Sine Wave Energy Feedback Device User Manual

Nietz Electric Co.,Ltd

CONTENT

Preface

Thank you for purchase and use the NZR sine wave energy feedback device produced by Nietz Electric Co.,Ltd . The NZR sine wave energy feedback device is a low-noise energy-saving product manufactured by Canadian technology, using advanced algorithms to achieve complete sine wave energy feedback. NZR can feed back the regenerative electric energy generated in the motor speed regulation process to the power grid, thereby avoiding the energy loss caused by the conventional energy consumption type braking unit, thereby achieve the energy saving effect.

The NZR sine wave energy feedback device contains a reactor and a noise filter, which can be directly connected to the power grid without causing interference to the power grid or surrounding electrical equipment.
This manual provides some precautions for product installation wiring and routine maintenance. To ensure proper installation and operation of this product, please read this manual carefully before install the machine.
This manual is included in the packing accessories, please hand it to the end user of this product and keep it in a safe place.

Statement

Nietz Electric Co.,Ltd reserves the right to change functions, technical data, standards and parameters.
Reproduction or reproduction of part or all of this manual without the written permission of the company is prohibited.
In order to align the contents of the manual with the product hardware and software, we have carefully reviewed and verified the manual, but we do not rule out the possibility of deviation, so we do not guarantee the content and hardware and software described in the manual (printed Version)It is exactly the same. The data in the manual is tested according to the prescribed procedures, and the necessary changes (corrections) will be listed in new version. Please indicate the inadequacy of the contents of the manual.

Chapter 1 Safety Information

1.1 Safety Definition

	Incorrect use can cause dangerous situations, cause personal injury or serious property damage.
	Incorrect use may result in a dangerous situation, cause minor or moderate personal injury, damage to the device or the device may not work properly.
	In order to get a better performance, give some tips.

Chart 1-1 Safe Definition

1.2 Installation and wiring considerations

	1. Wiring work must be carried out by qualified person, otherwise there is a risk of electric shock or machine damage due to incorrect wiring. 2. When installing and wiring, the device and other inverters connected to it must be powered off, and wait for 5 to 10 minutes to confirm that the stored capacity of the internal capacitors of each related device is discharged and then operate. To ensure personal safety. 3. The grounding terminal of the device must be grounded reliably, otherwise there is a danger of electric shock.
	1. The three-phase output terminal of the device and the DC bus voltage input terminal must be correctly distinguished and wired correctly. Otherwise, it will not work, or even damage the device itself and related devices, and there is a fire hazard. 2. Install the unit in a well ventilated area, otherwise the unit may be overheated and damaged.

1.3 Precautions for use

Danger	After power-on, the internal parts of the device are exposed to dangerous high voltage. Non-professionals should not touch the internal parts of the machine at will, otherwise there may be danger of electric shock.
Warning	Do not drop metal objects such as screws and gaskets into the unit. Otherwise, there is a danger of damage to the unit. Make sure the cover of the chassis is closed during use.

1.4 Others

Warning	1.Product scrapping should be treated according to industrial waste. It is strictly forbidden to burn, otherwise there is danger of explosion. 2.Do not install NZR sine wave energy feedback devices with damaged or missing components, otherwise there is a danger of damage to the machine or personal safety.

Chapter 2 Precautions for Unpacking Acceptance

2.1 Unpacking appearance acceptance

The NZR sine wave energy feedback device produced by Nietz Electric Co.,Ltd has passed strict testing and quality inspection before leaving the factory. Before unpacking, please check carefully whether the product packaging is damaged due to inadvertent transportation, check for damage caused by transportation, fall off and the front cover or body recessed. If any of the above problems exist, please contact with us or your supplier in time.

2.2 Product acceptance

After opening the package, please confirm the following items:

1. Confirm that the model number on the product label is the product model you ordered;
2. Check if there is damage to the parts caused by transportation, fall off and the front cover or body recessed.

Item Number	Operation Voltage	Fit for asynchronous motor power
NZR-04-T-CS	280Vac～480Vac	5.5KW～7.5KW
Note	For more product information, please refer to Chapter 3 Models and Specifications.	

Chart 2-1 Product information description

Danger	1. Do not install NZR sine wave energy feedback device with damaged or missing parts. Otherwise, there will be danger of power failure or personal safety. 2. If there is any packaging damage or product problem, please contact with us or supplier in time.

Chapter 3 Models and Specifications

3.1 Naming rules

The NZR avoids wasted energy by delivering it back to your power source for use by other loads. It has easy to setup and install, safe to use, parallel usage of multiple units, realize complete current sharing. It is mainly applied in cases where rapid DEC, positioning and brake is needed eg mine hoist, elevator, textile machine, paper-making machinery, centrifugal machine, washing machine, drawbench, proportional action and crown block.

NZR -04 -T -C S				
	①	② ③ ④ ⑤		
① Series	NZR	Sine wave Regenerative Braking Unit		
② Power Supply	2	190Vac～250Vac		
	4	280Vac～480Vac		
	6	530Vac～790Vac		
③ Paower range	T	5.5～7.5KW		
	S	11～15KW		
	M	18.5～22KW		
	L	30～37KW		
	X	45KW		
	55	55KW	75	75KW
	90	90KW	110	110KW
	132	132KW	160	160KW
	185	185KW	220	220KW
	250	250KW	280	280KW
	315	315KW	355	355KW
	.....	.....	.....	.....
④ Control type	C	Digital control		
⑤ Load feature	S	Standard		
	H	Heavy duty		
	C	Persistent		

3.2 Technical specifications

Item		Specification
Power supply	Voltage	3 phase 190Vac~250Vac; 280Vac~480Vac; 530Vac~790Vac
	Frequency	40Hz~70Hz
Control	Current control	Space vector control, current & voltage THD<5% @ 100% load
	Output control	Intelligent predictive control of DC bus voltage
	Rectifier feedback/Feedback action voltage	330Vdc (220Vac class) ±150Vdc Adjustable; 600Vdc (380Vac class) ±200Vdc adjustable; 1000Vdc (660Vac class) ±200Vdc adjustable
	Fan control	43℃ turn on, 40℃ turn off or programmable control mode

	Protection	Overcurrent, overload, current limit, DC short circuit, DC overvoltage, DC undervoltage, overheat, grid amplitude fault, grid frequency fault, grid phase fault, AC short circuit, external EXT Terminal input fault protection, etc.
Display	Mode indication	Power supply, monitoring, enable operation, fault, parameter modification, rectification feedback / feedback status indication, keyboard data display, etc.
Installation conditions	Installation site	In the cabinet, the altitude is not more than 1000m (for every 1000m of altitude, it must be derated by 10%), no direct sunlight, no conductive dust and corrosive gas
	Ambient temperature	-10 ~ 40 ℃, good ventilation
	environment humidity	90% RH or less (no condensation)
	Vibration	0.5g or less
	Air environment	None dust, direct sunlight, corrosive gas, flammable gas, oil mist, steam, water, etc., do not contain too much salt
	Installation method	Wall-mounted, IP20
Storage environment	Ambient temperature	-40~70℃
	environment humidity	5~95％RH
	Air environment	No dust, direct sunlight, corrosive gas, flammable gas, oil mist, steam, water, etc., do not contain too much salt

Chart 3-2 Product specifications

3.3 Product selection instructions

* The adaptive motor power is calculated based on the grid voltage level as the benchmark, without the need to enlarge or reduce the capacity. In the occasions where the power generation efficiency of the motor is relatively high, the power level needs to be enlarged by one gear when selecting the model.

* When it is applied to permanent magnet synchronous motor(the power generation efficiency of permanent magnet synchronous motor with the same power is one level higher than that of asynchronous motor), the power level needs to be enlarged by one gear when selecting the model.

* Standard type (S series), braking torque is 110%, suitable for: centrifuge, lathe, textile machine, printing machine, sugar separation machine, industrial dehydrator, packaging machine, kowtow machine, pumping unit, rewind Machine, paper machine, spindle, gantry planer, etc. If you are unsure of your choice, please choose the heavy duty (H series) NZR sine wave energy feedback device. In the case of motor emergency stop braking (where the motor stops from high speed or heavy load braking, the motor emergency stop braking time is less than 8 seconds), the power level needs to be enlarged by one gear when selecting the model.

* Heavy-duty type (H series), braking torque is 150%, suitable for: crane, hoist, elevator, tower crane, winch, cable car, port door machine, coal shearer, down belt conveyor, winch, steel rolling machine, driving, Crane, crane, uncoiling and winding, wire drawing machine, wire drawing machine, monkey car, reel, ship lock, etc .

* Continuous type (C series), braking torque is 220%, suitable for continuous uninterrupted feedback occasions, commonly used for dynamometer and generator grid-connected feedback.

* 25% DTC rated current refers to the rated current of the machine's feedback work in 1/4 working system. That is:

in a 2min (min is minutes) period, the feedback continues to work for 0.5min and stops for 1.5min.

* 50% DTC rated current refers to the rated current for the machine's feedback work in 1/2 working system. That is: in the 2min (min is minutes) period, the feedback continues to work for 1min and stops for 1min.

* 100% DTC rated current refers to the rated current of the machine's feedback work during continuous uninterrupted operation.
* Peak current can work continuously for 3s (s is seconds).

Standard load Version – Selection Table

S version	Voltage	Adapted motor power (KW)		25% DTC rated current	Peak current	Shell
		Asynchronous	Synchronous			
NZR-06-045-CS	660Vac	45	37	36A	45A	C3
NZR-06-055-CS		55	45	44A	55A	C3
NZR-06-075-CS		75	55	60A	75A	C3
NZR-06-090-CS		90	75	85A	110A	C4
NZR-06-110-CS		110	90	105A	132A	C4
NZR-06-132-CS		132	110	125A	160A	C4
NZR-06-160-CS		160	132	145A	185A	C5
NZR-06-185-CS		185	160	170A	220A	C5
NZR-06-220-CS		220	185	200A	250A	C5
NZR-06-250-CS		250	220	220A	280A	C6
NZR-06-280-CS		280	250	250A	315A	C6
NZR-06-315-CS		315	280	280A	355A	C6
NZR-06-355-CS		355	315	315A	400A	C6
NZR-04-T-CS	380Vac	5.5~7.5	3.7~5.5	12.0A	16.0A	C1
NZR-04-S-CS		11~15	7.5~11	16.5A	22.5A	C1
NZR-04-M-CS		18.5~22	15~18.5	25.5A	32A	C2
NZR-04-L-CS		30~37	22~30	36A	45A	C2
NZR-04-X-CS		45	37	44A	55A	C2
NZR-04-055-CS		55	45	60A	75A	C3
NZR-04-075-CS		75	55	72A	90A	C3
NZR-04-090-CS		90	75	88A	110A	C3
NZR-04-110-CS		110	90	125A	160A	C4
NZR-04-132-CS		132	110	145A	185A	C4
NZR-04-160-CS		160	132	170A	220A	C5
NZR-04-185-CS		185	160	200A	250A	C5
NZR-04-220-CS		220	185	225A	280A	C5
NZR-04-250-CS		250	220	280A	355A	C6
NZR-04-280-CS		280	250	315A	400A	C6
NZR-04-315-CS		315	280	355A	450A	C6
NZR-04-355-CS		355	315	400A	500A	C6
NZR-02-T-CS	220Vac	3.7~5.5	2.2~3.7	12.0A	16.0A	C1
NZR-02-S-CS		7.5~11	5.5~7.5	16.5A	22.5A	C1

NZR-02-M-CS		15	11	25.5A	32A	C2
NZR-02-L-CS		18.5	15	36A	45A	C2
NZR-02-X-CS		22	18.5	44A	55A	C2
NZR-02-030-CS		30	22	60A	75A	C3
NZR-02-037-CS		37	30	72A	90A	C3
NZR-02-045-CS		45	37	88A	110A	C3
NZR-02-055-CS		55	45	125A	160A	C4
NZR-02-075-CS		75	55	145A	185A	C4

Chart 3-3 Standard product selection table

Heavy duty Version – Selection Table

H version	Voltage	Adapted motor power (KW)		50% DTC rated current	Peak current	Shell
		Asynchronous	Synchronous			
NZR-06-037-CH	660Vac	37	30	33A	45A	C3
NZR-06-045-CH		45	37	41A	55A	C3
NZR-06-055-CH		55	45	56A	75A	C3
NZR-06-075-CH		75	55	80A	110A	C4
NZR-06-090-CH		90	75	95A	132A	C4
NZR-06-110-CH		110	90	115A	160A	C4
NZR-06-132-CH		132	110	132A	185A	C5
NZR-06-160-CH		160	132	160A	220A	C5
NZR-06-185-CH		185	160	185A	250A	C5
NZR-06-220-CH		220	185	210A	280A	C6
NZR-06-250-CH		250	220	235A	315A	C6
NZR-06-280-CH		280	250	265A	355A	C6
NZR-06-315-CH		315	280	300A	400A	C6
NZR-04-T-CH	380Vac	3.7~5.5	2.2~3.7	11.0A	16.0A	C1
NZR-04-S-CH		7.5~11	5.5~7.5	15.0A	22.5A	C1
NZR-04-M-CH		15~18.5	11~15	24A	32A	C2
NZR-04-L-CH		22~30	18.5~22	33A	45A	C2
NZR-04-X-CH		37	30	41A	55A	C2
NZR-04-045-CH		45	37	56A	75A	C3
NZR-04-055-CH		55	45	67A	90A	C3
NZR-04-075-CH		75	55	82A	110A	C3
NZR-04-090-CH		90	75	120A	160A	C4
NZR-04-110-CH		110	90	135A	185A	C4
NZR-04-132-CH		132	110	160A	220A	C5
NZR-04-160-CH		160	132	185A	250A	C5
NZR-04-185-CH		185	160	220A	280A	C5
NZR-04-220-CH		220	185	265A	355A	C6
NZR-04-250-CH		250	220	300A	400A	C6
NZR-04-280-CH		280	250	335A	450A	C6
NZR-04-315-CH		315	280	375A	500A	C6

NZR-02-T-CH	220Vac	2.2~3.7	2.2	11.0A	16.0A	C1
NZR-02-S-CH		5.5~7.5	3.7~5.5	15.0A	22.5A	C1
NZR-02-M-CH		11	7.5	24A	32A	C2
NZR-02-L-CH		15	11	33A	45A	C2
NZR-02-X-CH		18.5	15	41A	55A	C2
NZR-02-022-CH		22	18.5	56A	75A	C3
NZR-02-030-CH		30	22	67A	90A	C3
NZR-02-037-CH		37	30	82A	110A	C3
NZR-02-045-CH		45	37	120A	160A	C4
NZR-02-055-CH		55	45	135A	185A	C4

Chart 3-4 Heavy-duty product selection Chart

Persistent Version – Selection Table

C version	Voltage	Adapted motor power (KW)		100% DTC rated current	Peak current	Shell
		Asynchronous	Synchronous			
NZR-06-037-CC	660Vac	37	30	30A	55A	C3
NZR-06-045-CC		45	37	41A	75A	C3
NZR-06-055-CC		55	45	55A	110A	C4
NZR-06-075-CC		75	55	75A	132A	C4
NZR-06-090-CC		90	75	90A	160A	C4
NZR-06-110-CC		110	90	110A	185A	C5
NZR-06-132-CC		132	110	132A	220A	C5
NZR-06-160-CC		160	132	160A	250A	C5
NZR-06-185-CC		185	160	170A	280A	C6
NZR-06-220-CC		220	185	200A	315A	C6
NZR-06-250-CC		250	220	220A	355A	C6
NZR-06-280-CC		280	250	250A	400A	C6
NZR-04-T-CC	380Vac	2.2～3.7	2.2	9.0A	16.0A	C1
NZR-04-S-CC		5.5～7.5	3.7～5.5	13.0A	22.5A	C1
NZR-04-M-CC		11	7.5	16.5A	32A	C2
NZR-04-L-CC		15	11	24.2A	45A	C2
NZR-04-X-CC		18.5～22	15～18.5	30.2A	55A	C2
NZR-04-030-CC		30	22	41A	75A	C3
NZR-04-037-CC		37	30	50A	90A	C3
NZR-04-045-CC		45	37	60A	110A	C3
NZR-04-055-CC		55	45	90A	160A	C4
NZR-04-075-CC		75	55	105A	185A	C4
NZR-04-090-CC		90	75	132A	220A	C5
NZR-04-110-CC		110	90	160A	250A	C5
NZR-04-132-CC		132	110	185A	280A	C5
NZR-04-160-CC		160	132	250A	355A	C6
NZR-04-185-CC		185	160	280A	400A	C6
NZR-04-220-CC		220	185	315A	450A	C6

NZR-04-250-CC		250	220	355A	500A	C6
NZR-02-T-CC	220Vac	2.2	2	9.0A	16.0A	C1
NZR-02-S-CC		3.7～5.5	2.2～3.7	13.0A	22.5A	C1
NZR-02-M-CC		7.5	5.5	16.5A	32A	C2
NZR-02-L-CC		11	7.5	24.2A	45A	C2
NZR-02-X-CC		15	11	30.2A	55A	C2
NZR-02-018-CC		18.5	15	41A	75A	C3
NZR-02-022-CC		22	18.5	50A	90A	C3
NZR-02-030-CC		30	22	60A	110A	C3
NZR-02-037-CC		37	30	90A	160A	C4
NZR-02-045-CC		45	37	105A	185A	C4

