Foreword

Thank you for using our MS20 high-performance photovoltaic water pump special series products!

Information coding:

Release time:

Version number: Ver A00

MS20 series is a highly reliable, small-sized and cost-effective product launched by our company, which supports high-performance drive of three-phase asynchronous motors, synchronous machines, BLDC motors, international leading vector control technology and universal V/F control mode, speed and torque control output mode, and at the same time, for photovoltaic power supply occasions, it integrates high-performance maximum power tracking algorithm (MPPT) to maximise the customer's on-site requirements. At the same time, for PV power supply occasions, it integrates high-performance maximum power tracking algorithm (MPPT), which maximally meets the needs of customers.

This instruction manual describes how to properly use the MS20 series. Be sure to read this instruction manual carefully before use (installation, operation , maintenance, inspection, etc.). In addition, please use the product only after understanding its safety precautions.

Special emphasis: In order to ensure the performance of the product, please make sure to set the nameplate parameters of the motor: rated voltage, rated current, rated power, rated frequency, rated speed, and the number of poles and other parameters of the motor when you use the product for the first time.

Caveat
● When using this product, be sure to mount the case or cover as specified and follow the instructions. ● The illustrations in this instruction manual are for illustrative purposes only and may differ from the product you ordered. ● The contents of this manual are subject to change in a timely manner due

to product upgrades or changes in specifications, as well as to improve the convenience and accuracy of the manual.

- If you need to order the instruction manual due to damage or loss, please contact our regional agents or directly contact our customer service centre.
- If you still have some questions about the use of the product, please contact our customer service centre.

DIRECTORY

Chapter 1 Safety Information and Precautions

Security Definition:

Description of safety markings that may be covered in this manual:

⚠ DANGER: Failure to operate as required may result in fire or serious injury, or even death.

⚠ CAUTION: Moderate or minor injuries may result from failure to operate as required, as well as the occurrence of equipment damage.

Users are requested to read this chapter carefully when installing, commissioning and servicing this product and be sure to follow the safety precautions required by the contents of this chapter. In case of any injury or damage caused by illegal operation, it has nothing to do with our company.

1.1 Security matters

1.1.1 Before installation

⚠ **Danger**
● Stop the installation if you find water in the box when you open it! ● Stop the installation if you find that visible parts are missing or parts are damaged! ● If you find that the product nameplate parameters do not correspond to the required product, stop the installation!

⚠ **Caution**
● Please take protective measures when handling the product to avoid injury! ● Please be gentle during the handling process to avoid damage to the product! ● Before leaving the factory, the product has done the qualified pressure resistance test, please do not carry out the pressure resistance check again, so as not to damage the product by irregular operation!

1.1.2 When installing

⚠ **Danger**
● The product should be mounted on metal or other flame-retardant objects, otherwise it is a fire hazard! ● The fixing bolts of the device elements must not be unscrewed, especially those marked in red!

- The product must not be installed in an environment containing explosive gases, otherwise there is a risk of explosion!

Caution

- Handle the product gently and hold the bottom of the product to prevent smashing feet or dropping the product!
- Do not allow wire tips or screws to fall into the product. Otherwise it causes damage to the product!
- Please install the product in a place with little vibration and avoid direct sunlight!
- When the product is installed in the cabinet, it is necessary to do a good job of heat dissipation, otherwise it may cause product failure or damage!

1.1.3 Wiring

Danger

- Wiring operations must be carried out by professionally qualified personnel, otherwise there is a risk of electric shock or equipment damage!
- The product must be separated from the power supply by a circuit breaker, otherwise a fire may occur!
- Please make sure the power supply is in zero energy state before wiring, otherwise there is a risk of electric shock!
- It is prohibited to connect the braking resistor directly between the (+) and (-) terminals of the DC bus, otherwise it will cause a fire!
- The product must be covered before powering up, otherwise it may cause electric shock!
- The wiring of all peripheral accessories must comply with the instructions in this manual and be wired correctly in accordance with the circuit connection methods provided in this manual, or cause accidents!

Caution

- All of our products have been tested for voltage resistance at the factory, and it is prohibited to carry out this test on the products again, otherwise there is a risk of equipment damage!
- The terminal signal line of the product should be wired as far away from the main power line as possible, and if the distance cannot be guaranteed, it should be vertically cross-distributed, otherwise it will cause the control signal

to be interfered!

- For motor cable lengths greater than 100 metres, it is recommended to use an output reactor, otherwise there is a risk of equipment failure!
- The encoder must use a shielded cable and the shield must be properly grounded!

1.1.4 Running

Danger

- After the wiring is completed and confirmed to be correct, it is necessary to ensure that the cover plate has been covered before the power is turned on, and it is strictly prohibited to open the cover plate after the power is turned on, otherwise there is a risk of electric shock!
- After the product is energised, do not touch the product and the surrounding circuitry regardless of the state of the product, otherwise there is a risk of electric shock!
- During the operation of the product, foreign objects falling into the equipment should be avoided, otherwise there is a risk of equipment damage!
- At the beginning of power-on, the product automatically detects the safety of the external strong electric circuit, at this time, never touch the product U, V, W terminals or motor terminals, otherwise there is a danger of electric shock!
- Products that have been in storage for more than 2 years should be supplied with power from the grid only after the regulator has gradually increased the voltage, otherwise there is a risk of equipment damage!
- Non-professional technicians are prohibited from testing the signals during operation, otherwise there is a risk of injury or equipment damage!

Caution

- Check that the peripheral circuits connected to the product are not short-circuited and that the connecting wires are not tightened, otherwise the equipment may be damaged!
- Before operation, make sure that the motor and machinery are within the permissible operating range, otherwise the equipment may be damaged!
- Do not touch the fan, radiator, or braking resistor directly, otherwise there is a risk of mechanical damage and burns!
- When performing rotation identification, make sure that the perimeter of the equipment is secured after operation!

1.1.5 Maintenance

Danger

- Product maintenance, inspection or replacement of parts must be carried out by a professionally qualified engineer!
- It is prohibited to carry out maintenance, inspection or replacement of parts of the product with electricity, otherwise there is a risk of electric shock!
- Wait at least 10 minutes or more after power failure to ensure that the residual voltage of the electrolytic capacitor drops to less than 36V before performing maintenance, inspection or replacement of parts!
- Parameters must be set after replacing the product, and all pluggable inserts must be plugged in and out with the power off!

Caution

- Try not to touch the component body when maintaining, checking or replacing parts, otherwise there is a risk of electrostatic damage to the device!
- All pluggable actions shall be carried out in the event of a power failure!

1.2 Precautions

1.2.1 Motor insulation check

Motor insulation check should be done before the motor is used for the first time, before reuse after a long period of time and during regular inspections to prevent damage to the product due to insulation failure of the motor windings. Insulation check must be separated from the motor wires from the product, it is recommended to use 500V voltage type megohmmeter, should ensure that the measured insulation resistance is not less than 5MΩ.

1.2.2 Thermal protection of the motor

If the selected motor does not match the rated capacity of the product, especially when the rated power of the product is greater than the rated power of the motor, be sure to adjust the value of the relevant parameters of the motor protection in the product or install a thermal relay in front of the motor to protect the motor.

1.2.3 Operation above industrial frequency

This product can be supplied with an output frequency of 0Hz to 600Hz. If the customer needs to operate the product at 50Hz or higher, please consider the capacity of the mechanism.

1.2.4 Vibration of mechanical devices

The product may encounter mechanical resonance points of the load device at some output frequencies, which can be avoided by setting the jump frequency parameter of the

product.

1.2.5 Regarding motor heat and noise

Since the output voltage of the product is PWM wave, which contains certain harmonics, the temperature rise, noise and vibration of the motor will be slightly increased compared with the frequency operation.

1.2.6 Cases where there are pressure-sensitive devices or capacitors on the output side to improve the power factor

The output of the product is PWM wave, the output side, if installed with capacitors to improve power factor or varistors for lightning protection, etc., is easy to trigger the product instantaneous overcurrent or even damage the product, please do not use it.

1.2.7 Switching devices such as contactors used for product inputs and outputs

If a contactor is added between the power supply and the product input, it is not permitted to use this contactor to control the start/stop of the product. Frequent charging and discharging tends to reduce the service life of the capacitors in the product. If a switching device such as a contactor is installed between the output terminal and the motor, it should be ensured that the product is operated on and off when there is no output, otherwise it is easy to cause damage to the module inside the product.

1.2.8 Use beyond the rated voltage value

Use of MS series products outside the permissible operating voltage range specified in the manual is not suitable and may cause damage to the devices inside the product. If necessary, use the appropriate step-up or step-down device to change the voltage.

1.2.9 Conversion of three-phase inputs to two-phase inputs

Do not change the three-phase products in the MS series to two-phase use. Failure to do so will result in malfunction or product damage. If the power grid is a two-phase input, consult the manufacturer's maintenance personnel to determine the correct product specification and model selection to be provided.

1.2.10 Lightning surge protection

This series of products are equipped with lightning overcurrent protection device, which has a certain self-protection ability for induced lightning. Customers should also install the protection at the front of the product for places where lightning occurs frequently.

1.2.11 Altitude and use of derating

In areas with an altitude of more than 1000m above sea level, the heat dissipation effect

of the product deteriorates due to thin air, and it is necessary to use the product at a reduced rate. Please contact us for technical advice in this case.

1.2.12 Attention at the end of the product

Electrolytic capacitors in the main circuit and electrolytic capacitors on the printed circuit board may explode when incinerated. Toxic gases are generated when plastic parts are incinerated. Please dispose of them as industrial waste.

1.2.13 About adapted motors

1) The standard motor is a four-pole squirrel cage asynchronous induction motor or permanent magnet synchronous motor. If the motor is not one of the above, please be sure to select the product according to the rated current of the motor;

2) Non-inverter motor cooling fan and rotor shaft is coaxial connection, the fan cooling effect is reduced when the speed is reduced, therefore, the motor overheating occasions should be added strong exhaust fan or replaced with an inverter motor;

3) The product has built-in adaptable motor standard parameters, according to the actual situation, it is necessary to identify the motor parameters or modify the default value to try to meet the actual value, otherwise it will affect the operating effect and protection performance;

4) A short circuit inside the cable or motor can cause the product to alarm or even blow up. Therefore, please perform the insulation short-circuit test on the initially installed motors and cables first, and also perform this test frequently during routine maintenance. Note that the product must be completely disconnected from the part being tested when doing this test.

1.3 Initial use

For the first time user of this product, you should read this manual carefully first. If you have any doubts about some functions and performance, please consult our technical support staff for assistance, which will be beneficial to the correct use of this product.

As we are committed to the continuous improvement of our products, the information provided by us is subject to change without prior notice.

The MS20 series products comply with the following international standards, and some of them have been certified by CE.

IEC/EN 61800-5-1:2003 Safety requirements for adjustable speed electrical drive systems;

IEC/EN 61800-3: 2004 Adjustable-speed electrical drive systems; Part 3:

Electromagnetic compatibility standard for products and its specific test methods (fulfilment of the requirements of the IEC/EN 61800-3 standard under the conditions of correct installation and proper use as described in chapter 6.3).

Chapter 2 Product Information

2.1 Naming rules

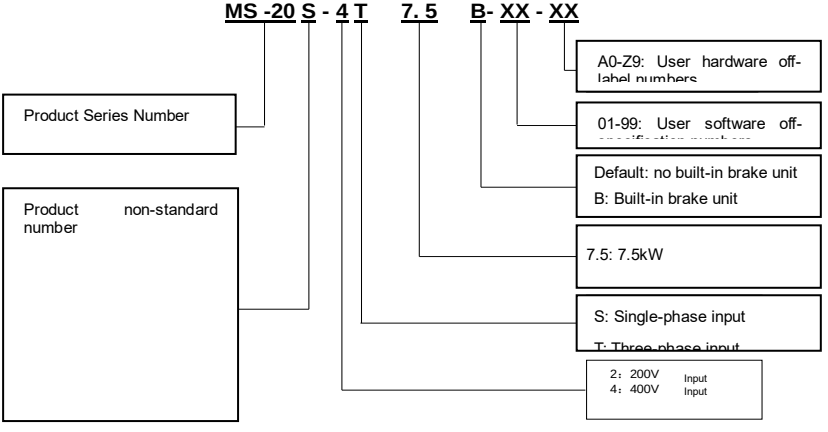


Figure 2-1 MS20 Series Naming Specification

2.2 Nameplates

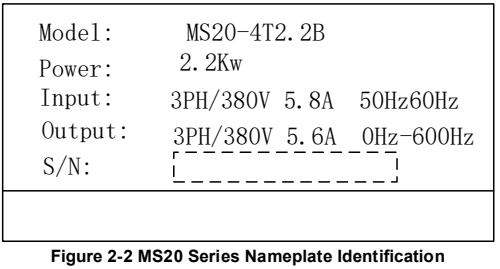


Figure 2-2 MS20 Series Nameplate Identification

2.3 Product range

Table 2-1 MS20 Model Number and Technical Data

■ MS20-2S/TXXXB, single/three-phase 220V input inverter

Product Model	Power (kW)	Three-phase rated output current (A)	Single-phase rated input current (A)	Three-phase rated input current (A)	Motor power (kW)	Brake unit
MS20-2S/T0.4B	0.4	2.8	5.5	3.2	0.4	built-in
MS20-2S/T0.75B	0.75	4.8	9.2	6.3	0.75	
MS20-2S/T1.5B	1.5	8.0	14.5	9	1.5	
MS20-2S/T2.2B	2.2	10	23	15	2.2	
MS20-2S/T3.7B	3.7	15	35	20.5	3.7	

