	Constant power speed limit enable	[0] Prohibition [1] Enable	0 to 1	0	
P23.21	Constant Power Speed Limit Curve	[0] Parabolic [1] Linear	0 to 1	0	
P23.22	Speed limit value at light load	This parameter is valid in constant power mode	0.0 to 300.0 [%]	160.0 [%]	
P23.23	Light load setting value	This parameter is valid in constant power mode	0.0 to 200.0 [%]	20.0 [%]	
P23.24	Speed limit value for heavy load	This parameter is valid in constant power mode	0.0 to 300.0 [%]	100.0 [%]	
P23.25	Overloaded set values	This parameter is valid in constant power mode	0.0 to 200.0 [%]	100.0 [%]	
P23.26	Position Loop Gain	Position Loop Gain	0.0 to 1000.0 [%]	0.0 [%]	
P23.27	Position loop velocity compensation	Position loop output limit value corresponding to maximum speed regulation	0.00 to 15.00 [%]	2.00 [%]	
P23.28	Torque control speed limit	[0] Maximum speed value: speed limited by P23.16 and P23.17 [1] Ramp Inputs [2] Ramp Outputs [3] DP communication	0 to 3	0	
P23.30	Speed Bias Setting Source (in torque mode)	[0] Speed bias value: Speed bias for P23.31 and P23.32 set values [1] Analog input 1 [2] Analog input 2 [3] Panel Settings	0 to 3	0	
P23.31	Positive speed bias	Setting the forward speed bias value	0.0 to 100.0 [%]	5.0 [%]	
P23.32	Reverse speed bias	Setting the reverse speed bias value	0.0 to 100.0 [%]	5.0 [%]	
P23.34	Synchronization Compensation Enable	[0] Prohibition [1] Enable	0 to 1	0	

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P23.35	magnetic field retention time	Magnetic field holding time after stopping	0.0 to 100.0 [s]	0.0 [s]	
P23.36	Starting magnetic field current	Setting the starting magnetic field current value	50.0 to 150.0 [%]	110.0 [%]	
P23.37	starting magnetic flux	starting magnetic flux	0.0 to 150.0 [%]	100.0 [%]	
P23.38	Starting flux end speed	Starting flux end speed	0.0 to 100.0 [%]	25.0 [%]	
P23.39	fundamental magnetic flux	fundamental magnetic flux	0.0 to 120.0 [%]	100.0 [%]	
P23.40	Basic magnetic flux starting speed	Basic magnetic flux starting speed	0.0 to 150.0 [%]	100.0 [%]	
P23.41	Maximum magnetic flux	Maximum magnetic flux	0.0 to 150.0 [%]	135.0 [%]	
P23.42	Torque observation function	[0] Prohibition [1] Enable	0 to 1	1	
P23.43	Torque observation time	Load observation time	25 to 1000 [ms]	75 [ms]	
P23.44	Load observation time	Weight observation time (functioning at constant power)	25 to 1000 [ms]	250 [ms]	
P23.45	No-load positive load torque value	This parameter is valid in constant power mode (weight)	0.0 to 100.0 [%]	22.0 [%]	
P23.46	No-load reverse load torque value	This parameter is valid in constant power mode	0.0 to 100.0 [%]	18.0 [%]	
P23.47	Heavy duty positive load torque value	This parameter is valid in constant power mode	0.0 to 200.0 [%]	92.0 [%]	
P23.48	Heavy load reverse load torque value	This parameter is valid in constant power mode	0.0 to 200.0 [%]	87.0 [%]	
P23.49	Load value at heavy load	This parameter is valid in constant power mode	0.0 to 150.0 [%]	100.0 [%]	

P23.51	Overvoltage suppression proportional gain	Bus overvoltage suppression proportional gain	0.0 to 1000.0 [%]	100.0 [%]	
P23.52	Overvoltage suppression integral	Bus overvoltage suppression integral	0.0 to 1000.0 [%]	100.0 [%]	
P23.53	Excitation control Kp	Flux Controller Proportional Gain	0.0 to 1000.0 [%]	100.0 [%]	
P23.54	Excitation Control Ki	Flux Controller Integral Gain	0.0 to 1000.0 [%]	100.0 [%]	
P23.55	Speed tracking proportional gain	Speed tracking controller proportional gain	0.0 to 1000.0 [%]	100.0 [%]	
P23.56	Speed Tracking Integral Gain	Speed Tracking Controller Integral Gain	0.0 to 1000.0 [%]	100.0 [%]	
P23.57	Degaussing Enable	[0] Prohibition [1] Enable	0 to 1	0	
P23.58	Maximum degaussing current	Setting the maximum current value for magnetic field degaussing	0.0 to 125.0 [%]	100.0 [%]	
P23.59	Excitation after degaussing stop	Setting the excitation value after the magnetic field demagnetization stops	1.0 to 25.0 [%]	2.5 [%]	
P23.60	DROOP control gain	When set to 0, DROOP control is not effective	0.0 to 100.0 [%]	0.0 [%]	
P23.61	DROOP control filter time	Adjust the DROOP control response. Increase this value when vibrations and oscillations occur	30 to 2000 [ms]	50 [ms]	
P23.62	Current Proportional Gain	Current controller proportional gain	0.0 to 1000.0 [%]	100.0 [%]	
P23.63	Current Integral Gain	Current Controller Integral Gain	0.0 to 1000.0 [%]	100.0 [%]	
P23.66	Flux Adaptive Gain1	Flux adaptive control gain1	0.0 to 1000.0 [%]	100.0 [%]	
P23.67	Flux Adaptive Gain2	Flux adaptive control gain2	0.0 to 1000.0 [%]	100.0 [%]	

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P23.69	Weighted constant phase		0.00 to 2.00 [%]	1.00 [%]	
P23.70	Weighted constant amplitude		0.00 to 2.00 [%]	1.00 [%]	
P23.71	Stator resistance adaptive enable	[0] Prohibition [1] Enable	0 to 1	0	
P23.72	Rotor resistance adaptive enable	[0] Prohibition [1] Enable	0 to 1	1	
P23.73	Resistance Accuracy	[0] 1× [1]× 10	0 to 1	0	
P23.74	Stator resistance	Stator resistance	0.00 to 650.00 [mOhm]	0.00 [mOhm]	
P23.75	Stator resistance weighting	Stator resistance weighting constant	0.70 to 1.00	0.90	
P23.76	Stator resistance gain 1	Stator Resistance Online Gain 1	90.0 to 110.0 [%]	100.0 [%]	
P23.77	Stator resistance gain2	Stator resistance online gain2	90.0 to 110.0 [%]	100.0 [%]	
P23.78	Rotor resistance	Rotor resistance	0.00 to 650.00 [mOhm]	0.00 [mOhm]	
P23.79	leakage	leakage	0.00 to 65.50 [mH]	0.000 [mH]	
P23.80	Leakage inductance factor1	Leakage inductance factor1	0.800 to 1.350	1.140	
P23.81	Leakage inductance factor2	Leakage inductance factor2	0.800 to 1.350	0.940	
P23.82	Leakage inductance factor 3	Leakage inductance factor 3	0.800 to 1.350	1.080	
P23.83	Leakage inductance factor 4	Leakage inductance factor 4	0.800 to 1.350	0.950	
P23.84	Stator Inductance	Stator Inductance	0.00 to 655.00 [mH]	0.00 [mH]	

