FAMCO
هایپرصنعت

ΘTETA
ELECTR

INSTRUCTION

MA610 / SERIES

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Preface

Thanks for choosing our products.

TETA MA610 series inverters are newly-designed by our company for controlling asynchronous AC inductance motors. Applying the most advanced speedless sensor vector control technology, DSP control system, and our product enhances its reliability to meet the adaptability to the environment, customized and industrialized design with more optimized functions, more flexible application and more stable performance.

The vector control performance of TETA MA610 series inverters is as outstanding as that of the leading sophisticated inverters on worldwide market. Its speed and torque control can be simultaneously, comparing with the other kinds, its function of anti-trip and strong adaptability to worse grid, temperature, humidity and dust make it meet the high performance requirement of the customer application.

TETA MA610 series inverters apply modularized design to meet the specific demand of customers, as well as the demand of the whole industry flexibly and follow the trend of industrial application to the inverters on the premise of meeting general need of the market. Powerful speed control, torque control, simple PLC, flexible input/output terminals, pulse frequency reference, traverse control can realize various complicate high-accuracy drives and provide integrative solution for the manufacturers of industrial devices, which contributes a lot to the cost reducing and improves reliability.

TETA MA610 series inverters can meet the demand of environmental protection which focuses on low noise and weakening electromagnetic interference in the application sites for the customers.

This manual provides installation and configuration, parameters setting, fault diagnoses and daily maintenance and relative precautions to customers. Please read this manual carefully before the installation to ensure a proper installation and operation and high performance of TETA MA610 series inverters.

If the product is ultimately used for military affairs or manufacture of weapon, it will be listed on the export control formulated.

Rigorous review and necessary export formalities are needed when exported.

Our company reserves the right to update the information of our products.

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Content

1.1 What this chapter contains

Please read this manual carefully and follow all safety precautions before moving, installing, operating and servicing the inverter. If ignored, physical injury or death may occur, or damage may occur to the devices.

If any physical injury or death or damage to the devices occurs for ignoring to the safety precautions in the manual, our company will not be responsible for any damages and we are not legally bound in any manner.

1.2 Safety definition

Danger:	Serious physical injury or even death may occur if not follow relevant requirements
Warning:	Physical injury or damage to the devices may occur if not follow relevant requirements
Note:	Physical hurt may occur if not follow relevant requirements
Qualified electricians:	People working on the device should take part in professional electrical and safety training, receive the certification and be familiar with all steps and requirements of installing, commissioning, operating and maintaining the device to avoid any emergency.

1.3 Warning symbols

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

Symbols	Name	Instruction
Danger	Electrical Danger	Serious physical injury or even death may occur if not follow the relative requirements
Warning	General danger	Physical injury or damage to the devices may occur if not follow the relative requirements
Do not	Electrostatic discharge	Damage to the PCBA board may occur if not follow the relative requirements
Hot sides	Hot sides	Sides of the device may become hot. Do not touch.
Note	Note	Physical hurt may occur if not follow the relative requirements

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1.4 Safety guidelines

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

Inverter model	Minimum waiting time
380V 1.5kW-110kW	5 minutes
380V 132 kW-315 kW	15 minutes
380V above 350 kW	25 minutes

Do not refit the inverter unauthorized; otherwise fire, electric shock or other injury may occur.

The base of the heat sink may become hot during running. Do not touch to avoid hurt.

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

1.4.1 Delivery and installation

Please install the inverter on fire-retardant material and keep the inverter away from combustible materials.
Connect the braking optional parts (braking resistors, braking units or feedback units) according to the wiring diagram.
Do not operate on the inverter if there is any damage or components loss to the inverter.
Do not touch the inverter with wet items or body, otherwise electric shock may occur.

Note:

Select appropriate moving and installing tools to ensure a safe and normal running of the inverter and avoid physical injury or death. For physical safety, the erector should take some mechanical protective measurements, such as wearing exposure shoes and working uniforms.
Ensure to avoid physical shock or vibration during delivery and installation.
Do not carry the inverter by its cover. The cover may fall off.
Install away from children and other public places.
The inverter cannot meet the requirements of low voltage protection in IEC61800-5-1 if the sea level of installation site is above 2000m.
Please use the inverter on appropriate condition (See chapter **Installation Environment**).
Don't allow screws, cables and other conductive items to fall inside the inverter.
The leakage current of the inverter may be above 3.5mA during operation. Ground

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with proper techniques and ensure the grounding resistor is less than 10Ω. The conductivity of PE grounding conductor is the same as that of the phase conductor (with the same cross sectional area).

R, S and T are the input terminals of the power supply, while U, V and W are the motor terminals. Please connect the input power cables and motor cables with proper techniques; otherwise the damage to the inverter may occur.

1.4.2 Commission and running

	Disconnect all power supplies applied to the inverter before the terminal wiring and wait for at least the designated time after disconnecting the power supply. High voltage is present inside the inverter during running. Do not carry out any operation except for the keypad setting. The inverter may start up by itself when P01.21=1. Do not get close to the inverter and motor. The inverter can not be used as "Emergency-stop device". The inverter can not be used to break the motor suddenly. A mechanical braking device should be provided.

Note:

Do not switch on or off the input power supply of the inverter frequently.

For inverters that have been stored for a long time, check and fix the capacitance and try to run it again before utilization (see **Maintenance and Hardware Fault Diagnose**).

Cover the front board before running, otherwise electric shock may occur.

1.4.3 Maintenance and replacement of components

	Only qualified electricians are allowed to perform the maintenance, inspection, and components replacement of the inverter. Disconnect all power supplies to the inverter before the terminal wiring. Wait for at least the time designated on the inverter after disconnection. Take measures to avoid screws, cables and other conductive matters to fall into the inverter during maintenance and component replacement.

Note:

Please select proper torque to tighten screws.

Keep the inverter, parts and components away from combustible materials during maintenance and component replacement.

Do not carry out any isolation and pressure test on the inverter and do not measure the control circuit of the inverter by megameter.

Carry out a sound anti-electrostatic protection to the inverter and its internal components during maintenance and component replacement.

1.4.4 What to do after scrapping

	There are heavy metals in the inverter. Deal with it as industrial effluent.

Quick Start-up 2

2.1 What this chapter contains

This chapter mainly describes the basic guidelines during the installation and commission procedures on the inverter, which you may follow to install and commission the inverter quickly.

2.2 Unpacking inspection

Check as followings after receiving products:

1. Check that there are no damage and humidification to the package. If not, please contact
2. Check the information on the type designation label on the outside of the package to verify that the drive is of the correct type. If not, please contact with local dealers.
3. Check that there are no signs of water in the package and no signs of damage or breach to the inverter. If not, please contact with local dealers.
4. Check the information on the type designation label on the outside of the package to verify that the name plate is of the correct type. If not, please contact with local dealers.
5. Check to ensure the accessories (including user's manual, control keypad and extension card) inside the device is complete. If not, please contact with local dealers.

2.3 Application confirmation

Check the machine before beginning to use the inverter:

1. Check the load type to verify that there is no overload of the inverter during work and check that whether the drive needs to modify the power degree.
2. Check that the actual current of the motor is less than the rated current of the inverter.
3. Check that the control accuracy of the load is the same of the inverter.
4. Check that the incoming supply voltage is correspondent to the rated voltage of the inverter.

2.4 Environment

Check as followings before the actual installation and usage:

1. Check that the ambient temperature of the inverter is below 40℃. If exceeds, derate 3% for every additional 1℃. Additionally, the inverter can not be used if the ambient temperature is above 50℃. **Note:** for the cabinet inverter, the ambient temperature means the air temperature inside the cabinet.
2. Check that the ambient temperature of the inverter in actual usage is above -10℃. If not, add heating facilities. **Note:** for the cabinet inverter, the ambient temperature means the air temperature inside the cabinet.

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3. Check that the altitude of the actual usage site is below 1000m. If exceeds, derate1% for every additional 100m.
. Check that the humidity of the actual usage site is below 90% and condensation is not allowed. If not, add additional protection inverters.
5. Check that the actual usage site is away from direct sunlight and foreign objects can not enter the inverter. If not, add additional protective measures.
6. Check that there is no conductive dust or flammable gas in the actual usage site. If not, add additional protection to inverters.

2.5 Installation confirmation

Check as followings after the installation:

1. Check that the input and output cables meet the need of actual load.
2. Check that the accessories of the inverter are correctly and properly installed. The installation cables should meet the needs of every component (including reactors, input filters, output reactors, output filters, DC reactors, braking units and braking resistors).
3. Check that the inverter is installed on non-flammable materials and the calorific accessories (reactors and braking resistors) are away from flammable materials.
4. Check that all control cables and power cables are run separately and the routation complies with EMC requirement.
5. Check that all grounding systems are properly grounded according to the requirements of the inverter.
6. Check that the free space during installation is sufficient according to the instructions in user's manual.
7. Check that the installation conforms to the instructions in user's manual. The drive must be installed in an upright position.
8. Check that the external connection terminals are tightly fastened and the torque is appropriate.
9. Check that there are no screws, cables and other conductive items left in the inverter. If not, get them out.

2.6 Basic commission

Complete the basic commissioning as followings before actual utilization:

1. Select the motor type, set correct motor parameters and select control mode of the inverter according to the actual motor parameters.
2. Autotune. If possible, de-coupled from the motor load to start dynamic autotune. Or if not, static autotune is available.
3. Adjust the ACC/DEC time according to the actual running of the load.
4. Commission the device via jogging and check that the rotation direction is as required. If not, change the rotation direction by changing the wiring of motor.
5. Set all control parameters and then operate.

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3.1 What this chapter contains

The chapter briefly describes the operation principle, product characteristics, layout, name plate and type designation information.

3.2 Basic principles

TETA MA610 series inverters are wall, flange and mountable devices for controlling asynchronous AC inductance motors.

The diagram below shows the main circuit diagram of the inverter. The rectifier converts three-phase AC voltage to DC voltage. The capacitor bank of the intermediate circuit stabilizes the DC voltage. The converter transforms the DC voltage back to AC voltage for the AC motor. The brake pipe connects the external braking resistor to the intermediate DC circuit to consume the feedback energy when the voltage in the circuit exceeds its maximum limit.

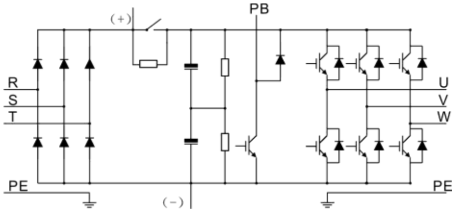

Diagram 3-1 The main circuit diagram (≤30kW)

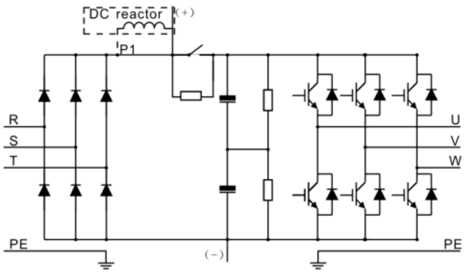

Diagram 3-2 The main circuit diagram (≥37kW)

Note:

1. The inverter above **37kW** (including **37kW**) supports external DC reactor which is an optional part. Before connecting, it is necessary to remove the copper row between **P1** and **(+).**

2. The inverters (≤30kW) have standard embedded braking units and the braking resistor is optional.

3. The inverters (≥37kW) can be installed with optional braking units and the braking unit and resistor are optional.

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3.3 Product specification

Function		Specification
Input	Input voltage (**V**)	AC 3PH 220V(-15%)~240V(+10%) AC 3PH 380V(-15%)~440V(+10%) AC 3PH 520V(-15%)~690V(+10%)
	Input current (**A**)	Refer to the rated value
	Input frequency (**Hz**)	50Hz or 60Hz Allowed range: 47~63Hz
Output	Output voltage (**V**)	0~Input voltage
	Output current (**A**)	Refer to the rated value
	Output power (**kW**)	Refer to the rated value
	Output frequency (**Hz**)	0~400Hz
Technical control feature	Control mode	SVPW M, SVC
	Motor type	Asynchronous motor
	Speed ratio	Asynchronous motor 1:100 (SVC)
	Speed control accuracy	±0.2% (sensorless vector control)
	Speed fluctuation	± 0.3%(sensorless vector control)
	Torque response	<20ms(sensorless vector control)
	Torque control accuracy	10%(sensorless vector control)
	Starting torque	Asynchronous motor: 0.5Hz/150% (SVC)
	Overload capability	G type: 150% of rated current: 1 minute 180% of rated current: 10 seconds 200% of rated current: 1 second
Running control feature	Frequency setting	Digital setting, analog setting, pulse frequency setting, multi-step speed running setting, simple PLC setting, PID setting, MODBUS communication setting. Shift between the set combination and set channel.
	Auto voltage adjustment	Keep a stable voltage automatically when the grid voltage transients
	Fault protection	Provide over 30 fault protection functions: overcurrent, overvoltage, undervoltage, overheating, phase loss and overload, etc.
	Speed tracking	Restart the rotating motor smoothly Note: This function is available for the inverters of 4kW and above 4kW.
Peripheral	Terminal analog input	≤ 20mV

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Function		Specification
interface	resolution	
	Terminal switch input resolution	≤ 2ms
	Analog input	1 channels (AI2) 0~10V/0~20mA and 1 channel (AI3) -10~10V
	Analog output	2 channels (AO1, AO2) 0~10V /0~20mA
	Digital input	8 channels common input, the Max. frequency: 1kHz, internal impedance: 3.3kΩ; 1 channel high speed input, the Max. frequency: 50kHz
	Digital output	1 channel high speed pulse output, the Max. frequency: 50kHz; 1 channel Y terminal open collector pole output
	Relay output	2 channels programmable relay output RO1A NO, RO1B NC, RO1C common terminal RO2A NO, RO2B NC, RO2C common terminal Contactor capability: 3A/AC250V,1A/DC30V
Others	Mountable method	Wall, flange and floor mountable
	Temperature of the running environment	-10~50℃, derate above 40℃
	Ingress protection	IP20
	Cooling	Air-cooling
	Braking unit	Built-in braking unit for inverters below 30kW (including 30kW) External braking unit for others
	EMC filter	Built-in C3 filter: meet the degree requirement of IEC61800-3 C3 External optional filter:meet the degree requirement of IEC61800-3 C2

3.4 Name plate

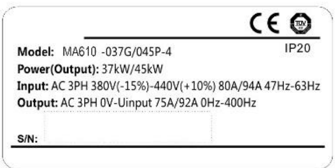

Fig 3-3 Name plate

Note: This is the example of the name plate for the standard products, and CE\TUV\IP20 will be marked according to the actual situations.

3.5 Type designation key

The type designation contains information on the inverter. The user can find the type designation on the type designation label attached to the inverter or the simple name plate.

MA610 -011G/015P-4
A B C D E F

Fig 3-4 Product type

Key	Instructions	
A	MA610 : abbreviation of TETA MA610	
B, D	3-digit code: output power. "R" means the decimal point; "011":11kW; "015":15kW	
C, E	C	G:Constant torque load
	E	P:Variable torque load
F	Input voltage degree: 2: AC 3PH 220V(-15%)~240V(+10%) 4: AC 3PH 380V(-15%)~ 440V(+10%) 6: AC 3PH 520V(-15%)~690V(+10%)	

3.6 Rated specifications

Model	Constant torque			Variable torque		
	Output power (kW)	Input current (A)	Output current (A)	Output power (kW)	Input current (A)	Output current (A)
MA610-0R7G-4	0.75	3.4	2.5			
MA610-1R5G-4	1.5	5.0	3.7			
MA610-2R2G-4	2.2	5.8	5			
MA610-004G/5R5P-4	4	13.5	9.5	5.5	19.5	14
MA610-5R5G/7R5P-4	5.5	19.5	14	7.5	25	18.5
MA610-7R5G/011P-4	7.5	25	18.5	11	32	25
MA610-011G/015P-4	11	32	25	15	40	32
MA610-015G/018P-4	15	40	32	18.5	47	38
MA610-018G/022P-4	18.5	47	38	22	56	45
MA610-022G/030P-4	22	56	45	30	70	60
MA610-030G/037P-4	30	70	60	37	80	75
MA610-037G/045P-4	37	80	75	45	94	92
MA610-045G/055P-4	45	94	92	55	128	115
MA610-055G/075P-4	55	128	115	75	160	150
MA610-075G/090P-4	75	160	150	90	190	180
MA610-090G/110P-4	90	190	180	110	225	215
MA610-110G/132P-4	110	225	215	132	265	260

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Model	Constant torque			Variable torque		
	Output power (kW)	Input current (A)	Output current (A)	Output power (kW)	Input current (A)	Output current (A)
MA610-132G/160P-4	132	265	260	160	310	305
MA610-160G/185P-4	160	310	305	185	345	340
MA610-185G/200P-4	185	345	340	200	385	380
MA610-200G/220P-4	200	385	380	220	430	425
MA610-220G/250P-4	220	430	425	250	485	480
MA610-250G/280P-4	250	485	480	280	545	530
MA610-280G/315P-4	280	545	530	315	610	600
MA610-315G/350P-4	315	610	600	350	625	650
MA610-350G/400P-4	350	625	650	400	715	720
MA610-400G-4	400	715	720			
MA610-500G-4	500	890	860			

Note:

1. The input current of 1.5~315kW inverters is measured when the input voltage is 380V and no DC reactor and input/output reactor.
2. The input current of 350~500kW inverters is measured when the input voltage is 380V and the circuit is with input reactor.
3. The rated output current is defined as the output current when the output voltage is 380V.
4. In the allowable voltage range, the output power and current can not exceed the rated output power and current in any situation.

3.7 Structure diagram

Below is the layout figure of the inverter (take the inverter of 30kW as the example).

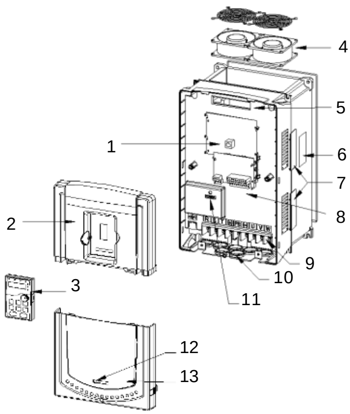

Fig 3-5 Product structure diagram

Serial No.	Name	Illustration
1	Keypad port	Connect the keypad
2	Upper cover	Protect the internal parts and components
3	Keypad	See **Keypad Operation Procedure** for detailed information
4	Cooling fan	See **Maintenance and Hardware Fault Diagnose** for detailed information
5	Wires port	Connect to the control board and the drive board
6	Name plate	See **Product Overview** for detailed information
7	Side cover	Optional part. The side cover will increase the protective degree of the inverter. The internal temperature of the inverter will increase, too, so it is necessary to derate the inverter at the same time
8	Control terminals	See **Electric Installation** for detailed information
9	Main circuit terminals	See **Electric Installation** for detailed information
10	Main circuit cable entry	Fix the main circuit cable
11	POWER light	Power indicator
12	Simple name plate	See **Product Overview** for detailed information
13	Lower cover	Protect the internal parts and components

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4.1 What this chapter contains

The chapter describes the mechanical installation and electric installation.

⚠	Only qualified electricians are allowed to carry out what described in this chapter. Please operate as the instructions in **Safety Precautions**. Ignoring these may cause physical injury or death or damage to the devices. Ensure the power supply of the inverter is disconnected during the operation. Wait for at least the time designated until the POWER indicator is off after the disconnection if the power supply is applied. It is recommended to use the multimeter to monitor that the DC bus voltage of the drive is under 36V. The installation and design of the inverter should be complied with the requirement of the local laws and regulations in the installation site. If the installation infringes the requirement, our company will exempt from any responsibility. Additionally, if users do not comply with the suggestion, some damage beyond the assured maintenance range may occur.

4.2 Mechanical installation

4.2.1 Installation environment

The installation environment is important for a full performance and long-term stable functions of the inverter. Check the installation environment as followings:

Environment	Conditions
Installation site	Indoor
Environment temperature	-10~+50℃ If the ambient temperature of the inverter is above 40℃, derate 3% for every additional 1℃. It is not recommended to use the inverter if the ambient temperature is above 50℃. In order to improve the reliability of the device, do not use the inverter if the ambient temperature changes frequently. Please provide cooling fan or air conditioner to control the internal ambient temperature below the required one if the inverter is used in a close space such as in the control cabinet. When the temperature is too low, if the inverter needs to restart to run after a long stop, it is necessary to provide an external heating device to increase the internal temperature, otherwise damage to
Humidity	RH≤90% No condensation is allowed.

Environment	Conditions
	The maximum relative humility should be equal to or less than 60% in corrosive air.
Storage temperature	-30~+60℃
Running environment condition	The installation site of the inverter should: keep away from the electromagnetic radiation source; keep away from contaminative air, such as corrosive gas, oil mist and flammable gas; ensure foreign objects, such as metal power, dust, oil, water can not enter into the inverter(do not install the inverter on the flammable materials such as wood); keep away from direct sunlight, oil mist, steam and vibration environment.
Altitude	Below 1000m If the sea level is above 1000m, please derate 1% for every additional 100m.
Vibration	≤ 5.8m/s2(0.6g)
Installation direction	The inverter should be installed on an upright position to ensure sufficient cooling effect.

Note:

TETA MA610 series inverters should be installed in a clean and ventilated environment according to enclosure classification.

Cooling air must be clean, free from corrosive materials and electrically conductive dust.

4.2.2 Installation direction

The inverter may be installed on the wall or in a cabinet.

The inverter must be installed in an upright position. Check the installation site according to the requirements below. Refer to chapter **Dimension Drawings** in the appendix for frame details.

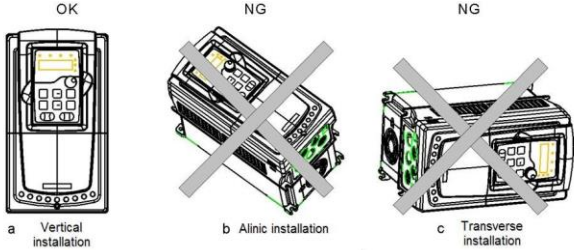

Fig 4-1 Installation direction of the inverter

4.2.3 Installation manner

The inverter can be installed in two different ways, depending on the frame size:

a) Wall mounting (for the inverter≤315kW)

b) Flange mounting (for the inverter≤200kW). Some need optional flange installation board. c) Floor mounting (220kW ≤the inverter≤500kW). Some need optional base.

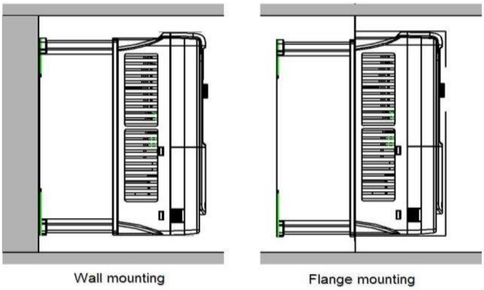

Fig 4-2 Installation manner

(1) Mark the hole location. The location of the holes is shown in the dimension drawings in the appendix.

(2) Fix the screws or bolts to the marked locations.

(3) Position the drive onto the wall.

(4) Tighten the screws in the wall securely.

Note:

1. The flange installation bracket is needed in the flange installation of 1.5~30kW inverters, which the flange installation of 37~200kW inverters does not need the installation bracket.
2. 220~315kW inverters need optional base in the floor installation.

4.2.4 Multiple installations

Parallel installation

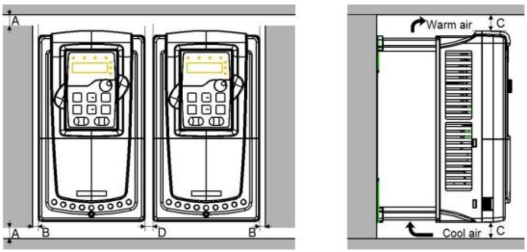

Fig 4-3 Parallel installation

Note:

Before installing the different sizes inverters, please align their top position for the convenience of later maintenance.

The minimum space of B, D and C is 100mm.

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4.2.5 Vertical installation

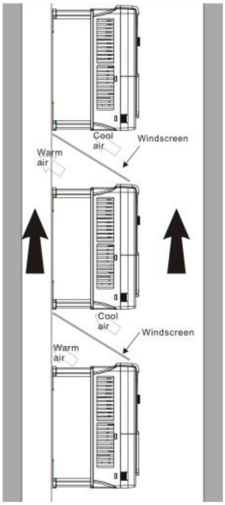

Fig 4-4 Vertical installation

Note: Windscreen should be added in vertical installation for avoiding mutual impact and insufficient cooling.

4.2.6 Tilt installation

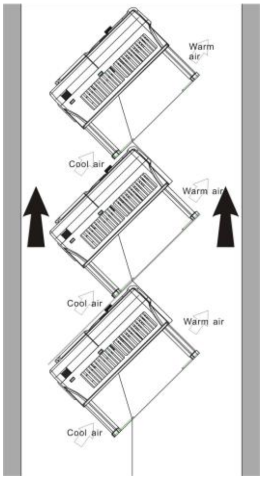

Fig 4-5 Tilt installation

Note: Ensure the separation of the wind input and output channels in tilt installation for avoiding mutual impact.

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4.3 Standard wiring

4.3.1 Wiring diagram of main circuit

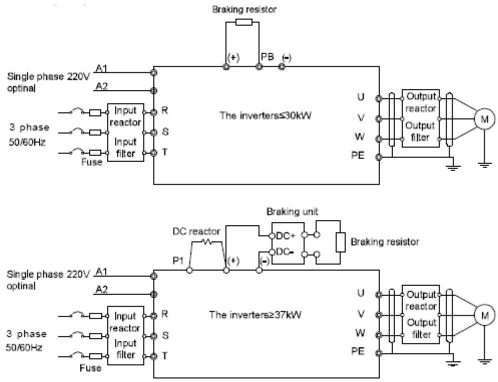

Fig 4-6 Wring diagram of main circuit

Note:

The fuse, DC reactor, braking unit, braking resistor, input reactor, input filter, output reactor, output filter are optional parts. Please refer to **Peripheral Optional Parts** for detailed information.

A1 and **A2** are optional parts.

P1 and **(+)** are short circuited in factory, if need to connect with the DC rector, please remove the contact tag between **P1** and **(+)**.

4.3.2 Terminals figure of main circuit

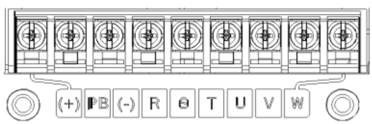

Fig 4-7 0.75~5.5 kW terminals of main circuit

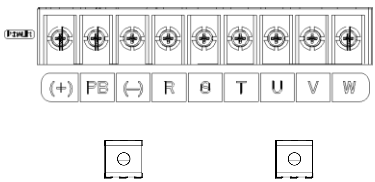

Fig 4-8 7.5~15kW terminals of main circuit

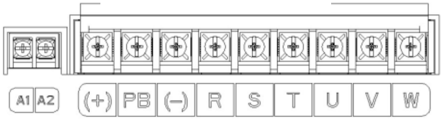

Fig 4-9 18.5kW terminals of main circuit

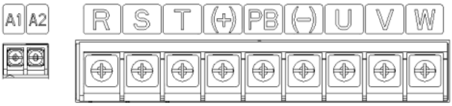

Fig 4-10 22~30kW terminals of main circuit

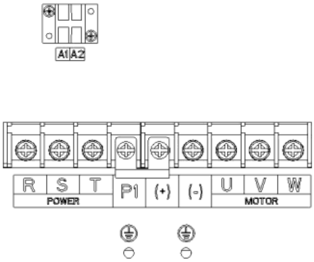

Fig 4-11 37~55 kW terminals of main circuit

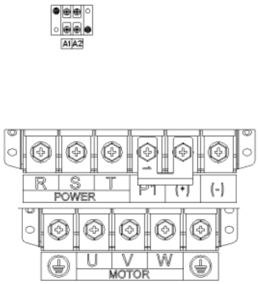

Fig 4-12 75~110kW terminals of main circuit

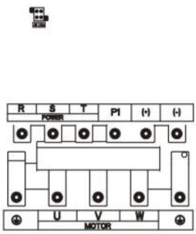

Fig 4-13 132~200kW terminals of main circuit

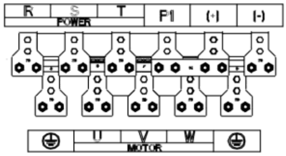

Fig 4-14 220~315kW terminals of main circuit

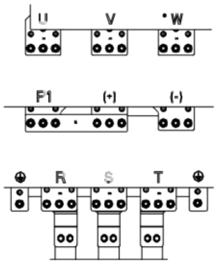

Fig 4-15 350~500kW terminals of main circuit

Terminal	Terminal name ≤30kW	Terminal name ≥37kW	Function
R, S, T	Power input of the main circuit		3-phase AC input terminals which are generally connected with the power
U, V, W	The inverter output		3-phase AC output terminals which are generally connected with the motor.
P1	This terminal is inexistent	DC reactor terminal 1	P1 and (+) are connected with the terminals of DC reactor. (+) and (-) are connected with the terminals of braking unit. PB and (+) are connected with the terminals of braking resistor.
(+)	Braking resistor 1	DC reactor terminal 2, braking unit terminal 1	
(-)	/	Braking unit terminal 2	
PB	Braking resistor terminal 2	This terminal is inexistent.	
PE	380V:the grounding resistor is less than 10Ohm		Protective grounding terminals, every machine is provided 2 PE terminals as the standard configuration. These terminals should be grounded with proper techniques.

Terminal	Terminal name		Function
	≤30kW	≥37kW	
A1 and A2	Control power supply terminal		Optional parts (external 220V control power supply)

Note:

Do not use an asymmetrically constructed motor cable. If there is a symmetrically constructed grounding conductor in the motor cable in addition to the conductive shield, connect the grounding conductor to the grounding terminal at the inverter and motor ends.

Braking resistor, braking unit and DC reactor are optional parts.

Route the motor cable, input power cable and control cables separately.

If the terminal is not appeared, the machine does not provide the terminal as the external terminal.

4.3.3 Wiring of terminals in main circuit

1. Fasten the grounding conductor of the input power cable with the grounding terminal of the inverter (**PE**) by **360** degree grounding technique. Connect the phase conductors to **R**, **S** and **T** terminals and fasten.
2. Strip the motor cable and connect the shield to the grounding terminal of the inverter by **360** degree grounding technique. Connect the phase conductors to **U**, **V** and **W** terminals and fasten.
3. Connect the optional brake resistor with a shielded cable to the designated position by the same procedures in the previous step.
4. Secure the cables outside the inverter mechanically.

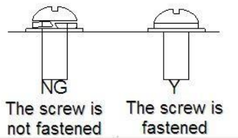

Fig 4-16 Correct installation of the screw

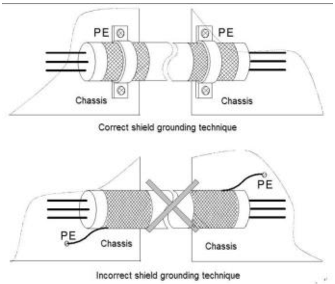

Fig 4-17 360 degree grounding technique

4.3.4 Wiring diagram of control

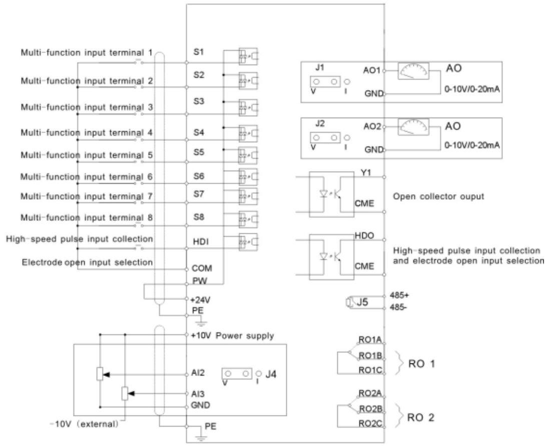

Fig 4-18 Wiring diagram of the control circuit

4.3.5 Terminals of control circuit

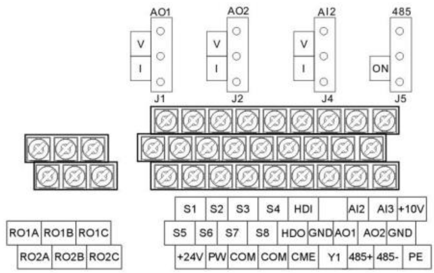

Fig 4-19 0.75~15kW Terminals of control circuit

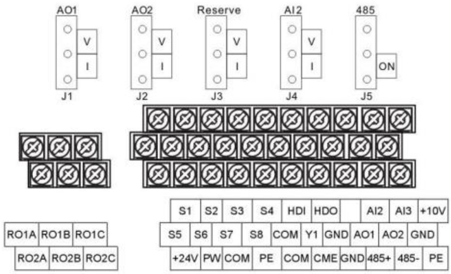

Fig 4-20 18.5~500kW Terminals of control circuit

Note: the spare terminal is reserved and not be used.

<table>
<tr><th>Terminal name</th><th colspan="2">Description</th></tr>
<tr><td>+10V</td><td colspan="2">Local power supply +10V</td></tr>
<tr><td>AI2</td><td colspan="2" rowspan="2">1. Input range: AI2 voltage and current can be chose: 0~10V/0~20mA; AI2 can be shifted by J4; AI3:-10V~+10V
2. Input impedance: voltage input: 20kΩ; current input: 500Ω
3. Resolution: the minimum one is 5mV when 10V corresponds to 50Hz
4. Deviation ±1%, 25℃</td></tr>
<tr><td>AI3</td></tr>
<tr><td>GND</td><td colspan="2">+10V reference null potential</td></tr>
<tr><td>AO1</td><td colspan="2" rowspan="2">1. Output range:0~10V or 0~20mA; AO1 can be shifted by J1; AO2 can be shifted by J2
2. Deviation±1%,25℃</td></tr>
<tr><td>AO2</td></tr>
<tr><td>RO1A</td><td colspan="2" rowspan="3">RO1 relay output, RO1A NO, RO1B NC, RO1C common terminal
Contactor capability: 3A/AC250V,1A/DC30V</td></tr>
<tr><td>RO1B</td></tr>
<tr><td>RO1C</td></tr>
<tr><td>RO2A</td><td colspan="2" rowspan="3">RO2 relay output, RO2A NO, RO2B NC, RO2C common terminal
Contactor capability: 3A/AC250V,1A/DC30V</td></tr>
<tr><td>RO2B</td></tr>
<tr><td>RO2C</td></tr>
<tr><td>PE</td><td colspan="2">Grounding terminal</td></tr>
<tr><td>PW</td><td colspan="2">Provide the input switch working power supply from external to internal.
Voltage range: 12~24V</td></tr>
<tr><td>24V</td><td colspan="2">The inverter provides the power supply for users with a maximum output current of 200mA</td></tr>
<tr><td>COM</td><td colspan="2">+24V common terminal</td></tr>
<tr><td>S1</td><td>Switch input 1</td><td rowspan="8">1. Internal impedance:3.3kΩ
2. 12~30V voltage input is available
3. The terminal is the dual-direction input terminal supporting both NPN and PNP
4. Max input frequency:1kHz
5. All are programmable digital input terminal. User can set the terminal function through function codes.</td></tr>
<tr><td>S2</td><td>Switch input 2</td></tr>
<tr><td>S3</td><td>Switch input 3</td></tr>
<tr><td>S4</td><td>Switch input 4</td></tr>
<tr><td>S5</td><td>Switch input 5</td></tr>
<tr><td>S6</td><td>Switch input 6</td></tr>
<tr><td>S7</td><td>Switch input 7</td></tr>
<tr><td>S8</td><td>Switch input 8</td></tr>
<tr><td>HDI</td><td colspan="2">Except for S1~S8, this terminal can be used as high frequency input channel.
Max. input frequency:50kHz</td></tr>
<tr><td>HDO</td><td colspan="2">1. Switch input:200mA/30V
2. Output frequency range:0~50kHz</td></tr>
<tr><td>COM</td><td colspan="2">+24V common terminal</td></tr>
<tr><td>CME</td><td colspan="2">Common terminal of HDO and Y1, short-connected with COM in factory</td></tr>
<tr><td>Y1</td><td colspan="2">1.Swtich capability:200mA/30V
2.Output frequency range:0~1kHz</td></tr>
<tr><td>485+</td><td colspan="2" rowspan="2">485 communication interface and 485 differential signal interface
If it is the standard 485 communication interface, please use twisted pairs or shield cable.</td></tr>
<tr><td>485-</td></tr>
</table>

4.3.6 Input /Output signal connection figure

Please use U-shaped contact tag to set NPN mode or PNP mode and the internal or external power supply. The default setting is NPN internal mode.

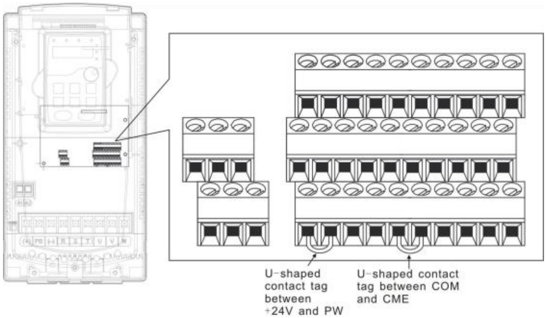

Fig 4-21 U-shaped contact tag

If the signal is from NPN transistor, please set the U-shaped contact tag between +24V and PW as below according to the used power supply.

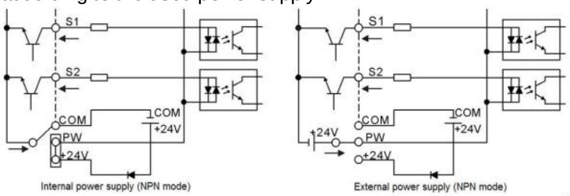

Fig 4-22 NPN modes

If the signal is from PNP transistor, please set the U-shaped contact tag as below according to the used power supply.

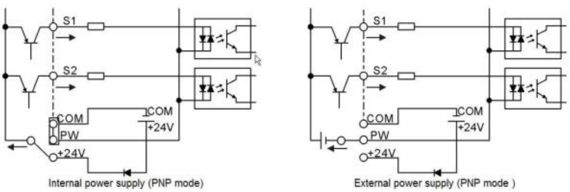

Fig 4-23 PNP modes

4.4 Layout protection

4.4.1 Protecting the inverter and input power cable in short-circuit situations

Protect the inverter and input power cable in short circuit situations and against thermal overload.

Arrange the protection according to the following guidelines.

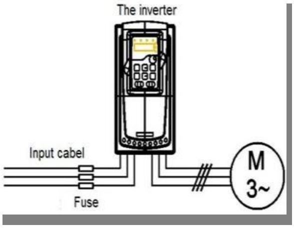

Fig 4-24 Fuse configuration

Note: Select the fuse as the manual indicated. The fuse will protect the input power cable from damage in short-circuit situations. It will protect the surrounding devices when the internal of the inverter is short circuited.

4.4.2 Protecting the motor and motor cable in short-circuit situations

The inverter protects the motor and motor cable in a short-circuit situation when the motor cable is dimensioned according to the rated current of the inverter. No additional protection devices are needed.

⚠	**If the inverter is connected to multiple motors, a separate thermal overload switch or a circuit breaker must be used for protecting each cable and motor. These devices may require a separate fuse to cut off the short-circuit current.**

4.4.3 Protecting the motor against thermal overload

According to regulations, the motor must be protected against thermal overload and the current must be switched off when overload is detected. The inverter includes a motor thermal protection function that protects the motor and closes the output to switch off the current when necessary.

4.4.4 Implementing a bypass connection

It is necessary to set power frequency and variable frequency conversion circuits for the assurance of continuous normal work of the inverter if faults occur in some significant situations.

In some special situations, for example, if it is only used in soft start, the inverter can be conversed into power frequency running after starting and some corresponding bypass should be added.

⚠	**Never connect the supply power to the inverter output terminals U, V and W. Power line voltage applied to the output can result in permanent damage to the inverter.**

If frequent shifting is required, employ mechanically connected switches or contactors to ensure that the motor terminals are not connected to the AC power line and inverter output terminals simultaneously.

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Keypad Operation F 5

5.1 What this chapter contains

This chapter contains following operation:

- Buttons, indicating lights and the screen as well as the methods to inspect, modify and set function codes by keypad
- Start-up

5.2 Keypad

The keypad is used to control TETA MA610 series inverters, read the state data and adjust parameters.

Fig 5-1 Keypad

No.	Name	Description	
1	State LED	RUN/TUNE	LED off means that the inverter is in the stopping state; LED blinking means the inverter is in the parameter autotune state; LED on means the inverter is in the running state.
		FWD/REV	FED/REV LED LED off means the inverter is in the forward rotation state; LED on means the inverter is in the reverse rotation state

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No.	Name	Description		
2		LOCAL/REMOT	LED for keypad operation, terminals operation and remote communication control LED off means that the inverter is in the keypad operation state; LED blinking means the inverter is in the terminals operation state; LED on means the inverter is in the remote communication control state.	
		TRIP	LED for faults LED on when the inverter is in the fault state; LED off in norm al state; LED blinking means the inverter is in the pre-alarm state.	
2	Unit LED	Mean the unit displayed currently		
			Hz	Frequency unit
			RPM	Rotating speed unit
			A	Current unit
			%	Percentage
			V	Voltage unit
3	Code displaying zone	5-figure LED display displays various monitoring data and alarm code such as set frequency and output frequency.		
4	Digital potentiometer	Tuning frequency. Please refer to P08.42.		
5	Buttons		Programming key	Enter or escape from the first level menu and remove the parameter quickly
			Entry key	Enter the menu step-by-step Confirm parameters
			UP key	Increase data or function code progressively
			DOWN key	Decrease data or function code progressively
			Right-shift key	Move right to select the displaying parameter circularly in stopping and running mode. Select the parameter modifying

No.	Name	Description		
				during the parameter modification
			Run key	This key is used to operate on the inverter in key operation mode
			Stop/ Reset key	This key is used to stop in running state and it is limited by function code P07.04 This key is used to reset all control modes in the fault alarm state
			Quick key	The function of this key is confirmed by function code P07.02.

5.3 Keypad displaying

The keypad displaying state of TETA MA610 series inverters is divided into stopping state parameter, running state parameter, function code parameter editing state and fault alarm state and so on.

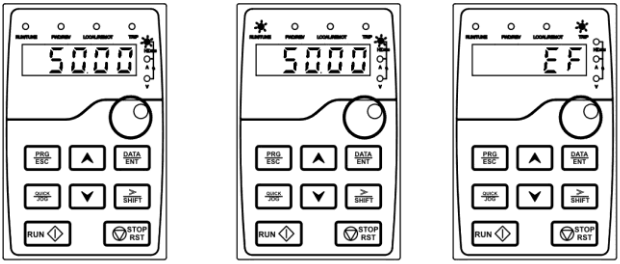

Fig 5-2 Displayed state

5.4 Keypad operation

Operate the inverter via operation panel. See the detailed structure description of function codes in the brief diagram of function codes.

5.4.1 How to modify the function codes of the inverter

The inverter has three levels menu, which are:

1. Group number of function code (first-level menu)
2. Tab of function code (second-level menu)
3. Set value of function code (third-level menu)

Remarks: Press both the PRG/ESC and the DATA/ENT can return to the second-level menu from the third-level menu. The difference is: pressing DATA/ENT will save the set parameters into the control panel, and then return to the second-level menu with shifting to the next function code automatically; while pressing PRG/ESC will directly return to the second-level menu without saving the parameters, and keep staying at the current function code.

Under the third-level menu, if the parameter has no flickering bit, it means the function code

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cannot be modified. The possible reasons could be:
1) This function code is not modifiable parameter, such as actual detected parameter, operation records and so on;
2) This function code is not modifiable in running state, but modifiable in stop state.
Example: Set function code P00.01 from 0 to 1.

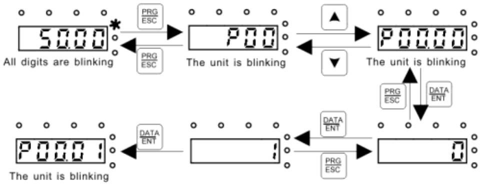

Fig 5-3 Sketch map of modifying parameters

5.4.2 How to set the password of the inverter

TETA MA610 series inverters provide password protection function to users. Set P7.00 to gain the password and the password protection becomes valid instantly after quitting from the function code editing state. Press PRG/ESC again to the function code editing state, “0.0.0.0.0” will be displayed. Unless using the correct password, the operators cannot enter it.
Set P7.00 to 0 to cancel password protection function.
The password protection becomes effective instantly after retreating form the function code editing state. Press PRG/ESC again to the function code editing state, “0.0.0.0.0” will be displayed. Unless using the correct password, the operators cannot enter it.

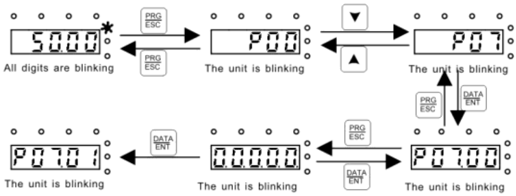

Fig 5-4 Sketch map of password setting

5.4.3 How to watch the inverter state through function codes

TETA MA610 series inverters provide group P17 as the state inspection group. Users can enter into P17 directly to watch the state.

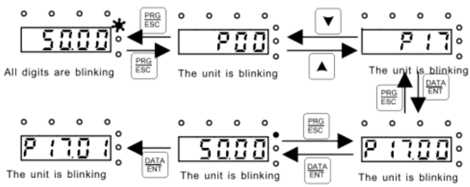

Fig 5-5 Sketch map of state watching

Function Parameter 6

6.1 What this chapter contains

This chapter lists and describes the function parameters.

6.2 TETA MA610 general series function parameters

The function parameters of TETA MA610 series inverters have been divided into 30 groups (P00~P29) according to the function, of which P18~P28 are reserved. Each function group contains certain function codes applying 3-level menus. For example, "P08.08" means the eighth function code in the P8 group function, P29 group is factory reserved, and users are forbidden to access these parameters.

For the convenience of function codes setting, the function group number corresponds to the first level menu, the function code corresponds to the second level menu and the function code corresponds to the third level menu.

1. Below is the instruction of the function lists:

The first line "Function code": codes of function parameter group and parameters;

The second line "Name": full name of function parameters;

The third line "Detailed illustration of parameters": detailed illustration of the function parameters;

The fourth line "Default value": the original factory set value of the function parameter;

The fifth line "Modify": the modifying character of function codes (the parameters can be modified or not and the modifying conditions), below is the instruction:

"○": means the set value of the parameter can be modified on stop and running state;

"◎": means the set value of the parameter can not be modified on the running state;

"●": means the value of the parameter is the real detection value which can not be modified.

(The inverter has limited the automatic inspection of the modifying character of the parameters to help users avoid mismodifying).

2. "Parameter radix" is decimal (DEC), if the parameter is expressed by hex, then the parameter is separated from each other when editing. The setting range of certain bits are 0~F (hex).

3."The default value" means the function parameter will restore to the default value during default parameters restoring. But the detected parameter or recorded value won't be restored.

4. For a better parameter protection, the inverter provides password protection to the parameters. After setting the password (set P07.00 to any non-zero number), the system will come into the state of password verification firstly after the user press PRG/ESC to come into the function code editing state. And then "0.0.0.0.0." will be displayed. Unless the user input right password, they cannot enter into the system. For the factory setting parameter zone, it needs correct factory password (remind that the users can not modify the factory parameters by themselves, otherwise, if the parameter setting is incorrect, damage to the inverter may occur). If the password protection is unlocked, the user can modify the password freely and the inverter will work as the last setting one. When P07.00 is set to 0, the password can be canceled. If P07.00 is not 0 during powering on, then the parameter is protected by the password. When modify the parameters by serial communication, the function of the password follows the above rules, too.

Function code	Name	Detailed instruction of parameters	Default value	Modify
P00 Group Basic function group				
P00.00	Speed control mode	1: Sensorless vector control mode 1 (applying to AM) No need to install encoders. It is suitable in cases with high speed control accuracy for accurate speed and torque control at all power ratings. 2:SVPWM control No need to install encoders. It can improve the control accuracy with the advantages of stable operation, valid low-frequency torque boost and current vibration suppression and the functions of slip compensation and voltage adjustment. **Note**: AM-Asynchronous motor	2	◎
P00.01	Run command channel	Select the run command channel of the inverter. The control command of the inverter includes: start-up, stop, forward, reverse, jogging and fault reset. 0:Keypad running command channel("LOCAL/REMOT" light off) Carry out the command control by RUN, STOP/RST on the keypad. Set the multi-function key QUICK/JOG as FWD/REV shifting function (P07.02=3) to change the running direction; press RUN and STOP/RST simultaneously in running state to make the inverter coast to stop. 1:Terminal running command channel ("LOCAL/REMOT" flickering) Carry out the running command control by the forward rotation, reverse rotation and forward jogging and reverse jogging of the multi-function terminals 2:Communication running command channel ("LOCAL/REMOT" on); The running command is controlled by the upper monitor via communication.	0	○

<table>
<tr><th>Function code</th><th>Name</th><th>Detailed instruction of parameters</th><th>Default value</th><th>Modify</th></tr>
<tr><td>P00.02</td><td>Communication selection</td><td>0: MODBUS communication
1~3: Reserved</td><td>0</td><td>○</td></tr>
<tr><td>P00.03</td><td>Max. output frequency</td><td>This parameter is used to set the Maximum output frequency of the inverter. Users should pay attention to this parameter because it is the foundation of the frequency setting and the speed of acceleration and deceleration.
Setting range: P00.04~400.00Hz</td><td>50.00 Hz</td><td>◎</td></tr>
<tr><td>P00.04</td><td>Upper limit of the running frequency</td><td>The upper limit of the running frequency is the upper limit of the output frequency of the inverter which is lower than or equal to the maximum frequency.
Setting range:P00.05~P00.03 (Max. output frequency)</td><td>50.00 Hz</td><td>◎</td></tr>
<tr><td>P00.05</td><td>Lower limit of the running frequency</td><td>The lower limit of the running frequency is that of the output frequency of the inverter.
The inverter runs at the lower limit frequency if the set frequency is lower than the lower limit one.
Note: Max. output frequency ≥ Upper limit frequency ≥ Lower limit frequency
Setting range:0.00Hz~P00.04 (Upper limit of the running frequency)</td><td>0.00Hz</td><td>◎</td></tr>
<tr><td>P00.06</td><td>A frequency command</td><td rowspan="2">0:Keypad data setting
Modify the value of P00.10 (set the frequency by keypad) to modify the frequency by the keypad.
1:Analog AI1 setting(The inverter(≤15kW) can be set by the analog potentiometer on the keypad and AI1 setting is not available for the device which is 18.5kW or higer than 18.5kW)
2:Analog AI2 setting
3:Analog AI3 setting
Set the frequency by analog input terminals. TETA MA610 series inverters provide 3 channels analog input terminals as the standard configuration, of which AI1/AI2 are the voltage/current option (0~10V/0~20mA) which can be shifted by jumpers; while AI3 is voltage input (-10V~+10V).
Note: when analog AI1/AI2 select 0~20mA input, the corresponding voltage of 20mA is 10V.</td><td>0</td><td>○</td></tr>
<tr><td>P00.07</td><td>B frequency command</td><td>2</td><td>○</td></tr>
</table>

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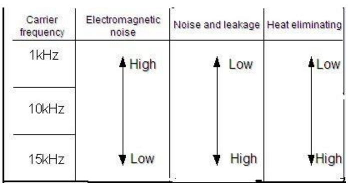
Function code	Name	Detailed instruction of parameters	Default value	Modify
		100.0% of the analog input setting corresponds to the maximum frequency (function code P00.03) in forward direction and -100.0% corresponds to the maximum frequency in reverse direction (function code P00.03) 4:High-speed pulse HDI setting The frequency is set by high-speed pulse terminals. TETA MA610 series inverters provide 1 channel high speed pulse input as the standard configuration. The pulse frequency range is 0.00~50.00kHz. 100.0% of the high speed pulse input setting corresponds to the maximum frequency in forward direction (P00.03) and -100.0% corresponds to the maximum frequency in reverse direction (P00.03). **Note:** The pulse setting can only be input by multi-function terminals HDI. Set P05.00 (HDI input selection) to high speed pulse input, and set P05.49 (HDI high speed pulse input function selection) to frequency setting input. 5:Simple PLC program setting The inverter runs at simple PLC program mode when P00.06=5 or P00.07=5. Set P10 (simple PLC and multi-step speed control) to select the running frequency, running direction, ACC/DEC time and the keeping time of corresponding step. See the function description of P10 for detailed information. 6: Multi-step speed running setting The inverter runs at multi-step speed mode when P00.06=6 or P00.07=6. Set P05 to select the current running step, and set P10 to select the current running frequency. The multi-step speed has the priority when P00.06 or P00.07 does not equal to 6, but the setting step can only be the 1~15 step. The setting step is 0~15 if P00.06 or P00.07 equals to 6. 7: PID control setting The running mode of the inverter is process PID		

Function code	Name	Detailed instruction of parameters	Default value	Modify
		control when P00.06=7 or P00.07=7. It is necessary to set P09. The running frequency of the inverter is the value after PID effect. See P09 for the detailed information of the preset source, preset value, and feedback source of PID. 8:MODBUS communication setting The frequency is set by MODBUS communication. See P14 for detailed information. 9~11: Reserved **Note:** A frequency and B frequency can not set as the same frequency reference mode.		
P00.08	B frequency command reference	0:Maximum output frequency, 100% of B frequency setting corresponds to the maximum output frequency 1: A frequency command, 100% of B frequency setting corresponds to the maximum output frequency. Select this setting if it needs to adjust on the base of A frequency command.	0	○
P00.09	Combination of the setting source	0: A, the current frequency setting is A frequency command 1: B, the current frequency setting is B frequency command 2: A+B, the current frequency setting is A frequency command + B frequency command 3: A-B, the current frequency setting is A frequency command - B frequency command 4: Max (A, B): the bigger one between A frequency command and B frequency is the set frequency. 5: Min (A, B): The lower one between A frequency command and B frequency is the set frequency. **Note:**The combination manner can be shifted by P05(terminal function)	0	○
P00.10	Keypad set frequency	When A and B frequency commands are selected as “keypad setting”, this parameter will be the initial value of inverter reference frequency Setting range:0.00 Hz~P00.03 (the Max. frequency)	50.00 Hz	○

Function code	Name	Detailed instruction of parameters	Default value	Modify
P00.11	ACC time 1	ACC time means the time needed if the inverter speeds up from 0Hz to the Max. One (P00.03). DEC time means the time needed if the inverter speeds down from the Max. Output frequency to 0Hz (P00.03). TETA MA610 series inverters define four groups of ACC/DEC time which can be selected by P05. The factory default ACC/DEC time of the inverter is the first group. Setting range of P00.11 and P00.12:0.0~3600.0s	Depend on model	○
P00.12	DEC time 1		Depend on model	○
P00.13	Running direction	0: Runs at the default direction, the inverter runs in the forward direction. FWD/REV indicator is off. 1: Runs at the opposite direction, the inverter runs in the reverse direction. FWD/REV indicator is on. Modify the function code to shift the rotation direction of the motor. This effect equals to the shifting the rotation direction by adjusting either two of the motor lines (U, V and W). In keypad control, the motor rotation direction can be changed by QUICK/JOG on the keypad. Refer to parameter P07.02. **Note:** When the function parameter comes back to the default value, the motor's running direction will come back to the factory default state, too. In some cases it should be used with caution after commissioning if the change of rotation direction is disabled. 2: Forbid to run in reverse direction: It can be used in some special cases if the reverse running is disabled.	0	○
P00.14	Carrier frequency setting	 The relationship table of the motor type and carrier frequency:	Depend on model	○

<table>
<tr><th>Function code</th><th>Name</th><th>Detailed instruction of parameters</th><th>Default value</th><th>Modify</th></tr>
<tr><td></td><td></td><td>

Model	Factory setting of carrier frequency
1.5~11kW	8kHz
15~55kW	4kHz
Above 75kW	2kHz

The advantage of high carrier frequency: ideal current waveform, little current harmonic wave and motor noise.
The disadvantage of high carrier frequency: increasing the switch loss, increasing inverter temperature and the impact to the output capacity. The inverter needs to derate on high carrier frequency. At the same time, the leakage and electrical magnetic interference will increase.
Applying low carrier frequency is contrary to the above, too low carrier frequency will cause unstable running, torque decreasing and surge.
The manufacturer has set a reasonable carrier frequency when the inverter is in factory. In general, users do not need to change the parameter.
When the frequency used exceeds the default carrier frequency, the inverter needs to derate 20% for each additional 1k carrier frequency.
Setting range:1.0~15.0kHz</td><td></td><td></td></tr>
<tr><td>P00.15</td><td>Motor parameter autotuning</td><td>0:No operation
1:Rotation autotuning
Comprehensive motor parameter autotune
It is recommended to use rotation autotuning when high control accuracy is needed.
2:Static autotuning 1
It is suitable in the cases when the motor can not de-couple from the load.
3:Static autotuning 2
It is suitable in the cases when the motor can not de-couple form the load. But only for parts of parameters.</td><td>0</td><td>◎</td></tr>
<tr><td>P00.16</td><td>AVR function selection</td><td>0:Invalid
1:Valid during the whole procedure
The auto-adjusting function of the inverter can</td><td>1</td><td>○</td></tr>
</table>

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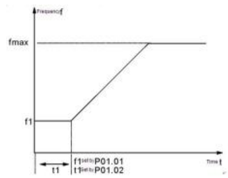
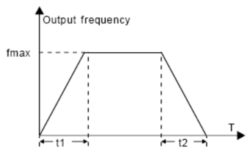
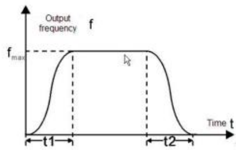
Function code	Name	Detailed instruction of parameters	Default value	Modify
		cancel the impact on the output voltage of the inverter because of the bus voltage fluctuation.		
P00.17	Inverter type	0:G type, for the constant torque load of rated parameters 1:P type; for the variable torque load of rated parameters (fans and water pumps) TETA MA610 inverters can use G/P type, the available motor power of G type is small one power file than that of P type.	0	◎
P00.18	Function restore parameter	0:No operation 1:Restore the default value 2:Clear fault records **Note:** The function code will restore to 0 after finishing the operation of the selected function code. Restoring to the default value will cancel the user password, please use this function with caution.	0	◎
P01 Group Start-up and stop control				
P01.00	Start mode	0:Start-up directly:start from the starting frequency P01.01 1:Start-up after DC braking: start the motor from the starting frequency after DC braking (set the parameter P01.03 and P01.04). It is suitable in the cases where reverse rotation may occur to the low inertia load during starting. 2: Start-up after speed tracking: start the rotating motor smoothly after tracking the rotation speed and direction automatically. It is suitable in the cases where reverse rotation may occur to the big inertia load during starting. **Note:** This function is available for the inverters of 4kW and above.	0	◎
P01.01	Starting frequency of direct start	Starting frequency of direct start-up means the original frequency during the inverter starting. See P01.02 for detailed information. Setting range: 0.00~50.00Hz	0.50Hz	◎
P01.02	Retention time of the starting frequency	Set a proper starting frequency to increase the torque of the inverter during starting. During the retention time of the starting frequency, the output frequency of the inverter is the starting	0.0s	◎

Function code	Name	Detailed instruction of parameters	Default value	Modify
		frequency. And then, the inverter will run from the starting frequency to the set frequency. If the set frequency is lower than the starting frequency, the inverter will stop running and keep in the stand-by state. The starting frequency is not limited in the lower limit frequency.  Setting range: 0.0~50.0s		
P01.03	The braking current before starting	The inverter will carry out DC braking at the braking current set before starting and it will speed up after the DC braking time. If the DC braking time is set to 0, the DC braking is invalid.	0.0%	◎
P01.04	The braking time before starting	The stronger the braking current, the bigger the braking power. The DC braking current before starting means the percentage of the rated current of the inverter. The setting range of P01.03: 0.0~100.0% The setting range of P01.04: 0.00~50.00s	0.00s	◎
P01.05	ACC/DEC selection	The changing mode of the frequency during start-up and running. 0:Linear type The output frequency increases or decreases linearly.   1: S curve	0	◎

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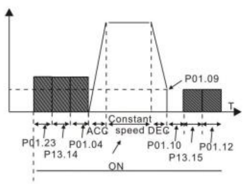
<table>
<tr><th>Function code</th><th>Name</th><th>Detailed instruction of parameters</th><th>Default value</th><th>Modify</th></tr>
<tr><td>P01.06</td><td>ACC time of the starting step of S</td><td rowspan="2">0.0~50.0s</td><td>0.1s</td><td>○</td></tr>
<tr><td>P01.07</td><td>DEC time of the ending step of S curve</td><td>0.1s</td><td>○</td></tr>
<tr><td>P01.08</td><td>Stop mode</td><td>0: Decelerate to stop: after the stop command becomes valid, the inverter decelerates to reduce the output frequency during the set time. When the frequency decreases to 0Hz, the inverter stops.
1: Coast to stop: after the stop command becomes valid, the inverter ceases the output immediately. And the load coasts to stop at the mechanical inertia.</td><td>0</td><td>○</td></tr>
<tr><td>P01.09</td><td>Starting frequency of DC braking</td><td>Starting frequency of DC braking: start the DC braking when running frequency reaches starting frequency determined by P1.09.</td><td>0.00Hz</td><td>○</td></tr>
<tr><td>P01.10</td><td>Waiting time before DC braking</td><td rowspan="3">Waiting time before DC braking: Inverters block the output before starting the DC braking. After this waiting time, the DC braking will be started so as to prevent over-current fault caused by DC braking at high speed.
DC braking current：The value of P01.11 is the percentage of rated current of inverter. The bigger the DC braking current is, the greater the braking torque is.
DC braking time: The retention time of DC brake. If the time is 0, the DC brake is invalid. The inverter will stop at the set deceleration time.