■ MS20-2TXXXB, 3-phase 220V input inverter

Product Model	Power (kW)	Three-phase rated output current (A)	Three-phase rated input current (A)	Motor power (kW)	Brake unit
MS20-2T5.5B	5.5	24	29	5.5	
MS20-2T7.5B	7.5	32	35	7.5	
MS20-2T11(B)	11	45	50	11	Built-in optional
MS20-2T15(B)	15	60	65	15	
MS20-2T18.5(B)	18.5	73	80	18.5	
MS20-2T22(B)	22	91	95	22	
MS20-2T30(B)	30	112	118	30	

■ MS20-4TXXXB, 3-phase 400V input inverter

Product Model	Power (kW)	Three-phase rated output current (A)	Three-phase rated input current (A)	Motor power (kW)	Brake unit
MS20-4T0.75B	0.75	2.8	3.5	0.75	built-in
MS20-4T1.5B	1.5	4.3	5.0	1.5	
MS20-4T2.2B	2.2	5.6	6.0	2.2	
MS20-4T3.7B	3.7	9.4	10.5	3.7	
MS20-4T5.5B	5.5	13	14.6	5.5	

Product Model	Power (kW)	Three-phase rated output current (A)	Three-phase rated input current (A)	Motor power (kW)	Brake unit
MS20-4T7.5B	7.5	17	20.5	7.5	
MS20-4T11B	11	25	29	11	
MS20-4T15B	15	32	35	15	
MS20-4T18.5B	18.5	39	44	18.5	built-in
MS20-4T22B	22	45	50	22	
MS20-4T30B	30	60	65	30	
MS20-4T37B	37	75	80	37	
MS20-4T45*	45	91	95	45	
MS20-4T55*	55	112	118	55	
MS20-4T75*	75	150	157	75	

2.4 Technology Specifications

Input/Output Characteristics	Rated Input Voltage	200V voltage level: DC-200~400V,AC single/three-phase 220V
		400V voltage level: three-phase 380VAC voltage, DC-200-800V, continuous fluctuation ±10%, short-term fluctuation -15% to +10%.
	Rated Input Frequency	50Hz/60Hz±5%
	Output voltage	3-phase: 0 to rated input voltage with less than ±3% error
	Output frequency	0.00 to 600.00Hz, unit 0.01Hz
	Overload capacity	150 per cent 1 minute; 180 per cent 10 seconds; 200 per cent 0.5 seconds
Operational control characteristics	Control method	V/f control PG-free vector control (SVC)
	Speed range	1:100 (V/f) 1:200 (SVC)
	Speed control accuracy	±0.5% (V/f control) ±0.2 per cent (SVC)
	Speed bump	±0.3 per cent (SVC)
	Torque response	<10ms (SVC)
	Starting torque	0.5 Hz: 180 per cent (V/f, SVC) 0.25 Hz: 180 per cent (SVC)
Basic Functions	V/F curve	Three types: linear; multipoint; N-square V/F curve
	V/F separation	2 ways: full separation, half separation
	Acceleration and deceleration curves	Linear or S-curve acceleration and deceleration mode; four types of acceleration and deceleration time; acceleration and deceleration time range 0.0~60000s
	DC Brake	DC braking frequency: 0.00Hz~maximum frequency, braking time: 0.0s~30.0s, braking action current value: 0.0%~100.0%
	Point control	Tap frequency range: 0.00Hz~50.00Hz; tap acceleration/deceleration time 0.0s~60000s
	Simple PLC, multispeed operation	Up to 16 speeds via built-in PLC or control terminals

	Built-in PID	Closed-loop process control systems can be easily realised
	Automatic Voltage Regulation (AVR)	Automatically keep the output voltage constant when the grid voltage changes
	Overpressure and overcurrent speed control Fast current limiting function	Automatic limitation of current and voltage during operation to prevent frequent over-current and over-voltage tripping.
		Minimises overcurrent faults and protects the normal operation of the product
	Torque limiting and control	Automatic limitation of torque during operation to prevent frequent overcurrent trips
	Input terminal	Six switch input terminals, of which X6 can be used as high-speed pulse input. Support active open collector NPN, PNP and dry contact input mode, two analogue input terminals, one for voltage and current input selectable, one for voltage input.
	Output terminal	A high-speed pulse output terminal, 0 ~ 50kHz square wave signal output, can achieve the set frequency, output frequency and other physical quantities of the output, a switching output terminal, a set of relay output terminals
		One analogue output terminal, voltage and current outputs are selectable, and physical quantities such as set frequency and output frequency can be output.
Featured Functions	Various main and auxiliary setting and switching, speed searching, various acceleration and deceleration curve selection, holding brake control, up to 16-segment speed operation (two-segment speed supports flexible frequency setting mode), swing frequency control operation, fixed-length control, counting function, over-excitation braking, over-voltage stall, under-voltage stall, restarting after a power outage, frequency jumping, frequency binding, free switching of four-segment acceleration and deceleration time, motor temperature protection, flexible Fan control, process PID control, simple PLC, sag control, parameter recognition, weak magnetism control, high-precision torque limitation, V/f separation control.	

protective function	Power-on motor short-circuit detection, over-current protection, over-voltage protection, under-voltage protection, over-heating protection, overload protection, etc.	
Matrix	Location	Indoors, out of direct sunlight, free of dust, corrosive gases, flammable gases, oil mist, water vapour, dripping water or salt, etc.
	Altitude	Derated for use above 1000 metres above sea level, rated output current will be derated by 1% for every 100 metres of elevation.
	Environmental temperature	-10℃~50℃, derating between 50℃~60℃, 1℃ increase, rated output current reduced by 1%.
	Humidity level	5 to 95%, no condensation allowed
	Vibratory	Less than 5.9 m/s^2 (0.6g)
	Storage temperature	-20℃～+60℃
Others	Installation	wall-mounted
	Protection class	IP20
	Cooling method	forced air cooling

2.5 Product outline drawing, mounting hole dimensions

2.5.1 Schematic diagram of product appearance

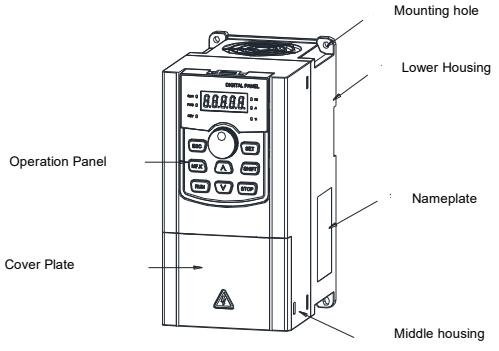


Figure 2-3 MS20 Series Moulded Case Outline Schematic Diagram

2.5.2 External shape and mounting hole dimensions

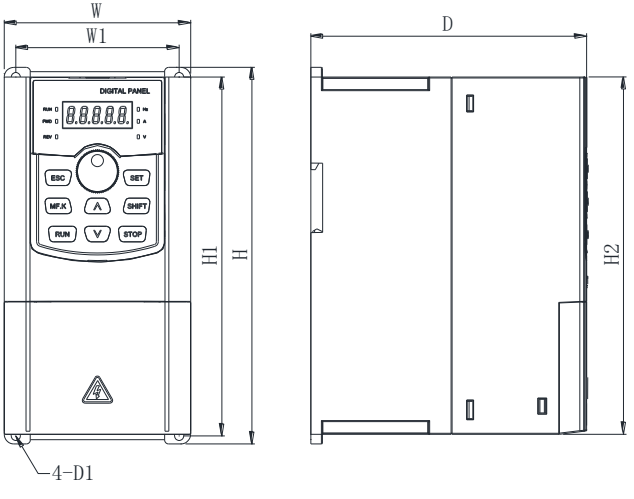


Figure 2-4 Plastic Housing Mounting Hole Dimension Drawing

Table 2-2 MS20 series moulded case product appearance and mounting hole size (mm)

Product Model	Mounting hole mm		Body size mm				Mounting hole diameter mm	Weight kg
	W1	H1	H	H2	W	D		
MS20-2S-7R5G/1R5P	67.5	160	170	/	85	129	ø4.5	1
MS20-2S-1R5G/2R2P								
MS20-4T-R75G/1R5P								
MS20-4T-1R5G/2R2P								
MS20-2S-2R2G/003P	85	185	194	/	97	144	ø5.5	1.4
MS20-2S-003G/004P								
MS20-4T-004G/5R5P								
MS20-4T-5R5G/7R5P								
MS20-2S-004G/5R5P	106	233	245	/	124	171	ø5.5	2.5
MS20-2S-5R5G/7R5P								
MS20-4T-7R5G/011P								
MS20-4T-011G/015P								
MS20-2S-7R5G/009P	120	317	335	/	200	178.2	Ø8	5.1
MS20-2T-011G/015P								
MS20-4T-015G/018P								
MS20-4T-018G/022P								
MS20-4T-022G/030P								

Table 2-3 MS20 Product Sheet Metal Box Mounting Hole Dimensions (mm)

Product Model	Mounting hole mm		Body size mm				Mounting hole diameter mm	Weight kg
	W1	H1	H	H2	W	D		
MS20-4T-018G/022P-L	120	317	335	/	200	178.2	Ø8	8.4
MS20-4T-022G/030P-L								
MS20-4T-030G/037P	150	372	390	/	255	195	Ø8	14.8
MS20-4T-037G/045P								
MS20-4T-045G/055P	180	437	455		300	225	ø 10	35
MS20-4T-055G/075P								
MS20-4T-075G/090P	260	510	530		310	258	ø 12	43
MS20-4T-090G/110P								
MS20-4T-110G/132P	260	750	785		395	285	ø 12	50
MS20-4T-132G/160P	280	762	790		500	350	ø 13	85
MS20-4T-160G/185P								
MS20-4T-185G/200P								

2.5.3 External Dimensions of MS20 Series External Keypads

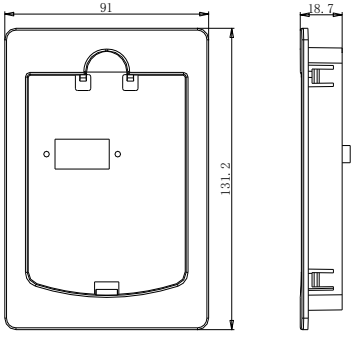


Figure 2-5 MS20 Series External Keyboard Mounting Base Dimensions

2.5.4 Mounting opening dimensions for MS20 series **external lead-in keypads**:

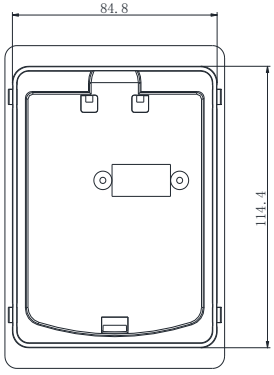


Figure 2-6 Mounting Base Opening Dimensions for MS20 Series External Keypads

2.6 Brake Assembly Selection Guide

Table 2-3 MS20 Series Brake Assembly Selection Table

Product Model	Recommended power of braking resistor	Recommended Resistance Value of Braking Resistor	Brake unit	Note
MS20-2S-R40G/R75P	80W	≥100Ω	Built-in optional or standard built-in	After Product Model Add "B"
MS20-2S-R75G/1R5P	150W	≥100Ω		
MS20-2S-1R5G/2R2P	200W	≥80Ω		
MS20-2S-2R2G/003P	300W	≥50Ω		
MS20-2S-003G/004P	400W	≥40Ω		
MS20-2S-004G/5R5P	450W	≥30Ω		
MS20-2S-5R5G/7R5P	600W	≥20Ω		
MS20-2S-7R5G/009P	800W	≥15Ω		
MS20-2T-009G/011P	1000W	≥10Ω		
MS20-2T-011G/015P	1000W	≥10Ω		
MS20-4T-R75G/1R5P	150W	≥250Ω		
MS20-4T-1R5G/2R2P	150W	≥100Ω		
MS20-4T-2R2G/004P	300W	≥100Ω		

MS20-4T-004G/5R5P	450W	≥100Ω		
MS20-4T-5R5G/7R5P	500W	≥80Ω		
MS20-4T-7R5G/011P	500W	≥75Ω		
MS20-4T-011G/015P	800W	≥30Ω		
MS20-4T-015G/018P	1000W	≥25Ω		
MS20-4T-018G/022P	1300W	≥16Ω		
MS20-4T-022G/030P	1500W	≥16Ω		
MS20-4T-030G/037P	2000W	≥16Ω		
MS20-4T-037G/045P	2000W	≥16Ω		
MS20-4T-045G/055P	3000W	≥10Ω		
MS20-4T-055G/075P	3600W	≥5Ω		

Note: For braking resistor resistance selection, please follow the above table strictly, otherwise the built-in braking unit may be damaged or the resistor may be damaged.

2.7 Selection guidance

This product is available in two control modes: normal V/F and SVC.