P23.85	Stator inductance magnetic field 85 %	Mutual inductance coefficient at 85% magnetic chain	40.0 to 150.0 [%]	108.0 [%]	
P23.86	Stator inductance magnetic field 87.5 %	Mutual inductance coefficient at 87.5% magnetic chain	40.0 to 150.0 [%]	106.5 [%]	
P23.87	Stator inductance magnetic field 90 %	Mutual inductance coefficient at 90% magnetic chain	40.0 to 150.0 [%]	105.0 [%]	
P23.88	Stator inductance magnetic field 92.5 %	Mutual inductance coefficient at 92.5% magnetic chain	40.0 to 150.0 [%]	103.5 [%]	
P23.89	Stator inductance magnetic field 95 %	Mutual inductance coefficient at 95% magnetic chain	40.0 to 150.0 [%]	102.0 [%]	
P23.90	Stator inductance magnetic field 102.5%	Mutual inductance coefficient at 102.5% magnetic chain	40.0 to 150.0 [%]	99.0 [%]	
P23.91	Stator inductance magnetic field 105 %	Mutual inductance coefficient at 105% magnetic chain	40.0 to 150.0 [%]	96.5 [%]	
P23.92	Stator inductance magnetic field 110 %	Mutual inductance coefficient at 110% magnetic chain	40.0 to 150.0 [%]	93.0 [%]	
P23.93	Stator inductive m agnetic field 115%	Mutual inductance coefficient at 115% magnetic chain	40.0 to 150.0 [%]	88.5 [%]	
P23.94	Stator inductance magnetic field 120 %	Mutual inductance coefficient at 120% magnetic chain	40.0 to 150.0 [%]	83.0 [%]	
P23.95	Stator inductance magnetic field 125 %	Mutual inductance coefficient at 125% magnetic chain	40.0 to 150.0 [%]	77.0 [%]	

P23.96	Stator inductance magnetic field 130 %	Mutual inductance coefficient at 130% magnetic chain	40.0 to 150.0 [%]	70.5 [%]	
P23.97	Stator inductive m agnetic field 135%	Mutual inductance coefficient at 135% magnetic chain	40.0 to 150.0 [%]	63.5 [%]	
P23.98	moment of inertia (mechanics)	Moment of inertia (expressed in time)	0.01 to 300.00 [s]	0.75 [s]	
P23.99	Friction loss factor	Friction loss factor	0.00 to 10.00 [%]	0.00 [%]	

10.23 Bus communication P33

Function code	Name	Explanation	Setting range	Default value	Particular
P33.0	Profibus communication enable	[0] Prohibition [1] Enable	0 to 1	0	
P33.1	station address	According to PLC settings	1 to 255	1	
P33.2	Communication type selection	[0] PPO 1 [1] PPO 2 [2] PPO 5 [3] GUIDE	0 to 3	2	
P33.3	Communication input area memory	Setting according to communication protocol	0 to 16	14	
P33.4	Communication output area memory	Setting according to communication protocol	0 to 16	14	
P33.5	Faulty operation	[0] faulty emergency stops [1] Faulty deceleration stops [2] Warning to slow down and stop [3] Ignore	0 to 3	0	
P33.6	Fault detection delay time		0 to 1000 [ms]	50 [ms]	
P33.7	Automatic fault reset	[0] Prohibition [1] Enable	0 to 1	0	
P33.8	Auto reset time		0.0 to 10.0 [s]	3.0 [s]	
P33.13	Communication input word [W0]	See Table 7-2	0 to 37	0	
P33.14	Communication input word accuracy [W0]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000	0 to 4	0	

P33.15	Communication input word [W1]	See Table 7-2	0 to 37	0	
P33.16	Communication input word accuracy [W1]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000	0 to 4	0	
P33.17	Communication input word [W2]	See Table 7-2	0 to 37	0	
P33.18	Communication input word accuracy [W2]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000	0 to 4	0	
P33.19	Communication input word [W3]	See Table 7-2	0 to 37	0	
P33.20	Communication input word accuracy [W3]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000	0 to 4	0	
P33.21	Communication input word [W4]	See Table 7-2	0 to 37	1	
P33.22	Communication input word accuracy [W4]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000	0 to 4	0	
P33.23	Communication input word [W5]	See Table 7-2	0 to 37	18	
P33.24	Communication input word accuracy [W5]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000	0 to 4	2	
P33.25	Communication input word [W6]	See Table 7-2	0 to 37	21	

P33.26	Communication input word accuracy [W6]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000	0 to 4	1	
P33.27	Communication input word [W7]	See Table 7-2	0 to 37	22	
P33.28	Communication input word accuracy [W7]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000	0 to 4	1	
P33.29	Communication input word [W8]	See Table 7-2	0 to 37	23	
P33.30	Communication input word accuracy [W8]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000	0 to 4	1	
P33.31	Communication input word [W9]	See Table 7-2	0 to 37	0	
P33.32	Communication input word accuracy [W9]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000	0 to 4	0	
P33.33	Communication input word [W10]	See Table 7-2	0 to 37	0	
P33.34	Communication input word accuracy [W10]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000	0 to 4	0	
P33.35	Communication input word [W11]	See Table 7-2	0 to 37	0	
P33.36	Communication input word accuracy [W11]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000	0 to 4	0	

P33.37	Communication input word [W12]	See Table 7-2	0 to 37	0	
P33.38	Communication input word accuracy [W12]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000	0 to 4	0	
P33.39	Communication input word [W13]	See Table 7-2	0 to 37	0	
P33.40	Communication input word accuracy [W13]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000	0 to 4	0	
P33.41	Communication input word [W14]	See Table 7-2	0 to 37	0	
P33.42	Communication input word accuracy [W14]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000	0 to 4	0	
P33.43	Communication input word [W15]	See Table 7-2	0 to 37	0	
P33.44	Communication input word accuracy [W15]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000	0 to 4	0	
P33.45	Communication output word [W0]	See Table 7-3	0 to 48	0	
P33.46	Communication output word accuracy [W0]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000 [5][%] 1× [6][%]× 10 [7][%]× 100	0 to 7	0	
P33.47	Communication output word [W1]	See Table 7-3	0 to 48	0	