Setting range of P01.09: 0.00Hz~P00.03 (the Max. frequency)</td><td>0.00s</td><td>○</td></tr>
<tr><td>P01.11</td><td>DC braking current</td><td>0.0%</td><td>○</td></tr>
<tr><td>P01.12</td><td>DC braking time</td><td>0.00s</td><td>○</td></tr>
</table>

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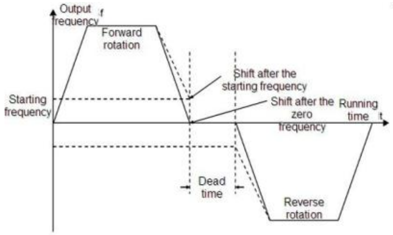
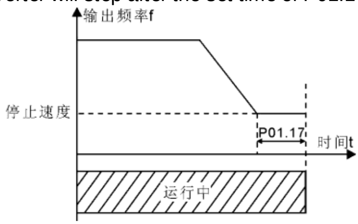
Function code	Name	Detailed instruction of parameters	Default value	Modify
		Setting range of P01.10: 0.00~50.00s Setting range of P01.11: 0.0~100.0% Setting range of P01.12: 0.00~50.00s		
P01.13	Dead time of FW D/REV rotation	During the procedure of switching FWD/REV rotation, set the threshold by P01.14, which is as the table below:  Setting range: 0.0~3600.0s	0.0s	○
P01.14	Shifting between FW D/REV rotation	Set the threshold point of the inverter: 0:Switch after 0 frequency 1:Switch after the starting frequency 2:Switch after the stopping speed	0	◎
P01.15	Stopping speed	0.00~100.00Hz	0.50 Hz	◎
P01.16	Detection of stopping speed	0: Detect according to speed setting (no stopping delay) 1: Detect according to speed feedback (only valid for vector control)	1	◎
P01.17	Detection time of the feedback speed	If set P01.16 to 1, the feedback frequency is less than or equal to P01.15 and detect in the set time of P01.17, the inverter will stop; otherwise the inverter will stop after the set time of P01.17  Setting range: 0.00~100.00s (only valid when P01.16=1)	0.50s	◎
P01.18	Operation protection	When the running command channel is the terminal control, the system will detect the state	0	○

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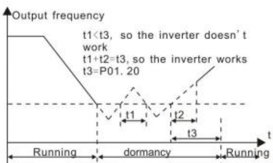
Function code	Name	Detailed instruction of parameters	Default value	Modify
	during powering on	of the running terminal during powering on. 0:The terminal running command is invalid when powering on. Even the running command is detected to be valid during powering on, the inverter won't run and the system keeps in the protection state until the running command is canceled and enabled again. 1:The terminal running command is valid when powering on. If the running command is detected to be valid during powering on, the system will start the inverter automatically after the initialization. **Note:** this function should be selected with cautions, or serious result may follow.		
P01.19	Action selection (operation frequency <lower frequency limit and valid when the lower limit >0)	This function code determines the running state of the inverter when the set frequency is lower than the lower-limit one. 0: Run at the lower limit frequency 1: Stop 2: Hibernation The inverter will coast to stop when the set frequency is lower than the lower-limit one. If the set frequency is above the lower limit one again and it lasts for the time set by P01.20, the inverter will come back to the running state automatically.	0	◎
P01.20	Hibernation restore delay time	This function code determines the hibernation delay time. When the running frequency of the inverter is lower than the lower limit one, the inverter will pause to stand by. When the set frequency is above the lower limit one again and it lasts for the time set by P01.20, the inverter will run automatically. **Note:** The time is the total value when the set frequency is above the lower limit one.  Setting range: 0.0~3600.0s (valid when P01.19=2)	0.0s	○
P01.21	Restart after power off	This function can enable the inverter start or not after the power off and then power on.	0	○

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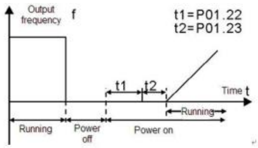
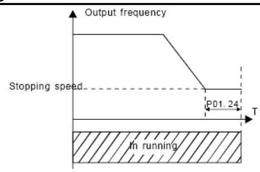
Function code	Name	Detailed instruction of parameters	Default value	Modify
		0: Disable 1: Enable, if the starting need is met, the inverter will run automatically after waiting for the time defined by P01.22.		
P01.22	The waiting time of restart after power off	The function determines the waiting time before the automatic running of the inverter when powering off and then powering on.  Setting range: 0.0~3600.0s (valid when P01.21=1)	1.0s	○
P01.23	Start delay time	The function determines the brake release after the running command is reference, and the inverter is in a stand-by state and wait for the delay time set by P01.23 Setting range: 0.0~60.0s	0.0s	○
P01.24	Delay time of the stop speed	 Setting range: 0.0~100.0 s	0.0s	●
P01.25	0Hz output selection	0: Output without voltage 1: Output with voltage 2: Output at the DC braking current	0	●
P02 Group Motor 1				
P02.01	Rated power of AM 1	0.1~3000.0kW	Depend on model	◎
P02.02	Rated frequency of AM 1	0.01Hz~P00.03(the Max. frequency)	50.00 Hz	◎
P02.03	Rated speed of AM 1	1~36000rpm	Depend on model	◎
P02.04	Rated voltage of AM 1	0~1200V	Depend on model	◎

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Function code	Name	Detailed instruction of parameters	Default value	Modify
P02.05	Rated current of AM 1	0.8~6000.0A	Depend on model	◎
P02.06	Stator resistor of AM 1	0.001~65.535Ω	Depend on model	○
P02.07	Rotor resistor of AM 1	0.001~65.535Ω	Depend on model	○
P02.08	Leakage inductance of AM 1	0.1~6553.5mH	Depend on model	○
P02.09	Mutual inductance of AM 1	0.1~6553.5mH	Depend on model	○
P02.10	Non-load current of AM 1	0.1~6553.5A	Depend on model	○
P02.26	Motor 1 overload protection	0: No protection 1: Common motor (with low speed compensation). Because the heat-releasing effect of the common motors will be weakened, the corresponding electric heat protection will be adjusted properly. The low speed compensation characteristic mentioned here means reducing the threshold of the overload protection of the motor whose running frequency is below 30Hz. 2: Variable frequency motor (without low speed compensation) Because the heat-releasing effect of the specific motors won't be impacted by the rotation speed, it is not necessary to adjust the protection value during low-speed running.	2	◎
P02.27	Motor 1 over load protection coefficient	Times of motor overload M = Iout/(In*K) In is the rated current of the motor, Iout is the output current of the inverter and K is the motor protection coefficient. So, the bigger the value of K is, the smaller the value of M is. When M =116%, the fault will be reported after 1 hour, when M =200%, the fault will be reported after 1 minute, when M>=400%, the fault will be reported instantly.	100.0%	○

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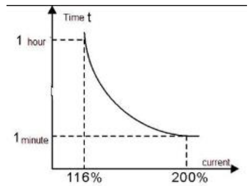
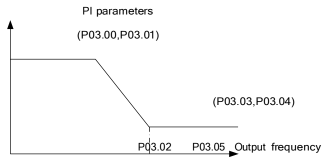
<table>
<tr><th>Function code</th><th>Name</th><th>Detailed instruction of parameters</th><th>Default value</th><th>Modify</th></tr>
<tr><td></td><td></td><td>

Setting range: 20.0%~120.0%</td><td></td><td></td></tr>
<tr><td>P02.28</td><td>Correction coefficient of motor 1 power</td><td>Correct the power displaying of motor 1.
Only impact the displaying value other than the control performance of the inverter.
Setting range: 0.00~3.00</td><td>1.00</td><td>●</td></tr>
<tr><td colspan="5">P03 Group Vector control</td></tr>
<tr><td>P03.00</td><td>Speed loop proportional gain1</td><td rowspan="6">The parameters P03.00~P03.05 only apply to vector control mode. Below the switching frequency 1(P03.02), the speed loop PI parameters are: P03.00 and P03.01. Above the switching frequency 2(P03.05), the speed loop PI parameters are: P03.03 and P03.04. PI parameters are gained according to the linear change of two groups of parameters. It is shown as below:


Setting the proportional coefficient and integral time of the adjustor can change the dynamic response performance of vector control speed loop. Increasing the proportional gain and decreasing the integral time can speed up the dynamic response of the speed loop. But too high proportional gain and too low integral time may cause system vibration and overshoot. Too low proportional gain may cause system vibration and speed static deviation.
PI has a close relationship with the inertia of the system. Adjust on the base of PI according to</td><td>20.0</td><td>○</td></tr>
<tr><td>P03.01</td><td>Speed loop integral time1</td><td>0.200s</td><td>○</td></tr>
<tr><td>P03.02</td><td>Low switching frequency</td><td>5.00Hz</td><td>○</td></tr>
<tr><td>P03.03</td><td>Speed loop proportional gain 2</td><td>20.0</td><td>○</td></tr>
<tr><td>P03.04</td><td>Speed loop integral time 2</td><td>0.200s</td><td>○</td></tr>
<tr><td>P03.05</td><td>High switching frequency</td><td>10.00Hz</td><td>○</td></tr>
</table>

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Function code	Name	Detailed instruction of parameters	Default value	Modify
		different loads to meet various demands. The setting range of P03.00:0~200.0 The setting range of P03.01: 0.000~10.000s The setting range of P03.02:0.00Hz~P03.05 The setting range of P03.03:0~200.0 The setting range of P03.04: 0.000~10.000s The setting range of P03.05:P03.02~P00.03(the Max. output frequency)		
P03.06	Speed loop output filter	0~8 (corresponds to 0~2^8/10ms)	0	○
P03.07	Compensation coefficient of electro motion slip	Slip compensation coefficient is used to adjust the slip frequency of the vector control and improve the speed control accuracy of the system. Adjusting the parameter properly can control the speed steady-state error. Setting range:50~200%	100%	○
P03.08	Compensation coefficient of braking slip		100%	○
P03.09	Current loop percentage coefficient P	**Note**: 1 These two parameters adjust the PI adjustment parameter of the current loop which affects the dynamic response speed and control accuracy directly. Generally, users do not need to change the default value. 2 Only apply to SVC control mode 0(P00.00=0). Setting range:0~65535	1000	○
P03.10	Current loop integral coefficient 1		1000	○
P03.11	Torque setting method	This parameter is used to enable the torque control mode, and set the torque. 0:Torque control is invalid 1:Keypad setting torque(P03.12) 2:Analog AI1 setting torque(The inverter ≤15kW) can be set by the analog potentiometer on the keypad and AI1 setting is not available for the device which is 18.5kW or higer than 18.5kW 3:Analog AI2 setting torque 4:Analog AI3 setting torque 5:Pulse frequency HDI setting torque 6:Multi-step torque setting 7:MODBUS communication setting torque 8~10:Reserved Note: Setting modes 2~10, 100% corresponds to three times of the rated current of the motor.	0	○

<table>
<tr><th>Function code</th><th>Name</th><th>Detailed instruction of parameters</th><th>Default value</th><th>Modify</th></tr>
<tr><td>P03.12</td><td>Keypad setting torque</td><td>Setting range: -300.0%~300.0%(rated current of the Motor)</td><td>50.0%</td><td>○</td></tr>
<tr><td>P03.13</td><td>Torque reference filter time</td><td>0.000~10.000s</td><td>0.010s</td><td>○</td></tr>
<tr><td>P03.14</td><td>Upper frequency of forward rotation in vector control</td><td rowspan="2">0:Keypad
(P03.16 sets P03.14,P03.17 sets P03.15)
1: AI1 (The inverter(≤15kW) can be set by the analog potentiometer on the keypad and AI1 setting is not available for the device which is 18.5kW or higer than 18.5kW)
2: AI2
3: AI3
4:Pulse frequency HDI setting upper-limit frequency
5:Multi-step setting upper-limit frequency
6:MODBUS communication setting upper-limit frequency
7~ 9: Reserved
Note: Setting method 1~9, 100% corresponds to the maximum frequency</td><td>0</td><td>○</td></tr>
<tr><td>P03.15</td><td>Upper frequency of reverse rotation in vector control</td><td>0</td><td>○</td></tr>
<tr><td>P03.16</td><td>Keypad setting for upper frequency of forward rotation</td><td rowspan="2">This function is used to set the upper limit of the frequency. P03.16 sets the value of P03.14; P03.17 sets the value of P03.15.
Setting range:0.00 Hz~P00.03 (the Max. output frequency)</td><td>50.00 Hz</td><td>○</td></tr>
<tr><td>P03.17</td><td>Keypad setting for upper frequency of reverse rotation</td><td>50.00Hz</td><td>○</td></tr>
<tr><td>P03.18</td><td>Upper electromotion torque source</td><td rowspan="2">This function code is used to select the electro motion and braking torque upper-limit setting source selection.
0:Keypad setting upper-limit frequency
(P03.20 sets P03.18, P03.21 sets P03.19)
1: AI1 (The inverter(≤15kW) can be set by the</td><td>0</td><td>○</td></tr>
<tr><td>P03.19</td><td>Upper braking</td><td>0</td><td>○</td></tr>
</table>

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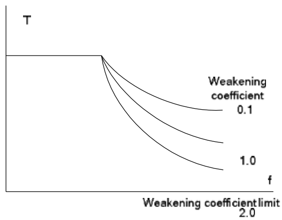
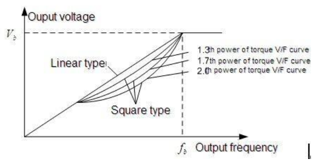
Function code	Name	Detailed instruction of parameters	Default value	Modify
	torque source	analog potentiometer on the keypad and AI1 setting is not available for the device which is 18.5kW or higer than 18.5kW) 2: AI2 3: AI3 4: HDI 5: MODBUS communication **Note**: setting mode 1~9,100% corresponds to three times of the motor current.		
P03.20	Keypad setting of electro motion	The function code is used to set the limit of the torque. Setting range:0.0~300.0%(motor rated current)	180.0%	○
P03.21	Keypad setting of braking torque		180.0%	○
P03.22	Weakening coefficient in constant power zone	The usage of motor in weakening control.  Function code P03.22 and P03.23 are effective at constant power. The motor will enter into the weakening state when the motor runs at rated speed. Change the weakening curve by modifying the weakening control coefficient. The bigger the weakening control coefficient is, the steeper the weak curve is. The setting range of P03.22:0.1~2.0 The setting range of P03.23:10%~100%	0.3	○
P03.23	Lowest weakening point in constant power zone		20%	○
P03.24	Max. voltage limit	P03.24 set the Max. Voltage of the inverter, which is dependent on the site situation. The setting range:0.0~120.0%	100.0%	◎
P03.25	Pre-exciting time	Reactivate the motor when the inverter starts up. Build up a magnetic field inside the inverter to improve the torque performance during the starting process.	0.300s	○

Function code	Name	Detailed instruction of parameters	Default value	Modify
		The setting time:0.000~10.000s		
P03.26	Weak magnetic proportional gain	0~8000 **Note:** P03.24~P03.26 are invalid for vector mode.	1000	○
P03.27	Vector control speed	0: Display the actual value 1: Display the setting value	0	○
P03.28	Compensation coefficient of static friction	0.0~100.0% Adjust P03.28 to compensate the coefficient of static friction. Only valid when setting in 1Hz.	0.0%	○
P03.29	Compensation coefficient of dynamic friction	0.0~100.0% Adjust P03.29 to compensate the coefficient of static friction. Only valid when setting in 1Hz.	0.0%	○
P04 Group SVPWM control				
P04.00	Motor 1 V/F curve setting	These function codes define the V/F curve of TETA MA610 motor 1, and meet the need of different loads. 0:Straight line V/F curve ; applying to the constant torque load 1:Multi-dots V/F curve 2:1.3th power low torque V/F curve 3:1.7th power low torque V/F curve 4:2.0th power low torque V/F curve Curves 2~4 apply to the torque loads such as fans and water pumps. Users can adjust according to the features of the loads to achieve a best energy-saving effect. 5:Customized V/F(V/F separation); in this mode, V can be separated from f and f can be adjusted through the frequency reference channel set by P00.06 or the voltage reference channel set by P04.27 to change the feature of the curve. **Note:** V_b in the below picture is the motor rated voltage and f_b is the motor rated frequency. 	0	◎

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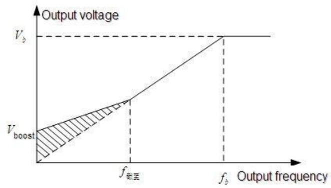
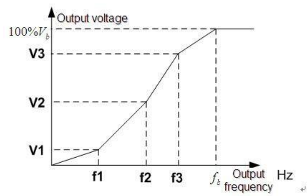
<table>
<tr><th>Function code</th><th>Name</th><th>Detailed instruction of parameters</th><th>Default value</th><th>Modify</th></tr>
<tr><td>P04.01</td><td>Motor 1 torque boost</td><td rowspan="2">Torque boost is used for the compensation of low frequency torque. P04.01 is relative to the Max. output voltage V_b.
P04.02 defines the percentage of closing frequency of manual torque to f_b.
Torque boost should be selected according to the load. The bigger the load is, the bigger the torque is. Too big torque boost is inappropriate because the motor will run with over magnetic, and the current of the inverter will increase to add the temperature of the inverter and decrease the efficiency.
When the torque boost is set to 0.0%, the inverter is automatic torque boost.
Torque boost threshold: below this frequency point, the torque boost is effective, but over this frequency point, the torque boost is invalid.


The setting range of P04.01:0.0%:(automatic) 0.1%~10.0%
The setting range of P04.02:0.0%~50.0%</td><td>0.0%</td><td>○</td></tr>
<tr><td>P04.02</td><td>Motor 1 torque boost close</td><td>20.0%</td><td>○</td></tr>
<tr><td>P04.03</td><td>V/F frequency 1 of motor 1</td><td rowspan="5">

When P04.00 =1, the user can set V/F curve through P04.03~P04.08.
V/F is generally set according to the load of the motor.</td><td>0.00Hz</td><td>○</td></tr>
<tr><td>P04.04</td><td>V/F voltage 1 of motor 1</td><td>00.0%</td><td>○</td></tr>
<tr><td>P04.05</td><td>V/F frequency 2 of motor 1</td><td>00.00Hz</td><td>○</td></tr>
<tr><td>P04.06</td><td>V/F voltage 2 of motor 1</td><td>00.0%</td><td>○</td></tr>
<tr><td>P04.07</td><td>V/F frequency 3 of motor 1</td><td>00.00Hz</td><td>○</td></tr>
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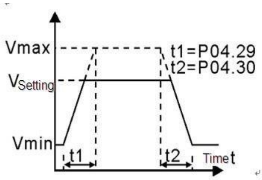
Function code	Name	Detailed instruction of parameters	Default value	Modify
P04.08	V/F voltage 3 of motor 1	**Note:**V1 < V2 < V3, f1 < f2 < f3. Too high low frequency voltage will heat the motor excessively or damage. The inverter may occur the overcurrent speed or overcurrent protection. The setting range of P04.03: 0.00Hz~P04.05 The setting range of P04.04:0.0%~110.0% The setting range of P04.05:P04.03~ P04.07 The setting range of P04.06:0.0%~110.0% (the rated voltage of motor 1) The setting range of P04.07:P04.05~ P02.02 (the rated frequency of motor 1) The setting range of P04.08:0.0%~110.0% (the rated voltage of motor 1)	00.0%	○
P04.09	V/F slip compensation gain of motor 1	This function code is used to compensate the change of the rotation speed caused by load during compensation SVPWM control to improve the rigidity of the motor. It can be set to the rated slip frequency of the motor which is counted as below: $\triangle f=f_b-n*p/60$ Of which, f_b is the rated frequency of the motor, its function code is P02.02; n is the rated rotating speed of the motor and its function code is P02.03; p is the pole pair of the motor. 100.0% corresponds to the rated slip frequency Δf. Setting range:0.0~200.0%	100.0%	○
P04.10	Motor 1 low frequency vibration control factor	In the SVPWM control mode, current fluctuation may occur to the motor on some frequency, especially the motor with big power. The motor can not run stably or overcurrent may occur. These phenomena can be canceled by adjusting this parameter. The setting range of P04.10:0~100 The setting range of P04.11:0~100 The setting range of P04.12:0.00Hz~P00.03 (the Max. frequency)	10	○
P04.11	Motor 1 high frequency vibration control factor		10	○
P04.12	Motor 1 vibration control threshold		30.00 Hz	○
P04.26	Energy-saving operation selection	0:No action 1:Automatic energy-saving operation Motor on the light load conditions, automatically	0	◎

Function code	Name	Detailed instruction of parameters	Default value	Modify
		adjusts the output voltage to save energy		
P04.27	Voltage setting channel	Select the output setting channel at V/F curve separation. 0: Keypad setting voltage: the output voltage is determined by P04.28. 1:AI1 setting voltage(The inverter(≤15kW) can be set by the analog potentiometer on the keypad and AI1 setting is not available for the device which is 18.5kW or higer than 18.5kW) 2:AI2 setting voltage; 3:AI3 setting voltage; 4:HDI setting voltage; 5:Multi-step speed setting voltage; 6:PID setting voltage; 7:MODBUS communication setting voltage; **Note:** 100% corresponds to the rated voltage of the motor.	0	○
P04.28	Keypad setting voltage	The function code is the voltage digital set value when the voltage setting channel is selected as "keypad selection" The setting range:0.0%~100.0%	100.0%	○
P04.29	Voltage increasing time	Voltage increasing time is the time when the inverter accelerates from the output minimum voltage to the output maximum voltage.	5.0s	○
P04.30	Voltage decreasing time	Voltage decreasing time is the time when the inverter decelerates from the output maximum voltage to the output minimum voltage. The setting range:0.0~3600.0s	5.0s	○
P04.31	Maximum output voltage	Set the upper and low limit of the output voltage. The setting range of P04.31:P04.32~100.0% (the rated voltage of the motor)	100.0%	◎
P04.32	Minimum output voltage	The setting range of P04.32:0.0%~ P04.31 (the rated voltage of the motor) 	0.0%	◎

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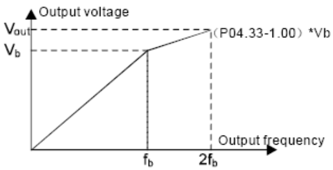
Function code	Name	Detailed instruction of parameters	Default value	Modify
P04.33	Weaking coefficient at constant power	Used to adjust the output voltage of inverter in SVPWM mode when weaking magnetic. Note: Invalid in constant-torque mode.  The setting range of P04.33: 1.00~1.30	1.00	●
P05 Group Input terminals				
P05.00	HDI input	0: HDI is high pulse input. See P05.49~P05.54 1: HDI is switch input	0	◎
P05.01	S1 terminal function selection	0: No function 1: Forward rotation 2: Reverse rotation 3: 3-wire control 4: Forward jogging 5: Reverse jogging 6: Coast to stop 7: Fault reset 8: Operation pause 9: External fault input 10:Increasing frequency setting(UP) 11:Decreasing frequency setting(DOWN) 12:Cancel the frequency change setting 13:Shift between A setting and B setting 14:Shift between combination setting and A setting 15:Shift between combination setting and B setting 16:Multi-step speed terminal 1 17:Multi-step speed terminal 2 18:Multi-step speed terminal 3 19:Multi- step speed terminal 4 20:Multi- step speed pause 21:ACC/DEC time option 1	1	◎
P05.02	S2 terminal function selection		4	◎
P05.03	S3 terminal function selection		7	◎
P05.04	S4 terminal function selection		0	◎
P05.05	S5 terminal function selection		0	◎
P05.06	S6 terminal function selection		0	◎
P05.07	S7 terminal function selection		0	◎
P05.08	S8 terminal function selection		0	◎

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<tr><th>Function code</th><th>Name</th><th>Detailed instruction of parameters</th><th>Default value</th><th>Modify</th></tr>
<tr><td>P05.09</td><td>HDI terminal function selection</td><td>22:ACC/DEC time option 2
23:Simple PLC stop reset
24:Simple PLC pause
25:PID control pause
26:Traverse Pause(stop at the current frequency)
27:Traverse reset(return to the center frequency)
28:Counter reset
29:Torque control prohibition
30:ACC/DEC prohibition
31:Counter trigger
32:Length reset
33:Cancel the frequency change setting temporarily
34:DC brake
36:Shift the command to the keypad
37:Shift the command to the terminals
38:Shift the command to the communication
39: Pre-exciting command
40:Clear the power
41:Keep the power
61: PID pole switching</td><td>0</td><td>◎</td></tr>
<tr><td>P05.10</td><td>Polarity selection of the input terminals</td><td>The function code is used to set the polarity of the input terminals.
Set the bit to 0, the input terminal is anode.
Set the bit to 1, the input terminal is cathode.<table><tr><td>BIT0</td><td>BIT1</td><td>BIT2</td><td>BIT3</td><td>BIT4</td></tr><tr><td>S1</td><td>S2</td><td>S3</td><td>S4</td><td>S5</td></tr><tr><td>BIT5</td><td>BIT6</td><td>BIT7</td><td>BIT8</td><td></td></tr><tr><td>S6</td><td>S7</td><td>S8</td><td>HDI</td><td></td></tr></table>The setting range:0x000~0x1FF</td><td>0x000</td><td>○</td></tr>
<tr><td>P05.11</td><td>ON-OFF filter time</td><td>Set the sample filter time of S1~S8 and HDI terminals. If the interference is strong, increase the parameter to avoid the disoperation.
0.000~1.000s</td><td>0.010s</td><td>○</td></tr>
<tr><td>P05.12</td><td>Virtual terminals setting</td><td>0x000~0x1FF(0: Disabled, 1:Enabled)
BIT0:S1 virtual terminal
BIT1:S2 virtual terminal
BIT2:S3 virtual terminal
BIT3:S4 virtual terminal
BIT4:S5 virtual terminal
BIT5:S6 virtual terminal</td><td>0x000</td><td>◎</td></tr>
</table>

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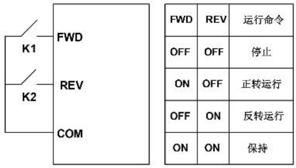
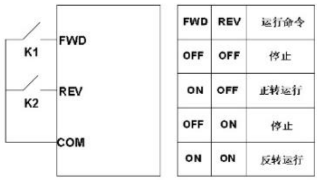
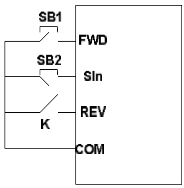
<table>
<tr><th>Function code</th><th>Name</th><th>Detailed instruction of parameters</th><th>Default value</th><th>Modify</th></tr>
<tr><td></td><td></td><td>BIT6:S7 virtual terminal
BIT7:S8 virtual terminal
BIT8:HDI virtual terminal</td><td></td><td></td></tr>
<tr><td>P05.13</td><td>Terminals control running mode</td><td>during operation:
Set the operation mode of the terminals control
0:2-wire control 1, comply the enable with the direction. This mode is widely used. It determines the rotation direction by the defined FWD and REV terminals command.


:2-wire control 2; Separate the enable from the direction. FW D defined by this mode is the enabling ones. The direction depends on the state of the defined REV.


2:3-wire control 1; Sin is the enabling terminal on this mode, and the running command is caused by FWD and the direction is controlled by REV. Sin is natural closed.


The direction control is as below
<table><tr><th>SIn</th><th>REV</th><th>Previous direction</th><th>Current direction</th></tr></table></td><td>0</td><td>◎</td></tr>
</table>

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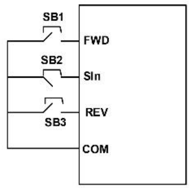
<table>
<tr><th>Function code</th><th>Name</th><th>Detailed instruction of parameters</th><th>Default value</th><th>Modify</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td rowspan="2">ON</td><td rowspan="2">OFF→ON</td><td>Forward</td><td>Reverse</td></tr>
<tr><td>Reverse</td><td>Forward</td></tr>
<tr><td rowspan="2">ON</td><td rowspan="2">ON→OFF</td><td>Reverse</td><td>Forward</td></tr>
<tr><td>Forward</td><td>Reverse</td></tr>
<tr><td rowspan="2">ON→ OFF</td><td>ON</td><td colspan="2" rowspan="2">Decelerate to stop</td></tr>
<tr><td>OFF</td></tr>
</table>
3:3-wire control 2; Sin is the enabling terminal on this mode, and the running command is caused by SB1 or SB3 and both of them control the running direction.NC SB2 generates the stop command.


<table>
<tr><th>SIn</th><th>FWD</th><th>REV</th><th>Direction</th></tr>
<tr><td rowspan="2">ON</td><td rowspan="2">OFF→ ON</td><td>ON</td><td>Forward</td></tr>
<tr><td>OFF</td><td>Reverse</td></tr>
<tr><td rowspan="2">ON</td><td>ON</td><td rowspan="2">OFF→ ON</td><td>Forward</td></tr>
<tr><td>OFF</td><td>Reverse</td></tr>
<tr><td rowspan="2">ON→ OFF</td><td></td><td></td><td rowspan="2">Decelerat e to stop</td></tr>
<tr><td></td><td></td></tr>
</table>
Note: for the 2-wire running mode, when FWD/REV terminal is valid, the inverter stop because of the stopping command from other sources, even the control terminal FWD/REV keeps valid; the inverter won't work when the stopping command is canceled. Only when FWD/REV is relaunched, the inverter can start again. For example, the valid STOP/RST stop when PLC signal cycles stop, fixed-length stop and terminal control (see P07.04).</td><td></td><td></td></tr>
<tr><td>P05.14</td><td>S1 terminal switching-on delay time</td><td>The function code defines the corresponding delay time of electrical level of the programmable terminals from switching on to switching off.</td><td>0.000s</td><td>○</td></tr>
</table>

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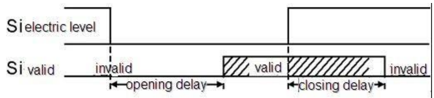
Function code	Name	Detailed instruction of parameters	Default value	Modify
P05.15	S1 terminal switching-off delay time		0.000s	○
P05.16	S2 terminal switching-on delay time	Setting range:0.000~50.000s	0.000s	○
P05.17	S2 terminal switching-off delay time		0.000s	○
P05.18	S3 terminal switching-on delay time		0.000s	○
P05.19	S3 terminal switching-off delay time		0.000s	○
P05.20	S4 terminal switching-on delay time		0.000s	○
P05.21	S4 terminal switching-off delay time		0.000s	○
P05.22	S5 terminal switching-on delay time		0.000s	○
P05.23	S5 terminal switching-off delay time		0.000s	○
P05.24	S6 terminal switching-on delay time		0.000s	○
P05.25	S6 terminal switching-off delay time		0.000s	○

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Function code	Name	Detailed instruction of parameters	Default value	Modify
P05.26	S7 terminal switching-on delay time		0.000s	○
P05.27	S7 terminal switching-off delay time		0.000s	○
P05.28	S8 terminal switching-on delay time		0.000s	○
P05.29	S8 terminal switching-off delay time		0.000s	○
P05.30	HDI terminal switching-on delay time		0.000s	○
P05.31	HDI terminal switching-off delay time		0.000s	○
P05.32	Lower limit of	The inverter(≤15kW) can be set by the analog potentiometer on the keypad and AI1 setting is not available for the device which is 18.5kW or higer than 18.5 kW. The function code defines the relationship between the analog input voltage and its corresponding set value. If the analog input voltage beyond the set minimum or maximum input value, the inverter will count at the minimum or maximum one. When the analog input is the current input, the corresponding voltage of 0~20mA is 0~10V. In different cases, the corresponding rated value of 100.0% is different. See the application for detailed information. The figure below illustrates different applications:	0.00V	○
P05.33	Corresponding setting of the lower limit of AI1		0.0%	○
P05.34	Upper limit of		10.00V	○
P05.35	Corresponding setting of the upper limit of AI1		100.0%	○
P05.36	AI1 input filter time		0.100s	○
P05.37	Lower limit of		0.00V	○

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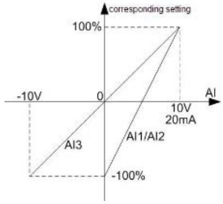
<table>
<tr><th>Function code</th><th>Name</th><th>Detailed instruction of parameters</th><th>Default value</th><th>Modify</th></tr>
<tr><td>P05.38</td><td>Corresponding setting of the lower limit of AI2</td><td rowspan="11">

Input filter time: this parameter is used to adjust the sensitivity of the analog input. Increasing the value properly can enhance the anti-interference of the analog, but weaken the sensitivity of the analog input
Note: Analog AI1 and AI2 can support 0~10V or 0~20mA input, when AI1 and AI2 selects 0~20mA input, the corresponding voltage of 20mA is 5V. AI3 can support the output of -10V~+10V.
The setting range of P05.32:0.00V~P05.34
The setting range of P05.33:-100.0%~100.0%
The setting range of P05.34:P05.32~10.00V
The setting range of P05.35:-100.0%~100.0%
The setting range of P05.36:0.000s~10.000s
The setting range of P05.37:0.00V~P05.39
The setting range of P05.38:-100.0%~100.0%
The setting range of P05.39:P05.37~10.00V
The setting range of P05.40:-100.0%~100.0%
The setting range of P05.41:0.000s~10.000s
The setting range of P05.42:-10.00V~P05.44
The setting range of P05.43:-100.0%~100.0%
The setting range of P05.44: P05.42~P05.46
The setting range of P05.45:-100.0%~100.0%
The setting range of P05.46:P05.44~10.00V
The setting range of P05.47:-100.0%~100.0%
The setting range of P05.48:0.000s~10.000s</td><td>0.0%</td><td>○</td></tr>
<tr><td>P05.39</td><td>Upper limit of AI2</td><td>10.00V</td><td>○</td></tr>
<tr><td>P05.40</td><td>Corresponding setting of the upper limit of AI2</td><td>100.0%</td><td>○</td></tr>
<tr><td>P05.41</td><td>AI2 input filter time</td><td>0.100s</td><td>○</td></tr>
<tr><td>P05.42</td><td>Lower limit of AI3</td><td>-10.00V</td><td>○</td></tr>
<tr><td>P05.43</td><td>Corresponding setting of the lower limit of AI3</td><td>-100.0%</td><td>○</td></tr>
<tr><td>P05.44</td><td>Middle value of AI3</td><td>0.00V</td><td>○</td></tr>
<tr><td>P05.45</td><td>Corresponding middle setting of AI3</td><td>0.0%</td><td>○</td></tr>
<tr><td>P05.46</td><td>Upper limit of AI3</td><td>10.00V</td><td>○</td></tr>
<tr><td>P05.47</td><td>Corresponding setting of the upper limit of AI3</td><td>100.0%</td><td>○</td></tr>
<tr><td>P05.48</td><td>AI3 input filter time</td><td>0.100s</td><td>○</td></tr>
<tr><td>P05.49</td><td>HDI high-speed pulse input</td><td>The function selection when HDI terminals is high-speed pulse input
0:Frequency setting input, frequency setting source
1:Counter input, high-speed pulse counter input terminals
2:Length counting input, length counter input terminals</td><td>0</td><td>◎</td></tr>
</table>

<table>
<tr><th>Function code</th><th>Name</th><th>Detailed instruction of parameters</th><th>Default value</th><th>Modify</th></tr>
<tr><td>P05.50</td><td>Lower limit frequency of HDI</td><td>0.000kHz~P05.52</td><td>0.000 kHz</td><td>○</td></tr>
<tr><td>P05.51</td><td>Corresponding setting of HDI low frequency setting</td><td>-100.0%~100.0%</td><td>0.0%</td><td>○</td></tr>
<tr><td>P05.52</td><td>Upper limit frequency of HDI</td><td>P05.50 ~50.00kHz</td><td>50.00 kHz</td><td>○</td></tr>
<tr><td>P05.53</td><td>Corresponding setting of upper limit frequency of HDI</td><td>-100.0%~100.0%</td><td>100.0%</td><td>○</td></tr>
<tr><td>P05.54</td><td>HDI frequency input filter time</td><td>0.000s~10.000s</td><td>0.100s</td><td>○</td></tr>
<tr><td colspan="5">P06 Group Output terminals</td></tr>
<tr><td>P06.00</td><td>HDO output</td><td>The function selection of the high-speed pulse output terminals.
0: Open collector pole high speed pulse output: The Max.pulse frequency is 50.0kHz. See P06.27~P06.31 for detailed information of the related functions.
1: Open collector pole output. See P06.02 for detailed information of the related functions.</td><td>0</td><td>◎</td></tr>
<tr><td>P06.01</td><td>Y1 output</td><td rowspan="4">0:Invalid
1:In operation
2:Forward rotation
3:Reverse rotation
4: Jogging
5:The inverter fault
6:Frequency degree test FDT1
7:Frequency degree test FDT2
8:Frequency arrival
9:Zero speed running
10:Upper limit frequency arrival</td><td>0</td><td>○</td></tr>
<tr><td>P06.02</td><td>HDO output</td><td>0</td><td>○</td></tr>
<tr><td>P06.03</td><td>Relay RO1 output</td><td>1</td><td>○</td></tr>
<tr><td>P06.04</td><td>Relay RO2 output</td><td>5</td><td>○</td></tr>
</table>

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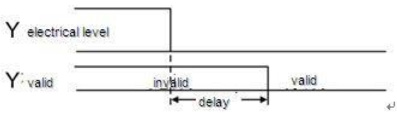
Function code	Name	Detailed instruction of parameters	Default value	Modify
		11:Lower limit frequency arrival 12:Ready for operation 13:Pre-magnetizing 14:Overload pre-alarm 15: Underload pre-alarm 16:Completion of simple PLC step 17:Completion of simple PLC cycle 18:Setting count value arrival 19:Defined count value arrival 20:External fault valid 21:Length arrival 22:Running time arrival 23:MODBUS communication virtual terminals output 26: DC bus voltage establishment 27: Auxiliary motor 1 28: Auxiliary motor 2		
P06.05	Polarity selection of output terminals	The function code is used to set the pole of the output terminal. When the current bit is set to 0, input terminal is positive. When the current bit is set to 1, input terminal is negative. BIT0: Y; BIT1: HDO; BIT2: RO1; BIT3: RO2 Setting range:0~F	0	○
P06.06	Y1 switching-on delay time	The function code defines the corresponding delay time of the electrical level change during the programmable terminal switching on and off.  The setting range :0.000~50.000s **Note:** P06.08 and P06.09 are valid only when P06.00=1.	0.000s	○
P06.07	Y1 switching-off delay time		0.000s	○
P06.08	HDO switching-on delay time		0.000s	○
P06.09	HDO switching-off delay time		0.000s	○
P06.10	RO1 switching-on delay time		0.000s	○

Function code	Name	Detailed instruction of parameters	Default value	Modify
P06.11	RO1 switching-off delay time		0.000s	○
P06.12	RO2 switching-on delay time		0.000s	○
P06.13	RO2 switching-off delay time		0.000s	○
P06.14	AO1 output	0:Running frequency	0	○
P06.15	AO2 output	1:Setting frequency	0	○
P06.16	HDO high-speed pulse output selection	2:Ramp reference frequency 3:Running rotation speed 4:Output current (relative to the rated current of the inverter) 5:Output current (relative to the rated current of the motor) 6:Output voltage 7:Output power 9:Output torque 10:Analog AI1 input value (The inverter(≤15kW) can be set by the analog potentiometer on the keypad and AI1 setting is not available for the device which is 18.5kW or higer than 18.5 kW) 11:Analog AI2 input value 12:Analog AI3 input value 13:High speed pulse HDI input value 14:MODBUS communication set value 1 15:MODBUS communication set value 2 22: Torque current (relative to the rated current of the motor) 23: Ramp reference frequency(with sign)	0	○
P06.17	Lower limit of AO1 output	The above function codes define the relative relationship between the output value and analog output. When the output value exceeds the range of set maximum or minimum output, it will count according to the low-limit or upper-limit output. When the analog output is current output, 1mA equals to 0.5V. In different cases, the corresponding analog	0.0%	○
P06.18	Corresponding AO1 output to the lower limit		0.00V	○
P06.19	Upper limit of AO1 output		100.0%	○

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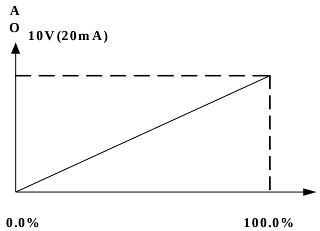
Function code	Name	Detailed instruction of parameters	Default value	Modify
P06.20	The corresponding AO1 output to the upper limit	output of 100% of the output value is different. Please refer to each application for detailed information.  Setting range of P06.18 0.00V~10.00V Setting range of P06.19 P06.17~100.0% Setting range of P06.20 0.00V~10.00V Setting range of P06.21 0.000s~10.000s Setting range of P06.22 0.0%~P06.24 Setting range of P06.23 0.00V~10.00V Setting range of P06.24 P06.22~100.0% Setting range of P06.25 0.00V~10.00V Setting range of P06.26 0.000s~10.000s Setting range of P06.27 0.000s~10.000s Setting range of P06.28 0.00~50.00kHz Setting range of P06.29 P06.27~100.0% Setting range of P06.30 0.00~50.00kHz Setting range of P06.31 0.000s~10.000s	10.00V	○
P06.21	AO1 output filter time		0.000s	○
P06.22	Lower limit of AO2 output		0.0%	○
P06.23	Corresponding AO2 output to the lower limit		0.00V	○
P06.24	Upper limit of AO2 output		100.0%	○
P06.25	Corresponding AO2 output to the upper limit		10.00V	○
P06.26	AO2 output filter time		0.000s	○
P06.27	Lower limit of HDO output		0.00%	○
P06.28	Corresponding HDO output to the lower limit		0.00kHz	○
P06.29	Upper limit of HDO output		100.0%	○
P06.30	Corresponding HDO output to the upper limit		50.00 kHz	○
P06.31	HDO output filter time		0.000s	○
P07 Group Human-Machine Interface				
P07.00	User's password	0~65535 The password protection will be valid when setting any non-zero number. 00000: Clear the previous user's password, and	0	○

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Function code	Name	Detailed instruction of parameters	Default value	Modify
		make the password protection invalid. After the user's password becomes valid, if the password is incorrect, users cannot enter the parameter menu. Only correct password can make the user check or modify the parameters. Please remember all users' passwords. Retreat editing state of the function codes and the password protection will become valid in 1 minute. If the password is available, press PRG/ESC to enter into the editing state of the function codes, and then "0.0.0.0.0" will be displayed. Unless input right password, the operator can not enter into it. **Note:** Restoring to the default value can clear the password, please use it with caution.		
P07.01	Parameter copy	The function code determines the mode of parameters copy. 0:No operation 1:Upload the local function parameter to the keypad 2:Download the keypad function parameter to local address(including the motor parameters) 3:Download the keypad function parameter to local address (excluding the motor parameter of P02 group) 4:Download the keypad function parameters to local address (only for the motor parameter of P02 group) **Note:** After completing the 1~4 operation, the parameter will come back to 0 automatically, the function of upload and download excludes the factory parameters of P29.	0	◎
P07.02	QUICK/JOG function selection	0:No function 1: Jogging. Press QUICK/JOG to begin the jogging running. 2: Shift the display state by the shifting key. Press QUICK/JOG to shift the displayed function code from right to left. 3: Shift between forward rotations and reverse rotations. Press QUICK/JOG to shift the direction of the frequency commands. This function is only	1	◎

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روبـروی پالایشگاه نفت پارس، پلاک ۱۲

Function code	Name	Detailed instruction of parameters	Default value	Modify
		valid in the keypad commands channels. 4: Clear UP/DOWN settings. Press QUICK/JOG to clear the set value of UP/DOWN. 5: Coast to stop. Press QUICK/JOG to coast to stop. 6: Shift the running commands source. Press QUICK/JOG to shift the running commands source. 7:Quick commission mode(committee according to the non-factory parameter) **Note:** Press QUICK/JOG to shift between forward rotation and reverse rotation, the inverter does not record the state after shifting during powering off. The inverter will run according to parameter P00.13 during next powering on.		
P07.03	Shifting sequence selection of QUICK/JOG commands	When P07.02=6, set the shifting sequence of running command channels. 0:Keypad control→terminals control →communication control 1:Keypad control←→terminals control 2:Keypad control←→communication control 3:Terminals control←→communication control	0	○
P07.04	STOP/RST stop function	STOP/RST is valid for stop function. STOP/RST is valid in any state for the fault reset. 0:Only valid for the keypad control 1:Both valid for keypad and terminals control 2:Both valid for keypad and communication control 3:Valid for all control modes	0	○
P07.05	Parameters state 1	0x0000~0xFFFF BIT0:running frequency (Hz on) BIT1:set frequency(Hz flickering) BIT2:bus voltage (Hz on) BIT3:output voltage(V on) BIT4:output current(A on) BIT5:running rotation speed (rpm on) BIT6:output power(% on) BIT7:output torque(% on) BIT8:PID reference(% flickering) BIT9:PID feedback value(% on) BIT10:input terminals state	0x03FF	○

Function code	Name	Detailed instruction of parameters	Default value	Modify
		BIT11:output terminals state BIT12:torque set value(% on) BIT13:pulse counter value BIT14:length value BIT15:PLC and the current stage in multi-step speed		
P07.06	Parameters state 2	0x0000~0xFFFF BIT0: AI1 (V on) (The inverter(≤15kW) can be set by the analog potentiometer on the keypad and AI1 setting is not available for the device which is 18.5kW or higer than 18.5 kW) BIT1: AI2 (V on) BIT2: AI3 (V on) BIT3: HDI frequency BIT4: motor overload percentage (% on) BIT5: the inverter overload percentage (% on) BIT6: ramp frequency given value(Hz on) BIT7: linear speed BIT8: AC inlet current (A on) BIT9: upper limit frequency (Hz on)	0x0000	
P07.07	The parameter in the stop state	0x0000~0xFFFF BIT0:set frequency (Hz on, frequency flickering slowly) BIT1:bus voltage (V on) BIT2:input terminals state BIT3:output terminals state BIT4:PID reference (% flickering) BIT5:PID feedback value(% flickering) BIT6:reserved BIT7:analog AI1 value(V on) (The inverter(≤ 15kW) can be set by the analog potentiometer on the keypad and AI1 setting is not available for the device which is 18.5kW or higer than 18.5 kW) BIT8:analog AI2 value(V on) BIT9: analog AI3 value(V on) BIT10:high speed pulse HDI frequency BIT11:PLC and the current step in multi-step speed BIT12:pulse counters BIT13:length value BIT14: upper limit frequency (Hz on)	0x00FF	○

Function code	Name	Detailed instruction of parameters	Default value	Modify
P07.08	Frequency coefficient	0.01~10.00 Displayed frequency=running frequency* P07.08	1.00	○
P07.09	Rotation speed coefficient	0.1~999.9% Mechanical rotation speed =120*displayed running frequency×P07.09/motor pole pairs	100.0%	○
P07.10	Linear speed coefficient	0.1~999.9% Linear speed= Mechanical rotation speed×P07.10	1.0%	○
P07.11	Rectifier bridge module temperature	0~100.0℃		●
P07.12	Converter module temperat	0~100.0℃		●
P07.13	Software version	1.00~655.35		●
P07.14	Local accumulative running time	0~65535h		●
P07.15	High bit of power consumption	Display the power used by the inverter. The power consumption of the inverter =P07.15*1000+P07.16 Setting range of P07.15: 0~65535°(*1000) Setting range of P07.16: 0.0~999.9°		●
P07.16	Low bit of power consumption			●
P07.17	Inverter type	0: G type 1: P type		●
P07.18	The rated power of the inverter	0.4~3000.0kW		●
P07.19	The rated voltage of the inverter	50~1200V		●
P07.20	The rated current of the inverter	0.1~6000.0A		●
P07.21	Factory bar code 1	0x0000~0xFFFF		●
P07.22	Factory bar code 2	0x0000~0xFFFF		●

Function code	Name	Detailed instruction of parameters	Default value	Modify
P07.23	Factory bar code 3	0x0000~0xFFFF		●
P07.24	Factory bar code 4	0x0000~0xFFFF		●
P07.25	Factory bar code 5	0x0000~0xFFFF		●
P07.26	Factory bar code 6	0x0000~0xFFFF		●
P07.27	Current fault type	0:No fault 1:IGBT U phase protection(OUt1) 2:IGBT V phase protection(OUt2) 3:IGBT W phase protection(OUt3) 4:OC1 5:OC2 6:OC3 7:OV1 8:OV2 9:OV3 10:UV 11:Motor overload(OL1) 12:The inverter overload(OL2) 13:Input side phase loss(SPI) 14:Output side phase loss(SPO) 15:Overheat of the rectifier module(OH1) 16:Overheat fault of the inverter module(OH2) 17:External fault(EF) 18:485 communication fault(CE) 19:Current detection fault(ItE) 20:Motor antotune fault(tE) 21:EEPROM operation fault(EEP) 22:PID response offline fault(PIDE) 23:Braking unit fault(bCE) 24:Running time arrival(END) 25:Electrical overload(OL3) 26:Panel communication fault(PCE) 27:Parameter uploading fault (UPE) 28:Parameter downloading fault(DNE) 32:Grounding short circuit fault 1(ETH1) 33:Grounding short circuit fault 2(ETH2)		●
P07.28	Previous fault type			●
P07.29	Previous 2 fault type			●
P07.30	Previous 3 fault type			●

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Function code	Name	Detailed instruction of parameters	Default value	Modify
P07.31	Previous 4 fault type	36: Undervoltage fault(LL)		●
P07.32	Previous 5 fault type			●
P07.33	Running frequency at current fault		0.00Hz	●
P07.34	Ramp reference frequency at current fault		0.00Hz	
P07.35	Output voltage at the current fault		0V	
P07.36	Output current at current fault		0.0A	
P07.37	Bus voltage at current fault		0.0V	
P07.38	The Max. temperature at current fault		0.0℃	
P07.39	Input terminals state at current fault		0	●
P07.40	Output terminals state at current fault		0	●
P07.41	Running frequency at previous fault		0.00Hz	●
P07.42	Ramp reference frequency at previous fault		0.00Hz	●
P07.43	Output		0V	●