Chart 3-5 Continuous Product Selection Chart

3.4 Product dimensions and installation dimensions

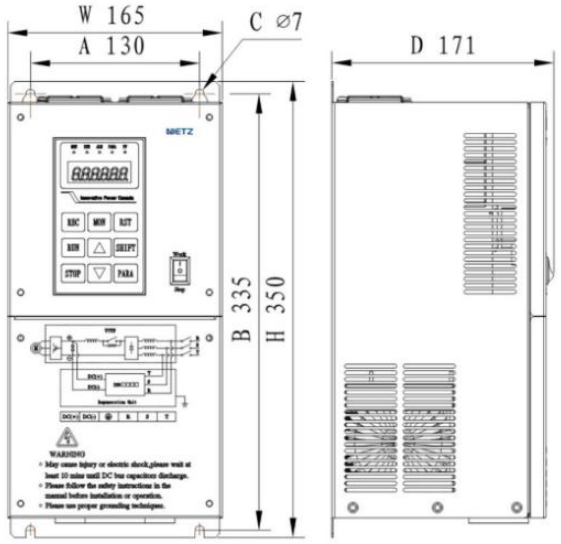


Figure 3-1 C1 wall-mounted chassis dimensions and installation dimensions

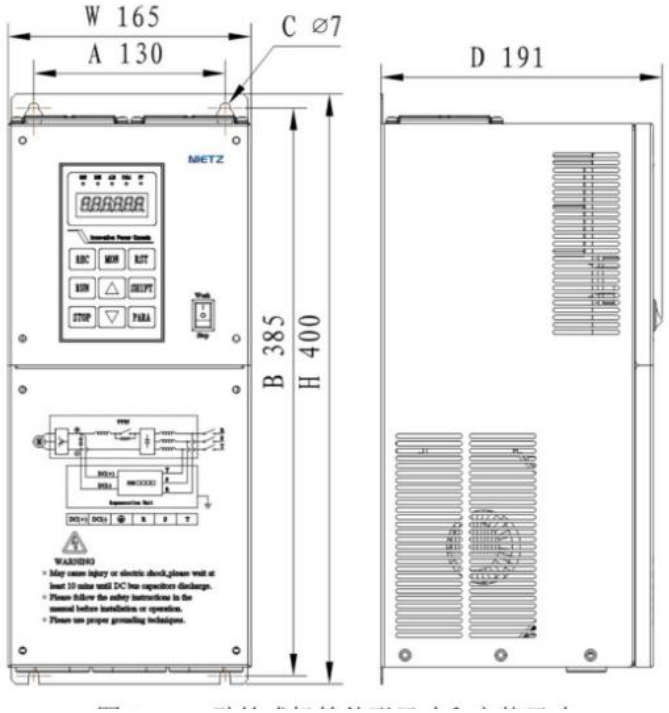


Figure 3-2 C2 wall-mounted chassis dimensions and installation dimensions

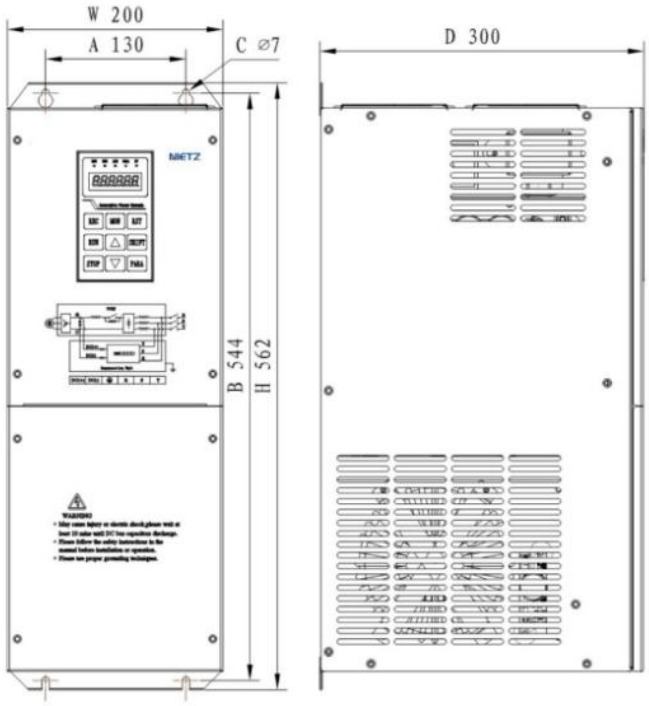


Figure 3-3 C3 wall-mounted chassis dimensions and installation dimensions

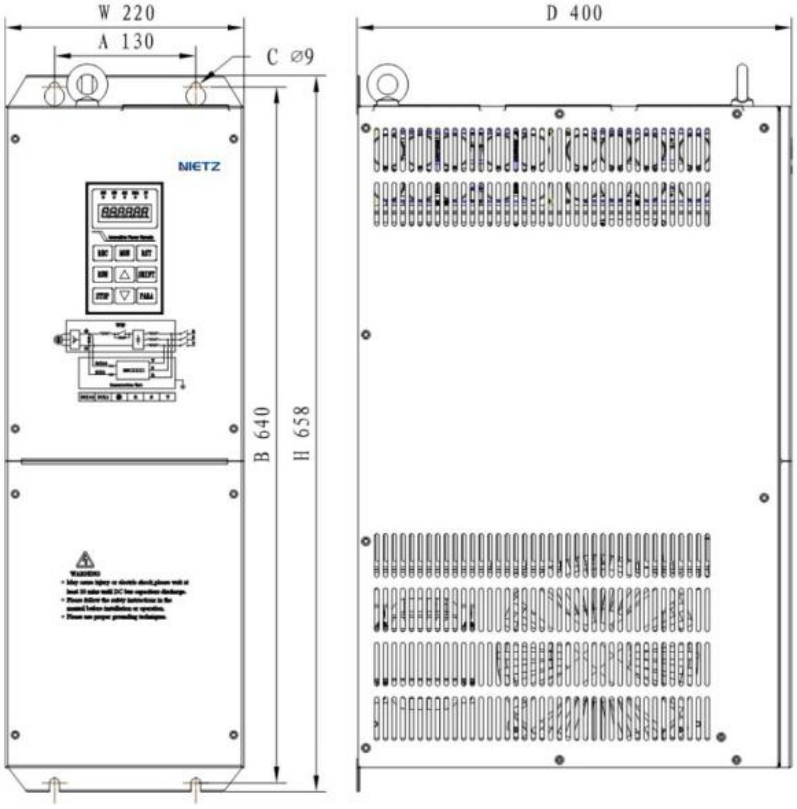


Figure 3-4 C4 wall-mounted chassis dimensions and installation dimensions

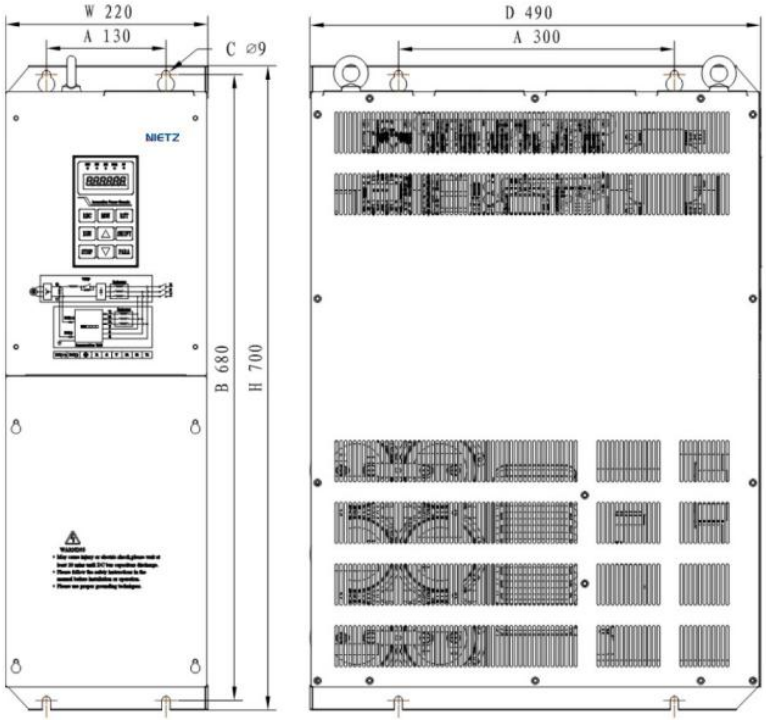


Figure 3-5 C5 wall-mounted chassis dimensions and installation dimensions

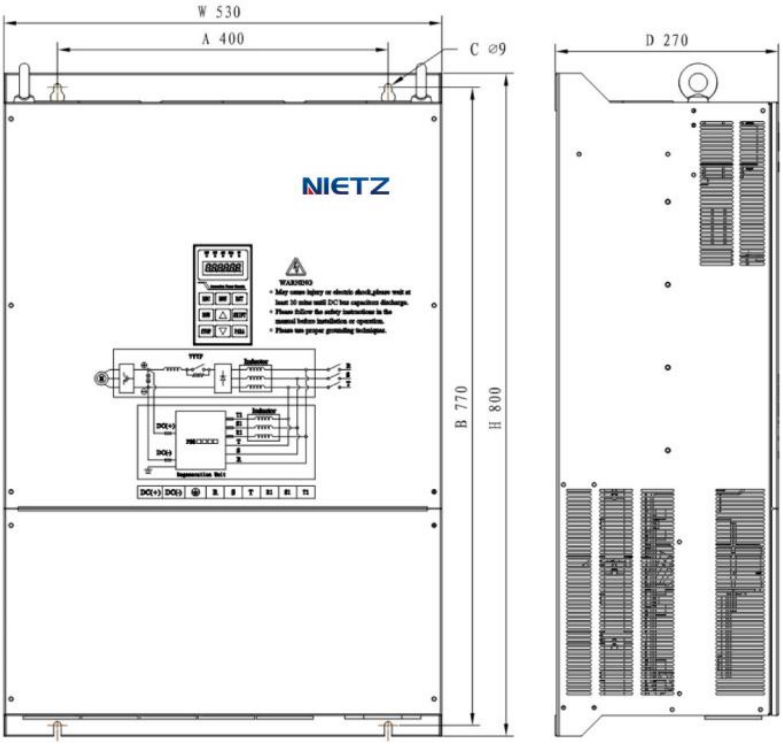


Figure 3-6 C6 wall-mounted chassis dimensions and installation dimensions

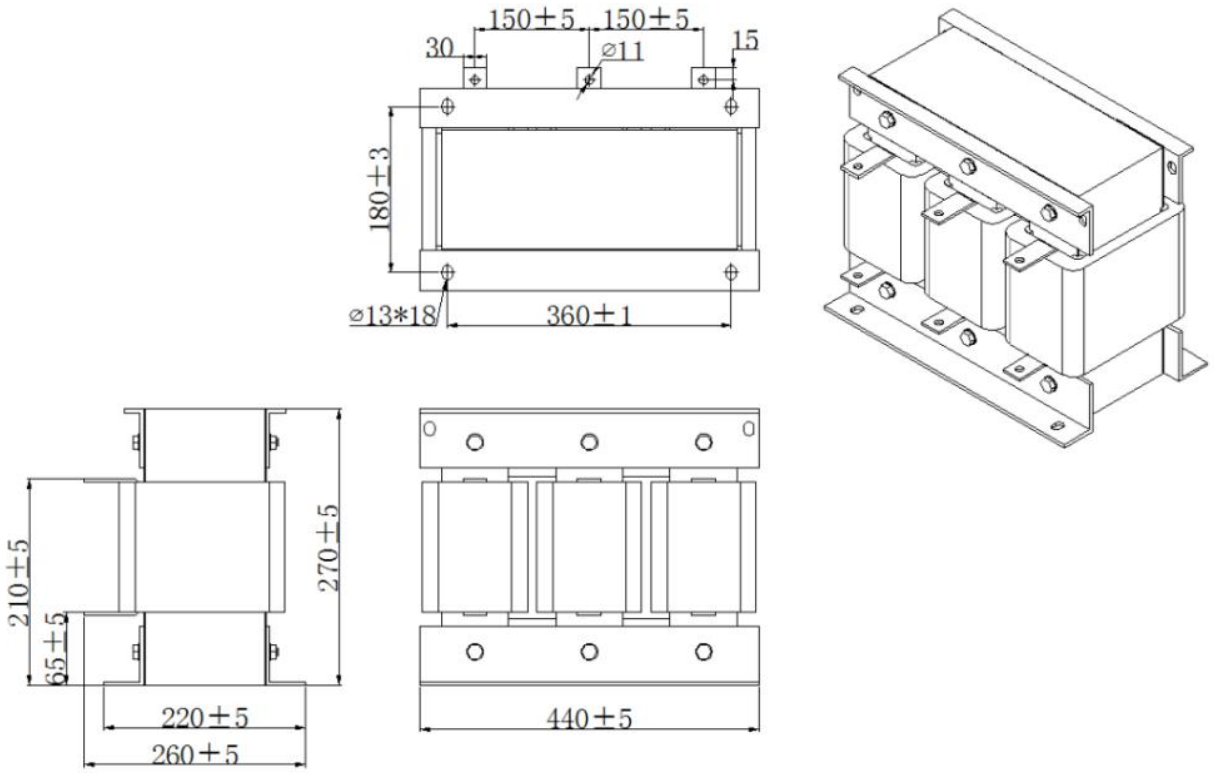


Figure 3-7 External Reactor PF-150/0.5-L Dimensions and Mounting Dimensions

Dimensions

Note	C5 chassis with external reactor PF-150/0.5-L one, connected to R1/S1/T1 terminal
	C6 chassis with external reactor PF-150/0.5-L two pcs, and connected to R1/S1/T1 in parallel

Shell of Wall-mounted	W_mm	H_mm	A_mm	B_mm	C_mm	D_mm	Package weight,kg
C1	165	350	130	335	⌀7	171	11 (including buit-in reactor)
C2	165	400	130	385	⌀7	191	17 (including buit-in reactor)
C3	200	562	130	544	⌀7	300	41 (including buit-in reactor)
C4	220	658	130	640	⌀9	400	58 (including buit-in reactor)
C5	220	700	130	680	⌀9	490	141 (including buit-in reactor PF-150/0.5-L, 1 unit)
C5 flat type	490	700	300	680	⌀9	220	
C6	530	800	400	770	⌀9	270	262 (including buit-in reactor PF-150/0.5-L, 2 units)

Chart 3-6 Chassis installation dimension table

Chapter 4 Installation Guide

4.1 Main Circuit Wiring

1. The main circuit is wired in the form of terminals. Open the terminal cover of the case. Wiring according to the terminal identification.

Pic.4-1 Main circuit description of C1, C2, C3,C4 case

Terminal mark	Functional description
R,S,T	3 phase power supply's terminals. No need to distinguish phase sequence
⏚	Ground terminal. Prevent the chassis leakage current from causing harm to human body.
DC (+)	DC input terminal, Connect to the positive terminal of the DC bus of the general inverter.
DC (-)	DC input terminal, Connect to the negative terminal of the DC bus of the general inverter.

Chart 4-1 C1, C2, C3, and C4 chassis main circuit wiring instructions

4-2 Main circuit description of C5, C6 case

Terminal mark	Functional description
R, S, T	3 phase power supply's terminals of Sync signal, See Figure 4-4 for connection method
R1, S1, T1	3 phase output reactor terminal. See Figure 4-4 for connection method
⏚	Ground terminal. Prevent the chassis leakage current from causing harm to human body.
DC (+)	DC input terminal, Connect to the positive terminal of the DC bus of the general inverter.
DC (-)	DC input terminal, Connect to the negative terminal of the DC bus of the general inverter.

2.Wiring principle diagram of energy feedback device and inverter main circuit ,Refer to Figure 4-3 and Figure 4-4

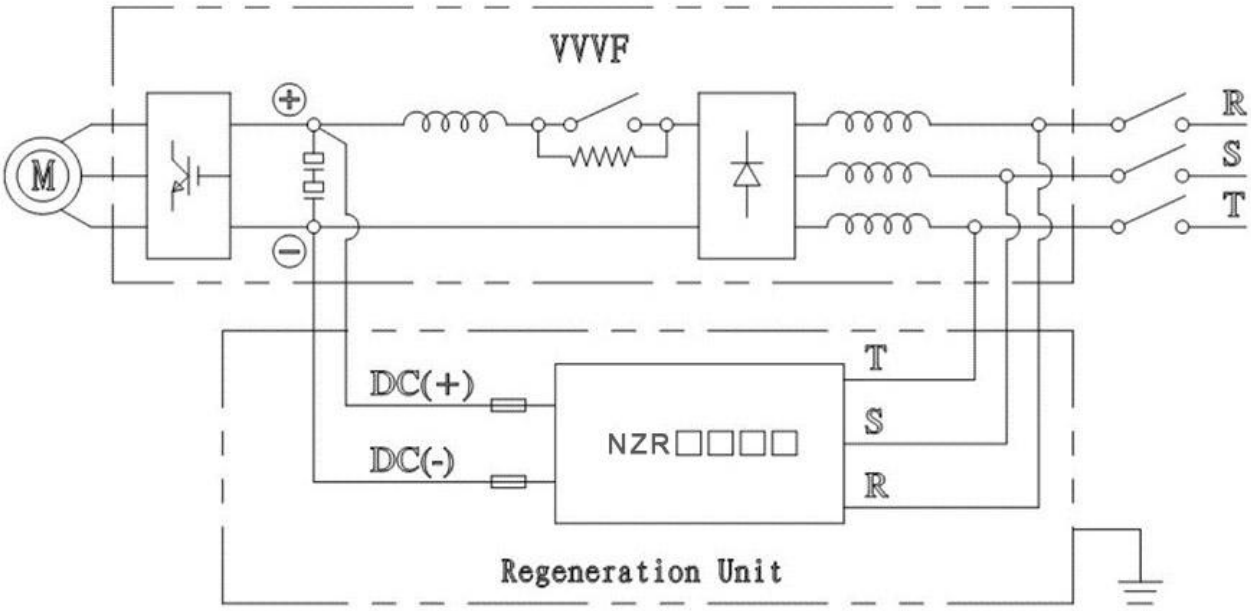


Figure 4-3 C1、C2、C3、C4 Type Chassis energy feedback device and inverter main circuit wiring schematic

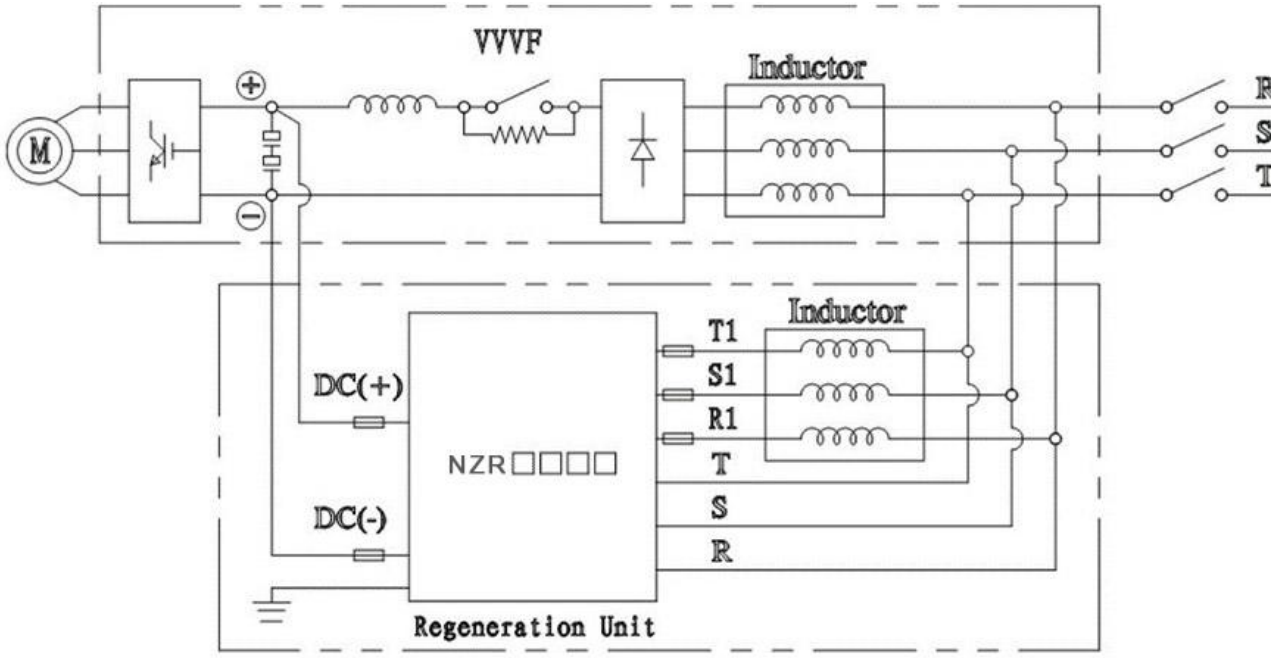


Figure 4-4 C5, C6 case is energy feedback unit and inverter main circuit wiring principle diagram

wiring schematic

Note	The C5 shell suited 1 unit Reactor PF-150/0.5-L, contact on terminal R1/S1/T1
	The C6 shell suited 2 units Reactor PF-150/0.5-L, parallel contact on terminal R1/S1/T1

4.2 Control loop wiring

1, NZR sine wave energy feedback device has a control board inside, and its control terminal is shown in figure 4-3.