Selection of products must first clarify the technical requirements of the system for frequency conversion speed control, product applications and load characteristics of the specific situation, and from the appropriate motor, output voltage, rated output current and other factors for comprehensive consideration, and then select to meet the requirements of the model and determine the mode of operation.

Generally speaking: the rated load current of the motor should not exceed the rated current of the inverter product. It is necessary to select the mating motor capacity or output current capacity as specified in the manual, taking care to compare the rated current of the motor and the product. The overload capacity of the product is only meaningful for the starting and braking process. Any short-term overload during operation will cause a change in the speed of the load. Consider enlarging the power band by one if the speed accuracy is required to be high.

Fans and pumps type: lower requirements in terms of overload capacity, because the load torque is proportional to the square of the speed, so the load is lighter when running at low speeds (except for Roots fans) and because this type of load does not have any special requirements for speed accuracy, so choose the square torque V/F.

Constant torque loads: Most loads have constant torque characteristics, but the requirements in terms of speed accuracy and dynamic performance are generally not high. For example, extruders, mixers, conveyor belts, in-plant transport trams, cranes and other panning mechanisms. Multi-segment V/F operation is available for selection.

The controlled object has certain dynamic and static index requirements: these loads generally require hard mechanical characteristics at low speeds in order to meet the dynamic and static index requirements of the production process on the control system. Selection can choose SVC control mode.

Chapter 3 Mechanical and Electrical Installations

3.1 Mechanical Installation

3.1.1 Installation environment and requirements:

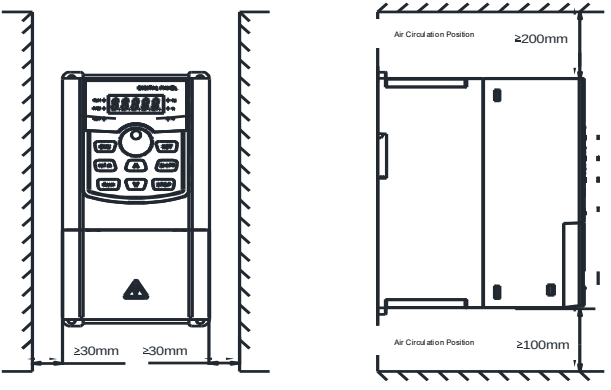
1) Ambient temperature: It is not permitted to operate the product in an ambient temperature exceeding the permissible temperature range (-10℃～60℃).

2) Mount the product on the surface of a flame retardant object with enough space around it to dissipate heat. The product tends to generate a lot of heat when working. and mount it vertically on the mounting support with screws.

3) Please install in a place where vibration is not easy. Vibration should be no greater than 0.6 G. Take special care to keep it away from equipment such as presses.

4) Avoid installing in direct sunlight, humidity and water droplets.

5) Avoid installing in places where there are corrosive, flammable and explosive gases in the air, as well as oil, dust and metal powders.



6)

7) Figure 3-1 Installation diagram of MS20 series inverter

For top and bottom mounting: When the product is mounted on the top and bottom, please install the heat-insulating deflector.

Rated current class	Mounting Dimension

	Vertical height	Lateral width
≤32A	≥100mm	May not be required
32A-60A	≥200mm	≥50mm

3.2 Electrical Installation

3.2.1 Selection guidance for peripheral electrical components

Table 3-1 MS20 Product Peripheral Electrical Components Selection Guide

Product Model	Blanking A	Contactors A	Input side main circuit conductor mm^2	Output side main circuit conductor mm^2	Containment circuit breaker mm^2
MS20-2S-R40G/R75P	10	9	2.5	2.5	1.0
MS20-2S-R75G/1R5P	10	9	4	2.5	1.0
MS20-2S-1R5G/2R2P	16	12	6	4	1.0
MS20-2S-2R2G/003P	20	18	6	4	1.0
MS20-2S-003G/004P	20	18	6	4	1.0
MS20-2S-004G/5R5P	40	32	6	6	1.0
MS20-2S-5R5G/7R5P	50	40	10	10	1.0
MS20-2S-7R5G/009P	63	50	10	10	1.0
MS20-2T-009G/011P	63	50	10	10	1.0
MS20-4T-R75G/1R5P	10	9	2.5	2.5	1.0
MS20-4T-1R5G/2R2P	10	9	2.5	2.5	1.0
MS20-4T-2R2G/004P	10	9	2.5	2.5	1.0
MS20-4T-004G/5R5P	16	12	4	4.0	1.0
MS20-4T-5R5G/7R5P	20	18	4	4.0	1.0
MS20-4T-7R5G/011P	20	18	4	4.0	1.0
MS20-4T-011G/015P	40	32	6	6.0	1.0
MS20-4T-015G/018P	50	40	10	10	1.0
MS20-4T-018G/022P	63	50	10	10	1.0
MS20-4T-022G/030P	63	50	10	10	1.0
MS20-4T-030G/037P	100	65	16	16	1.0
MS20-4T-037G/045P	100	80	16	16	1.0
MS20-4T-045G/055P	125	95	16	16	1.0
MS20-4T-055G/075P	160	150	25	25	1.0
MS20-4T-075G/090P	225	185	35	35	1.0
MS20-4T-090G/110P	250	225	50	50	1.0
MS20-4T-110G/132P	315	265	70	70	1.0
MS20-4T-132G/160P	350	330	70	70	1.0
MS20-4T-160G/185P	400	330	95	95	1.0

Product Model	Blanking A	Contactors A	Input side main circuit conductor mm^2	Output side main circuit conductor mm^2	Containment circuit breaker mm^2
MS20-4T-185G/200P	500	400	95	95	1.0
MS20-4T-200G/220P	500	400	95	95	1.0

3.2.2 External wiring

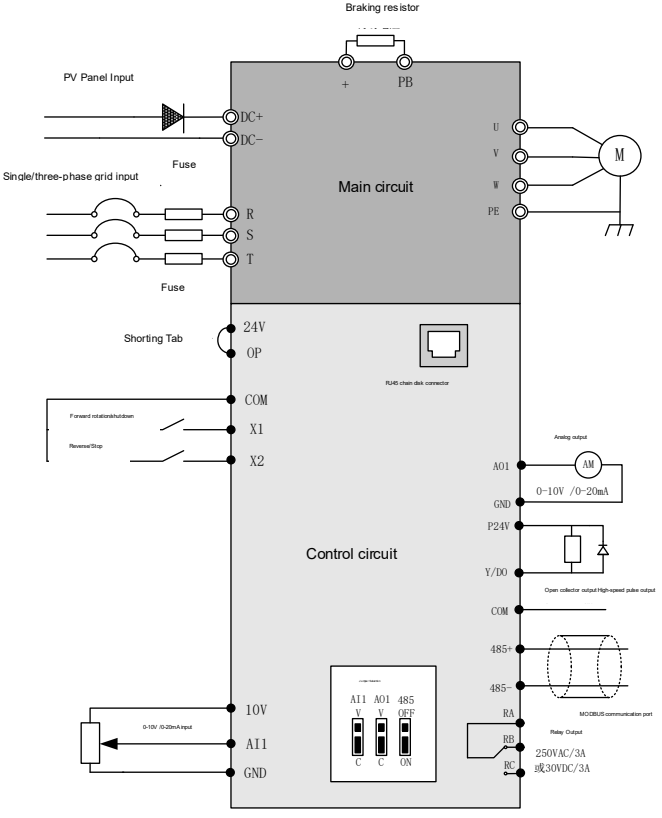


Figure 3-2 Typical Wiring Schematic for MS20 Products

Caveats:

1) Terminal ◎ indicates the main circuit terminal, and ● indicates the control circuit terminal.

2) Built-in brake unit is optional for each model of the MS20 series.

3) A "B" at the end of the model number indicates that it has its own brake unit.

4) Signal lines and power lines must be routed separately, and if control cables and power cables cross, they should be crossed at a 90-degree angle as far as possible. It is better to use shielded twisted-pair cable for analogue signal cable and shielded three-core cable for power cable (its specification should be one grade larger than that of ordinary motor cable) or follow the user manual of the product.

3.2.3 Main circuit terminals and wiring

Danger

1、 Confirm that the power switch is OFF before performing wiring operations, otherwise electric shock may occur!

2、 Wiring personnel must be professionally trained, otherwise it may cause damage to the equipment and people!

3、 It must be reliably grounded, otherwise there is a risk of electric shock or a risk of fire!

Caution

1、 Confirm that the input power supply is the same as the rating of the product, otherwise the product will be damaged!

2、 Make sure that the motor is compatible with the product, otherwise it may damage the motor or cause product protection!

3、 It is not possible to connect the power supply to the U, V and W terminals without damaging the product!

4、 Do not connect the braking resistor directly to the DC bus (+), (-) or cause a fire!

1) Three-phase 380V specification inverter main circuit terminals

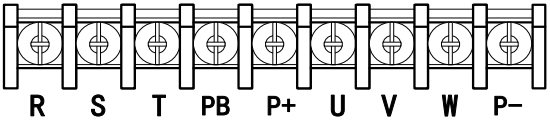


Figure 3-3 MS20 Series Three-Phase 380V Inverter Main Circuit Terminal Arrangement Diagram

(2) Single-phase/three-phase 220V specification inverter main circuit terminals

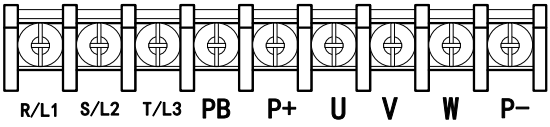


Figure 3-4 MS20 series single-phase/three-phase 220V series inverter main circuit terminal arrangement diagram

Terminal Marking	Name (of a thing)	Instructions
R/S/T L1/L2/L3	4T/2T Series Power Input Terminals	AC input three-phase power connection point single-phase 220V AC power connection point
P+, PB	Brake Resistor Connection Terminal	Connecting the braking resistor
U, V, W	Product Output Terminal	Connecting a three-phase motor
P+, P-	Photovoltaic panel access terminals	Access to photovoltaic panels

3.2.4 Main circuit terminal wiring requirements for MS20 series products:

3.2.4.1 Wiring operations must be carried out by professionally qualified personnel, otherwise there is a risk of electric shock or damage to the social security.

3.2.4.2 Make sure that the input power supply is completely disconnected before carrying out wiring work, otherwise there is a risk of electric shock.

3.4.2.3 All wiring and circuits shall comply with EMC and safety standards.

3.4.2.4 Terminal wiring screws or bolts must be tightened or there is a risk of damage to the equipment.

3.4.2.5 It is not permitted to connect signals of AC 220 VAC voltage level to terminals other than control terminals RA, RB, RC.

3.2.5 Control terminals and wiring

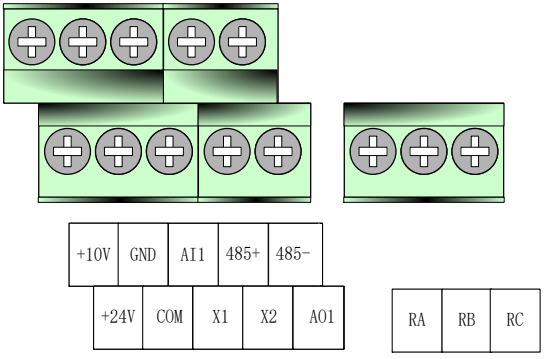


Figure 3-5 MS20 Series Inverter Control Loop Terminal Layout

Table 3-2 MS20 Product Control Terminal Function Description

Form	Terminal Symbols	Terminal Name	Functional Description
Power supply	+10V-GND	External +10V power supply	Supply +10V externally, max. output current: 10mA Used as external potentiometer power supply, resistance value range: 1kΩ~50kΩ.
	+24V-COM	External +24V power supply	Provide +24V external power supply, generally used as digital input/output terminal power supply and external sensor power supply, maximum output current: 200mA.
Model pseudo-enter (a password) confirm or agree with	AI1-GND	Analogue input terminals	1、Input voltage range: DC 0V~10V/4mA~20mA. 2、Input impedance: 100kΩ
Freq	X1-COM	Digital Input 1	1. Optical coupling isolation, compatible with bipolar

For m	Terminal Symbols	Terminal Name	Functional Description
Uentl y court esy or style nam e tradit ionall y give n male s aged 20 in dyna stic Chin a enter (a pass word) confi rm or agre e with	X2-COM	Digital Input 2	inputs 2、Input impedance: 4.7kΩ 3、Voltage range at level input: 9V~30V
Anal ogue expo rts	AO1-GND	Analogue output 1	Voltage or current output is determined by the AO1 jumper selection on the control board. Output voltage range: 0V~10V Output current range: 0mA~20mA
Rela	RA-RB	normally closed	Contact drive capability:

For m	Terminal Symbols	Terminal Name	Functional Description
Y outp ut		terminal	AC 250V, 3A; DC 30V, 3A.
	RA-RC	normal open terminal	
Com muni catio n port	485+/485-	communication interface	Transmission rate: 4.8K/9.6K/19.2K/38.4K/57.6K/115.2Kbps Maximum distance 500 metres (using standard network cable)
Keyp ads	CN3	external keyboard interface	Adopting standard network cable, the longest communication distance is 3 metres when connecting to the operation panel.

3) Control terminal screws and wiring specifications.