Function code	Name	Detailed instruction of parameters	Default value	Modify
	voltage at previous fault			
P07.44	The output current at previous fault		0.0A	●
P07.45	Bus voltage at previous		0.0V	●
P07.46	The Max. temperature at previous fault		0.0℃	●
P07.47	Input terminals state at previous fault		0	●
P07.48	Output terminals state at previous fault		0	●
P07.49	Runnig frequency at previous 2 fault		0.00Hz	●
P07.50	Output voltage at previous 2 faults		0.00Hz	●
P07.51	Output current at previous 2 faults		0V	●
P07.52	Output current at previous 2 fault		0.0A	●
P07.53	Bus voltage at previous 2 fault		0.0V	●
P07.54	The Max.		0.0℃	●

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Function code	Name	Detailed instruction of parameters	Default value	Modify
	temperature at previous 2 fault			
P07.55	Input terminals state at previous 2 fault		0	●
P07.56	Output terminals state at previous 2 fault		0	●
P08 Group Enhanced function				
P08.00	ACC time 2	Refer to P00.11 and P00.12 for detailed definition. TETA MA610 series define four groups of ACC/DEC time which can be selected by P5 group. The first group of ACC/DEC time is the factory default one. Setting range:0.0~3600.0s	Depend on model	○
P08.01	DEC time 2		Depend on model	○
P08.02	ACC time 3		Depend on model	○
P08.03	DEC time 3		Depend on model	○
P08.04	ACC time 4		Depend on model	○
P08.05	DEC time 4		Depend on model	○
P08.06	Jogging frequency	This parameter is used to define the reference frequency during jogging. Setting range: 0.00Hz ~P00.03 (the Max. frequency)	5.00Hz	○
P08.07	Jogging ACC time	The jogging ACC time means the time needed if the inverter runs from 0Hz to the Max. Frequency.	Depend on model	○
P08.08	Jogging DEC time	The jogging DEC time means the time needed if the inverter goes from the Max. Frequency (P0.03) to 0Hz.	Depend on model	○

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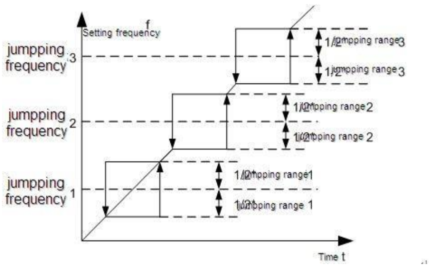
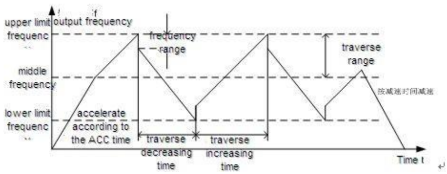
Function code	Name	Detailed instruction of parameters	Default value	Modify
		Setting range:0.0~3600.0s		
P08.09	Jumping frequency 1	When the set frequency is in the range of jumping frequency, the inverter will run at the edge of the jumping frequency. The inverter can avoid the mechanical resonance point by setting the jumping frequency. The inverter can set three jumping frequency. But this function will be invalid if all jumping points are 0.	0.00Hz	○
P08.10	Jumping frequency range 1		0.00Hz	○
P08.11	Jumping frequency		0.00Hz	○
P08.12	Jumping frequency range 2		0.00Hz	○
P08.13	Jumping frequency 3		0.00Hz	○
P08.14	Jumping frequency range 3	 Setting range: 0.00Hz ~P00.03 (the Max. frequency)	0.00Hz	○
P08.15	Traverse range	This function applies to the industries where traverse and convolution function are required such as textile and chemical fiber. The traverse function means that the output frequency of the inverter is fluctuated with the set frequency as its center. The route of the running frequency is illustrated as below, of which the traverse is set by P08.15 and when P08.15 is set as 0, the traverse is 0 with no function.	0.0%	○
P08.16	Sudden jumping frequency range		0.0%	○
P08.17	Traverse boost time		5.0s	○
P08.18	Traverse declining time	 Traverse range: The traverse running is limited by upper and low frequency. The traverse range relative to the center frequency: traverse range AW = center frequency ×traverse range P08.15.	5.0s	○

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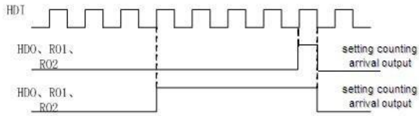
Function code	Name	Detailed instruction of parameters	Default value	Modify
		Sudden jumping frequency = traverse range AW ×sudden jumping frequency range P08.16. When run at the traverse frequency, the value which is relative to the sudden jumping frequency. The raising time of the traverse frequency: The time from the lowest point to the highest one. The declining time of the traverse frequency: The time from the highest point to the lowest one. The setting range of P08.15: 0.0~100.0% (relative to the set frequency) The setting range of P08.16: 0.0~50.0% (relative to the traverse range) The setting range of P08.17: 0.1~3600.0s The setting range of P08.18: 0.1~3600.0s		
P08.19	Setting length	The function codes of setting length, actual length and unit pulse are mainly used to control the fixed length. The length is counted by the pulse signal of HDI terminals input and the HDI terminals are needed to set as the length counting input. Actual length＝the length counting input pulse /unit pulse When the actual length P08.20 exceeds the setting length P08.19, the multi-function digital output terminals will output ON. Setting range of P08.19: 0~65535m Setting range of P08.20:0~65535m Setting range of P08.21:1~10000 Setting range of P08.22:0.01~100.00cm Setting range of P08.23:0.001~10.000 Setting range of P08.24:0.001~1.000	0m	○
P08.20	Actual length		0m	●
P08.21	Pulse per rotation		1	○
P08.22	Alxe perimeter		10.00 cm	○
P08.23	Length ratio		1.000	○
P08.24	Length correcting coefficient		1.000	○
P08.25	Setting counting value	The counter works by the input pulse signals of the HDI terminals. When the counter achieves a fixed number, the multi-function output terminals will output the signal of "fixed counting number arrival" and the counter go on working; when the counter achieves a setting number, the multi-function output terminals will output the signal of "setting counting number arrival", the counter will clear all	0	○
P08.26	Reference counting value		0	○

Function code	Name	Detailed instruction of parameters	Default value	Modify
		numbers and stop to recount before the next pulse. The setting counting value P08.26 should be no more than the setting counting value P08.25. The function is illustrated as below:  setting range of P08.25:P08.26~65535 Setting range of P08.26:0~P08.25		
P08.27	Set running time	Pre-set running time of the inverter. When the accumulative running time achieves the set time, the multi-function digital output terminals will output the signal of “running time arrival”. Setting range:0~65535 min	0m	○
P08.28	Fault reset times	The time of the fault reset: set the fault reset time by selecting this function. If the reset time exceeds this set value, the inverter will stop for the fault and wait to be repaired. The interval time of the fault reset: The interval between the time when the fault occurs and the time when the reset action occurs. Setting range of P08.28:0~10 Setting range of P08.29:0.1~3600.0s	0	○
P08.29	Interval time of automatic fault reset		1.0s	○
P08.30	Frequency decreasing ratio of the dropping control	The output frequency of the inverter changes as the load. And it is mainly used to balance the power when several inverters drive one load. Setting range:0.00~10.00Hz	0.00Hz	○
P08.32	FDT1 electrical level detection value	When the output frequency exceeds the corresponding frequency of FDT electrical level, the multi-function digital output terminals will output the signal of “frequency level detect FDT” until the output frequency decreases to a value lower than (FDT electrical level—FDT retention detection value) the corresponding frequency, the signal is invalid. Below is the waveform diagram:	50.00 Hz	○
P08.33	FDT1 retention detection value		5.0%	○
P08.34	FDT2		50.00	○

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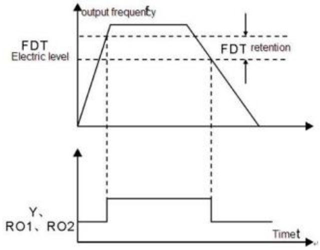
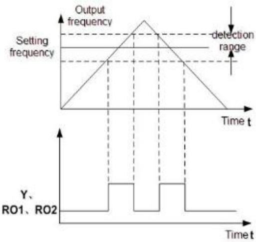
Function code	Name	Detailed instruction of parameters	Default value	Modify
	electrical level detection value		Hz	
P08.35	FDT2 retention detection value	Setting range of P08.32: 0.00Hz~P00.03 (the Max. frequency) Setting range of P08.33: -100.0~100.0% (FDT1 electrical level) Setting range of P08.34: 0.00 Hz ~P00.03 (the Max. frequency) Setting range of P08.35: 0.0~100.0% (FDT2 electrical level)	5.0%	○
P08.36	Frequency arrival detection value	When the output frequency is among the below or above range of the set frequency, the multi-function digital output terminal will output the signal of "frequency arrival", see the diagram below for detailed information:  The setting range:0.00Hz~P00.03 (the Max. frequency)	0.00Hz	○
P08.37	Energy braking enable	This parameter is used to control the internal braking unit. 0:Disable 1:Enable **Note:** Only applied to internal braking unit. After enabling, the overvoltage stall point will increase by 20V more than the energy braking point.	0	○
P08.38	Threshold voltage	After setting the original bus voltage, adjust this parameter to break the load appropriately. The	380V voltage:	○

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<table>
<tr><th>Function code</th><th>Name</th><th>Detailed instruction of parameters</th><th>Default value</th><th>Modify</th></tr>
<tr><td></td><td></td><td>factory value changes with voltage level.
The setting range:200.0~2000.0V
In order to prevent customers set the value is too large, it is recommended setting range:<table><tr><td>voltage</td><td>380V</td><td>500V</td><td>660</td></tr><tr><td>range</td><td>685~750V</td><td>860~950V</td><td>1080~1180V</td></tr></table></td><td>700.0V
500V voltage: 900.0V
660V voltage: 1120.0V</td><td></td></tr>
<tr><td>P08.39</td><td>Cooling fan running mode</td><td>Set the operation mode of the cooling fan.
0: Normal mode, after the rectifier receives operation command or the detected temperature of module is above 45℃ or the module current is above 20% of the rated current, the fan rotates.
1:The fan keeps on running after power on (generally for the site with high temperature and humidity)</td><td>0</td><td>○</td></tr>
<tr><td>P08.40</td><td>PWM selection</td><td>0x00~0x21
LED ones: PWM mode selection
0: PWM mode 1, three-phase modulation and two-modulation
1: PWM mode 2, three-phase modulation
LED tens: low-speed carrier frequency limit mode
0: Low-speed carrier frequency limit mode 1, the carrier frequency will limit to 2k if it exceeds 2k at low speed
1:Low-speed carrier frequency limit mode 2, the carrier frequency will limit to 4k if it exceeds 4k at low speed
2: No limit</td><td>00</td><td>◎</td></tr>
<tr><td>P08.41</td><td>Over commission selection</td><td>0x00~0x11
LED ones
0: Invalid
1: Valid
LED tens
0: Light overcommission
1: Heavy overcommission</td><td>0x01</td><td>◎</td></tr>
<tr><td>P08.42</td><td>Keypad data control</td><td>0x000~0x1223
LED ones:frequency enable selection
0:Both ∧/∨ keys and digital potentiometer adjustments are valid
1:Only ∧/∨ keys adjustment is valid</td><td>0x0000</td><td>○</td></tr>
</table>

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Function code	Name	Detailed instruction of parameters	Default value	Modify
		2:Only digital potentiometer adjustments is valid 3:Neither ∧/∨ keys nor digital potentiometer adjustments are valid LED tens: frequency control selection 0:Only valid when P00.06=0 or P00.07=0 1:Valid for all frequency setting manner 2:Invalid for multi-step speed when multi-step speed has the priority LED hundreds: action selection during stopping 0:Setting is valid 1:Valid during running, cleared after stopping 2:Valid during running, cleared after receiving the stop command LED thousands: ∧/∨ keys and digital potentiometer integral function 0:The integral function is valid 1:The integral function is invalid		
P08.43	Integral ratio of the keypad potentiometr	0.01~10.00s	0.10s	○
P08.44	UP/DOWN terminals control	0x00~0x221 LED ones: frequency control selection 0:UP/DOWN terminals setting valid 1:UP/DOWN terminals setting valid LED tens: frequency control selection 0:Only valid when P00.06=0 or P00.07=0 1:All frequency means are valid 2:When the multi-step are priority, it is invalid to the multi-step LED hundreds: action selection when stop 0:Setting valid 1: Valid in the running, clear after stop 2: Valid in the running, clear after receiving the stop commands	0x000	○
P08.45	UP terminals frequency increasing	0.01~50.00Hz/s	0.50 Hz/s	○
P08.46	DOWN terminals	0.01~50.00 Hz/s	0.50 Hz/s	○

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Function code	Name	Detailed instruction of parameters	Default value	Modify
	frequency integral ratio			
P08.47	Action when the frequency setting is off	0x000~0x111 LED ones: Action selection when power off. 0:Save when power off 1:Clear when power off LED tens: Action selection when MODBUS set frequency off 0:Save when power off 1:Clear when power off LED hundreds:The action selection when other frequency set frequency off 0:Save when power off 1:Clear when power off	0x000	○
P08.48	High bit of initial power consumption	This parameter is used to set the original value of the power consumption. The original value of the power consumption =P08.48*1000+ P08.49 Setting range of P08.48: 0~59999°(k) Setting range of P08.49:0.0~999.9°	0°	○
P08.49	Low bit of initial power consumption		0.0°	○
P08.50	Magnetic flux braking	This function code is used to enable magnetic flux. 0: Invalid. 100~150: The bigger the coefficient, the stronger the braking is. This inverter is used to increase the magnetic flux to decelerate the motor. The energy generated by the motor during braking can be converter into heat energy by increasing the magnetic flux. The inverter monitors the state of the motor continuously even during the magnetic flux period So the magnetic flux can be used in the motor stop, as well as to change the rotation speed of the motor. Its other advantages are: Brake immediately after the stop command. It does not need to wait the magnetic flux weaken. Better cooling for motors. The current of the stator other than the rotor increases during magnetic flux braking, while the cooling of the stator is more effective than the rotor.	0	●

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Function code	Name	Detailed instruction of parameters	Default value	Modify
P08.51	Input power factor of the inverter	This function code is used to adjust the displayed current of the AC input side. Setting range:0.00~1.00	0.56	○
P09 Group PID control				
P09.00	PID reference source	When the frequency command selection (P00.06, P00. 07) is 7 or the voltage setting channel selection (P04.27) is 6, the running mode of the inverter is procedure PID controlled. The parameter determines the target reference channel during the PID procures. 0:Keypad digital reference(P09.01) 1:Analog channel AI1 reference (The inverter (≤15kW) can be set by the analog potentiometer on the keypad and AI1 setting is not available for the device which is 18.5kW or higer than 18.5kW) 2:Analog channel AI2 reference 3:Analog channel AI3 set 4:High speed pulse HDI set 5:Multi-step speed set 6:MODBUS communication set The setting target of procedure PID is a relative one, 100% of the setting equals to 100% of the response of the controlled system. The system is calculated according to the relative value (0~100.0%). Note: Multi-step speed reference, it is realized by setting P10 group parameters.	0	○
P09.01	Keypad PID preset	When P09.00=0, set the parameter whose basic value is the feedback value of the system. The setting range:-100.0%~100.0%	0.0%	○
P09.02	PID feedback source	Select the PID channel by the parameter. 0:Analog channel AI1 feedback (The inverter(≤ 15kW) can be set by the analog potentiometer on the keypad and AI1 setting is not available for the device which is 18.5kW or higer than 18.5 kW) 1:Analog channel AI2 feedback 2:Analog channel AI3 feedback 3:High speed HDI feedback 4:MODBUS communication feedback **Note**: The reference channel and the feedback	0	○

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Function code	Name	Detailed instruction of parameters	Default value	Modify
		channel can not coincide, otherwise, PID can not control effectively.		
P09.03	PID output feature	0: PID output is positive: When the feedback signal exceeds the PID reference value, the output frequency of the inverter will decrease to balance the PID. For example, the strain PID control during wrap-up 1: PID output is negative: When the feedback signal is stronger than the PID reference value, the output frequency of the inverter will increase to balance the PID. For example, the strain PID control during wrap-down	0	○
P09.04	Proportional gain (Kp)	The function is applied to the proportional gain P of PID input. P determines the strength of the whole PID adjuster. The parameter of 100 means that when the offset of PID feedback and reference value is 100%, the adjusting range of PID adjustor is the Max. Frequency (ignoring integral function and differential function). The setting range:0.00~100.00	1.00	○
P09.05	Integral time(Ti)	This parameter determines the speed of PID adjustor to carry out integral adjustment on the deviation of PID feedback and reference. When the deviation of PID feedback and reference is 100%, the integral adjustor works continuously after the time (ignoring the proportional effect and differential effect) to achieve the Max. Frequency (P00.03) or the Max. Voltage (P04.31). Shorter the integral time, stronger is the adjustment Setting range: 0.01~10.00s	0.10s	○
P09.06	Differential time(Td)	This parameter determines the strength of the change ratio when PID adjustor carries out integral adjustment on the deviation of PID feedback and reference. If the PID feedback changes 100% during the time, the adjustment of integral adjustor (ignoring the proportional effect and differential effect) is	0. 00s	○

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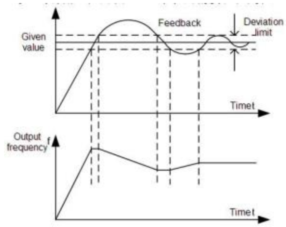
Function code	Name	Detailed instruction of parameters	Default value	Modify
		the Max. Frequency (P00.03) or the Max. Voltage (P04.31). Longer the integral time, stronger is the adjusting. Setting range: 0.00~10.00s		
P09.07	Sampling cycle(T)	This parameter means the sampling cycle of the feedback. The modulator calculates in each sampling cycle. The longer the sapling cycle is, the slower the response is. Setting range: 0.000~10.000s	0.100s	○
P09.08	PID control deviation limit	The output of PID system is relative to the maximum deviation of the close loop reference. As shown in the diagram below, PID adjustor stops to work during the deviation limit. Set the function properly to adjust the accuracy and stability of the system.  Setting range:0.0~100.0%	0.0%	○
P09.09	Output upper limit of PID	These parameters are used to set the upper and lower limit of the PID adjustor output. 100.0 % corresponds to Max. frequency or the Max. voltage of (P04.31) Setting range of P09.09: P09.10~100.0% Setting range of P09.10: -100.0%~P09.09	100.0%	○
P09.10	Output lower limit of PID		0.0%	○
P09.11	Feedback offline detection value	Set the PID feedback offline detection value, when the detection value is smaller than or equal to the feedback offline detection value, and the lasting time exceeds the set value in P09.12, the inverter will report “PID feedback offline fault” and the keypad will display PIDE.	0.0%	○
P09.12	Feedback offline detection time		1.0s	○

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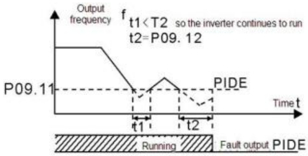
Function code	Name	Detailed instruction of parameters	Default value	Modify
		 Setting range of P09.11: 0.0~100.0% Setting range of P09.12: 0.0~3600.0s		
P09.13	PID adjustment	0x0000~0x1111 LED ones: 0: Keep on integral adjustment when the frequency achieves the upper and low limit; the integration shows the change between the reference and the feedback unless it reaches the internal integral limit. When the trend between the reference and the feedback changes, it needs more time to offset the impact of continuous working and the integration will change with the trend. 1: Stop integral adjustment when the frequency achieves the upper and low limit. If the integration keeps stable, and the trend between the reference and the feedback changes, the integration will change with the trend quickly. LED tens: P00.08 is 0 0: The same with the setting direction; if the output of PID adjustment is different from the current running direction, the internal will output 0 forcedly. 1:Opposite to the setting direction LED hundreds: P00.08 is 0 0: Limit to the maximum frequency 1: Limit to frequency A LED thousands: 0:A+B frequency, the buffer of A frequency is invalid 1:A+B frequency, the buffer of A frequency is valid ACC/DEC is determined by ACC time 4 of P08.04	0x0001	○
P09.14	Proportional	0.00~100.00	1.00	○

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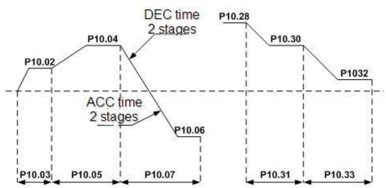
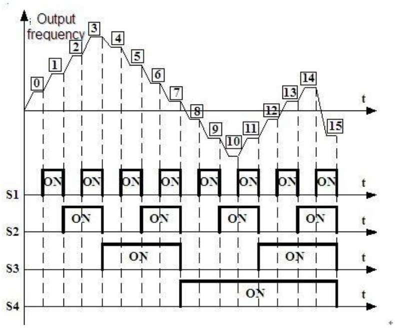
Function code	Name	Detailed instruction of parameters	Default value	Modify
	gain at low frequency (Kp)			
P09.15	PID command of ACC/DEC time	0.0~1000.0s	0.0s	○
P09.16	PID output filter time	0.000~10.000s	0.000s	○
P10 Group Simple PLC and multi-step speed control				
P10.00	Simple PLC	0: Stop after running once. The inverter has to be commanded again after finishing a cycle. 1: Run at the final value after running once. After finish a signal, the inverter will keep the running frequency and direction of the last run. 2: Cycle running. The inverter will keep on running until receiving a stop command and then, the system will stop.	0	○
P10.01	Simple PLC memory	0: Power loss without memory 1:Power loss memory；PLC record the running step and frequency when power loss.	0	○
P10.02	Multi-step speed 0	100.0% of the frequency setting corresponds to the Max. frequency P00.03. When selecting simple PLC running, set P10.02~P10.33 to define the running frequency and direction of all steps. **Note:** The symbol of multi-step determines the running direction of simple PLC. The negative value means reverse rotation.  Multi-step speeds are in the range of $--f_{max}$~f_{max} and it can be set continuously. TETA MA610 series inverters can set 16 steps	0.0%	○
P10.03	The running time of step 0		0.0s	○
P10.04	Multi-step speed 1		0.0%	○
P10.05	The running time of step 1		0.0s	○
P10.06	Multi-step speed 2		0.0%	○
P10.07	The running time of step 2		0.0s	○
P10.08	Multi-step speed 3		0.0%	○
P10.09	The running time of step 3		0.0s	○
P10.10	Multi-step		0.0%	○

<table>
<tr><th>Function code</th><th>Name</th><th>Detailed instruction of parameters</th><th>Default value</th><th>Modify</th></tr>
<tr><td></td><td>speed 4</td><td rowspan="19">speed, selected by the combination of multi-step terminals 1~4, corresponding to the speed 0 to speed 15.


When S1=S2=S3=S4=OFF, the frequency input manner is selected via code P00.06 or P00.07. When all S1=S2=S3=S4 terminals aren’t off, it runs at multi-step which takes precedence of keypad, analog value, high-speed pulse, PLC, communication frequency input. Select at most 16 steps speed via the combination code of S1, S2, S3, and S4.
The start-up and stopping of multi-step running is determined by function code P00.06, the relationship between S1,S2,S3,S4 terminals and multi-step speed is as following:
<table>
<tr><td>S1</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>S2</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr>
<tr><td>S3</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td><td>ON</td><td>ON</td></tr>
<tr><td>S4</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td></tr>
<tr><td>Step</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr>
<tr><td>S1</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>S2</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr>
<tr><td>S3</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td><td>ON</td><td>ON</td></tr>
<tr><td>S4</td><td>ON</td><td>ON</td><td>ON</td><td>ON</td><td>ON</td><td>ON</td><td>ON</td><td>ON</td></tr>
<tr><td>Step</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td></tr>
</table>

Setting range of P10.(2n,1<n<17):
-100.0~100.0%
Setting range of</td><td></td><td></td></tr>
<tr><td>P10.11</td><td>The running time of step 4</td><td>0.0s</td><td>○</td></tr>
<tr><td>P10.12</td><td>Multi-step speed 5</td><td>0.0%</td><td>○</td></tr>
<tr><td>P10.13</td><td>The running time of step 5</td><td>0.0s</td><td>○</td></tr>
<tr><td>P10.14</td><td>Multi-step speed 6</td><td>0.0%</td><td>○</td></tr>
<tr><td>P10.15</td><td>The running time of step 6</td><td>0.0s</td><td>○</td></tr>
<tr><td>P10.16</td><td>Multi-step speed 7</td><td>0.0%</td><td>○</td></tr>
<tr><td>P10.17</td><td>The running time of step 7</td><td>0.0s</td><td>○</td></tr>
<tr><td>P10.18</td><td>Multi-step speed 8</td><td>0.0%</td><td>○</td></tr>
<tr><td>P10.19</td><td>The running time of step 8</td><td>0.0s</td><td>○</td></tr>
<tr><td>P10.20</td><td>Multi-step speed 9</td><td>0.0%</td><td>○</td></tr>
<tr><td>P10.21</td><td>The running time of step 9</td><td>0.0s</td><td>○</td></tr>
<tr><td>P10.22</td><td>Multi-step speed 10</td><td>0.0%</td><td>○</td></tr>
<tr><td>P10.23</td><td>The running time of step 10</td><td>0.0s</td><td>○</td></tr>
<tr><td>P10.24</td><td>Multi-step speed 11</td><td>0.0%</td><td>○</td></tr>
<tr><td>P10.25</td><td>The running time of step 11</td><td>0.0s</td><td>○</td></tr>
<tr><td>P10.26</td><td>Multi-step speed 12</td><td>0.0%</td><td>○</td></tr>
<tr><td>P10.27</td><td>The running time of step 12</td><td>0.0s</td><td>○</td></tr>
<tr><td>P10.28</td><td>Multi-step speed 13</td><td>0.0%</td><td>○</td></tr>
</table>

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<table>
<tr><th>Function code</th><th>Name</th><th>Detailed instruction of parameters</th><th>Default value</th><th>Modify</th></tr>
<tr><td>P10.29</td><td>The running time of step 13</td><td rowspan="5">P10.(2n+1,1<n<17):0.0~6553.5s(min)</td><td>0.0s</td><td>○</td></tr>
<tr><td>P10.30</td><td>Multi-step speed 14</td><td>0.0%</td><td>○</td></tr>
<tr><td>P10.31</td><td>The running time of step 14</td><td>0.0s</td><td>○</td></tr>
<tr><td>P10.32</td><td>Multi-step speed 15</td><td>0.0%</td><td>○</td></tr>
<tr><td>P10.33</td><td>The running time of step 15</td><td>0.0s</td><td>○</td></tr>
<tr><td>P10.34</td><td>Simple PLC 0~7 step ACC/DEC time</td><td rowspan="2">Below is the detailed instruction:
<table>
<tr><th>Function code</th><th colspan="2">Binary bit</th><th>Step</th><th>ACC/DEC 0</th><th>ACC/DEC 1</th><th>ACC/DEC 2</th><th>ACC/DEC 3</th></tr>
<tr><td rowspan="8">P10.34</td><td>BIT1</td><td>BIT0</td><td>0</td><td>00</td><td>01</td><td>10</td><td>11</td></tr>
<tr><td>BIT3</td><td>BIT2</td><td>1</td><td>00</td><td>01</td><td>10</td><td>11</td></tr>
<tr><td>BIT5</td><td>BIT4</td><td>2</td><td>00</td><td>01</td><td>10</td><td>11</td></tr>
<tr><td>BIT7</td><td>BIT6</td><td>3</td><td>00</td><td>01</td><td>10</td><td>11</td></tr>
<tr><td>BIT9</td><td>BIT8</td><td>4</td><td>00</td><td>01</td><td>10</td><td>11</td></tr>
<tr><td>BIT11</td><td>BIT10</td><td>5</td><td>00</td><td>01</td><td>10</td><td>11</td></tr>
<tr><td>BIT13</td><td>BIT12</td><td>6</td><td>00</td><td>01</td><td>10</td><td>11</td></tr>
<tr><td>BIT15</td><td>BIT14</td><td>7</td><td>00</td><td>01</td><td>10</td><td>11</td></tr>
<tr><td rowspan="8">P10.35</td><td>BIT1</td><td>BIT0</td><td>8</td><td>00</td><td>01</td><td>10</td><td>11</td></tr>
<tr><td>BIT3</td><td>BIT2</td><td>9</td><td>00</td><td>01</td><td>10</td><td>11</td></tr>
<tr><td>BIT5</td><td>BIT4</td><td>10</td><td>00</td><td>01</td><td>10</td><td>11</td></tr>
<tr><td>BIT7</td><td>BIT6</td><td>11</td><td>00</td><td>01</td><td>10</td><td>11</td></tr>
<tr><td>BIT9</td><td>BIT8</td><td>12</td><td>00</td><td>01</td><td>10</td><td>11</td></tr>
<tr><td>BIT11</td><td>BIT10</td><td>13</td><td>00</td><td>01</td><td>10</td><td>11</td></tr>
<tr><td>BIT13</td><td>BIT12</td><td>14</td><td>00</td><td>01</td><td>10</td><td>11</td></tr>
<tr><td>BIT15</td><td>BIT14</td><td>15</td><td>00</td><td>01</td><td>10</td><td>11</td></tr>
</table>
After the users select the corresponding ACC/DEC time, the combined 16 binary bits will change into decimal bit, and then set the</td><td>0x0000</td><td>○</td></tr>
<tr><td>P10.35</td><td>Simple PLC 8~15 step ACC/DEC time</td><td>0x0000</td><td>○</td></tr>
</table>

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Function code	Name	Detailed instruction of parameters	Default value	Modify
		corresponding function codes. Setting range: 0x0000~0xFFFF		
P10.36	PLC restart	0: Restart from the first step; stop during running (cause by the stop command, fault or power loss), run from the first step after restart. 1: Continue to run from the stop frequency; stop during running(cause by stop command and fault) the inverter will record the running time automatically, enter into the step after restart and keep the remaining running at the setting frequency.	0	◎
P10.37	Multi-step time unit	0: Seconds; the running time of all steps is counted by second 1: Minutes; the running time of all steps is counted by minute	0	◎
P11 Group Protective parameters				
P11.00	Phase loss protection	0x00~0x11 LED ones: 0: Input phase loss protection disable 1: Input phase loss protection enable LED tens: 0: Input phase loss protection disable 1: Input phase loss protection enable LED hundreds: 0: Input phase loss hardware protection disable 1: Input phase loss hardware protection enable	111	○
P11.01	Sudden power loss frequency-decreasing	0: Enable 1: Disable	0	○
P11.02	Frequency decreasing ratio of sudden power loss	Setting range: 0.00Hz/s~P00.03 (the Max. frequency) After the power loss of the grid, the bus voltage drops to the sudden frequency-decreasing point, the inverter begin to decrease the running frequency at P11.02, to make the inverter generate power again. The returning power can maintain the bus voltage to ensure a rated running of the inverter until the recovery of power. Voltage degree | 220V | 380V | 660V	10.00 Hz/s	○

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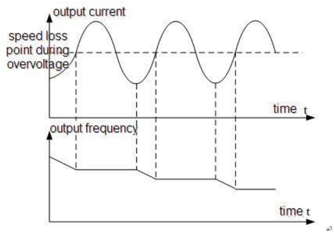
<table>
<tr><th>Function code</th><th>Name</th><th>Detailed instruction of parameters</th><th>Default value</th><th>Modify</th></tr>
<tr><td></td><td></td><td><table><tr><td>Frequency-decreasing point at sudden power loss</td><td>260V</td><td>460V</td><td>800V</td></tr></table>Note:
1. Adjust the parameter properly to avoid the stopping caused by inverter protection during the switching of the grid.
2. Prohibition of input phase protection can enable this function.</td><td></td><td></td></tr>
<tr><td>P11.03</td><td>Overvoltage stall protection</td><td>0:Disable
1:Enable

</td><td>1</td><td>○</td></tr>
<tr><td rowspan="2">P11.04</td><td rowspan="2">Protection voltage at overvoltage stall</td><td>120~150%(standard bus voltage) (380V)</td><td>140%</td><td rowspan="2">○</td></tr>
<tr><td>120~150%(standard bus voltage) (220V)</td><td>120%</td></tr>
<tr><td>P11.05</td><td>Current limit action selection</td><td rowspan="4">The actual increasing ratio is less than the ratio of output frequency because of the big load during ACC running. It is necessary to take measures to avoid overcurrent fault and the inverter trips.
During the running of the inverter, this function will detect the output current and compare it with the limit defined in P11.06. If it exceeds the level, the inverter will run at stable frequency in ACC running, or the inverter will derate to run during the constant running. If it exceeds the level continuously, the output frequency will keep on decreasing to the lower limit. If the output current is detected to be lower than the limit level, the inverter will accelerate to run.</td><td>01</td><td>◎</td></tr>
<tr><td rowspan="2">P11.06</td><td rowspan="2">Automatic current limit</td><td>G: 160.0%</td><td rowspan="2">◎</td></tr>
<tr><td>P: 120.0%</td></tr>
<tr><td>P11.07</td><td>The decreasing ratio during current limit</td><td>10.00 Hz/s</td><td>◎</td></tr>
</table>

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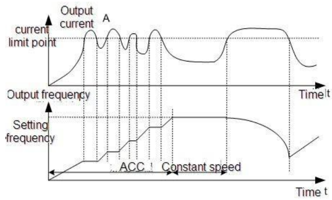
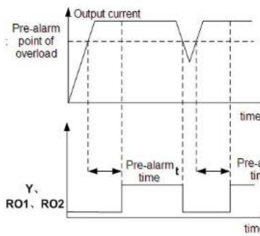
Function code	Name	Detailed instruction of parameters	Default value	Modify
		 Setting range of P11.05: 0x00~0x11 LED ones:current limit 0:Invalid 1:Always invalid LED tens:overload alarm 0:Valid 1: Invalid Setting range of P11.06: 50.0~200.0% Setting range of P11.07: 0.00~50.00Hz/s		
P11.08	Overload pre-alarm of the Motor/ inverter	The output current of the inverter or the motor is above P11.09 and the lasting time is beyond P11.10, overload pre-alarm will be output.  Setting range of P11.08: Enable and define the overload pre-alarm of the inverter or the motor. Setting range: 0x000~0x131 LED ones: 0:Overload pre-alarm of the motor, comply with the rated current of the motor 1:Overload pre-alarm of the inverter, comply with the rated current of the inverter LED tens: 0:The inverter continues to work after underload pre-alarm 1:The inverter continues to work after underload	0x000	○
P11.09	Overload pre-alarm test level		G: 150% P: 120%	○
P11.10	Overload pre-alarm detection time		1.0s	○

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Function code	Name	Detailed instruction of parameters	Default value	Modify
		pre-alarm and the inverter stops running after overload fault 2: The inverter continues to work after overload pre-alarm and the inverter stops running after underload fault 3. The inverter stops when overloading or underloading. LED hundreds : 0:Detection all the time 1:Detection in constant running Setting range of P11.09: P11.11~200% Setting range of P11.10: 0.1~3600.0s		
P11.11	Detection level of the underload pre-alarm	If the inverter current or the output current is lower than P11.11, and its lasting time is beyond P11.12, the inverter will output underload pre-alarm. Setting range of P11.11: 0~P11.09 Setting range of P11.12: 0.1~3600.0s	50%	○
P11.12	Detection time of the underload pre-alarm		1.0s	○
P11.13	Output terminal action during fault	Select the action of fault output terminals on undervoltage and fault reset. 0x00~0x11 LED ones: 0:Action under fault undervoltage 1:No action under fault undervoltage LED tens: 0:Action during the automatic reset 1:No action during the automatic reset	0x00	○
P11.16	Extension functions selection	0x00~0x11 LED ones:Voltage drop frequency-decreasing selection 0: Voltage drop frequency-decreasing selection disable 1: Voltage drop frequency-decreasing selection enable LED tens: Step 2 ACC/DEC time option 0: Step 2 ACC/DEC time option disable 1: Step 2 ACC/DEC time option enable，when running frequency more than P08.36, ACC/DEC time switch to step 2 ACC/DEC time	00	○
P13 Group	**Reserved**			

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Function code	Name	Detailed instruction of parameters	Default value	Modify
P13.13	Braking current of short-circuit	When P01.00=0 during the starting of the inverter, set P13.14 to a non-zero value to enter the short circuit braking. When the running frequency is lower than P01.09 during the stopping of the inverter, set 13.15 to a non-zero value to enter into stopping short circuited braking and then carry out the DC braking at the time set by P01.12 (refer to the instruction of P01.09~P01.12) . Setting range of P13.13: 0.0~150.0% (the inverter) Setting range of P13.14: 0.00~50.00s Setting range of P13.15: 0.00~50.00s	0.0%	○
P13.14	Braking retention time before starting		0.00s	○
P13.15	The braking retention time when stopping		0.00s	○
P14 Group Serial communication				
P14.00	Local communication address	The setting range:1~247 When the master is writing the frame, the communication address of the slave is set to 0; the broadcast address is the communication address. All slaves on the MODBUS fieldbus can receive the frame, but the salve doesn't answer. The communication address of the drive is unique in the communication net. This is the fundamental for the point to point communication between the upper monitor and the drive. **Note:** The address of the slave cannot set to 0.	1	○
P14.01	Communication baud ratio	Set the digital transmission speed between the upper monitor and the inverter. 0:1200BPS 1:2400BPS 2:4800BPS 3:9600BPS 4:19200BPS 5:38400BPS 6:57600BPS 7:115200BPS **Note:** The baud rate between the upper monitor and the inverter must be the same. Otherwise, the communication is not applied. The bigger the baud rate, the quicker the communication speed.	4	○
P14.02	Digital bit checkout	The data format between the upper monitor and the inverter must be the same. Otherwise, the	1	○

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Function code	Name	Detailed instruction of parameters	Default value	Modify
		communication is not applied. 0: No check (N,8,1) for RTU 1: Even check (E,8,1) for RTU 2: Odd check (O,8,1) for RTU 3:No check (N,8,2) for RTU 4: Even check (E,8,2) for RTU 5: Odd check(O,8,2) for RTU 6: No check (N,7,1) for ASCII 7: Even check (E,7,1) for ASCII 8: Odd check (O,7,1) for ASCII 9:No check (N,7,2) for ASCII 10: Even check (E,7,2) for ASCII 11: Odd check(O,7,2) for ASCII 12: No check (N,8,1) for ASCII 13: Even check (E,8,1) for ASCII 14: Odd check (O,8,1) for ASCII 15:No check (N,8,2) for ASCII 16: Even check (E,8,2) for ASCII 17: Odd check(O,8,2) for ASCII		
P14.03	Answer delay	0~200ms It means the interval time between the interval time when the drive receive the data and sent it to the upper monitor. If the answer delay is shorter than the system processing time, then the answer delay time is the system processing time, if the answer delay is longer than the system processing time, then after the system deal with the data, waits until achieving the answer delay time to send the data to the upper monitor.	5	○
P14.04	Fault time of communication overtime	0.0(invalid), 0.1~60.0s When the function code is set as 0.0, the communication overtime parameter is invalid. When the function code is set as non-zero, if the interval time between two communications exceeds the communication overtime, the system will report “485 communication faults” (CE). Generally, set it as invalid; set the parameter in the continuous communication to monitor the communication state.	0.0s	○
P14.05	Transmission	0:Alarm and stop freely	0	○

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Function code	Name	Detailed instruction of parameters	Default value	Modify
	fault processing	1:No alarm and continue to run 2:No alarm and stop according to the stop means (only under the communication control) 3:No alarm and stop according to the stop means (under all control modes)		
P14.06	Communication processing	LED ones: 0: Operation with response: the drive will respond to all reading and writing commands of the upper monitor. 1:Operation without response；The drive only responds to the reading command other than the writing command of the drive. The communication efficiency can be increased by this method. LED tens: 0: Communication encrypting valid 1: Communication encrypting invalid	0x00	○
P16 Group Ethernet function				
P17 Group Monitoring function				
P17.00	Setting frequency	Display current set frequency of the inverter Range: 0.00Hz~P00.03		●
P17.01	Output frequency	Display current output frequency of the inverter Range: 0.00Hz~P00.03		●
P17.02	Ramp reference frequency	Display current ramp reference frequency of the inverter Range: 0.00Hz~P00.03		●
P17.03	Output voltage	Display current output voltage of the inverter Range: 0~1200V		●
P17.04	Output current	Display current output current of the inverter Range: 0.0~3000.0A		●
P17.05	Motor speed	Display the rotation speed of the motor. Range: 0~65535RPM		●
P17.08	Motor power	Display current motor power Range:-300~300%		●
P17.09	Output torque	Display the current output torque of the inverter. Range: -250.0~250.0%		●
P17.10	Evaluated motor frequency	Evaluated frequency of motor rotor Range: 0.00Hz~ P00.03		●
P17.11	DC bus	Display current DC bus voltage of the inverter		●

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<table>
<tr><th>Function code</th><th>Name</th><th>Detailed instruction of parameters</th><th>Default value</th><th>Modify</th></tr>
<tr><td></td><td>voltage</td><td>Range: 0.0~2000.0V</td><td></td><td></td></tr>
<tr><td>P17.12</td><td>ON-OFF input terminals state</td><td>Display current Switch input terminals state of the inverter
<table>
<tr><td></td><td>BIT8</td><td>BIT7</td><td>BIT6</td><td>BIT5</td></tr>
<tr><td></td><td>HDI</td><td>S8</td><td>S7</td><td>S6</td></tr>
<tr><td>BIT4</td><td>BIT3</td><td>BIT2</td><td>BIT1</td><td>BIT0</td></tr>
<tr><td>S5</td><td>S4</td><td>S3</td><td>S2</td><td>S1</td></tr>
</table>
Range: 0000~00FF</td><td></td><td>●</td></tr>
<tr><td>P17.13</td><td>ON-OFF output terminals state</td><td>Display current Switch output terminals state of the inverter
<table>
<tr><td>BIT3</td><td>BIT2</td><td>BIT1</td><td>BIT0</td></tr>
<tr><td>RO2</td><td>RO1</td><td>HDO</td><td>Y</td></tr>
</table>
Range: 0000~000F</td><td></td><td>●</td></tr>
<tr><td>P17.14</td><td>Digital adjustment</td><td>Display the adjustment through the keypad of the inverter.
Range : 0.00Hz~P00.03</td><td></td><td>●</td></tr>
<tr><td>P17.15</td><td>torque reference</td><td>Display the torque given, the percentage to the current rated torque of the motor.
Setting range: -300.0%~300.0%
(the rated current of the motor)</td><td></td><td>●</td></tr>
<tr><td>P17.16</td><td>Linear speed</td><td>Display the current linear speed of the inverter.
Range: 0~65535</td><td></td><td>●</td></tr>
<tr><td>P17.17</td><td>Length</td><td>Display the current length of the inverter.
Range: 0~65535</td><td></td><td>●</td></tr>
<tr><td>P17.18</td><td>Counting value</td><td>Display the current counting number of the inverter.
Range: 0~65535</td><td></td><td>●</td></tr>
<tr><td>P17.19</td><td>AI1 input voltage</td><td>The inverter(≤15kW) can be set by the analog potentiometer on the keypad and AI1 setting is not available for the device which is 18.5kW or higer than 18.5 kW .
Display analog AI1 input signal
Range:</td><td></td><td>●</td></tr>
<tr><td>P17.20</td><td>AI2 input voltage</td><td>Display analog AI2 input signal
Range: 0.00~10.00V</td><td></td><td>●</td></tr>
<tr><td>P17.21</td><td>AI3 input voltage</td><td>Display analog AI2 input signal
Range: -10.00~10.00V</td><td></td><td>●</td></tr>
<tr><td>P17.22</td><td>HDI input frequency</td><td>Display HDI input frequency
Range: 0.000~50.000kHz</td><td></td><td>●</td></tr>
</table>

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Function code	Name	Detailed instruction of parameters	Default value	Modify
P17.23	PID reference value	Display PID reference value Range: -100.0~100.0%		●
P17.24	PID feedback value	Display PID response value Range: -100.0~100.0%		●
P17.25	Power factor of the motor	Display the current power factor of the motor. Range: -1.00~1.00		●
P17.26	Current running time	Display the current running time of the inverter. Range:0~65535min		●
P17.27	Simple PLC and the current step of the multi-step speed	Display simple PLC and the current step of the multi-step speed Range: 0~15		●
P17.35	AC input current	Display the input current in AC side. Range: 0.0~5000.0A		●
P17.36	Output torque	Display the output torque. Positive value is in the electromotion state, and negative is in the power generating state. Range : -3000.0Nm~3000.0Nm		●
P17.37	Counting of the motor overload	0~100 (100 is OL1 fault)		●
P17.38	PID output	-100.00~100.00%	0.00%	●
P17.39	wrong download of parameters	0.00~99.99	0.00	●
P24 Group Water supply				
P24.00	water supply selection	0: Disabled 1: Enabled	0	◎
P24.01	Press feedback source	0: AI1 setting value (The inverter(≤15kW) can be set by the analog potentiometer on the keypad and AI1 setting is not available for the device which is 18.5 kW or higer than 18.5 kW) 1: AI2 setting value 2: AI3 setting value 3: HDI setting value	0	○
P24.02	Hibernation	0: Hibernate as the setting frequency ˂ P24.03	0	◎

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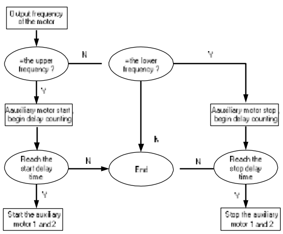
<table>
<tr><th>Function code</th><th>Name</th><th>Detailed instruction of parameters</th><th>Default value</th><th>Modify</th></tr>
<tr><td></td><td>check</td><td>1: Hibernate as the feedback pressure > P24.04</td><td></td><td></td></tr>
<tr><td>P24.03</td><td>Starting frequency of the hibernation</td><td>0.00~P0.03(the Max. frequency)</td><td>10.00 Hz</td><td>○</td></tr>
<tr><td>P24.04</td><td>Starting pressure of hibernation</td><td>0.00~100.0%</td><td>50.0%</td><td>○</td></tr>
<tr><td>P24.05</td><td>Hibernation delay time</td><td>0.0~3600.0s</td><td>5.0s</td><td>○</td></tr>
<tr><td>P24.06</td><td>Hibernation awake</td><td>0: Awake as the setting frequency > P24.07
1: Awake as the feedback pressure < P24.08</td><td>0</td><td>○</td></tr>
<tr><td>P24.07</td><td>Awake frequency</td><td>0.00~P0.03(the Max. frequency)</td><td>20.00 Hz</td><td>○</td></tr>
<tr><td>P24.08</td><td>Setting value of hibernation</td><td>0.00~100.0%</td><td>10.0%</td><td>○</td></tr>
<tr><td>P24.09</td><td>Mini hibernation time</td><td>0.0~3600.0s</td><td>5.0s</td><td>○</td></tr>
<tr><td>P24.10</td><td>Valid auxiliary motor</td><td rowspan="3">Setting range of P24.11: 0.0~3600.0s
P24.10~P24.12 can make three motors to form a simple system of water supply.



P24.10 is used to select the valid auxiliary motor.
0: No auxiliary motor
1: Auxiliary motor 1 valid
2: Auxiliary motor 2 valid
3: Auxiliary motor 1 and 2 valid</td><td>0</td><td>○</td></tr>
<tr><td>P24.11</td><td>Start/stop delay time of auxiliary motor 1</td><td>5.0s</td><td>○</td></tr>
<tr><td>P24.12</td><td>Start/stop delay time of auxiliary motor 2</td><td>5.0s</td><td>○</td></tr>
</table>

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7.1 What this chapter contains

This chapter describes the internal function mode of the inverter in details.

	Check all terminals are connected properly and tightly. **Check that the power of the motor corresponds to that of the inverter.**

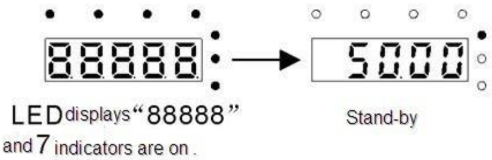
7.2 First powering on

Check before powering on

Please check according to the installation list in chapter two.

Original powering operation

Check to ensure there is no mistake in wiring and power supply, switch on the air switch of the AC power supply on the input side of the inverter to power on the inverter. 8.8.8.8.8. will be displayed on the keypad, and the contactor closes normally. When the character on the nixie tubs changes to the set frequency, the inverter has finished the initialization and it is in the stand-by state.



Below diagram shows the first operation: (take motor 1 as the example)

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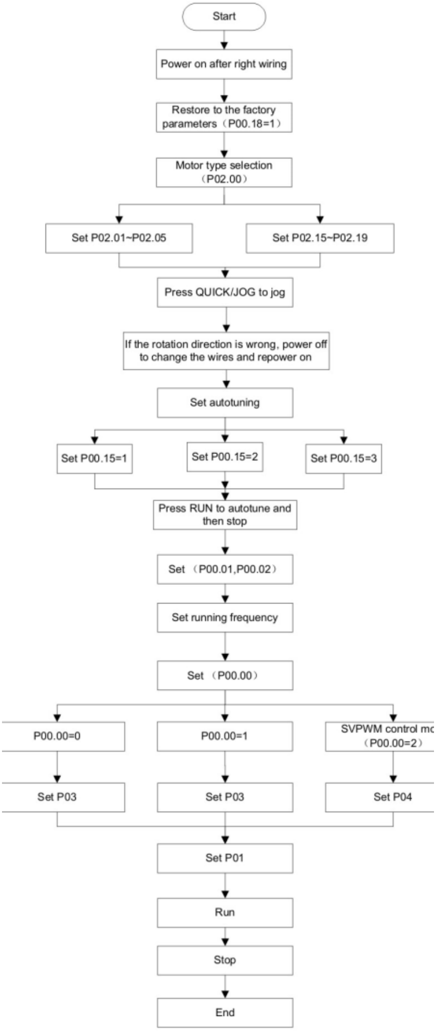

Note: If fault occurs, please do as the "Fault Tracking". Estimate the fault reason and settle the issue.

Besides P00.01 and P00.02, terminal command setting can also used to set the running command channel.

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Current running command channel P00.01	Multi-function terminal 36 Shifting the command to keypad	Multi-function terminal 37 Shifting the command to communication	Multi-function terminal 38 Shifting the command to communication
Keypad running command channel		Terminal running command channel	Communication running command channel
Terminal running command channel	Keypad running command channel	/	Communication running command channel
Communication running command channel	Keypad running command channel	Terminal running command channel	/

Note: "/" means the multi-function terminal is invalid on the current reference channel.
Relative parameters table:

7.3 Vector control

Because asynchronous motors have the characteristics of high stage, nonlinear, strong coupling and various variables, the actual control of the asynchronous motor is very difficult. Vector control is mainly used to settle this problem with the theme of that divide the stator current vector into exciting current (the current heft generating internal magnetic field of the motor) and torque current (the current heft generating torque) by controlling and measuring the stator current vector according to the principles of beamed magnetic field to control the range and phase of these two hefts. This method can realize the decoupling of exciting current and torque current to adjust the high performance of asynchronous motors.
MA610 series inverters are embedded speedless sensor vector control calculation for driving both asynchronous motors and synchronous motors. Because the core calculation of vector control is based on exact motor parameter models, the accuracy of motor parameter will impact on the performance of vector control. It is recommended to input the motor parameters and carry out autotune before vector running.
Because the vector control calculation is vary complicated, high technical theory is needed for the user during internal autotune. It is recommended to use the specific function parameters in vector control with cautions.

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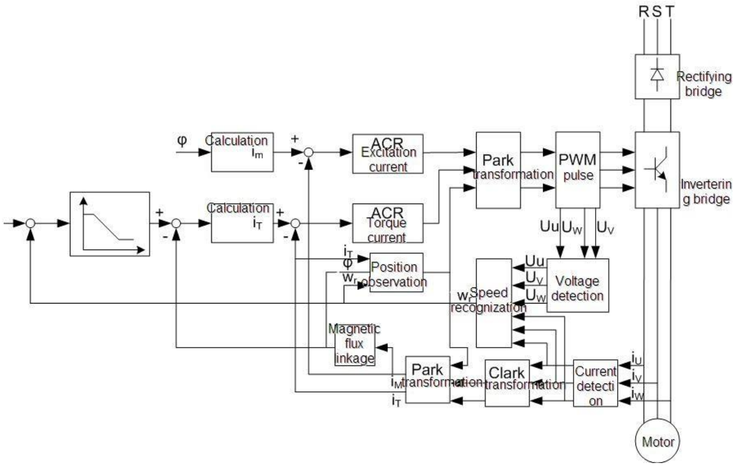
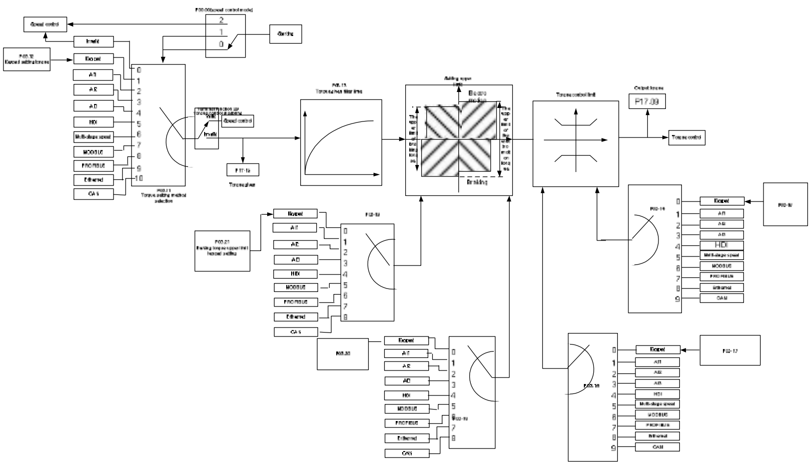


7.4 Torque control

TETA MA610 series inverters support two kinds of control mode: torque control and rotation speed control. The core of rotation speed is that the whole control focuses on the stable speed and ensures the setting speed is the same as the actual running speed. The Max. Load should be in the range of the torque limit. The core of torque control is that the whole control focues on the stable torque and ensures the setting torque is the same as the actual output torque. At the same time, the output frequency is among the upper limit or the lower limit.



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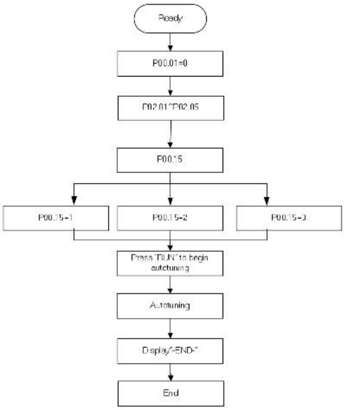
7.5 Parameters of the motor

	Physical accident may occur if the motor starts up suddenly during autotune. Please check the safety of surrounding environment of the motor and the load before autotune. **The power is still applied even the motor stops running during static autotune. Please do not touch the motor until the autotune is completed, otherwise there would be electric shock.**
	Do not carry out the rotation autotune if the motor is coupled with the load, please do not operate on the rotation autotune. Otherwise misaction or damage may occur to the inverter or the mechanical devices. When carry out autotune on the motor which is coupled with load, the motor parameter won't be counted correctly and misaction may occur. It is proper to de-couple the motor from the load during autotune when necessary.



The control performance of the inverter is based on the established accurate motor model. The user has to carry out the motor autotune before first running (take motor 1 as the example).

Note:

1. Set the motor parameters according to the name plate of the motor.

2. During the motor autotune, de-couple the motor form the load if rotation autotune is selected to make the motor is in a static and empty state, otherwise the result of autotune is incorrect. The asynchronous motors can autotune the parameters of P02.06~P02.10.

3. During the motor autotune 1, do not to de-couple the motor form the load if static autotune is selected. Because only some parameters of the motor are involved, the control performance is not as better as the rotation autotune. The asynchronous motors can autotune the parameters of P02.06~P02.10.