Port	Port function description	
Control port	CN16（DC BUS）	DC bus voltage port (note that the positive and negative poles cannot be connected incorrectly)
	CN5（R S T）	Three-phase Grid sampling port
	J2 （T1） and J3 （T2）	Temperature sensor port
	CN6（HU）	U-phase voltage type Hall sensor sampling port
	CN8（HV）	V-phase voltage type Hall sensor sampling port
	CN9（HW）	W-phase voltage type Hall sensor sampling port
	CN7	RS232 Keyboard communication port
User port	TA、TB、TC	TA/TB is the relay output normally closed ; TC/TB is the relay output normally open ; (AC: 270V/3A; DC: 30V/3A); its function is determined by HH--06 parameters
	T1A、T1B、T1C	T1A/T1B is the relay output normally closed ; T1C/T1B is the relay output normally open ; (AC: 270V/3A; DC: 30V/3A); its function is determined by HH--07 parameters
	24V	24V output voltage, maximum output current 0.5A, COM is earth wire
	EXT	External fault input: EXT and COM are shorted-valid, EXT and COM are disconnected- invalid.
	DI1	Machine enable control terminal: DI1 and COM are shorted-valid, DI1 and COM are disconnected- invalid.
	DI2	External control input: DI2 and COM are shorted-valid, DI2 and COM are disconnected- invalid.
	DI3	Elevator emergency power supply input: DI3 and COM are shorted to enable elevator emergency power have output, DI3 is disconnected from COM to stop elevator emergency power output
	DI4	Elevator emergency power supply input shutdown: DI4 and COM are shorted to turn off the elevator emergency power output. DI4 is disconnected from COM to turn on the elevator emergency power output
	DI5	Contactor input normally open : DI5 is shorted to COM for connected, DI5 is disconnected from COM for disconnection
	DI6	Grid input status : DI6 and COM are short-circuited for grid abnormal, DI6 and COM are disconnected for normal
	DI7	Battery input status: DI7 and COM are shorted for the battery capacity normal, and DI7 and COM are disconnected for battery in low.
	COM	Public use port
	485+、485-	RS485 Communication port

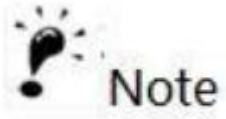
Figure 4-3 Control board terminal block description chart

2 .The control board has three control modes: stop, regenerative feedback/feedback, and emergency power output. These three modes are selected by the combination of DI1, DI3, DI4, DI5, DI6, and DI7 terminals. See chart 4-4 for details.

Model	DI Terminal（DI and COM：Short= 0，Disconnect =1，X =Any）					
	DI1	DI3	DI4	DI5	DI6	DI7
Stop	1	X	X	X	X	X
Regen Feedback	0	X	X	0	1	X
Stop	0	X	X	1	1	X
Stop	0	X	X	X	0	1
Stop	0	X	X	0	0	0
Stop	0	1	X	1	0	0
Stop	0	0	0	1	0	0
Emergency power output	0	0	1	1	0	0

4-4 Control board control mode Chart

3，The NZR sine wave energy feedback device is configured by default in the rectification feedback/feedback control mode, that is, DI1 and DI5 are shorted to COM, as shown in Chart 4-4. The UU--24 parameters in Chart 5-9 are set to 1 and configured as feedback mode. In the feedback mode, when the input DC bus voltage is higher than the feedback operation voltage, NZR operates in the feedback model; when the input DC bus voltage is lower than the feedback operation voltage, NZR operates in the stop feedback model. In the feedback mode, you can configure the UU--30 parameters in Chart 5-9 to select the float charge control.

	The red switch button on the C1 and C2 chassis cover is the terminal to directly connect DI1 and COM s. Red switch operation: Operation= DI1 and COM shorted ; Stop=disconnected from DI1 and COM

4，If the NZR sine wave energy feedback device needs to be configured for other control modes, you can refer to UU--24 and UU--30 parameters in Chart 4-4 and Chart 5-9. Refer to chart 4-3 for the description of the control panel port unctions.

4.3 Wiring cable description

Item			Cable Cross-sectional area (mm2)		
S Series	H Series	C Series	Main circuit line	Earth Wire	Control terminal
NZR-02-T-CS	NZR-02-T-CH	NZR-02-T-CC	≥2.5	≥0.8	≥0.8
NZR-02-S-CS	NZR-02-S-CH	NZR-02-S-CC	≥4	≥0.8	≥0.8
NZR-02-M-CS	NZR-02-M-CH	NZR-02-M-CC	≥6	≥2.5	≥0.8
NZR-02-L-CS	NZR-02-L-CH	NZR-02-L-CC	≥6	≥2.5	≥0.8
NZR-02-X-CS	NZR-02-X-CH	NZR-02-X-CC	≥8	≥2.5	≥0.8
NZR-02-030-CS	NZR-02-022-CH	NZR-02-018-CC	≥10	≥4	≥0.8
NZR-02-037-CS	NZR-02-030-CH	NZR-02-022-CC	≥10	≥4	≥0.8
NZR-02-045-CS	NZR-02-037-CH	NZR-02-030-CC	≥20	≥6	≥0.8
NZR-02-055-CS	NZR-02-045-CH	NZR-02-037-CC	≥25	≥6	≥0.8
NZR-02-075-CS	NZR-02-055-CH	NZR-02-045-CC	≥25	≥6	≥0.8
Item			Cable Cross-sectional area (mm2)		
S Series	H Series	C Series	Main circuit line	Earth Wire	Control terminal
NZR-04-T-CS	NZR-04-T-CH	NZR-04-T-CC	≥2.5	≥0.8	≥0.8
NZR-04-S-CS	NZR-04-S-CH	NZR-04-S-CC	≥4	≥0.8	≥0.8
NZR-04-M-CS	NZR-04-M-CH	NZR-04-M-CC	≥6	≥2.5	≥0.8
NZR-04-L-CS	NZR-04-L-CH	NZR-04-L-CC	≥6	≥2.5	≥0.8
NZR-04-X-CS	NZR-04-X-CH	NZR-04-X-CC	≥8	≥2.5	≥0.8
NZR-04-055-CS	NZR-04-045-CH	NZR-04-030-CC	≥10	≥4	≥0.8
NZR-04-075-CS	NZR-04-055-CH	NZR-04-037-CC	≥10	≥4	≥0.8
NZR-04-090-CS	NZR-04-075-CH	NZR-04-045-CC	≥20	≥6	≥0.8
NZR-04-110-CS	NZR-04-090-CH	NZR-04-055-CC	≥25	≥6	≥0.8
NZR-04-132-CS	NZR-04-110-CH	NZR-04-075-CC	≥25	≥6	≥0.8
NZR-06-045-CS	NZR-06-037-CH	NZR-06-030-CC	≥8	≥2.5	≥0.8

NZR-06-055-CS	NZR-06-045-CH	NZR-06-037-CC	≥10	≥4	≥0.8
NZR-06-075-CS	NZR-06-055-CH	NZR-06-045-CC	≥10	≥4	≥0.8
NZR-06-090-CS	NZR-06-075-CH	NZR-06-055-CC	≥20	≥6	≥0.8
NZR-06-110-CS	NZR-06-090-CH	NZR-06-075-CC	≥25	≥6	≥0.8
NZR-06-132-CS	NZR-06-110-CH	NZR-06-090-CC	≥25	≥6	≥0.8
Note			Main circuit line includes：R、S、T、DC（+）、DC（-）		

Chart 4-5 C1、C2、C3、C4 Chassis wiring cable description Chart

Item			Cable Cross-sectional area（mm2）		
S Series	H Series	C Series	Main circuit line	Earth Wire	Control terminal
NZR-04-160-CS	NZR-04-132-CH	NZR-04-090-CC	≥35	≥8	≥0.8
NZR-04-185-CS	NZR-04-160-CH	NZR-04-110-CC	≥35	≥8	≥0.8
NZR-04-220-CS	NZR-04-185-CH	NZR-04-132-CC	≥50	≥8	≥0.8
NZR-04-250-CS	NZR-04-220-CH	NZR-04-160-CC	≥65	≥10	≥0.8
NZR-04-280-CS	NZR-04-250-CH	NZR-04-185-CC	≥65	≥10	≥0.8
NZR-04-315-CS	NZR-04-280-CH	NZR-04-220-CC	≥80	≥10	≥0.8
NZR-04-355-CS	NZR-04-315-CH	NZR-04-250-CC	≥80	≥10	≥0.8
NZR-06-160-CS	NZR-06-132-CH	NZR-06-110-CC	≥35	≥8	≥0.8
NZR-06-185-CS	NZR-06-160-CH	NZR-06-132-CC	≥35	≥8	≥0.8
NZR-06-220-CS	NZR-06-185-CH	NZR-06-160-CC	≥50	≥8	≥0.8
NZR-06-250-CS	NZR-06-220-CH	NZR-06-185-CC	≥65	≥10	≥0.8
NZR-06-280-CS	NZR-06-250-CH	NZR-06-220-CC	≥65	≥10	≥0.8
NZR-06-315-CS	NZR-06-280-CH	NZR-06-250-CC	≥80	≥10	≥0.8
NZR-06-355-CS	NZR-06-315-CH	NZR-06-280-CC	≥80	≥10	≥0.8

Note	Main circuit line includes：R1、S1、T1、DC（+）、DC（-）。 R, S, T are the synchronous signal terminals of the three-phase power grid, and the cross-sectional area of the wiring cable is ≥4m㎡

Chart 4-6 C5、C6 Chassis wiring cable description Chart

4.4 Installation space requirements

Note	1. If the device is installed in a cabinet such as a control cabinet, fully consider the heat dissipation problem, reserve a cooling hole or install an fan to ensure that the temperature around the device does not exceed the specified value. Do not install in a closed box with poor heat dissipation and small space.
	2.If the device is installed in a cabinet such as a control cabinet, ensure that there is a sui Chart space for each device up and down and left and right. As shown in Figure 4-5A.
	3、When install multiple units in the same equipment or control cabinet, it is recommended to install them horizontally, easy wiring and reducing the thermal effects between each other. As shown in Figure 4-6.
	4. If it is limited by the installation space, it must be arranged up and down (vertical alignment). A partition should be placed in the middle to prevent the heat from the lower part from affecting the upper part. As shown in Figure 4-5B.
Warning	The device should not be installed near flammable or explosive objects. It should not be installed in direct sunlight, conductive dust and corrosive gas. It should not be installed in a place easy to touch, otherwise it may cause an accident.

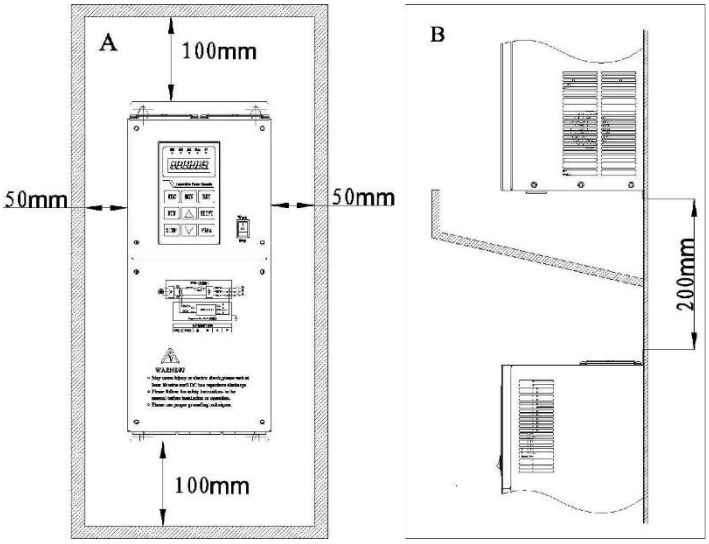


Figure 4-5 Retaining space requirements for each device up, down, left, and right

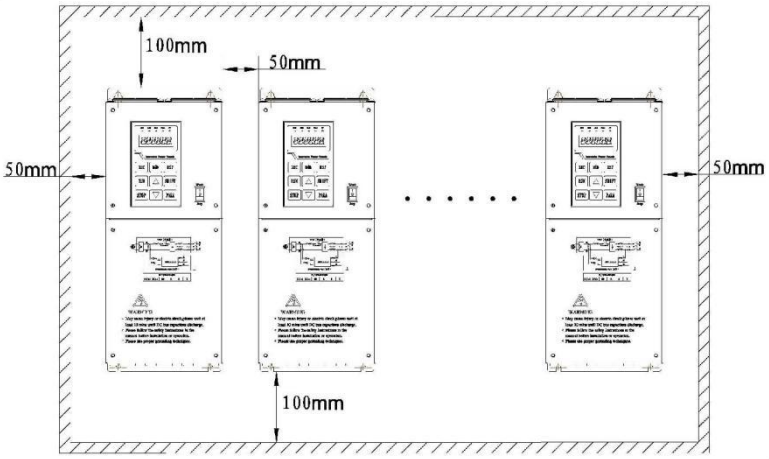


Figure 4-6 Multiple devices are installed horizontally to install the upper and lower left and right reserved space requirements.

Chapter 5 Parameter Settings

5.1 Keyboard Control Setting

5.1.1 Keyboard operation panel

The keyboard operation panel is composed of status indication area, data display area and button operation area.

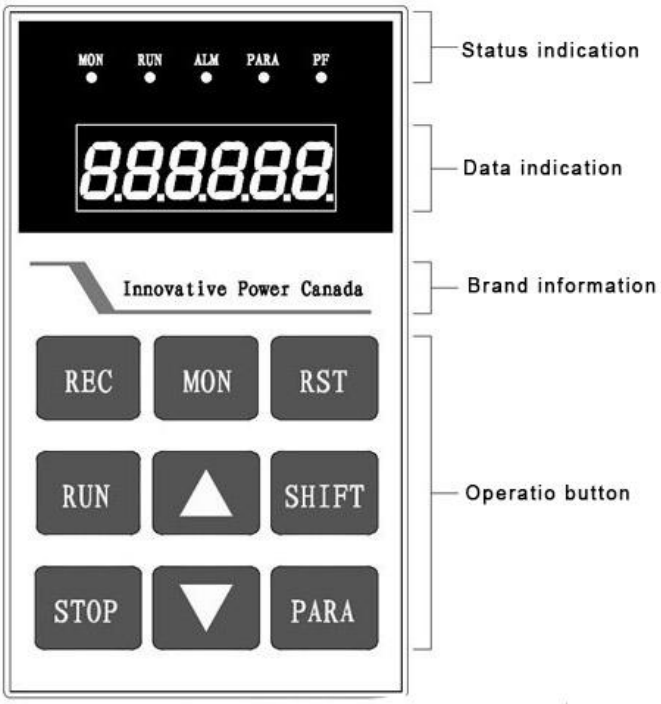


Figure 5-1 Keyboard operation panel

5.1.2 Status indication

Indicator	Indicating Content
MON	When this lamp ON,then “MON” or “REC” menu display status.
RUN	When this lamp ON,DI1 and COM port shorted enable working status
ALM	When this lamp ON,Error alarm, NZR stops working, And display the corresponding error code in the data display screen
PARA	When this lamp ON,“PARA”or“RST”menu display status
PF	When this lamp ON,Three-phase emergency power output status; This light flashes then NZR start to feedback output or rectification
	feedback output , the flashing frequency is 5Hz.
Note: All status indicators are always on and the display 8.8.8.8.8.8. indicates that the communication cable connection is abnormal.	

Chart 5-1 O peration panel status indicators

5.1.3 Data Display Section

The data display part is displayed by a six-digit LED digital tube, and the displayed content is different according to the selected parameter code. The displayed content is represented by a decimal number and is displayed individually in code (for example, displaying a fault code).