Cable Type	Cable Size (mm^2)	Bolt	Torque (kgf·cm)
Shielded cables	1.0	M3	5±0.5

3.3 Instructions for wiring the control board

Analogue input and output terminals

Analogue input and output voltage signals are particularly susceptible to external interference, so the general use of shielded cable transmission, and wiring distance is as short as possible, and will be shielded against the inverter end of a good grounding, the transmission distance should not exceed 20m.

The control cable should be kept at a distance of more than 20cm from the main circuit and the strong electric lines, avoiding parallel placement with the strong electric lines, and when crossing with the strong electric lines, it is recommended to adopt the vertical wiring method in order to prevent the inverter from false operation due to interference.

Where the analogue input and output signals are subject to serious interference, a filter capacitor or ferrite core is required on the analogue signal source side.

Switching Input and Output Terminals

Switching input and output signals are generally transmitted by shielded cables, and the wiring distance is as short as possible, and the shielding layer will be good grounded by the inverter end, and the transmission distance should not be more than 20 m. When the drive is elected to use the active mode, it is necessary to take the necessary filtering measures for the crosstalk of the power supply, and it is usually recommended to use the dry contact control mode.

When wiring the control cable should be kept at a distance of more than 20cm from the main circuit and

the strong power lines, and avoid parallel placement with the strong power lines, if it is impossible to avoid crossing with the strong power lines, it is recommended to use vertical wiring to prevent inverter malfunction due to interference.

3.3.1 Switching Input Terminal Description

- **Dry contact method**

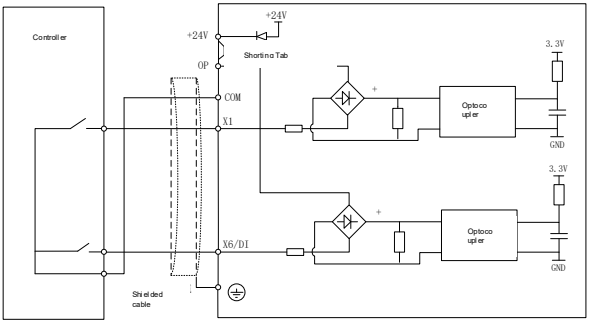


Figure 3-7 Using the internal power supply dry contact method

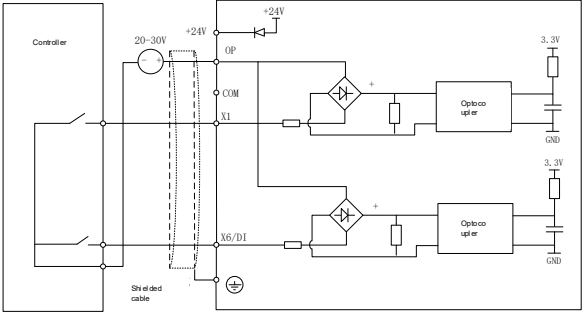


Figure 3-8 Using the External Power Supply Dry Contact Method

When using external power supply, you must remove the short-circuit piece between +24V and OP, otherwise it will damage the product; the voltage range of external power supply is DC20~30V, otherwise it can't guarantee the normal work or even may damage the product.

- **Open collector NPN wiring method**

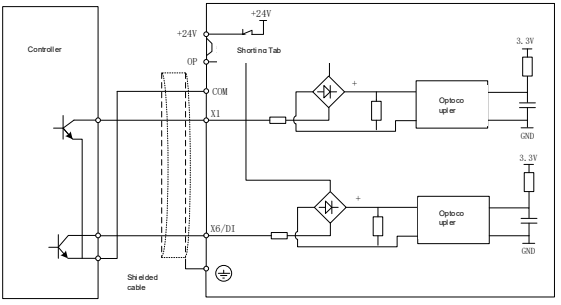


Figure 3-9 Using the Internal Power Open Collector NPN Wiring Method

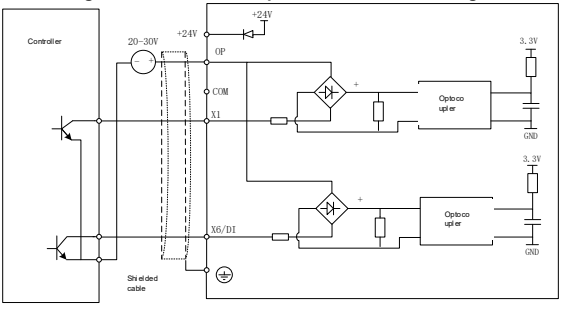


Figure 3-10 Open Collector NPN Wiring Using External Power Supply

When using external power supply, you must remove the short-circuit piece between +24V and OP, otherwise it will damage the product; the voltage range of external power supply is DC20~30V, otherwise it can't guarantee the normal work or even may damage the product.

- **Open collector PNP wiring method**

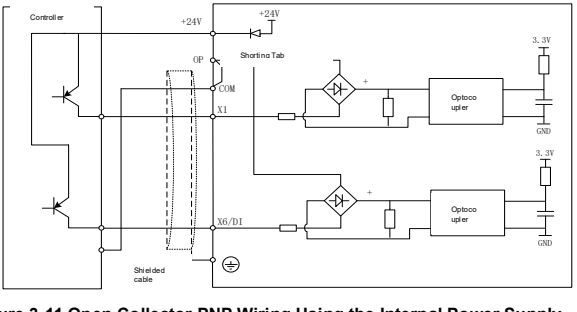
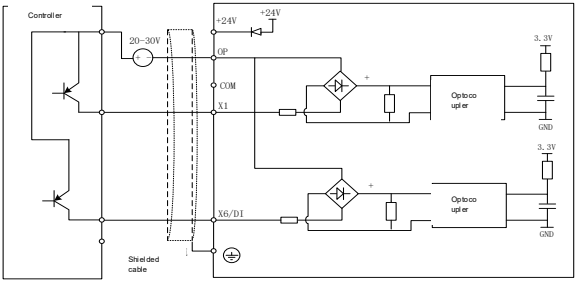


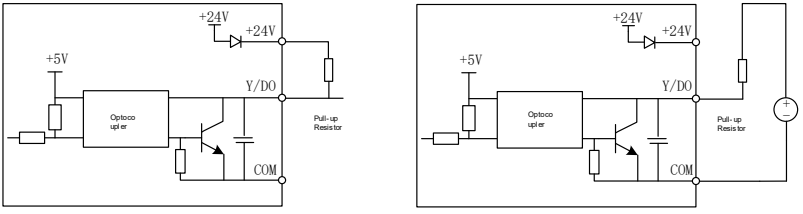
Figure 3-11 Open Collector PNP Wiring Using the Internal Power Supply

When using the PNP wiring method, you must remove the shorting piece between +24V and OP and reroute it between OP and COM, otherwise it will not work properly.



When using external power supply, you must remove the short circuit piece between +24V and OP, otherwise the product will be damaged; the voltage range of external power supply is DC20~30V, otherwise normal operation cannot be guaranteed and even the product may be damaged.

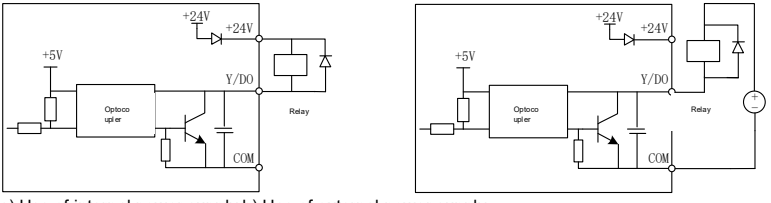
3.3.2 Switching Output Terminal Description



a) Use of internal power supply b) Use of external power supply

Figure 3-13 Wiring when the Y/DO terminal is connected to a pull-up resistor output

When the Y/DO terminal is set to pulse output, a 0~50kHz pulse signal can be output.



a) Use of internal power supply b) Use of external power supply

Figure 3-14 Wiring when Y/DO terminal drives a relay

1、When using the relay coil voltage is lower than 24V, it is necessary to add a resistor between the relay and output terminals to divide the voltage according to the coil impedance. ,,

Relay Output Terminal Wiring Instructions

2, MS20 series inverter control board has a set of programmable relay dry contact output.

3、Relay contacts are RA/RB/RC, of which RA and RB are normally closed contacts and RA and RC are normally open contacts, whose functions are defined in the function code.

4, if driving inductive loads (such as electromagnetic relays or contactors), should be installed surge voltage

absorption circuit, such as RC absorption circuit (note that its leakage current should be less than the holding current of the controlled contactor or relay), varistor or renewable diode, etc. (used in the DC magnetic circuit, the installation of which must pay attention to the polarity). The absorption circuit components should be installed close to the coil ends of the relay or contactor.

3.3.3 Signal switching jumper switch function description

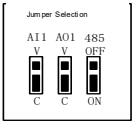


Figure 3-15 Signal switching jumper switch diagram

Grade	Functionality	Factory setting
485	485 termination resistor selection: ON for 100Ω termination resistor, OFF for no termination resistor	OFF: no resistance
AI1	AI1 analogue type selection: C for current input (0~20mA), V for voltage input (0~10V)	V: 0~10V
AO1	AO1 analogue type selection: C for current output (0~20mA), V for voltage output (0~10V)	V: 0~10V

3.4 EMC problems in wiring

The working principle of the frequency converter determines that it will produce a certain amount of noise, which will affect and interfere with other equipment; at the same time, the weak electrical signals inside the frequency converter are also susceptible to interference by the frequency converter itself and other equipment, in order to reduce or eliminate the interference of the frequency converter to the outside world and the frequency converter by the interference of the outside world, this section on the suppression of noise, grounding, the suppression of leakage current, the application of power filters to make a number of brief explanations in several aspects. This section gives some brief explanations on several aspects of noise suppression, grounding, leakage current suppression and power filter application.

3.4.1 Noise Suppression Countermeasures

When the peripheral equipment and the inverter share the same system power supply, the noise generated by the inverter will spread to other equipment in the same system through the power line and cause malfunction, at this time, the following measures can be taken:

1) Install an input noise filter at the input of the inverter;

2) Add a power filter to the power input of the affected equipment;

3) Use an isolation transformer to separate the noise propagation path between other equipment and the inverter.

The wiring of the peripheral equipment and the inverter form a loop that can cause the equipment to operate incorrectly. At this time, if you disconnect the grounding of the equipment, it will reduce the false operation.

1) Easily affected equipment and signal lines should be installed as far away from the inverter as possible.

2) The signal line should use shielded cable and the shield is reliably grounded, the signal line cable can also be set into the metal tube, the distance between the metal tube at least 20cm, and should be as far away as possible from the inverter and its peripheral devices and cables, to avoid parallel wiring of the signal line, the power line or bundled with the power line into a bundle of wiring.

Signal lines shall be kept orthogonal to the crossing when they must cross power cables.

3) The motor cable line should be placed in a larger thickness of the barrier, such as the placement of more than 2mm thickness of the pipeline or buried in a cement tank, but also the power line into a metal pipe, and grounded with a shielded cable.

4) Use a 4-core motor cable, one of which is grounded at the proximal end of the inverter and the other side is connected to the motor housing.

5) The inverter input and output are equipped with radio noise filters and linear noise filters such as ferrite common-mode chokes to suppress the radiated noise of the power line.

3.4.2 Grounding

1. The largest possible standard size of grounding cable should be used to reduce the impedance of the grounding system;

2, grounding wire as short as possible; and grounding point as close as possible to the inverter

3, four-core motor cable in a line should be grounded in the inverter side, the other side connected to the motor grounding terminal, if the motor and inverter have a special grounding pole, the effect is better;

4, the grounding end of each part of the system is connected together, the leakage current becomes a source of noise, which will affect other equipment in the system, so the inverter and other equipment susceptible to interference with the grounding end needs to be separated;

5. Arrangement of grounding cables should be far away from noise-sensitive equipment input and output wiring.

3.4.3 Leakage Current Suppression

Leakage current flows through the interline and ground distribution capacitors on the input and output sides of the inverter, and its size is related to the capacitance of the distribution capacitors and the carrier frequency. Leakage current is divided into two kinds of leakage current to ground and leakage current between lines.

1. The leakage current to ground is not only circulating inside the inverter system, it may affect other equipment because of the ground loop, and these leakage currents may make the earth leakage protector and other equipment malfunction. The higher the carrier frequency of the inverter, the greater the leakage current to ground; the longer the motor cable, the greater the parasitic capacitance, the greater the leakage current to ground. Therefore, reducing the carrier frequency and selecting the shortest possible motor cable is the most direct and effective way to suppress the earth leakage current.

2. The interline leakage current flowing between the cables on the output side of the inverter, and its high harmonics will accelerate the aging of the cables, and may also cause other equipment to operate incorrectly. The higher the carrier frequency of the inverter, the higher the interline leakage current; the longer the motor

cable, the larger the parasitic capacitance, the higher the interline leakage current. Therefore, reduce the carrier frequency and use the shortest possible motor cable is the most direct and effective way to inhibit the leakage current to ground. Increasing the output reactor can also effectively inhibit the size of the leakage current between the lines.