4. During the motor autotune 2, do not to de-couple the motor form the load if static autotune is selected. Because only some parameters of the motor are involved, the control performance is not as better as the rotation autotune. The asynchronous motors can autotune the parameters of P02.06~P02.08. It is suitable in the cases which SVPWM control is applied.

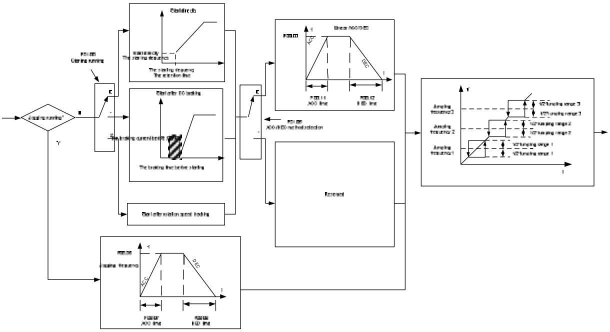
7.6 Start-up and stop control

The start-up and stop control of the inverter includes three states: start after the running command during normal powering on, start after the restarting function becomes valid during norm al powering on and start after the automatic fault reset. Below is the detailed instruction for three starting.

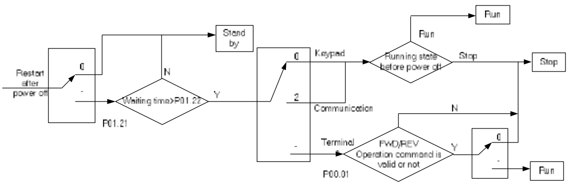
There are three starting modes for the inverter: start from the starting frequency directly, start after the DC braking and start after the rotation speed tracking. The user can select according to different situations to meet their needs.

For the load with big inertia, especially in the cases where the reverse rotation may occur, it is better to select starting after DC braking and then starting after rotation speed tracking.

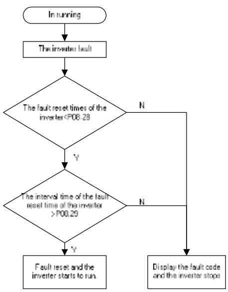
1.The starting logic figure of starting after the running command during the normal powering on



2. The starting logic figure of starting after the restarting function becomes valid during the normal powering on



3. The starting logic figure of starting after the automatic fault reset



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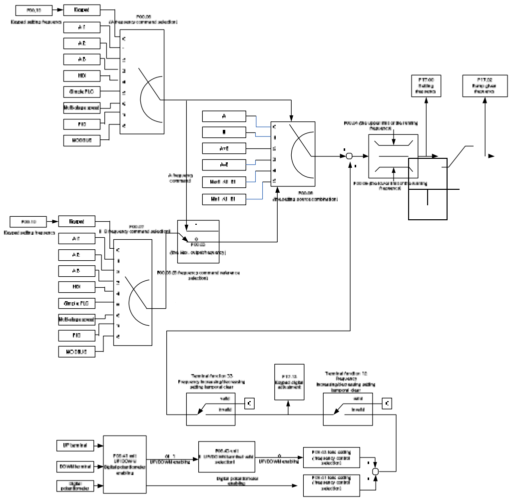
7.7 Frequency setting

TETA MA610 series inverters can set the frequency by various means. The reference channel can be divided into main reference channel and assistant reference channel.

There are two main reference channels: A frequency reference channel and B frequency reference channel. These two reference channels can carry out mutual simple math calculation between each other. And the reference channels can be shifted dynamically through set multi- function terminals.

There are three assistant reference channels: keypad UP/DOWN input, terminals UP/DOWN switch input and digital potentiometer input. The three ways equal to the effect of input UP/DOWN reference in internal assistant reference of the inverter. The user can enable the reference method and the effect of the method to the frequency reference by setting function codes.

The actual reference of the inverter is consisted of main reference channel and assistant reference channel.



TETA MA610 series inverters support the shifting between different reference channels and the detailed shifting rules is as below:

Current reference channel P00.09	Multi-function terminal function 13 Shifting from A channel to B channel	Multi-function terminal function 14 Shifting from combination setting to A channel	Multi-function terminal function 15 Shifting from combination setting to B channel
A	B	/	/
B	/	/	/
A+B	/	A	B
A-B	/	A	B
Max(A,B)	/	A	B
Min(A,B)	/	A	B

Note: "/" means the multi-function terminal is invalid under the current reference channel.

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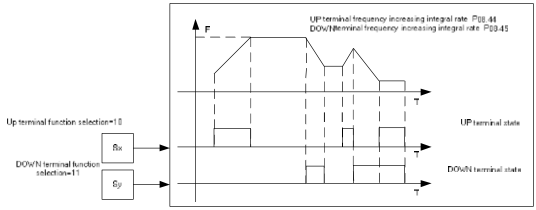
When select multi-function terminal UP (10) and DOWN (11) to set the internal assistant frequency, P08.44 and P08.45 can be set to increase or decrease the set frequency quickly.

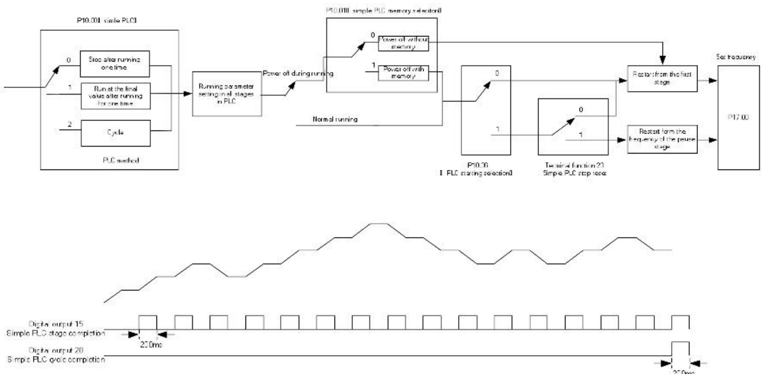


7.8 Simple PLC

Simple PLC function is also a multi-step speed generator. The inverter can change the running frequency, direction to meet the need of processing according to the running time automatically. In the past, this function needs to be assisted by external PLC, but now the inverter can realize this function by itself.

The series inverters can control 16-step speed with 4 groups of ACC/DEC time.

The multi-function digital output terminals or multi-function relay output an ON signal when the set PLC finishes a circle (or a step).



7.9 Multi-step speed running

Set the parameters when the inverter carries out multi-step speed running. TETA MA610 series inverters can set 16 step speed which can be selected by the combination code of multi-step speed terminals 1~4. They correspond to multi-step speed 0 to 15.

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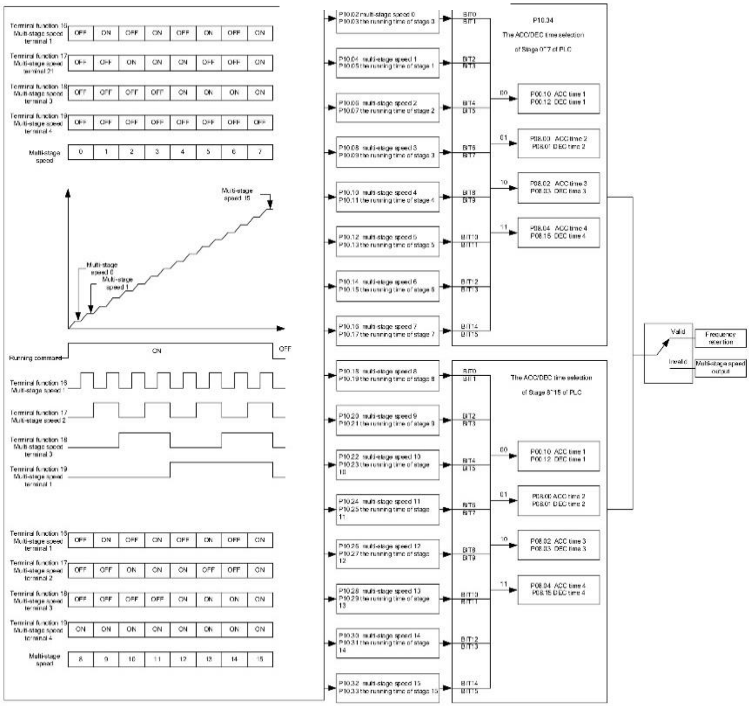
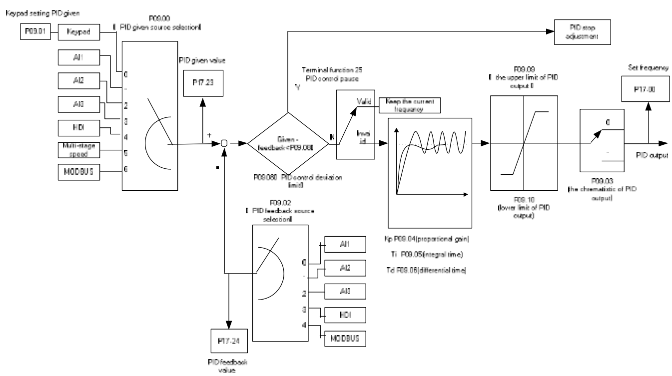


7.10 PID control

PID control is commonly used to control the procedure. Adjust the output frequency by proportional, integral, differential operation with the dispersion of the target signals to stabilize the value on the target. It is possible to apply to the flow, pressure and temperature control. Figure of basic control is as below:



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When P00.06, P00. 07=7 or P04.27=6, the running mode of the inverter is procedure PID control.

7.15.1 General steps of PID parameters setting:

a Ensure the gain P

When ensure the gain P, firstly cancel the PID integration and derivation (set Ti=0 and Td=0, see the PID parameter setting for detailed information) to make proportional adjustment is the only method to PID. Set the input as 60%~70% of the permitted Max. Value and increase gain P from 0 until the system vibration occurs, vice versa, and record the PID value and set it to 60%~70% of the current value. Then the gain P commission is finished.

b Ensure the integration time

After ensuring the gain P, set an original value of a bigger integration time and decrease it until the system vibration occurs, vice versa, until the system vibration disappear. Record the Ti and set the integration time to 150%~180% of the current value. Then integration time commission is finished.

c Ensure the derivation time

Generally, it is not necessary to set Td which is 0.

If it needs to be set, set it to 30% of the value without vibration via the same method with P and Ti.

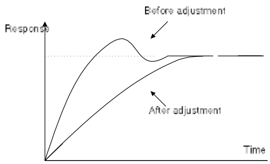
d Commission the system with and without load and then adjust the PID Parameter until it is available.

7.15.2 PID inching

After setting the PID control parameters, inching is possible by following means:

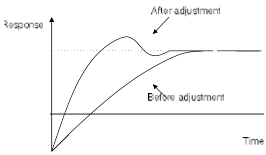
Control the overshoot

Shorten the derivation time and prolong the integration time when overshoot occurs.



Achieve the stable state as soon as possible

Shorten the integration time (Ti) and prolong the derivation time (Td) even the overshoot occurs, but the control should be stable as soon as possible.



Control long vibration

If the vibration periods are longer than the set value of integration time (Ti), it is necessary to prolong the integration time (Ti) to control the vibration for the strong integration.

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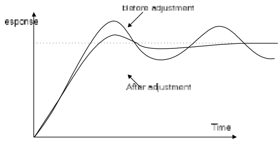
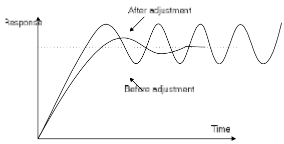


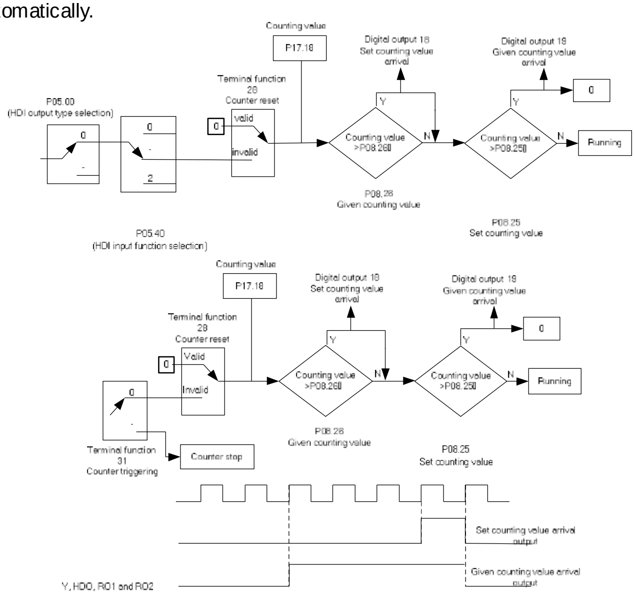
Control short vibration

Short vibration period and the same set value with the derivation time (Td) mean that the derivation time is strong. Shortening the derivation time (Td) can control the vibration. When setting the derivation time as 0.00(ire no derivation control) is useless to control the vibration, decrease the gain.



7.11 Pulse counter

TETA MA610 series inverters support pulse counter which can input counting pulse through HDI terminal. When the actual length is longer than or equal to the set length, the digital output terminal can output length arrival pulse signal and the corresponding length will be cleared automatically.



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8.1 What this chapter contains

This chapter describes how to reset faults and view fault history. It also lists all alarm and fault messages including the possible cause and corrective actions.

⚠	**Only qualified electricians are allowed to maintain the inverter. Read the safety instructions in chapter Safety precautions before working on the inverter.**

8.2 Alarm and fault indications

Fault is indicated by LEDs. See **Operation Procedure**. When TRIP light is on, an alarm or fault message on the panel display indicates abnormal inverter state. Using the information reference in this chapter, most alarm and fault cause can be identified and corrected. If not, contact with the office.

8.3 How to reset

The inverter can be reset by pressing the keypad key STOP/RST, through digital input, or by switching the power light. when the fault has been removed, the motor can be restarted.

8.4 Fault history

Function codes P07.27~P07.32 store 6 recent faults. Function codes P07.33~P07.40, P07.41~P7.48 and P07.49~P07.56 show drive operation data when the latest 3 faults occurs.

8.5 Fault instruction and solution

Do as the following after the inverter fault:

1. Check to ensure there is nothing wrong with the keypad. If not, please contact with the local office.

2. If there is nothing wrong, please check P07 and ensure the corresponding recorded fault parameters to confirm the real state when the current fault occurs by all parameters.

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

4. Eliminate the fault and ask for relative help.

5. Check to eliminate the fault and carry out fault reset to run the inverter.

Fault code	Fault type	Possible cause	What to do
OUt1	IGBT Ph-U fault	The acceleration is too fast IGBT module fault Misaction caused by interference The connection of the driving wires is not good, Grounding is not properly	Increase Acc time Change the power unit Check the driving wires Inspect external equipment and eliminate interference
OUt2	IGBT Ph-V fault		
OUt3	IGBT Ph-W fault		

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Fault code	Fault type	Possible cause	What to do
OC1	Over-current when acceleration	The acceleration or deceleration is too fast The voltage of the grid is too low The power of the inverter is too low The load transients or is abnormal The grounding is short circuited or the output is phase loss There is strong external interference The overvoltage stall protection is not open	Increase the ACC time Check the input power Select the inverter with a larger power Check if the load is short circuited (the grounding short circuited or the wire short circuited) or the rotation is not smooth Check the output configuration. Check if there is strong interference Check the setting of relative function codes
OC2	Over-current when deceleration		
OC3	Over-current when constant speed running		
OV1	Over-voltage when acceleration	The input voltage is abnormal There is large energy feedback No braking components Braking energy is not open	Check the input power Check if the DEC time of the load is too short or the inverter starts during the rotation of the motor or it needs to add the dynamic bracking components Install the braking components Check the setting of relative function codes
OV2	Over-voltage when deceleration		
OV3	Over-voltage when constant speed running		
UV	DC bus Under-voltage	The voltage of the power supply is too low The overvoltage stall protection is not open	Check the input power of the supply line Check the setting of relative function codes
OL1	Motor overload	The voltage of the power supply is too low The motor setting rated current is incorrect The motor stall or load transients is too strong	Check the power of the supply line Reset the rated current of the motor Check the load and adjust the torque lift
OL2	Inverter overload	The acceleration is too fast Reset the rotating motor The voltage of the power supply is too low The load is too heavy The motor power is too big	Increase the ACC time Avoid the restarting after stopping Check the power of the supply line Select an inverter with bigger power Select a proper motor

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Fault code	Fault type	Possible cause	What to do
OL3	Electrical overload	The inverter will report overload pre-alarm according to the set value	Check the load and the overload pre-alarm point.
SPI	Input phase loss	Phase loss or fluctuation of input R,S,T	Check input power Check installation distribution
SPO	Output phase loss	U,V,W phase loss input(or serious asymmetrical three phase of the load)	Check the output distribution Check the motor and cable
OH1	Rectify overheat	Air duct jam or fan damage Ambient temperature is too high The time of overload running is too long	Clean the air duct or the fan Reduce the ambient temperature
OH2	IGBT overheat		
EF	External fault	SI external fault input terminals action	Check the external device input
CE	Communication error	The baud rate setting is incorrect Fault occurs to the communication wiring. The communication address is wrong There is strong interference to	Set proper baud rate Check the communication connection distribution Set proper communication address Chang or replace the connection distribution or improve the anti-interference capability
ItE	Current detection fault	The connection of the control board is not good Hoare components is broken The modifying circuit is abnormal	Check the connector and repatch Change the hoare Change the main control panel
tE	Autotuning fault	The motor capacity does not comply with the inverter capability The rated parameter of the motor does not set correctly. The offset between the parameters autotunting and the standard parameter is huge Autotune overtime	Change the inverter mode Set the rated parameter according to the motor name plate Empty the motor load and reindentify Check the motor connection and set the parameter. Check if the upper limit frequency is above 2/3 of the rated frequency.

Fault code	Fault type	Possible cause	What to do
EEP	EEPROM fault	Error of controlling the write and read of the parameters Damage to EEPROM	Press STOP/RST to reset Change the main control panel
PIDE	PID feedback fault	PID feedback offline PID feedback source disappear	Check the PID feedback signal Check the PID feedback source
bCE	Braking unit fault	Braking circuit fault or damage to the braking pipes The external braking resistor is not sufficient	Check the braking unit and change new braking pipe Increase the braking resistor
ETH1	Grounding shortcut fault 1	The output of the inverter is short circuited with the ground There is fault in the current detection circuit	Check if the connection of the motor is normal or not Change the hoare Change the main control panel
ETH2	Grounding shortcut fault 2		
dEu	Velocity deviation fault	The load is too heavy or stalled	Check the load and ensure it is normal Increase the detection time Check whether the control parameters are normal
STo	Maladjustment fault	The control parameters of the synchronous motors not set properly The autoturn parameter is not right The inverter is not connected to the motor	Check the load and ensure it is normal Check whether the control parameter is set properly or not Increase the maladjustment detection time
END	Time reach of factory setting	The actual running time of the inverter is above the internal setting running time	Ask for the supplier and adjust the setting running time
PCE	Keypad communication fault	The connection of the keypad wires is not good or broken The keypad wire is too long and affected by strong interference There is circuit fault on the communication of the keypad and main board	Check the keypad wires and ensure whether there is mistake Check the environment and avoid the interference source Change the hardware and ask for service

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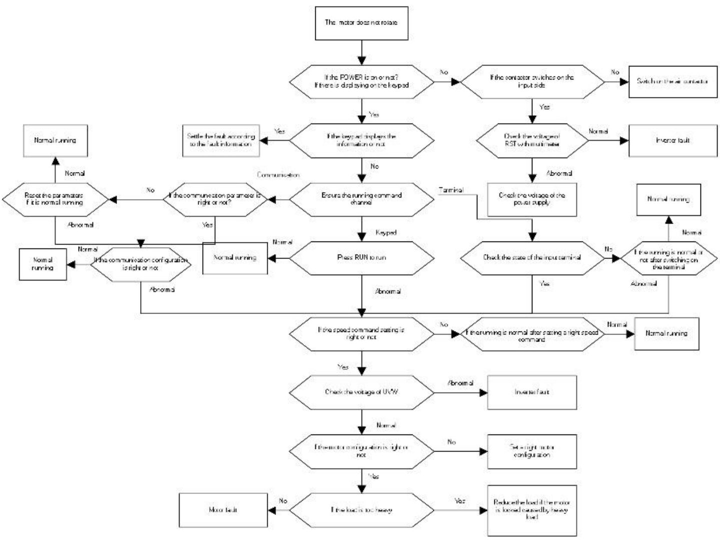
Fault code	Fault type	Possible cause	What to do
DNE	Parameters downloading fault	The connection of the keypad wires is not good or broken The keypad wire is too long and affected by strong interference There is mistake on the data storage of the keypad	Check the keypad wires and ensure whether there is mistake Change the hardware and ask for service Repack-up the data in the keypad
LL	Electronic underload fault	The inverter will report the underload pre-alarm according to the set value	Check the load and the underload pre-alarm point

8.5.2 Other states

Fault code	Fault type	Possible cause	What to do
PoFF	System power off	System power off or the bus voltage is too low	Check the grid
	Communication failure between the keypad and main control board	The keypad is not conneted correctly	Check the installation environment

8.6 Common fault analysis

8.6.1 The motor does not work



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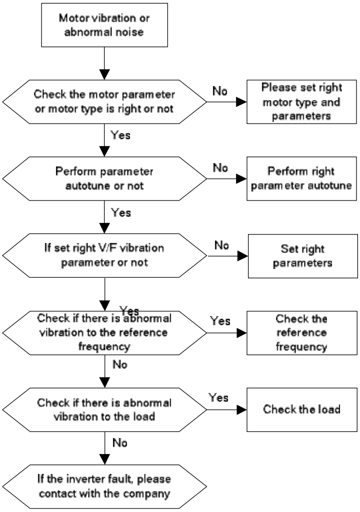
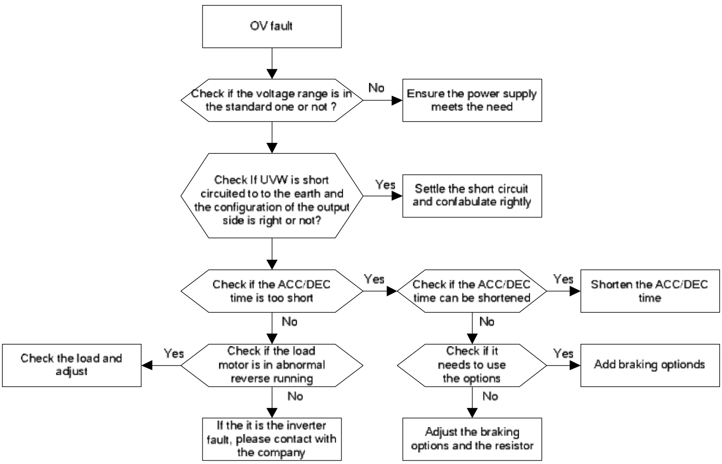
8.6.2 Motor vibration



8.6.3 Overvoltage



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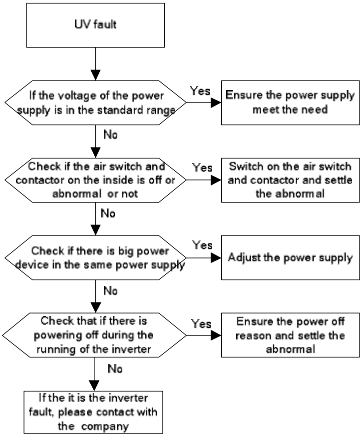
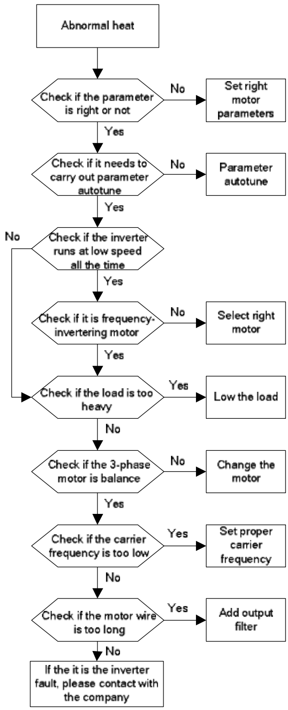
8.6.4 Undervoltage fault



8.6.5 Abnormal motor heat



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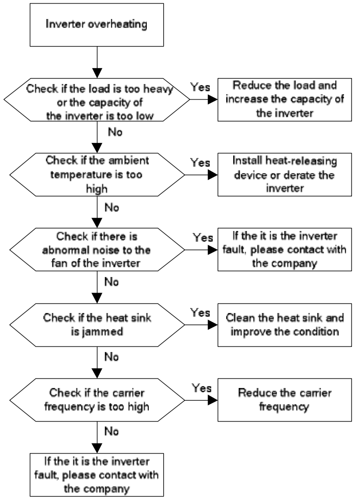
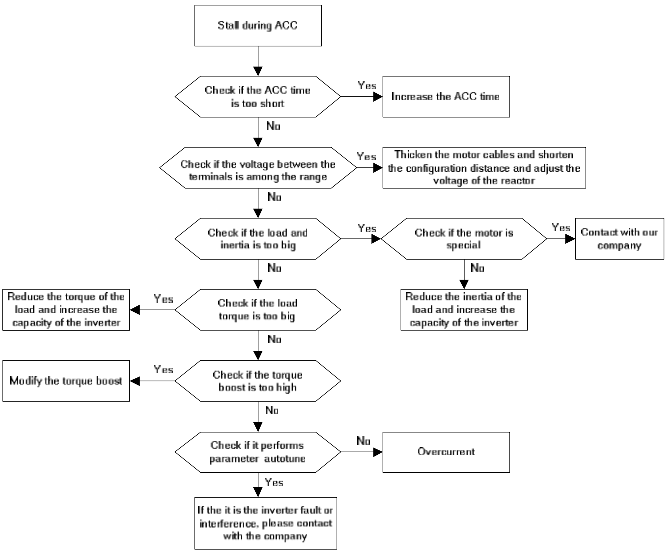
8.6.6 Inverter overheating



8.6.7 Stall during the acceleration of the motor



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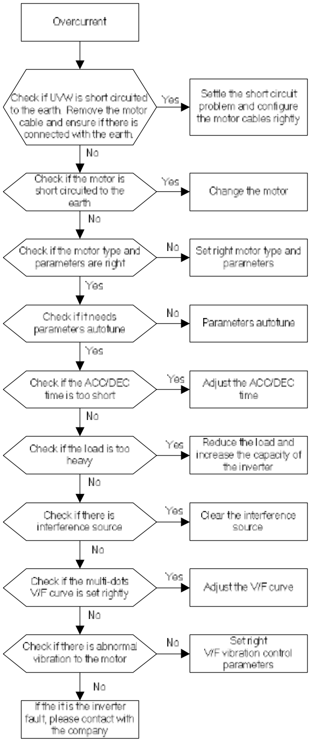
8.6.8 Overcurrent



8.7 Inverter system interference troubleshooting

If sensitive devices(PLC,PC,sensors,test enquipment,etc.) exist interference problems when the system is running, you can troubleshoot by the following means:

1. Try plugging in or unplugging the jumper pins of C3 filter to verify whether the interference has been eliminated.
2. Check whether the drive power lines and the signal/ communication lines of sensitive equipment go down the same trough, if there is, it should be again separated from the wiring.
3. If the sensitive equipment and drive to take power from the same grid, it is recommended to install isolation transformer and filter to the distribution of sensitive equipment side.
4. The relative shield wire of sensitive equipment try to ground at both ends、single-grounded、ungrounded respectively; to verify whether the interference has been eliminated.
5. Try to make the interfered sensitive equipment and the drive have no common ground, or floating processing; to verify whether the interference has been eliminated.

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8.8 Maintenance and hardware diagnostics

8.8.1 Overcurrent

If installed in an appropriate environment, the inverter requires very little maintenance. The table lists the routine maintenance intervals recommended .

<table>
<tr><th colspan="2">Checking part</th><th>Checking item</th><th>Checking method</th><th>Criterion</th></tr>
<tr><td colspan="2" rowspan="2">Ambient environment</td><td>Check the ambient temperature, humidity and vibration and ensure there is no dust, gas, oil fog and water drop.</td><td>Visual examination and instrument test</td><td>Conforming to the manual</td></tr>
<tr><td>Ensure there are no tools or other foreign or dangerous objects</td><td>Visual examination</td><td>There are no tools or dangerous objects.</td></tr>
<tr><td colspan="2">Voltage</td><td>Ensure the main circuit and control circuit are normal.</td><td>Measurement by millimeter</td><td>Conforming to the manual</td></tr>
<tr><td colspan="2" rowspan="2">Keypad</td><td>Ensure the display is clear enough</td><td>Visual examination</td><td>The characters are displayed normally.</td></tr>
<tr><td>Ensure the characters are displayed totally</td><td>Visual examination</td><td>Conforming to the manual</td></tr>
<tr><td rowspan="4">Main circuit</td><td rowspan="3">For public use</td><td>Ensure the screws are tightened up</td><td>Tighten up</td><td>NA</td></tr>
<tr><td>Ensure there is no distortion, crackles, damage or color-changing caused by overheating and aging to the machine and insulator.</td><td>Visual examination</td><td>NA</td></tr>
<tr><td>Ensure there is no dust and dirtiness</td><td>Visual examination</td><td>NA
Note: if the color of the copper blocks change, it does not mean that there is something wrong with the features.</td></tr>
<tr><td>The lead of the conductors</td><td>Ensure that there is no distortion or color-changing of the conductors caused by overheating.</td><td>Visual examination</td><td>NA</td></tr>
</table>

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Checking part		Checking item	Checking method	Criterion
		Ensure that there are no crackles or color-changing of the protective layers.	Visual examination	NA
	Terminals seat	Ensure that there is no damage	Visual examination	NA
	Filter capacitors	Ensure that there is no weeping, color-changing, crackles and cassis expansion.	Visual examination	NA
		Ensure the safety valve is in the right place.	Estimate the usage time according to the maintenance or measure the static capacity.	NA
		If necessary, measure the static capacity.	Measure the capacity by instruments.	The static capacity is above or equal to the original value *0.85.
	Resistors	Ensure whether there is replacement and splitting caused by overheating.	Smelling and visual examination	NA
		Ensure that there is no offline.	Visual examination or remove one ending to coagulate or measure with multimeters	The resistors are in ±10% of the standard value.
	Transformers and reactors	Ensure there is no abnormal vibration, noise and smelling,	Hearing, smelling and visual examination	NA
	Electromagnetism contactors and relays	Ensure whether there is vibration noise in the workrooms.	Hearing	NA
		Ensure the contactor is good enough.	Visual examination	NA
Control circuit	PCB and plugs	Ensure there are no loose screws and contactors.	Fasten up	NA
		Ensure there is no smelling and	Smelling and visual	NA

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Checking part		Checking item	Checking method	Criterion
		color-changing.	examination	
		Ensure there are no crackles, damage distortion and rust.	Visual examination	NA
		Ensure there is no weeping and distortion to the capacitors.	Visual examination or estimate the usage time according to the maintenance information	NA
Cooling system	Cooling fan	Estimate whether there is abnormal noise and vibration.	Hearing and Visual examination or rotate with hand	Stable rotation
		Estimate there is no losses screw.	Tighten up	NA
		Ensure there is no color-changing caused by overheating.	Visual examination or estimate the usage time according to the maintenance information	NA
	Ventilating duct	Ensure whether there is stuff or foreign objection in the cooling fan, air vent.	Visual examination	NA

Consult the local service representative for more details on the maintenance.

8.8.2 Cooling fan

The inverter's cooling fan has a minimum life span of 25,000 operating hours. The actual life span depends on the inverter usage and ambient temperature.

The operating hours can be found through P07.14 (accumulative hours of the inverter).

Fan failure can be predicted by the increasing noise from the fan bearings. If the inverter is operated in a critical part of a process, fan replacement is recommended once these symptoms appear.

8.8.2.1 Replacing the cooling fan

⚠	**Read and follow the instructions in chapter Safety Precautions. Ignoring the instructions would cause physical injury or death, or damage to the equipment.**

1. Stop the inverter and disconnect it from the AC power source and wait for at least the time

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designated on the inverter.
2. Lever the fan holder off the drive frame with a screwdriver and lift the hinged fan holder slightly upward from its front edge.
3. Loose the fan cable from the clip.
4. Disconnect the fan cable.
5. Remove the fan holder from the hinges.
6. Install the new fan holder including the fan in reverse order.
7. Restore power.

8.8.3 Capacitors

8.8.3.1 Reforming the capacitors

The DC bus capacitors must be reformed according to the operation instruction if the inverter has been stored for a long time.The storing time is counted form the producing date other than the delivery data which has been marked in the serial number of the inverter.

Time	Operational principle
Storing time less than 1 year	Operation without charging
Storing time 1-2 years	Connect with the power for 1 hour before first ON command
Storing time 2-3 years	Use power surge to charge for the inverter • Add 25% rated voltage for 30 minutes • Add 50% rated voltage for 30 minutes • Add 75% rated voltage for 30 minutes • Add 100% rated voltage for 30 minutes
Storing time more than 3 years	Use power surge to charge for the inverter • Add 25% rated voltage for 2 hours • Add 50% rated voltage for 2 hours • Add 75% rated voltage for 2 hours • Add 100% rated voltage for 2 hours

The method of using power surge to charge for the inverter:
The right selection of Power surge depends on the supply power of the inverter. Single phase 220V AC/2A power surge applied to the inverter with single/three-phase 220V AC as its input voltage. The inverter with single/three-phase 220V AC as its input voltage can apply Single phase 220V AC/2A power surge. All DC bus capacitors charge at the same time because there is one rectifier.
High-voltage inverter needs enough voltage (for example, 380V) during charging. The small capacitor power (2A is enough) can be used because the capacitor nearly does not need current when charging.
The operation method of inverter charging through resistors (LEDs):
The charging time is at least 60 minutes if charge the DC bus capacitor directly through supply power. This operation is available on normal temperature and no-load condition and the resistor should be serially connected in the 3-phase circuits of the power supply(the distance between resistors of each phase≥5.5mm):
380V drive device: 1k/100W resistor. LED of 100W can be used when the power voltage is no more than 380V. But if used, the light may be off or weak during charging.

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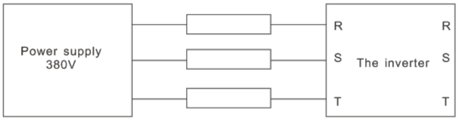

380V charging illustration of the driven device

8.8.3.2 Change electrolytic capacitors

⚠	**Read and follow the instructions in chapter Safety Precautions. Ignoring the instructions may cause physical injury or death, or damage to the equipment.**

Change electrolytic capacitors if the working hours of electrolytic capacitors in the inverter are above 35000. Please contact with the local offices

8.8.4 Power cable

⚠	**Read and follow the instructions in chapter Safety Precautions. the instructions may cause physical injury or death, or damage to the equipment.**

1. Stop the drive and disconnect it from the power line. Wait for at least the time designated on the inverter.
2. Check the tightness of the power cable connections.
3. Restore power.

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9.1 What this chapter contains

This chapter describes the communication protocol of TETA MA610 series inverters.
The TETA MA610 series inverters provide RS485 communication interface. It adopts international standard MODBUS communication protocol to perform master-slave communication. The user can realize centralized control through PC/PLC, upper control PC, etc. (set the control command, running frequency of the inverter, modify relevant function codes, monitor and control the operating state and fault information of the inverter and so on) to adapt specific application requirements.

9.2 Brief instruction to MODBUS protocol

MODBUS protocol is a software protocol and common language which is applied in the electrical controller. With this protocol, the controller can communicate with other devices via network (the channel of signal transmission or the physical layer, such as RS485). And with this industrial standard, the controlling devices of different manufacturers can be connected to an industrial network for the convenient of being monitored.
There are two transmission modes for MODBUS protocol: ASCII mode and RTU (Remote Terminal Units) mode. On one MODBUS network, all devices should select same transmission mode and their basic parameters, such as baud rate, digital bit, check bit, and stopping bit should have no difference.
MODBUS network is a controlling network with single-master and multiple slaves, which means that there is only one device performs as the master and the others are the slaves on one MODBUS network. The master means the device which has active talking right to sent message to MODBUS network for the controlling and inquiring to other devices. The slave means the passive device which sends data message to the MODBUS network only after receiving the controlling or inquiring message (command) form the master (response). After the master sends message, there is a period of time left for the controlled or inquired slaves to response, which ensure there is only one slave sends message to the master at a time for the avoidance of singles impact.
Generally, the user can set PC, PLC, IPC and HMI as the masters to realize central control. Setting certain device as the master is a promise other than setting by a bottom or a switch or the device has a special message format. For example, when the upper monitor is running, if the operator clicks sending command bottom, the upper monitor can send command message actively even it can not receive the message form other devices. In this case, the upper monitor is the master. And if the designer makes the inverter send the data only after receiving the command, then the inverter is the slave.
The master can communicate with any single slave or with all slaves. For the single-visiting command, the slave should feedback a response message; for the broadcasting message from the master, the slave does not need to feedback the response message.

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9.3 Application of the inverter

The MODBUS protocol of the inverter is RTU mode and the physical layer is 2-wire RS485.

9.3.1 RS485

The interface of 2-wire RS485 works on semiduplex and its data signal applies differential transmission which is called balance transmission, too. It uses twisted pairs, one of which is defined as A (+) and the other is defined as B (-). Generally, if the positive electrical level between sending drive A and B is among +2~+6V, it is logic“1”, if the electrical level is among -2V~-6V; it is logic“0”.

485+ on the terminal board corresponds to A and 485- to B.

Communication baud rate means the binary bit number in one second. The unit is bit/s (bps). The higher the baud rate is, the quicker the transmission speed is and the weaker the anti-interference is. If the twisted pairs of 0.56mm（24AW G）is applied as the communication cables, the Max. Transmission distance is as below:

Baud rate	Max. transmission distance	Baud rate	Max. transmission distance
2400BPS	1800m	9600BPS	800m
4800BPS	1200m	19200BPS	600m

It is recommended to use shield cables and make the shield layer as the grounding wires during RS485 remote communication.

In the cases with less devices and shorter distance, it is recommended to use 120Ω terminal resistor as the performance will be weakened if the distance increase even though the network can perform well without load resistor.

9.3.2 RTU mode

9.3.2.1 RTU communication frame format

If the controller is set to communicate by RTU mode in MODBUS network every 8bit byte in the message includes two 4Bit hex characters. Compared with ASCII mode, this mode can send more data at the same baud rate.

Code system

- 1 start bit
- 7 or 8 digital bit, the minimum valid bit can be sent firstly. Every 8 bit frame includes two hex characters (0...9, A...F)
- 1 even/odd check bit . If there is no checkout, the even/odd check bit is inexistent.
- 1 end bit (with checkout), 2 Bit(no checkout)

Error detection field

- CRC

The data format is illustrated as below:

11-bit character frame (BIT1~BIT8 are the digital bits)

Start bit	BIT1	BIT2	BIT3	BIT4	BIT5	BIT6	BIT7	BIT8	Check bit	End bit

10-bit character fram e (BIT1~BIT7 are the digital bits)

Start bit	BIT1	BIT2	BIT3	BIT4	BIT5	BIT6	BIT7	Check bit	End bit

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In one character frame, the digital bit takes effect. The start bit, check bit and end bit is used to send the digital bit right to the other device. The digital bit, even/odd checkout and end bit should be set as the same in real application.
The MODBUS minimum idle time between frames should be no less than 3.5 bytes. The network device is detecting, even during the interval time, the network bus. When the first field (the address field) is received, the corresponding device decodes next transmitting character. When the interval time is at least 3.5 byte, the message ends.
The whole message frame in RTU mode is a continuous transmitting flow. If there is an interval time (more than 1.5 bytes) before the completion of the frame, the receiving device will renew the uncompleted message and suppose the next byte as the address field of the new message. As such, if the new message follows the previous one within the interval time of 3.5 bytes, the receiving device will deal with it as the same with the previous message. If these two phenomena all happen during the transmission, the CRC will generate a fault message to respond to the sending devices.
The standard structure of RTU frame:

START	T1-T2-T3-T4(transmission time of 3.5 bytes)
ADDR	Communication address: 0~247(decimal system)(0 is the broadcast address)
CMD	03H:read slave parameters 06H:write slave parameters
DATA (N-1) ... DATA (0)	The data of 2*N bytes are the main content of the communication as well as the core of data exchanging
CRC CHK low bit	Detection value:CRC (16BIT)
CRC CHK high bit	
END	T1-T2-T3-T4(transmission time of 3.5 bytes)

9.3.2.2 RTU communication frame error checkout

Various factors (such as electromagnetic interference) may cause error in the data transmission. For example, if the sending message is a logic “1”,A-B potential difference on RS485 should be 6V, but in reality, it may be -6V because of electromagnetic interference, and then the other devices take the sent message as logic “0”. If there is no error checkout, the receiving devices will not find the message is wrong and they may give incorrect response which cause serious result. So the checkout is essential to the message.
The theme of checkout is that: the sender calculate the sending data according to a fixed formula, and then send the result with the message. When the receiver gets this message, they will calculate anther result according to the same method and compare it with the sending one. If two results are the same, the message is correct. If not, the message is incorrect.
The error checkout of the frame can be divided into two parts: the bit checkout of the byte and the whole data checkout of the frame (CRC check).

Bit checkout of the byte

The user can select different bit checkouts or non-checkout, which impacts the check bit setting of each byte.

The definition of even checkout: add an even check bit before the data transmission to illustrate the number of “1” in the data transmission is odd number or even number. When it is even, the check byte is “0”, otherwise, the check byte is”1”. This method is used to stabilize the parity of the data.

The definition of odd checkout: add an odd check bit before the data transmission to illustrate the number of “1” in the data transmission is odd number or even number. When it is odd, the check byte is “0”, otherwise, the check byte is”1”. This method is used to stabilize the parity of the data.

For example, when transmitting “11001110”, there are five “1” in the data. If the even checkout is applied, the even check bit is “1”; if the odd checkout is applied; the odd check bit is “0”. The even and odd check bit is calculated on the check bit position of the frame. And the receiving devices also carry out even and odd checkout. If the parity of the receiving data is different from the setting value, there is an error in the communication.

CRC check

The checkout uses RTU frame format. The frame includes the frame error detection field which is based on the CRC calculation method. The CRC field is two bytes, including 16 figure binary values. It is added into the frame after calculated by transmitting device. The receiving device recalculates the CRC of the received frame and compares them with the value in the received CRC field. If the two CRC values are different, there is an error in the communication.

During CRC, 0*FFFF will be stored. And then, deal with the continuous 6-above bytes in the frame and the value in the register. Only the 8Bit data in every character is effective to CRC, while the start bit, the end and the odd and even check bit is ineffective.

The calculation of CRC applies the international standard CRC checkout principles. When the user is editing CRC calculation, he can refer to the relative standard CRC calculation to write the required CRC calculation program.

Here provided a simple function of CRC calculation for the reference (programmed with C language):

```
unsigned int crc_cal_value(unsigned char *data_value,unsigned char data_length)
{
int i;
unsigned int crc_value=0xffff;
while(data_length--)
{     crc_value^=*data_value++;
for(i=0;i<8;i++)
{
if(crc_value&0x0001)crc_value=(crc_value>>1)^0xa001;
else crc_value=crc_value>>1;
}         }
return(crc_value);
}
```

In ladder logic, CKSM calculated the CRC value according to the frame with the table inquiry.

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The method is advanced with easy program and quick calculation speed. But the ROM space the program occupied is huge. So use it with caution according to the program required space.

9.4 RTU command code and communication data illustration

9.4.1 Command code: 03H

read N words（Word）(the Max. continuous reading is 16 words)

Command code 03H means that if the master read data form the inverter, the reading number depends on the “data number” in the command code. Max. continuous reading number is 16 and the parameter address should be continuous. The byte length of every data is 2 (one word). The following command format is illustrated by hex (a number with “H” means hex) and one hex occupies one byte.
The command code is used to read the working step of the inverter.
For example, read continuous 2 data content from 0004H from the inverter with the address of 01H (read the content of data address of 0004H and 0005H), the frame structure is as below:
RTU master command message (from the master to the inverter)

START	T1-T2-T3-T4 (transmission time of 3.5 bytes)
ADDR	01H
CMD	03H
High bit of the start address	00H
Low bit of the start address	04H
High bit of data number	00H
Low bit of data number	02H
CRC low bit	85H
CRC high bit	CAH
END	T1-T2-T3-T4 (transmission time of 3.5 bytes)

T1-T2-T3-T4 between START and END is to provide at least the time of 3.5 bytes as the leisure time and distinguish two messages for the avoidance of taking two messages as one message.
ADDR = 01H means the command message is sent to the inverter with the address of 01H and ADDR occupies one byte
CMD=03H means the command message is sent to read data form the inverter and CMD occupies one byte
“Start address” means reading data form the address and it occupies 2 bytes with the fact that the high bit is in the front and the low bit is in the behind.
“Data number” means the reading data number with the unit of word. If the “start address’ is 0004H and the “data number” is 0002H, the data of 0004H and 0005H will be read.
CRC occupies 2 bytes with the fact that the high bit is in the front and the low bit is in the behind.
RTU slave response message (from the inverter to the master)

START	T1-T2-T3-T4 (transmission time of 3.5 bytes)

ADDR	01H
CMD	03H
Byte number	04H
Data high bit of address 0004H	13H
Data low bit of address 0004H	88H
Data high bit of address 0005H	00H
Data low bit of address 0005H	00H
CRC CHK low bit	7EH
CRC CHK high bit	9DH
END	T1-T2-T3-T4 (transmission time of 3.5 bytes)

The meaning of the response is that:

ADDR = 01H means the command message is sent to the inverter with the address of 01H and ADDR occupies one byte

CMD=03H means the message is received from the inverter to the master for the response of reading command and CMD occupies one byte

"Byte number" means all byte number from the byte(excluding the byte) to CRC byte(excluding the byte). 04 means there are 4 byte of data from the "byte number" to "CRC CHK low bit", which are "digital address 0004H high bit", "digital address 0004H low bit", "digital address 0005H high bit" and "digital address 0005H low bit".

There are 2 bytes stored in one data with the fact that the high bit is in the front and the low bit is in the behind of the message, the data of data address 0004H is 1388H, and the data of data address 0005H is 0000H.

CRC occupies 2 bytes with the fact that the high bit is in the front and the low bit is in the behind.

9.4.2 Command code: 06H

06H (correspond to binary 0000 0110), write one word(Word)

The command means that the master write data to the inverter and one command can write one data other than multiple dates. The effect is to change the working mode of the inverter. For example, write 5000 (1388H) to 0004H from the inverter with the address of 02H, the frame structure is as below:

RTU master command message (from the master to the inverter)

START	T1-T2-T3-T4(transmission time of 3.5 bytes)
ADDR	02H
CMD	06H
High bit of write data address	00H
Low bit of write data address	04H
High bit of data content	13H
Low bit of data content	88H
CRC CHK low bit	C5H
CRC CHK high bit	6EH
END	T1-T2-T3-T4 (transmission time of 3.5 bytes)

RTU slave response message (from the inverter to the master)

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START	T1-T2-T3-T4 (transmission time of 3.5 bytes)
ADDR	02H
CMD	06H
High bit of writing data address	00H
Low bit of writing data address	04H
High bit of data content	13H
Low bit of data content	88H
CRC CHK low bit	C5H
CRC CHK high bit	6EH
END	T1-T2-T3-T4 (transmission time of 3.5 bytes)

Note: section 10.2 and 10.3 mainly describe the command format, and the detailed application will be mentioned in 10.8 with examples.

9.4.3 Command code 08H for diagnosis

Meaning of sub-function codes

Sub-function Code	Description
0000	Return to inquire information data

For example: The inquiry information string is same as the response information string when the loop detection to address 01H of driver is carried out.

The RTU request command is:

START	T1-T2-T3-T4 (transmission time of 3.5 bytes)
ADDR	01H
CMD	08H
High bit of sub-function code	00H
Low bit of sub-function code	00H
High bit of data content	12H
Low bit of data content	ABH
Low bit of CRC	ADH
High bit of CRC	14H
END	T1-T2-T3-T4 (transmission time of 3.5 bytes)

The RTU response command is:

START	T1-T2-T3-T4 (transmission time of 3.5 bytes)
ADDR	01H
CMD	08H
High bit of sub-function code	00H
Low bit of sub-function code	00H
High bit of data content	12H
Low bit of data content	ABH
Low bit of CRC	ADH
High bit of CRC	14H
END	T1-T2-T3-T4 (transmission time of 3.5 bytes)

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9.4.4 Command code: 10H, continuous writing

Command code 10H means that if the master writes data to the inverter, the data number depends on the "data number" in the command code. The Max. continuous reading number is 16.

For example, write 5000(1388H) to 0004H of the inverter whose slave address is 02H and 50(0032H) to 0005H, the frame structure is as below:

The RTU request command is:

START	T1-T2-T3-T4 (transmission time of 3.5 bytes)
ADDR	02H
CMD	10H
High bit of write data	00H
Low bit of write data	04H
High bit of data number	00H
Low bit of data number	02H
Byte number	04H
High bit of data 0004H	13H
Low bit of data 0004H	88H
High bit of data 0005H	00H
Low bit of data 0005H	32H
Low bit of CRC	C5H
High bit of CRC	6EH
END	T1-T2-T3-T4 (transmission time of 3.5 bytes)

The RTU response command is:

START	T1-T2-T3-T4 (transmission time of 3.5 bytes)
ADDR	02H
CMD	10H
High bit of write data	00H
Low bit of write data	04H
High bit of data number	00H
Low bit of data number	02H
Low bit of CRC	C5H
High bit of CRC	6EH
END	T1-T2-T3-T4 (transmission time of 3.5 bytes)

9.4.5 The definition of data address

The address definition of the communication data in this part is to control the running of the inverter and get the state information and relative function parameters of the inverter.

9.4.5.1 The rules of parameter address of the function codes

The parameter address occupies 2 bytes with the fact that the high bit is in the front and the low bit is in the behind. The range of high and low byte are: high byte—00~ffH; low byte—00~ffH. The high byte is the group number before the radix point of the function code and the low byte is the number after the radix point. But both the high byte and the low byte should be changed into hex. For example P05.06, the group number before the radix point of the function code is 05, then the high bit of the parameter is 05, the number after the radix point 05, then the low bit of the parameter is 06, then the function code address is 0506H and the parameter address of P10.01 is 0A01H.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modification	Serial No.
P10.00	Simple PLC means	0：Stop after running once. 1：Run at the final value after running once. 2 ：Cycle running.	0~2	0	○	354
P10.01	Simple PLC memory selection	0：power loss without memory 1：power loss memory；	0~1	0	○	355

Note: P29 group is the factory parameter which can not be read or changed. Some parameters can not be changed when the inverter is in the running state and some parameters can not be changed in any state. The setting range, unit and relative instructions should be paid attention to when modifying the function code parameters.

Besides, EEPROM is stocked frequently, which may shorten the usage time of EEPROM. For users, some functions are not necessary to be stocked on the communication mode. The needs can be met on by changing the value in RAM. Changing the high bit of the function code form 0 to 1 can also realize the function. For example, the function code P00.07 is not stocked into EEPROM. Only by changing the value in RAM can set the address to 8007H. This address can only be used in writing RAM other than reading. If it is used to read, it is an invalid address.

9.4.5.2 The address instruction of other function in MODBUS

The master can operate on the parameters of the inverter as well as control the inverter, such as running or stopping and monitoring the working state of the inverter.

Below is the parameter list of other functions

Function instruction	Address definition	Data meaning instruction	R/W characteristics
Communication control command	2000H	0001H:forward running	W/R
		0002H:reverse running	
		0003H:forward jogging	
		0004H:reverse jogging	
		0005H:stop	
		0006H:coast to stop (emergency stop)	
		0007H:fault reset	
		0008H:jogging stop	
The address of the communication setting value	2001H	Communication setting frequency(0~Fm ax(unit: 0.01Hz))	W/R
	2002H	PID reference, range(0~1000, 1000 corresponds to100.0%)	

Function instruction	Address definition	Data meaning instruction	R/W characteristics
	2003H	PID feedback, range(0~1000, 1000 corresponds to100.0%)	W/R
	2004H	Torque setting value (-3000~3000, 1000 corresponds to the 100.0% of the rated current of the motor)	W/R
	2005H	The upper limit frequency setting during forward rotation(0~Fmax(unit: 0.01Hz))	W/R
	2006H	The upper limit frequency setting during reverse rotation(0~Fmax(unit: 0.01Hz))	W/R
	2007H	The upper limit torque of electromotion torque (0~3000, 1000 corresponds to the 100.0% of the rated current of the motor)	W/R
	2008H	The upper limit torque of braking torque (0~3000, 1000 corresponds to the 100.0% of the rated current of the motor)	W/R
	2009H	Special control command word Bit0~1:=00:motor 1 =01:motor 2 =10:motor 3 =11:motor 4 Bit2:=1 torque control =0:speed control	W/R
	200AH	Virtual input terminal command , range: 0x000~0x1FF	W/R
	200BH	Virtual input terminal command , range: 0x00~0x0F	W/R
	200CH	Voltage setting value(special for V/F separation) (0~1000, 1000 corresponds to the 100.0% of the rated voltage of the motor)	W/R
	200DH	AO output setting 1(-1000~1000, 1000 corresponds to 100.0%)	W/R
	200EH	AO output setting 2(-1000~1000, 1000 corresponds to 100.0%)	W/R
SW 1 of the inverter	2100H	0001H:forward running	R
		0002H:forward running	
		0003H:stop	
		0004H:fault	
		0005H: POFF state	
SW 2 of the inverter	2101H	Bit0: =0:bus voltage is not established =1:bus voltage is established Bit1~2:=00:motor 1 =01:motor 2 =10:motor 3 =11:motor 4	R

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Function instruction	Address definition	Data meaning instruction	R/W characteristics
		Bit3: =0:asynchronous motor =1:synchronous motor Bit4:=0:pre-alarm without overload =1:overload pre-alarm Bit5~ Bit6:=00:keypad control =01:terminal control =10:commuincation control	
Fault code of the inverter	2102H	See the fault type instruction	R
Identifying code of the inverter	2103H	MA610 -----0x010C	R
Operation frequency	3000H	Range: 0.00Hz~P00.03	R
Setting frequency	3001H	Range: 0.00Hz~P00.03	R
Bus voltage	3002H	Range: 0~1200V	R
Output voltage	3003H	Range: 0~1200V	R
Output current	3004H	Range: 0.0~5000.0A	R
Operation speed	3005H	Range: 0~65535RPM	R
Output power	3006H	Range: -300.0~300.0%	R
Output torque	3007H	Range: 0~65535RPM	R
Close loop setting	3008H	Range: -100.0%~100.0%	R
Close loop feedback	3009H	Range: -100.0%~100.0%	R
Input IO state	300AH	Range: 0000~00FF	R
Output IO state	300BH	Range: 0000~00FF	R
AI 1	300CH	Range: 0.00~10.00V	R
AI 2	300DH	Range: 0.00~10.00V	R
AI 3	300EH	Range: 0.00~10.00V	R
AI 4	300FH	Reserved	R
Read high speed pulse 1 input	3010H	Range: 0.00~50.00kHz	R
Read high speed pulse 2 input	3011H	Reserved	R
Read current step of the multi-step speed	3012H	Range: 0~15	R
External length	3013H	Range: 0~65535	R
External	3014H	Range: 0~65535	R

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Function instruction	Address definition	Data meaning instruction	R/W characteristics
counting value			
Torque setting	3015H	Range: 0~65535	R
Inverter code	3016H		R
Fault code	5000H		R

R/W characteristics means the function is with read and write characteristics. For example, "communication control command" is writing chrematistics and control the inverter with writing command (06H). R characteristic can only read other than write and W characteristic can only write other than read.

Note: when operate on the inverter with the table above, it is necessary to enable some parameters. For example, the operation of running and stopping, it is necessary to set P00.01 to communication running command channel and set P00.02 to MODBUS communication channel. And when operate on "PID reference", it is necessary to set P09.00 to "MODBUS communication setting".