When the software detects error, regardless of the current display content, will directly display the error code, and the “ALM” indication will turn ON; when the error is eliminated, the delay setting Recovery time (default 30 seconds, the software can set different recovery time according to different errors. For details, please refer to Chart 5-8), the software will automatically recover and display the
contents of the “FF00” parameter data.

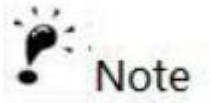
5.1.4 Button operation

Button	Function
MON	Enter “MON”menu and view the monitoring parameters.
REC	Enter “REC” menu and view the error record parameters. (After the error occurs, press this button to view the error record)
PARA	Enter "PARA" menu and modify or view the function parameters.
RST	Enter the "RST" menu, modify or view the debug parameters (require a password to modify)
SHIFT	Shift to left (Press "SHIFT" once, move one bit to the left, then 1.5Hz frequency flash)
△	Numerical up key
▽	Numerical down key
STOP	Parameter modification status (only DI1 is disconnected from the COM port, this button is valid)
RUN	Confirm parameter modification

Chart 5-2 Keyboard Button List

Steps	Keyboard operation	
	Monitoring parameter view	Error record parameter view
Menu	Press MON to enter, The default display FF--00	Press the REC button to enter, Default display REC--00
Select	Press SHIFT、△、▽to select parameter code	Press SHIFT、△、▽to select parameter code
Confirm	Press RUN to confirm	Press RUN to confirm

Chart 5-3 Monitoring parameters and error record parameters



ONLY when DI1 and COM port is disconnected ,then you can modify the parameters chart 5-4 5-5 5-6

Steps	Keyboard operation	
	Function parameter modification	Function parameter view
Menu	Press the PARA button to enter, default display HH--00	Press the PARA button to enter, default display HH--00
Select	Press SHIFT、△、▽ to select parameter code	Press SHIFT、△、▽ to select parameter code
Enter modify	Press STOP to enter the modification state, and the six-digit modified value is displayed at this time.	
Modify	Press SHIFT、△、▽ to select parameter code,not saved	
Confirm	Press RUN to confirm the modified parameter value and save it.	Press RUN to confirm the display

Chart 5-4 Function parameter modification or viewing operation Chart

Steps	Keyboard Operation	
	Debug parameter modification	Debug parameter view
Menu	Press RST to enter, default display UU--00	Press RST to enter, default display UU--00
Select	Press SHIFT, △, ▽ to select parameter code	Press SHIFT, △, ▽ key to select parameter code
password status	Press STOP to enter the password input status and display ------	
password input	Press SHIFT, △, ▽ to enter the correct six-digit password.	
password confirm	Press RUN to confirm the password. Simultaneous display of six modified values	
Modify	Press SHIFT, △, ▽ to modify the parameter value, but it has not been saved yet.	
Confirm	Press RUN to confirm the modified parameter value and save. Press RUN to confirm the display.	Press RUN to confirm the display.

Chart 5-5 Modifying the debugging parameters or viewing the operation chart

Steps	Keyboard operation
Menu	Press RST to enter,default display UU--00
Select	Press SHIFT, △, ▽ key to select UU -- 99
Original password status	Press STOP to enter the original password input state,display------
Original password input	Press SHIFT, △, ▽ to enter the correct original password.
Original password confirm	Press RUN to confirm the original password and enter the new password input status and display ------(the six-digit password cannot contain the “-” character)
New password input	Press SHIFT, △, ▽ to enter the new password value, but it has not been saved yet.
New password confirm	Press RUN to confirm the modified new password value and save it.

Chart 5-6 Keyboard password modification operation Chart

5.1.5 Control Board Keyboard Parameters

Chart 5-7 shows the monitoring parameter Chart. Refer to Chart 5-3 for the button operation procedure.

parameter Code	parameter name	Unit	Value Range	Display description
FF--00	Feedback energy	KWH	0 ~ 99999.9	Cumulative energy feed back to the grid
FF--01	PWM output enable state	1	0 ~ 1	0→PWM Stop output 1→PWM output
FF--02	AC grid voltage level	VAC	220/380/660	AC grid voltage level applicable to the machine, RMS
FF--03	Machine power	KW	2.2 ~ 500.0	Machine power rating
FF--04	Temperature sensor T1	℃	-20 ~ 99.9	Temperature of T1 sensor
FF--05	Temperature sensor T2	℃	-20 ~ 99.9	Temperature of T2 sensor
FF--06	Fan control status	1	0 ~ 1	0→Fan Stop；1→Fan operation
FF--07	EEPROM status	1	0 ~ 1	0→normal；1→abnormal
FF--08	RS232 Communication status	1	0 ~ 1	0→Communication does not send data； 1→Communication send data
FF--09	TA/TB/TC Relay output status	1	0 ~ 1	0→TA/TB closed，TC/TB open；

				1→TA/TB open，TC/TB closed；
FF--10	T1A/T1B/T1C Relay output status	1	0 ~ 1	0→T1A/T1B closed ，T1C/T1B open； 1→T1A/T1B open，T1C/T1B closed；
FF--11	DI1 input status	1	0 ~ 1	1→DI1/COM Disconnect；0→DI1/COM shorted
FF--12	DI2 input status	1	0 ~ 1	1→DI2/COM Disconnect；0→DI2/COM shorted
FF--13	DI3 input status	1	0 ~ 1	1→DI3/COM Disconnect；0→DI3/COM shorted
FF--14	DI4 input status	1	0 ~ 1	1→DI4/COM Disconnect；0→DI4/COM shorted
FF--15	DI5 input status	1	0 ~ 1	1→DI5/COM Disconnect；0→DI5/COM shorted
FF--16	DI6 input status	1	0 ~ 1	1→DI6/COM Disconnect；0→DI6/COM shorted
FF--17	DI7 input status	1	0 ~ 1	1→DI7/COM Disconnect；0→DI7/COM shorted
FF--18	EXT input status	1	0 ~ 1	1→EXT/COM disconnected 0→EXT/COM shorted
FF--19	Machine working mode	1	0 ~ 2	0→stop mode; 1→rectification feedback/feedback mode; 2→Emergency power output mode
FF--20	DC bus voltage	V	0 ~ 1240.0	Display DC bus voltage value
FF--21	DC bus charging	1	0 ~ 1	0→Bus charging is not completed; 1→Bus charging is completed
FF--22	Chip PWM output status	1	0 ~ 1	Chip: 0 → no PWM output; 1 → PWM output
FF--23	Rectification feedback state	1	0 ~ 1	0→non-rectifying feedback state; 1→rectification feedback state
FF--24	Power grid R phase zero offset coefficient	1	0 ~ 65520	The display range is between 30768 and 34768, indicating that the correction is correct, otherwise it needs to be recalibrated.
FF--25	Power grid S phase zero offset coefficient	1	0 ~ 65520	

FF--26	Power grid T phase zero offset coefficient	1	0 ~ 65520	
FF--27	Current R phase zero offset coefficient	1	0 ~ 65520	The display range is between 30768 and 34768, indicating that the correction is correct. Otherwise, it needs to be recalibrated (the Hall sensor should be connected and then corrected)
FF--28	Current S phase zero offset coefficient	1	0 ~ 65520	
FF--29	Current T phase zero offset coefficient	1	0 ~ 65520	
FF--30	Phase sequence of three-phase power grid	1	0 ~ 1	0→Phase sequence R→S→T ; 1→Phase sequence R→T→S
FF--31	Three-phase grid voltage	VAC	0.0 ~ 900.0	Display three-phase AC grid voltage, RMS
FF--32	R phase grid voltage	VAC	0.0 ~ 520.0	Display R phase AC grid voltage, RMS
FF--33	S phase grid voltage	VAC	0.0 ~ 520.0	Display S phase AC grid voltage, RMS
FF--34	T phase grid voltage	VAC	0.0 ~ 520.0	Display T phase AC grid voltage, RMS
parameter Code	parameter name	unit	variation range	Display description
FF--35	Three-phase average current	A	0 ~ 2000.0	Display the average current of the three-phase AC grid, RMS
FF--36	R phase current	A	0 ~ 2000.0	Shows the average current of the R-phase grid, RMS
FF--37	S phase current	A	0 ~ 2000.0	Shows the average current of the S-phase grid, RMS
FF--38	T phase current	A	0 ~ 2000.0	Shows the average current of the T-phase grid, RMS
FF--39	Rectified electric energy	KWH	0 ~ 99999.9	Consumed cumulative power consumption of the grid during rectification
FF--40	Grid average frequency	Hz	0 ~ 100.00	Display the average frequency of the three-phase grid
FF--41	R phase grid frequency	Hz	0 ~ 100.00	Display R phase grid frequency
FF--42	S phase grid frequency	Hz	0 ~ 100.00	Display S phase grid frequency
FF--43	T phase grid frequency	Hz	0 ~ 100.00	Display T phase grid frequency

FF--44	Machine running maximum current	A	0.0 ~ 600.0	Actual running maximum current = this value / Hall number
FF--45	Default setting maximum current	A	0.0 ~ 600.0	Actual setting maximum current = this value / Hall number
FF--46	Feedback power	KW	0.0 ~ 999.9	Energy power fed back to the grid
FF--47	Rectified power	KW	0.0 ~ 999.9	Power consumption of the grid during rectification
other	display8.8.8.8.8.8.	RE	Reserve	Reserve

Chart 5-7 Monitoring parameter Chart of the control board

Chart 5-8 is the function parameter Chart . Refer to Chart 5-4 for the key operation steps.

Parameter code	Parameter name	unit	variation range	Defaults	Detailed description of the parameters
HH--00	Sensor T1 oH1 overheat protection temperature	℃	55 ~ 95.0	80.0	If the value of the T1 temperature sensor is higher than this setting, jump oH1 overheat protection
HH--01	Sensor T2 oH2 overheat protection temperature	℃	55 ~ 95.0	80.0	If the value of the T2 temperature sensor is higher than this setting, jump oH2 overheat protection
HH--02	oH1 overheat protection Recovery Time	S	2 ~ 3600	30	FF--04 is less than (HH--00 - 10) After the delay is set, the protection is restored.
HH--03	oH2 overheat protection Recovery Time	S	2 ~ 3600	30	FF--05 is less than (HH--01 - 10) After the set value is delayed, the protection is restored.
HH--04	Fan control mode	1	0 ~ 4	0	Fan control mode reference Chart 5-11
HH--05	EXT external fault Recovery Time	S	2 ~ 3600	30	After the external fault is eliminated, the recovery time is delayed, and the software automatically recovers.
HH--06	TA/TB/TC control mode	1	0 ~ 24	14	Relay Control Mode Reference Chart 5-12
HH--07	T1A/T1B/T1C Relay control mode	1	0 ~ 24	14	Relay Control Mode Reference Chart 5-12

HH--08	DC bus Threshold voltage	V	180.0 ~ 1200.0	400.0	Control the TA/TB/TC relay and set the bus threshold voltage. Refer to Chart 5-12.
HH--09	DC bus Threshold voltage 1	V	180.0 ~ 1200.0	400.0	Control the T1A/T1B/T1C relay and set the threshold voltage. Refer to Chart 5-12.
HH--10	TA/TB/TC Relay timing	min	1 ~ 17280	30	Control the TA/TB/TC relay and set the timing time. Refer to Chart 5-12.
HH--11	T1A/T1B/T1C Relay timing time 1	min	1 ~ 17280	30	Control the T1A/T1B/T1C relay, set the timing time 1, refer to Chart 5-12
Parameter code	Parameter name	unit	variation range	Defaults	Detailed description of the parameters
HH--12	TA/TB/TC Relay conduction time	S	0 ~ 240	30	Used to control the TA/TB/TC relay and set the on-time. Refer to Chart 5-12.
HH--13	T1A/T1B/T1C Relay conduction time 1	S	0 ~ 240	30	Control the T1A/T1B/T1C relay and set the on-time 1. Refer to Chart 5-12.
HH--14	TA/TB/TC Relay off time	S	0 ~ 240	30	Used to control the TA/TB/TC relay and set the off time. Refer to Chart 5-12.
HH--15	T1A/T1B/T1C Relay off time 1	S	0 ~ 240	30	Control the T1A/T1B/T1C relay and set the off time 1. Refer to Chart 5-12.
HH--16	DC bus voltage Automatic correction	V	200.0 ~ 1200.0	Display bus voltage	Enter the required correction value in the modified value. After 3 seconds, press the “RUN” button to confirm the completion of the automatic calibration (within the step size ±50V, if it exceeds ±50V, please correct it multiple times)
HH--17	Charging contactor open Voltage threshold	V	220VAC: 130 ~ 170 380VAC: 220 ~ 300 660VAC: 380 ~ 480	220VAC: 130.0 380VAC: 220.0 660VAC: 380.0	After the DC bus voltage is less than the set value, the charging contactor will open.

HH--18	Charging contactor Voltage threshold	V	220VAC: 220 ~ 270 380VAC: 380 ~ 580 660VAC: 640 ~ 900	220VAC: 240.0 380VAC: 430.0 660VAC: 740.0	After the DC bus voltage is greater than the set value and delays the HH--21 setting, the charging contactor will pick up
HH--19	DC bus voltage oE overvoltage protection threshold	V	220VAC: 350 ~ 480 380VAC: 720 ~ 820 660VAC: 1120 ~ 1220	220VAC: 430.0 380VAC: 800.0 660VAC: 1200.0	After the DC bus voltage is greater than the set value, the oE overvoltage protection fault is reported.
HH--20	DC bus voltage LE undervoltage protection threshold	V	220VAC: 180 ~ 210 380VAC: 310 ~ 370 660VAC: 490 ~ 620	220VAC: 180.0 380VAC: 320.0 660VAC: 560.0	After the DC bus voltage is less than the set value, the LE undervoltage protection fault is reported.
HH--21	Charging contactor delay	S	2 ~ 240	2	After reaching the suction condition, after the set time is delayed, the suction is completed.
HH--22	oE overvoltage protection Recovery Time	S	2 ~ 3600	30	When the voltage is less than (HH--19 - 20) delay the set value, the protection is restored.
HH--23	LE undervoltage Protection recovery time	S	2 ~ 3600	30	DC bus voltage is higher than HH--18 delays, the set value, protection recovery
HH--24	HE hardware overvoltage	S	2 ~ 3600	30	The voltage is less than (HH--19 - 20V) and the set
	protection Recovery Time				value is delayed, and the protection is restored. Hardware overvoltage: 505V, 840V, 1240V

HH--25	RS485 communication address	1	0 ~ 31	31	RS485 communication machine address
HH--26	Three phase voltage current Zero offset correction	1	0 ~ 6	0	When set to 6, the calibration is entered. After 3 seconds, the value is changed from 6 to 1. The calibration is completed.
Parameter code	Parameter name	unit	variation range	Defaults	Detailed description of the parameters
HH--27	Power supply three-phase power grid Phase sequence correction	1	0 ~ 6	Auto	0 correction failed 1 correction succeeded 6 entered calibration, failure 3 seconds for the grid is dead
HH--28	Three-phase power grid RMS voltage Automatic correction	VAC	50.0 ~ 900.0	Display grid voltage	Enter the required correction value in the modified value. After 3 seconds, press the “RUN” button to confirm the completion of the automatic calibration (within the step size ±50V, if it exceeds ±50V, please correct it multiple times)
HH--29	FF three-phase grid frequency Fault protection recovery time	S	2 ~ 3600	30	After the grid over/under frequency fault is eliminated and the set value is delayed, the protection is restored.
HH--30	UF three-phase power grid amplitude fault protection recovery time	S	2 ~ 3600	30	The power grid amplitude over/under voltage fault is eliminated and the set value is delayed, then the protection is restored.
HH--31	Three-phase power grid Phase voltage amplitude Overvoltage protection setting	VAC	220VAC: 130 ~ 180 380VAC: 225 ~ 308 660VAC: 380 ~ 496	220VAC: 153.0 380VAC: 264.0 660VAC: 458.0	If the phase voltage amplitude of the three-phase power grid is greater than the set value, the UF protection fault is reported.
HH--32	Three-phase	VAC	220VAC:	220VAC:	If the phase voltage amplitude
	power grid Phase voltage amplitude Undervoltage protection setting		76 ~ 127 380VAC: 131 ~ 222 660VAC:	101.0 380VAC: 175.0 660VAC:	of the three-phase power grid is less than the set value, the UF protection fault is reported.

			228 ~ 370	304.0	
HH--33	PF grid abnormality or phase loss fault protection recovery time	S	2 ~ 3600	30	Grid phase anomaly or phase loss fault elimination delay the set value, protection recovery
HH--34	oC overcurrent protection Recovery Time	S	2 ~ 3600	30	Protection recovery after overcurrent fault cancellation and delay of the set value
HH--35	Overload protection starting point	1	0.75 ~ 0.95	0.75	This item is the percentage of the maximum current of the machine. If the set value is exceeded, the overload protection time will be calculated.
HH--36	Maximum running current of the machine corresponds to overload protection time	S	0.1 ~ 5.0	3.0	This setting is the overload protection time corresponding to the maximum current of the machine. Refer to the calculation formula below.
Overload protection time (seconds): Y=1000*(1-X)2+B, set HH--36 to B, HH--35 to X, X range [0.75 ~ 0.95]					
HH--37	oL overload protection Recovery Time	S	2 ~ 3600	30	Current overload protection fault elimination delay the set value, then protection recovery
HH--38	Rectified feedback voltage / Feedback voltage	V	220VAC: 180 ~ 480 380VAC: 400 ~ 800 660VAC: 800 ~ 1200	220VAC: 330.0 380VAC: 600.0 660VAC: 1000.0	When the DC bus voltage is higher than the set value, feedback starts. When the set value is lower than this set value, the rectification/feedback stops.