3.4.4 Use of power supply filters

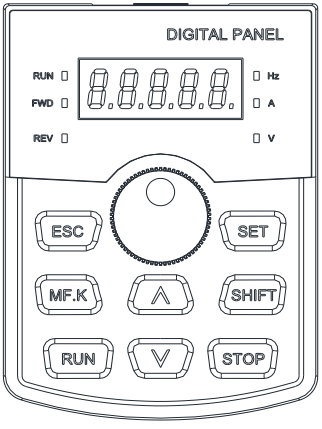
Frequency converters belong to the equipment that can generate strong interference and are sensitive to external interference, it is recommended to use power filters. The following points should be noted when using them:

1. The filter body shell needs to be reliably grounded;
2. Keep the input and output lines of the filter as far away as possible to avoid coupling with each other;
3. the filter as far as possible by the inverter end, and the filter and the inverter must be connected to the same public ground.

Chapter 4 Operation and Display

4.1 Introduction to the operation and display interface

With the operation panel, you can modify the functional parameters of the product, monitor the working status of the product and control the operation of the product (start, stop), etc. Its appearance and functional areas are shown in the figure below:



1)

2) **Figure 4-1 Schematic diagram of operation panel**

3) Status Display Lamp Description:

FWD/REV: When the FWD light is on during shutdown, it means that the product is valid for forward rotation command, or positive rotation operation status during operation, and when FWD is flashing, it means that the product is switching from positive rotation status to reverse rotation status. When FWD is blinking, it means the product is switching from forward to reverse state.

4) Unit indicator:

Hz frequency unit **A** current unit **V** voltage unit

RMP (Hz+A) RPM unit **% (A+V)** percentage

5) Digital display area:

The 5-digit LED display shows the set frequency, output frequency, various monitoring data and alarm codes.

6) Keyboard Button Description Sheet

Table 4-1 Keyboard Menu

Keystrokes	Name (of a thing)	Functionality
ESC/PRG	programming key	First level menu entry or exit
SET	confirmation key	Step-by-step access to the menu screen and confirmation of setting parameters
△	incremental key	Incrementing of data or function codes
▽	decrement key	Decrement of data or function codes
SHIFT/>>	shift key	Under the shutdown display interface and operation display interface, the display parameters can be selected cyclically; when modifying the parameters, the modification position of the parameters can be selected.
RUN	run key (on a computer keyboard)	For running operations in keyboard mode
STOP	Stop/Reset	During the running state, pressing this key can be used to stop the running operation; during the fault alarm state, it can be used to reset the operation, and the characteristics of this key are governed by the function code F7-16.
MF.K	multifunction selector	Selection of function switching according to F7-00

4.2 Function Code Viewing and Modification Method Explanation

The operating panel of the MS20 product uses a two-level menu structure for parameter settings and other operations.

4.2.1. Parameter modification/setting procedure:

A、 Under the monitoring state, press key "**PRG**" to enter the function code parameter display state, and continue to press key "**PRG**" to enter the parameter function group display state.

B、 Parameter selection in the monitoring state is set and selected via the F15 parameter group.

C、 Under the parameter code display state, the parameter function code parameter bit blinks through the "**SHIFT**" button, then the current blinking bit data can be modified.

D、 Modify the blinking parameter group by pressing the / △ ▽ button to modify the target function code group.

E、 "SET" button to enter the parameter function code.

F、 Modify to the target parameter value, **"SET"** button, confirm the modified parameter value.

G、After the parameter modification is completed, the current display function code returns to the current valid display function code, completing the parameter modification.

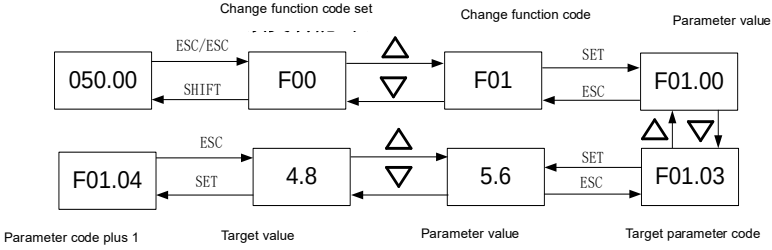


Figure 4-2 Parameter Modification Flowchart

4.2.2. Monitoring status display:

4.2.2.1 Switching of monitoring parameters in shutdown mode

Under the shutdown state, the set frequency is displayed by default, and when the set frequency is displayed, the display value flashes, and you can switch to display other parameters through the **"SHIFT"** key. If we want to check the bus voltage in addition to the set frequency in the shutdown state, we can switch to the display contents in the shutdown state by pressing the **"SHIFT"** key.

4.2.2.2 Switching monitoring parameters in the operating state

Under the running state, the default display of the running frequency, you can use the **"SHIFT"** key to switch to display other parameters. If we want to check the bus voltage and output current in addition to the set frequency in the shutdown state, we can switch to the display contents in the shutdown state by pressing the **"SHIFT"** key.

4.2.2.3 Switching monitoring parameters in the operating state

In the shutdown, fault or running state, if the digital function terminal UP/DOWN is

valid, or /△ ▽ on the operation panel, it will directly enter the digital frequency parameter modification state, and the modified frequency, is directly written into the **F00.07** parameter group.

Table of functional parameters for chapter V

5.1 MS20 Function Code Group Overview Table:

Categorisation	Function code group	Reference page
Group F: Operating parameter settings	F0: Basic Function Group	
	F1: Operational control parameter group	
	F2: Motor parameter group	
	F3: Motor vector control	
	F4: Motor VF control parameters	
	F5: Digital terminal parameter group	
	F6: Analogue terminal parameter group	
	F7: Keypad and display parameter group	
	F8: Torque control parameters	
	F9: PV water pump control parameters	
	FA: Fault and protection parameter set	
	Fb: Process PID control parameter set	
	FC: Multi-speed, PLC and pendulum parameter set	
	Fd: Communication control function parameter group	
	FE: Reserved parameters	
	FF: Manufacturer's parameters	
	E0-E4 Fault Parameter Group	
Group U: Surveillance	D0: Status monitoring	

Change the property description:

△ Parameters can be changed during operation, in the shutdown state, without being locked by the keypad as well as by the parameter lock;

× Parameters can be changed in the shutdown state, without the keypad and parameter lock, and cannot be changed in the running state;

★ Monitor parameters that cannot be changed.

Function code	Name (of a thing)	Instructions	Factory value	Causality	Mail address
F0 Basic parameter group					
F0.00	Motor Ⅰ control mode	0: Vector control without speed sensor (SVC) 1: V/F control 2: Vector control with speed sensor (FVC) 3: V/F split control	**1**	**X**	**0x000**
F0.01	Run Command Channel	0: Keypad control 1: Terminal control 2: RS485 communication control	**2**	**X**	**0x001**
F0.02	Speed/torque control method	0: Speed control 1: Torque control	**0**	**X**	**0x002**
F0.03	Frequency feed master channel selection	0: Keypad digital give frequency 1: Keypad potentiometer give 2: AI1 give 3: AI2 give 4: AI3 give 5: Terminal pulse PUL give 6: RS485 communication give 7: Terminal UP/DW control 8: PID control give 9: Program control (PLC) give 10: APP 11: AI4 (expansion) 12: Terminal switching	**10**	**X**	**0x003**
F0.04	Auxiliary Channel Selection for Frequency Setting	0: Keypad digital given frequency 1: Keypad potentiometer given 2: AI1 given 3: AI2 given 4: AI3 given 5: Terminal pulse PUL given 6: RS485 communication given	**1**	**X**	**0x004**
F0.05	Main Channel Gain	0.000 to 5.000	**1.000**	**X**	**0x005**
F0.06	Auxiliary Channel Gain	0.000 to 5.000	**1.000**	**X**	**0x006**

F0.07	Combination of main and auxiliary channels	LED digit: Combination mode selection 0: Main channel valid 1: Auxiliary channel valid 2: Main + Auxiliary 3: Main - Auxiliary 4: MAX{Main, Auxiliary} 5: MIN{Main, Auxiliary} 6: Main × Auxiliary LED ten digits: Frequency control direction selection 0: Frequency control direction invalid 1: Frequency control direction valid	**0**	**X**	**0x007**
F0.08	Keypad numeric setting frequency	0.00 to upper limit frequency	**50.00 Hz**	**Y**	**0x008**
F0.09	Rotation direction selection	0: direction unchanged 1: direction reversed 2: reverse prohibited	**0**	**X**	**0x009**
F0.10	Maximum frequency	0.00 to 320.00Hz	**50.00 Hz**	**X**	**0x00A**
F0.11	Upper frequency source selection	0: Upper limit frequency digital give 1: Keypad potentiometer give 2: AI1 3: AI2 4: AI3 5: Terminal pulse PUL give 6: RS485 communication give	**0**	**X**	**0x00B**
F0.12	Upper limit frequency digital setting	Lower limit frequency to maximum output frequency	**50.00 Hz**	**Y**	**0x00C**
F0.13	reservation				**0x00D**
F0.14	lower frequency	0.00 to upper limit frequency	**0.00Hz**	**Y**	**0x00E**
F0.15	Lower frequency operation mode	0: Stop 1: Run at lower frequency limit	**1**	**Y**	**0x00F**
F0.16	carrier frequency	0.6 to 15.0kHz	**models**	**Y**	**0x010**

F0.17	Carrier PWM wave characteristic selection	LED digit: carrier-temperature correlation 0: temperature-independent 1: temperature-dependent LED ten-digit: carrier-output-frequency correlation 0: output-frequency-independent 1: output-frequency-dependent LED hundred-digit: random PWM depth 0: off 1-8: on, adjusting the depth LED thousand bits: overmodulation option 0: off 1: on	**1010**	**Y**	**0x011**
F0.18	Acceleration time 1	0.10 to 650.00s	**models**	**Y**	**0x012**
F0.19	Deceleration time 1	0.10 to 650.00s	**models**	**Y**	**0x013**
F0.20	Parameter initialisation	0: No action 1: Restore factory values (without restoring motor parameters) 2: Clear fault record 3: Restore factory values (restore motor parameters)	**0**	**X**	**0x014**
F0.21	modulation factor	5.0 to 150.0 per cent	**100.0 per cent**	**Y**	**0x015**
F0.23	reservation			**X**	**0x017**
F0.24	Run Command Bundle	Single digit: keyboard command command bundle Ten digit: terminal command command bundle Hundred digit: communication command command bundle Thousand digit: optional card command command bundle 0: no bundle 1: Keypad digit given frequency 2: Keypad potentiometer given 3: Voltage analogue VS given 4: Voltage/current analogue AI given 5: Current analogue AS given 6: Terminal pulse PUL given 7: RS485 communication given 8: Terminal UP/DW control 9: PID control given 10: Programme control PLC given 11: Option card 12: VS3 (extension)	**000**	**X**	**0x018**
F0.25	reservation				**0x019**

F0.26	Voltage and Frequency Separation Output Voltage Source	0: Function code F0.27 set 1: AI1 given 2: AI2 given 3: AI3 given 4: Terminal pulse PUL given 5: PID output given 6: RS485 communication given 7: Option card 8: AI4 (expansion)	**0**	**X**	**0x01A**
F0.27	Digital setting of voltage-frequency separation output voltage	0.0 per cent - 100.0 per cent	**0**	**Y**	**0x01B**
F0.28	Rise slope of voltage-frequency separation voltage	0.0-1000.0sec	**1.0**	**Y**	**0x01C**
F0.29	Slope of voltage-frequency separation voltage drop	0.0-1000.0sec	**1.0**	**Y**	**0x01D**
F0.30	Pressure-frequency separation stop mode	0: voltage/frequency decreases to 0 at the same time; 1: voltage decreases to 0 and then frequency decreases;	**0**	**Y**	**0x01E**
F1 Operational control parameter set					
F1.00	Start-up mode	LED digit: Starting method 0: Starting from starting frequency 1: DC braking first and then starting from starting frequency 2: Starting after speed tracking and direction judgement LED digit 10: Speed tracking direction 0: One to one with stopping direction 1: One to one with starting direction 2: Automatic searching	**0**	**X**	**0x100**
F1.01	RPM tracking time	0.01 to 60.00s	**0.50s**	**Y**	**0x101**
F1.02	Start pre-excitation time	0.00 to 60.00s	**0**	**Y**	**0x102**
F1.03	Start-up frequency	0.00 to 60.00Hz	**0.50Hz**	**Y**	**0x103**
F1.04	Starting frequency duration	0.0 to 50.0s	**0.0s**	**Y**	**0x104**
F1.05	Braking current before starting	0.0 to 150.0 per cent	**60.0 per cent**	**Y**	**0x105**
F1.06	Pre-start braking time	0.0 to 60.0s	**1.0s**	**Y**	**0x106**