P33.48	Communication output word accuracy [W1]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000 [5][%] 1× [6][%]× 10 [7][%]× 100	0 to 7	0
P33.49	Communication output word [W2]	See Table 7-3	0 to 48	0
P33.50	Communication output word accuracy [W2]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000 [5][%] 1× [6][%]× 10 [7][%]× 100	0 to 7	0
P33.51	Communication output word [W3]	See Table 7-3	0 to 48	0
P33.52	Communication output word accuracy [W3]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000 [5][%] 1× [6][%]× 10 [7][%]× 100	0 to 7	0
P33.53	Communication output word [W4]	See Table 7-3	0 to 48	1
P33.54	Communication output word accuracy [W4]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000 [5][%] 1× [6][%]× 10 [7][%]× 100	0 to 7	0
P33.55	Communication output word [W5]	See Table 7-3	0 to 48	19

P33.56	Communication output word accuracy [W5]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000 [5][%] 1× [6][%]× 10 [7][%]× 100	0 to 7	2	
P33.57	Communication output word [W6]	See Table 7-3	0 to 48	26	
P33.58	Communication output word accuracy [W6]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000 [5][%] 1× [6][%]× 10 [7][%]× 100	0 to 7	6	
P33.59	Communication output word [W7]	See Table 7-3	0 to 48	30	
P33.60	Communication output word accuracy [W7]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000 [5][%] 1× [6][%]× 10 [7][%]× 100	0 to 7	1	
P33.61	Communication output word [W8]	See Table 7-3	0 to 48	14	
P33.62	Communication output word accuracy [W8]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000 [5][%] 1× [6][%]× 10 [7][%]× 100	0 to 7	0	
P33.63	Communication output word [W9]	See Table 7-3	0 to 48	13	

P33.64	Communication output word accuracy [W9]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000 [5][%] 1× [6][%]× 10 [7][%]× 100	0 to 7	0	
P33.65	Communication output word [W10]	See Table 7-3	0 to 48	40	
P33.66	Communication output word accuracy [W10]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000 [5][%] 1× [6][%]× 10 [7][%]× 100	0 to 7	6	
P33.67	Communication output word [W11]	See Table 7-3	0 to 48	0	
P33.68	Communication output word accuracy [W11]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000 [5][%] 1× [6][%]× 10 [7][%]× 100	0 to 7	0	
P33.69	Communication output word [W12]	See Table 7-3	0 to 48	0	
P33.70	Communication output word accuracy [W12]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000 [5][%] 1× [6][%]× 10 [7][%]× 100	0 to 7	0	

P33.71	Communication output word [W13]	See Table 7-3	0 to 48	0	
P33.72	Communication output word accuracy [W13]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000 [5][%] 1× [6][%]× 10 [7][%]× 100	0 to 7	0	
P33.73	Communication output word [W14]	See Table 7-3	0 to 48	0	
P33.74	Communication output word accuracy [W14]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000 [5][%] 1× [6][%]× 10 [7][%]× 100	0 to 7	0	
P33.75	Communication output word [W15]	See Table 7-3	0 to 48	0	
P33.76	Communication output word accuracy [W15]	[0] 1× [1]× 10 [2]× 100 [3]× 1000 [4]× 10000 [5][%] 1× [6][%]× 10 [7][%]× 100	0 to 7	0	

Table 7-2 Communication Input Word Descriptions

setpoint	show
0	non-use
1	Control word 0

2	Control word 1
3	Control word 2
4	Control word 3
5	Control word 4
6	Encoder high [32]
7	Encoder low bit [32]
8	32_MSW
9	32_LSW
10	digital output
11	parameter control word
12	Parameter 0 @32bit
13	Parameter 1 @32bit
14	Parameter 2 @32bit
15	Parameter 3 @32bit
16	Parameter 4 @32bit
17	Parameter 5 @32bit
18	Given frequency [Hz]
19	Given speed [rpm]
20	Given speed [%]
21	Given torque [%]
22	Torque limit value [%]
23	Speed limit value [Hz]
24	Active current setting
25	Reactive current setting
26	Analog output 1 [%]
27	Analog output 2 [%]
28	Acceleration time control
29	Deceleration time control
30～37	SET_W12～19

Table 7-3 Communication Output Word Descriptions

setpoint	clarification
0	non-use

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1	Status word 0
2	Status word 1
3	Status word 2
4	Status word 3
5	Status word 4
6	Status word 5
7	Parameter 0 @32bit
8	Parameter 1 @32bit
9	Parameter 2 @32bit
10	Parameter 3 @32bit
11	Parameter 4 @32bit
12	Parameter 5 @32bit
13	Encoder high [32]
14	Encoder low bit [32]
15	32bit_MSW
16	32bit_LSW
17	digital input
18	digital output
19	output frequency
20	Estimated speed [rpm]
21	Measured speed [rpm]
22	DC bus voltage
23	Bus filter voltage
24	temp
25	Motor torque
26	Load torque
27	RMS value of phase A current
28	RMS value of phase B current
29	RMS phase C current
30	Current RMS
31	output voltage

32	Setting frequency
33	Analog Input 1
34	Analog Input 2
35	output power
36	Motor filtering torque
37	Load filtering torque
38	dead weight
39	peak current (elec.)
40	Filter torque setting
41～ 48	AW22～ 29

11. Abnormal Countermeasures and Inspection

11.1 Warning Codes

Displays a warning code in the stopped state:

Warning code	Warning message	Reason for warning	Step
W01	The system's not ready. SYS_NOT_RDY	The system is not ready at power-up.	Confirm input voltage, bus voltage
W02	No drive enable signal NO_DRV_ENABLE	If the digital input terminal is set to [Drive Enable] and the corresponding conditions are not met, the corresponding control word is not signaled.	Confirm the digital input parameters of parameter group P3, the corresponding external relays and wiring. Checking the status of the control word in communication
W03	Terminal Local Warning LOCAL_EM	When the digital input terminal is set to [Local Emergency Stop Signal], the conditions corresponding to it are met.	Confirm the digital input parameters of parameter group P3, the corresponding external relays and wiring.
W04	Terminal Remote Warning REMOTE_EM	When the digital input terminal is set to [Remote Emergency Stop Signal], the corresponding conditions are met.	Confirm the digital input parameters of parameter group P3, the corresponding external relays and wiring.
W06	overheating O.T	The rectifier unit or inverter overheats and the heat sink temperature rises to the value of parameter P7.14 (Over-temperature fault)	Confirm case temperature, cooling fan, load current
W09	DP communication warning P/B ALARM	DP card communication external warning	Checking the status of the corresponding control bit for DP communication
W10	MODBUS communication warning MODBUS ALARM	External warning for Modbus communication	Confirmation of the status of the corresponding control bits for Modbus communication
W15	Parameter setting error PARAMETER ERROR	Parameter setting error	Verify that the parameter settings are not out of range