HH--39	Three-phase emergency power supply The output voltage	VAC	220VAC: 140 ~ 300 380VAC: 280 ~ 480 660VAC: 560 ~ 760	220VAC: 220.0 380VAC: 380.0 660VAC: 660.0	Control three-phase emergency power supply output voltage within ±10% range
HH--40	Fan starting temperature	℃	43 ~ 53	43.0	Fan control mode reference chart 5-11
Parameter code	Parameter name	unit	variation range	Defaults	Detailed description of the parameters
HH--41	Emergency power delay enable	1	0 ~ 1	1	0→Enable stop ; 1→Enable output
HH--42	Three-phase emergency power supply Delayed output time	S	0.1 ~ 1800.0	10.0	When the delay output is enabled, this is the time for the three-phase emergency power supply delay output.
Other	Display 8.8.8.8.8.8	keep	keep	keep	Keep

Chart 5-8 Function parameter chart of the control board

Chart 5-9 is the debugging parameter Chart . Refer to Chart 5-5 for the operation steps.

Parameter code	Parameter name	unit	variation range	Defaults	Detailed description of the parameters
UU--00	Restore initialization parameters	1	0 ~ 6	0	When the set value is 6, the control panel will revert to the initialization parameters after being powered on again.
UU--01	PWM carrier frequency	KHz	8.0 ~ 8.0	8.0	Non-professionals, please do not modify
UU--02	PWM dead zone	μS	2.0 ~ 10.0	3.0	Non-professionals, please do not modify
UU--03	PWM output mode	1	0 ~ 1	0	0 vector bipolar 1 vector unipolar
UU--04	Three-phase grid zero crossing	1	500 ~ 4000	2000	Non-professionals, please do not modify

UU--05	Hall rated current	A	5 ~ 2000	100	Non-professionals, please do not modify
UU--06	Number of circles around the Hall	1	1 ~ 5	1	Non-professionals, please do not modify
UU--07	Current rms Display	A	2.0 ~	Display Curren	Enter the required correction value in the modified value.
	correction		1000.0	t value	After 3 seconds, press the “RUN” button to confirm the completion of the automatic calibration (within the correction step length within ±50A, please repeat the correction for more than ±50A)
UU--08	Feedback energy ratio coefficient	1	0.80 ~ 2.00	1.00	Non-professionals, please do not modify
UU--09	Rectified energy proportional coefficient	1	0.80 ~ 2.00	1.00	Non-professionals, please do not modify
UU--10	Feedback power display clear	1	0 ~ 6	0	0 is not cleared; 1 is cleared successfully; 6 enter clear
UU--11	Rectified energy display clear	1	0 ~ 6	0	
UU--12	Grid frequency calculation option	1	0 ~ 2	0	0 rated frequency is not calculated 1 Calculate the real-time frequency of the 50Hz grid 2 Calculate the real-time frequency of the 60Hz grid
UU--13	Input grid rated frequency	Hz	40.0 ~ 70.0	50.00	Rated frequency of three-phase input grid
UU--14	50Hz grid over frequency	Hz	55.0 ~ 65.0	65.00	50Hz grid over frequency protection point
UU--15	50Hz grid underfrequency	Hz	35.0 ~ 45.0	35.00	50Hz grid underfrequency protection point

UU--16	60Hz grid over frequency	Hz	66.0 ~ 78.0	78.00	60Hz grid over frequency protection point
UU--17	60Hz grid underfrequency	Hz	42.0 ~ 54.0	42.00	60Hz grid underfrequency protection point
UU--18	Clear all fault records	1	0 ~ 6	0	0 failure 1 clear success 6 enter clear
UU--19	Leading lag phase angle	Deg ree	-20 ~ 20	0.0	Non-professional please do not modify (left positive and
					right negative)
UU--20	P parameter of current PI	1	0.01 ~ 4.00	1.000	Non-professionals, please do not modify
UU--21	I parameter of current PI	1	0.001 ~ 1.5	0.007	Non-professionals, please do not modify
UU--22	Rectified charging current acceleration	1	1 ~ 4	1	25ms*X，like 25ms*1=25ms
UU--23	Machine running maximum current	A	0.8 ~ 1.1 times	Built-in	Maximum current = this value / Hall number
UU--24	Rectifier feedback or feedback	1	0 ~ 1	0	0→Rectifier feedback；1→feedback
Parameter code	Parameter name	unit	variation range	Defaults	Detailed description of the parameters
UU--25	Three-phase emergency power supply output sampling standard value voltage	VAC	220VAC: 155.0 ~ 465 380VAC: 307.0 ~ 921 660VAC: 450.0 ~ 1350	220VAC: 310.0 380VAC: 614.0 660VAC: 900.0	Non-professionals, please do not modify
UU--26	P parameter of voltage PI	1	0.01 ~ 4.00	0.500	Non-professionals, please do not modify
UU--27	I parameter of voltage PI	1	0.001 ~ 1.5	0.100	Non-professionals, please do not modify

UU--28	Rectified feedback differential pressure level	1	2.0 ~ 16.0	3.0	Voltage difference：220VAC：120/3.0=40.0V Other grid：160/3.0=53.3V
UU--29	Current feedforward decoupling coefficient	1	0.0 ~ 0.250	0.100	Non-professionals, please do not modify WL
UU--30	DI2 is float control	1	0 ~ 2	0	0 invalid 1 short circuit valid 2 disconnection effective
UU--31	Emergency power supply acceleration time	1	1 ~ 15	4	672ms*X，如 672ms*5=2688ms
UU--32	DI4 shorting delay enable	1	0 ~ 1	1	0→Delayed stop；1→Delay enable
UU--33	DI4 short delay time	S	1 ~ 1200	30	DI4 short-circuit shutdown delay time
UU--34	Feedback current deviation value	1	1 ~ 320	40	Non-professionals, please do not modify
UU--35	Relay operating temperature	℃	10.0 ~ 20.0	10.0	Control relay, refer to chart 5-12
UU--36	Floating charge	V	220VAC: 180 ~ 480 380VAC: 400 ~ 800 660VAC: 800 ~ 1200	220VAC: 350.0 380VAC: 650.0 660VAC: 1050.0	Non-professionals, please do not modify
UU--98	Software version		PFA-X.X	X:0 ~ 9	Other parameters, display8.8.8.8.8.8
UU--99	Modify the keyboard password	1	0,1,2,3,4 5,6,7,8,9	default8 88888	Refer to Chart 5-6. After the parameter is initialized, the password will also be initialized to 888888.

Chart 5-9 Debugging parameters of the control board

➢5 Chart 5-10 is the error record parameter chart. Refer to chart 5-3 for the operation steps.

Parameter code	Parameter name	unit	variation range	Defaults	Detailed description of the parameters
REC-00	Latest failure		E0-XXX	E0----	E0---- E1---- E2---- E3---- E4----For no failure
REC-01	The first failure before the latest		E1-XXX	E1----	
REC-02	The latest second failure		E2-XXX	E2----	
REC-03	The latest third failure		E3-XXX	E3----	
REC-04	The latest 4th previous failure		E4-XXX	E4----	
XXX is one of faults as follows: oH1, oH2, EF, oE, LE, HE, FF, UF, PF, oC, and oL. Refer to Chart 6-1.					
REC-05	oH1 Number of failures		oH1-XX	oH1-00	XX：0 ~ 99 cycle display
REC-06	Bus voltage at oH1	V	0 ~ 1240.0	0.0	DC bus voltage
REC-07	R phase voltage at oH1	VAC	0.0 ~ 520	0.0	R phase voltage
REC-08	S phase voltage at oH1	VAC	0.0 ~ 520	0.0	S phase voltage
REC-09	T phase voltage at oH1	VAC	0.0 ~ 520	0.0	T phase voltage
REC-10	R phase current at oH1	A	0 ~ 2000.0	0.0	R phase current
REC-11	S phase current at oH1	A	0 ~ 2000.0	0.0	S phase current
REC-12	T phase current at oH1	A	0 ~ 2000.0	0.0	T phase current
Parameter code	Parameter name	unit	variation range	Defaults	Detailed description of the parameters
REC-13	oH2 Number of failures		oH2-XX	oH2-00	XX：0 ~ 99 cycle display
REC-14	Bus voltage at oH2	V	0 ~ 1240.0	0.0	DC bus voltage
REC-15	R phase voltage at oH2	VAC	0.0 ~ 520	0.0	R phase voltage
REC-16	S phase voltage at oH2	VAC	0.0 ~ 520	0.0	S phase voltage

REC-17	T phase voltage at oH2	VAC	0.0 ~ 520	0.0	T phase voltage
REC-18	R phase current at oH2	A	0 ~ 2000.0	0.0	R phase current
REC-19	S phase current at oH1	A	0 ~ 2000.0	0.0	S phase current
REC-20	T phase current at oH1	A	0 ~ 2000.0	0.0	T phase current
REC-21	EF failure occurrences		EF--XX	EF--00	XX：0 ~ 99 cycle display
REC-22	Bus voltage at EF	V	0 ~ 1240.0	0.0	DC bus voltage
REC-23	R phase voltage at EF	VAC	0.0 ~ 520	0.0	R phase voltage
REC-24	S phase voltage at EF	VAC	0.0 ~ 520	0.0	S phase voltage
REC-25	T phase voltage at EF	VAC	0.0 ~ 520	0.0	T phase voltage
REC-26	R phase current at EF	A	0 ~ 2000.0	0.0	R phase current
REC-27	S phase current at EF	A	0 ~ 2000.0	0.0	S phase current
REC-28	T phase current at EF	A	0 ~ 2000.0	0.0	T phase current
REC-29	oE Number of failures		oE--XX	oE--00	XX：0 ~ 99 cycle display
REC-30	Bus voltage at oE	V	0 ~ 1240.0	0.0	DC bus voltage
REC-31	R phase voltage at oE	VAC	0.0 ~ 520	0.0	R phase voltage
REC-32	S phase voltage at oE	VAC	0.0 ~ 520	0.0	S phase voltage
REC-33	T phase voltage at oE	VAC	0.0 ~ 520	0.0	T phase voltage
REC-34	R phase current at oE	A	0 ~ 2000.0	0.0	R phase current
REC-35	S phase current at oE	A	0 ~ 2000.0	0.0	S phase current
REC-36	T phase current at oE	A	0 ~ 2000.0	0.0	T phase current
REC-37	LE Number of failures		LE--XX	LE--00	XX：0 ~ 99 cycle display
REC-38	Bus voltage at LE	V	0 ~ 1240.0	0.0	DC bus voltage
REC-39	R phase voltage at LE	VAC	0.0 ~ 520	0.0	R phase voltage

REC-40	S phase voltage at LE	VAC	0.0 ~ 520	0.0	S phase voltage
REC-41	T phase voltage at LE	VAC	0.0 ~ 520	0.0	T phase voltage
REC-42	R phase current at RE	A	0 ~ 2000.0	0.0	R phase current
REC-43	S phase current at LE	A	0 ~ 2000.0	0.0	S phase current
REC-44	T phase current at LE	A	0 ~ 2000.0	0.0	T phase current
REC-45	HE Number of failures		HE--XX	HE—00	XX：0 ~ 99 cycle display
REC-46	Bus voltage at HE	V	0 ~ 1240.0	0.0	DC bus voltage
REC-47	R phase voltage at HE	VAC	0.0 ~ 520	0.0	R phase voltage
REC-48	S phase voltage at HE	VAC	0.0 ~ 520	0.0	S phase voltage
REC-49	T phase voltage at HE	VAC	0.0 ~ 520	0.0	T phase voltage
REC-50	R phase current at HE	A	0 ~ 2000.0	0.0	R phase current
REC-51	S phase current at HE	A	0 ~ 2000.0	0.0	S phase current
REC-52	T phase current at HE	A	0 ~ 2000.0	0.0	T phase current
REC-53	FF Number of failures		FF--XX	FF--00	XX：0 ~ 99 cycle display
REC-54	Bus voltage at FF	V	0 ~ 1240.0	0.0	DC bus voltage
Parameter code	Parameter name	unit	variation range	Defaults	Detailed description of the parameters
REC-55	R phase voltage at FF	VAC	0.0 ~ 520	0.0	R phase voltage
REC-56	S phase voltage at FF	VAC	0.0 ~ 520	0.0	S phase voltage
REC-57	T phase voltage at FF	VAC	0.0 ~ 520	0.0	T phase voltage
REC-58	R phase current at FF	A	0 ~ 2000.0	0.0	R phase current
REC-59	S phase current at FF	A	0 ~ 2000.0	0.0	S phase current
REC-60	T phase current at FF	A	0 ~ 2000.0	0.0	T phase current
REC-61	UF Number of failures		UF--XX	UF--00	XX：0 ~ 99 cycle display
REC-62	Bus voltage at UF	V	0～1240.0	0.0	DC bus voltage

REC-63	R phase voltage at UF	VAC	0.0 ~ 520	0.0	R phase voltage
REC-64	S phase voltage at UF	VAC	0.0 ~ 520	0.0	S phase voltage
REC-65	T phase voltage at UF	VAC	0.0 ~ 520	0.0	T phase voltage
REC-66	R phase current at UF	A	0 ~ 2000.0	0.0	R phase current
REC-67	S phase current at UF	A	0 ~ 2000.0	0.0	S phase current
REC-68	T phase current at UF	A	0 ~ 2000.0	0.0	T phase current
REC-69	PF Number of failures		PF--XX	PF--00	XX：0 ~ 99 cycle display
REC-70	Bus voltage at PF	V	0 ~ 1240.0	0.0	DC bus voltage
REC-71	R phase voltage at PF	VAC	0.0 ~ 520	0.0	R phase voltage
REC-72	S phase voltage at PF	VAC	0.0 ~ 520	0.0	S phase voltage
REC-73	T phase voltage at PF	VAC	0.0 ~ 520	0.0	T phase voltage
REC-74	R phase current at PF	A	0 ~ 2000.0	0.0	R phase current
REC-75	S phase current at PF	A	0 ~ 2000.0	0.0	S phase current
REC-76	T phase current at PF	A	0 ~ 2000.0	0.0	T phase current
REC-77	oC Number of failures		oC--XX	oC--00	XX：0 ~ 99 cycle display
REC-78	Bus voltage at oC	V	0 ~ 1240.0	0.0	DC bus voltage
REC-79	R phase voltage at oC	VAC	0.0 ~ 520	0.0	R phase voltage
REC-80	S phase voltage at oC	VAC	0.0 ~ 520	0.0	S phase voltage
REC-81	T phase voltage at oC	VAC	0.0 ~ 520	0.0	T phase voltage
REC-82	R phase current at oC	A	0 ~ 2000.0	0.0	R phase current
REC-83	S phase current at oC	A	0 ~ 2000.0	0.0	S phase current
REC-84	T phase current at oC	A	0 ~ 2000.0	0.0	T phase current
REC-85	oL Number of failures		oL--XX	oL--00	XX：0 ~ 99 cycle display

REC-86	Bus voltage at oL	V	0 ~ 1240.0	0.0	DC bus voltage
REC-87	R phase voltage at oL	VAC	0.0 ~ 520	0.0	R phase voltage
REC-88	S phase voltage at oL	VAC	0.0 ~ 520	0.0	S phase voltage
REC-89	T phase voltage at oL	VAC	0.0 ~ 520	0.0	T phase voltage
REC-90	R phase current at oL	A	0 ~ 2000.0	0.0	R phase current
REC-91	S phase current at oL	A	0 ~ 2000.0	0.0	S phase current
REC-92	T phase current at oL	A	0 ~ 2000.0	0.0	T phase current
Others	Display 8.8.8.8.8.8.	keep	Keep	Keep	Keep

Chart 5-10 Fault record parameter chart of the control board

Value	Fan control instructions
0	FF04 display value is higher than HH40 item or FF05 display value is higher than HH40 item or IGBT drive, fan operation; FF04 display value is less than (HH40 - 3) and FF05 display value is less than (HH40 - 3) and IGBT stops driving, delay 1 second fan stop
1	Power on Fan keep working
2	When DI2 is shorted to COM, the fan runs; when DI2 is disconnected from COM, the fan stops after 1 second delay.
3	FF--04 indicates that the value is higher than HH--40 or FF--05 is higher than HH--40 or DI2/COM is shorted, the fan is running; When FF--04 shows that the value is less than (HH--40 - 3) and FF--05 shows that the value is less than (HH--40 - 3) and DI2/COM is disconnected, the fan stops after 1 second delay.
4	FF--04 display value is higher than HH--40 parameters or FF--05 display value is higher than HH--40 parameters, fan operation; FF--04 display value is less than (HH--40 - 3) and FF--05 display value is less than (HH--40 - 3), delay 1 second fan stop

Chart 5-11 Fan control mode Chart of the control board

➢ TA/TB/TC relay and T1A/T1B/T1C relay control mode Chart

Value	TA/TB/TC relay control mode Operation：TA/TB Open，TC/TB Closed Stop：TA/TB Closed，TC/TB Open	T1A/T1B/T1C relay control mode Operation：T1A/T1B Open，T1C/T1B Closed Stop：T1A/T1B Closed，T1C/T1B Open
0	Overload status control:Enter OL state, Operation; exit OL state, Stop	Overload status control:Enter OL state, Operation; exit OL state, Stop
1	DI1 Control：DI1/COM Shorted,operation；DI1/COM disconnected,Stop	
2	DI2 Control： DI2/COMShorted,operation； DI2/COM disconnected,Stop	DI2 Control： DI2/COMShorted,operation；DI2/COM disconnected,Stop
3	DI3 Control：DI3/COMShorted,operation；DI3/COM disconnected,Stop	
4	DI4 Control： DI4/COMShorted,operation； DI4/COM disconnected,Stop	DI4 Control： DI4/COMShorted,operation；DI4/COM disconnected,Stop
5	DI5 Control：DI5/COMShorted,operation；DI5/COM disconnected,Stop	
6	DI6 Control： DI6/COMShorted,operation； DI6/COM disconnected,Stop	DI6 Control： DI6/COMShorted,operation；DI6/COM disconnected,Stop
7	DI7 Control：DI7/COMShorted,operation；DI7/COM disconnected,Stop	
8	EXT Control： EXT/COMShorted,operation； EXT/COM disconnected,Stop	EXT Control： EXT/COMShorted,operation；EXT/COM disconnected,Stop
9	Fan control: fan operation, operation; fan stop, stop	
10	Three-phase emergency power output status control: Emergency power output, operation; no emergency power output, stop	Three-phase emergency power output status control: Emergency power output, operation; no emergency power output, stop