F1.07	Acceleration and deceleration options	LED digit: Acceleration/deceleration time reference 0: Maximum frequency 1: Fixed frequency LED digit 10: Acceleration/deceleration mode 0: Straight line 1: S curve	**00**	**X**	**0x107**
F1.08	S-curve onset acceleration rate	20.0 per cent to 100.0 per cent	**50.0 per cent**	**Y**	**0x108**
F1.09	S-curve onset deceleration rate	20.0 per cent to 100.0 per cent	**50.0 per cent**	**Y**	**0x109**
F1.10	Shutdown mode	LED digit: 0: deceleration stop 1: free stop LED digit: 0: random stop 1: stop back to home position	**0**	**Y**	**0x10A**
F1.11	Stopping DC braking start frequency	0.00 to 50.00Hz	**1.00Hz**	**Y**	**0x10B**
F1.12	Stopping DC braking current	0.0 to 150.0 per cent	**60.0 per cent**	**Y**	**0x10C**
F1.13	Shutdown DC braking wait time	0.0 to 60.0s	**0.0s**	**Y**	**0x10D**
F1.14	Shutdown DC braking duration	0.0 to 60.0s	**0.0s**	**Y**	**0x10E**
F1.18	Acceleration time 2	0.10 to 650.00s	**10.00s**	**Y**	**0x112**
F1.19	Deceleration time 2	0.10 to 650.00s	**10.00s**	**Y**	**0x113**
F1.20	Acceleration time 3	0.10 to 650.00s	**10.00s**	**Y**	**0x114**
F1.21	Deceleration time 3	0.10 to 650.00s	**10.00s**	**Y**	**0x115**
F1.22	Acceleration time 4	0.10 to 650.00s	**10.00s**	**Y**	**0x116**
F1.23	Deceleration time 4	0.10 to 650.00s	**10.00s**	**Y**	**0x117**
F1.24	Emergency stop deceleration time	0.10 to 650.00s	**10.00s**	**Y**	**0x118**
F1.25	Forward and reverse dead time	0.0 to 120.0s	**0.0s**	**Y**	**0x119**
F1.26	downtime frequency	0.00 to 60.00Hz	**0.50Hz**	**Y**	**0x11A**
F1.27	Zero speed holding torque	0.0 to 150.0 per cent	**models**		**0x11B**
F1.28	Zero Speed Holding Torque Time	0.0 to 6000.0sec When 6000.0s is set, it is held without time limit.	**0**		**0x11C**
F1.29	Power failure restart action selection	0: not valid 1: valid	**0**	**Y**	**0x11D**

F1.30	Power failure restart wait time	0.00 to 120.00s	**0.50s**	**Y**	**0x11E**
F1.31	Terminal operation protection selection	LED digit: Terminal run command selection at power-on 0: Terminal run command is invalid at power-on 1: Terminal run command is valid at power-on LED digit 10: Terminal run command selection at switching of run command-given channel 0: Terminal run command is invalid at cut-in 1: Terminal run command is valid at cut-in	**11**	**Y**	**0x11F**
F1.32	Tap operation frequency setting	0.00 to maximum frequency	**5.00 Hz**	**Y**	**0x120**
F1.33	Tap acceleration time	0.01 to 650.00s	**10.00s**	**Y**	**0x121**
F1.34	Tap deceleration time	0.01 to 650.00s	**10.00s**	**Y**	**0x122**
F1.35	hopping frequency	0.00 to maximum frequency	**0.00Hz**	**Y**	**0x123**
F1.36	hopping frequency amplitude	0.00 to maximum frequency	**0.00Hz**	**Y**	**0x124**
F2 Motor parameter set					
F2.00	Motor type	0: Asynchronous motor (AM) 1: Permanent magnet synchronous motor (PM) 2: Single-phase asynchronous motor (VF control only)	**0**	**X**	**0x200**
F2.01	Motor rated power	0.4 ~ 1000.0kW	**models**	**X**	**0x201**
F2.02	Motor rated voltage	0 to 1500V	**models**	**X**	**0x202**
F2.03	Motor rated current	0.1 ~ 2000.0A	**models**		**0x203**
F2.04	Motor rated frequency	0.01 to maximum frequency	**models**	**X**	**0x204**
F2.05	Rated motor speed	0 ~ 65000rpm	**models**	**X**	**0x205**
F2.06	Number of motor poles	2-48	**4**		**0x206**
F2.07	Motor no-load current	0.1 to 650.0A	**models**	**X**	**0x207**
F2.08	Motor stator resistance	0.001 to 65.000	**models**	**X**	**0x208**
F2.09	Motor Rotor Resistance	0.001 to 65.000	**models**	**X**	**0x209**
F2.10	Motor stator and rotor inductors	0.1 ~ 6500.0mH	**models**	**X**	**0x20A**
F2.11	Motor stator-rotor mutual inductance	0.1 ~ 6500.0mH	**models**	**X**	**0x20B**

F2.12	Self-learning selection of motor parameters	0: No operation 1: Rotational self-learning 2: Stationary self-learning	**0**	**X**	**0x20C**
F2.21	Synchronous machine stator resistance	0.001 to 65.000 (0.001Ohm)	**models**	**X**	**0x215**
F2.22	Synchronous machine d-axis inductors	0.01mH to 655.35mH	**models**	**X**	**0x216**
F2.23	Synchronous machine q-axis inductors	0.01mH to 655.35mH	**models**	**X**	**0x217**
F2.24	Synchronous machine reverse electromotive force	0.1V to 1000.0V	**models**	**Y**	**0x218**
F2.25	Synchroniser encoder mounting angle	0.0° to 360.0°.	**models**	**X**	**0x219**
F2.26	IAE Angle Compensation	0 to 65535	**0**	**X**	**0x21A**
F2.27	Inductive identification current	0.1% - 100.0%	**20.0**	**X**	**0x21B**
F2.28	Reverse Potential Recognition Current	0.1% - 100.0%	**50.0**	**X**	**0x21C**
F2.29	reservation				
F2.30	Asynchronous no-load current Missimum value	0.1%	**51.0**	**X**	**0x21E**
F2.31	Asynchronous stator resistance standard value	0.01 per cent	**5.20**	**X**	**0x21F**
F2.32	Youngest value of asynchronous rotor resistance	0.01 per cent	**4.14**	**X**	**0x220**
F2.33	Asynchronous Mutual Inductance Missimum Value	0.1%	**214.6**	**X**	**0x221**
F2.34	Asynchronous leakage inductance	0.01 per cent	**9.73**	**X**	**0x222**
F2.35	Asynchronous leakage inductance coefficient standard value	0.01 per cent	**0**	**X**	**0x223**
F2.36	Synchronous stator resistance standard value	0.01 per cent	**3.00 per cent**	**X**	**0x224**
F2.37	Synchronised d-axis inductance value	0.01 per cent	**5.00**	**X**	**0x225**
F2.38	Synchronised q-axis inductance value	0.01 per cent	**5.00**	**X**	**0x226**
F2.39	Synchronous motor reverse	0.1V	**340.0**	**X**	**0x227**

	electromotive force				
F2.40	Encoder mounting angle	0.1°	**0.0°**	**X**	**0x228**
F3 Motor Vector Control					
F3.00	ASR (speed ring) proportional gain 1	0.00 to 1.00	**0.20**	**Y**	**0x300**
F3.01	ASR (velocity loop) integration time1	0.01 to 10.00s	**0.10**	**Y**	**0x301**
F3.02	Loss of speed protection value	0 to 5000ms	**0ms**	**Y**	**0x302**
F3.03	ASR filter time1	0.000 to 0.100s	**0.005**	**Y**	**0x303**
F3.04	ASR switching frequency1	0.00 to 50.00Hz	**5.00**	**Y**	**0x304**
F3.05	ASR (speed loop) proportional gain 2	0.00 to 1.00	**0.20**	**Y**	**0x305**
F3.06	ASR (velocity loop) integration time2	0.01 to 10.00s	**0.10**	**Y**	**0x306**
F3.07	SVC and VF switching frequency	0.50 to 50.00Hz			**0x307**
F3.08	ASR filter time2	0.000 to 0.100s	**0.005s**	**Y**	**0x308**
F3.09	ASR switching frequency2	0.00 to 50.00Hz	**10.00 Hz**	**Y**	**0x309**
F3.10	Differential Compensation Factor	0 to 250 per cent	**100%**	**Y**	**0x30A**
F3.11	Maximum output torque	0.0 to 250.0 per cent	**150.0**	**Y**	**0x30B**
F3.12	Constant power area torque compensation start frequency	100.0 per cent to 500.0 per cent	**1.2**	**Y**	**0x30C**
F3.13	Constant power area torque compensation factor	0 to 100 per cent	**0.3**	**Y**	**0x30D**
F3.14	Constant Power Zone Torque Limit Onset Frequency	100.0 per cent to 500.0 per cent	**2**	**Y**	**0x30E**
F3.15	Constant Power Zone Torque Limit	50 to 200 per cent	**1.2**	**Y**	**0x30F**
F3.16	Current loop D-axis proportional gain	0.1 to 10.0	**1.0**	**Y**	**0x310**
F3.17	Current loop D-axis integral gain	0.1 to 10.0	**1.0**	**Y**	**0x311**
F3.18	Current loop Q-axis proportional gain	0.1 to 10.0	**1.0**	**Y**	**0x312**

F3.19	Current loop Q-axis integral gain	0.1 to 10.0	**1.0**	**Y**	**0x313**
F3.20	D-axis feed-forward gain	0.0 to 200.0 per cent	**50.0 per cent**	**Y**	**0x314**
F3.21	Q-axis feed-forward gain	0.0 to 200.0 per cent	**50.0 per cent**	**Y**	**0x315**
F3.22	Optimised current loop bandwidth	0.0 to 99.99ms	**2.00ms**	**Y**	**0x316**
F3.23	reservation				
F3.24	Upper limit of weak magnetic control current	0 - 200 per cent	**50%**	**Y**	**0x318**
F3.25	Weak Magnetic Control Feedforward Gain	0 - 500 per cent	**0 per cent**	**Y**	**0x319**
F3.26	Weak Magnetic Control Proportional Gain	0 - 9999	**100**	**Y**	**0x31A**
F3.27	Weak Magnetism Control Integral Gain	0 - 9999	**200**	**Y**	**0x31B**
F3.35	Synchronised open-loop start-up mode	0: direct start; 1: find angle start;	**1**		**0x323**
F3.36	Synchronised open-loop vector low-frequency boost	0 to 100.0 per cent	**50.0 per cent**	**Y**	**0x324**
F3.37	Synchronous open-loop vector high-frequency boost	0.0 to 100.0 per cent	**5.0 per cent**	**Y**	**0x325**
F3.38	Low Boost Holding Frequency	0.0 to 100.0 per cent	**10.00 per cent**	**Y**	**0x326**
F3.39	Low frequency boost cut-off frequency	0.0 to 100.0 per cent	**20.00 per cent**	**Y**	**0x327**
F3.40	High-frequency injection frequency	0 - 2000Hz	**1000Hz**	**Y**	**0x328**
F3.41	High frequency injection voltage	1 - 2000 (4096 corresponds to rated motor voltage)	**1000**	**Y**	**0x329**
F3.42	phase-locked loop P	0 - 500.00	**50.00**	**X**	**0x32A**
F3.43	Phase Locked Loop I	0 - 500.00	**40.00**	**Y**	**0x32B**
F3.44	High Frequency Injection Control Word	bit0: Enable HF injection bit1: Use HF injection angle at low frequency bit2: HF filter depth	**0/3**	**Y**	**0x32C**
F4 Motor VF control parameters					

F4.00	Linear VF curve selection	0: linear VF curve; 1-9: 1.1-1.9 power VF curve; 10: square VF curve; 11: custom VF curve;	**0**	**X**	**0x400**
F4.01	Self-setting voltage V1	0.0 to 100.0 per cent	**3.0 per cent**	**X**	**0x401**
F4.02	Self-setting frequency F1	0.00 to maximum frequency	**1.00Hz**	**X**	**0x402**
F4.03	Self-setting voltage V2	0.0 to 100.0 per cent	**28.0 per cent**	**X**	**0x403**
F4.04	Self-setting frequency F2	0.00 to maximum frequency	**10.00 Hz**	**X**	**0x404**
F4.05	Self-setting voltage V3	0.0 to 100.0 per cent	**55.0 per cent**	**X**	**0x405**
F4.06	Self-setting frequency F3	0.00 to maximum frequency	**25.00 Hz**	**X**	**0x406**
F4.07	Self-setting voltage V4	0.0 to 100.0 per cent	**78.0 per cent**	**X**	**0x407**
F4.08	Self-setting frequency F4	0.00 to maximum frequency	**37.50 Hz**	**X**	**0x408**
F4.09	Self-setting voltage V5	0.0 to 100.0 per cent	**100.0 per cent**	**X**	**0x409**
F4.10	Self-setting frequency F5	0.00 to maximum frequency	**50.00 Hz**	**X**	**0x40A**
F4.11	Percentage of output voltage	25-100 per cent	**100%**	**X**	**0x40B**
F4.12	Manual Torque Boost	0.1 to 30.0%, 0 auto torque boost	**Model Setting**	**Y**	**0x40C**
F4.13	Torque boost cut-off frequency	0.0 to 100.0 per cent	**100.0 per cent**	**Y**	**0x40D**
F4.14	Differential Compensation Gain	0 - 200.0 per cent	**0 per cent**	**Y**	**0x40E**
F4.15	Multiple power VF curve onset frequency	0.00Hz - maximum frequency	**10.00 Hz**	**Y**	**0x40F**
F4.16	Oscillation suppression gain	0.0 - 10.0	**5.0**	**Y**	**0x410**
F4.17	Oscillation suppression filter time	1 - 1000ms	**50ms**	**Y**	**0x411**
F4.18	overcurrent suppression point	50% - 200%	**150 per cent**	**Y**	**0x412**
F4.19	Overcurrent rejection gain	0 - 500 per cent	**50%**	**Y**	**0x413**
F4.20	Overcurrent suppression filter time	1 - 1000ms	**20ms**	**Y**	**0x414**
F4.21	AVR Functions			**Y**	**0x415**
F4.22	reservation			**Y**	**0x416**
F4.23	Automatic energy saving options	Digit: 0 off, 1 on Decile: frequency change exit depth Hundredths: Thousandths:	**50**	**Y**	**0x417**