Warning code	Warning message	Reason for warning	Step
W18	Temperature detection abnormality Temp_Sensing Fail	Temperature Detection Abnormal Warning	Confirm temperature sampling connection cable Verify communication between the power supply board and the control board Verify that the power supply board is normal
W20	The slave's not ready. SLV_NOT_RDY	Abnormalities on the slave during parallel operation	Confirm that the parallel control line and slave status are normal.
W21	Slave 1 communication error SLV1_CAN_ERR	Slave 1 communication error during parallel operation	Confirm that the parallel communication line and slave 1 communication are normal.
W22	Slave 2 communication error SLV2_CAN_ERR	Slave 2 communication error during parallel operation	Confirm that the parallel communication line and slave 2 communication are normal.
W23	Slave 3 communication error SLV3_CAN_ERR	Slave 3 communication error during parallel operation	Confirm that the parallel communication line and slave 3 communication are normal.
W24	Slave 4 communication error SLV4_CAN_ERR	Slave 4 communication error during parallel operation	Confirm that the parallel communication line and slave 4 communication are normal.
W25	Slave 5 communication error SLV5_CAN_ERR	Slave 5 communication error during parallel operation	Confirm that the parallel communication line and slave 5 communication are normal.

11.2 Fault Codes

Fault codes are displayed in the operating state:

trouble code	error message (computing)	step
[E050]	U-phase upper bridge arm fault (non-resettable) ERR_UT not reset	Confirm that this IGBT is normal Confirm that the IGBT driver cable and driver circuit are normal. Power back on after power failure

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[E051]	U-phase lower bridge arm failure (non-resettable) ERR_UT not reset	Confirm that this IGBT is normal Confirm that the IGBT driver cable and driver circuit are normal. Power back on after power failure
[E052]	V-phase upper bridge arm fault (non-resettable) ERR_UT not reset	Confirm that this IGBT is normal Confirm that the IGBT driver cable and driver circuit are normal. Power back on after power failure
[E053]	V-phase lower bridge arm failure (non-resettable) ERR_UT not reset	Confirm that this IGBT is normal Confirm that the IGBT driver cable and driver circuit are normal. Power back on after power failure
[E054]	W-phase upper bridge arm fault (non-resettable) ERR_UT not reset	Confirm that this IGBT is normal Confirm that the IGBT driver cable and driver circuit are normal. Power back on after power failure
[E055]	W-phase lower bridge arm failure (non-resettable) ERR_UT not reset	Confirm that this IGBT is normal Confirm that the IGBT driver cable and driver circuit are normal. Power back on after power failure
[E056]	Slave failure (non-resettable) ERR_SLAVE_FAULT not reset	Confirm that the slave is working properly Power back on after powering down the slave
[E100]	overpressurization OV	Confirm parameter P8.35 (Deceleration time 1) and adjust its timing. Confirmation of parameter P7.12 (busbar overvoltage)
[E105]	phase sequence UV	The bus voltage drops to its limit value due to a drop in input voltage or the input power supply is out of phase. Confirmation of input voltage Confirmation of parameter P7.13 (Bus undervoltage)
[E110]	overcurrent OC	In the inverter, check the motor load; check that the gate is open; check the acceleration and deceleration times; check that the motor and its wiring are normal; check that the encoder and wiring are normal; and check parameter P7.4 (Overcurrent protection [motor 1]) In the regenerative rectifier unit, confirm parameter P7.4 (Overcurrent protection) and confirm the load of the inverter.
[E111]	overloaded OL	Check motor load Confirmation of load current Confirmation parameters P7.48, P7.49 Confirm that the motor and its wiring are normal
[E112]	short circuit to earth ZC	Confirmation parameter P7.8 Confirm that the motor is not short-circuited Verify that the equipment ground is connected Verify that the current sensor is wired properly

[E113]	Input out of phase MIP	Confirm that the input power supply is normal
[E114]	Output Out-of-Phase MOP	Confirm that the inverter output wire to the motor is normal
[E115]	overspeed OS	Motor speed exceeds parameter P7.19 Confirmation parameter P7.19 Confirm the encoder is good or bad and there is no interference in the wiring.
[E116]	Open-loop vector control error SLVC Fail	Verify that the acceleration and deceleration times are not too short Confirmation parameter P7.23
[E117]	motor stalling MOTOR STALL	Check brake connections If there is an encoder, make sure that the encoder is connected and that parameters P20.14 and P20.15 are set correctly.
[E118]	Encoder Error PG ERROR	Verify that the electrical connection of the encoder and the settings of parameters P20.14 and P20.15 are correct.
[E119]	speed anomaly (geology) SPEED ABNORMAL	Verify that the electrical connection of the encoder and the settings of parameters P20.14 and P20.15 are correct. Confirmation parameters P7.31, P7.32
[E121]	Multi-drive product IGBT1 overheating OT1	Confirmation of external and internal temperatures Confirmation of equipment cooling fan Confirmation of load current
[E122]	Multi-drive product IGBT2 overheating OT2	Confirmation of external and internal temperatures Confirmation of equipment cooling fan Confirmation of load current
[E123]	Multi-drive product IGBT3 overheating OT3	Confirmation of external and internal temperatures Confirmation of equipment cooling fan Confirmation of load current
[E124]	Multi-drive product IGBT4 overheat OT4	Confirmation of external and internal temperatures Confirmation of equipment cooling fan Confirmation of load current
[E125]	Multi-drive product IGBT5 overheating OT5	Confirmation of external and internal temperatures Confirmation of equipment cooling fan Confirmation of load current
[E126]	Multi-drive product IGBT6 overheating OT6	Confirmation of external and internal temperatures Confirmation of equipment cooling fan Confirmation of load current
[E127]	Multi-drive product IGBT7 overheating OT7	Confirmation of external and internal temperatures Confirmation of equipment cooling fan Confirmation of load current
[E128]	Multi-drive product IGBT8 overheating OT8	Confirmation of external and internal temperatures Confirmation of equipment cooling fan Confirmation of load current