11	Rectifier feedback output state control: rectified feedback output, operation; no rectification feedback output, stop	
12	PWM output enable state control: PWM enable output, operation; PWM stop output, stop	PWM output enable state control: PWM enable output, operation; PWM stop output, stop
13	DC bus charging contactor state control: when the contactor is closed, operation; when the contactor is opened, stops	
14	Error control: action when there is error; Stop when there is no error	
15	DC bus threshold voltage control: set HH--08 item to Vth Busbar>Vth, operation; busbar <(Vth - 20), Stop	DC bus threshold voltage 1 control: set HH--09 item to Vth1 Busbar>Vth1, operation; busbar <(Vth1 - 20), Stop
16	DC bus threshold voltage control: set HH--08 item to Vth Busbar <Vth, operation; busbar> (Vth + 20), stop	DC bus threshold voltage 1 control: set HH--09 item to Vth1 bus line <Vth1, operation; bus line>(Vth1 + 20), stop

Control value	TA/TB/TC relay control instructions Operation: TA/TB is open, TC/TB is closed Stop: TA/TB closed, TC/TB open	T1A/T1B/T1C Relay Control Description operation: T1A/T1B is open, T1C/T1B is closed Stop: T1A/T1B is closed and T1C/T1B is open
17	DI1 is the enable control terminal, and HH--10 is the timing time: During the time set by HH--10, the HH--12 on-time and the HH--14 off-time are alternately switched in turn. On time, operation; turn off time,Stop	DI1 is the enable control terminal, and HH--11 is the timing time: Periodically during the time set in HH--11 The HH--13 conduction time and the HH--15 off time are alternately switched. Turn On time, operation; turn off time, Stop
18	DI2 is the enable control terminal, and HH--10 is the timing time: During the time set by HH--10, the HH--12 on-time and the HH--14 off-time are alternately switched in turn. Turn On time, operation; turn off time,Stop	DI2 is the enable control terminal, and HH--11 is the timing time: Periodically during the time set in HH--11 The HH--13 conduction time and the HH--15 off time are alternately switched. Turn On time, operation; turn off time, Stop

19	EXT is the enable control terminal, HH--10 items are the timing time: During the time set by HH--10, the HH--12 on-time and the HH--14 off-time are alternately switched in turn. Turn On time, operation; turn off time, Stop	EXT is the enable control terminal, and HH--11 is the timed: Periodically during the time set in HH--11 The HH--13 conduction time and the HH--15 off time are alternately switched. Turn On time, operation; turn off time, Stop
20	DI1 is the enable control terminal: the HH--12 on-time and the HH--14 off-time are cyclically switched in a periodic manner. Turn On time, operation; turn off time,Stop	DI1 is the enable control terminal: the HH--13 conduction time and the HH--15 off time are cyclically switched in a periodic manner. Turn On time, operation; turn off time, Stop
21	DI2 is the enable control terminal: the HH--12 on-time and the HH--14 off-time are cyclically switched in a periodic manner. Turn On time, operation; turn off time, Stop	DI2 is the enable control terminal: the HH--13 conduction time and the HH--15 turn-off time are cyclically switched in a periodic manner. Turn On time, operation; turn off time, stop
22	EXT is the enable control terminal: the HH--12 on-time and the HH--14 off-time are cyclically switched in a periodic manner. Turn On time, operation; turn off time, stop	EXT is the enable control terminal: the HH--13 conduction time and the HH--15 off time are cyclically switched in a periodic manner. turn On time, operation; turn off time, Stop
23	DC bus charging is completed and there is no error, operation; otherwise, Stop	DC bus charging is completed and there is no error, operation; otherwise, Stop
24	Sensor T1 temperature control: set UU--35 items to Th T1>Th, operation; T1<(Th-2), Stop	Sensor T1 temperature control: set UU--35 items to Th T1>Th, operation; T1<(Th-2), stop

Chart 5-12 Control board Relay control mode Chart

5.2 Setting of common control parameters

5.2.1 Setting of rectification feedback/feedback action voltage

If the rectification feedback/feedback action voltage does not meet the requirements of field operation, you can change the HH--38 parameters in Chart 5-8 to change the rectification feedback/feedback action voltage.

5.2.2 Setting of three-phase emergency power supply output voltage

If the output voltage of the three-phase emergency power supply cannot meet the requirements of field operation, you can change the HH--39 parameters in Chart 5-8 to change the output voltage of the three-phase emergency power supply.

5.2.3 Setting of three-phase emergency power supply delay output time

From the three-phase power grid to the three-phase emergency power output, the fastest response time is 50mS. If the time of the three-phase emergency power supply delay output cannot meet the requirements of field work, you can change the HH--41 parameter and the HH--42 parameter in Chart 5-8 to change the time from the three-phase power failure to the three-phase emergency power output.

5.2.4 Setting of the contact voltage of the charging contactor

If the charging contactor's pull-in voltage cannot meet the requirements of field work, you can change the HH--18 parameter in Chart 5-8 to change the operating voltage of the charging contactor.

5.2.5 Charging contactor pull-in delay time setting

If the charging contactor pull-in delay time does not meet the requirements of field work, you can change the HH--21 parameter in Chart 5-8 to change the delay time of the charging contactor.

5.2.6 Setting of Fault Protection Recovery Time

The software default fault protection recovery time is 30S. If the fault protection recovery time does not meet the requirements of field work, you can change the fault protection recovery time by changing the HH--02 or HH--03 or HH--05 or HH--22 or HH--23 or HH--24 or HH--29 or HH--30 or HH--33 or HH--34 or HH--37 parameters in Chart 5-8.

5.2.7 Control Mode Settings

If the NZR sine wave energy feedback device needs to be configured in other control modes, it can be configured according to the UU--24 parameters and UU--30 parameters in Chart 4-4 and Chart 5-9. Refer to Chart 4-3 for the corresponding control board port function description. DI1/COM is the enable control terminal, which can be configured as a simple PLC control function.

5.2.8 Relay normally open normally closed contact output setting

If you need to use the relay normally open normally closed contact output as the control, you can set the relay configuration, refer to the HH--06 and HH--07 parameters in Chart 5-8 and Chart 5-12.

5.2.9 Overheat protection temperature value Setting

If you need to change the overheat protection temperature value, please refer to the HH--00 and HH--01 parameters in Chart 5-8.

5.2.10 Fan Control Mode Settings

If you need to change the fan control mode, please refer to the HH--04 parameters in Chart 5-8 and Chart 5-11.

5.2.11 Overvoltage Protection Threshold VoltageSetting

To change the overvoltage protection threshold voltage, refer to the HH--19 or HH--31 parameters in Chart 5-8.

5.2.12 Undervoltage Protection Threshold VoltageSetting

To change the undervoltage protection threshold voltage, refer to the HH--20 or HH--32 parameters in Chart 5-8.

5.2.13 Voltage and current zero offset correction Setting

Refer to HH--26 parameters in Chart 5-8.

5.2.14 Voltage and current display value correction Setting

Refer to HH--16 or HH--28 parameters in Chart 5-8.

5.2.15 Current overload time setting

Refer to the HH--35 and HH--36 parameters in Chart 5-8.

5.2.16 Rectification charging current acceleration time setting

Refer to the UU--22 parameters in Chart 5-9 for the time when the rectified charging current is accelerated to the bus voltage.

5.2.17 Acceleration time setting for three-phase emergency power output

For the time when the emergency power supply is accelerated from zero to the standard voltage output, refer to the UU--31 parameters in Chart 5-9.

5.2.18 Floating Charge Control Settings

When the inverter stops, when the DC bus voltage of the NZR device is required to rise, the floating charge source control settings refer to the UU--30 and UU--36 parameters in Chart 5-9.

The setting of the above common control parameters can also be completed through RS485 communication settings.

5.3 RS485 communication

5.3.1 Data communication protocol adopted

The communication protocol used by the control board in our product unit is a subset of the MODBUS communication protocol. The communication protocol defines the method and function code for reading and writing control board parameters.

5.3.2 Networking Mode

Through RS485 communication, it can form two single-host multi-slave and single-single single-slave networking modes.

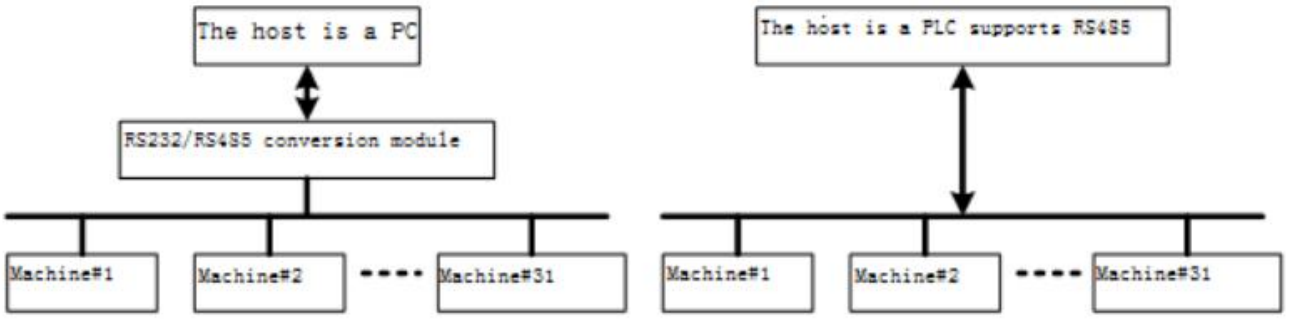


Figure 5-2 Schematic diagram of a single-master multi-slave network

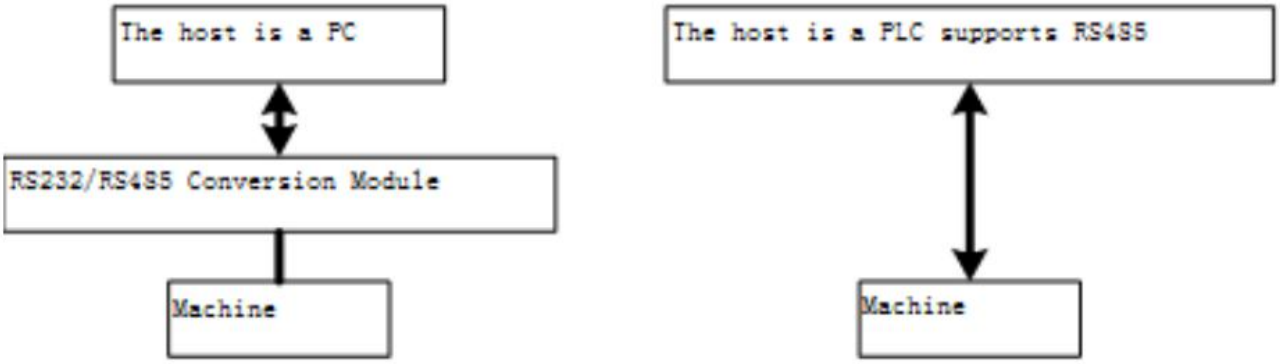


Figure 5-3 Schematic diagram of a single-master single-slave network

5.3.3 Communication physical interface

The control board in our product unit has RS485 interface terminals (respectively: RS485 signal positive "485+" and RS485 signal negative "485-"), communication mode is asynchronous communication, half duplex, 9600 baud rate, eight digits Data bit, no parity, one stop bit.

5.3.4 Communication protocol format

The MODBUS protocol of RTU mode is only supported in our product device. The communication frame format is as follows:

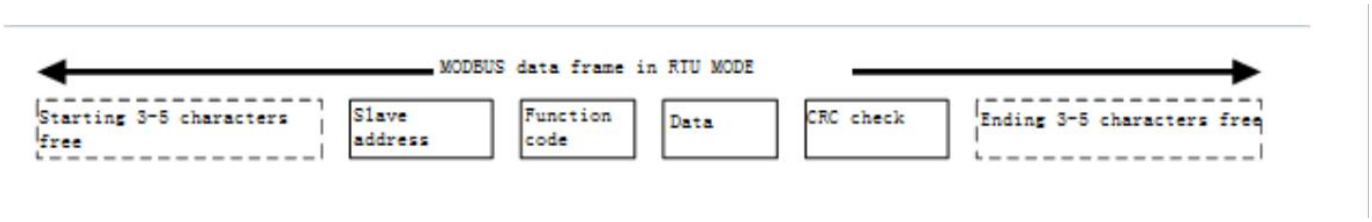


Figure 5-4 Communication protocol format

In the MODBUS communication protocol of the RTU mode, the data is specified to transmit the upper byte first and then the lower byte. Data verification uses CRC

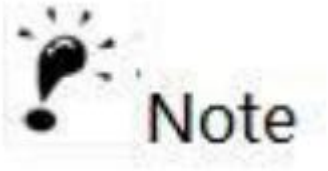
cyclic redundancy check.
The slave address range is 0 to 31. It can be set in the keyboard. If the parameter "HH25" is displayed as 31, it means that the slave address is 31, which is 0x1F.

5.3.5 MODBUS communication protocol function code

1、Support for reading and writing parameters

function code	Function code meaning
0x06	Read a number of consecutive addresses (up to 16, at least 1) of registers
0x08	Test loop feedback
0x16	Write a single register

Chart 5-13 Function codes supported by the control board



➢ The control panel's function parameters, control parameters and status parameters are mapped to the MODBUS read and write registers.

➢ The slave address range is 0 to 31. It can be set in the keyboard. If the parameter "HH25" is displayed as 31, it means that the slave address is 31, which is 0x1F. (DI1/COM is the enable control port: DI1/COM is shorted to enable; DI1/COM is disconnected to stop. When modifying parameters,
DI1/COM needs to be disconnected to modify the parameters.)

➢ When RS485 communication is performed on a single machine, the J4 interface on the control board is set to ROFF (the default corresponding two pin pins are not connected); when multiple machines RS485 network communication, the J4 interface on the control board is set to RON (set
Corresponding to the two pins shorted).

5.3.6 Communication data format description

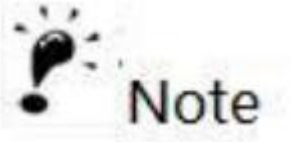
function code	Features	Command information		Response message	Abnormal response information
		Number of bytes	Minimum number of bytes	Maximum number of bytes	Number of bytes
0x06	Read a number of consecutive registers	8	7	37	5
0x08	Test loop feedback	8	8	8	5
0x16	Write a single register	8	8	8	5

Chart 5-14 Information frame byte length

5.3.7 Communication response error code

Error code	Error condition
0x00	When testing loop feedback, the input test data does not match
0x01	The test address entered does not match when testing loop feedback
0x02	The number of read registers is either zero or more than 16, or the address overflows (exceeding the 0x012C address range)
0x03	DI1/COM is not disconnected when modifying parameters
0x04	The entered address does not match the address of the modifiable register
0x05	The register modification has not been completed yet, and new parameters are written to be modified.
0x06	The input function code does not match, or the address of the input register overflows (exceeding the 0x012C address range)
0x07	The entered CRC check code does not match
No response message Compatible with multiple RS485 in parallel	The input RS485 communication machine address does not match (please set the correct communication format: 9600 baud rate, eight data bits, no parity, one stop bit; if the communication format is set incorrectly, there is no response message or response Error in information data)
	Eight bytes of command information can be input in batches, or input once, and there is no response message when the command information entered is less than eight bytes.

5-15 Communication response error code



- If there is no response information, set the correct communication format and test the RS485 link with test loop feedback. If there is no response message from the test loop feedback, there is a problem with the RS485 link connection.

- RS485 is half-duplex communication. It is guaranteed that there is no command information input within 200mS of the response message, otherwise the response information data will be wrong.

- Enter eight bytes of command information as one data command frame, and each data command frame time interval requirement is greater than 200mS. Otherwise, the input command information overlaps with the response information, causing the response information to be in error or lost.

- If the input data command frame is larger than eight bytes, the redundant input command information overlaps with the response information, causing the response information data to be in error.