The encoding rules for device codes (corresponds to identifying code 2103H of the inverter)

Code high 8 bit	Meaning	Code low 8 bit	Meaning
01	MA	0x0c	MA610 general inverters

Note: the code is consisted of 16 bit which is high 8 bits and low 8 bits. High 8 bits mean the motor type series and low 8 bits mean the derived motor types of the series. For example, 0110H means TETA MA610 vector inverters.

9.4.6 Fieldbus ratio values

The communication data is expressed by hex in actual application and there is no radix point in hex. For example, 50.12Hz can not be expressed by hex so 50.12 can be magnified by 100 times into 5012, so hex 1394H can be used to express 50.12.

A non-integer can be timed by a multiple to get an integer and the integer can be called fieldbus ratio values.

The fieldbus ratio values are referred to the radix point of the setting range or default value in the function parameter list. If there are figures behind the radix point (n=1), then the fieldbus ratio value m is 10^n . Take the table as the example:

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modification	Serial No.
P01.20	Hibernation restore delay time	Setting range: 0.0~3600.0s (valid when P01.19=2)	0.0~3600.0	0.0s	○	39
P01.21	Restart after power off	0: disabling 1: enabling	0~1	0	○	40

If there is one figure behind the radix point in the setting range or the default value, then the fieldbus ratio value is 10. if the data received by the upper monitor is 50, then the "hibernation restore delay time" is 5.0 (5.0=50÷10).

If MODBUS communication is used to control the hibernation restore delay time as 5.0s. Firstly, 5.0 can be magnified by 10 times to integer 50 (32H) and then this data can be sent.

01	06	01 14	00 32	49 E7
inverter address	read command	parameters address	data number	CRC check

After the inverter receives the command, it will change 50 into 5 according to the fieldbus ratio value and then set the hibernation restore delay time as 5s.

Another example, after the upper monitor sends the command of reading the parameter of hibernation restore delay time ,if the response message of the inverter is as following:

01	03	02	00 32	39 91
inverter address	read command	2 bytes data	parameter data	CRC check

Because the parameter data is 0032H (50) and 50 divided by 10 is 5, then the hibernation restore delay time is 5s.

9.4.7 Fault message response

There may be fault in the communication control. For example, some parameter can only be read. If a writing message is sent, the inverter will return a fault response message.

The fault message is from the inverter to the master, its code and meaning is as below:

Code	Name	Meaning
01H	Illegal command	The command from master can not be executed. The reason maybe: 1. This command is only for new version and this version can not realize. 2. Slave is in fault state and can not execute it.
02H	Illegal data address.	Some of the operation addresses are invalid or not allowed to access. Especially the combination of the register and the transmitting bytes are invalid.
03H	Illegal value	When there are invalid data in the message framed received by slave. **Note:** This error code does not indicate the data value to write exceed the range, but indicate the message frame is an illegal frame.
04H	Operation	The parameter setting in parameter writing is invalid. For example,

Code	Name	Meaning
	failed	the function input terminal can not be set repeatedly.
05H	Password error	The password written to the password check address is not same as the password set by P7.00.
06H	Data frame error	In the frame message sent by the upper monitor, the length of the digital frame is incorrect or the counting of CRC check bit in RTU is different from the lower monitor.
07H	Written not allowed.	It only happen in write command, the reason maybe: 1. The written data exceeds the parameter range. 2. The parameter should not be modified now. 3. The terminal has already been used.
08H	The parameter can not be changed during running	The modified parameter in the writing of the upper monitor can not be modified during running.
09H	Password protection	When the upper monitor is writing or reading and the user password is set without password unlocking, it will report that the system is locked.

The slave uses functional code fields and fault addresses to indicate it is a normal response or some error occurs (named as objection response). For normal responses, the slave shows corresponding function codes, digital address or sub-function codes as the response. For objection responses, the slave returns a code which equals the normal code, but the first byte is logic 1.

For example: when the master sends a message to the slave, requiring it to read a group of address data of the inverter function codes, there will be following function codes:

0 0 0 0 0 0 1 1 (Hex 03H)

For normal responses, the slave responds the same codes, while for objection responses, it will return:

1 0 0 0 0 0 1 1 (Hex 83H)

Besides the function codes modification for the objection fault, the slave will respond a byte of abnormal code which defines the error reason.

When the master receives the response for the objection, in a typical processing, it will send the message again or modify the corresponding order.

For example, set the "running command channel" of the inverter (P00.01, parameter address is 0001H) with the address of 01H to 03, the command is as following:

01	06	00 01	00 03	98 0B
inverter address	read command	parameter address	parameter data	CRC check

But the setting range of "running command channel" is 0~2, if it is set to 3, because the number is beyond the range, the inverter will return fault response message as below:

01	86	04	43 A3
inverter address	abnormal response code	fault code	CRC check

Abnormal response code 86H means the abnormal response to writing command 06H; the fault code is 04H. In the table above, its name is operation failed and its meaning is that the parameter setting in parameter writing is invalid. For example, the function input terminal can not be set repeatedly.

9.4.8 Example of writing and reading

Refer to 10.4.1 and 10.4.2 for the command format.

9.4.8.1 Example of reading command 03H

Read the state word 1 of the inverter with the address of 01H (refer to table 1). From the table 1, the parameter address of the state word 1 of the inverter is 2100H.

The command sent to the inverter:

01	03	21 00	00 01	8E 36
inverter address	read parameter	parameter address	data number	CRC check

If the response message is as below:

01	03	02	00 03	F8 45
inverter address	read command	data number	data content	CRC check

The data content is 0003H. From the table 1, the inverter stops.

Watch "the current fault type" to "the previous 5 times fault type" of the inverter through commands, the corresponding function code is P07.27~P07.32 and corresponding parameter address is 071BH~0720H(there are 6 from 071BH).

The command sent to the inverter:

03	03	07 1B	00 06	B5 59
inverter address	read command	start address	total 6 parameters	CRC check

If the response message is as below:

03	03	0C	00 23	00 23	00 23	00 23	00 23	00 23	5F D2
inverter address	read command	byte number	current fault type	previous fault type	previous 2 fault type	previous 3 fault type	previous 4 fault type	previous 5 fault type	CRC check

See from the returned data, all fault types are 0023H (decimal 35) with the meaning of maladjustment (STo).

9.4.8.2 Example of writing command 06H

Make the inverter with the address of 03H to run forward. See table 1, the address of "communication control command" is 2000H and forward running is 0001. See the table below.

Function instruction	Address definition	Data meaning instruction	R/W characteristics
Communication control command	2000H	0001H: forward running	W
		0002H: reverse running	
		0003H: forward jogging	
		0004H: reverse jogging	
		0005H: stop	
		0006H: coast to stop (emergency stop)	
		0007H: fault reset	
		0008H: jogging stop	
		0009H: pre-exciting	

The command sent by the master:

03 06 20 00 00 01 42 28
(inverter address | write command | parameter address | forward running | CRC check)

If the operation is success, the response may be as below (the same with the command sent by the master):

03 06 20 00 00 01 42 28
(inverter address | write command | parameter address | forward running | CRC check)

Set the Max. Output frequency of the inverter with the address of 03H as100Hz.

P00.03	Max. output frequency	Setting range : P00.04~600.00Hz(400.00Hz)	10.00~600.00	50.00Hz	◎	3.

See the figures behind the radix point, the fieldbus ratio value of the Max. output frequency (P00.03) is 100. 100Hz timed by 100 is 10000 and the corresponding hex is 2710H.
The command sent by the master:

03 06 00 03 27 10 62 14
(inverter address | write command | parameter address | forward running | CRC check)

If the operation is successful, the response may be as below (the same with the command sent by the master):

03 06 00 03 27 10 62 14
(inverter address | write command | parameter address | forward running | CRC check)

Note: the blank in the above command is for illustration. The blank can not be added in the actual application unless the upper monitor can remove the blank by themselves.

Common communication fault

Common communication faults are: no response to the communication or the inverter returns abnormal fault.
The possible reason for no response to the communication:
Selecting wrong serial interface, for example, if the converter is COM1, selecting COM2 during the communication
The baud rate, digital bit, end bit and check bit are not the same with the inverter + and - of RS485 are connected in reverse.
The 485 wire cap on the terminal board of the inverter is not plug in. the wire cap in behind the terminal arrangement.

9.4.8.3 Example of continous writing command10H

Example 1: make the inverter whose address is 01H run forward at 10Hz. Refer to the instruction of 2000H and 0001. Set the address of “communication setting frequency” is 2001H and 10Hz corresponds to 03E8H. See the table below.

Function instruction	Address definition	Data meaning instruction	R/W characteristics
Communication	2000H	0001H:forward running	W/R

Function instruction	Address definition	Data meaning instruction	R/W characteristics
control command		0002H:reverse running	
		0003H:forward jogging	
		0004H:reverse jogging	
		0005H:stop	
		0006H:coast to stop (emergency stop)	
		0007H:fault reset	
		0008H:jogging stop	
The address of communication setting	2001H	Communication setting frequency(0~Fmax(unit:0.01Hz))	W/R
	2002H	PID given, range(0~1000, 1000 corresponds to 100.0%)	

Set P00.01 to 2 and P00.06 to 8.

The command sent to the inverter:

01	10	20 00	00 02	04	00 01	03 E8	3B 10
Inverter address	Continuous writing command	Parameters address	Data number	Byte number	Forward running	10Hz	CRC check

If the response message is as below:

01	10	20 00	00 02	4A 08
Inverter address	Continuous writing command	Parameters address	Data number	CRC check

Example 2: set the ACC time of 01H inverter as 10s and the DEC time as 20s

P00.11	ACC time 1	ACC time means the time needed if the inverter speeds up from 0Hz to the Max. One (P00.03). DEC time means the time needed if the inverter speeds down from the Max. Output frequency to 0Hz (P00.03). Setting range of P00.11 and P00.12:0.0~3600.0s	Depend on model	○
P00.12	DEC time 1		Depend on model	○

The corresponding address of P00.11 is 000B, the ACC time of 10s corresponds to 0064H, and the DEC time of 20s corresponds to 00C8H.

The command sent to the inverter:

01	10	00 0B	00 02	04	00 64	00 C8	F2 55
Inverter address	Continuous writing command	Parameters address	Data number	Byte number	10s	20s	CRC check

If the response message is as below:

01	10	00 0B	00 02	30 0A
Inverter address	Continuous writing command	Parameters address	Data number	CRC check

Note: The space between above commands is for instruction and there is no space between the commands during actual applications.

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A.1 What this chapter contains

This chapter contains the technical specifications of the inverter, as well as provisions for fulfilling the requirements for CE and other marks.

A.2 Ratings

A.2.1 Capacity

Inverter sizing is based on the rated motor current and power. To achieve the rated motor power reference in the table, the rated current of the inverter must be higher than or equal to the rated motor current. Also the rated power of the inverter must be higher than or equal to the rated motor power. The power ratings are the same regardless of the supply voltage within one voltage range.

Note:

1. The maximum allowed motor shaft power is limited to 1.5 · PN. If the limit is exceeded, motor torque and current are automatically restricted. The function protects the input bridge of the drive against overload.

2. The ratings apply at ambient temperature of 40 °C

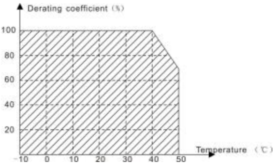
3. It is important to check that in Common DC systems the power flowing through the common DC connection does not exceed PN.

A.2.2 Derating

The load capacity decreases if the installation site ambient temperature exceeds 40 °C, the altitude exceeds 1000 meters or the switching frequency is changed from 4 kHz to 8, 12 or 15 kHz.

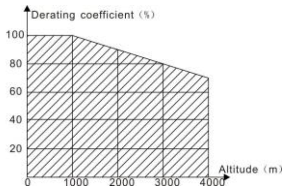
A.2.2.1 Temperature derating

In the temperature range +40 °C…+50 °C, the rated output current is decreased by 3% for every additional 1 °C. Refer to the below list for the actual derating.



A.2.2.2 Altitude derating

The device can output rated power if the installation site below 1000m. The output power decreases if the altitude exceeds 1000 meters. Below is the detailed decreasing range of the derating:



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For 3-phase 200 V drives, the maximum altitude is 3000m above sea level. In altitudes 2000…3000 m, the derating is 1% for every 100 m.

A.2.2.3 Carrier frequency derating

For TETA MA610 series inverters, different power level corresponds to different carrier frequency range. The rated power of the inverter is based on the factory carrier frequency, so if it is above the factory value, the inverter needs to derate 20% for every additional 1 kHz carrier frequency.

A.3 Electric power network specification

Voltage	AC 3PH 220(-15%)~240(+10%) AC 3PH 380(-15%)~440(+10%) AC 3PH 520(-15%)~690(+10%)
Short-circuit capacity	Maximum allowed prospective short-circuit current at the input power connection as defined in IEC 60439-1 is 100 kA. The drive is suitable for use in a circuit capable of delivering not more than 100 kA at the drive maximum rated voltage.
Frequency	50/60 Hz ± 5%, maximum rate of change 20%/s

A.4 Motor connection data

Motor type	Asynchronous inductance motor
Voltage	0 to U1, 3-phase symmetrical, Um ax at the field weakening point
Short-circuit protection	The motor output is short-circuit proof by IEC 61800-5-1
Frequency	0...400 Hz
Frequency resolution	0.01 Hz
Current	Refer to Ratings
Power limit	1.5 · PN
Field weakening point	10...400 Hz
Carrier frequency	4, 8, 12 or 15 kHz

A.4.1 EMC compatibility and motor cable length

To comply with the European EMC Directive (standard IEC/EN 61800-3), use the following maximum motor cable lengths for 4 kHz switching frequency.

All frame	Maximum motor cable length, 4 kHz
Second environment (category C3)	30
first environment (category C2)	30

Maximum motor cable length is determined by the drive’s operational factors. Contact your local representative for the exact maximum lengths when using external EMC filters.

A.5 Applicable standards

The inverter complies with the following standards:

EN ISO 13849-1: 2008	Safety of machinery-safety related parts of control systems - Part 1: general principles for design
IEC/EN 60204-1:2006	Safety of machinery. Electrical equipment of machines. Part 1: General requirements.
IEC/EN 62061: 2005	Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems
IEC/EN 61800-3:2004	Adjustable speed electrical power drives systems. Part 3: EMC requirements and specific test methods
IEC/EN 61800-5-1:2007	Adjustable speed electrical power drive systems – Part 5-1: Safety requirements – Electrical, thermal and energy
IEC/EN 61800-5-2:2007	Adjustable speed electrical power drive systems – Part 5-2: Safety requirements. Functional.

A.5.1 CE marking

The CE mark is attached to the drive to verify that the drive follows the provisions of the European Low Voltage (2006/95/EC) and EMC Directives (2004/108/EC).

A.5.2 Compliance with the European EMC Directive

The EMC Directive defines the requirements for immunity and emissions of electrical equipment used within the European Union. The EMC product standard (EN 61800-3:2004) covers requirements stated for drives. See section EMC regulations

A.6 EMC regulations

EMC product standard (EN 61800-3:2004) contains the EMC requirements to the inverter. First environment: domestic environment (includes establishments connected to a low-voltage network which supplies buildings used for domestic purposes).
Second environment includes establishments connected to a network not directly supplying domestic premises.
Four categories of the inverter:
Inverter of category C1: inverter of rated voltage less than 1000 V and used in the first environment.
Inverter of category C2: inverter of rated voltage less than 1000 V other than pins, sockets and motion devices and intended to be installed and commissioned only by a professional electrician when used in the first environment.
Note: IEC/EN 61800-3 in EMC standard doesn't limit the power distribution of the inverter, but it defines the step, installation and commission. The professional electrician has necessary skills in installing and/or commissioning power drive systems, including their EMC aspects.
Inverter of category C3: inverter of rated voltage less than 1000 V and used in the second environment other than the first one.
Inverter of category C4: inverter of rated voltage more than 1000 V or the rated current is above or equal to 400A and used in the complicated system in second environment.

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A.6.1 Category C2

The emission limits are complied with the following provisions:

1. The optional EMC filter is selected according to the options and installed as specified in the EMC filter manual.
2. The motor and control cables are selected as specified in this manual.
3. The drive is installed according to the instructions reference in this manual.
4. For the maximum motor cable length with 4 kHz switching frequency, see **EMC compatibility and motor cable length**

	In a domestic environment, this product may cause radio inference, in which case supplementary mitigation measures may be required.

A.6.2 Category C3

The immunity performance of the drive complies with the demands of IEC/EN 61800-3, second environment.

The emission limits are complied with the following provisions:

1. The optional EMC filter is selected according to the options and installed as specified in the EMC filter manual.
2. The motor and control cables are selected as specified in this manual.
3. The drive is installed according to the instructions reference in this manual.
4. For the maximum motor cable length with 4 kHz switching frequency, see **EMC compatibility and motor cable length**

	A drive of category C3 is not intended to be used on a low-voltage public network which supplies domestic premises. Radio frequency interference is expected if the drive is used on such a network.

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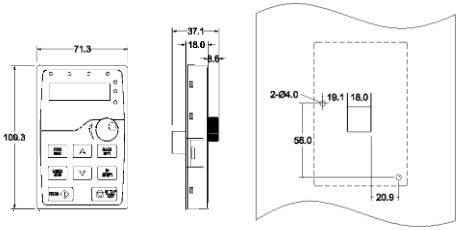
B.1 What this chapter contains

Dimension drawings of the TETA MA610 are shown below. The dimensions are reference in millimeters and inches.

B.2 Keypad structure

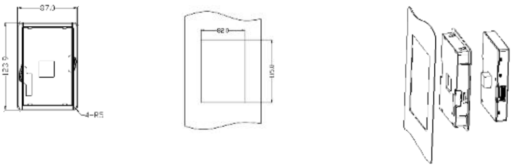
B.2.1 Structure chart



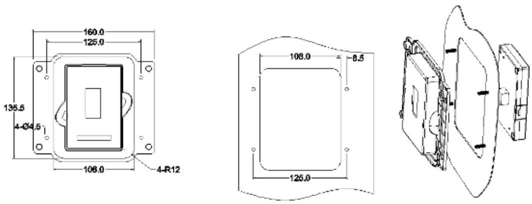
keyboard without bracket mounting hole size

B.2.2 Installation chart

Note: The external keypad can be fix by M3 screws directly or the installation bracket. The installation bracket for inverters of 0.75~30kW is optional and the installtaion bracket for inverters of 37~500kW is optional or substitutive by the external standard one.



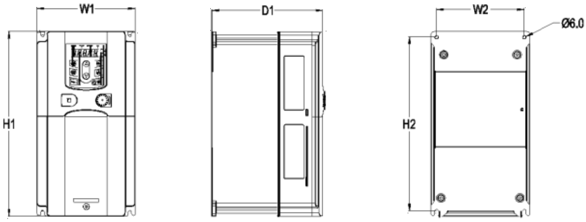
Installation bracket of the key (0.75~500kW)(optional)



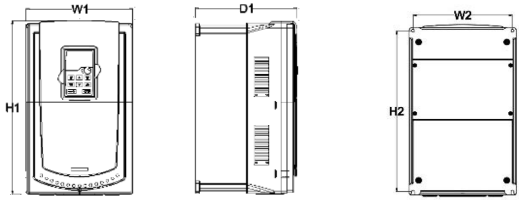
Installation bracket of the key (37~500kW)(standard)

B.3 Inverter chart

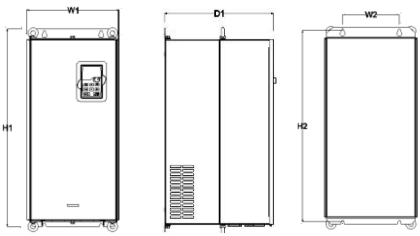
B.3.1 Wall mounting



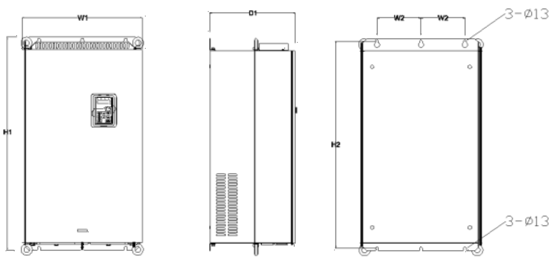
0.75-15kW wall mounting



18.5-30kW wall mounting



37-110kW wall mounting



132-20kW wall mounting

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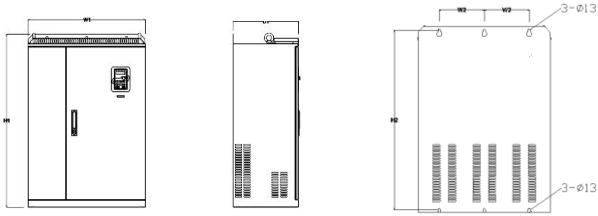
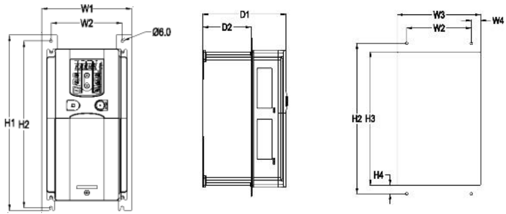


220-315kW wall mounting

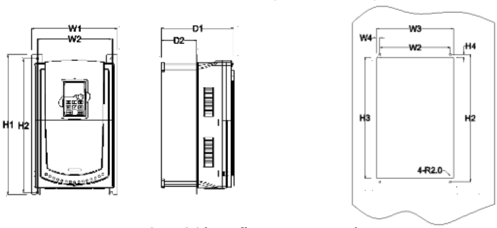
Installation dimension (unit: mm)

Model	W1	W2	H1	H2	D1	Installation hole
0.75kW ~2.2kW	126	115	186	175	174.5	5
4kW ~5.5kW	146	131	256	243.5	181	6
7.5kW ~15kW	170	151	320	303.5	216	6
18.5kW	230	210	342	311	216	6
22kW ~30kW	255	237	407	384	245	7
37kW ~55kW	270	130	555	540	325	7
75kW ~110kW	325	200	680	661	365	9.5
132kW ~200kW	500	180	870	850	360	11
220kW ~315kW	680	230	960	926	379.5	13

B.3.2 Flange mounting



0.75-15kW flange mounting



18.5-30kW flange mounting

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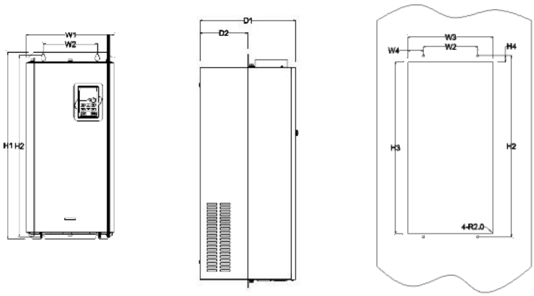
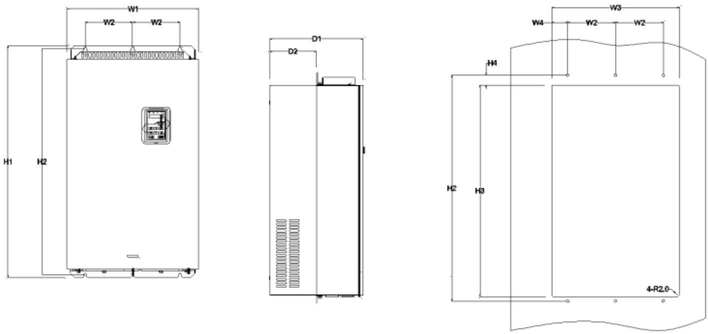


37-110kW flange mounting



132-200kW flange mounting

Installation dimension (unit: mm)

Model	W1	W2	W3	W4	H1	H2	H3	H4	D1	D2	Installation hole
0.75kW~2.2kW	150.2	115	130	7.5	234	220	190	13.5	155	65.5	5
4kW~5.5kW	170.2	131	150	9.5	292	276	260	6	167	84.5	6
7.5kW~15kW	191.2	151	174	11.5	370	351	324	12	196.3	113	6
18.5kW	250	210	234	12	375	356	334	10	216	108	6
22kW~30kW	275	237	259	11	445	426	404	10	245	119	7
37kW~55kW	270	130	261	65.5	555	540	516	17	325	167	7
75kW~110kW	325	200	317	58.5	680	661	626	23	363	182	9.5
132kW~200kW	500	180	480	60	870	850	796	37	358	178.5	11

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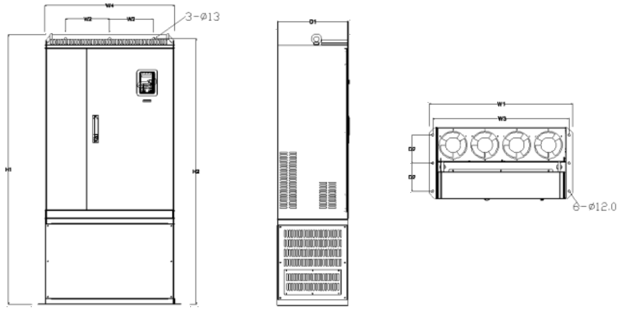
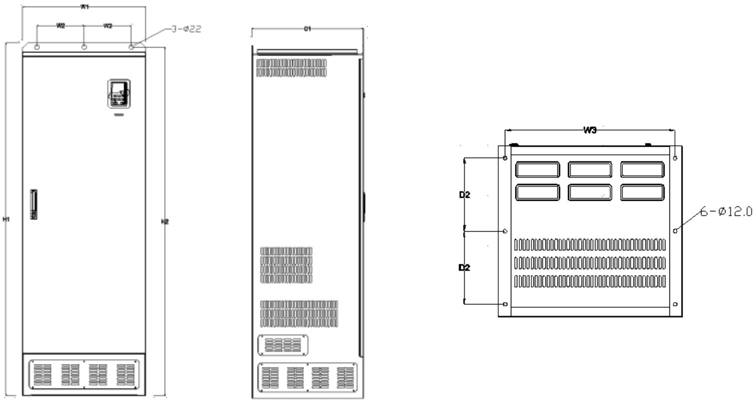
B.3.3 Floor mounting



220-315kW floor mounting



50-500kW floor mounting

Model	W1	W2	W3	W4	H1	H2	D1	D2	Installation hole
220kW ~315kW	750	230	714	680	1410	1390	380	150	13\12
350kW ~500kW	620	230	573	\	1700	1678	560	240	22\12

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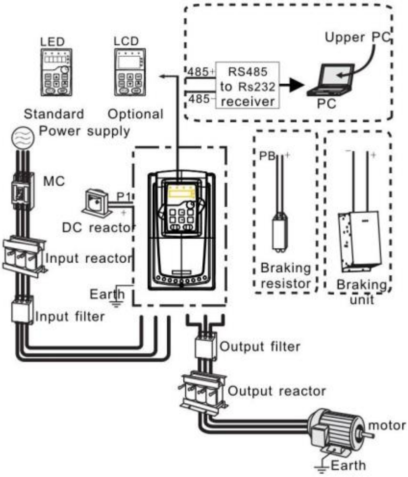
C.1 What this chapter contains

This chapter describes how to select the options and parts of TETA MA610 series.

C.2 Peripheral wiring

Below is the peripheral wiring of TETA MA610 series inverters.



Note:

1. The inverters (≤15kW) have standard film keypad and the inverters (≥18.5kW) have standard LED keypad.

2· The inverter below 30kW (including 30kW) are embedded with braking unit.

3. Only the inverter above 37kW (including 37kW) have P1 terminal and are connected with DC reactors.

4. The braking units apply standard braking unit DBU series in. Refer to the instruction of DBU for detailed information.

Pictures	Name	Descriptions
	Cables	Device to transfer the electronic signals
	Breaker	Prevent from electric shock and protect the power supply and the cables system from overcurrent when short circuits occur. (Please select the breaker with the function of reducing high order harmonic and the rated sensitive current to 1 inverter should be above 30mA).

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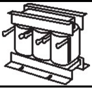
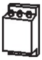
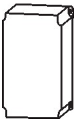
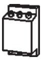
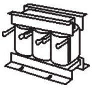
Pictures	Name	Descriptions
	Input reactor	This device is used to improve the power factor of the input side of the inverter and control the higher harmonic current. The inverter above 37kW (including 37kW) can be connected with DC reactor.
	DC reactor	
	Input filter	Control the electromagnetic interference generated from the inverter, please install close to the input terminal side of the inverter.
 or 	Braking unit or resistors	Shorten the DEC time The inverters below 30kW (including 30kW) only need braking resistors and the inverters above 37kW (including 37 kW) need braking units
	Output filter	Control the interference from the output side of the inverter and please install close to the output terminals of the inverter.
	Output reactor	Prolong the effective transmitting distance of the inverter to control the sudden high voltage when switching on/off the IGBT of the inverter.

C.3 Power supply

Please refer to **Electronical Installation**.

	**Check that the voltage degree of the inverter complies with the voltage of the supply power voltage.**

C.4 Cables

C.4.1 Power cables

Dimension the input power and motor cables according to local regulations.

- The input power and the motor cables must be able to carry the corresponding load currents.
- The cable must be rated for at least 70 °C maximum permissible temperature of the conductor in continuous use.
- The conductivity of the PE conductor must be equal to that of the phase conductor (same cross-sectional area).
- Refer to chapter **Technical Data** for the EMC requirements.

A symmetrical shielded motor cable (see the figure below) must be used to meet the EMC requirements of the CE.

A four-conductor system is allowed for input cabling, but a shielded symmetrical cable is

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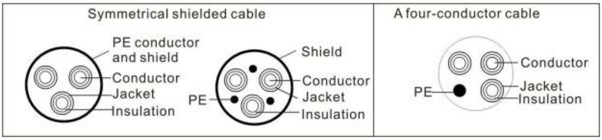
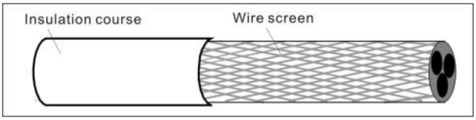
recommended. Compared to a four-conductor system, the use of a symmetrical shielded cable reduces electromagnetic emission of the whole drive system as well as motor bearing currents and wear.



Note: A separate PE conductor is required if the conductivity of the cable shield is not sufficient for the purpose.

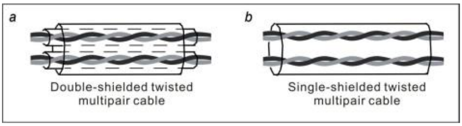
To function as a protective conductor, the shield must have the same cross-sectional area as the phase conductors when they are made of the same metal.

To effectively suppress radiated and conducted radio-frequency emissions, the shield conductivity must be at least 1/10 of the phase conductor conductivity. The requirements are easily met with a copper or aluminum shield. The minimum requirement of the motor cable shield of the drive is shown below. It consists of a concentric layer of copper wires. The better and tighter the shield, the lower the emission level and bearing currents.



C.4.2 Control cables

All analog control cables and the cable used for the frequency input must be shielded. Use a double-shielded twisted pair cable (Figure a) for analog signals. Employ one individually shielded pair for each signal. Do not use common return for different analog signals.



A double-shielded cable is the best alternative for low-voltage digital signals, but a single-shielded or unshielded twisted multi-pair cable (Figure b) is also usable. However, for frequency input, always use a shielded cable.

The relay cable needs the cable type with braided metallic screen.

The keypad needs to connect with cables. It is recommended to use the screen cable on complex electrical magnetic condition.

Note: Run analog and digital signals in separate cables.

Do not make any voltage tolerance or insulation resistance tests (for example hi-pot or megger) on any part of the drive as testing can damage the drive. Every drive has been tested for insulation between the main circuit and the chassis at the factory. Also, there are voltage-limiting circuits inside the drive which cut down the testing voltage automatically. Check the insulation of the input power cable according to local regulations before

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connecting to the drive.

Note: Check the insulation of the input power cables according to local regulations before connecting the cables.

The inverter	Recommended cable size(mm^2)				Screw	
	R,S,T U,V,W	PE	P1(+)	PB(+)(-)	Terminal screw size	Tightening torque (Nm)
MA610 -0R7G-4	2.5	2.5	2.5	2.5	M4	1.2~1.5
MA610 -1R5G-4	2.5	2.5	2.5	2.5	M4	1.2~1.5
MA610 -2R2G-4	2.5	2.5	2.5	2.5	M4	1.2~1.5
MA610 -004G/5R5P-4	2.5	2.5	2.5	2.5	M4	1.2~1.5
MA610 -5R5G/7R5P-4	4	4	2.5	2.5	M5	2~2.5
MA610 -7R5G/011P-4	6	6	4	2.5	M5	2~2.5
MA610 -011G/015P-4	10	10	6	4	M5	2~2.5
MA610 -015G/018P-4	10	10	10	4	M5	2~2.5
MA610 -018G/022P-4	16	16	10	6	M6	4~6
MA610 -022G/030P-4	25	16	16	10	M6	4~6
MA610 -030G/037P-4	25	16	16	10	M8	9~11
MA610 -037G/045P-4	35	16	25	16	M8	9~11
MA610 -045G/055P-4	50	25	35	25	M8	9~11
MA610 -055G/075P-4	70	35	50	25	M10	18~23
MA610 -075G/090P-4	95	50	70	35	M10	18~23
MA610 -090G/110P-4	120	70	95	35	M10	18~23
MA610 -110G/132P-4	150	70	120	70	M12	31~40
MA610 -132G/160P-4	185	95	150	95	M12	31~40
MA610 -160G/185P-4	240	95	185	50	M12	31~40
MA610 -185G/200P-4	120*2P	150	95*2P	50	M12	31~40
MA610 -200G/220P-4	120*2P	150	95*2P	50	M12	31~40
MA610 -220G/250P-4	150*2P	150	95*2P	50	M12	31~40
MA610 -250G/280P-4	150*2P	150	120*2P	95	M12	31~40
MA610 -280G/315P-4	185*2P	185	120*2P	95	M12	31~40
MA610 -315G/350P-4	185*2P	185	120*2P	95	M12	31~40
MA610 -350G/400P-4	95*4P	95*2P	150*2P	120	M12	31~40
MA610 -400G-4	95*4P	95*2P	150*2P	120	M12	31~40
MA610 -500G-4	120*4P	95*2P	95*4P	120	M12	31~40

Note:

1. It is appropriate to use the recommended cable size under 40℃ and rated current. The wiring distance should be no more than 100m.
2. Terminals P1, (+), PB and (-) connects the DC reactor options and parts.

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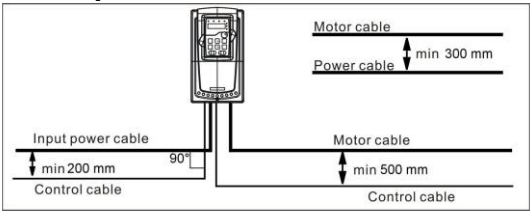
C.4.3 Routing the cables

Route the motor cable away from other cable routes. Motor cables of several drives can be run in parallel installed next to each other. It is recommended that the motor cable, input power cable and control cables are installed on separate trays. Avoid long parallel runs of motor cables with other cables to decrease electromagnetic interference caused by the rapid changes in the drive output voltage.

Where control cables must cross power cables make sure that they are arranged at an angle as near to 90 degrees as possible.

The cable trays must have good electrical bonding to each other and to the grounding electrodes. Aluminum tray systems can be used to improve local equalizing of potential.

A figure of the cable routing is shown below.



C.4.4 Checking the insulation

Check the insulation of the motor and motor cable as follows:

1. Check that the motor cable is connected to the motor and disconnected from the drive output terminals U, V and W.
2. Measure the insulation resistance between each phase conductor and the Protective Earth conductor using a measuring voltage of 500 V DC. For the insulation resistance of other motors, please consult the manufacturer’s instructions.

Note: Moisture inside the motor casing will reduce the insulation resistance. If moisture is suspected, dry the motor and repeat the measurement.

C.5 Breaker, electromagnetic contactor and leakage protection switch

Due to the inverter output high frequency PWM voltage waveform, and the existance of distributed capacitance between IGBT and heatsink in internal inverter and the distributed capacitance between motor stator and rotor will cause the inverter inevitably generate high-frequency leakage current to ground. The high-frequency leakage current will back flow to grid through the earth to interference the leakage protection switch, thus causing the leakage protection switch malfunction. This is due to the inverter output voltage characteristics inherent in the decision.

To ensure the stability of the system, it is recommended to use the inverter dedicated leakage protection switch which rated residual operation current 30mA or more(for example, corresponds to IEC60755 Type B). If you are not using the inverter dedicated leakage protection switch caused by malfunction, try to reduce the carrier frequency, or replace the electromagnetic leakage protection switch which rated residual operating current of 200mA

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or more.

It is necessary to add fuse for the avoidance of overload.

It is appropriate to use a breaker (MCCB) which complies with the inverter power in the 3-phase AC power and input power and terminals (R,S and T). The capacity of the inverter should be 1.5-2 times of the rated current.

⚠	**Due to the inherent operating principle and construction of circuit breakers, independent of the manufacturer, hot ionized gases may escape from the breaker enclosure in case of a short-circuit. To ensure safe use, special attention must be paid to the installation and placement of the breakers. Follow the manufacturer's instructions.**

Inverter	Breaker (A)	Fuse (A)	Rated current of the reactor (A)
MA610 -0R7G-4	10	16	12
MA610 -1R5G-4	10	16	12
MA610 -2R2G-4	16	16	12
MA610 -004G/5R5P-4	16	25	12
MA610 -5R5G/7R5P-4	25	32	25
MA610 -7R5G/011P-4	40	40	25
MA610 -011G/015P-4	50	50	40
MA610 -015G/018P-4	63	63	40
MA610 -018G/022P-4	63	80	50
MA610 -022G/030P-4	80	100	65
MA610 -030G/037P-4	100	125	80
MA610 -037G/045P-4	125	160	95
MA610 -045G/055P-4	160	160	115
MA610 -055G/075P-4	160	200	150
MA610 -075G/090P-4	250	250	185
MA610 -090G/110P-4	250	315	225
MA610 -110G/132P-4	315	315	265
MA610 -132G/160P-4	350	400	330
MA610 -160G/185P-4	400	500	400
MA610 -185G/200P-4	500	630	500
MA610 -200G/220P-4	500	630	500
MA610 -220G/250P-4	630	630	500
MA610 -250G/280P-4	630	800	630
MA610 -280G/315P-4	700	800	630
MA610 -315G/350P-4	800	1000	780
MA610 -350G/400P-4	800	1000	780
MA610 -400G-4	1000	1250	780
MA610 -500G-4	1200	1250	980

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C.6 Reactors

If the distance between the inverter and the motor is longer than 50m, frequent overcurrent protection may occur to the inverter because of high leakage current caused by parasitic capacitance effects from the long cables to the ground. In order to avoid the damage of the motor insulation, it is necessary to add reactor compensation.

The power of the inverter	Input reactor	DC reactor	Output reactor
MA610 -0R7G-4	ACL2-1R5-4	/	OCL2-1R5-4
MA610 -1R5G-4	ACL2-1R5-4	/	OCL2-1R5-4
MA610 -2R2G-4	ACL2-2R2-4	/	OCL2-2R2-4
MA610 -004G/5R5P-4	ACL2-004-4	/	OCL2-004-4
MA610 -5R5G/7R5P-4	ACL2-5R5-4	/	OCL2-5R5-4
MA610 -7R5G/011P-4	ACL2-7R5-4	/	OCL2-7R5-4
MA610 -011G/015P-4	ACL2-011-4	/	OCL2-011-4
MA610 -015G/018P-4	ACL2-015-4	/	OCL2-015-4
MA610 -018G/022P-4	ACL2-018-4	/	OCL2-018-4
MA610 -022G/030P-4	ACL2-022-4	/	OCL2-022-4
MA610 -030G/037P-4	ACL2-030-4	/	OCL2-030-4
MA610 -037G/045P-4	ACL2-037-4	DCL2-037-4	OCL2-037-4
MA610 -045G/055P-4	ACL2-045-4	DCL2-045-4	OCL2-045-4
MA610 -055G/075P-4	ACL2-055-4	DCL2-055-4	OCL2-055-4
MA610 -075G/090P-4	ACL2-075-4	DCL2-075-4	OCL2-075-4
MA610 -090G/110P-4	ACL2-090-4	DCL2-090-4	OCL2-090-4
MA610 -110G/132P-4	ACL2-110-4	DCL2-110-4	OCL2-110-4
MA610 -132G/160P-4	ACL2-132-4	DCL2-132-4	OCL2-132-4
MA610 -160G/185P-4	ACL2-160-4	DCL2-160-4	OCL2-160-4
MA610 -185G/200P-4	ACL2-200-4	DCL2-200-4	OCL2-200-4
MA610 -200G/220P-4	ACL2-200-4	DCL2-200-4	OCL2-200-4
MA610 -220G/250P-4	ACL2-250-4	DCL2-250-4	OCL2-250-4
MA610 -250G/280P-4	ACL2-250-4	DCL2-250-4	OCL2-250-4
MA610 -280G/315P-4	ACL2-280-4	DCL2-280-4	OCL2-280-4
MA610 -315G/350P-4	ACL2-315-4	DCL2-315-4	OCL2-315-4
MA610 -350G/400P-4	Standard	DCL2-350-4	OCL2-350-4
MA610 -400G-4	Standard	DCL2-400-4	OCL2-400-4
MA610 -500G-4	Standard	DCL2-500-4	OCL2-500-4

Note:

1. The rated derate voltage of the input reactor is 2%±15%.

2. The power factor of the input side is above 90% after adding DC reactor.

3. The rated derate voltage of the output reactor is 1%±15%.

4. Above options are external, the customer should indicate when purchasing.

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C.7 Filters

The inverter	Input filter	Output filter
MA610 -0R7G-4	FLT-P04006L-B	FLT-L04006L-B
MA610 -1R5G-4		
MA610 -2R2G-4		
MA610 -004G/5R5P-4	FLT-P04016L-B	FLT-L04016L-B
MA610 -5R5G/7R5P-4		
MA610 -7R5G/011P-4	FLT-P04032L-B	FLT-L04032L-B
MA610 -011G/015P-4		
MA610 -015G/018P-4	FLT-P04045L-B	FLT-L04045L-B
MA610 -018G/022P-4		
MA610 -022G/030P-4	FLT-P04065L-B	FLT-L04065L-B
MA610 -030G/037P-4		
MA610 -037G/045P-4	FLT-P04100L-B	FLT-L04100L-B
MA610 -045G/055P-4		
MA610 -055G/075P-4	FLT-P04150L-B	FLT-L04150L-B
MA610 -075G/090P-4		
MA610 -090G/110P-4	FLT-P04240L-B	FLT-L04240L-B
MA610 -110G/132P-4		
MA610 -132G/160P-4		
MA610 -160G/185P-4	FLT-P04400L-B	FLT-L04400L-B
MA610 -185G/200P-4		
MA610 -200G/220P-4		

The inverter	Input filter	Output filter
MA610 -220G/250P-4	FLT-P04600L-B	FLT-L04600L-B
MA610 -250G/280P-4		
MA610 -280G/315P-4		
MA610 -315G/350P-4	FLT-P04800L-B	FLT-L04800L-B
MA610 -350G/400P-4		
MA610 -400G-4		
MA610 -500G-4	FLT-P041000L-B	FLT-L041000L-B

Note: The input EMI meet the requirement of C2 after adding input filters.

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C.8 Braking system

C.8.1 Select the braking components

It is appropriate to use braking resistor or braking unit when the motor brakes sharply or the motor is driven by a high inertia load. The motor will become a generator if its actual rotating speed is higher than the corresponding speed of the reference frequency. As a result, the inertial energy of the motor and load return to the inverter to charge the capacitors in the main DC circuit. When the voltage increases to the limit, damage may occur to the inverter. It is necessary to apply braking unit/resistor to avoid this accident happens.

	Only qualified electricians are allowed to design, install, commission and operate on the inverter. **Follow the instructions in "warning" during working. Physical injury or death or serious property may occur.** **Only qualified electricians are allowed to wire. Damage to the inverter or braking options and part may occur. Read carefully the instructions of braking resistors or units before connecting them with the inverter.** **Do not connect the braking resistor with other terminals except for PB and (-). Do not connect the braking unit with other terminals except for (+) and (-). Damage to the inverter or braking circuit or fire may occur.**
	Connect the braking resistor or braking unit with the inverter according to the diagram. Incorrect wiring may cause damage to the inverter or other devices.

TETA MA610 series inverters below 30kW (including 30kW) need internal braking units and the inverters above 37kW need external braking unit. Please select the resistance and power of the braking resistors according to actual utilization.

Note:

Select the resistor and power according to the provided data.

The braking torque may increase because of the raising of braking resistor. The below table

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is calculated at 100% of the braking torque, 10%, 50% and 80%of the braking usage ratio. The user can select according to the actual working.

Refer to the operation instructions of braking units when using external units for right setting of voltage degree. Otherwise normal operation of the inverter may be impacted.

The inverter	Braking unit type	100% of braking rate (Ω)	The consumed power of the braking resistor			Mini Braking Resistor (Ω)
			10% braking	50% braking	80% braking	
MA610 -0R7G-4	Internal braking unit	653	0.1	0.6	0.9	240
MA610 -1R5G-4		326	0.23	1.1	1.8	170
MA610 -2R2G-4		222	0.33	1.7	2.6	130
MA610 -004G/5R5P-4		122	0.6	3	4.8	80
MA610 -5R5G/7R5P-4		89	0.75	4.1	6.6	60
MA610 -7R5G/011P-4		65	1.1	5.6	9	47
MA610 -011G/015P-4		44	1.7	8.3	13.2	31
MA610 -015G/018P-4		32	2	11	18	23
MA610 -018G/022P-4		27	3	14	22	19
MA610 -022G/030P-4		22	3	17	26	17
MA610 -030G/037P-4		16	5	23	36	17
MA610 -037G/045P-4	DBU100H-060-4	13	6	28	44	11.7
MA610 -045G/055P-4	DBU100H-110-4	10	7	34	54	6.4
MA610 -055G/075P-4		8	8	41	66	
MA610 -075G/090P-4		6.5	11	56	90	
MA610 -090G/110P-4	DBU100H-160-4	5.4	14	68	108	4.4
MA610 -110G/132P-4		4.5	17	83	132	
MA610 -132G/160P-4	DBU100H-220-4	3.7	20	99	158	3.2
MA610 -160G/185P-4	DBU100H-320-4	3.1	24	120	192	2.2
MA610 -185G/200P-4		2.8	28	139	222	
MA610 -200G/220P-4		2.5	30	150	240	
MA610 -220G/250P-4	DBU100H-400-4	2.2	33	165	264	1.8
MA610 -250G/280P-4		2.0	38	188	300	
MA610 -280G/315P-4	Two DBU100H-320-4	3.6*2	21*2	105*2	168*2	2.2*2
MA610 -315G/350P-4		3.2*2	24*2	118*2	189*2	
MA610 -350G/400P-4		2.8*2	27*2	132*2	210*2	
MA610 -400G-4		2.4*2	30*2	150*2	240*2	
MA610 -500G-4	Two DBU100H-400-4	2*2	38*2	186*2	300*2	1.8*2

Never use a brake resistor with a resistance below the minimum value specified for the particular drive. The drive and the internal chopper are not able to handle the overcurrent caused by the low resistance.

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⚠	**Increase the power of the braking resistor properly in the frequent braking situation (the frequency usage ratio is more than 10%).**

C.8.2 Select the brake resistor cables

Use a shielded cable to the resistor cable.

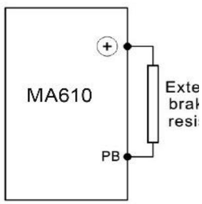
C.8.3 Place the brake resistor

Install all resistors in a place where they will cool.

⚠	**The materials near the brake resistor must be non-flammable. The surface temperature of the resistor is high. Air flowing from the resistor is of hundreds of degrees Celsius. Protect the resistor against contact.**

Installation of the braking resistor:

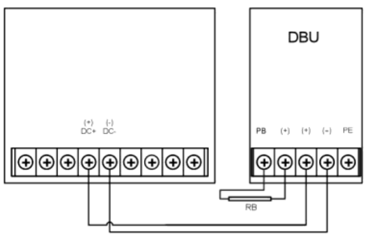
⚠	**The inverters below 30kW (including 30kW) only needs external braking resistors.** **PB and (+) are the wiring terminals of the braking resistors.**



Installation of braking units:

⚠	**The inverters above 37kW (including 370kW) only needs external braking units.** **(+), (-) are the wiring terminals of the braking units.** **The wiring length between the (+),(-) terminals of the inverter and the (+),(-) terminals of the braking units should be no more than 5m,and the distributing length among BR1 and BR2 and the braking resistor terminals should be no more than 10m.**

Signal installation is as below:



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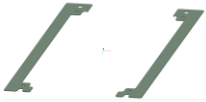
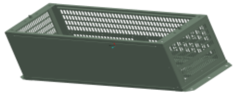
C.9 Other optional parts

No.	Optional part	Instruction	Picture
1	Flange installation bracket	Needed for the flange installation of 1.5~30kW inverters Not needed for the flange installation of 37~200kW inverters	
2	Installation base	Optimal for 220~315kW inverters An input AC/DC reactor and output AC reactor can be put in the base.	
3	Installation bracket	Use the screw or installation bracket to fix the external keypad. Optimal for 1.5~30kW inverters ands standard for 37~500kW inverters	
4	Side cover	Protect the internal circuit in serious environment. Derate when selecting the cover.	
5	LCD Keypad	Support several languages, parameters copy, high-definition display and the installation dimension is compatible with the LED keypad.	
6	LED keypad	0.75~15kW inverter optional.	

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Address any inquiries about the product to your local offices

D.2 Feedback on inverters manuals

Your comments on our manuals are welcome.

D.3 Document library on the internet

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This manual may be modified when necessary because of improvement of the product, modification, or changes in specifications, this manual is subject to change without notice

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INSTRUCTION MANUAL
使用说明书

FAMCO
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TETA INVERTER

200V Class

0.75 ~ 55 kw
1 ~ 75 HP

380V Class

0.75 ~ 185 kw
1 ~ 250 HP

TETA INVERTER

MA510 Series

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Preface

The MA510 product is an inverter designed to control a three-phase induction motor. Please read this manual carefully to ensure correct operation, safety and to become familiar with the inverter functions.

The MA510 inverter is an electrical / electronic product and must be installed and handled by qualified service personnel.

Improper handling may result in incorrect operation, shorter life cycle, or failure of this product as well as the motor.

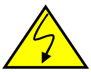
All MA510 documentation is subject to change without notice. Be sure to obtain the latest editions for use or visit our website at www.tetaelectric.com

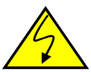
Available Documentation:

1. MA510 Start-up and Installation Manual
2. MA10 Instruction Manual

Read this instruction manual thoroughly before proceeding with installation, connections(wiring), operation, or maintenance and inspection.

Ensure you have sound knowledge of the inverter and familiarize yourself with all safety information and precautions before proceeding to operate the inverter.

Please pay close attention to the safety precautions indicated by the warning  and caution  symbol.

 **Warning**	Failure to ignore the information indicated by the warning symbol may result in death or serious injury.
 **Caution**	Failure to ignore the information indicated by the caution symbol may result in minor or moderate injury and/or substantial property damage.

FAMCO هایپرصنعت

Chapter 1 Safety Precaution

1.1 Before Supplying Power to the Inverter

Warning
The main circuit must be correctly wired. For single phase supply use input terminals (R/L1, T/L3) and for three phase supply use input terminals (R/L1, S/L2, T/L3). Terminals U/T1, V/T2, W/T3 must only be used to connect the motor. Connecting the input supply to any of the U/T1, V/T2 or W/T3 terminals will cause damage to the inverter.

Caution
To avoid the front cover from disengaging or other physical damage, do not carry the inverter by its cover. Support the unit by its heat sink when transporting. Improper handling can damage the inverter or injure personnel, and should be avoided. □ To avoid the risk of fire, do not install the inverter on or near flammable objects. Install on nonflammable objects such as metal surfaces. □ If several inverters are placed inside the same control panel, provide adequate ventilation to maintain the temperature below 40°C/104°F (50°C/122°F without a dust cover) to avoid overheating or fire. □ When removing or installing the digital operator, turn off the power first, and then follow the instructions in this manual to avoid operator error or loss of display caused by faulty connections.

Warning
□ This product is sold subject to IEC 61800-3. In a domestic environment this product may cause radio interference in which case the user may need to apply corrective measures. □ Over temperature protection function on motor is disabled.

1.2 Wiring

Warning

- Always turn OFF the power supply before attempting inverter installation and wiring of the user terminals.
- Wiring must be performed by a qualified personnel / certified electrician.
- Make sure the inverter is properly grounded. (200V Class: Grounding impedance shall be less than 100Ω. 400V Class: Grounding impedance shall be less than 10Ω.) It is required to disconnect the ground wire in the control board to avoid the sudden surge causing damage on electronic parts if it is improperly grounded.
- Please check and test emergency stop circuits after wiring. (Installer is responsible for the correct wiring.)
- Never touch any of the input or output power lines directly or allow any input or output power lines to come in contact with the inverter case.
- Do not perform a dielectric voltage withstand test (megger) on the inverter or this will result in inverter damage to the semiconductor components.

Caution

- The line voltage applied must comply with the inverter's specified input voltage.
- Connect braking resistor and braking unit to the designated terminals.
- Do not connect a braking resistor directly to the DC terminals P(+) and N(-), otherwise fire may result.
- Use wire gauge recommendations and torque specifications.
- Never connect input power to the inverter output terminals U/T1, V/T2, W/T3.
- Do not connect a contactor or switch in series with the inverter and the motor.
- Do not connect a power factor correction capacitor or surge suppressor to the inverter output。
- Ensure the interference generated by the inverter and motor does not affect peripheral devices.

FAMCO هاپیرصنعت

1.3 Before Operation

Warning
□ Reduce the carrier frequency (parameter P0-14) If the cable from the inverter to the motor is over 80 ft (25m). A high-frequency current can be generated by stray capacitance between the cables and result in an overcurrent trip of the inverter, an increase in leakage current, or an inaccurate current readout.
□ Be sure to install all covers before turning on power. Do not remove any of the covers while power to the inverter is on, otherwise electric shock may occur.
□ Do not operate switches with wet hands, otherwise electric shock may result.
□ Do not touch inverter terminals when energized even if inverter has stopped, otherwise electric shock may result.

1.4 Parameter Setting

Caution
□ Do not connect a load to the motor while performing an auto-tune.
□ Make sure the motor can freely run and there is sufficient space around the motor when performing a rotational auto-tune.

1.5 Operation

Warning

□ Do not connect or disconnect the motor during operation. This will cause the inverter to trip and may cause damage to the inverter.

□ Operations may start suddenly if an alarm or fault is reset with a run command active. Confirm that no run command is active upon resetting the alarm or fault, otherwise accidents may occur.

□ If automatic restart after power recovery (parameter P1-14) is enabled, the inverter will start automatically after power is restored.

□ Make sure it is safe to operate the inverter and motor before performing a rotational auto-tune.

□ Do not check signals on circuit boards while the inverter is running.

□ After the power is turned off, the cooling fan may continue to run for some time.

Caution

□ Do not touch heat-generating components such as heat sinks and braking resistors.

□ Carefully check the performance of motor or machine before operating at high speed, otherwise Injury may result.

□ Note the parameter settings related to the braking unit when applicable.

□ Do not use the inverter braking function for mechanical holding, otherwise injury may result.

□ Do not check signals on circuit boards while the inverter is running.

1.6 Maintenance, Inspection [illegible] nt

Warning

□ Wait a minimum of 5 minutes after power has been turned OFF before starting an inspection. Also confirm that the charge light is OFF and that the DC bus voltage has dropped below 25Vdc. Wait a minimum of 15 minutes while inverter is over 20HP.

□ Never touch high voltage terminals in the inverter.

□ Make sure power to the inverter is disconnected before disassembling the inverter.

□ Only authorized personnel should perform maintenance, inspection, and replacement operations. (Take off metal jewelry such as watches and rings and use insulated tools.)