[E137]	Fan blockage FAN STALL	Verify that the fan is functioning properly
[E138]	Temperature Sampling Fault TEMP_SENSING FAIL	Confirm temperature sampling connection cable Verify communication between the power supply board and the control board Confirm that the power supply board is normal
[E139]	pre-charge fault Pre_Charging Fail (Regenerative rectifier Unit)	Confirm the input voltage of the rectifier/feedback unit Confirm that the charging circuit (charging contactor, resistor, etc.) is normal. Confirmation parameter P7.95
[E140]	Input voltage too low Line UV (Regenerative rectifier Unit)	Confirmation Regenerative rectifier Module Input Voltage Verify that there are no problems with main contactor suction (main contacts, coil power, etc.)
[E141]	Input power supply out of phase Line OPEN (Regenerative rectifier Unit)	Confirm that the input voltage of the regenerative rectifier module is normal.
[E142]	Incoming power supply detection fault Line Detection Error (Regenerative rectifier Unit)	Confirm the input voltage of the rectifier/feedback unit Confirm the voltage sampling connection line in the rectifier/feedback unit.
[E143]	Main contactor feedback point failure Line SW Fail (Regenerative rectifier Unit)	Confirm DI terminal settings Confirm the main contactor feedback point connection line Confirm main contactor control wiring
[E144]	Main contactor short circuit Line SW SHORT (Regenerative rectifier Unit)	Confirm the main contactor feedback point connection line Verify that the main contactor is not shorted
[E145]	Excessive grid voltage (AFE) Line OV (Regenerative rectifier Unit)	Confirm the input voltage of the regenerative rectifier units Verify that parameter P16.0 is consistent with the actual voltage
[E146]	Abnormal grid frequency (AFE) Line Over_Freq (Regenerative rectifier Unit)	Confirm the input voltage of the rectifier/feedback unit Verify that the voltage sampling in the regenerative rectifier units is normal.
[E151]	U-phase upper bridge arm IGBT failure PDP [UT]	Confirm that this IGBT is normal Confirm that the IGBT driver cable and driver circuit are normal. Confirm that the output wiring or motor is normal
[E152]	U-phase lower bridge arm IGBT failure PDP [UB]	Confirm that this IGBT is normal Confirm that the IGBT driver cable and driver circuit are normal. Confirm that the output wiring or motor is normal
[E153]	V-phase upper bridge arm IGBT failure PDP [VT]	Confirm that this IGBT is normal Confirm that the IGBT driver cable and driver circuit are normal. Confirm that the output wiring or motor is normal

[E154]	V-phase lower bridge arm IGBT failure PDP [VB]	Confirm that this IGBT is normal Confirm that the IGBT driver cable and driver circuit are normal. Confirm that the output wiring or motor is normal
[E155]	W-phase upper bridge arm IGBT failure PDP [WT]	Confirm that this IGBT is normal Confirm that the IGBT driver cable and driver circuit are normal. Confirm that the output wiring or motor is normal
[E156]	W-phase lower bridge arm IGBT failure PDP [WB]	Confirm that this IGBT is normal Confirm that the IGBT driver cable and driver circuit are normal. Confirm that the output wiring or motor is normal
[E160]	Slave computer failure SLVE FAULT	Verify that the slave is not reporting errors
[E161]	The slave's not ready. SLV_NOT_RDY	Confirm that the slave meets the operating conditions
[E162]	Slave 1 communication error SLV1_CAN_ERR	Confirm that the parallel communication line and slave 1 communication are normal.
[E163]	Slave 2 communication error SLV2_CAN_ERR	Confirm that the parallel communication line and slave 2 communication are normal.
[E164]	Slave 3 communication error SLV3_CAN_ERR	Confirm that the parallel communication line and slave 3 communication are normal.
[E165]	Slave 4 communication error SLV4_CAN_ERR	Confirm that the parallel communication line and slave 4 communication are normal.
[E166]	Slave 5 communication error SLV5_CAN_ERR	Confirm that the parallel communication line and slave 5 communication are normal.
[E170]	Failure of self-tuning MOTOR TUNING FAIL	Confirm motor nameplate parameters Confirmation parameter P7.33
[E180]	DP communication error P/B ERROR	Verify that the communication card is connected properly Verify that the communication configuration is correct
[E181]	DP communication warning P/B_EM	Check the status of communication control word CW0.4.
[E200]	Terminal Local Fault LOCAL_EM	When the digital input terminal is set to [Local emergency stop signal], the corresponding terminal is signaled. Confirm the digital input parameters of parameter group P3, the corresponding external relays and wiring.
[E201]	Terminal Remote Fault REMOTE_EM	When the digital input terminal is set to [Remote emergency stop signal], the corresponding terminal has a signal. Confirm the digital input parameters of parameter group P3, the corresponding external relays and wiring.
[E202]	Modbus communication failure MODBUS EMERGENCY	Modbus communication control word has a signal to confirm its status

[E203]	No drive control signal DRIVE DISABLED	No signal for the corresponding control word in DP communication No signal from the corresponding terminal in the terminal control.
[E210]	Keyboard Operator Malfunction Panel Error	Verify that the operation panel is connected properly
[E220]	Memory CRC checksum error MEMORY CRC ERR	Replacement of control board
[E221]	parameter error PARAMETER ERROR	Confirm that the parameter settings meet the requirements

11.3 Troubleshooting

Troubleshooting the regenerative rectifier units:

Defective phenomenon		Inspection matters	Step
Regenerative rectifier Unit Power Up Unsuccessful	DC voltage no value	-Is the control board power indicator normal	-Confirm control power supply DC15V
		-Charging resistor contactor is engaged or not	-Check DO5 setting value -Confirm the connection from DO5 to the charging resistor contactor. -Confirmation of regenerative rectifier system feed voltage is normal
	DC voltage has value	-Is the main contactor engaged	-Confirm the connection from DO4 to the main contactor. -Confirmation of input power to the rectifier/feedback unit

Inverter troubleshooting:

Fault phenomenon		Inspection matters	Step
Motor will not rotate	No output from inverter	-Is the digital input terminal assigned -Whether the run command signal is ON -Is the forward or reverse terminal in good contact with the COM terminal	-Check digital input terminal assignment -Run command signal is set to ON -Please connect the forward or reverse terminal and COM terminal (selected as terminal mode).
		-Is the bus voltage normal	-Measurement of inverter bus voltage
		-Is the operation panel power light on. If yes, check again if the operation signal lamp is on.	-If the power light on the operation panel does not turn on and there is no improvement after plugging the panel cable back in, please consult us. -If the operation panel power lamp is on but the run signal lamp is not, give the run command again.
		-If a warning or fault message has been displayed on the operation panel	-Run after reset
		-Is the operating mode and command value of the inverter correct?	-Check the inverter operating mode parameters
	Inverter has output	-Is the motor in a holding condition or is the load too heavy?	-Release the holding brake and lighten the load -Try running the motor separately
		-If the motor is equipped with a brake, does the brake operate normally?	-Cautiously open the gate before running
		-Is the motor wired properly or is there a phase loss in the motor?	-Check inverter output and motor connection status
		-Is the inverter output current greater than or equal to the current limit value	-Confirm that the parameter settings are correct and try to adjust the acceleration time to slowly increase the speed.
		-Is the contactor status ON when there is an electromagnetic contactor between the inverter and the motor?	-Confirm the ON status of the electromagnetic contactor and the wiring status.
When the motor steering is reversed		-Is the inverter output three-phase and motor wiring normal?	-Interchange V-phase and W-phase
		-The terminals connected to the control circuit and their parameters are set correctly.	-Confirming forward/reverse terminal wiring and parameter values
When motor speed cannot be increased		-Is the load overloaded	-Discharge or lighten the load -If it is overloaded, it activates its limiting function so that the speed falls below its speed setting.
		-Speed command signal is normal	-Confirm control circuit wiring -Confirming signals and setpoints