F4.24	Lower frequency limit for energy-saving operation	0.0 to 100.0 per cent	**25.0 per cent**	**Y**	**0x418**
F4.25	Energy Saving Bucking Time	0.1 to 5000.0s	**10.0s**	**Y**	**0x419**
F4.26	Lower limit of energy-saving buck	20.0 to 100.0 per cent	**30.0 per cent**	**Y**	**0x41A**
F4.27	Energy Saving Buck Rate	1 - 1000V/sec	**50V/sec**	**Y**	**0x41B**
F4.28	Voltage regulation proportional gain	0 - 100	**20**	**Y**	**0x41C**
F4.29	Voltage Regulation Integral Gain	0 - 100	**20**	**Y**	**0x41D**
F4.30	EVF Torque Boost Gain	0 - 500 per cent	**100%**		**0x41E**
F4.31	EVF torque boost filter time	1 - 1000ms	**20ms**		**0x41F**
F4.32	EVF Differential Compensation Gain	0 - 500 per cent	**30 per cent**		**0x420**
F4.33	EVF Differential Compensation Filter Time	1 - 1000ms	**100ms**		**0x421**
F4.34	reservation				**0x422**
F4.35	Single-phase asynchronous motor smash ratio	10 - 200 per cent	**80 per cent**		**0x423**
F4.36	Single-phase motor current calibration factor	50 - 200 per cent	**120 per cent**		**0x424**
F4.40	Stabiliser proportional gain	0.1% - 100.0%	**5.0 per cent**		**0x428**
F4.41	Stabiliser filter time	1ms - 1000ms	**50ms**		**0x429**
F4.42	Low Frequency Current Boost	0.0 per cent - 200.0 per cent	**150.0 per cent**		**0x42A**
F4.43	Low Frequency Boost Maintenance Frequency	0 to 100.0 per cent	**20.0 per cent**		**0x42B**
F4.44	Low-frequency current boost cut-off frequency	0 to 100.0 per cent	**40.0 per cent**		**0x42C**
F4.45	D-axis current gain	0.0 - 100.0	**1.0**		**0x42D**
F4.46	Q-axis current gain	0.0 - 100.0	**1.0**		**0x42E**
F4.47	Flux Setting Strength	-200 - 500 per cent	**30 per cent**		**0x42F**
F4.48	Flux Control Proportional Gain	0 - 9999	**0**		**0x430**
F4.49	Flux Control Integral Gain	0 - 9999	**0**		**0x431**
F4.50	overcurrent suppression point	0.0 to 250.0 per cent	**120.0 per cent**		**0x432**

F4.51	Overcurrent rejection gain	0 - 500 per cent	**100%**		**0x433**
F4.52	Overcurrent suppression integral	1ms - 1000ms	**30ms**		**0x434**
F4.53	DC pull-in time	1ms - 9999ms	**1000ms**		**0x435**
F4.54	Start-up frequency	0.00Hz to 99.00Hz	**3.00Hz**		**0x436**
F4.55	Start-up frequency time	0.0sec to 999.0sec	**2.0sec**		**0x437**
F4.56	downtime frequency	0.00Hz to 99.00Hz	**1.00Hz**		**0x438**
F5 Digital Terminal Parameter Group					
F5.00	Multi-function input terminal 1(X1)	0: No function	**9**		**0x500**
F5.01	Multi-function input terminal 2(X2)	1: Positive rotation operation	**1**		**0x501**
F5.02	Multi-function input terminal 3(X3)	2: Reverse run	**0**		**0x502**
F5.03	Multi-function input terminal 4(X4)	3: Three-wire operation control (Xi)	**0**		**0x503**
F5.04	Multi-function input terminal 5 (X5)	4: Positive rotation point movement	**0**		**0x504**
F5.05	Multi-function input terminal 6 (X6)	5: Reverse point movement	**0**		**0x505**
F5.06	Multi-function input terminal 7 (X7)	6: Free parking	**0**		**0x506**
F5.07	Multi-function input terminal 8(X8)	7: Emergency stop	**0**		**0x507**
		8: Fault reset			
		9: External fault input			
		10: Frequency increment (UP)			
		11: Decreasing frequency (DW)			
		12: Frequency Increment/Decrement Clear (UP/DW Clear)			
		13: Speed torque control switching			
		14: Torque control prohibited			
		15: Multi-speed terminal 1			
		16: Multi-speed terminal 2			
		17: Multi-Speed Terminal 3			
		18: Multi-Speed Terminal 4			

		19: Acceleration and deceleration time selection terminal 1			
		20: Acceleration and deceleration time selection terminal 2			
		21: Acceleration and deceleration pauses			
		31: Programme execution (PLC) pause			
		32: Programme run (PLC) restarted			
		33: Oscillating frequency inputs			
		34: Pendulum pause			
		35: Pendulum reset			
		36: Frequency channel switching terminal 1			
		37: Frequency channel switching terminal 2			
		38: Frequency channel switching terminal 3			
		39: Frequency channel switching terminal 4			
		40: Timer trigger terminal			
		41: Timer clear terminal			
		42: Counter clock input terminal			
		43: Counter zero terminal			
		44: DC braking command			
F5.08	X1 to X4 terminal characteristics selection	LED digit: X1 terminal 0: closed valid 1: disconnected valid LED ten digit: X2 terminal 0: closed valid 1: disconnected valid LED hundred digit: X3 terminal 0: closed valid 1: disconnected valid LED thousand digit: X4 terminal 0: closed valid 1: disconnected valid	**0000**	**X**	**0x508**
F5.09	X1 to X4 input terminal filter time	0.000 to 60.000s	**0.010s**	**Y**	**0x509**

F5.10	X5 to X7 Terminal Characteristics Selection	LED digit: X5 terminal 0: closed valid 1: disconnected valid LED ten digit: X6 terminal 0: closed valid 1: disconnected valid LED hundred digit: X7 terminal 0: closed valid 1: disconnected valid	**0000**	**X**	**0x50A**
F5.11	X5 to X7 input terminal filter time	0.000 to 60.000s	**0.010s**	**Y**	**0x50B**
F5.12	Terminal control operation mode	0: 2-wire 1 1: 2-wire 2 2: 3-wire 1 3: 3-wire 2	**0**	**X**	**0x50C**
F5.13	Selection of terminal operation mode	LED digit: free stop terminal recovery mode 0: restore original command after invalidation 1: do not restore original command after invalidation LED ten digits: emergency stop terminal recovery mode 0: restore original command after disconnection 1: do not restore original command after disconnection LED hundred digits: terminal operation mode selection after fault reset 0: terminal control can be switched on directly 1: terminal control can be switched on only after stopping first LED thousand digits: reserved	**0111**	**X**	**0x50D**
F5.16	PUL input minimum frequency	0.00 to 50.00kHz	**0.00kHz**	**Y**	**0x510**
F5.17	PUL Minimum Frequency Correspondence Setting	0.00 to 100.00 per cent	**0**	**T**	**0x511**
F5.18	PUL Input Maximum Frequency	0.00 to 50.00kHz	**50.00kHz**	**Y**	**0x512**
F5.19	PUL Maximum Frequency Corresponding Setting	0.00 to 100.00 per cent	**1**	**Y**	**0x513**
F5.20	PUL filter time	0.00 to 10.00s	**0.10s**	**Y**	**0x514**
F5.21	PUL cut-off frequency	0.000 to 1.000kHz	**0.010kHz**	**Y**	**0x515**

F5.22	Terminal UP/DW control mode	0: power-down shutdown storage 1: power-down no storage, shutdown storage 2: valid for operation, shutdown cleared	**0**	**Y**	**0x516**
F5.23	UP/DW control frequency increase/decrease rate	0.01 to 50.00Hz/s	**0.50 Hz/s**	**Y**	**0x517**
F5.24	timer time unit	0: seconds 1: minutes 2: hours	**0**	**Y**	**0x518**
F5.25	Timer Maximum	0 to 65000 (not reset when set to 65000)	**65,000**	**Y**	**0x519**
F5.26	Timer Setpoint	0 to 65000	**0**	**Y**	**0x51A**
F5.27	Counter Maximum	0 to 65000	**1000**	**Y**	**0x51B**
F5.28	Counter Setting	0 to 65000	**500**	**Y**	**0x51C**
F5.29	Output terminal 1 (Y1)	0: no output	**0**	**Y**	**0x51D**
		1: Inverter in operation			
		2: Inverter in reverse operation			
		3: Fault Trip Alarm 1 (alarm during fault self-recovery)			
		4: Fault trip alarm 2 (no alarm during fault self-recovery)			
		5: Fault retry in progress			
		6: External fault shutdown			
		7: Inverter undervoltage			
		8: Inverter operation ready			
		9: Output frequency level detection 1 (FDT1)			
		10: Output frequency level detection 2 (FDT2)			
		11: The given frequency reaches			
		12: Zero speed in operation			
		13: Upper limit frequency reached			
		14: Lower frequency reach			
		15: Completion of the programme run cycle period			
		16: Programme run phase run completed			
		17: PID feedback exceeds upper limit			
		18: PID feedback below lower limit			
		19: PID feedback sensor disconnected			

		20: Motor overload warning			
		21: Timer time is up			
		22: Counter reaches maximum value			
		23: Counter reaches set value			
		24: Energy braking in			
		25: PG feedback disconnected			
		26: Emergency stop in progress			
		27: Overload pre-warning output			
		28: Low load pre-warning output			
F5.30	Relay output 1 (TA1-TB1-TC1)	Same definition as Y terminal output	**3**	**Y**	**0x51E**
F5.32	Output frequency level 1 (FDT1)	0.00 to maximum frequency	**30.00 Hz**	**Y**	**0x520**
F5.33	FDT1 lag	0.00 to maximum frequency	**0.00Hz**	**Y**	**0x521**
F5.34	Output frequency level 2 (FDT2)	0.00 to maximum frequency	**50.00 Hz**	**Y**	**0x522**
F5.35	FDT2 lag	0.00 to maximum frequency	**0.00Hz**	**Y**	**0x523**
F5.36	The given frequency reaches the detection amplitude	0.00 to 50.00Hz	**0.50Hz**	**Y**	**0x524**
F5.37	Overload pre-warning level	0.0 to 200.0 per cent	**1.8**	**Y**	**0x525**
F5.38	Overload pre-warning delay	0.0 to 100.0s	**0.5s**	**Y**	**0x526**
F5.39	Low-load pre-warning level	0.0 to 200.0 per cent	**0.3**	**Y**	**0x527**
F5.40	Low Load Pre-Alarm Delay	0.0 to 100.0s	**0.5s**	**Y**	**0x528**
F5.41	X1 rising edge delay time	0.0 to 360.0s	**0**	**Y**	**0x529**
F5.42	X1 falling edge delay time	0.0 to 360.0s	**0**	**Y**	**0x52A**
F5.43	X2 rising edge delay time	0.0 to 360.0s	**0**	**Y**	**0x52B**
F5.44	X2 falling edge delay time	0.0 to 360.0s	**0**	**Y**	**0x52C**
F5.45	X3 Rising edge delay time	0.0 to 360.0s	**0**	**Y**	**0x52D**
F5.46	X3 falling edge delay time	0.0 to 360.0s	**0**	**Y**	**0x52E**
F5.47	Y1 output delay time	0.0 to 360.0s	**0**	**Y**	**0x52F**
F5.48	Relay 1 output delay time	0.0 to 360.0s	**0**	**Y**	**0x530**

F6 Analogue terminal parameter group					
F6.00	AI1 lower limit value	0.00 to 10.00V	**0.00V**	**Y**	**0x600**
F6.01	AI1 lower limit setting	0.00 to 100.00 per cent	**0.00 per cent**	**Y**	**0x601**
F6.02	AI1 upper limit value	0.00 to 24.00V	**23.50V**	**Y**	**0x602**
F6.03	AI1 upper limit setting	0.00 to 100.00 per cent	**100.00 per cent**	**Y**	**0x603**
F6.04	AI1 filter time	0.00-10.00sec	**1.00sec**	**Y**	**0x604**
F6.05	AI2 lower limit value	0.00 to 10.00V	**0.00V**	**Y**	**0x605**
F6.06	AI2 lower limit setting	0.00 to 100.00 per cent	**0.00 per cent**	**Y**	**0x606**
F6.07	AI2 upper limit	0.00 to 10.00V	**10.00V**	**Y**	**0x607**
F6.08	AI2 Upper Limit Correspondence Setting	0.00 to 100.00 per cent	**100.00 per cent**	**Y**	**0x608**
F6.09	AI2 filter time	0.00-10.00sec	**0.10sec**		**0x609**
F6.10	AI3 lower limit value	0.00 to 20.00mA	**0.00V**	**Y**	**0x60A**
F6.11	AI3 lower limit setting	0.00 to 100.00 per cent	**0.00 per cent**	**Y**	**0x60B**
F6.12	AI3 upper limit	0.00 to 20.00mA	**10.00V**	**Y**	**0x60C**
F6.13	AI3 upper limit setting	0.00 to 100.00 per cent	**100.00 per cent**	**Y**	**0x60D**
F6.14	AI3 filter time	0.00-10.00sec	**0.10sec**		**0x60E**
F6.15	Analogue input curve selection	Single digit: AI1 Tenth digit: AI2 Hundredth digit: AI3 0: Straight line (default) 1: Curve 1 2: Curve 2	**000**	**X**	**0x60F**
F6.16	Analogue input polarity selection	Single digit: AI1 Tenth digit: AI2 Hundredth digit: AI3 0: voltage 1: current	**000**	**Y**	**0x610**