Caution

□ The Inverter can be used in an environment with a temperature range from 14° - 104°F (-10 ~ 40°C) and relative humidity of 95% non-condensing.

□ The inverter must be operated in a dust, gas, mist and moisture free environment.

1.7 Disposal of the Inverter

Caution

□ Please dispose of this unit with care as an industrial waste and according to your required local regulations.

□ The capacitors of inverter main circuit and printed circuit board are considered as hazardous waste and must not be burned.

□ The Plastic enclosure and parts of the inverter such as the top cover board will release harmful gases if burned.

Chapter 2 Model Description

2.1 Nameplate Data

It is essential to verify the MA510 inverter nameplate and make sure that the MA510 inverter has the correct rating so it can be used in your application with the proper sized AC motor.

Unpack the MA510 inverter and check the following:

(1) The MA510 inverter and quick setting guide are contained in the package.

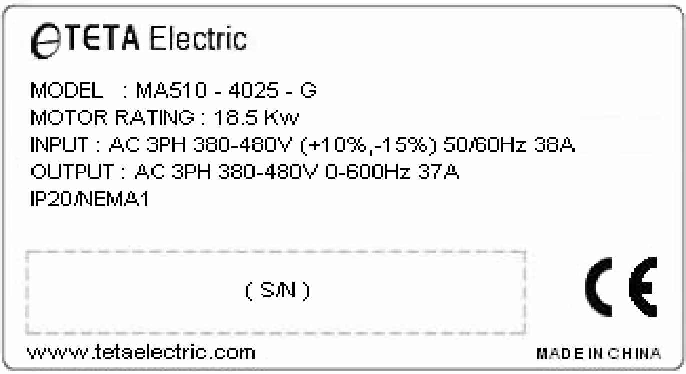
(2) The MA510 inverter has not been damaged during transportation there should be no dents or parts missing.

(3) The MA510 inverter is the type you ordered. You can check the type and specifications on the main nameplate.

(4) Check that the input voltage range meets the input power requirements.

(5) Ensure that the motor HP matches the motor rating of the inverter.

Model Identification



MA510 - 4 025

MA510 series

Voltage Rating:

2 : 220 v

4 : 380 v

Motor Rating:

001 : 1HP

025 : 25HP

050 : 50HP

2.2 Inverter Models-Motor P

Model Number	Input Voltage	Rated Power (kw)	Rated input current (A)	Rated output current (A)	Compatible Motor (HP)
MA510-2001	3-phase 220V -+ 15%	0.75	5	4.5	1
MA510-2002		1.5	7.7	7	2
MA510-2003		2.2	11	10	3
MA510-2005		4	17	16	5
MA510-2008		5.5	21	20	7.5
MA510-2010		7.5	31	30	10
MA510-2015		11	43	42	15
MA510-2020		15	56	55	20
MA510-2025		18.5	71	70	25
MA510-2030		22	81	80	30
MA510-2040		30	112	110	40
MA510-2050		37	132	130	50
MA510-2060		45	163	160	60
MA510-2075		55	181	190	75
MA510-4001	3-phase 380V -+ 15%	0.75	3.4	2.5	1
MA510-4002		1.5	5	3.7	2
MA510-4003		2.2	5.8	5	3
MA510-4005		4	10	9	5
MA510-4008		5.5	15	13	7.5
MA510-4010		7.5	20	17	10
MA510-4015		11	26	25	15
MA510-4020		15	35	32	20
MA510-4025		18.5	38	37	25
MA510-4030		22	46	45	30

Model Number	Input Voltage	Power	Rated input current	Rated output current	Compatible Motor
MA510-4040	3-phase 380V -+ 15%	30	62	60	40
MA510-4050		37	76	75	50
MA510-4060		45	90	90	60
MA510-4075		55	105	110	75
MA510-4100		75	140	150	100
MA510-4125		90	160	176	125
MA510-4150		110	210	210	150
MA510-4175		132	240	250	175
MA510-4215		160	290	300	215
MA510-4250		185	330	340	250

Chapter 3 Environment and Installation

3.1 Environment

The installing environment of the inverter directly affects its functions and the service life. Therefore, the installation environment must meet the following conditions:

Applicable environment	
Operating Temperature	(-10~40° C) (With the dust-protection cover open, the applicable operation temperature (-10~50° C) (full load) can reach maximum of 60° C) . But it is required to de-rating 2% of the rated current for increasing one degree. For multiple inverters installed side by side in the plate, please pay attention to the placement to facilitate heat
Storage Temperature	(-20~70C)
Humidity	RH should be 5% to 95%, free of condensation or water droplets.
Shock	Maximum acceleration:1.2G (12m/s2), from 49.84 to 150 Hz Displacement amplitude : 0.3mm (peak value), from 10 to 49.84 Hz

3.2 Installation

Installation site

The product shall be installed in the environment for easy operation, avoiding to be exposed to the following environments:

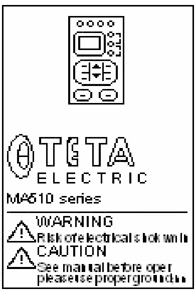
- Avoid direct sunlight
- Avoid rain drops or wet environment
- Avoid oil mist and salt erosion
- Avoid corrosive liquid and gas
- Avoid dust, lint fibers, and small metal filings.
- Avoid electromagnetic interference (soldering machine, power machine)
- Keep away from radioactive and flammable materials
- Avoid vibration (punch). Please add a vibration-proof pad to reduce vibration if it can not be avoided

3.2.1 Installation Spaces

Please install the MA510 inverter in vertical direction, leaving enough space to ensure the cooling effect, shown in below Figure. Avoid the upside-down or horizontal installation.

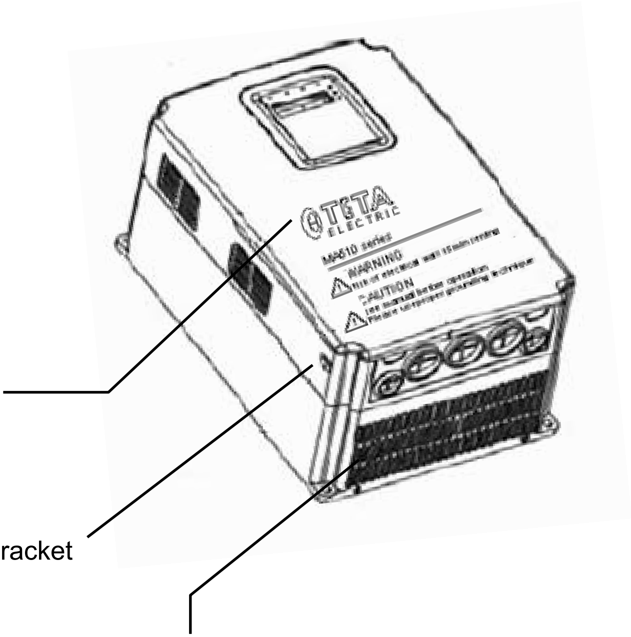
The temperature of inverter's radiator cooling may reach 90 ° C in operation. Therefore, the contact surface for the inverter installation shall be made by the hightemperature-resistant material.

When the inverter is operating in the power distribution box, the environment must be ventilated and the environmental temperature must be less than +40 ° C.

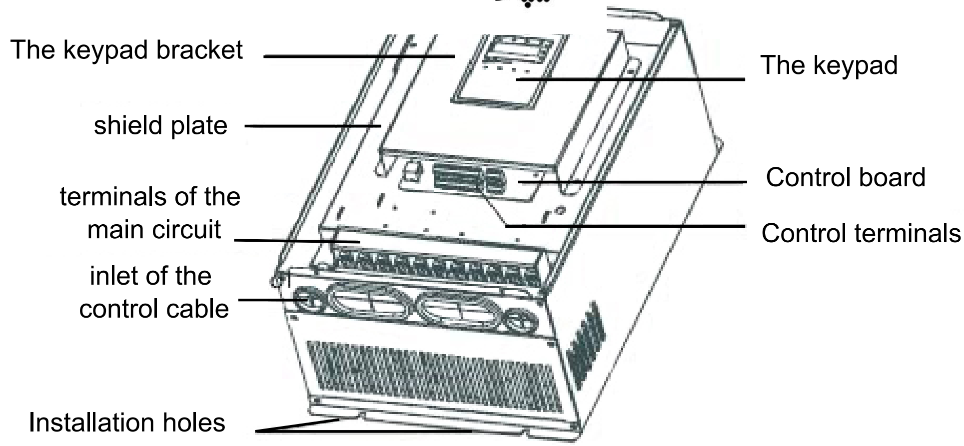


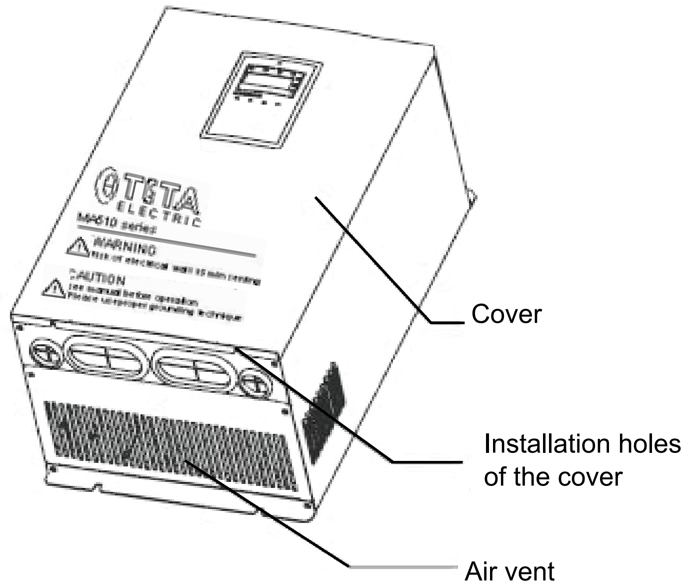
Up / Down	please leave 150mm
Left Right side	for the inverter capacity of 18.5kW (including the smaller Kw),the minimum width recommended is 100mm. for the inverter capacity of 22 kW (including the higher Kw), the minimum width recommended is 200mm.

3.2.2 External View and part



for capacities below 25 HP





for capacities above(and include) 25 HP

3.2.3 Unpacking inspection

Caution

□ Don't install or use any inverter that is damaged or has fault parts, otherwise physical injury may occur.

check the following items after unpacking the inverter

1. Inspect the entire exterior of the inverter and motor to ensure there are no scratches or other damage caused by the transportation
2. Ensure there is operation manual in the packing box
3. Inspect the name plate and ensure it is what you ordered.
4. Ensure the optional parts are what you need if you have ordered ones.

Please contact the local agent if there is any damage to the inverter or optional parts.

3.2.4 Disassemble and installation

Caution

□ The dropping of the main part may cause physical injury .

□ The inverter is fixed on a non-flammable wall such as metal and away from heat and flammable materials to avoid the fire.

□ If more than two drives are installed in a cabinet , the temperature should be lower than 40 by means of cooling fan. Overheat may cause fire or damage to the drive.

Only qualified people are allowed to operate on the drive device/system. Ignoring the instructions in "warning" may cause serious physical injury or death or property loss.

1. After the power is cut off, while the “CHARGE” indicator of the inverter is still on, it means the discharge of the capacitor has not been completed. Don’t touch the circuit or replace components at this time.

2. Never wire or disassemble/assemble internal connectors of inverter when the power is supplied.

3. Prohibit connecting U,V and W of inverter output terminals to AC power.

4. Terminal E of the inverter must be well grounded.

5. Since semiconductor components are easily damaged by high voltage, do not carry out the high voltage withstand test on internal components of MA510 inverter.

6. CMOS IC of the inverter control board is easily affected and damaged by static electricity, thus, do not touch the control board.

7. connect the input power lines tightly and permanently.

3.3 Inverter Wiring

3.3.1 Wiring Peripheral Power Devices

Examples for wiring the periphery devices of MA510 are shown in the following:

Power supply

Circuit breaker

Electromagnetic contactor

AC reactor

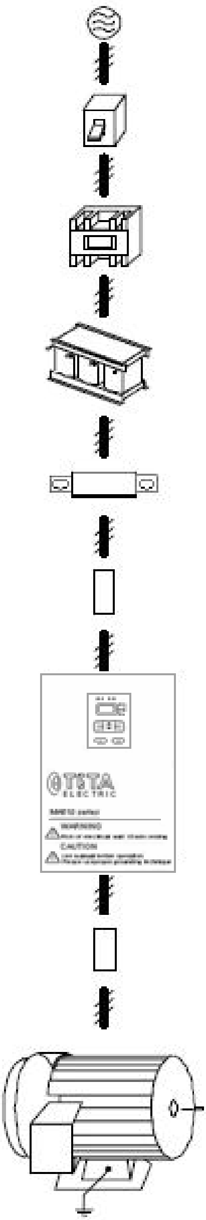
Fast acting fuse

Input noise filter

Inverter

Zero-phase noise filter

3-phase induction motor



Electromagnetic contactor : It can not add for general use. However for the application requiring external sequence control or automatic restart function power cut, is required. Please avoid using it for the start/stop control of the inverter as possible.

AC reactor : In case of further improving the power factor or suppress the external surge , an AC reactor can be additionally equipped.

Fast acting fuse: To protect interface devices.

Input noise filter: The surrounding device may be disturbed when inverter is working.EMC filter can minimize the interface

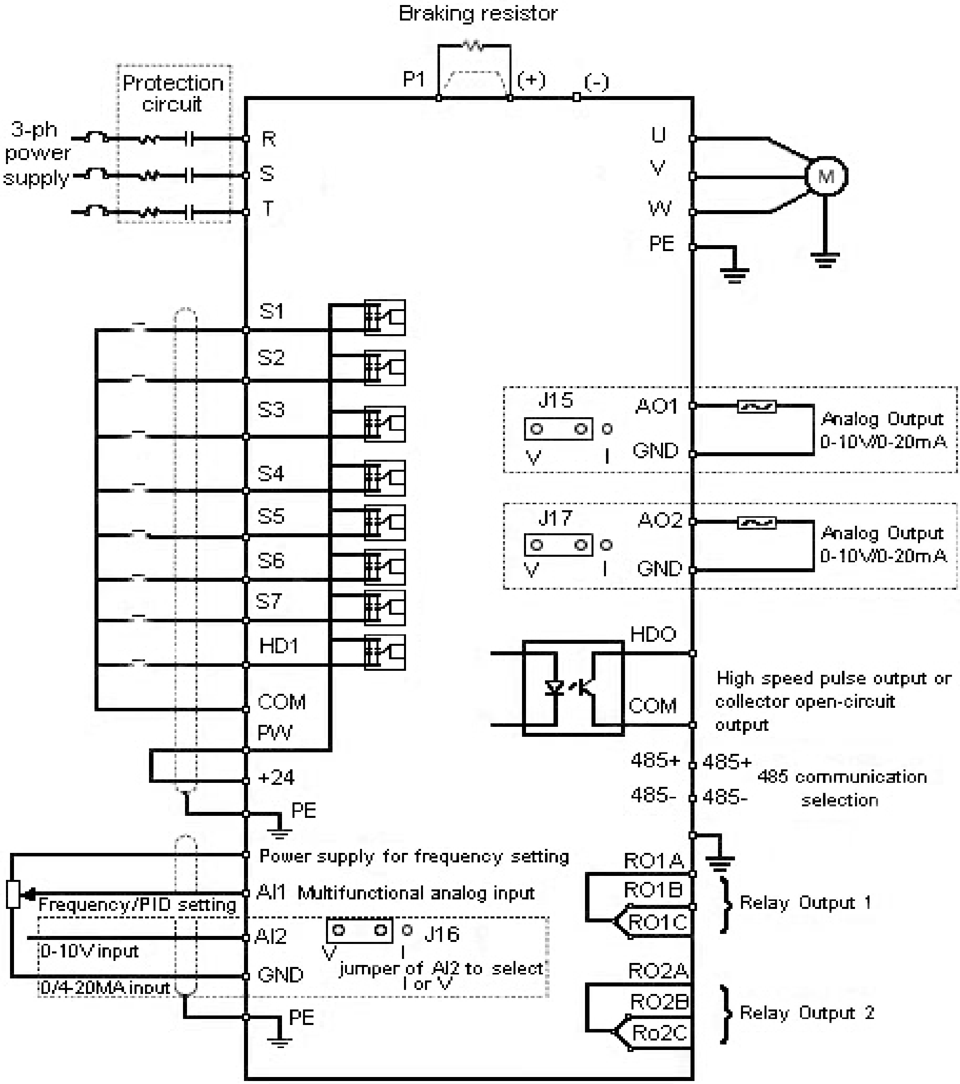
Inverter : Terminal R,S,T at input side have no phase requirement, thus they can be arbitrarily exchanged. Terminal E must be well grounded

Zero-phase noise filter : Adding this at the output side of the inverter can be decrease the radiated interface and induced noise.

Motor : If an inverter drives multiple motors, the rated current of the inverter must be greater than the total current that all motors operate at the same time. Motor and inverter must be grounded respectively.

3.3.2 General Wiring Diagram

The following is the standard wiring diagram for the MA510 inverter.Locations and symbols of the wiring terminal block might be different due to different models.



For Inverters≥ 18.5 Kw

Only the master circuit of 380 V 1 r models of lower capacity with built-in braking resistor provide te ing resistor can be connected directly between (+) and PB.

The wire length of the braking resistor should be less than 5m.

Please pay attention to safty prevention and smooth ventilation when installing braking resistors because the temperature will rise for the heat releasing.

The (+) and (-) terminals of the braking units corresponds to the (+) and (-) terminals of the inverter when the external braking unit is connected.

The wiring length between the (+) and (-) terminals of the inerter and the (+), (-) of the braking units should not be more than 5m and the distributing length among BR1 and BR2 and the braking resistor terminals should not be more than 10m.

Caution
Be sure that the electric polarity of (+) (-) terminals is right; it is not allowed to connect (+) with (-) terminals directly , otherwise damage or fire may occur.

3.3.3 Terminal description

Major Circuit Terminals

Terminal	function discription
R S T	Terminals of 3phase AC input
(+) (-)	spare terminals of external braking unit
(+) PB	spare terminals of external braking resistor
P1 (+)	spare terminals of external DC reactor
(-)	terminal of negative DC bus
(+)	terminal of positive DC bus
U V W	Terminals of 3phase AC output
⏚	terminal of ground

2 ~ 3 HP , 380 V

(+)	PB	R	S	T	U	V	W	⏚
		POWER			MOTOR			

5 ~ 7.5 HP , 220 / 380 V

(+)	PB	(-)	R	S	T	U	V	W	⏚
			POWER			MOTOR			

10 ~ 20 HP , 380 V / 10HP 220 V

⏚	(+)	PB	(-)	R	S	T	U	V	W	⏚
				POWER			MOTOR			

25 ~ 150 HP , 380 V / 15 ~ 20 HP 220V

⏚	R	S	T	P1	(+)	(-)	U	V	W	⏚
	POWER						MOTOR			

175 ~ 250 HP , 380 V

R	S	T	U	V	W
POWER			MOTOR		

⏚	P1	(+)	(-)	⏚

Control Circuit Terminals

485+	485-	+10V	GND	S1	S2	S3	S4	S5	S6	S7
GND	AI1	AI2	AO1	AO2	COM	PW	+24V	COM	HDI	HDO

RO1A	RO1B	RO1C
RO2A	RO2B	RO2C

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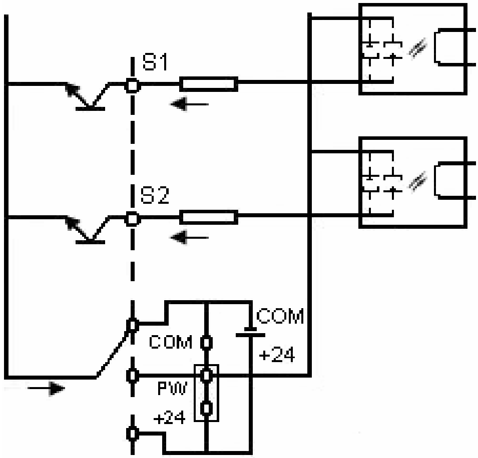
روبـروی پالایشگاه نفت پارس، پلاک ۱۲

Type	Terminal	Termi	Signal level
Digital Input	S1~S7	ON-OFF signal input, optical coupling with PW and COM	24VDC,8mAoptocoupler isolation (maximum voltage of 30Vdc, input impedance of 3.3kΩ)
24V Power supply	(+24v)	Digital signal SOURCE sharing point (PW switched to SOURCE)	±15%, Maximum output current: 150mA (the sum of all load)
	COM	Common terminal of Digital signals (PW switched to SINK)	
External power supply	PW**	(+24v) terminal is connected to PW terminal as default*	default (+24v)
Pulse input signal	HDI	Pulse or ON-OFFinput ,optical coupling with PW and COM	frequency range:0~50kHz Input voltage:9~30V Input impedence:1.1KΩ
Analog input signal	AI1	Voltage speed command	(-10v~+10v)Input impedance:20KΩ
	AI2	Multi-function analog input terminal switched by J16	From 0V ~ +10V / 0 ~ 20mA Input impedance: 10KΩ(voltage) / 250Ω(current)
	(+10v)	Power for speed setting	
	GND	Analog signals sharing terminal	
Pulse output signal	HDO	high speed pulse or open collector output. The corresponding common terminal is COM	Output frequency range: 0 ~ 50kHz
Analog output signal	AO1	analog output terminals above 5HP: AO1 by J15 and AO2 by J17 2~3HP: AO1 by J15 and AO2 by J14 can be selected	Output range : Voltage (0 ~ 10v) current (0 ~ 20mA)
	AO2		
RS-485 port	+485	RS-485 / MODBUS***	Opto-coupler isolation, differential input and output
	-485		

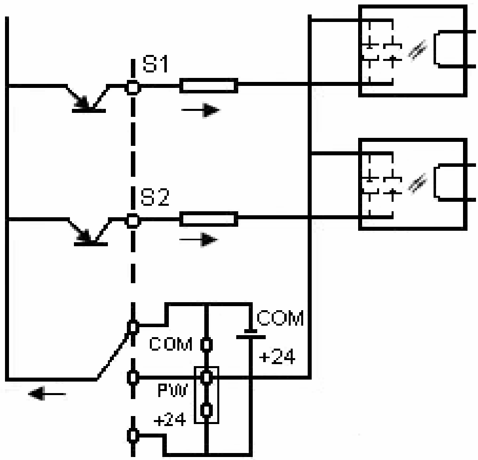
Type	Terminal	Termi	Signal level
Relay Output	RO1A	RO1 common	Contact capacity : AC 250V / 3A DC 30V / 1A
	RO1B	RO1 normally close(NC)	
	RO1C	RO1 normally open(NO)	
	RO2A	RO2 common	
	RO2B	RO2 normally close(NC)	
	RO2C	RO2 normally open(NO)	

*If the external power supply is needed , disconnect (+24v) with PW terminal and connect external power supply

**Using of PW to set sink or source mode



sink mode



source mode

***Please use twisted pairs and shield cables on the standard communication port

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روبروی پالایشگاه نفت پارس، پلاک ۱۲

Jumper	…on
J2 , J4	It is porhibited to be connected together , otherwise it will cause inverter malufanction.
J16	switch between 0~10v and 0~20mA Input V connect to GND means voltage input I connect to GND means current input
J15 and J17 above 5HP	switch between 0~10v and 0~20mA Output V connect to GND means voltage output I connect to GND means current output
J14 and J15 2HP~3HP	switch between 0~10v and 0~20mA Output V connect to GND means voltage output I connect to GND means current output
SW1	Switch of terminal resistor for RS-485 communication , dialing to ON means connecting to terminal resistor while dialing to OFF means disconnecting to terminal resistor.(only valid for 5HP and above)
J7	RS-485 communication jumper
J17 and J18 2HP~3HP	Switch of terminal resistor for RS-485 communication. Jumper enable: connect terminal resistor Jumper disable: Disconnect terminal resistor

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3.3.4 Wiring Precautions

For the external wiring of the control terminal, please attention to the followings:

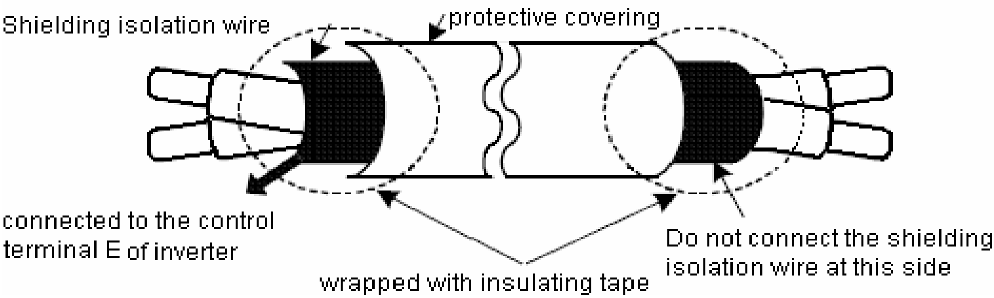
Use shield or twisted-pair cables to connect control terminals.

The cable connected to the control terminal should be left away from the main circuit and strong current circuits (including power supply cable, motor cable, relay and contactor connecting cable) at least 20cm , and parallel wiring should be avoided. It is suggested to apply perpendicular wiring to prevent inverter malufanction caused by external interference.

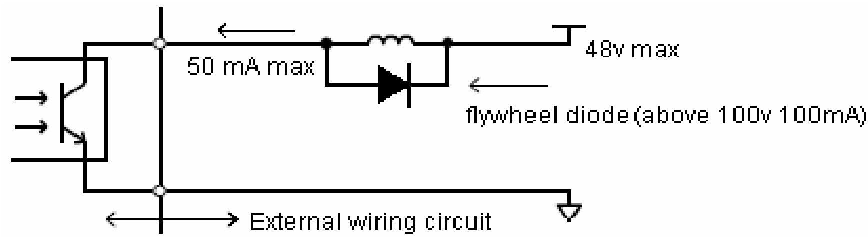
Contact output terminal R1A, R1B, R1C (or R2A,R2B, R2C) must be isolated from terminal 1 ~ 7, A01, A02, GND, HDO, COM, +10V, AI1, AI2, HD1 when wiring.

In order to avoid the electrical noise interference, the control circuit wiring must adopt shielding isolation twisted wire, please refer to the following diagram; the wiring distance should not exceed 50m.

Connect the ground terminal(PE) with shield wire.



When connecting the output contact of the multi-function optocoupler to the relay, it is necessary to add flywheel diode in parallel to both sides of the relay coil, as shown in the following diagram.



For the wiring of the main circuit t … ntion to the followings:

It doesn’t need to consider the phase sequence for input power R, S, T.

Prohibit connecting U,V and W of inverter output terminals to AC power.

Inverter output terminal U, V and W are connected to the motor terminal U, V, W. If the inverter executes forward rotation instruction while the motor rotates in reversal direction, simply exchange any two wires of U, V, W is enough.

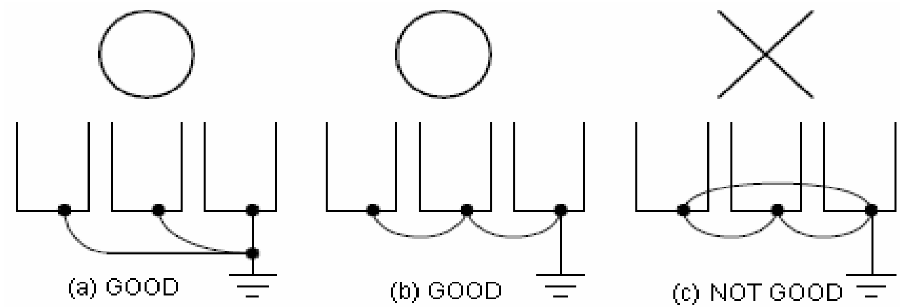
Never connect the inverter output terminal to the capacitor or LC,RC noise filter of improving the power factor.

Grounding terminal (E) is grounded to the earth by the third type grounding way. (grounding resistance of 100Ω or less)

Inverter grounding wire can not be grounded together with high - current loads such as welding machines and high-powered motors and so on. They must be grounded respectively.

Grounding wire size follows the specification of electrical equipment technical basisThe shorter grounding wire is, the better it is.

If several inverters are grounded jointly , please refer to the following diagrams for grounding. Do not form a circuit in grounding.



Determine wire size:

When choosing wire, a consideration of the voltage drop caused by the wire is a must.

Voltage drop is calculated as shown below. In general, the voltage drop shall be controlled below 2% of the rated voltage. Voltage drop between wires (V) = × wire resistance (Ω / km) × wiring length (m) × current (A) × 10-3

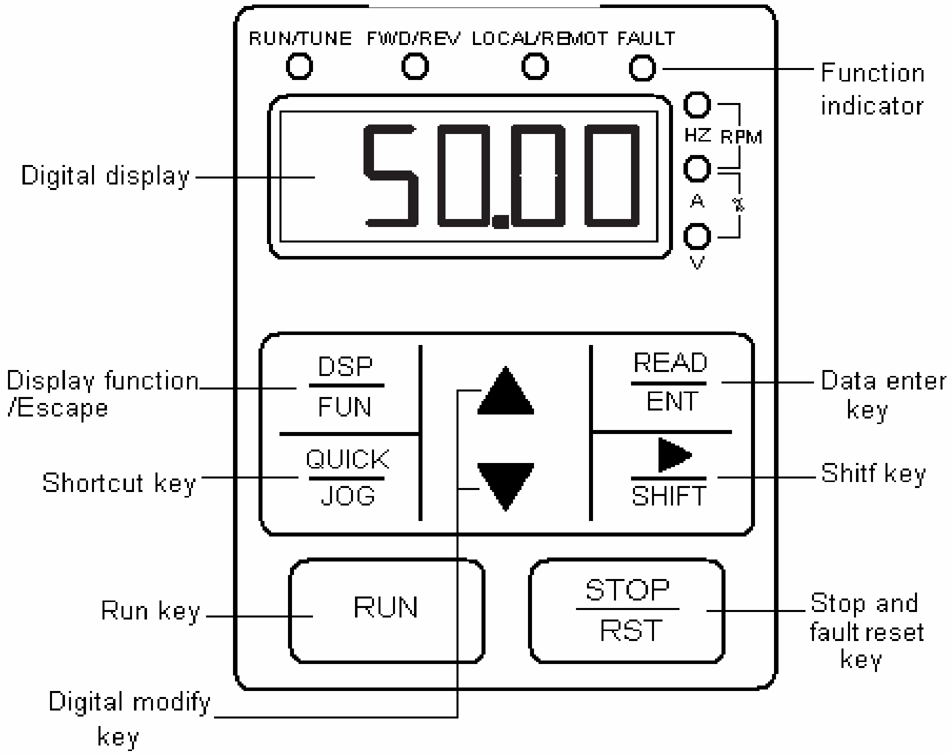
AC reactor for parallel power coordination:

If the capacity exceeds 600kVA, please add AC reactor to the input side of the inverter in series. AC power can be used for power coordination and power factor improvement.

Wiring length between the inverter and the motor:

If the total length between the inverter and the motor, the inverter itself and other peripheral devices will be affected because the high-frequency carrier frequency(the IGBT ON / OFF switching frequency) of the inverter will increase the leakage current between wiring and the ground. As a result, if the wiring length between the inverter and the motor is very long, please modestly reduce the carrier frequency, as shown below.

Wiring distance between the inverter and the motor	< 30m	30m ~ 50m	50m~100m	⋧ 100m
Allowable carrier frequency (set values of P0-14)	15kHz(max)	10kHz(max)	5kHz(max)	2kHz(max)



Key	Name	Function Description
DSP / FUN	Display function/Escape	Enter or escape from the first level menu
READ / ENT	Read enter key	Progressively enter menu and confirm parameter
▲	Digital modify key	Progressively increase data or function codes
▼	Digital modify key	Progressively decrease data or function codes
▶ / SHIFT	shift key	In parameter setting mode , press this button to select the bit to be modified in in other modes cyclically displays parameters by right shift

Key	Name	Function Description
RUN	Run key	Start to run the inverter in keypad control mode
STOP/RST	Stop / Reset key	In running status, registered by P7.04, can be used to stop the inverter. When fault alarm, can be used to reset the inverter without any restriction
QUICK/JOG	Shortcut key	Determined by function code P7.03 : 0 : Display status switching 1 : Jog operation 2 : Switch between forward and reverse 3 : Clear the UP/DOWN terminals settings 4 : Quick debugging mode
RUN + STOP/RST	Combination key	Pressing the RUN and STOP/RST at the same time can achieve inverter coast to stop

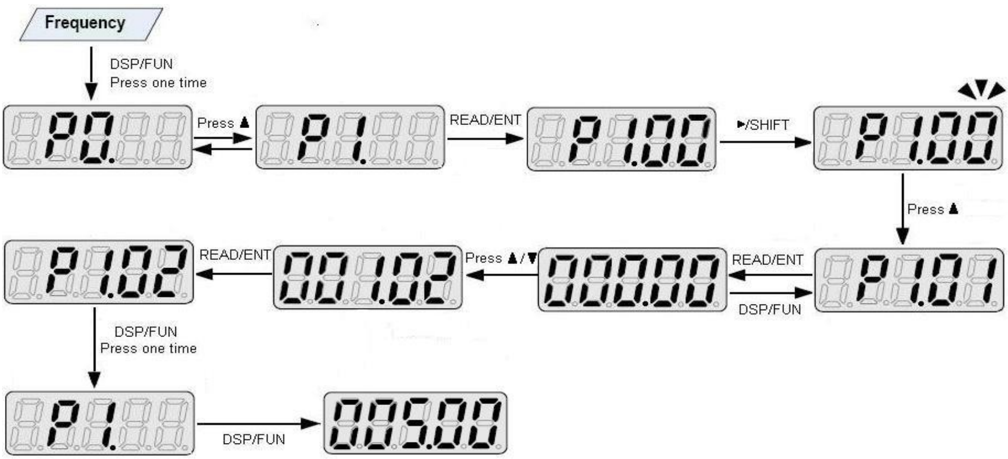
Function indicator	Description
RUN/TUNE	Extinguished : Stop status Flickering : Parameter auto tuning status Light on : Operating status
FWD/REV	Extinguished : Forward operation Light on : Reverse operation
LOCAL/REMOT	Extinguished : Keypad control Flickering : Terminal control Light on : Communication control

Function indicator	Description
FAULT	Extinguished : Normal operation status Flickering : Over load pre-warning status Light on : Fault of the inverter
HZ	Frequency unit
A	Current Unit
V	Voltage unit
RPM	Rotating speed unit
%	Percentage

4.4.1 Keypad Operation Description

4.4.1.1 Parameter setting

Press either the PRG/ESC or the DATA/ENT can return to the second - level menu from the third-level menu. The difference is: pressing DATA/ENT will save the set parameters in to the control panel,and then return to the second-level menu with shifting to the next function code automatically.While pressing PRG/ESC will return to the second-level menu without saving parameters,and keep staying at the current function code.



Under the third - level menu , if th … flickering bit, it means the function code can not be modified. The possible reasons could be:

this function is not modifiable parameter, such as actual detected parameter operation records and so on.

this function is not modifiable in running mode.

Short cut menu QUICK/JOG

Short cut menu provides a quick way to view and modify function parameters.

set the P7.03 to 4,then press QUICK/JOG , the inverter will search the which is different from the factory setting , save these data beyond 32,parameter it can not display the overlength part . Press QUICK/JOG will be shortcut debugging mode. If the QUICK/JOG displays "NULLP",it means the parameters are the same with the factory setting.

If want to return to last display , press QUICK/JOG

Fault reset

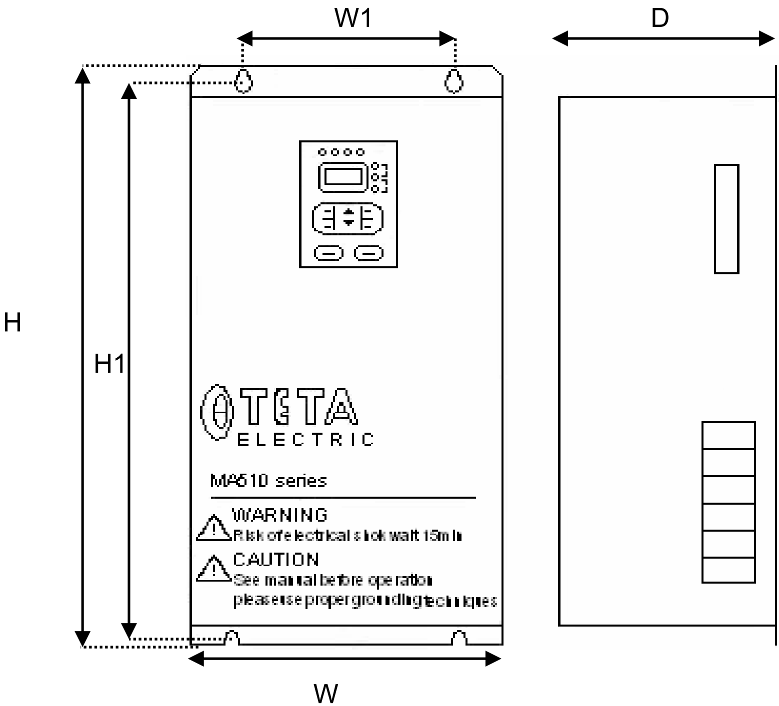
If fault occurs to the inverter , it will inform the related fault information . User can use STOP/RST or according terminals determined by P5 group to reset fault.

After fault reset, the inverter is in stand - by state. If user does not reset the fault the inverter will be in operation protection state, and can not run.

Chapter 5 Overall Dimension

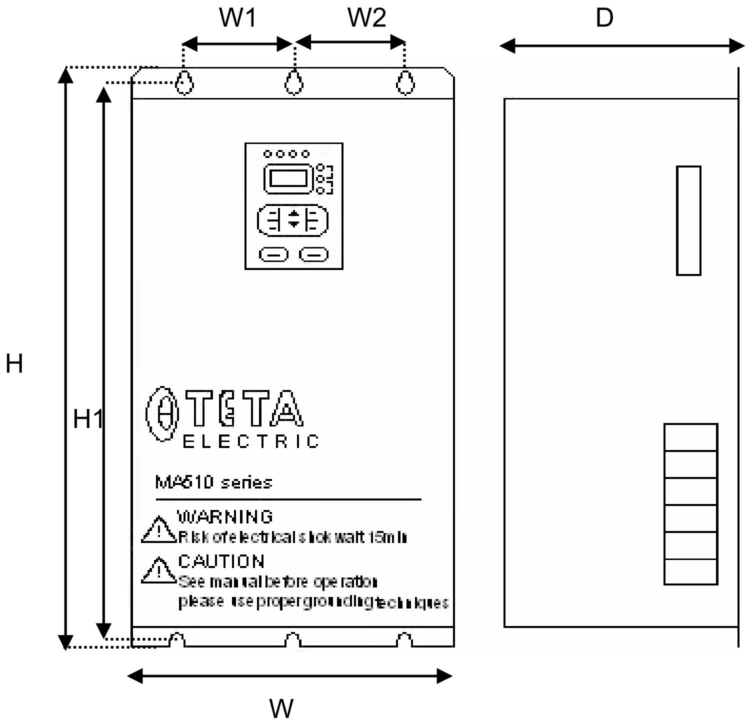
Standard model

(a) 380V : 20HP ~ 40HP



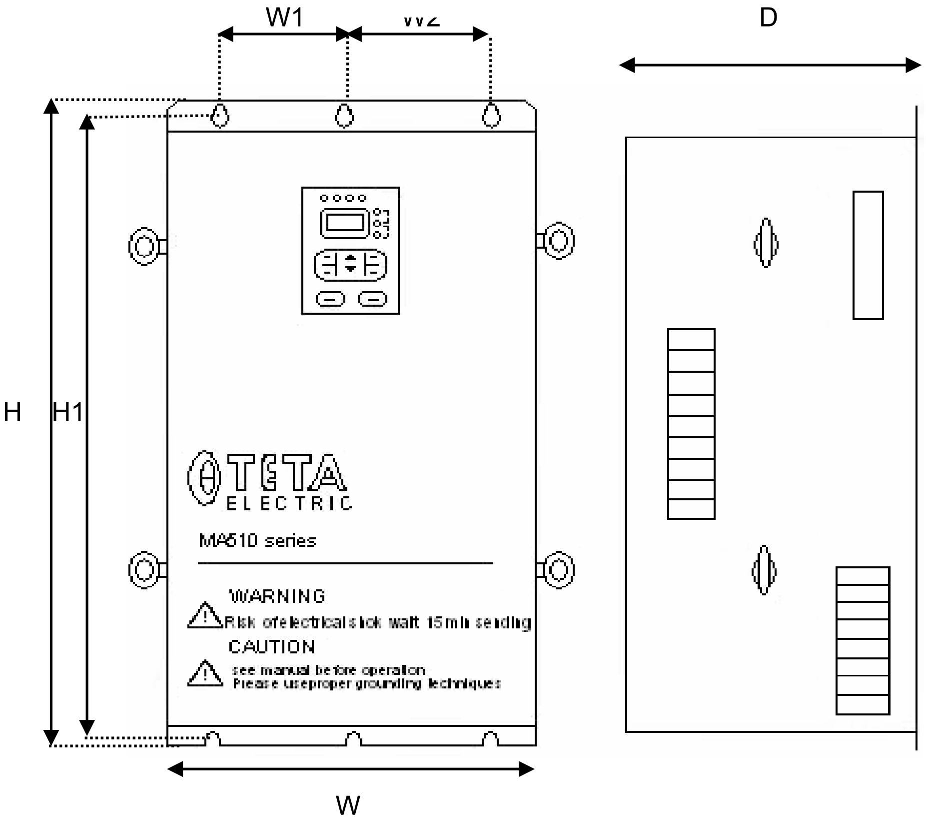
Inverter Model	Dimension (mm)					
	W	H	D	W1	H1	GW(kg)
MA510 4025	290	470	215	175	460	12
MA510 4030	290	470	215	175	460	12
MA510 4040	290	470	215	175	460	12

(b) 380V : 50HP ~ 75HP



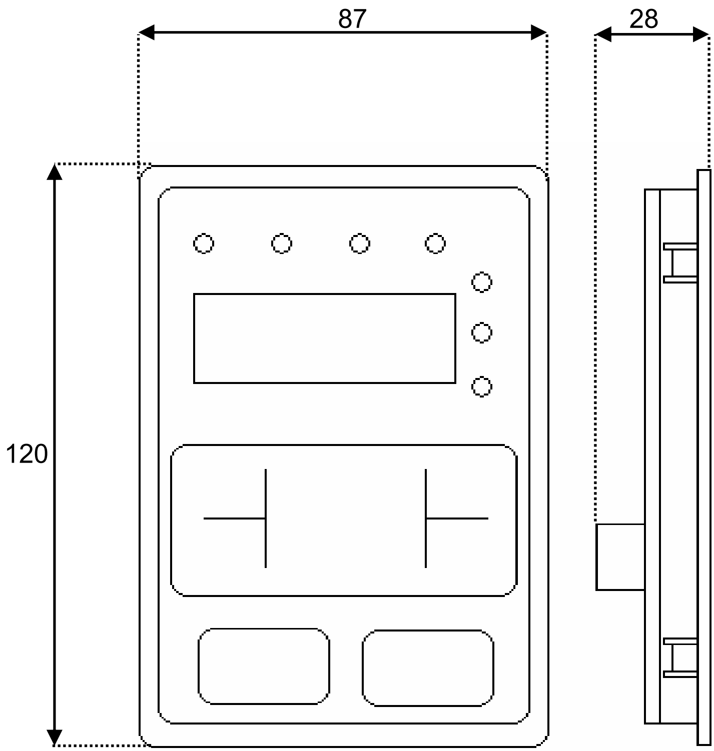
Inverter Model	Dimension (mm)					
	W	H	D	W1/W2	H1	GW(kg)
MA510 4050	375	585	270	115	665	36
MA510 4060	375	585	270	115	665	36
MA510 4075	375	585	270	115	665	36

(c) 380V : 100HP ~ 150HP



Inverter Model	Dimension (mm)					
	W	H	D	W1/W2	H1	GW(kg)
MA510 4100	460	755	330	160	735	48
MA510 4125	460	755	330	160	735	48
MA510 4150	460	755	330	160	735	50

Keypad Dimension

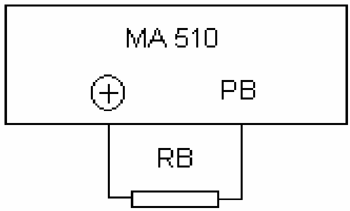


Model Number	Input Voltage	Braking Resistor	used number	Braking Unit	used number
MA510-2002	3-phase 220V -+ 15%	260W/130Ω	1	----	0
MA510-2003		260W/80Ω	1	----	0
MA510-2005		400W/48Ω	1	----	0
MA510-2008		550W/35Ω	1	----	0
MA510-2010		780W/26Ω	1	----	0
MA510-2015		1100W/17Ω	1	----	0
MA510-2020		1800W/13Ω	1	----	0
MA510-2025		2000W/10Ω	1	70	1
MA510-2030		2500W/8Ω	1	80	1
MA510-2040		1800W/13Ω	2	110	2
MA510-2050		2000W/10Ω	2	130	2
MA510-2060		2500W/8Ω	2	160	2
MA510-2075		3000W/6.5Ω	2	190	2
MA510-4002	3-phase 380V -+ 15%	260W/400Ω	1	----	0
MA510-4003		390W/150Ω	1	----	0
MA510-4005		390W/150Ω	1	----	0
MA510-4008		520W/100Ω	1	----	0
MA510-4010		1040W/50Ω	1	----	0
MA510-4015		1040W/50Ω	1	----	0
MA510-4020		1560W/40Ω	1	----	0
MA510-4025		6000W/20Ω	1	37	1
MA510-4030		6000W/20Ω	1	45	1
MA510-4040		6000W/20Ω	1	60	1
MA510-4050		9600W/13.6Ω	1	75	1
MA510-4060		9600W/13.6Ω	1	90	1
MA510-4075		9600W/13.6Ω	1	110	1

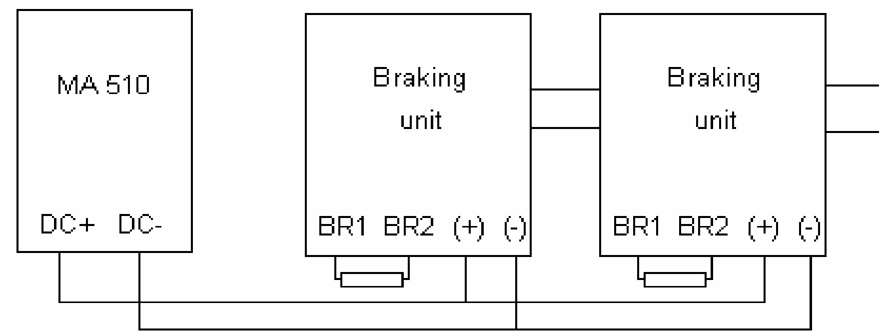
Model Number	Input Voltage	Power	ated put current	Rated output current	Compatible Motor
MA510-4100		9600W/13.6Ω	2	150	2
MA510-4125		9600W/13.6Ω	2	176	2
MA510-4150		9600W/13.6Ω	2	210	2
MA510-4175		3000W/4Ω	1	250	1
MA510-4215		3000W/4Ω	1	300	1
MA510-4250		4000W/3Ω	1	340	1

In the installation of braking module and braking resistor, you needs to keep an appropriate distance from the inverter, and maintain a good ventilation of the installation environment.

select the resistor and power of the braking unit according to the data our company provided.