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Motor jerks during operation	-Is there too much load variation -Is there a large change in the input voltage -Does it occur at a particular frequency	-Raise the power of the motor and inverter by one notch -Reduces load and input voltage variations -Fine-tune its output frequency setting
When the motor current exceeds the rated current	-Unstable bus voltage	-Check the inverter bus voltage
	-Is the load too large	-Discharge or lighten the load
	-Is the motor in a holding state	-Release the motor from the holding state
	-Is the load dynamic (its weight is variable)	-Recheck the inverter power
	-Is motor self-tuning completed properly	-Re-learning of motor self-tuning

12. Maintenance and upkeep

<table>
<tr><td align="center">⚡ DANGER</td></tr>
<tr><td>

1. **Do not touch the terminals of the multi-drive product; there is a high voltage on the terminals.**
   There is a risk of electrocution.
2. **Be sure to install the terminal cover before energizing, and when removing the cover, be sure to disconnect the power supply.**
   There is a risk of electrocution.
3. **Cut off the main circuit power supply and confirm that the light-emitting diode is off before carrying out maintenance and inspection.**
   Danger of residual voltage on electrolytic capacitors.
4. **Do not perform maintenance or inspection work by non-specialized technicians.**
   There is a risk of electrocution.

</td></tr>
</table>

<table>
<tr><td align="center">⚠ CAUTION</td></tr>
<tr><td>

1. **CMOS integrated circuits are installed on the operation panel board, control board, and driver board, so be careful when using them.**

   By touching the board directly with your fingers, electrostatic induction may damage the integrated chips on the board.
2. **Do not change the wiring or disassemble the terminal wires while the power is on.**
   There is a risk of electrocution.
3. **Do not check signals during operation.**
   can damage the device.

</td></tr>
</table>

12.1 Care and maintenance instructions

As multi-drive products are typical products combining power electronic technology and microelectronic technology, they have the dual characteristics of

industrial equipment and microelectronic devices. Changes in the environment in which the multi-drive product is used, such as the influence of temperature, humidity, smoke, etc., as well as the aging of the internal components of the multi-drive product and other factors, may lead to a variety of failures of the multi-drive product. Therefore, in order to make this product operate normally for a long period of time, it is necessary to carry out daily inspection and regular (at least once every six months) maintenance on the multi-drive product in the process of storage and use.

12.2 Routine maintenance

In order to prevent multi-drive products from malfunctioning, ensure the normal operation of the equipment, and extend the service life of multi-drive products, it is necessary to carry out routine maintenance of multi-drive products, and the contents of routine maintenance are indicated below:

Inspection items	Inspection content	Criterion
Operating environment	1. Temperature, humidity 2. Dust, gas	1. Shut down or reduce the ambient temperature if the temperature is > 40 ℃ Humidity < 95%, no condensation 2. No odor, no flammable, explosive gas
Cooling system	1. Installation environment 2. Multi-drive product body fan	1. The installation environment is well ventilated and the air ducts are not blocked. 2. The body fan runs normally, no abnormal noise
Multi-drive product body	1. Vibration, temperature rise 2. Noise 3. Wires, terminals	1. Smooth vibration, normal air temperature at the air outlet 2. No abnormal noise, no odor 3. Fastening screws are not loose
Electrical machinery	1. Vibration, temperature rise 2. Noise	1. Smooth operation and normal temperature 2. No abnormal, uneven noise
Input and output parameters	1. Input Voltage 2. Output current	1. Input voltage within the specified range 2. Output current below rated value

12.3 Regular maintenance

In order to prevent malfunctioning of multi-drive products and to ensure their long-term high-performance and stable operation, users must regularly (within half a year) inspect the multi-drive products, the contents of the inspection are indicated below:

Inspection items	Inspection content	Methods of elimination
Screws for external terminals	Loose screws or not	Tighten
Power component	Dust, dirt	Complete removal of debris with dry compressed air
Car radiator	Dust, dirt	Complete removal of debris with dry compressed air
Electrolytic capacitor	Discoloration and odor	Replacement of electrolytic capacitors
Fan (loanword)	Abnormal noise and vibration Whether the cumulative time exceeds 20,000 hours	1. Clearance of debris 2. Replacement of the fan
PCB board	Dust, dirt	Complete removal of debris with dry compressed air

12.4 Replacement of wearing parts

Fans and electrolytic capacitors in multi-drive products are easily damaged parts, and their life span is closely related to the usage environment and maintenance conditions. The general life time of fragile components is as follows:

Fans: Replace after more than 5 years of use. If the multi-drive product is used in a critical position, replace the fan as soon as it begins to make abnormal noise. Fan

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spare parts are available from Wuhan Guide Technology Co.

Electrolytic capacitors: must be replaced after more than 5 years of use. For details, please contact Wuhan Guide Technology Co., Ltd. or call our national unified service hotline (400-0077-570).

Note: Life time is the time when used under the following conditions.

(1) Ambient temperature: 40℃ ;

(2) Load factor: 80%;

(3) Operating rate: 24 hours/day.

12.5 Storage and Warranty

When multi-drive products are not used temporarily or stored for a long period of time after purchase, the following should be observed:

(1)   Avoid storing the multi-drive products in high temperature, humid or vibrating or metal dusty places and ensure good ventilation.

(2)   If the multi-drive product is not used for a long period of time, it should be energized once every six months to restore the characteristics of the filter capacitor and to check the function of the multi-drive product. When energizing, the voltage should be gradually increased through an autotransformer, and the energizing time should not be less than 5 hours.

During the warranty period, a repair fee shall be charged for faults caused by

① Malfunctions caused by use not in accordance with the operation manual or use beyond standard specifications.

② Malfunctions caused by self-repair or modification without permission.

③ Malfunctions caused by poor storage.

④ Malfunctions caused by using multi-drive products for non-normal functions.

⑤ Damage to machinery caused by fire, salt corrosion, gas corrosion, earthquake, storm, flood, lightning, abnormal voltage or other force majeure.

Even if the warranty period is exceeded, the company provides a lifetime paid maintenance service.