5.3.8 Abnormal response message format

	Slave address	function code	Error code	CRC check	
				High byte	Low byte
Hexadecimal data	1F (correct slave address)	00 (function code initialization)	07	01	C4

Chart 5-16 Format of abnormal response information

5.3.9 Test loop feedback command information and response message format

	Slave address	function code	Test register address		Test data content		CRC check	
			High byte	Low byte	High byte	Low byte	High byte	Low byte
Hexadecimal data	1F (default)	08	00	55	AA	AA	0D	7A

Chart 5-17 Command information format for test loop feedback

	Slave address	function code	Test register address		Test data content		CRC check	
			High byte	Low byte	High byte	Low byte	High byte	Low byte
Hexadecimal data	1F (default)	08	00	55	AA	AA	0D	7A

Chart 5-18 Response message format for test loop feedback

5.3.10 Register definition

The control board defines the hexadecimal data registers shown in the following table (each data register is 16-bit unsigned integer data unsigned int)

Address	Function description	Bit description	Description	Note
0x0000	PFE error status	0	Error Status	1 Error，0 Normal
		1	oH1 temperature sensor T1 overheat Error status	1 overheat，0 Normal

		2	oH2 temperature sensor T2 overheat error status	1 overheat，0 Normal
		3	EF terminal EXT external input error status	1 External failure，0 Normal
		4	oE DC bus overvoltage error status	1 Overvoltage error，0 Normal
		5	LE DC bus undervoltage error condition	1 Undervoltage error，0 Normal
		6	HE DC bus hardware overvoltage error status	1 Hardware overvoltage，0 Normal
		7	FF three-phase grid frequency error status	1 Frequency failure，0 Normal
		8	UF three-phase power grid amplitude error status	1 Amplitude failure，0 Normal
		9	PF three-phase power grid phase error status	1 Phase failure，0 Normal
		10	oC three-phase overcurrent error status	1 Overcurrent error，0 Normal
		11	oL three-phase current overload error status	1 Overload error，0 Normal
		12	Reserved	Reserved
		13	Reserved	Reserved
		14	Reserved	Reserved
		15	Reserved	Reserved
0x0001	Feedback energy	High 16	Cumulative feedback to the grid	32-bit feedback power display,Unit：0.0001 KWH
0x0002	Feedback energy	Low 16		
0x0003	PWM output enable state	16 Bit	0 is the stop output; 1 is the enable output	Unit：1
0x0004	AC grid voltage level	16 Bit	Applicable AC grid voltage level, RMS	Unit：VAC
Address	Function description	Bit description	Description	Note
0x0005	Machine power	16 Bit	Machine power rating	Unit: 0.1KW
0x0006	Sensor T1 temperature	16 Bit	Temperature sensor temperature T1	Does not display negative numbers, unit: 0.1 ° C
0x0007	Sensor T2 temperature	16 Bit	Temperature sensor temperature T2	
0x0008	Fan control status	16 Bit	0 is the fan stop; 1 is the fan running	

0x0009	EEPROM status	16 Bit	0 is abnormal for reading and writing; 1 is normal for reading and writing.	
0x000A	RS232 communication status	16 Bit	0 is not sending data; 1 is sending data	Unit: 1
0x000B	TA/TB/TC Relay output status	16 Bit	0 is TA/TB closed, TC/TB is open; 1 is open for TA/TB, TC/TB is closed;	Unit: 1
0x000C	TA/TB/TC Relay output status	16 Bit	0 is closed for T1A/T1B and T1C/T1B is open; 1 is open for T1A/T1B and closed for T1C/T1B;	Unit: 1
0x000D	DI1 input status	16 Bit	1: DI1/COM is disconnected; 0: DI1/COM is shorted	Unit: 1
0x000E	DI2 input status	16 Bit	1: DI2/COM is disconnected; 0: DI2/COM is shorted	Unit: 1
0x000F	DI3 input status	16 Bit	1: DI3/COM is disconnected; 0: DI3/COM is shorted	Unit: 1
0x0010	DI4 input status	16 Bit	1: DI4/COM disconnected; 0: DI4/COM shorted	Unit: 1
0x0011	DI5 input status	16 Bit	1: DI5/COM disconnected; 0: DI5/COM shorted	Unit: 1
0x0012	DI6 input status	16 Bit	1: DI6/COM is disconnected; 0: DI6/COM is shorted	Unit: 1
0x0013	DI7 input status	16 Bit	1: DI7/COM is disconnected; 0: DI7/COM is shorted	Unit: 1
0x0014	EXT input status	16 Bit	1: EXT/COM is disconnected 0: EXT/COM is shorted	Unit: 1
0x0015	Machine working mode	16 Bit	0 stop mode; 1 rectification feedback / feedback mode; 2 emergency power output mode	Unit: 1
0x0016	DC bus voltage	16 Bit	Display DC bus voltage value	Unit: 0.1V
0x0017	DC bus charging mark	16 Bit	0 is not completed for charging; 1 is charging completed	Unit: 1
0x0018	Chip PWM output status	16 Bit	0 is no PWM output; 1 is PWM output	Unit: 1
0x0019	Rectification feedback state	16 Bit	0 non-rectifying feedback state; 1 rectification feedback state	Unit: 1
0x001A	R-phase zero-bias coefficient of power grid	16 Bit	The display range is between 30768 and 34768, indicating that the correction is correct, otherwise it needs to be recalibrated.	Unit: 1

0x001B	Power grid S phase zero offset coefficient	16 Bit		
0x001C	Grid T phase zero offset coefficient	16 Bit		
0x001D	Current R phase zero offset coefficient	16 Bit	The display range is between 30768 and 34768, indicating that the correction is correct. Otherwise, it needs to be recalibrated (the Hall sensor should be connected and then corrected)	Unit: 1
0x001E	Current S phase zero offset coefficient	16 Bit		
0x001F	Current T phase zero offset coefficient	16 Bit		
0x0020	Phase sequence of three-phase power grid	16 Bit	0: R→S→T phase sequence; 1:R →T→S phase sequence	Unit: 1
0x0021	Three-phase grid voltage	16 Bit	Display three-phase AC grid voltage, RMS	Unit: 0.1VAC
0x0022	R phase grid voltage	16 Bit	Display R phase AC grid voltage, RMS	Unit: 0.1VAC
0x0023	S phase grid voltage	16 Bit	Display S phase AC grid voltage, RMS	Unit: 0.1VAC
0x0024	T phase grid voltage	16 Bit	Display T phase AC grid voltage, RMS	Unit: 0.1VAC
0x0025	Three-phase average current	16 Bit	Average current of three-phase AC grid, RMS	Unit: 0.1A
0x0026	R phase current	16 Bit	Average current of R-phase AC grid, RMS	Unit: 0.1A
0x0027	S phase current	16 Bit	Average current of the S-phase AC grid, RMS	Unit: 0.1A
0x0028	T phase current	16 Bit	Average current of the T-phase AC grid, RMS	Unit: 0.1A
0x0029	Rectified electric energy	High 16 Bit	Consumed cumulative power consumption of the grid during rectification	32-bit rectified power display, Unit: 0.0001 kWh
0x002A	Rectified electric energy	Low 16 Bit		

0x002B	Three-phase grid average frequency	16 Bit	Display the average frequency of the three-phase grid	Unit: 0.01Hz
Address	Function description	Bit description	Description	Note
0x002C	R phase grid frequency	16 Bit	Display R phase grid frequency	Unit: 0.01Hz
0x002D	S phase grid frequency	16 Bit	Display S phase grid frequency	Unit: 0.01Hz
0x002E	T phase grid frequency	16 Bit	Display T phase grid frequency	Unit: 0.01Hz
0x002F	Machine running maximum current	16 Bit	Actual maximum current = this value / Hall number	Unit: 0.1A
0x0030	Default setting maximum current	16 Bit	Actual maximum current = this value / Hall number	Unit: 0.1A
0x0031	Feedback power	High 16 Bit	Display the power delivered back to the grid	Unit：0.001KW
0x0032	Feedback power	Low 16 Bit		
0x0033	Rectified power	High 16 Bit	Display the power consumption of the grid when rectifying	Unit: 0.001KW
0x0034	Rectified power	Low 16 Bit		
0x0035	Reserved	16 Bit	Reserved	Reserved
.....	Reserved	16 Bit	Reserved	Reserved
0x0064	Reserved	16 Bit	Reserved	Reserved
0x0065	Latest failure	16 Bit	Example: Read any registered value 0x1903 in 0x0065 to 0x0069 as decimal 6403, X is thousands, Y is hundreds, Z is tens and units, then X=6, Y=4, Z=03, check the chart It is oH2 error; when the read register value is 0x0000, it means no error ("-" and " " are meaningless characters, such as "-EF" actually means "EF" error)	
0x0066	The first failure before the latest	16 Bit		
0x0067	The latest second failure	16 Bit		

0x0068	The latest third failure	16 Bit	
0x0069	The latest 4th previous failure	16 Bit	

X/Y value	0	1	2	3	4	5	6	7	8	9			
represent	C	d	E	F	H	L	o	P	U	-			
Z value	01	02	03	04	05	06	07	08	09	10	11	12	13
represent	0	1	2	3	4	5	6	7	8	9	A	b	C
Z Value	14	15	16	17	18	19	20	21	22	23			
represent	D	E	F	H	L	o	P	U	-				

0x006A	oH1 failure occurrences	16 Bit	Number of failures, 0 to 99 cycles display	Unit: 1
0x006B	Bus voltage at oH1	16 Bit	DC bus voltage at oH1 error	Unit: 0.1V
0x006C	R phase voltage at oH1	16 Bit	R-phase voltage at oH1 error	Unit: 0.1VAC
0x006D	S phase voltage at oH1	16 Bit	S phase voltage at oH1 error	Unit: 0.1VAC
0x006E	T phase voltage at oH1	16 Bit	T-phase voltage at oH1 error	Unit: 0.1VAC
0x006F	R phase current at oH1	16 Bit	R phase current at oH1 error	Unit: 0.1A
0x0070	S phase current at oH1	16 Bit	S phase current at oH1 error	Unit: 0.1A
0x0071	Phase T current at oH1	16 Bit	Phase T current at oH1 error	Unit: 0.1A
0x0072	oH2 failure occurrences	16 Bit	Number of failures, 0 to 99 cycles display	Unit: 1
0x0073	Bus voltage at oH2	16 Bit	DC bus voltage at oH2 error	Unit: 0.1V
0x0074	R phase voltage at oH2	16 Bit	R-phase voltage at oH2 error	Unit: 0.1VAC
0x0075	S phase voltage at oH2	16 Bit	S phase voltage at oH2 error	Unit: 0.1VAC
0x0076	T-phase voltage at oH2	16 Bit	T-phase voltage at oH2 error	Unit: 0.1VAC
0x0077	R phase current at oH2	16 Bit	R-phase current at oH2 error	Unit: 0.1A
0x0078	S phase current at oH2	16 Bit	S phase current at oH2 error	Unit: 0.1A
0x0079	Phase T current at oH2	16 Bit	Phase T current at oH2 error	Unit: 0.1A

0x007A	EF failure occurrences	16 Bit	Number of failures, 0 to 99 cycles display	Unit: 1
0x007B	Bus voltage at EF	16 Bit	DC bus voltage at EF error	Unit: 0.1V
0x007C	R phase voltage at EF	16 Bit	R-phase voltage at EF error	Unit: 0.1VAC
Address	Function description	Bit description	Description	Note
0x007D	S phase voltage at EF	16 Bit	S phase voltage at EF error	Unit: 0.1VAC
0x007E	T phase voltage at EF	16 Bit	T-phase voltage at EF error	Unit: 0.1VAC
0x007F	R phase current at EF	16 Bit	R phase current in EF error	Unit: 0.1A
0x0080	S phase current at EF	16 Bit	S phase current in EF error	Unit: 0.1A
0x0081	T phase current at EF	16 Bit	T-phase current in EF error	Unit: 0.1A
0x0082	oE failure occurrences	16 Bit	Number of failures, 0 to 99 cycles display	Unit: 1
0x0083	Bus voltage at oE	16 Bit	DC bus voltage at oE error	Unit: 0.1V
0x0084	R phase voltage at oE	16 Bit	R-phase voltage at oE error	Unit: 0.1VAC
0x0085	S phase voltage at oE	16 Bit	S phase voltage at oE error	Unit: 0.1VAC
0x0086	T-phase voltage at oE	16 Bit	T-phase voltage at oE error	Unit: 0.1VAC
0x0087	R phase current at oE	16 Bit	R phase current at oE error	Unit: 0.1A
0x0088	S phase current at oE	16 Bit	S phase current at oE error	Unit: 0.1A
0x0089	Phase T current at oE	16 Bit	T phase current at oE error	Unit: 0.1A
0x008A	LE failure occurrences	16 Bit	Number of failures, 0 to 99 cycles display	Unit: 1
0x008B	Bus voltage at LE	16 Bit	DC bus voltage at LE error	Unit: 0.1V
0x008C	R phase voltage at LE	16 Bit	R-phase voltage at LE error	Unit: 0.1VAC
0x008D	S phase voltage at LE	16 Bit	S-phase voltage at LE error	Unit: 0.1VAC
0x008E	T phase voltage at LE	16 Bit	T-phase voltage at LE error	Unit: 0.1VAC

0x008F	R phase current at LE	16 Bit	R phase current when LE error	Unit: 0.1A
0x0090	S phase current at LE	16 Bit	S-phase current at LE error	Unit: 0.1A
0x0091	T phase current at LE	16 Bit	T-phase current at LE error	Unit: 0.1A
0x0092	Number of HE failures	16 Bit	Number of failures, 0 to 99 cycles display	Unit: 1
0x0093	Bus voltage at HE	16 Bit	DC bus voltage at HE error	Unit: 0.1V
0x0094	R phase voltage at HE	16 Bit	R-phase voltage at HE error	Unit: 0.1VAC
0x0095	S phase voltage at HE	16 Bit	S phase voltage at HE error	Unit: 0.1VAC
0x0096	T phase voltage at HE	16 Bit	T phase voltage at HE error	Unit: 0.1VAC
0x0097	R phase current in HE	16 Bit	R phase current when HE fails	Unit: 0.1A
0x0098	S phase current in HE	16 Bit	S phase current when HE fails	Unit: 0.1A
0x0099	T phase current in HE	16 Bit	T phase current when HE fails	Unit: 0.1A
0x009A	FF failure occurrences	16 Bit	Number of failures, 0 to 99 cycles display	Unit: 1
0x009B	Bus voltage at FF	16 Bit	DC bus voltage at FF error	Unit: 0.1V
0x009C	R phase voltage at FF	16 Bit	R-phase voltage at FF error	Unit: 0.1VAC
0x009D	S phase voltage at FF	16 Bit	S phase voltage at FF error	Unit: 0.1VAC
0x009E	T-phase voltage at FF	16 Bit	T-phase voltage at FF error	Unit: 0.1VAC
0x009F	R phase current at FF	16 Bit	R phase current in FF error	Unit: 0.1A
0x00A0	S phase current at FF	16 Bit	S phase current in FF error	Unit: 0.1A
0x00A1	T phase current at FF	16 Bit	T phase current in FF error	Unit: 0.1A
0x00A2	UF failure occurrences	16 Bit	Number of failures, 0 to 99 cycles display	Unit: 1
0x00A3	Bus voltage at UF	16 Bit	DC bus voltage at UF error	Unit: 0.1V
0x00A4	R-phase voltage	16 Bit	R-phase voltage at UF error	Unit: 0.1VAC

	at UF			
0x00A5	S phase voltage at UF	16 Bit	S phase voltage at UF error	Unit: 0.1VAC
0x00A6	T-phase voltage at UF	16 Bit	T-phase voltage at UF error	Unit: 0.1VAC
Address	Function description	Bit description	Description	Note
0x00A7	R phase current at UF	16 Bit	R phase current in UF error	Unit: 0.1A
0x00A8	S phase current at UF	16 Bit	S phase current in UF error	Unit: 0.1A
0x00A9	Phase T current at UF	16 Bit	T-phase current in UF error	Unit: 0.1A
0x00AA	PF failure occurrences	16 Bit	Number of failures, 0 to 99 cycles display	Unit: 1
0x00AB	Bus voltage at PF	16 Bit	DC bus voltage at PF error	Unit: 0.1V
0x00AC	R phase voltage at PF	16 Bit	R-phase voltage at PF error	Unit: 0.1VAC
0x00AD	S phase voltage at PF	16 Bit	S phase voltage at PF error	Unit: 0.1VAC
0x00AE	T phase voltage at PF	16 Bit	T-phase voltage at PF error	Unit: 0.1VAC
0x00AF	R phase current at PF	16 Bit	R phase current in PF error	Unit: 0.1A
0x00B0	S phase current at PF	16 Bit	S phase current in PF error	Unit: 0.1A
0x00B1	Phase T current at PF	16 Bit	T phase current in PF error	Unit: 0.1A
0x00B2	oC failure occurrences	16 Bit	Number of failures, 0 to 99 cycles display	Unit: 1
0x00B3	Bus voltage at oC	16 Bit	DC bus voltage at oC error	Unit: 0.1V
0x00B4	R phase voltage at oC	16 Bit	R phase voltage at oC error	Unit: 0.1VAC
0x00B5	S phase voltage at oC	16 Bit	S phase voltage at oC error	Unit: 0.1VAC
0x00B6	T-phase voltage at oC	16 Bit	T-phase voltage at oC error	Unit: 0.1VAC
0x00B7	R phase current at oC	16 Bit	R phase current at oC error	Unit: 0.1A
0x00B8	S phase current	16 Bit	S phase current at oC error	Unit: 0.1A

	at oC			
0x00B9	Phase T current at oC	16 Bit	Phase T current at oC error	Unit: 0.1A
0x00BA	oL failure occurrences	16 Bit	Number of failures, 0 to 99 cycles display	Unit: 1
0x00BB	Bus voltage at oL	16 Bit	DC bus voltage at oL error	Unit: 0.1V
0x00BC	R phase voltage at oL	16 Bit	R-phase voltage at oL error	Unit: 0.1VAC
0x00BD	S phase voltage at oL	16 Bit	S phase voltage at oL error	Unit: 0.1VAC
0x00BE	T-phase voltage at Ol	16 Bit	T-phase voltage at oL error	Unit: 0.1VAC
0x00BF	R phase current at oL	16 Bit	R phase current at oL error	Unit: 0.1A
0x00C0	S phase current at oL	16 Bit	S phase current at oL fault	Unit: 0.1A
0x00C1	T phase current at oL	16 Bit	T-phase current at oL fault	Unit: 0.1A
0x00C2	Reserved	16 Bit	Reserved	Reserved
.....	Reserved	16 Bit	Reserved	Reserved
0x00C8	Reserved	16 Bit	Reserved	Reserved
The above registers are read-only registers The following registers are read and write registers				
0x00C9	Sensor T1 oH1 overheat protection temperature	16 Bit	If the value of the T1 temperature sensor is higher than this setting, jump oH1 overheat protection	Range 550 ~ 950, Unit: 0.1 ℃
0x00CA	Sensor T2 oH2 overheat protection temperature	16 Bit	If the value of the T2 temperature sensor is higher than this setting, jump oH2 overheat protection	Range 550 ~ 950, Unit: 0.1 ℃
0x00CB	oH1 overheat protection recovery time	16 Bit	After the oH1 error is eliminated and the set value is delayed, the protection is restored.	Range 2 to 3600, Unit: S
0x00CC	oH2 overheat protection recovery time	16 Bit	After the oH2 fault is eliminated and the set value is delayed, the protection is restored.	Range 2 to 3600, Unit: S
0x00CD	Fan control mode	16 Bit	Specific fan control mode reference chart 5-9	Range 0 to 4, unit: 1