External braking resistor



External braking unit
Parallel

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Chapter 7 Parameters List

Parameter group	Name
P0 Group	Basic function
P1 Group	Start and Stop Control
P2 Group	Motor Parameters
P3 Group	Vector Control
P4 Group	V/F Control
P5 Group	Input Terminals
P6 Group	Output Terminals
P7 Group	Human and Machine Interface
P8 Group	Enhanced Function
P9 Group	PID Control
PA Group	Simple PLC and Multi-step Speed Control
PB Group	Protection Function
PC Group	serial communication
PD Group	Supplementary Function
PE Group	Factory Setting

P0 Group：Basic function

Function	Name	Description	Setting	Default
P0.00	Control	0: V/F control 1: Sensorless vector control 2:Torque control (sensorless vector control)	0~2	0
P0.01	Run command source	0: Keypad (LED extinguished) 1: Terminal (LED flickering) 2: Communication(LED lights on)	0~2	0
P0.02	Keypad and Terminal UP/DOWN setting	0:Valid, save UP/DOWN value when Power off 1: Valid, do not save UP/DOWN value when power off 2: Invalid 3: valid during running, clear when stop.	0~3	0
P0.03	Maximum frequency	10.00~400.00Hz	10.00 ~ 400.00Hz	50.00Hz
P0.04	Upper frequency Limit	P0.05~P0.03 (the Maximum frequency)	P0.05 ~ P0.03	50.00Hz
P0.05	Lower frequency Limit	0.00~P0.04 (Lower frequency Limit)	P0.05 ~ P0.04	0.00Hz
P0.06	Keypad Reference Frequency	0.00~P0.03 (the Maximum frequency)	0.00 ~ P0.03	50.00Hz

Function	Name		Setting	Default
P0.07	Frequency A command source	0: keypad 1: AI1 2: AI2 3: HDI 4: simple PLC 5: Multi-stage speed 6: PID 7: Remote communication	0~7	0
P0.08	Frequency B command Source	0: AI1 1: AI2 2: HDI	0~2	0
P0.09	Scale of frequency B command	0: maximum frequency 1: Frequency A command	0~1	0
P0.10	Frequency command selection	0: A 1: B 2: A+B 3: Max(A and B)	0~3	0
P0.11	Acceleration time 0	0.1~3600.0s	0.1 ~ 3600.0s	Depend 0n model
P0.12	Deceleration time 0	0.1~3600.0s	0.1 ~ 3600.0s	Depend 0n model
P0.13	Running direction selection	0: forward 1: reverse 2: forbid reverse	0~2	0
P0.14	Carrier frequency	1.0~15.0kHz	1.0 ~ 15.0kHz	Depend 0n model

Function	Name		Setting	Default
P0.15	AVR function	0: Invalid 1: valid all the time 2: only valid in deceleration	0~2	1
P0.16	Motor parameters autotuning	0: No action 1: Rotation autotuning 2: static autotuning	0~3	2
P0.17	Restore parameters	0: No action 1: Restore factory setting 2: Clear fault records	P0.17	P0.17
P1 Group: Start and Stop Control				
P1.00	Start Mode	0: Start directly 1:DC braking and start 2:Speed tracking and start	0.2	0
P1.01	Starting frequency	0.00~10.00Hz	0.00 ~ 10.00	0.00Hz
P1.02	Hold time of starting frequency	0.0~50.0s	0.0~50.0	0.0s
P1.03	DC Braking Current Before start	0.0~150.0%	0.0~150.0	0
P1.04	DC Braking time before start	0.0~50.0s	0.0~50.0	0.0s
P1.05	Acceleration	0: Linear	0~1	0

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Function	Name		Setting	Default
	Deceleration mode	1: reserved		
P1.06	Stop mode	0: Decelerate to stop 1: Coast to stop	0~1	0
P1.07	Starting frequency of DC braking	0.00~P0.03	0.00 ~ P0.03	0.00Hz
P1.08	Waiting time before DC braking	0.0~50.0s	0.0~50.0	0.0s
P1.09	DC braking current	0.0~150.0s	0.0~150.0	0
P1.10	DC braking time	0.0~50.0s	0.0~50.0	0.0s
P1.11	Dead time of FWD/REV	0.0~3600.0s	0.0 ~ 3600.0	0.0s
P1.12	Action when running frequency is less than lower frequency limit (valid when lower frequency limit is above 0)	0: Running at the lower frequency limit 1: stop 2: stand-by	0~2	0

Function	Name		Setting	Default
P1.13	Delay time for restart	0.0~3600.0s (valid when P1.12=2)	0.0 ~ 3600.0	0
P1.14	Restart after power off	0: Disabled 1: Enabled	0~1	0
P1.15	Waiting time of restart	0.0~3600.0s (valid when P1.14=1)	0.0 ~ 3600.0	0.0s
P1.16	Terminal detection selection when power is on	0: Disabled 1: Enabled	0~1	0
P1.17	Reserved			
P1.18	Reserved			
P1.19	Reserved			
P2 Group: Motor Parameters				
P2.00	Inverter model	0: G model 1: P model	0~1	Depend on model
P2.01	Motor rated power	0.4~900.0kW	0.4 ~ 3000.0	Depend on model
P2.02	Motor rated frequency	0.01Hz~P0.03	10.00 ~ P0.0	50.00Hz
P2.03	Motor rated speed	0~36000pm	0.0 ~ 3600.0	Depend on model
P2.04	Motor rated voltage	0~800V	0~800	Depend on model
P2.05	Motor rated current	0.8~6000.0A	0.8 ~ 6000.0	Depend on model

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Function	Name		Setting	Default
P2.06	Motor stator resistance	0.001~65.535Ω	0.001 ~ 65.535	Depend on model
P2.07	Motor rotor resistance	0.001~65.535Ω	0.001 ~ 65.535	Depend on model
P2.08	Motor leakage inductance	0.1~6553.5mH	0.1 ~ 6553.5	Depend on model
P2.09	Motor leakage inductance	0.1~6553.5mH	0.1 ~ 6553.5	Depend on model
P2.10	Current without load	0.1~6553.5A	0.1 ~ 6553.5	Depend on model
P3 Group: Vector Control				
P3.00	ASR proportional gain Kp1	0~100	0~100	20
P3.01	ASR integral time Kp1	0.01~10.00s	0.01 ~ 10.00	0.50S
P3.02	ASR switching point 1	0.00Hz~P3.05	0.00 ~ P3.05	5.00Hz
P3.03	ASR proportional gain Kp2	0~100	0~100	25
P3.04	ASR integral time Kp2	0.01~10.00s	0.01 ~ 10.00	1.00s

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Function	Name		Setting	Default
P3.05	ASR switching point 2	P3.02~P0.03 (the Maximum frequency)	P3.02 ~ P0.03	10.00Hz
P3.06	Slip compensation rate of VC	50.0%~200.0%	50~200	100%
P3.07	Torque upper limit	0.0~200% (the rated current of the inveter)	0.0~200.0	G model: 150.00% P model: 120.00%
P3.08	Torque setting source	0: Keypad (corresponds to P3.09) 1: AI1 2: AI2 3: HDI 4: Multi-step speed 5:Remote communication (1~5: 100% corresponds to 2 times of the rated current of the inverter)	0~5	0
P3.09	Keypad torque setting	(-200.0%~200.0%) (the rated current of the inverter)	(-200.0% ~200.0%)	50.00%
P3.10	Upper frequency setting source	0: Keypad (P0.04) 1: AI1 2: AI2 3: HDI 4: Multi-step 5:Remote communication (1~4: 100% corresponds to the max. Frequency)	0~5	0

P4 Group: V/F Control

Function	Name	Description	Setting	Default
P4.00	V/F curve selection	0: Linear curve 1: Multidots curve 2: torque_stepdown curve (1.3 order) 3: Torque_stepdown curve (1.77 order) 4: Torque_stepdown curve (2.0 order)	0~4	0
P4.01	Torque boost	0.0%: (auto) 0.1%~10.0%	0.0 ~ 10.0	0.00%
P4.02	Torque boost cut-off	0.0%~50.0% (motor rated frequency)	0.0 ~ 50.0	20.00%
P4.03	V/F frequency 1	0.00Hz~P4.05	0.00 ~ P4.05	0.00Hz
P4.04	V/F voltage 1	0.0%~100.0% (the rated voltage of the motor)	0.0 ~ 100.0	0.00%
P4.05	V/F frequency 2	P4.03~P4.07	P4.03 ~ P4.7	0.00Hz
P4.06	V/F voltage 2	0.0%~100.0% (the rated voltage of the motor)	0.0 ~ 100.0	0.00%
P4.07	V/F frequency 3	P4.05~ P2.02 (the rated frequency of the motor)	P4.05 ~ P2.02	00.00Hz
P4.08	V/F voltage 3	0.0%~100.0% (the rated voltage of the motor)	0.0 ~ 100.0	0.00%
P4.09	Slip compensation limit	0.00~200.0%	0.0~200	0.00%

Function	Name		Setting	Default
P4.10	Auto energy saving selection	0: Disabled 1: Enabled	0~1	0
P4.11	Low-frequency threshold of restraining oscillation	0~10	0~10	2
P4.12	High-frequency threshold of restraining oscillation	0~10	0~10	0
P4.13	Boundary of restraining oscillation	0.0~P3.03	0.00 ~ P0.03	30.00Hz
P5 Group: Input Terminals				
P5.00	HDI selection	0: High speed pulse input 1: ON-OFF input	0~1	0
P5.01	S1 Terminal function	0: Invalid 1:Forward 2: Reverse 3: 3-wire control 4: Jog forward 5: Jog reverse 6: Coast to stop 7: Reset fault 8: Pause running 9: External fault input	0~39	1
P5.02	S2 Terminal function		0~39	4
P5.03	S3 Terminal function		0~39	7
P5.04	S4 Terminal function		0~39	0
P5.05	S5 Terminal function		0~39	0

Function	Name		Setting	Default
P5.06	S6 Terminal function	10: UP command 11: DOWN command	0~39	0
P5.07	S6 Terminal function	12: Clear UP/DOWN 13: Switch between A and B	0~39	0
P5.08	HDI Terminal function	14: Switch between A and A+B 15: Switch between B and A+B 16: Multi-step speed reference1 17: Multi-step speed reference2 18: Multi-step speed reference3 19: Multi-step speed reference4 20: Multi-step speed pause 21: ACC/DEC time selection 1 22: ACC/DEC time selection 2 23: Reset simple PLC when stop 24: Pause simple PLC 25: Pause PID 26: Pause traverse operation 27: Pause traverse operation 28: Reset counter 29: reset length 30: ACC/DEC ramp hold 31: Counter input 32: UP/DOWN invalid temporarily 33-39: Reserved	0~39	0
P5.09	ON-OFF filter times	1~10	1~10	5

Function	Name		Setting	Default
P5.10	Terminal control mode	0: 2-wire control mode 1 1: 2-wire control mode 2 2: 3-wire control mode 1 3: 3-wire control mode 2	0~3	0
P5.11	UP/DOWN setting change rate	0.01~50.00Hz/s	0.01~50.0 0	0.50Hz/s
P5.12	AI1 lower limit	0.00V~10.00V	-10.00~10.	0.00V
P5.13	AI1 lower limit correspondi n g setting	-100.0%~100.0%	-100.0~100	0.00%
P5.14	AI1 lower limit	0.00V~10.00V	-10.00~10.	10.00V
P5.15	AI1 lower limit correspondi ng setting	-100.0%~100.0%	-100.0~100	100.00%
P5.16	AI1 filter time constant	0.00s~10.00s	0.00~10.00	0.10s
P5.17	AI2 lower limit	0.00V~10.00V	0.00~10.00	0.00V
P5.18	AI2 lower limit correspondi ng setting	-100.0%~100.0%	-100.0~100	0.00%

Function	Name		Setting	Default
P5.19	AI2 upper limit	0.00V~10.00	0.000~10.0	10
P5.20	AI2 upper limit correspondi ng setting	-100.0%~100.0%	-100.0~100	100.00%
P5.21	AI2 filter time constant	0.00s~10.00s	0.00~10.00	0.10s
P5.22	HDI lower limit	0.0kHz	0.00~50.00	0.00kHz
P5.23	HDI lower limit correspondi ng setting	-100.0%~100.0%	-100.0~100	0.00%
P5.24	HDI upper limit	0.0kHz~50.0kHz	0.00~50.00	50.00kHz
P5.25	HDI lower limit setting	-100.0%~100.0%	-100.0~100	100%
P5.26	HDI filter time constant	0.00s~10.00s	0.00~10.00	0.10s
P6 Group: Output Terminals				
P6.00	HDO selection	0: No output 1: Running 2: Run forward 3: Run reverse 4: Fault output	0~1	0
P6.01	HDO ON-OFF Output selection		0~20	1

Function	Name		Setting	Default
		5: FDT reached 6: Frequency reached 7: Zero speed running 8: Preset count value reached 9: Specified count value reached 10: Length reached 11: Simple PLC step completed 12: PLCcycle completed 13: Running time reached		
P6.02	Relay 1 output selection	14: Upper frequency limit reached 15: Lower frequency limit reached 16: Read	0~20	4
P6.03	Relay 2 output selection	17: Auxiliary motor 1 started 18: Auxiliary motor 2 started 19~20: Reserved	0~20	0
P6.04	AO1 function selection	0: Running frequency 1: Reference frequency 2: Rotation speed	0-10	0
P6.05	AO2 function selection	3: Output current 4: Output voltage	0-10	0
P6.06	HDO function selection	5: Output power 6: Output torque 7: AI1 voltage 8: AI2 voltage/current 9: HDI frequency	0-10	0
P6.07	AO1 lower limit	0.0%~100%	0.0~100.0	0.00%

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Function	Name		Setting	Default
P6.08	AO1 lower limit correspondi ng output	0.00V~10.00V	0.00~10.00	0.00V
P6.09	AO1 upper limit	0.00V~10.00V	0.0~100.0	100.00%
P6.10	AO1 upper limit correspondi ng output	0.00V~10.00V	0.00~10.00	10.00V
P6.11	AO2 lower limit	0.0~100.0%	0.0~100.0	0.00%
P6.12	AO2 lower limit correspondi ng output	1~10.00V	0.00~10.00	0.00V
P6.13	AO2 upper limit	0.0~100.0%	0.0~100.0	100.00%
P6.14	AO2 upper limit correspondi ng output	0.00~10.00V	0.00~10.00	10.00V
P6.15	HDO lower limit	0.00%~100.00%	0.00~100.0	0.00%
P6.16	HDO lower limit correspondi ng output	0.000~50.000KHz	0.000~50.0	0.00KHz

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Function	Name		Setting	Default
P6.17	HDO upper limit	0.00%~100.00%	0.000~100.	100.00%
P6.18	HDO upper limit correspondi ng output	0.0~50.0KHz	0.000~50.0	50.00KHz
P7 Group: Human and Machine Interfaces				
P7.00	User password	0~65535	0~65535	0
P7.01	Reserve		Reserved	Reserved
P7.02	Reserve		Reserved	Reserved
P7.03	QUICK/JOG function selection	0: Display status switching 1: Jog 2: FWD/REV switching 3: Clear UP/DOWN setting 4: QUICK set mode	0~4	0
P7.04	STOP/RST function selection	0: Valid when keypad control (P0.03=0) 1: Valid when keypad or terminal control (P0.03=0 or1) 2: Valid when keypad or communication control (P0.03=0 or 2) 3: Always valid	0~3	0
P7.05	Keypad display selection	0: Preferential to external keypad 1: Both display, only external key valid. 2: Both display, only local key valid.	0~3	0

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Function	Name		Setting	Default
		3: Both display and key valid.		
P7.06	Running status display selection 1	0~0XFFFF BIT0: running frequency BIT1: reference frequency BIT2: DC bus voltage BIT3: Output voltage BIT4: Output current BIT5: Rotation speed BIT6: Line speed BIT7: Output power BIT8: Output torque BIT9: PID preset BIT10: PID feedback BIT11: Input terminal status BIT12: Output terminal status BIT13: Torque setting value BIT14: Count value	0~0XFFFF	0X07FF
P7.07	Running status display selection 2	0~0XFFFF BIT0: AI1 BIT1: AI2 BIT2: HDI frequency BIT3: Load percentage of motor BIT4: Load percentage of inverter BIT5~15: Reserved	0~0XFFFF	0

Function	Name		Setting	Default
P7.08	Stop status display selection	0~0XFFFFF BIT0: Reference frequency BIT1: DC bus voltage BIT2: Input terminal status BIT3: Output terminal status BIT4: PID preset BIT5: PID feedback BIT6: AI1 BIT7: AI2 BIT8: HDI frequency BIT9: Step No.of PLC or multi-step BIT10: Torque setting value BIT11~ BIT15: Reserved	0~0XFFFF	0x00ff
P7.09	Coefficient of rotation speed	0.0~999.9% Actual mechanical speed = 120 * output frequency * P7.09 / Number of poles of motor	0.1~999.9	100.00%
P7.10	Coefficient of line speed	0.0~999.9% Line speed = actual mechanical speed * P7.10	0.1~999.9	1.00%
P7.11	Rectify module temperature	0~100.0		
P7.12	IGBT module temperature	0~100.0		

Function	Name		Setting	Default
P7.13	Software version			
P7.14	Inverter rated power	0.4~3000.0KW	0.4~3000.0	Depend on model
P7.15	Inverter rated current	0.0~6000.0A	0.0~6000.0	Depend on model
P7.16	Accumulated running time	0~65535h		
P7.17	Third latest fault type	0: Not fault 1: IGBT Ph-U fault(OUT1) 2: IGBT Ph-V fault(OUT1) 3: IGBT Ph-W fault(OUT1) 4: Over-current when acceleration(OC1) 5: Over-current when deceleration(OC2) 6: Over-current when constant speed running(OC3) 7: Over-current when acceleration (OV1) 8: Over-current when deceleration (OV2) 9: Over-current when constant speed running(OV3) 10: DC bus under-voltage(UV) 11: Motor overload (OL1) 12: Inverter overload (OL2)		
P7.18	Second latest fault type			
P7.19	Latest fault type			

Function	Name		Setting	Default
		13: Input phase failure failure(SPO) 14: Output phase failure(SPO) 15: Rectify overheat (OH1) 16: IGBT overheat (OH2) 17: External fault (EF) 18: Communication fault(CE) 19: Current detection fault(ITE) 20: Autotuning fault (TE) 21: EEPROM fault (EEP) 22: PID feedback fault (PIDE) 23: Braking unit fault (BCE) 24: Running time arrival (END) 25: Overtorque fault (OL3)		
P7.20	Output frequency at current fault			
P7.21	Output current at current fault			
P7.22	DC bus voltage at current fault			
P7.23	Input terminal status at current fault			
P7.24	Output terminal status at current fault			

P8 Group: Enhanced Function				
Function	Name	Description	Setting	Default
P8.00	Acceleration time 1	0.1~3600.0s	0.1~3600.0	Depend on model
P8.01	Deceleration time 1	0.1~3600.0s	0.1~3600.0	Depend on model
P8.02	Acceleration time 2	0.1~3600.0s	0.1~3600.0	Depend on model
P8.03	Deceleration time 2	0.1~3600.0s	0.1~3600.0	Depend on model
P8.04	Acceleration time 3	0.1~3600.0s	0.1~3600.0	Depend on model
P8.05	Deceleration time 3	0.1~3600.0s	0.1~3600.0	Depend on model
P8.06	Jog reference	0.0~P0.03	0.00~P0.03	5.00Hz
P8.07	Jog acceleration time	0.1~3600.0s	0.1~3600.0	Depend on model
P8.08	Jog deceleration time	0.1~3600.0s	0.00~P0.03	Depend on model
P8.09	Skip Frequency1	0.00~P0.03	0.00~P0.03	0.00Hz
P8.10	Skip Frequency2	0.00~P0.03	0.00~P0.03	0.00Hz
P8.11	Skip Frequency bandwidth	0.00~P0.03	0.00~P0.03	0.00Hz
P8.12	Traverse amplitude	0.0~100.0%	0.0~100.0	0.00%

Function	Name		Setting	Default
P8.13	Jitter frequency	0.0~50.0%	0.0~50.0	1.00%
P8.14	Rise time of traverse	0.1~3600.0s	0.1~3600.0	5.0s
P8.15	Fall time of traverse	0.1~3600.0s	0.1~3600.0	5.0s
P8.16	Auto reset times	0~3	0~3	0
P8.17	Reset interval	0.1~100.0s	0.1~100.0	1.0s
P8.18	Preset count value	P8.19~65535	P8.19~655	0
P8.19	Specified count value	0~P8.18	0~P8.18	0
P8.20	Preset running time	0~65535	0~65535	65535h
P8.21	FDT level	0.00~P0.03	0.00~P0.03	50.00Hz
P8.22	FDT lag	0.0~100.0%	0.0~100.0	5.00%
P8.23	Frequency arrive detecting range	0.0~100.0% (maximum frequency)	0.0~100.0	0.00%
P8.24	Droop control	0.00~10.00Hz	0.00~10.00	0.00Hz
P8.25	Brake threshold voltage	115.0~140.0%	115.0~140	130.00%
P8.26	Cooling fan control	0: Auto stop mode 1: Always working	115.0~140	120.00%

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Function	Name		Setting	Default
P8.27	Overmodulation	0: Enabled 1: Disabled	0~1	0
P8.28	PWM mode	0: PWM mode 1 1: PWM mode 2 2: PWM mode 3	0~1	0
P9 Group: PID Control				
P9.00	PID preset source selection	0: Keypad 1: AI1 2: AI2 3: HDI 4: Multi-step 5: Remote communication	0~5	0
P9.01	Keypad PID preset	0.0%~100.0%	0.0~100.0	0.00%
P9.02	PID feedback source selection	0: AI1 1: AI2 2: AI1+AI2 3: HDI 4: Communication	0~3	0
P9.03	PID output characteristic	0: Positive 1: Negative	0~1	0
P9.04	Proportional gain (KP)	0.00~100.00	0.00~100.0	0.10s
P9.05	Integral time (Ti)	0.00~10.00s	0.01~10.00	0.10s
P9.06	Differential time (Td)	0.00~10.00s	0.00~100.0	0.01s

Function	Name		Setting	Default
P9.07	Sampling cycle (T)	0.01~100.00s	0.00~100.0	0.00%
P9.08	Bias limit	0.0~100.0%	0.0~100.0	0.00%
P9.09	Feedback lost detecting value	0.0~100.0%	0.0~100.0 %	0.00%
P9.10	Feedback lost detecting time	0.0~3600.0s	0.0~3600. 0	1.0s
PA Group: Simple PLC and Multi-step Speed Control				
PA.00	Simple PLC	0: Stop after one cycle 1: Hold last frequency after one cycle 2: Circular run	0~2	0
PA.01	Simple PLC status saving after power off	0: Disabled 1: Enabled	0~1	0
PA.02	Multi-step speed 0	-100.0~100.0%	-100.0~100	0.00%
PA.03	0^{th} Step running time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.04	Multi-step speed 1	-100.0~100.0%	-100.0~100	0.00%
PA.05	1st Step running time	0.0~6553.5s(h)	0.0~6553.5	0.0s

Function	Name		Setting	Default
PA.06	Multi-step speed2	-100.0~100.0%	-100.0~100	0.00%
PA.07	2nd step running time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.08	Multi-step speed 3	-100.0~100.0%	-100.0~100	0.00%
PA.09	3rd step running time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.10	Multi-step speed 4	-100.0~100.0%	-100.0~100	0.00%
PA.11	4th Step running time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.12	Multi-step speed 5	-100.0~100.0%	-100.0~100	0.00%
PA.13	5th Step running time speed	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.14	Multi-step	-100.0~100.0%	-100.0~100	0.00%
PA.15	6th Step running time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.16	Multi-step speed 7	-100.0~100.0%	-100.0~100	0.00%
PA.17	7th Step running time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.18	Multi-step speed 8	-100.0~100.0%	-100.0~100	0.00%
PA.19	8th Step running time	0.0~6553.5s(h)	0.0~6553.5	0.0s

Function	Name		Setting	Default
PA.20	Multi-step speed 9	-100.0~100.0%	-100.0~100	0.00%
PA.21	9th Step running time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.22	Multi-step speed 10	-100.0~100.0%	-100.0~100	0.00%
PA.23	10th Step running time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.24	Multi-step speed 11	-100.0~100.0%	-100.0~100	0.00%
PA.25	11th Step running time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.26	Multi-step speed 12	-100.0~100.0%	-100.0~100	0.00%
PA.27	12th Step running time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.28	Multi-step speed 13	-100.0~100.0%	-100.0~100	0.00%
PA.29	13th Step running time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.30	Multi-step speed 14	-100.0~100.0%	-100.0~100	0.00%
PA.31	14th Step running time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.32	Multi-step speed 15	-100.0~100.0%	-100.0~100	0.00%

Function	Name		Setting	Default
PA.33	15th Step running time	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.34	ACC/DEC time selection for step 0~7	0~0XFFFF	0~0XFFFF	0
PA.35	ACC/DEC time selection for step 8~15	0~0XFFFF	0~0XFFFF	0
PA.36	Simple PLC restart selection	0: restart from step 0 1: Continue from paused step	0~1	0
PA.37	Time unit	0: Second 1: Minute	0~1	0
PB Group: Protection Function				
Pb.00	Input phase-failure protection	0: Disabled 1: Enabled	0~1	1
Pb.01	Output phase-failure protection	0: Disabled 1: Enabled	0~1	1
Pb.02	Motor overload protection	0: Disabled 1: Normal motor(with low speed compensation) 2: Variable frequency motor (without low speed compensation)	0~2	2

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Function	Name		Setting	Default
Pb.03	Motor overload protection current	20.0%~120.0% (rated current of the motor)	20.0~120.0	100.00%
Pb.04	Threshold of trip-free	70.0.0~110.0% (standard bus voltage)	70.0~110.0	80.00%
Pb.05	Decrease rate of trip-free	0.00~P0.03 (the Max. frequency)	0.00~P0.03	0.00Hz/s
Pb.06	Over-voltage stall	0: Disabled 1: Enabled	0~1	1
Pb.07	Over-voltage stall protection point	110~150%	110~150	120%
Pb.08	Auto current limiting threshold	50~200%	50~200	G model : 150.00% P model : 160.00%
Pb.09	Frequency decrease rate when current limiting	0.00~100.00Hz/s	0.00~100.0	10.00Hz/s
Pb.10	Auto current limiting selection	0: Enabled 1: Disabled when constant speed	0~1	0

Function	Name		Setting	Default
Pb.11	Selection of overtorque (OL3)	0: No detection 1: Valid detection of overtorque during running,then continue running 2: Valid detection of overtorque during running,then warning and stop 3: Valid detection of overtorque during constant speed running , then continue running 4: Valid detection of overtorque during constant speed running, then warning and stop.	0~4	1
Pb.12	Detection level of overtorque	10.0%~200.0%(relative to the rated curent of the motor)	1.0~200.0	G model :150.0% P model :120%
Pb.13	Detection time of overtorque	0.1~60.0s	0.0~60.0	0.1s
Pb.14	reserved			
Pb.15	reserved			
PC Group: serial communication				
PC.00	Local address	0~247, 0 stands for the broadcast address	0~247	1

Function	Name		Setting	Default
PC.01	Baud rate selection	0: 1200BPS 1: 2400BPS 2: 4800BPS 3: 9600BPS 4: 19200BPS 5: 38400BPS	0~5	4
PC.02	Data format	0: RTU, 1 start bit, 8 data bits, no parity check, 1 stop bit. 1: RTU, 1 start bit, 8 data bits, even parity check, 1 stop bit. 2: RTU, 1 start bit, 8 data bits, odd parity check, 1 stop bit. 3: RTU, 1 start bit, 8 data bits, no parity check, 2 stop bit. 4: RTU, 1 start bit, 8 data bits, even parity check, 2 stop bit. 5: RTU, 1 start bit, 8 data bits, odd parity check, 2 stop bit.	0~5	1
PC.03	Communicati no delay time	0~200ms	0~200	5ms
PC.04	Communicatino timeout delay	0.0: Disabled 0.0~100.0s	0.0~100.0	0.0s
PC.05	Communicati no error action	0: Alarm and coast to stop 1: No alarm and continue to run 2: No alarm but stop	0~3	1

Function	Name		Setting	Default
		according to P1.06(if P0.03=2) 3: No alarm but stop according to P1.06		
PC.06	Response action	Unit`s place of LED 0: Response to writing 1: No response to writing Ten`s place of LED 0: Reference not saved when power off 1: Reference saved when power off	00~11	0
Pd Group: Supplementary Function				
PE Group: Factory Setting				

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8-TROUBLE SHOOTING

fault messages including the possible cause and corrective actions.This

chapter tells how to reset faults and view fault history.It also lists all alarm and

8.1 Fault and Trouble shooting

Fault Code	Fault Type	Reason	Solution
Out1	IGBT fault	1. Acc time is too short. 2. IGBT module fault. 3.Malfunction caused by interference. 4.Grounding is not properly	1. Increase Acc time. 2. Ask for support. 3. Inspect external equipment and eliminate interference.
OC1	Over-current when acceleration	1. Acc time is too short. 2.The voltage of the grid is too low. 3.The power of the inverter is too low.	1. Increase Acc time. 2. Check the input power 3. Select bigger capacity inverter.
OC2	Over-current when deceleration	1. Dec time is too short. 2. The torque of the load inertia is big 3. The power of the inverter is too low.	1. Increase Dec time. 2.Install a proper energy consumption braking components 3. Select bigger capacity inverter.
OC3	Over-current when constant speed running	1 The load transients or is abnormal. 2.The voltage of the grid is too low. 3.The power of the inverter is	1. Check the load or reduce the transient of the load 2. Check the input power supply 3. Select bigger capacity inverter.
OV1	Over-voltage when	1. The input voltage is Abnormal	1. Check the input power

Fault Code	Fault Type	F	Solution
	acceleration	2. Restart the running motor after sudden power loss.	2.Avoid restart-up after stopping
OV2	Over-voltage when deceleration	1. Dec time is too short. 2.The inertia of the load is big. 3.The input voltage is abnormal	1.Increase the Dec time 2.Increase the energy-consuming components 3. Check the input power
OV3	Over-voltage when constant speed running	1. The input voltage changes Abnormally. 2. The inertia of the load is big.	1. Install the input reactor 2.Add proper energy-consuming components
UV	DC bus Under-voltage	1. The voltage of the grid is low	1.Check the input power supply of the grid
OL1	Motor overload	1. The voltage of the power supply is 2. The motor setting rated current is incorrect. 3. The motor stall or load transients is too strong. 4.The power of the motor is too big.	1. Check the power of the supply Line 2. Reset the rated current of the motor 3. Check the load and adjust the torque lift 4. Select a proper motor.
OL2	Inverter overload	1. The acceleration is too fast 2. Reset the rotating motor 3. The voltage of the power supply is too low. 4. The load is too heavy.	1. Increase the ACC time 2. Avoid the restarting after stopping. 3. Check the power of the supply line 4. Select an inverter with bigger power

<table>
<tr><th>Fault Code</th><th>Fault Type</th><th>F</th><th>Solution</th></tr>
<tr><td>SPI</td><td>Input phase loss</td><td>Phase loss or fluctuation of input R,S,T</td><td>1. Check input power
2. Check installation distribution</td></tr>
<tr><td>SPO</td><td>Output phase loss</td><td>U , V , W phase loss input(or serious asymmetrical three phase of the load)</td><td>1. Check the output distribution
2. Check the motor and cable</td></tr>
<tr><td>OH1</td><td>Rectify IGBT overheat</td><td rowspan="2">1.Sudden overcurrent of the inverter
2.There is direct or indirect short circuit between output 3 phase
3.Air duct jam or fan damage
4.Ambient temperature is too high.
5.The wiring of the control panel or plug-ins are loose
6.The assistant power supply is damaged and the drive voltage is undervoltage
7.The bridge arm of the power module is switched on
8.The control panel is abnormal1. Refer to the overcurrent solution</td><td rowspan="2">1. Refer to the overcurrent solution
2. Redistribute
3. Dredge the wind channel or
4. Low the ambient temperature
5. Check and reconnect
6. Ask for service
7. Ask for service
8. Ask for service</td></tr>
<tr><td>OH2</td><td>Inverter IGBT overheat</td></tr>
<tr><td>EF</td><td>External fault</td><td>S1: External fault input terminal take effect</td><td>1. Check the external device input</td></tr>
</table>

Fault Code	Fault Type	F	Solution
CE	Communi cation	1. The baud rate setting is incorrect. 2.Communication fault	1. Set proper baud rate 2. Press STOP/RST to reset and ask for help 3. Check the communication
		3.The communication is off for a long time.	connection distribution
ItE	Current detection fault	1. The connection of the control board is not good Assistant power is bad 2. Assistant power is damaged 3. Hoare components is broken 4. The modifying circuit is abnormal.	1. Check and reconnect 2. Ask for service 3. Ask for service 4. Ask for service
tE	Autotuning fault	1. The motor capacity does not comply with the inverter capability 2. The rated parameter of the motor	1.Change the inverter model 2.Set the rating parameters according to the nameplate of the motor
EEP	EEPROM fault	1. Error of controlling the write and read of the parameters 2. Damage to EEPROM	1.Press STOP/RST to reset 2. Ask for service
PIDE	PID feedback fault	1. PID feedback offline 2. PID feedback source disappear	1.Check the PID feedback signal wires 2.Check PID feedback source

Fault Code	Fault Type	F	Solution
bE	Braking unit fault	1. Braking circuit fault or damage to the braking pipes 2.The external braking resisitor is a little low	1.Check the braking unit and change new braking pipes 2.Increase the braking resistor
END	Time reach of factory setting	1.Trial time arrival	1. Ask for service
OL3	Overtorque	1. The acceleration is too fast 2. Reset the rotating motor 3. The voltage of the power supply is too low. 4. The load is too heavy.	1. Increase the ACC time 2. Avoid the restarting after stopping. 3.Check the power of the supply line 4. Select an inverter with bigger power 5. Adjust PB.11 to a proper value

自序

该MA510产品是设计用于控制三相异步电机的变频器.请仔细阅读本手册，以确保正确的操作，安全和熟悉的逆变器的功能。

在MA510逆变器是一种电气/电子产品，必须安装合格的维修人员来处理。

处理不当，可能会导致不正确的操作，生命周期较短，或者失败这种产品，以及电机。

所有MA510文件如有变更，恕不另行通知.请务必获取最新版本使用或访问我们的网站 www.tetaelectric.com

可用文档：

1. MA510启动和安装手册
2. MA510说明书

阅读本说明书在进行安装，配线（连接），运行，维修和检查前彻底。

确保您有变频器的良好的知识，并着手操作变频器之前，所有的安全注意事项，熟悉。

请密切关注由指定的安全注意事项

警告 和慎重 符号

警示	未能无视警告标志指示的信息可能会造成死亡或严重伤害。
慎重	未能无视警示符号表示的信息可能会造成轻微的人身伤害和/或重大财产损失。

第1章安全注意事项

1.1 在供电的逆变器

警示

主电路必须正确接线.对于单相供电使用的输入端子（R / L1，T / L3）和三相电源使用输入端子（R / L1，S / L2，T / L3）.端子U/ T1，V/ T 2，W / T3必须仅用于连接电机.连接的输入电源任何U/ T1的，V / T2或W / T3终端将导致损坏逆变器。

慎重

为了避免脱离或其他物理损坏前盖，不要被它的封面进行逆变器.其散热器运输时支持单位.操作不当可能会损坏变频器或伤害的人员，并应尽量避免。

□为避免火灾的危险，不要打开或易燃物品附近安装变频器.安装在不可燃物，如金属表面。

□若多台变频器放在同一个控制面板内，提供足够的通风，以保持低于40°C /104°F 温度（50°C/122°F无防尘罩），以避免过热或起火。

□当拆卸或安装数字操作，关闭电源，然后再按照本手册中的说明，以避免操作错误或损失显示器造成的接触不良。

警示

□本产品系通过IEC618003.在家庭环境中，该产品可能会造成这种情况下，用户可能需要采取纠正措施的无线电干扰。

□过的电机温度保护功能关闭。

1.2 接线

警示

□务必关掉电源是否逆变器安装在用户终端和接线之前。

□接线都必须由合格的人员/认证的电工进行。

□确保变频器正确接地。

（200V级：接地阻抗应小于100Ω400V级：接地阻抗应大于10Ω少）。它需要断开接地线在控制板上，以避免突然增加造成的电子零件损坏，如果它是不正确接地。

□请检查和接线后，测试紧急停止电路。（安装程序负责正确接线。）

□切勿触摸任何输入或输出电源线直接或允许任何输入或输出电源线来与逆变器壳体接触。

□不要执行一电介质耐压逆变器上测试（兆欧表）或这将导致逆变器损坏半导体元件。

慎重

□应用必须遵守变频器的额定输入电压的线电压。

□制动电阻和制动单元连接到指定的终端。

□不要直接连接制动电阻，直流端子P（+）和N（ - ）， 否则可 能会 导致起火。

□使用线规建议和扭矩规格。

□切勿输入电源连接到变频器输出端子U/ T1，V/ T2，W / T3。

□不要连接接触器或开关串联逆变器和电机。

□不要将功率因数校正电容或浪涌抑制器到变频器的输出。

□确保由逆变器和电动机产生的干扰不会影响外围设备 。

1.3 术前

警示
□降低载波频率（参数P0-14）。 如果从逆变器到 电动机的 电缆是超 过 80英尺 （25米）。高频电流可以通过寄生生成 在过流的逆变器的跳闸电缆和结果之间的电容，一个， 或不准 确 的 电 流读数。 □务必打开电源之前安装好所有的盖子。不要删除任何的封面，而电源逆变器上，否则可能会发生触电。 □不要操作开关用湿手，否则可能会造成触电。 通电时，即使变频器已经停止□不要触摸变频器端子，否则会导致触电。

1.4参数设置

慎重
□不要负载连接到电机，同时进行自动调整。 □确保电机能自由运转和有电机周围执行旋转自动调谐时有足够的空间。

1.5 操作

警示

□不要连接或操作过程中断开电机。这将导致逆变器跳闸并可能损坏逆变器。

□操作可能会突然启动，如果报警或故障复位与运行命令有效。确认没有运行命令后，重置报警或故障激活，否则可能发生事故。

□如果恢复供电（参数P1-14） 后自动重 启启用时， 逆变器 将自动 供电恢复后启动。

□确保它是安全的执行旋转自动调谐之前，操作变频器和电机。

□请勿检查信号电路板上的变频器运行时。

□之后关闭电源，冷却风扇可以继续运转一段时间。

慎重

□不要触摸发热部件如散热器和制动电阻。

在高 速运转之前 □仔细检查电动机或机器的性能，否则可能造成伤害。

□注意有关制动单元时适用的参数设置。

□不要使用变频器的制动功能的机械保持，否则可能会造成伤害。

□请勿检查信号电路板上的变频器运行时。

1.6 维护，检查和更换

警示

□至少等待5分钟后电源已关闭在开始检查前。同时确认充电指示灯熄灭，并

且直流母线电压低于25VDC等待至少15分钟，而逆变器是在20HP。

□切勿触摸变频器的高压端子。

□确保电源逆变器拆卸逆变器之前断开。

□只有授权人员才能进行维修，检查和更换操作。

（取下金属饰品如手表和戒指，并使用绝缘工具。）

慎重

□该逆变器可以与一个温度范围内的环境从14°-104°F(-10 ~ 40°C) 和95% 的

非 冷凝的相对湿度被使用。

□变频器必须在一个灰尘，气体，气雾和无湿气的环境中操作。

1.7 处置逆变器

慎重

□请小心处理本单位作为工业废弃物，并根据您的需要的地方法规。

□逆变主电路和印刷电路板的电容器被认为是有害废物，必须不被烧坏。

□变频器的塑料外壳和部件，如顶盖板会如果 焚 烧释放出有害气体。

第2章型号说明

2.1 铭牌数据

关键是要验证MA510变频器的铭牌，并确保在MA510逆变器有正确的评价，

因此它可以与适当大小的交流电机应用中使用。

拆开MA510逆变器和检查以下内容：

（1）MA510逆变器和速凝导向都包含在包中。

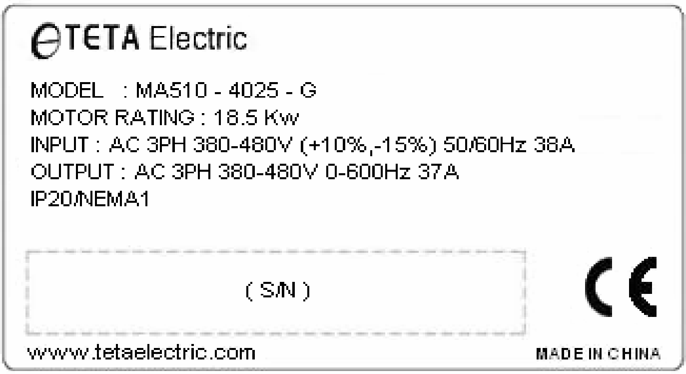
（2）MA510逆变器尚未在运输过程中损坏，应无凹陷或零件丢失。

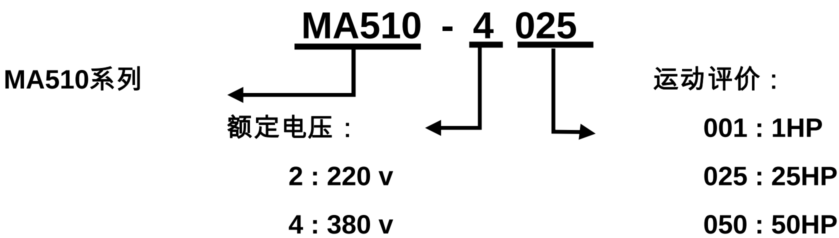
（3）MA510逆变器是您点的类型。您可以检查主铭牌上的型号和规格。

（4）检查输入电压范围满足输入功率要求。

（5）确保电机惠普与变频器的电机功率。

型号识别





2.2 变频器型号，电机额定功

型号	输入电压	额定功率 (kw)	额定输入电流(A)	额定输出电流 (A)	额定输出电流 (HP)
MA510-2001	3-相 220V -+ 15%	0.75	5	4.5	1
MA510-2002		1.5	7.7	7	2
MA510-2003		2.2	11	10	3
MA510-2005		4	17	16	5
MA510-2008		5.5	21	20	7.5
MA510-2010		7.5	31	30	10
MA510-2015		11	43	42	15
MA510-2020		15	56	55	20
MA510-2025		18.5	71	70	25
MA510-2030		22	81	80	30
MA510-2040		30	112	110	40
MA510-2050		37	132	130	50
MA510-2060		45	163	160	60
MA510-2075		55	181	190	75
MA510-4001	3-相 380V -+ 15%	0.75	3.4	2.5	1
MA510-4002		1.5	5	3.7	2
MA510-4003		2.2	5.8	5	3
MA510-4005		4	10	9	5
MA510-4008		5.5	15	13	7.5
MA510-4010		7.5	20	17	10
MA510-4015		11	26	25	15
MA510-4020		15	35	32	20
MA510-4025		18.5	38	37	25
MA510-4030		22	46	45	30

型号	输入电压	(kW)	定输入电流(A)	额定输出电流 (A)	额定输出电流 (HP)
MA510-4040	3-phase 380V -+ 15%	30	62	60	40
MA510-4050		37	76	75	50
MA510-4060		45	90	90	60
MA510-4075		55	105	110	75
MA510-4100		75	140	150	100
MA510-4125		90	160	176	125
MA510-4150		110	210	210	150
MA510-4175		132	240	250	175
MA510-4215		160	290	300	215
MA510-4250		185	330	340	250

第3章环境及安装

3.1 环境

变频器的安装环境直接影响其功能和使用寿命。因此，安装环境必须满足以下

条件：

适用环境	
工作温度	（10~40°C）（具有防尘保护盖打开，适用的工作温度（10~50°C）（满载）可以达到最大60°C）。但它需要降额额定电流的2%用于增加一度。 对于多台变频器并排安装在板上，请注意位置，以方便散热。
储存温度	(-20~70C)
湿度	相对湿度为5%至95%，游离的缩合或水滴。
冲击	最大加速度：1.2G（12米/ S2），从49.84到150赫兹 位移振幅：0.3毫米（峰值），由10~49.84赫兹

3.2 设备

安装地点

该产品应安装在便于操作的环境，避免被暴露在以下环境中

□避免阳光直射

□避免雨滴或潮湿的环境中

□避免油雾，盐的侵蚀

□避免腐蚀性液体和气体

□避免灰尘，绒毛纤维及金属细屑。

□防止电磁干扰（熔接机，动力机器）

□远离放射性物质及可燃物

□避免震动（冲床）。请添加防振垫，以减少振动，如果它不能避免

3.2.1 安装空间

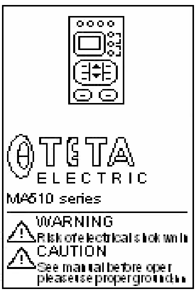
请安装MA510变频器在垂直方向上，留出足够的空间，保证散热效果，如下

图所示。避免上下颠倒或水平安装。

变频器散热器冷却的温度可能达到90°C运行。

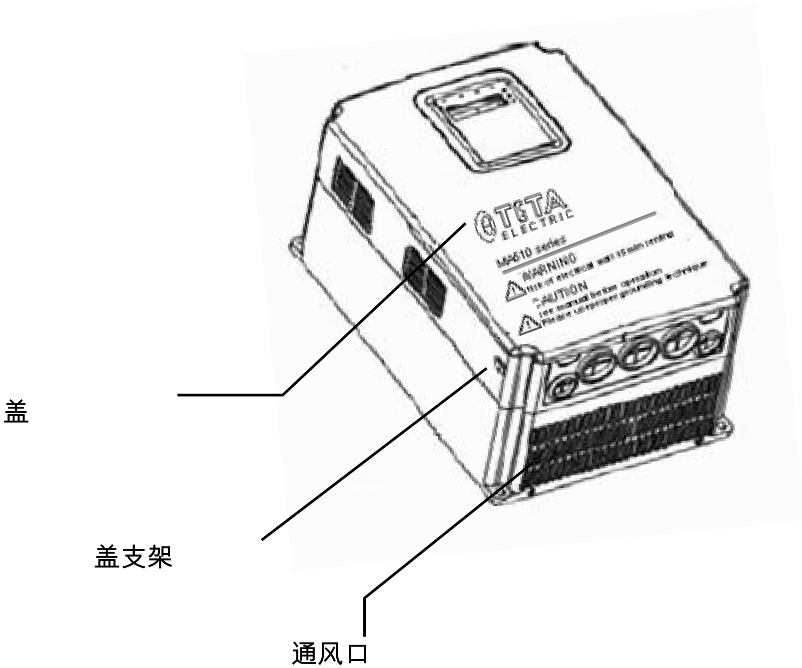
因此，接触表面为变频器安装由高温性材料制成。

当变频器在电力配电箱操作，环境一定要通风，环境温度必须小于+ 40°C。

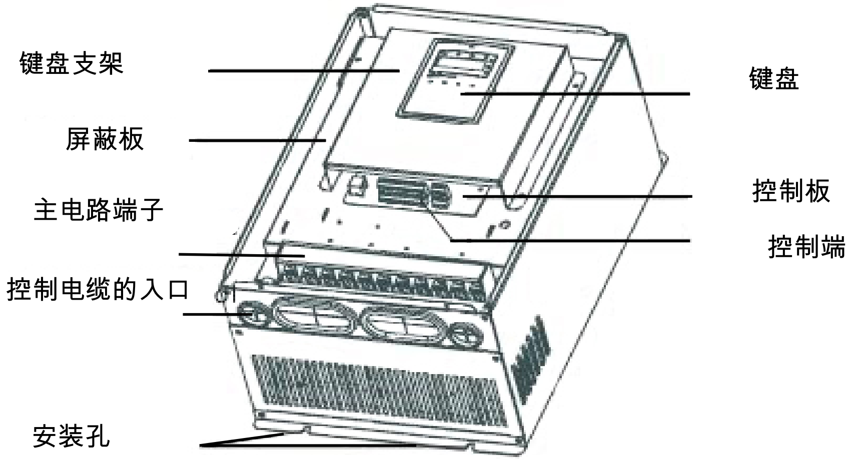


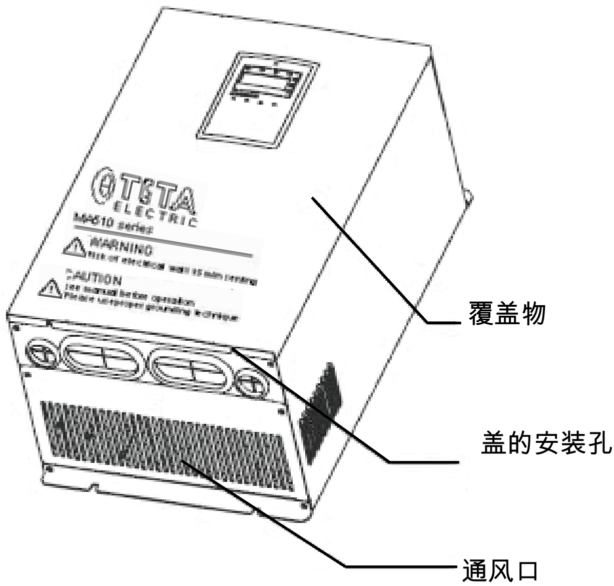
向上/向下	请留下150mm
左右侧	为18.5KW的逆变器容量（包括较小千瓦），推荐的最小宽度为100mm。 为22千瓦（包括较高千瓦）逆变器的容量，建议的最小宽度为200mm。

3.2.2外形图和零件描述



对于低于25惠普能力





对于上面的能力（包括）25 HP

3.2.2 外形图和零件描述

慎重
□不要安装或使用被损坏或故障配件的任何逆变器，否则可能发生人身伤害。 拆包逆变器后检查下列项目 1.检查变频器与电机的整个外，以确保没有划伤或损坏所造成的交通 2.确保有操作手册中的包装盒 3.检查铭牌，并确保它是您点什么。 4.确保可选的部分是你所需要的，如果你已经订购的。 请联系当地的代理商，如果有到逆变器或可选部件的损坏。

3.2.4拆卸与安装

慎重
□的主要部分的下落可能会造成人身伤害。 □逆变器被固定在一个不易燃的壁，例如金属和远离热源和易燃材料，以避免火灾。 □如果两个以上的驱动器安装在机柜，其温度应通过冷却风扇的装置是低于40。过热可能导致火灾或损坏驱动器。

只有合格的人才被允许驱动设备/系统上运行。忽略中的说明”，“警告”，“可能会导致严重的人身伤害或死亡或财产损失。1，电源被切断后，而”充电“指示灯逆变器仍在，这意味着电容尚未完成的排出。请勿触摸电路或在这个时候更换部件。

2.切勿线或拆卸/安装变频器内部连接器时，接通电源。

3.禁止连接的逆变器输出端子与交流电源的U，V和W。

变频器4.终端E必须良好接地。

5.由于半导体元件是由高压易损坏，不进行高耐压试验在MA510变频器内部元器件。

6.变频器控制板的 CMOS IC很容易受到影响，并通过静态破坏

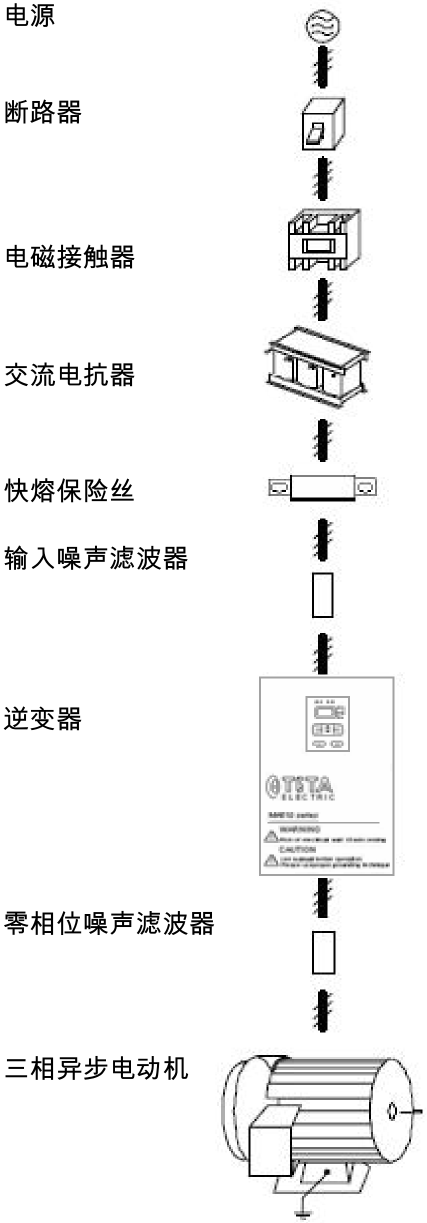
电力，因此，不要触摸控制板。

7.连接输入电源线连接紧固，久治不愈。

3.3 变频器的布线

3.3.1接线外围功率器件

配线MA510的周边装置的实例示于以下：



电磁接触器：它不能添加用于一般用途。然而，对于需要外部顺序控制或自动重启功能停电的应用程序，是必需的。请避免使用它变频器尽可能的起动/停止控制。

交流电抗器：如果进一步提高功率因数或抑制外来浪涌，交流电抗器可以另外配。

快熔保险丝：为了保护接口的设备。

输入噪声滤波器：当变频器 工作的 .EMC 过滤器的界面最大限度地减少周围的设备可能会受到干扰

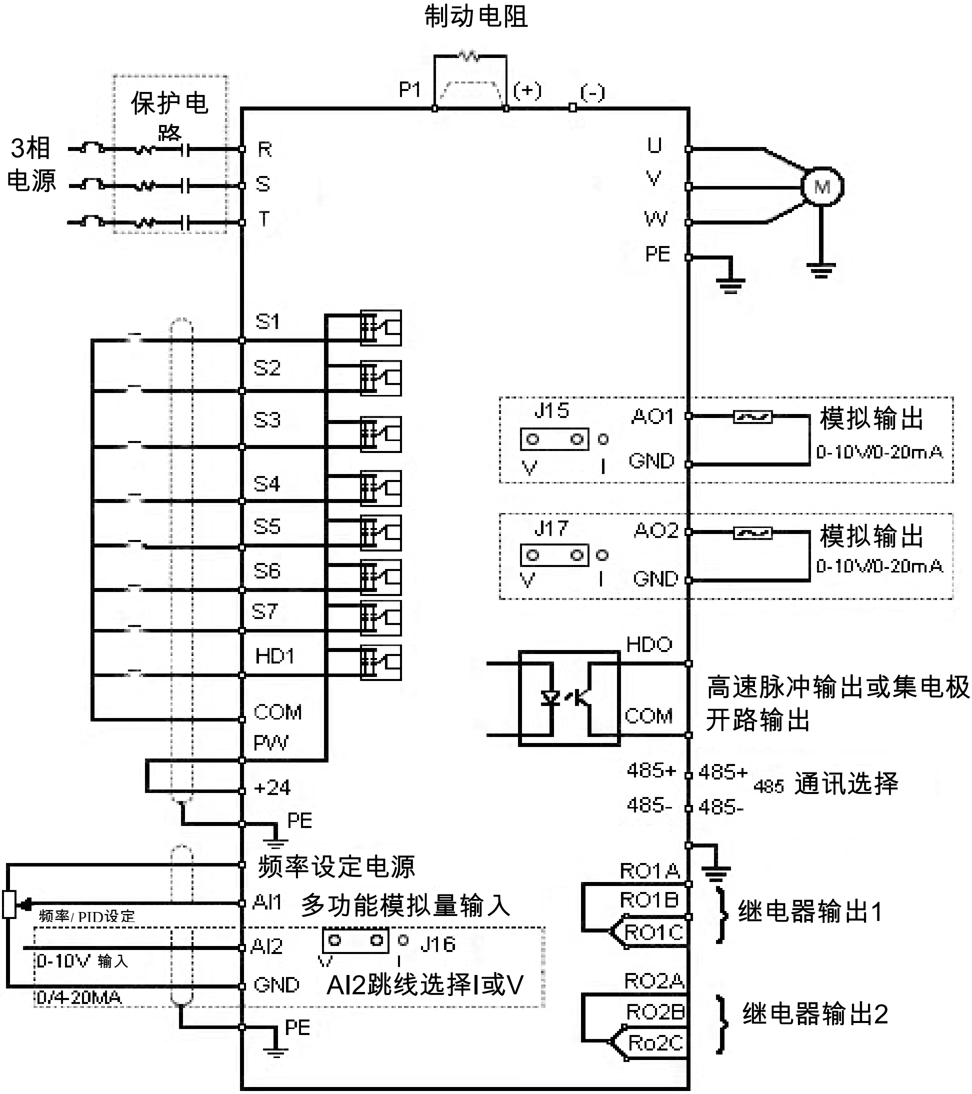
逆变：端子R，S，T，在输入侧具有无相位的要求，因此它们可以被任意交换。终端E必须良好接地

零相位噪声滤波器：在逆变器的输出侧添加此可以减少辐射接口和感应噪声。

电机：如果变频器驱动多台电机，变频器的额定电流应大于总电流大于所有电动机同时工作。电机和变频器必须分别接地。

3.3.2 一般接线图

以下是可能不同的标准接线图MA510 .地点和接线端子排的象征，由于不同的模式。



对于逆变器 ≥18.5千瓦

的380伏1只有主电路～20HP（ 量与内置制动电阻器模型提供

终端PB.The制动电阻可以直接在（+）和PB连接。
制动电阻器的导线长度应小于5米。
安装制动电阻时，请注意的Safty预防和流畅的通风，因为温度升高的散热。

的（+）和（ - ）的制动单元端子对应于（+）和（-）时的外部制动单元
被连接在逆变器的端子。

之间的布线长度的（+）和（ - ）的inerter的和终端的（+），（ - ）
的制动单元应该不超过5m和间BR1和BR2的分布长度和制动电阻器端子不应
该要大于10m。

慎重
确保的（+）电动极性（ - ）端子是正确的;它不允许连接（+）与（ - ） 直接端子，否则会损坏或可能发生火灾

3.3.3 端子说明

主要回路端子

Terminal	function discription
R S T	三相交流输入端子
(+) (-)	外置制动单元的备用端子
(+) PB	外接制动电阻的备用端子
P1 (+)	外部直流电抗器的备用端子
(-)	负直流母线端子
(+)	正直流母线端子
U V W	三相交流输出端子
⏚	的接地端子

FAMCO
هایپرصنعت

2 ~ 3 HP , 380 V

(+)	PB	R	S	T	U	V	W	⏚
		电力			汽车			

5 ~ 7.5 HP , 220 / 380 V

(+)	PB	(-)	R	S	T	U	V	W	⏚
			电力			汽车			

10 ~ 20 HP , 380 V / 10HP 220 V

⏚	(+)	PB	(-)	R	S	T	U	V	W	⏚
				电力			汽车			

25 ~ 150 HP , 380 V / 15 ~ 20 HP 220V

⏚	R	S	T	P1	(+)	(-)	U	V	W	⏚
	电力						汽车			

175 ~ 250 HP , 380 V

R	S	T	U	V	W
电力			汽车		

⏚	P1	(+)	(-)	⏚

控制回路端子

485+	485-	+10V	GND	S1	S2	S3	S4	S5	S6	S7
GND	AI1	AI2	AO1	AO2	COM	PW	+24V	COM	HDI	HDO

RO1A	RO1B	RO1C
RO2A	RO2B	RO2C

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روبروی پالایشگاه نفت پارس، پلاک ۱۲

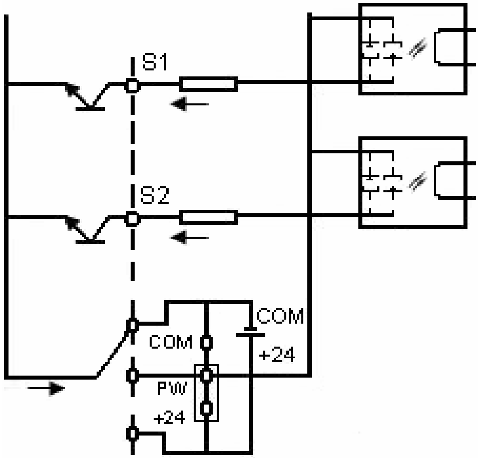
FAMCO
هایپرصنعت

类型	终桌站	终[illegible]	信号电平
数字输入	S1~S7	ON-OFF 信号输入，与PW和光耦合的COM	24VDC，8mA 光电耦合器 隔离（30V直流最大电压，3.3kΩ的输入阻抗）
24V 动力供应	(+24v)	数字信号源的共享点（PW 切换到源）	±15%，最大输出电流：150毫安（所有负载的总和）
	COM	数字信号的“通用终端（PW切换片）	
外部电源	PW**	（+24V）端连接到PW终端作为默认t*	默认值（+24V）
脉输入信号	HDI	脉冲或ON-OFFinput，与PW和光耦合COM	频率范围：0〜50kHz的输入电压：9〜30V输入阻抗：1.1KΩ
模拟输入信号	AI1	电压速度指令	（-10V〜+10V）输入阻抗：20KΩ
	AI2	多功能模拟输入端子转换由J16	从0V〜+10V/0〜20mA的输入阻抗：10KΩ（电压）/250Ω（电流）
	(+10v)	电源的速度设定	
	GND	模拟信号共享终端	
脉产量信号	HDO	高速脉冲或集电极开路输出。相应的公共端为COM	输出频率范围：0〜50kHz的
模拟产量信号	AO1	由J172〜3HP：AO1通过J15和AO2通过J14可以选择	输出范围：电压（0〜10V）电流（0〜20mA）的
	AO2		
RS-485 端口	+485	RS-485 / MODBUS***	光电耦合器隔离，差分输入和输出
	-485		

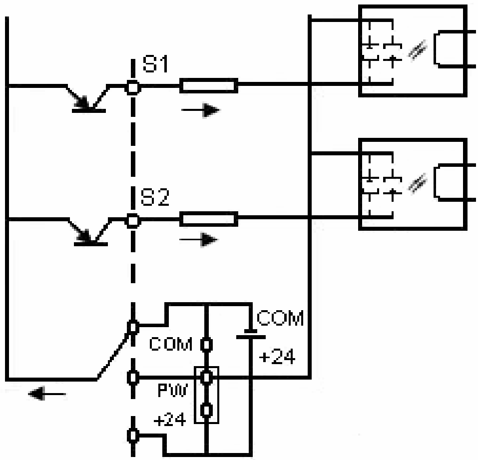
类型	终桌站	终	信号电平
继电器输出	RO1A	RO1常见	触点容量：AC 250V/3A DC 30V/1A
	RO1B	RO1常闭（NC）	
	RO1C	RO1常开（NO）	
	RO2A	RO2常见	
	RO2B	RO2常闭（NC）	
	RO2C	RO2常开（NO）	

*如果外部电源是必要的，断开连接（+24V）与PW端子和连接外部电源

**使用PW来设置下沉或源模式



沉模式



源模式

***请的标准通讯端口上使用双绞线和屏蔽电缆

跨接器	
J2，J4	据 被禁止 连接在一起，否则会引起变频器。
J16	开关 0〜10V和0〜20mA的输入 v连接到GND意味着电压输入 我连接到GND意味着电流输入
J15和J17 以上5HP	开关 0〜10V和0〜20mA输出 v连接到GND意味着电压输出 我连接到GND意味着电流输出
J14 和 J15 2HP~3HP	开关 0〜10V和0〜20mA输出 v连接到GND意味着电压输出 我连接到GND意味着电流输出
SW1	开关端接电阻的RS485通讯，拨至ON指连接到终端电阻器拨号时至OFF表示断开终端电阻。（仅适用于5HP以上）
J7	RS-485通信跳线
J17 和 J18 2HP~3HP	开关端接电阻的RS-485通讯。 跳线实现：连接终端电阻 跳线关闭：断开终端电阻