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Appendix: Schematic
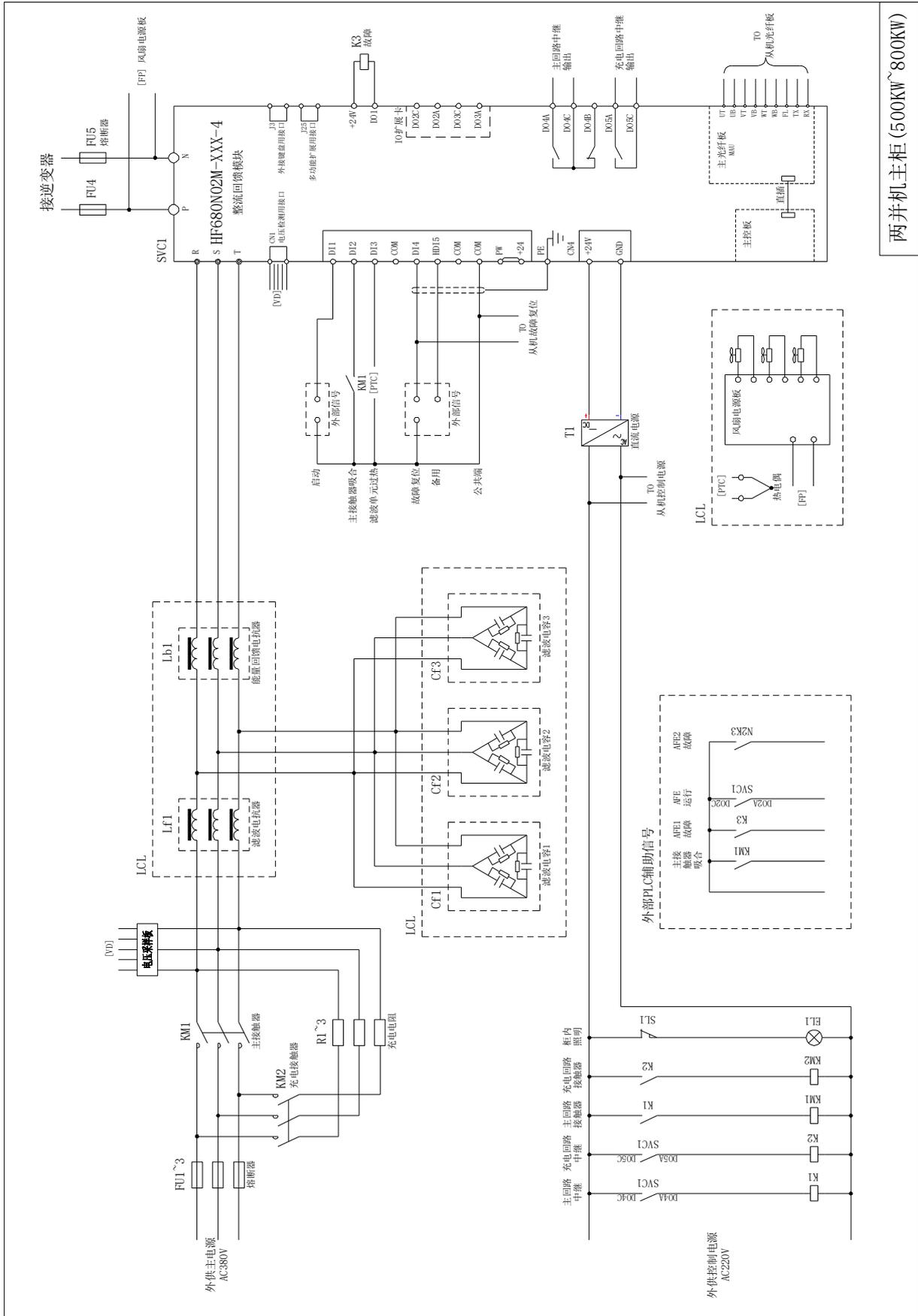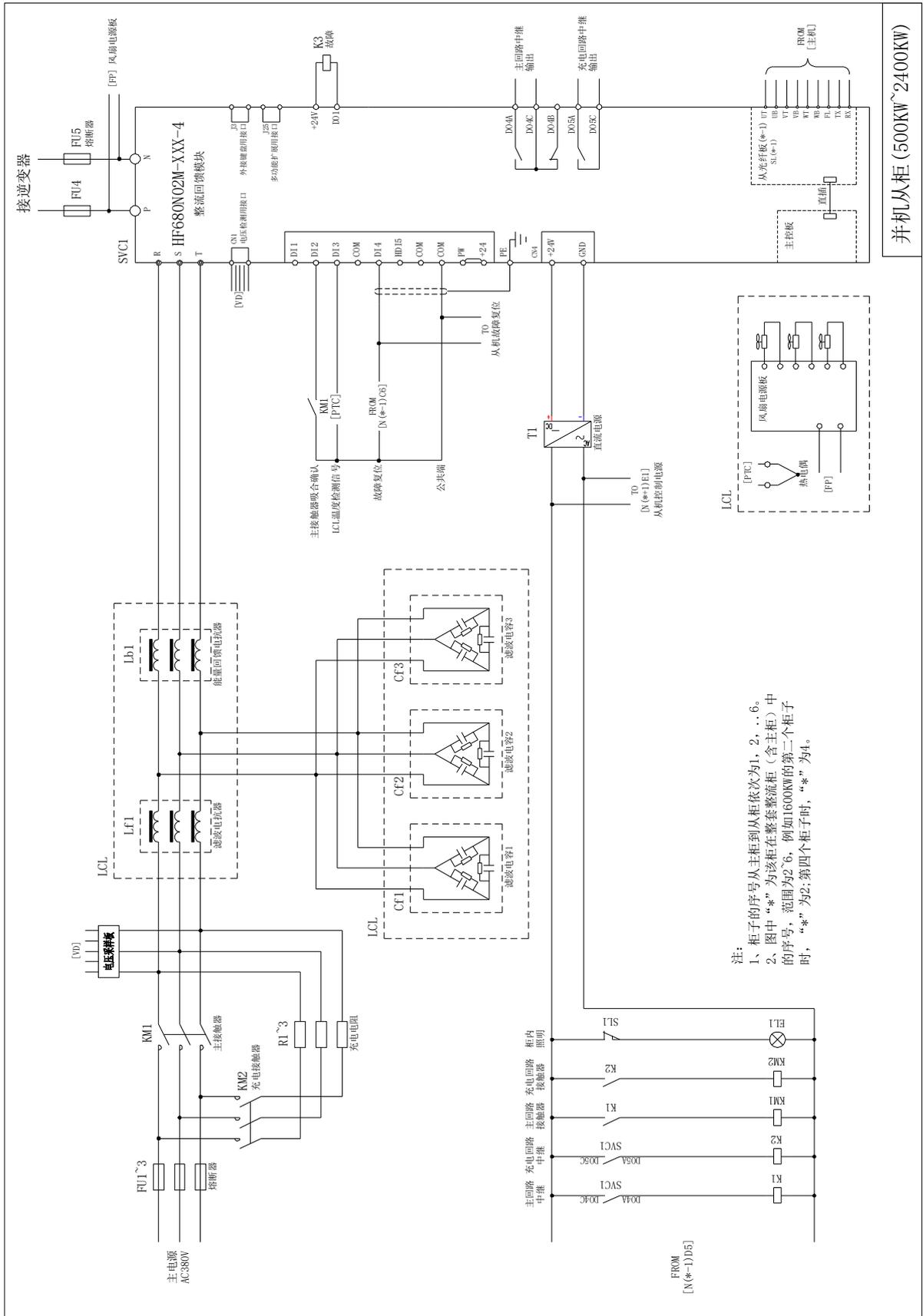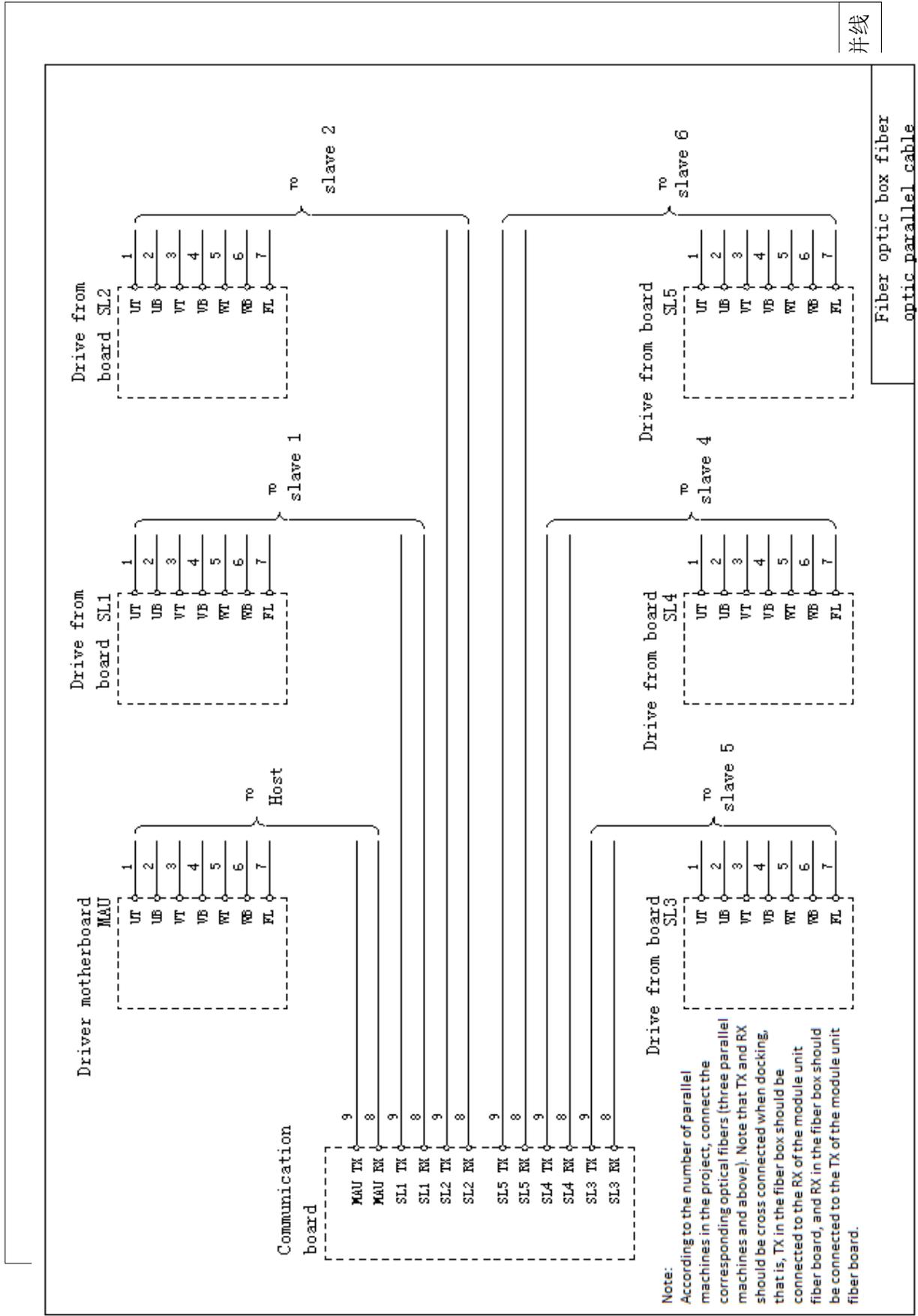
两并机主柜 (500KW~800KW)