0x00CE	EXT external fault recovery time	16 Bit	After the EXT external error is eliminated, the recovery time is delayed, and the software	Range 2 to 3600, unit: S
			automatically recovers.	
Address	Function description	Bit description	Description	Note
0x00CF	TA/TB/TC Relay control mode	16 Bit	Specific control mode reference chart 5-9	Range 0 to 24, unit: 1
0x00D0	T1A/T1B/T1C Relay control mode	16 Bit	Specific control mode reference chart 5-9	Range 0 to 24, unit: 1
0x00D1	DC bus Threshold voltage	16 Bit	Set the DC bus threshold voltage to control the TA/TB/TC relay. Refer to chart 5-9.	Range 1800 ~ 12000, Unit: 0.1V
0x00D2	DC bus Threshold voltage 1	16 Bit	Set the DC bus threshold voltage to control the T1A/T1B/T1C relay. Refer to chart 5-9.	Range 1800 ~ 12000, Unit: 0.1V
0x00D3	TA/TB/TC relay Timing	16 Bit	Set the timing time for controlling the TA/TB/TC relay. Refer to chart 5-9.	Range 1 to 17280, Unit: min
0x00D4	T1A/T1B/T1C Relay timing time 1	16 Bit	Set the timing time for controlling the T1A/T1B/T1C relay. Refer to Chart 5-9.	Range 1 to 17280, Unit: min
0x00D5	TA/TB/TC relay On time	16 Bit	Used to control TA/TB/TC relays, refer to Chart 5-9	Range 0 to 240, Unit: S
0x00D6	T1A/T1B/T1C Relay conduction time 1	16 Bit	Used to control T1A/T1B/T1C relays, refer to Chart 5-9	Range 0 to 240, Unit: S
0x00D7	TA/TB/TC relay Turn off time	16 Bit	Used to control TA/TB/TC relays, refer to Table 5-9	Range 0 to 240, Unit: S
0x00D8	T1A/T1B/T1C Relay off time 1	16 Bit	Used to control T1A/T1B/T1C relays, refer to Chart 5-9	Range 0 to 240, Unit: S
0x00D9	DC bus voltage automatic correction	16 Bit	Enter the required correction value, and the software will automatically correct after 3 seconds. (The correction step is within ±50V. If it exceeds ±	The range is 2000~12000, Unit: 0.1V

			50V, please correct it multiple times.)	
0x00DA	Charging contactor open voltage threshold	16 Bit	After the DC bus voltage is less than the set value, the charging contactor will open.	Modify the scope reference manual, Unit: 0.1V
0x00DB	Charging contactor pull-in voltage threshold	16 Bit	After the bus voltage is higher than the set value and delays the value of 0x00DE, the charging contactor pulls in	Modify the scope reference manual, Unit: 0.1V
0x00DC	DC bus voltage oE overvoltage protection threshold	16 Bit	After the DC bus voltage is higher than the set value, the oE overvoltage protection error is reported.	Modify the scope reference manual, Unit: 0.1V
0x00DD	DC bus voltage LE undervoltage protection threshold	16 Bit	After the DC bus voltage is less than the set value, the LE undervoltage protection fault is reported.	Modify the scope reference manual, Unit: 0.1V
0x00DE	Charging contactor pull-in delay time	16 Bit	The charging contactor reaches the pull-in condition, and after the set time is delayed, the pull-in is completed.	Range 2 to 240, Unit: S
0x00DF	oE overvoltage protection recovery time	16 Bit	The protection is restored after the DC bus voltage is less than (0x00DC item - 20) and the set value is delayed.	Range 2 to 3600, Unit: S
0x00E0	LE undervoltage protection recovery time	16 Bit	After the DC bus voltage is greater than the 0x00DB parameter and the set value is delayed, the protection is restored.	Range 2 to 3600, Unit: S

0x00E1	HE hardware Overvoltage protection recovery time	16 Bit	When the bus voltage is less than (0x00DC item -20) and the value is delayed, the hardware overvoltage protection is restored. Hardware overvoltage: 505V for 220VAC, 840V for 380VAC, and 1240V for 660VAC	Range 2 to 3600, Unit: S
0x00E2	RS485 communication address	16 Bit	Machine address set during RS485 communication	Machine address range: 0 to 31, Unit: 1
Address	Function description	Bit description	Description	Note
0x00E3	Phase sequence correction of power supply three-phase power grid	16 Bit	When the set value is 6, the zero offset correction is entered. After 3 seconds, when the read changes from 6 to 1, the calibration is completed.	Range 0 to 6, Unit: 1
0x00E4	Phase	16 Bit	0 correction failed 1 correction	Range 0 to 6,
	sequence correction of power supply three-phase power grid		succeeded 6 entered calibration, calibration failure lasted for more than 3 seconds for the grid no power	Unit: 1
0x00E5	Three-phase grid RMS Automatic voltage correction	16 Bit	Enter the correction value, and complete the automatic calibration after 3 seconds. The input is invalid during the calibration (the correction step is within ±50V, and the correction is more than ±50V)	Range 500 to 9000, Unit: 0.1VAC
0x00E6	FF three-phase grid frequency Fault protection recovery time	16 Bit	After the three-phase grid over/under frequency error is eliminated and the set value is delayed, the protection is restored.	Range 2 to 3600, Unit: S

0x00E7	UF three-phase power grid amplitude Fault protection recovery time	16 Bit	Protection of the three-phase grid phase voltage amplitude over/undervoltage fault and delay after the set value	Range 2 to 3600, Unit: S
0x00E8	Three-phase grid phase voltage amplitude overvoltage protection set value	16 Bit	If the amplitude of the three-phase power grid is greater than the set value, the UF protection fault is reported.	Refer to Chart 5-9 for the scope. Unit: 0.1VAC
0x00E9	Three-phase grid phase voltage amplitude undervoltage protection set value	16 Bit	If the amplitude of the three-phase power grid is less than the set value, the UF protection fault is reported.	Refer to chart 5-9 for the scope. Unit: 0.1VAC
0x00EA	PF grid abnormality or phase loss fault protection recovery time	16 Bit	After the phase failure of the three-phase power grid or the phase loss fault is eliminated and the set value is delayed, the protection is restored.	Range 2 to 3600, Unit: S
0x00EB	oC overcurrent protection Recovery Time	16 Bit	After the three-phase overcurrent protection error is eliminated and the set value is delayed, the protection is restored.	Range 2 to 3600, Unit: S
0x00EC	Overload protection starting point	16 Bit	This is the percentage of the maximum current that the machine is running. If this value is exceeded, the overload protection time is calculated.	Range 75 to 95, Unit: 0.01
0x00ED	Maximum running current of the machine corresponds to overload protection time	16 Bit	This setting is the maximum current corresponding to the overload protection time of the machine. Refer to chart 5-9 for the calculation formula.	Range 1 to 50, Unit: 0.1S

0x00EE	oL overload protection Recovery Time	16 Bit	After the three-phase current overload protection fault is eliminated and the set value is delayed, the protection is restored.	Range 2 to 3600, Unit: S
0x00EF	Rectified feedback voltage / Feedback voltage	16 Bit	When the DC bus voltage is higher than this value, feedback starts. Below this value, the rectification work/feedback stops.	Refer to Table 5-9 for the scope of modification. Unit: 0.1V
0x00F0	Three-phase emergency power supply output voltage	16 Bit	Control emergency power supply output voltage within ±10%	Refer to chart 5-9 for the scope. Unit: 0.1VAC
0x00F1	Fan operation temperature	16 Bit	Specific fan control mode reference chart 5-9	Refer to chart 5-9, unit: 0.1 ℃
0x00F2	Emergency power delay output enable	16 Bit	0 is not enabled; 1 is enable delay output	Range 0 to 1, Unit: 1
0x00F3	Three-phase emergency power supply Delayed output time	16 Bit	When the delay output is enabled, this is set to the time of the three-phase emergency power supply delay output.	Range 1 to 18000, unit: 0.1S
0x00F4	Reserved	16 Bit	Reserved	Reserved
.....	Reserved	16 Bit	Reserved	Reserved
0x012C	Reserved	16 Bit	Reserved	Reserved

Chart 5-19 Data Register Descriptions Defined by the Control Board

5.3.11 Notes on Reading and Writing Applications

When applying RS485 communication, you need to pay attention to the following five tips:

1. The defined data registers are read-only registers from 0x0000 address to 0x00C8 address, and the remaining registers are readable and writable registers.

2. DI1/COM is the enable control port: short enable; disconnect stop. This port can be used for remote control.

3. When it is necessary to modify the data register from 0x00C9 address to 0x012C address through RS485 communication, DI1/COM needs to be disconnected to be modified.

4. When a single machine communicates via RS485, the J4 interface on the control board is set to ROFF (the default corresponding two pin pins are not connected); when multiple machines communicate via RS485 network, the J4 interface on the control board needs to be set. For RON (set the corresponding two pins shorted).

5. Since the maximum number of writes of the EEPROM memory used by the control board is 1 million times, please do not modify RS485 communication from 0x00C9 address to 0x012C address frequently.

5.3.12 Reading and Writing Application Examples

1、The 0x06 instruction reads a number of consecutive addresses (up to 16, at least 1) of registers.

2、Read three consecutive registers starting at address 0x0000

Command information:

	Slave address	function code	Register address		Read word count		CRC check	
			High byte	Low byte	High byte	Low byte	High byte	Low byte
Hexadecimal data	1F	06	00	00	00	03	CA	75

Response information:

	Slave address	function code	Response data bytes	First register content		Register contents		CRC Check	
				High byte	Low byte	High byte	Low byte	High byte	Low byte
Hexadecimal data	1F	06	06	00	09	……	……	BC	EB
The first register content: 0x0009 = 0000 0000 0000 1001, look up Table 5-18 means: there is a fault, the external input fault of the terminal EXT									

3、The 0x16 instruction writes a single register

4、Write the register of the 0x00C9 address

Command information:

	Slave address	function code	Register address		Contents for Register address		CRC check	
			High byte	Low byte	High byte	Low byte	High byte	Low byte

Hexadecimal data	15	16	00	C9	03	20	9A	A1

Response message：

	Slave address	function code	Register address		Contents for Register address		CRC Check	
			High byte	Low byte	High byte	Low byte	High byte	Low byte
Hexadecimal data	1F	16	00	C9	03	20	9A	A1
Register contents: 0x0320 is decimal 800, check Chart 5-18 means: set the sensor T1's oH1 overheat protection temperature is 80.0 °C								

Chapter 6 Troubleshooting

6.1 Keyboard Control Error Code

In normal working conditions, when the software detects an abnormality, it will automatically stop the output, and switch to the error display state, and display the current abnormal error type on the keyboard. The meaning of each error code displayed is as follows:

Display code	**Error conditions**	**Error Meaning**
oH1	Temperature sensor T1 overheated	Temperature sensor T1 overheated
oH2	Temperature sensor T2 overheated	Temperature sensor T2 overheated
EF	EXT terminal input failure	EXT terminal input failure on the control board
oE	Over Voltage	DC bus voltage is too high
LE	Low Voltage	DC bus voltage is too low
HE	Hardware overvoltage	The hardware detects that the DC bus voltage is too high
FF	Grid frequency anomaly	Disconnected from the AC grid or abnormal power supply frequency AC grid voltage amplitude is abnormal AC grid missing phase or AC grid power supply abnormality

UF	Grid amplitude anomaly	
PF	Grid phase loss or grid power supply anomaly	
oC	Overcurrent	Three-phase current output overcurrent
oL	Overload	Three-phase current output overcurrent

Chart 6-1 Control board fault code chart

When an Error occurs, the software automatically stops the output and shows the type of fault on the keyboard all the time. When the fault is eliminated, the software will automatically restore to its normal working state after a certain recovery time (the default setting of the software is 30S, the recovery time can be modified, refer to the section "Setting up the recovery time of the fault protection").Whether in the normal working state or in the fault state, you can view the fault record through the keyboard, please refer to Table 5-10 for details.

6.2 Cause Analysis and Removal of Common Faults

Common malfunctions	**Cause analysis and troubleshooting**
Rectifier feedback or feedback does not work	Check that the wiring is correct; Check if the control mode configured by the control terminal is correct; Check if the selected device matches the field operating voltage; Check if the external power grid is normal;
	Detect if there is any device damage; Detecting the type of error reported by the keyboard;
Three-phase emergency power supply has no output	Check that the wiring is correct; Check if the control mode configured by the control terminal is correct; Check if the selected device matches the field operating voltage; Check if the external power grid is normal; Detect if there is any device damage; Detecting the type of error reported by the keyboard;
Inverter overvoltage protection during feedback	Check if the selected device capacity is sufficient; Check whether the feedback action voltage of the device matches the inverter; Detecting whether the device is damaged; Check if the feedback work or not

Device overheat protection	The selected device capacity is too small, please re-calculate the selection; The installation place of the device is not well ventilated, so that the heat generated during work cannot be dissipated; Whether the value of the overheat protection temperature set by the detecting device is too small;
Device overload protection	The selected device capacity is too small, please re-calculate the selection; Check if the overload time curve is set correctly;
The device reports the abnormal error protection of the power grid	Check if the air switch between the device and the grid is normal; Check if the wiring of the three-phase power grid is correct;
Check if the control mode configured by the control terminal is correct;	

Chart 6-2 Causes and troubleshooting of common errors

Chapter 7 Maintenance and Inspection

To prevent accidents in the future and to maintain the high reliability of the device for a long time,daily and periodic inspection should be carried out in order. Please pay attention to the following items when testing operation.

7.1 Routine inspection

Do not remove cover plate parts during machine operation or under electrical condition. Visually check the operation status from outside. Usually the following items are inspected：

- Whether the expected performance be achieved (in accordance with standard specifications)；
- Whether the surrounding environment meets the standard specifications；
- Are there any abnormal sounds, vibration and odour?
- Are there any signs of overheating or color change etc abnormal phenomena?；
- Whether the keyboard indicator or data display is normal；
- Check whether the heat dissipation of the machine is normal.

7.2 Regular inspection

Regular inspection should be carried out after the operation is stopped, the power supply is disconnected, and the cabinet door is opened. Even if the power supply is disconnected, the DC part of the main circuit still has electricity stored in the electrolytic capacitor. Discharge takes a certain time. At this time, there is still a high voltage danger. It should wait more than 10 minutes, or check the operation after confirming that the DC voltage has been reduced to the safe voltage value (below DC25V) with the multimeter and other measuring tools. Regular inspections are usually carried out according to the following terms：

- The power supply should be disconnected and it will take 10 minutes to check the operation. A more reliable method is to measure the terminal DC voltage with a multimeter, confirm that it has been reduced to the safe voltage value (below DC 25V) and then check the operation, otherwise there is a risk of electric shock
- Maintenance, inspection and replacement of parts by professional electricians；
- Metal articles (watches, rings, etc.) should be removed before operation；

- Insulated tools should be used；
- It is absolutely forbidden to retrofit this device, otherwise there will be the risk of accidents；
- Detect whether the surrounding environment is conducive to heat dissipation of the machine and not be exposed to direct sunlight for a long time.

Check parts	Check item	Inspection Method	Judging criteria
surroundings	Check ambient temperature, humidity, vibration, air (with or without dust, corrosive gases, soot, water droplets, etc.)	Visual and inspection instrument measurements	Meet the requirements in the standard specification
		Visually check for other objects or dangerous objects such as tools placed around them.	Not placed
Voltage	Is the voltage of the main circuit and the control circuit normal?	Multimeter and other measurements	Meet standard specifications
Structural parts such as frames	No abnormality sound and abnormal vibration	Visual and auditory examination	No abnormality
	Whether the bolts	Tighten	No
	(fasteners) are loose		abnormality
	Whether there is deformation, damage, whether there is discoloration due to overheating, whether there is any stain and dust adhesion	Visual inspection	No abnormality
The main circuit	General purpose: Whether the bolt parts are loose or loose	Tighten	No abnormality
	Whether the device and the insulation are deformed, cracked, damaged, discolored by overheating, with or without dirt and dust	Visual inspection	No abnormality

	Conductor, wire	Whether there is discoloration or deformation due to overheating, whether the insulation layer of the wire is damaged, cracked or discolored	visual inspection	No abnormality
	Terminal block	With or without damage	visual inspection	No abnormality
	electrolysis capacitance	Whether there is leakage, discoloration, cracks, expansion of the casing, whether the safety valve is protruding, and whether the safety valve has obvious expansion	visual inspection	No abnormality
	resistor	Whether there is odor due to overheating and cracking of insulation	Olfactory, visual inspection	No abnormality
		With or without wire break	Visually inspect or remove the connection on one side, multimeter	±10% of the basic resistance value
			measurement	
Control circuit	Circuit board	Whether there are screws and connector parts loose, odor and discoloration, cracking, damage, deformation, obvious rust, capacitor leakage or signs of deformation	Tighten Olfactory, visual inspection	Tighten, No abnormality
cooling system	cooling fan	No abnormality sound and abnormal vibration	Hearing and visual inspection, hand test rotation, power must be disconnected	Flexible rotation
		Whether the bolt parts are loose or not	Tighten	No abnormality

		Whether there is discoloration due to overheating	Visual inspection	No abnormality
	Ventilation path	There are no radiators and suction and exhaust ports, and no other things attached.	Visual inspection	No abnormality
Note: The dirt can be wiped off with a cleaning tool such as chemically neutral cloth, and the dust can be removed with a vacuum cleaner.				

Chart 7-1 Periodic inspection table

Chapter 8 Product Consulting and Quality Assurance

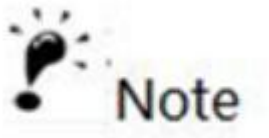
8.1 Requirements for consultation

When you need consultation, you should provide the following information to your agent or Nietz Electric Co.,Ltd

- Product Model；
- Product Serial Number；
- Date of purchase；
- Contents you want to ask (e.g. warranty time limit, damaged location, damaged degree, doubtful items, failure phenomena, application situation and operation status, etc.).

8.2 Product Quality Assurance

- The quality of products is guaranteed in three ways (returnable within one month, replaceable within three months, and free maintenance within 18 months), and paid maintenance service for whole life. If there is any problem with the NZR products you are using, please contact our company or the corresponding supplier in time. However, even during the warranty period, paid repairs are carried out in the following cases.
- Bilingual Contrast of Error Reporting；
- Unauthorized disassembly, assembly and transformation；
- Improper usage or beyond the scope of use；
- Damage or break down during falling or transportation (customer reason)；
- Problems caused by force majeure such as earthquakes, fires, storms, lightning disasters, voltage anomalies and other natural disasters, as well as secondary disasters；
- Failure problems caused by other reasons not from our company liability



The NZR sine wave energy feedback device of our company meets the relevant national standards up to the date of compilation of this specification, but we need to remind customers of the changing local laws and regulations to ensure the rational use of the NZR sine wave energy feedback device. Free maintenance service is limited to our production workshop, the company does not provide free on-site maintenance services.