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3.3.4 配线注意事项

为控制终端的外部布线，请注意以下事项：

使用屏蔽或双绞线连接控制端子

连接到控制电缆应留远离主电路和强电线路（包括电源线，电机线，继电器，

接触器连线）20cm以上，并应避免平行布线。建议采用垂直布线，以防止外

部干扰引起变频器。

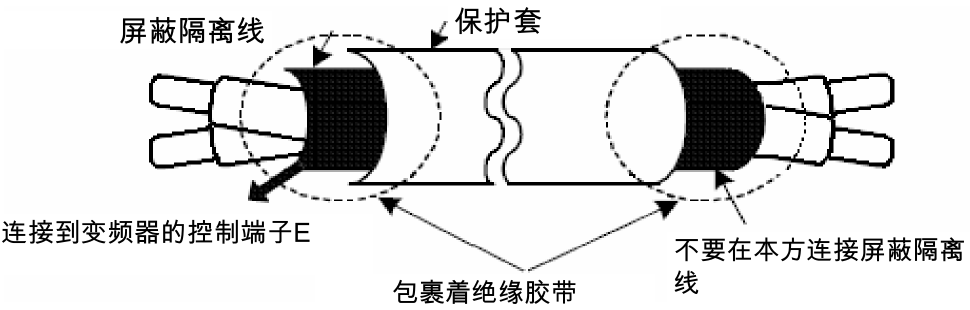
接点输出端子R1A，R1B，R1C（或R2A，R2B，R2C）必须从隔离

终端1～7，A01，A02，GND，HDO，COM，+ 10V，AI1，AI2，HD1接线时。

为了避免电气噪声的干扰，控制电路接线必须采用屏蔽隔离双绞线

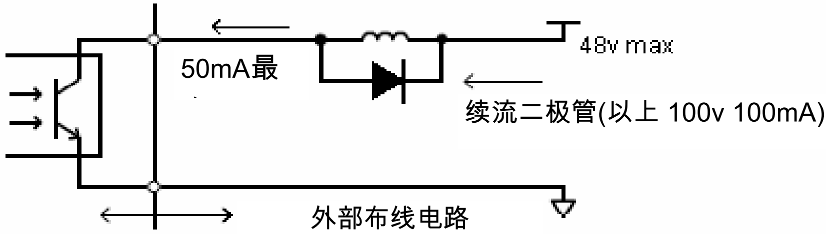
，请参考下面的示意图。

该布线距离不应超过50米。连接接地端子（PE）使用屏蔽电缆。



当连接多功能光耦至继电器的输出触点，它是必要的并联添加飞轮二极管给继

电器线圈的两侧，如图如下图。



对于主回路端子的接线，请注意以下事项：

它并不需要考虑输入功率R中的相序，S，T。

禁止连接的逆变器输出端子与交流电源的U，V和W。

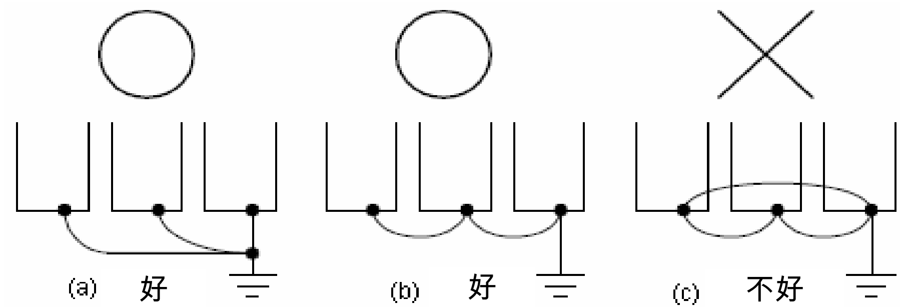
变频器输出端子U，V和W连接到电机端子U，V，W。如果逆变器执行正转指令，而马达旋转逆转方向，简单地交换的U，V的任何两根导线，W是不够的。

切勿将逆变器输出端连接电容器或LC，RC的噪声滤波器提高功率因数。

接地端子（E）是由第三类型接地方式接地至大地。（接地100Ω以下电阻）电流负载，-逆变器接地线不可与高接地作为焊接机和高功率马达等。它们必须接地分别。

接地导线规格如下电气设备技术规范短接地线，它是更好的。

若多台变频器共同接地，请参考以下图表接地。不要形成接地回路。



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确定导线规格：

当选择线，一个考虑的所造成的导线的电压降是一个必须。

电压降的计算如下所示。在一般情况下，电压降应控制在低于额定电压的2%。电线之间的电压降（V）=×丝

电阻（Ω/公里）×布线长度（m）×电流（A）×10-3

交流电抗器并联电源协调：

如果容量超过600KVA，请加交流电抗器来的输入端变频器串联。

AC电力可以用于协调功率和功率因数改进。

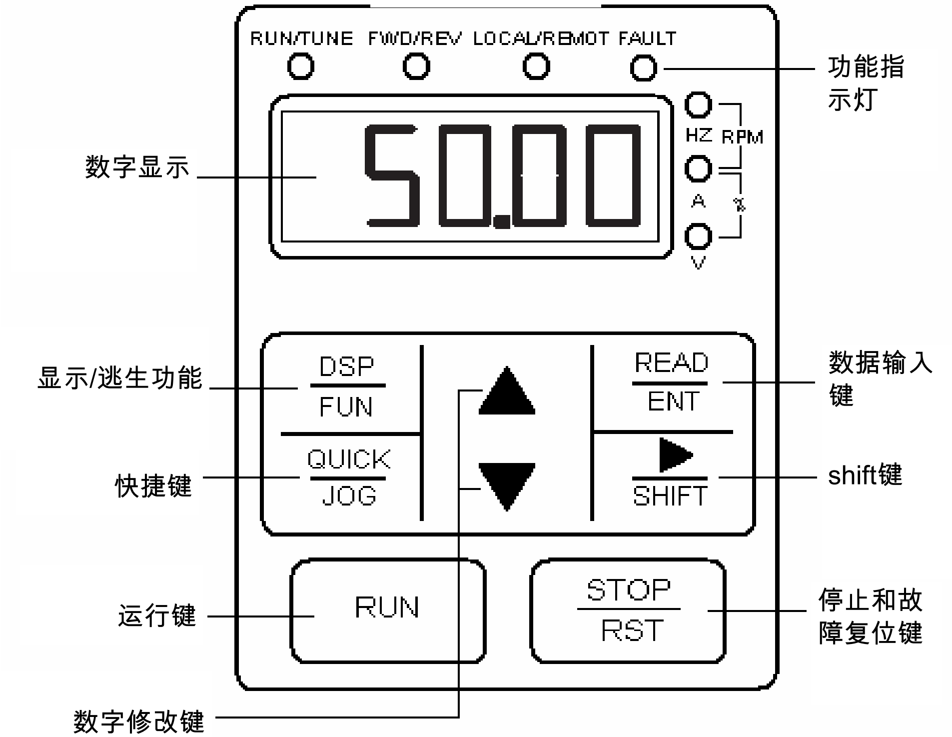
变频器和电机之间的接线长度：

如果逆变器和电机，逆变器自身和其他之间的总长度

外围设备将受到影响，因为逆变器的高频载波频率（在IGBT接通/断开切换频率）会增加接线和地之间的漏电流。其结果是，如果在逆变器和电动机之间的配线长度很长，请适度降低载波频率，如下所示。

之间的布线距离 逆变器和 马达	< 30m	30m ~ 50m	50m~100m	⩾ 100m
允许的载体 频率 （设置P0-14的值）	15kHz(最大)	10kHz(最大)	5kHz(最大)	2kHz(最大)

第4章键盘和编程功能



重点	命名	功能说明
DSP / FUN	显示功能/逃生	输入或从第一级菜单退出
READ / ENT	阅读回车键	逐步进入菜单，确认参数
▲	数字修改键	逐步增加的数据或功能码
▼	数字修改键	递减的数据或功能码
▶ / SHIFT	shift键	在参数设置模式下，按下此按钮可以选择位在其它模式进行修改，通过循环右移显示的参数

重点	命名	功能说明
RUN	运行关键	启动运行在键盘控制模式下，逆变器
STOP/RST	停止/复位键	在运行状态下，由P7.04注册，可以用来停止变频器。当故障报警，可用于复位变频器不受任何限制
QUICK/JOG	快捷键	确定由功能码P7.03： 0：显示状态切换 1：点动操作 2：在正向和反向开关 3：清除UP/ DOWN端子设置 4：快速调试模式
RUN + STOP/RST	组合键	按下 RUN 和 STOP/RST 并在 同时可以实现变频器自由停机

功能指示灯	描写
RUN/TUNE	熄灭：停止状态 闪烁：参数自整定状态 灯亮：工作状态
FWD/REV	消灭：正向运行 指示灯亮起：反向操作
LOCAL/REMOT	熄灭：键盘控制 闪烁：终端控制 点亮：通信控制

功能指示灯	描写
FAULT	熄灭：正常运行状态 闪烁：过载预警状态 逆变器故障：在光
HZ	频单元
A	目前单位
V	电压单元
RPM	转速单位
%	百分

4.4.1 键盘操作说明

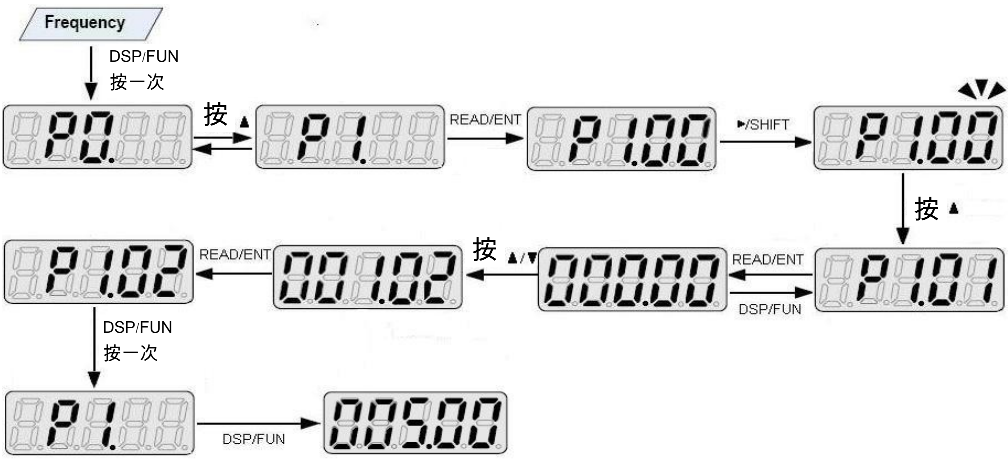
4.4.1.1参数设置

按任一 PRG/ESC 或 DATA/ENT 能返回第二个 -级菜单从第三级菜单

。所不同的是：按 DATA/ENT 将保存在控制面板的设定参数 ，然后 再

返回到第二级菜单与转移到下一个功能码.按 PRG/ESC 将返 回到第 二

级菜单不保存参数，并保持停留在当前功能码。



在第三个 - 级菜单，如果参数[illegible]着功能码不能被修改。

可能的原因可能是：

这个功能是不可修改参数，如实际检测的参数运行记录等。

这个功能是不可修改的运行模式。

快捷菜单 QUICK/JOG

快捷菜单提供了一种快速的方法来查看和修改功能参数。

设置P7.03为4，然后按 QUICK/JOG 键，变频器将搜 索这是 从出厂设置不同 ，保 存这些数据超过32 ，参数也无 法显 示过 长的部分。 按 QUICK/JOG 将快捷调试模式 。如果 QUICK/JOG 显示“NULLP” ，这意味着该参 数是相同的出厂设置 。 如果 想返回到上显示，按 QUICK/JOG

故障复位

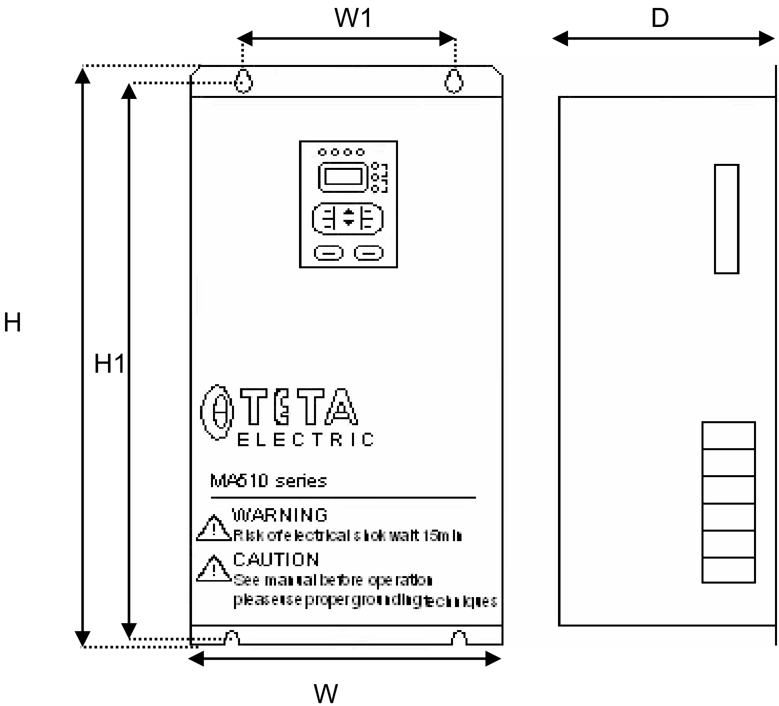
如果发生到逆变器故障，它会通知相关故障信息.用户可以使用STOP/ RST或P5组确定复位故障根据终端。

故障复位以后，变频器处于待机 - 由国家。如果用户不复位故障逆变器将在操作中保护状态，而无法运行。

第5章外形尺寸图

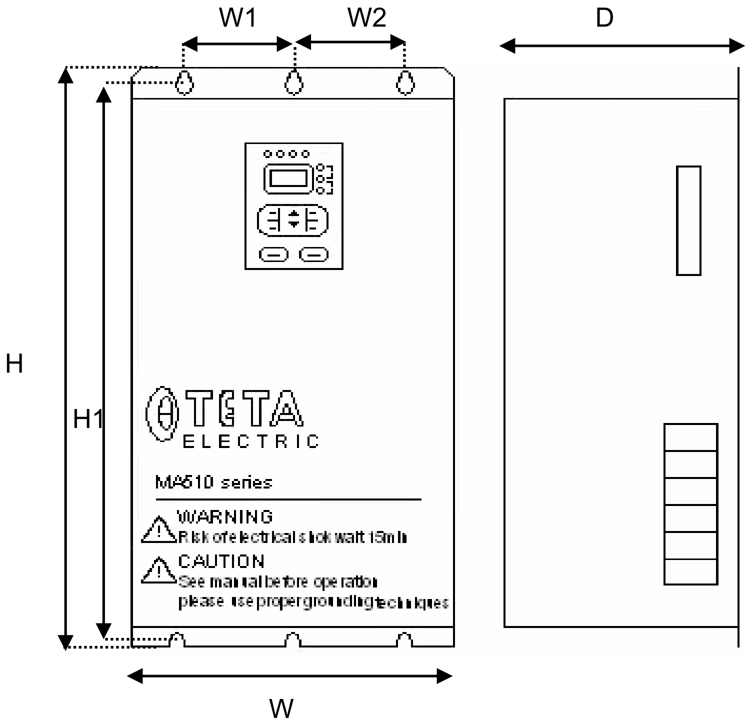
标准型

(a) 380V : 20HP ~ 40HP



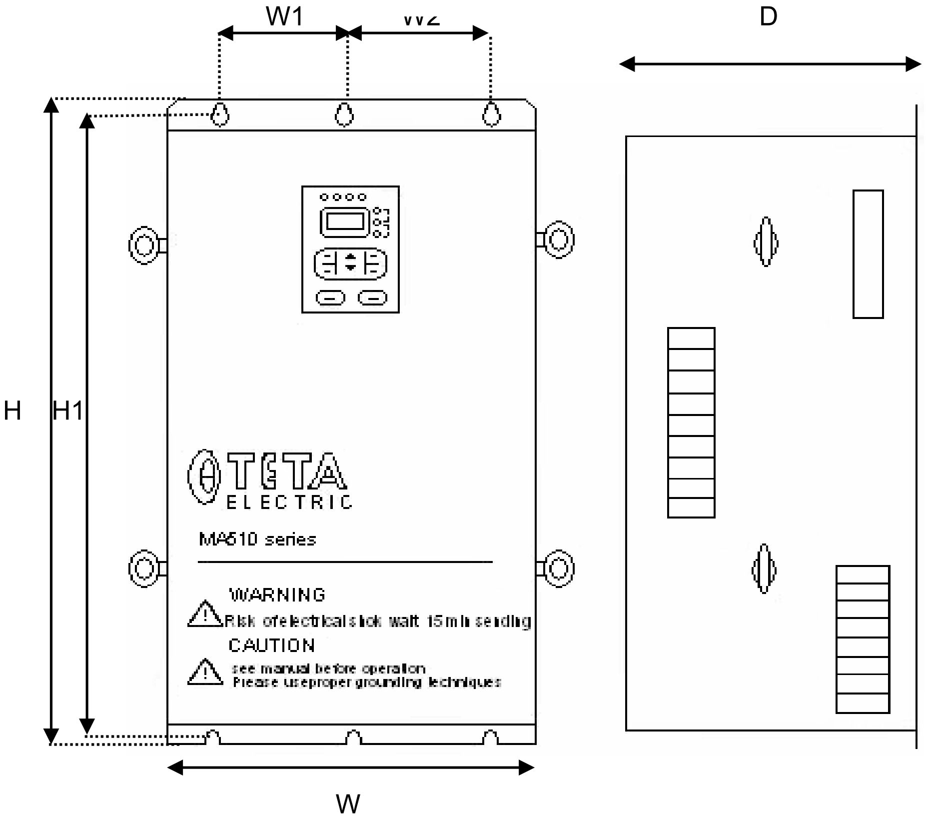
变频器型号	尺度 (mm)					
	W	H	D	W1	H1	GW(kg)
MA510 4025	290	470	215	175	460	12
MA510 4030	290	470	215	175	460	12
MA510 4040	290	470	215	175	460	12

(b) 380V : 50HP ~ 75HP



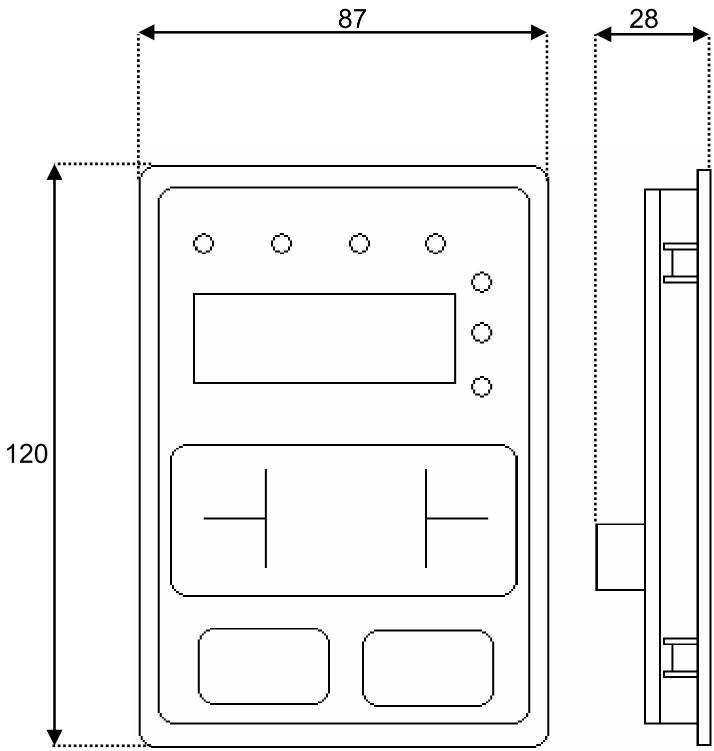
变频器型号	尺度 (mm)					
	W	H	D	W1/W2	H1	GW(kg)
MA510 4050	375	585	270	115	665	36
MA510 4060	375	585	270	115	665	36
MA510 4075	375	585	270	115	665	36

(c) 380V : 100HP ~ 150HP



变频器型号	尺度 (mm)					
	W	H	D	W1/W2	H1	GW(kg)
MA510 4100	460	755	330	160	735	48
MA510 4125	460	755	330	160	735	48
MA510 4150	460	755	330	160	735	50

键盘尺寸



型号	输入电压	制动电阻	使用数	制动单元	使用数
MA510-2002	3-相 220V -+ 15%	260W/130Ω	1	----	0
MA510-2003		260W/80Ω	1	----	0
MA510-2005		400W/48Ω	1	----	0
MA510-2008		550W/35Ω	1	----	0
MA510-2010		780W/26Ω	1	----	0
MA510-2015		1100W/17Ω	1	----	0
MA510-2020		1800W/13Ω	1	----	0
MA510-2025		2000W/10Ω	1	70	1
MA510-2030		2500W/8Ω	1	80	1
MA510-2040		1800W/13Ω	2	110	2
MA510-2050		2000W/10Ω	2	130	2
MA510-2060		2500W/8Ω	2	160	2
MA510-2075		3000W/6.5Ω	2	190	2
MA510-4002	3-相 380V -+ 15%	260W/400Ω	1	----	0
MA510-4003		390W/150Ω	1	----	0
MA510-4005		390W/150Ω	1	----	0
MA510-4008		520W/100Ω	1	----	0
MA510-4010		1040W/50Ω	1	----	0
MA510-4015		1040W/50Ω	1	----	0
MA510-4020		1560W/40Ω	1	----	0
MA510-4025		6000W/20Ω	1	37	1
MA510-4030		6000W/20Ω	1	45	1
MA510-4040		6000W/20Ω	1	60	1
MA510-4050		9600W/13.6Ω	1	75	1
MA510-4060		9600W/13.6Ω	1	90	1
MA510-4075		9600W/13.6Ω	1	110	1

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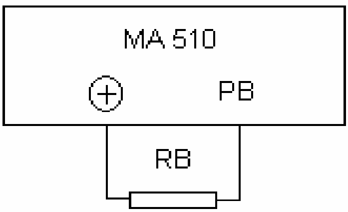
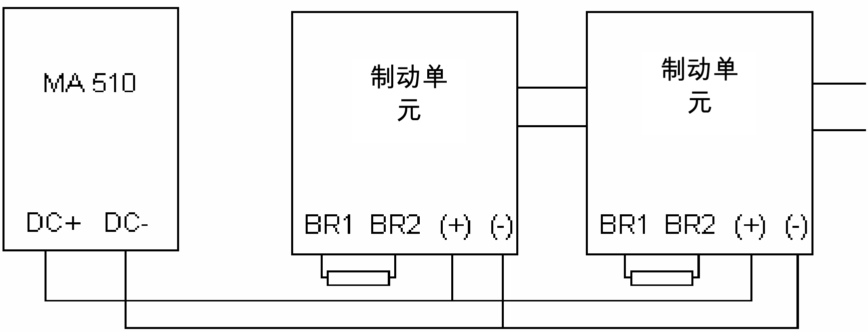
型号	输入电压	定	入电流	额定输出电流	支持汽车
MA510-4100		9600W/13.6Ω	2	150	2
MA510-4125		9600W/13.6Ω	2	176	2
MA510-4150		9600W/13.6Ω	2	210	2
MA510-4175		3000W/4Ω	1	250	1
MA510-4215		3000W/4Ω	1	300	1
MA510-4250		4000W/3Ω	1	340	1

在制动模块和制动电阻的安装，你需要不断的从逆变器适当距离，并保持安装环境的良好通风。

根据公司提供的数据选择制动单元的电阻和功率。



外接制动电阻



外部制动单元并联

第7章参数表

参数组	命名
P0集团	基本职能
P1组	启动和停止控制
P2组	电机参数
P3组	矢量控制
P4组	V / F控制
P5组	输入端子
P6组	输出端子
P7组	人机界面
P8组	增强功能
P9组	PID控制
PA集团	简易PLC及多段速控制
PB集团	保护功能
PC集团	串行通信
PD组	辅助功能
PE组	出厂设置

P0组：基本功能

功能代码	名称	说明	设定范围	默认
P0.00	控制	0：V / F控制 1：无传感器矢量控制 2：转矩控制(无传感器矢量控制）	0~2	0
P0.01	跑命令资源	0：键盘（LED熄灭） 1：端子（LED闪烁） 2：通讯（LED灯）	0~2	0
P0.02	键盘和终桌站 UP/ DOWN 环境	0：有效，节约UP/ DOWN值 当电源关闭 1：有效，不保存UP/DOWN值时，关闭电源 2：无效 3：运行期间有效，清楚何时停止	0~3	0
P0.03	最大频率	10.00~400.00Hz	10.00 ~ 400.00Hz	50.00Hz
P0.04	最大频率	P0.05~P0.03（最高频率）	P0.05 ~ P0.03	50.00Hz
P0.05	频率上限	0.00~P0.04（下限频率）	P0.05 ~ P0.04	0.00Hz
P0.06	键盘参考频率	0.00~P0.03（最高频率）	0.00 ~ P0.03	50.00Hz

功能代码	名称		设定范围	默认
P0.07	频次 A 命令源	0：键盘 1：AI1 2：AI2 3：HDI 4：简易PLC 5：多段速 6：PID 7：远程通讯	0~7	0
P0.08	频次 B 命令源	0: AI1 1: AI2 2: HDI	0~2	0
P0.09	的规模频率B 命令	0：最高频率 1：频率命令	0~1	0
P0.10	频率指令选 择	0: A 1: B 2: A+B 3: Max(A and B)	0~3	0
P0.11	加速时间0	0.1~3600.0s	0.1 ~ 3600.0s	依靠 模型
P0.12	减速时间0	0.1~3600.0s	0.1 ~ 3600.0s	依靠模型
P0.13	跑方向选择	0：前锋 1：反转转 2：禁止反转	0~2	0
P0.14	运营商频率	1.0~15.0kHz	1.0 ~ 15.0kHz	依靠模型

功能代码	名称		设定范围	默认
P0.15	AVR功能	0：无效 1：有效的所有的时间 2：只在减速有效	0~2	1
P0.16	汽车参数自动调整	0：无动作 1：旋转自动调整 2：静态自学习	0~3	2
P0.17	恢复参数	1：恢复出厂设置 2：清除故障记录	P0.17	P0.17
P1组：启动和停止控制				
P1.00	启动模式	0：直接启动 1：直流制动和启动 2：转速追踪再启动	0.2	0
P1.01	启动频率	0.00~10.00Hz	0.00 ~ 10.00	0.00Hz
P1.02	保持起动频率时间	0.0~50.0s	0.0~50.0	0.0s
P1.03	直流制动电流之前开始	0.0~150.0%	0.0~150.0	0
P1.04	直流制动时间开始前	0.0~50.0s	0.0~50.0	0.0s
P1.05	促进减速模式	0：直线 1：保留	0~1	0

功能代码	名称		设定范围	默认
P1.06	停止模式	0：减速停止 1：自由停车	0~1	0
P1.07	直流制动起动频率	0.00~P0.03	0.00 ~ P0.03	0.00Hz
P1.08	直流制动前的等待时间	0.0~50.0s	0.0~50.0	0.0s
P1.09	直流制动电流	0.0~150.0s	0.0~150.0	0
P1.10	直流制动时间	0.0~50.0s	0.0~50.0	0.0s
P1.11	FWD/REV的死区时间	0.0~3600.0s	0.0 ~ 3600.0	0.0s
P1.12	操作时运行频率小于频率下限（有效时频率下限为大于0）	0：运行在较低的频率30 限 1：停止 2：待机	0~2	0

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功能代码	名称		设定范围	默认
P1.13	延迟时间重启	0.0~3600.0s (有效时 P1.12=2)	0.0 ~ 3600.0	0
P1.14	断电后重新启动	0：禁用 1：启用	0~1	0
P1.15	等待重启的时间	0.0~3600.0s (有效时 P1.14=1)	0.0 ~ 3600.0	0.0s
P1.16	终端检测到选择当电源开启	0：禁用 1：启用	0~1	0
P1.17	版权所有			
P1.18	版权所有			
P1.19	版权所有			
P2组：电机参数				
P2.00	逆变器模型	0：G型 1：P型	0~1	依靠模型
P2.01	电机额定功率	0.4~900.0kW	0.4 ~ 3000.0	依靠模型
P2.02	电机额定频率	0.01Hz~P0.03	10.00 ~ P0.0	50.00Hz
P2.03	电机额定速度	0~36000pm	0.0 ~ 3600.0	依靠模型
P2.04	电机额定电压	0~800V	0~800	依靠模型
P2.05	电机额定当前	0.8~6000.0A	0.8 ~ 6000.0	依靠模型

功能代码	名称		设定范围	默认
P2.06	电机定子电阻	0.001~65.535Ω	0.001 ~ 65.535	依靠模型
P2.07	电机转子电阻	0.001~65.535Ω	0.001 ~ 65.535	依靠模型
P2.08	发动机泄漏电感	0.1~6553.5mH	0.1 ~ 6553.5	依靠模型
P2.09	发动机泄漏电感	0.1~6553.5mH	0.1 ~ 6553.5	依靠模型
P2.10	空载电流	0.1~6553.5A	0.1 ~ 6553.5	依靠模型
P3组 ：矢量控制				
P3.00	ASR 成比例的获得的Kp1	0~100	0~100	20
P3.01	ASR积分时间的Kp1	0.01~10.00s	0.01 ~ 10.00	0.50S
P3.02	ASR 交换点1	0.00Hz~P3.05	0.00 ~ P3.05	5.00Hz
P3.03	ASR 成比例的获得KP2	0~100	0~100	25
P3.04	ASR积分时间KP2	0.01~10.00s	0.01 ~ 10.00	1.00s

功能代码	名称		设定范围	默认
P3.05	ASR 交换 2点	P3.02~P0.03 (最大频率)	P3.02 ~ P0.03	10.00Hz
P3.06	滑VC补偿费	50.0%~200.0%	50~200	100%
P3.07	转矩上限	0.0~200% (的额定电流)	0.0~200.0	G 型: 150.00% P 型: 120.00%
P3.08	扭力 环境 资源	0: 0：键盘（ 相当于P3.09 ） 1: AI1 2: AI2 3: HDI 4: 多段速 5:远程通讯 (1~5: 100% 对应 于逆变器 的额定电流的2倍)	0~5	0
P3.09	键盘扭矩设置	(-200.0%~200.0%) （ 逆变器的额定电流 ）	(-200.0% ~200.0%)	50.00%
P3.10	上限频率设定源	0：键盘（ P0.04 ） 1: AI1 2: AI2 3: HDI 4：多段 5:远程通信（ 1～4：100%对应最大频率 ）	0~5	0

P4组：V / F控制

功能代码	名称	说明	设定范围	默认
P4.00	V / F 曲线选择	0：线性曲线 1：Multidots曲线 2：torque_stepdown曲线 （1.3顺序） 3：Torque_stepdown曲线 （1.77顺序） 4：Torque_stepdown曲线 （2.0顺序）	0~4	0
P4.01	转矩提升	（自动）0.1%～10.0%	0.0 ~ 10.0	0.00%
P4.02	转矩提升截止f	0.0%～50.0% （电机额定频率）	0.0 ~ 50.0	20.00%
P4.03	V / F频率1	0.00Hz~P4.05	0.00 ~ P4.05	0.00Hz
P4.04	V / F电压1	0.0%~100.0% (电机的额定电压)	0.0 ~ 100.0	0.00%
P4.05	V / F频率2	P4.03~P4.07	P4.03 ~ P4.7	0.00Hz
P4.06	V / F电压2	0.0%~100.0% (电机的额定电压)	0.0 ~ 100.0	0.00%
P4.07	V / F频率3	P4.05~ P2.02 (电机的额定频率)	P4.05 ~ P2.02	00.00Hz
P4.08	V / F电压3	0.0%~100.0% (电机的额定电压)	0.0 ~ 100.0	0.00%
P4.09	滑差补偿限额	0.00~200.0%	0.0~200	0.00%

功能代码	名称		设定范围	默认
P4.10	自动节能选择	0: 禁用 1: 启用	0~1	0
P4.11	抑制振荡低频阀值	0~10	0~10	2
P4.12	抑制振荡的高频阈值	0~10	0~10	0
P4.13	抑制振动的边界	0.0~P3.03	0.00 ~ P0.03	30.00Hz
P5组 ：输入端子				
P5.00	HDI选择	0：高速脉冲输入 1：ON-OFF输入	0~1	0
P5.01	S1端子功能	0：无效 1：正向	0~39	1
P5.02	S2端子功能	2：反转 3：3线控制	0~39	4
P5.03	S3端子功能	4：点动正 5：反转点动	0~39	7
P5.04	S4端子功能	6：自由停车 7：故障复位	0~39	0
P5.05	S5端子功能	8：暂停运行 9：外部故障输入	0~39	0

<table>
<tr><th>功能代码</th><th>名称</th><th></th><th>设定范围</th><th>默认</th></tr>
<tr><td>P5.06</td><td>S6端子功能</td><td rowspan="3">10：UP指令
11：DOWN指令
12：清除UP / DOWN
13：A和B之间切换
14：A和A + B之间切换
15：B和A + B之间切换
16：多段速定1
17：多段速给定2
18：多段速定3
19：多段速定4
20：多段速暂停
21：加速/减速时间选择1
22：加速/减速时间选择2
23：重设简易PLC时停止
24：暂停简易PLC
25：暂停PID
26：暂停遍历操作
27：暂停遍历操作
28：重设计数器
29：复位长度
30：加/减速斜坡保持
31：计数器输入
32：UP / DOWN暂时无效
33-39：保留</td><td>0~39</td><td>0</td></tr>
<tr><td>P5.07</td><td>S6端子功能</td><td>0~39</td><td>0</td></tr>
<tr><td>P5.08</td><td>HDI端子功能</td><td>0~39</td><td>0</td></tr>
<tr><td>P5.09</td><td>ON-OFF 滤波时间</td><td>1~10</td><td>1~10</td><td>5</td></tr>
</table>

功能代码	名称		设定范围	默认
P5.10	终端控制模式	0：2线控制模式1 1：2线控制模式2 2：3线控制模式1 3：三线式控制模式2	0~3	0
P5.11	UP/ DOWN 设定变化率	0.01~50.00Hz/s	0.01~50.00	0.50Hz/s
P5.12	AL1下限	0.00V~10.00V	-10.00~10.	0.00V
P5.13	AL1 相应设置下限	-100.0%~100.0%	-100.0~100	0.00%
P5.14	AL1下限	0.00V~10.00V	-10.00~10.	10.00V
P5.15	AL1下限对应的设定	-100.0%~100.0%	-100.0~100	100.00%
P5.16	AL1滤波器时间常数	0.00s~10.00s	0.00~10.00	0.10s
P5.17	AL2下限	0.00V~10.00V	0.00~10.00	0.00V
P5.18	AL2下限对应的设定	-100.0%~100.0%	-100.0~100	0.00%

功能代码	名称		设定范围	默认
P5.19	AL2上限	0.00V~10.00	0.000~10.0	10
P5.20	AL2上限对应设置	-100.0%~100.0%	-100.0~100	100.00%
P5.21	AI2滤波时间常数	0.00s~10.00s	0.00~10.00	0.10s
P5.22	HDI下限	0.0kHz	0.00~50.00	0.00kHz
P5.23	HDI下限对应的设定	-100.0%~100.0%	-100.0~100	0.00%
P5.24	HDI上限	0.0kHz~50.0kHz	0.00~50.00	50.00kHz
P5.25	HDI下限设定	-100.0%~100.0%	-100.0~100	100%
P5.26	HDI滤波器时间常数	0.00s~10.00s	0.00~10.00	0.10s
P6组 ：输出端子				
P6.00	HDO选择	0：无输出 1：运行 2：正向运行 3：运行反 4：故障输出	0~1	0
P6.01	HDO ON-OFF输出选择		0~20	1

功能代码	名称		设定范围	默认
		5：FDT达到 6：频率到达 7：零速运行 8：预置计数值达到 9：指定计数值达到 10：长度达到 11：简易PLC阶段完成 12：PLC 周期 完成 13：运行时间达到		
P6.02	继电器1输出选择	14：上限频率到达 15：下限频率达到 16：阅读	0~20	4
P6.03	继电器2输出选择	17：辅助电机1日开始 18：辅助电机2开始 19～20：保留	0~20	0
P6.04	AO1功能选择	0：运行频率 1：参考频率 2：转速	0-10	0
P6.05	AO2功能选择	3：输出电流 4：输出电压	0-10	0
P6.06	HDO功能选择	5：输出功率 6：输出转矩 7：AL1电压 8：的AI2电压/电流 9：HDI频率	0-10	0
P6.07	AO1下限	0.0%~100%	0.0~100.0	0.00%

功能代码	名称		设定范围	默认
P6.08	AO1下限对应的输出	0.00V~10.00V	0.00~10.00	0.00V
P6.09	AO1上限	0.00V~10.00V	0.0~100.0	100.00%
P6.10	AO1上相应限制输出	0.00V~10.00V	0.00~10.00	10.00V
P6.11	AO2下限	0.0~100.0%	0.0~100.0	0.00%
P6.12	AO2下限对应的输出	1~10.00V	0.00~10.00	0.00V
P6.13	AO2上限	0.0~100.0%	0.0~100.0	100.00%
P6.14	AO2上相应限制输出	0.00~10.00V	0.00~10.00	10.00V
P6.15	HDO下限	0.00%~100.00%	0.00~100.0	0.00%
P6.16	HDO下限对应的输出	0.000~50.000KHz	0.000~50.0	0.00KHz

功能代码	名称		设定范围	默认
P6.17	HDO上限	0.00%~100.00%	0.000~100.	100.00%
P6.18	HDO上限对应的输出	0.0~50.0KHz	0.000~50.0	50.00KHz
P7组：人机界面				
P7.00	用户密码	0~65535	0~65535	0
P7.01	储备		版权所有	版权所有
P7.02	储备		版权所有	版权所有
P7.03	QUICK/ JOG功能选择	0：显示状态切换 1：点动 2：FWD / REV切换	0~4	0
		3：清除UP / DOWN设定 4：快速设置模式		
P7.04	STOP/ RST功能选择	0：有效键盘控制（P0.03 = 0） 1：有效时，键盘或端子控制（P0.03 = 0 OR 1） 2：有效时，键盘或通讯控制（P0.03 = 0或2） 3：始终有效	0~3	0
P7.05	键盘显示选择	0：优先于外部键盘 1：这两种显示，只有外部密钥有效 2：两个显示，只有本地密钥有效	0~3	0

功能代码	名称		设定范围	默认
		3：显示和按键有效。		
P7.06	运行状态显示选择1	0～0XFFFF 位0：运行频率 BIT1：参考频率 位2：直流母线电压 BIT3：输出电压 位4：输出电流 位5：转速 位6：线速度 BIT7：输出功率 BIT8：输出转矩 BIT9：PID预设 BIT10：PID反馈 BIT11：输入端子状态 BIT12：输出端子状态 BIT13：转矩设定值 BIT14：计数值	0~0XFFFF	0X07FF
P7.07	运行状态显示选择2	0～0XFFFF 位0：AI1 BIT1：AI2 位2：HDI频率 BIT3：电机负载百分比 位4：变频器负载百分比 第5～15：保留	0~0XFFFF	0

功能代码	名称		设定范围	默认
P7.08	停机状态显示的选择	0～0xFFFFF BIT0：给定频率 BIT1：直流母线电压 BIT2：输入端子状态 BIT3：输出端子状态 BIT4：PID设定 BIT5：PID反馈 BIT6：AI1 BIT7：AI2 BIT8：HDI频率 BIT9：步骤 PLC或多步 BIT10：转矩设定值 BIT11～BIT15：保留	0~0XFFFF	0x00ff
P7.09	旋转速度的系数	0.0～999.9% 实际机械速度= 120 *输出频率* 电机的极P7.09 /数	0.1~999.9	100.00%
P7.10	线速度系数	0.0～999.9% 线速度=实际 机械转速* P7.10	0.1~999.9	1.00%
P7.11	整顿模块温度	0～100.0		
P7.12	IGBT模块温度	0～100.0		

<table>
<tr><th>功能代码</th><th>名称</th><th></th><th>设定范围</th><th>默认</th></tr>
<tr><td>P7.13</td><td>软件版本</td><td></td><td></td><td></td></tr>
<tr><td>P7.14</td><td>变频器额定功率</td><td>0.4～3000.0KW</td><td>0.4~3000.0</td><td>依靠模型</td></tr>
<tr><td>P7.15</td><td>变频器额定电流</td><td>0.0～6000.0A</td><td>0.0~6000.0</td><td>依靠模型</td></tr>
<tr><td>P7.16</td><td>累计运行时间</td><td>0～65535H</td><td></td><td></td></tr>
<tr><td>P7.17</td><td>第三次故障类型</td><td rowspan="3">0：不断裂
1：IGBT PH-U故障（OUT1）
2：IGBT PH-V故障（OUT1）
3：IGBT PH-W故障（OUT1）
4：过电流时，加速度（OC1）
5：过电流时，减速（OC2）
6：过电流,当恒 高速运行（OC3）
7：过电流时的加速度 （OV1）
8：过电流时，减速（OV2）
9：过电流时,恒高速运行（OV3）
10：DC总线欠压（UV）
11：电机过载（OL1）
12：变频器过载（OL2）</td><td></td><td></td></tr>
<tr><td>P7.18</td><td>第二次故障类型</td><td></td><td></td></tr>
<tr><td>P7.19</td><td>最新的故障类型</td><td></td><td></td></tr>
</table>

功能代码	名称		设定范围	默认
		13：输入缺相故障（SPO） 14：输出缺相（SPO） 15：整顿过热（OH1） 16：IGBT过热（OH） 17：外部故障（EF） 18：通讯故障（CE） 19：电流检测故障（ITE） 20：自动调谐故障（TE） 21：EEPROM故障（EEP） 22：PID反馈故障（PIDE） 23：制动单元故障（BCE） 24：运行时间到达（END） 25：转矩故障（OL3）		
P7.20	输出频率电流故障			
P7.21	输出电流的电流故障			
P7.22	在当前故障母线电压			
P7.23	在当前故障输入端子状态			
P7.24	在当前故障输出端子状态			

P8组：增强功能

功能代码	名称	说明	设定范围	默认
P8.00	加速时间1	0.1~3600.0s	0.1~3600.0	依靠模型
P8.01	减速时间1	0.1~3600.0s	0.1~3600.0	依靠模型
P8.02	加速时间2	0.1~3600.0s	0.1~3600.0	依靠模型
P8.03	减速时间2	0.1~3600.0s	0.1~3600.0	依靠模型
P8.04	加速时间3	0.1~3600.0s	0.1~3600.0	依靠模型
P8.05	减速时间3	0.1~3600.0s	0.1~3600.0	依靠模型
P8.06	点动参考	0.0~P0.03	0.00~P0.03	5.00Hz
P8.07	点动加速时间	0.1~3600.0s	0.1~3600.0	依靠模型
P8.08	点动减速时间	0.1~3600.0s	0.00~P0.03	依靠模型
P8.09	跳过频率1	0.00~P0.03	0.00~P0.03	0.00Hz
P8.10	跳过频率2	0.00~P0.03	0.00~P0.03	0.00Hz
P8.11	跳跃频率宽度	0.00~P0.03	0.00~P0.03	0.00Hz
P8.12	特拉弗斯幅度	0.0~100.0%	0.0~100.0	0.00%

功能代码	名称		设定范围	默认
P8.13	抖动频率	0.0~50.0%	0.0~50.0	1.00%
P8.14	上升遍历时间	0.1~3600.0s	0.1~3600.0	5.0s
P8.15	秋季遍历时间	0.1~3600.0s	0.1~3600.0	5.0s
P8.16	自动复位时间	0~3	0~3	0
P8.17	复位的时间间隔	0.1~100.0s	0.1~100.0	1.0s
P8.18	预置计数值	P8.19~65535	P8.19~655	0
P8.19	指定的计数值	0~P8.18	0~P8.18	0
P8.20	预设运行时间	0~65535	0~65535	65535h
P8.21	FDT电平	0.00~P0.03	0.00~P0.03	50.00Hz
P8.22	FDT滞后	0.0~100.0%	0.0~100.0	5.00%
P8.23	频率到达检测范围	0.0~100.0% (最高频率)	0.0~100.0	0.00%
P8.24	下垂控制	0.00~10.00Hz	0.00~10.00	0.00Hz
P8.25	制动阈值电压	115.0~140.0%	115.0~140	130.00%
P8.26	冷却风扇控制	0：自动停止模式 1：始终工作	115.0~140	120.00%

功能代码	名称		设定范围	默认
P8.27	过调制	0：启用 1：禁用	0~1	0
P8.28	PWM模式	0：PWM模式1 1：PWM模式2 2：PWM模式3	0~1	0
P9组：PID控制				
P9.00	PID设定源选择	0：键盘 1：AI1 2：AI2 3：HDI 4：多段 5：远程通讯	0~5	0
P9.01	键盘PID预设	0.0%～100.0%	0.0~100.0	0.00%
P9.02	PID反馈源选择	0：AI1 1：AI2 2：AI1+ AI2 3：HDI 4：通信	0~3	0
P9.03	PID输出特性	0：正 1：负	0~1	0
P9.04	比例增益（KP）	0.00~100.00	0.00~100.0	0.10s
P9.05	积分时间（TI）	0.00~10.00s	0.01~10.00	0.10s
P9.06	微分时间（TD）	0.00~10.00s	0.00~100.0	0.01s

功能代码	名称		设定范围	默认
P9.07	采样周期（T）	0.01~100.00s	0.00~100.0	0.00%
P9.08	偏差极限	0.0~100.0%	0.0~100.0	0.00%
P9.09	反馈丢失的检测值	0.0~100.0%	0.0~100.0%	0.00%
P9.10	反馈丢失检测时间	0.0~3600.0s	0.0~3600.0	1.0s
PA组：简易PLC及多段速控制				
PA.00	简易PLC	0：一个周期后停止 1：一个循环后保持最后的频率 2：循环运行	0~2	0
PA.01	简易PLC状态保存断电后	0：禁用 1：启用	0~1	0
PA.02	多段速0	-100.0~100.0%	-100.0~100	0.00%
PA.03	运行时间第0个步骤	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.04	多段速1	-100.0~100.0%	-100.0~100	0.00%
PA.05	运行时间第1步	0.0~6553.5s(h)	0.0~6553.5	0.0s

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功能代码	名称		设定范围	默认
PA.06	多段速2	-100.0~100.0%	-100.0~100	0.00%
PA.07	运行时间第2步	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.08	多段速3	-100.0~100.0%	-100.0~100	0.00%
PA.09	运行时间第3步	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.10	多段速4	-100.0~100.0%	-100.0~100	0.00%
PA.11	运行时间第四步	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.12	多段速5	-100.0~100.0%	-100.0~100	0.00%
PA.13	第五步运行时的速度6	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.14	多步	-100.0~100.0%	-100.0~100	0.00%
PA.15	第6步运行时间	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.16	多段速7	-100.0~100.0%	-100.0~100	0.00%
PA.17	第七步运行时间	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.18	多段速8	-100.0~100.0%	-100.0~100	0.00%
PA.19	运行时间8步	0.0~6553.5s(h)	0.0~6553.5	0.0s

功能代码	名称		设定范围	默认
PA.20	多段速9	-100.0~100.0%	-100.0~100	0.00%
PA.21	运行时间第九步	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.22	多段速10	-100.0~100.0%	-100.0~100	0.00%
PA.23	第十步运行时间	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.24	多段速11	-100.0~100.0%	-100.0~100	0.00%
PA.25	运行时间11步骤	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.26	多段速12	-100.0~100.0%	-100.0~100	0.00%
PA.27	运行时间12步骤	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.28	多段速13	-100.0~100.0%	-100.0~100	0.00%
PA.29	运行时间13步骤	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.30	多段速14	-100.0~100.0%	-100.0~100	0.00%
PA.31	运行时间14步骤	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.32	多段速15	-100.0~100.0%	-100.0~100	0.00%

功能代码	名称		设定范围	默认
PA.33	运行时间15步骤	0.0~6553.5s(h)	0.0~6553.5	0.0s
PA.34	加/减速时间选择为步0︶7	0~0XFFFF	0~0XFFFF	0
PA.35	步8︶15加/减速时间选择	0~0XFFFF	0~0XFFFF	0
PA.36	简易PLC重启选择	0：重新开始从步骤0 1：从暂停的步骤继续	0~1	0
PA.37	时间单位	0：第二 1：分钟	0~1	0
PB组：保护功能				
Pb.00	输入断相保护	0：禁用 1：启用	0~1	1
Pb.01	输出断相保护	0：禁用 1：启用	0~1	1
Pb.02	电机过载保护	0：禁用 1：普通电机（带低速补偿） 2：变频电机 （不带低速补偿）	0~2	2

功能代码	名称		设定范围	默认
Pb.03	电机过载保护电流	20.0%～120.0%（电机额定电流）	20.0~120.0	100.00%
Pb.04	门限旅免费	70.0.0～110.0%（标准母线电压）	70.0~110.0	80.00%
Pb.05	减少自由脱扣率	0.00～P0.03（最大频率）	0.00~P0.03	0.00Hz/s
Pb.06	过电压失速保护	0：禁用 1：启用	0~1	1
Pb.07	过电压失速保护点	110～150%	110~150	120%
Pb.08	自动限流	50～200%	50~200	G 模型： 150.00% P 模型： 160.00%
Pb.09	频率下降率时，限流	0.00～100.00Hz /s	0.00~100.0	10.00Hz/s
Pb.10	自动限流的选择	0：启用 1：禁用时，定速	0~1	0

功能代码	名称		设定范围	默认
Pb.11	选择的转矩（OL3）	0：未检测 1：有效检测过力矩的 行驶时，则继续 赛跑 2：有效检测过力矩的 在运行过程中，则警告 停止 3：有效检测过力矩的 恒速运行时，然后继续运行 4：有效检测过力矩的 恒速运行时， 然后报警并停止	0~4	1
Pb.12	的转矩检测水平	10.0%～200.0% （相对于所述电机的额定个当前)	1.0~200.0	G 模型 :150.0% P 模型 :120%
Pb.13	的转矩检测时间	0.1~60.0s	0.0~60.0	0.1s
Pb.14	保留的			
Pb.15	保留的			
PC组：串行通信				
PC.00	本地地址	0～247，0表示 广播地址	0~247	1

功能代码	名称		设定范围	默认
PC.01	波特率选择	0: 1200BPS 1: 2400BPS 2: 4800BPS 3: 9600BPS 4: 19200BPS 5: 38400BPS	0~5	4
PC.02	数据格式	0：RTU，1个起始位，8个数据位无奇偶校验，1个停止位 1：RTU，1个起始位，8个数据位，偶校验，1个停止位 2：RTU，1个起始位，8个数据位，奇校验，1个停止位 3：RTU，1个起始位，8个数据位，无奇偶校验，2个停止位 4：RTU，1个起始位，8个数据位，偶校验，2个停止位 5：RTU，1个起始位，8个数据位，奇校验，2个停止位	0~5	1
PC.03	传播延迟时间	0～200毫秒	0~200	5ms
PC.04	通信超时延迟	0.0：禁用 0.0～100.0s选择	0.0~100.0	0.0s
PC.05	通讯错误动作	0：报警并自由停车 1：不报警并继续运行 2：不报警，但停止	0~3	1

功能代码	名称		设定范围	默认
		根据P1.06（ 如果P0.03= 2 ） 3：不报警，但根据停 为P1.06		
PC.06	响应行动	LED的Unit`s地方 0：回应写作 1：不回应写Ten`s LED个位 0：引用时不被保存 没电了 1：参考保存时没电了	00~11	0
PD组：补充作用				
PE组出厂设置				

8-故障检修

故障信息，以及可能的原因和纠正措施。本章介绍了如何复位故障和查看

故障记录.它还列出了所有报警

8.1故障及故障排除

故障代码	故障类型	原因	解决方案
Out1	IGBT故障	1.加速时间过短 2. IGBT模块故障 3.错误所造成的干扰 4.接地是没有正确	1.增加加速时间。 2.要求支持。 3.检查外部设备，排除干扰
OC1	过电流时的加速度	1.加速时间过短。 2.网格的电压太低。 3.变频器的功率过低。	1.增加加速时间。 2.检查输入电源 3.选择更大容量的变频器。
OC2	过电流时减速	1.减速时间太短 2.负载惯量的转矩大 3.变频器的功率过低	1.增加减速时间。 2.安装适当的能量消费制动组件 3.选择更大容量的变频器
OC3	过电流恒速运行时	1负载瞬变或异常 2.负载的惯性大 3.输入电压异常	1.检查负载或减小负载的瞬态 2.检查输入电源 3.选择更大容量的变频器。
OV1	过电压时	1.输入电压为异常	1.检查输入电源

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故障代码	故障类型		解决方案
	促进	2.重新启动后突然断电运行的电机。	2.避免重启向上停药后
OV2	过电压时，减速	1.减速时间太短。 2.负载的惯性大。 3.输入电压异常	1.增加减速时间 2.增加的耗能组件 3.检查输入电源
OV3	过压恒速运行时，	1.输入电压变化异常。 2.负载的惯性大。	1.安装输入电抗器 2.增加的能量消耗成分
UV	直流母线欠压	1.网格的电压是低	1.检查网格的输入电源
OL1	电机过载	1.电源的电压是 2.电机设定的额定电流不正确 3.电机堵转或负载瞬态过强 4.电机功率过大	1.检查电源线的电源 2.复位电机的额定电流 3.检查负载，并调整扭矩电梯 4.选择合适的电机。
OL2	变频器过载超载	1.加速太快 2.复位旋转电机 3.将电源的电压太低 4.负载过大	1.增加加速时间 2，停车后应避免重新启动。 3.检查电源线的电源 4.选择一个逆变器功率较大

故障代码	故障类型		解决方案
SPI	输入缺相	缺相或输入波动 R,S,T	1.检查输入电源 2.检查安装分布
SPO	输出缺相	U，V，W缺相输入（或严重不对称的三相负载）	1.检查输出分布 2.检查电机和电缆
OH1	整顿IGBT过热	1.变频器的过电流突然	1.参考过流解决方案
		2.有输出三相之间的直接或间接的短路	2.重新分配
		3.风道堵塞或风扇损坏	3.疏通风道或改变风扇
		4.环境温度过高	4.低环境温度
OH2	逆变器IGBT过热	5.控制面板或插件的接线松动	5.检查和重新连接
		6.辅助电源损坏，驱动电压欠压	6.寻求技术支持
		7.电源模块的桥臂接通	7.寻求技术支持
		8.控制板异常1.参见过流解决方案	8.寻求技术支持
EF	外部故障	S1：外部故障输入端子生效	1.检查外部设备输入

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故障代码	故障类型	解决方案	
CE	通信	1.波特率设置不正确 2.通信故障	1.设置适当的波特率 2.按STOP/RST复寻求帮助位和 3.检查通信连接分配
ItE	电流检测故障	3.通信关闭很长一段时间 1.控制电路板的连接不是好助手功率是坏 2.辅助电源损坏 3.霍尔元件坏了 4.改性电路异常	1.检查并重新连接 2.询问服务 3.寻求技术支持 4.寻求技术支持
tE	自整定故障	1.电机容量不符合逆变器能力 2.电机的额定参数	1.更改变频器型号 2.根据电机的铭牌设置等级参数
EEP	EEPROM故障	1.错误控制写和读的参数 2.损害EEPROM	1.按 STOP/ RST复位 2.询问服务
PIDE	PID反馈故障	1. PID反馈离线 2. PID反馈源消失	1.检查PID反馈信号线 2.检查PID反馈源

故障代码	故障类型		解决方案
bE	制动单元故障	1.制动电路故障或损坏制动管 2.外部制动创制是有点低	1.检查制动单元，并更换新的制动管 2.增加制动电阻
END	出厂设定的时间范围	1.试用时代的到来	1.询问服务
OL3	过转矩	1.加速太快 2.复位旋转电机 3.将电源的电压太低 4.负载过大	1.增加加速时间 2，停车后应避免重新启动。 3，检查供应线路的功率 4.选择一个逆变器功率较大 5.调整PB.11为适当的值

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