多并机主柜 (1200KW~2400KW)

Fiber optic box fiber
optic parallel cable

Drive from
board SL2

to
slave 2

UT	1
UB	2
VT	3
VB	4
WT	5
WB	6
FL	7

Drive from board
SL5

to
slave 6

UT	1
UB	2
VT	3
VB	4
WT	5
WB	6
FL	7

Drive from
board SL1

to
slave 1

UT	1
UB	2
VT	3
VB	4
WT	5
WB	6
FL	7

Drive from board
SL4

to
slave 4

UT	1
UB	2
VT	3
VB	4
WT	5
WB	6
FL	7

Driver motherboard
MAU

to
Host

UT	1
UB	2
VT	3
VB	4
WT	5
WB	6
FL	7

Drive from board
SL3

to
slave 5

UT	1
UB	2
VT	3
VB	4
WT	5
WB	6
FL	7

Communication
board

MAU TX	9
MAU RX	8
SL1 TX	9
SL1 RX	8
SL2 TX	9
SL2 RX	8
SL5 TX	9
SL5 RX	8
SL4 TX	9
SL4 RX	8
SL3 TX	9
SL3 RX	8

Note:
According to the number of parallel
machines in the project, connect the
corresponding optical fibers (three parallel
machines and above). Note that TX and RX
should be cross connected when docking,
that is, TX in the fiber box should be
connected to the RX of the module unit
fiber board, and RX in the fiber box should
be connected to the TX of the module unit
fiber board.

Schematic diagram of external interface of rectification feedback standard cabinet

HF680N02C-XXX-4

L11	R	input
Top mother row L12	S	AC380V
L13	T	

P	P	
output		Top mother row
DC620V	N	N

N1X1
1   N1D31   Control power supply

2   N1D32   AC220V

N1X2
1   N1B61   Start signal

2   N1C62   fault reset

3   N1C63   backup

5   N1C60   Common terminal

6   N1D70

Multi functional passive input signal

Common terminal   N1E31   N1X3   1

Main contactor suction feedback   N1E32   2

AFE1 fault   N1E33   3

AFE run   N1E34   4

AFE2 fault   N1E41   6

AFE3 fault   N1E42   7

AFE4 fault   N1E43   8

AFE5 fault   N1E51   9

AFE6 fault   N1E52   10

Auxiliary passive output signal

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HF680N Series Instruction manual
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Precautions

1. Be sure to read this manual before using the inverter product.

2. For safety, ask professionals to carry out commissioning and wiring.

3. The contents of this manual are subject to change without prior notice.