F6.21	AO output signal selection	Single digit: AO1 0: 0 to 10V 1: 4.00 to 20.00mA 2: 0.00 to 20.00mA Ten digits: AO2 0: 0 to 10V 1: 4.00 to 20.00mA 2: 0.00 to 20.00mA	**0000**		**0x615**
F6.22	AO1 output selection	0: Given Frequency 1: Output Frequency 2: Output Current 3: Input Voltage 4: Output Voltage 5: Mechanical Speed 6: Retention 7: Output Torque 8: PID Giving Amount 9: PID Feedback Amount 10: Output Power 11: Bus Voltage 12: AI1 Input Value 13: AI2 Input Value 14: AI3 Input Value 15: PUL Input Value 16: Module Temperature 1 17: Module Temperature 2	**1**	**Y**	**0x616**
F6.23	A02 Output Selection		**1**	**Y**	**0x617**
F6.24	FM output selection		**1**	**Y**	**0x618**
F6.25	AO1 output gain	25.0 to 200.0 per cent	**100.0 per cent**	**Y**	**0x619**
F6.26	A01 Output signal bias	-10.0 to 10.0 per cent	**0.0 per cent**	**Y**	**0x61A**
F6.27	AO2 output gain	25.0 to 200.0 per cent	**100.0 per cent**	**Y**	**0x61B**
F6.28	A02 Analogue output signal bias	-10.0 per cent to 10.0 per cent	**0.0 per cent**	**Y**	**0x61C**
F6.29	FM frequency output lower limit	0.00 to 100.00kHz	**0.10kHz**	**Y**	**0x61D**
F6.30	FM frequency output limit	0.00 to 100.00kHz	**50.00kHz**	**Y**	**0x61E**
F6.31	reservation	0	**0**	**Y**	**0x61F**
F6.32	Lower limit value of curve 1	0.00 to 10.00V	**0.00V**	**Y**	**0x620**
F6.33	Curve 1 lower limit setting	0.00 to 100.00 per cent	**0.0 per cent**	**Y**	**0x621**
F6.34	Curve 1 Inflection Point 1 Input Voltage	0.00 to 10.00V	**3.00V**	**Y**	**0x622**

F6.35	Curve 1 Inflection Point 1 Corresponding Setting	0.00 to 100.00 per cent	**30.0 per cent**	**Y**	**0x623**
F6.36	Curve 1 Inflection Point 2 Input Voltage	0.00 to 10.00V	**6.00V**	**Y**	**0x624**
F6.37	Curve 1 Inflection Point 2 Corresponding Setting	0.00 to 100.00 per cent	**60.0 per cent**	**Y**	**0x625**
F6.38	Upper limit of curve 1	0.00 to 10.00V	**10.0V**	**Y**	**0x626**
F6.39	Curve 1 Upper Limit Corresponding Setting	0.00 to 100.00 per cent	**100.0 per cent**	**Y**	**0x627**
F6.40	Lower limit value of curve 2	0.00 to 10.00V	**0.00V**	**Y**	**0x628**
F6.41	Curve 2 lower limit setting	0.00 to 100.00 per cent	**0.0 per cent**	**Y**	**0x629**
F6.42	Curve 2 Inflection Point 1 Input Voltage	0.00 to 10.00V	**3.00V**	**Y**	**0x62A**
F6.43	Curve 2 Inflection Point 1 Corresponding Setting	0.00 to 100.00 per cent	**30.0 per cent**	**Y**	**0x62B**
F6.44	Curve 2 Inflection Point 2 Input Voltage	0.00 to 10.00V	**6.00V**	**Y**	**0x62C**
F6.45	Curve 2 Inflection Point 2 Corresponding Setting	0.00 to 100.00 per cent	**60.0 per cent**	**Y**	**0x62D**
F6.46	Upper limit of curve 2	0.00 to 10.00V	**10.00V**	**Y**	**0x62E**
F6.47	Curve 2 Upper Limit Correspondence Setting	0.00 to 100.00 per cent	**100.0 per cent**	**Y**	**0x62F**
F7 Keypad and Display Parameter Group					
F7.00	Parameter and key lock selection	0: No lock 1: Function parameter lock 2: Function parameter and key lock (except RUN/STOP/JOG) 3: Function parameter and key full lock	**0**	**Y**	**0x700**
F7.01	user password	0 to 9999	**0**	**Y**	**0x701**
F7.02	Keyboard MF.K selection	0: NONE 1: REV 2: JOG	**1**	**Y**	**0x702**

F7.03	Keyboard STOP key range	LED digit: terminal control selection 0: not valid for terminal commands 1: valid for terminal commands LED ten digits: communication control selection 0: not valid for communication commands 1: valid for communication commands LED hundred digits: reserved LED thousand digits: reserved	**0**	**Y**	**0x703**
F7.04	Keyboard up and down keys to select	LED digit: Keypad up/down key modification selection 0: Invalid 1: Modify keypad digit set frequency (F0.08) 2: Reserved 3: Modify keypad digit PID given (Fb.01) 4: Reserved LED ten digit: Keypad up/down key memory selection 0: No memory for power down 1: Memory for power down LED hundred digit: Reserved LED thousand digit: Reserved	**0011**	**Y**	**0x704**
F7.05	Function parameter copy	0: No operation 1: Parameters saved at the keyboard are transferred to the inverter 2: Inverter parameter values are transferred to the keyboard and saved	**0**	**Y**	**0x705**
F7.06	UP/DW control frequency change rate	0.01 to 50.00Hz	**0.50Hz**	**Y**	**0x706**
F7.07	inverter temperature				**0x707**
F7.08	rectification temperature				**0x708**
F7.09	Total running time				**0x709**
F7.10	Product Sequence				**0x70A**
F7.11	software version				**0x70B**
F7.12	--				**0x70C**
F7.13	Total power-up time				**0x70D**
F7.14	total power consumption				**0x70E**
F7.15	Keypad potentiometer lower limit	0.00 to 5.00V	**0.50V**	**Y**	**0x70F**
F7.16	Keypad potentiometer lower limit setting	0.00 to 100.00 per cent	**0**	**Y**	**0x710**
F7.17	Keypad potentiometer upper limit	0.00 to 5.00V	**4.50V**	**Y**	**0x711**

F7.18	Keypad potentiometer upper limit corresponding setting	0.00 to 100.00 per cent	**1**	**Y**	**0x712**
F7.19	Displayed in the first line of the keypad in the running state	LED digit: first group display 0: output frequency 1: given frequency 2: bus voltage 3: output voltage 4: output current 5: output power 6: output torque 7: input terminal X on state 8: output terminal Y on state 9: synchronous frequency A: set gear B: AI input C: module temperature 1 D: module temperature 2 E: mechanical speed F: PID feedback LED ten digits: second group display Display LED hundred digits: third group display LED thousand digits: fourth group display	**40EA/E340**	**Y**	**0x713**
F7.20	Displayed in the first line of the keypad in the down state	LED digit: first group display LED ten-digit: second group display LED hundred-digit: third group display LED thousand-digit: fourth group display	**412A/E241**	**Y**	**0xF714**
F7.21	Keypad second line display in running state	LED digit: first group display LED ten-digit: second group display LED hundred-digit: third group display LED thousand-digit: fourth group display	**CA42**	**Y**	**0xF715**
F7.22	Keypad second line display in standstill state	LED digit: first group display LED ten-digit: second group display LED hundred-digit: third group display LED thousand-digit: fourth group display	**CA42**	**Y**	**0xF716**
F7.23	Rotation speed display coefficient	0.10 to 500.00 per cent	**100.00 per cent**	**Y**	**0xF717**

F7.24	Keypad display selection	LED digit: LCD keypad display language 0: Chinese 1: English LED ten-digit: output frequency display selection 0: target frequency 1: synchronous frequency 2: integrator frequency LED hundred-digit: mechanical speed display selection 0: target speed 1: actual speed LED thousand-digit: fault code display mode 0: Hex code display 1: digital display	**1000**	**Y**	**0xF718**
F8 Torque control parameters					
F8.00	Torque feed channel selection	0: Keypad Numeric Give 1: Keypad Potentiometer Give ×F7.01 2: VS ×F7.01 3: AI ×F7.01 4: AS ×F7.01 5: PUL ×F7.01 6: RS485 Communicate Give ×F7.01 7: Option Card 8: VS3(Extension)	**0**	**X**	**0x800**
F8.01	Torque keypad digital setting	0 to 200.0 per cent	**100.0 per cent**	**Y**	**0x801**
F8.02	Torque direction selection	Single digit: Torque direction setting 0: Positive torque direction 1: Negative torque direction 10 digits: Torque reversal setting 0: Allow torque reversal 1: Prohibit torque reversal	**00**	**Y**	**0x802**
F8.03	Upper limit of output torque	F7.04 to 200.0 per cent	**150.0 per cent**	**Y**	**0x803**
F8.04	Output torque lower limit	0 to F7.03	**0 per cent**	**Y**	**0x804**

F8.05	Torque control forward speed limit selection	0: Function Code F7.07 Setting; 1: Keypad Potentiometer╳F7.07; 2: VS╳F7.07; 3: AI╳F7.07; 4: AS╳F7.07; 5: PUL╳F7.07; 6: RS485 Communicator╳F7.07 7: Option Card 8: VS3(Extension)	**0.10sec**	**Y**	**0x805**
F8.06	Torque control reverse speed limit selection	0: Function Code F7.08 Setting; 1: Keypad Potentiometer╳F7.08; 2: VS╳F7.08; 3: AI╳F7.08; 4: AS╳F7.08; 5: PUL╳F7.08; 6: RS485 Communicator╳F7.08; 7: Option Card 8: VS3(Extension)		**Y**	**0x806**
F8.07	Torque control positive maximum speed limit	0.00 to upper frequency	**50.00 Hz**	**Y**	**0x807**
F8.08	Torque control is limited to maximum speed anyway	0.00 to upper frequency	**50.00 Hz**	**Y**	**0x808**
F8.09	Speed/torque switching delay	0.00 to 10.00s	**0.01s**	**Y**	**0x809**
F8.10	Torque acceleration time	0.00 to 10.00s	**0.01s**	**Y**	**0x80A**
F8.11	Torque deceleration time	0.00 to 10.00s	**0.01s**	**Y**	**0x80B**
F8.12	Forward and reverse torque dead time	0.00 to 650.00s	**0.00s**	**Y**	**0x80C**
F9 Photovoltaic water pump control parameters					
F9.00	Photovoltaic water pumping model	0: Frequency conversion mode 1: CVT mode 2: MPPT mode	**2**		**0x900**
F9.01	CVT target voltage	20.0 per cent - 200.0 per cent	**81.0 per cent**		**0x903**
F9.02	MPPT voltage limit	20.0 per cent - 200.0 per cent	**100.0 per cent**		**0x904**
F9.03	MPPT voltage lower limit	20.0 per cent - 200.0 per cent	**50.0 per cent**		**0x905**
F9.04	Frequency Adjustment Gain	10.0 per cent - 500.0 per cent	**2.0 per cent**		**0x906**
F9.05	Frequency Adjustment Filter Time	0.001s - 9.999sec	**0.002sec**		

F9.06	MPPT search interval	0.1 - 60.0	**1.0sec**		**0x907**
F9.07	MPPT Gain	0-100	**50**		**0x908**
F9.08	reservation				
F9.09	Sleep Voltage Threshold	0 to 1000V	**0V**		**0x90B**
F9.10	Sleep recovery voltage	0 to 1000V	**400V**		**0x90C**
F9.11	Hibernation recovery wait time	0.0sec ~ 3000.0sec	**10.0sec**		**0x90D**
F9.12	Low Frequency Protection Detection Frequency	0 - 100%	**20 per cent**		**0x90E**
F9.13	Low frequency protection detection time	0.0sec ~ 3000.0sec	**30.0sec**		**0x90F**
F9.14	Automatic recovery time for low-frequency protection	0.0sec ~ 3000.0sec	**120.0sec**		**0x90F**
F9.15	Drying protection detection current	0 - 200 per cent	**40 per cent**		**0x910**
F9.16	Frequency of drying protection detection	0 - 100%	**80 per cent**		
F9.17	Drying protection detection time	0.0sec ~ 3000.0sec	**60.0sec**		**0x911**
F9.18	Automatic recovery time for drying protection	0.0sec ~ 3000.0sec	**900.0sec**		**0x912**
F9.19	Overcurrent protection detection current	0 - 200 per cent	**0 per cent**		**0x913**
F9.20	Overcurrent protection detection time	0.0sec ~ 3000.0sec	**30.0sec**		**0x914**
F9.21	Automatic recovery time for overcurrent protection	0.0sec ~ 3000.0sec	**900.0sec**		**0x915**
F9.22	Minimum power protection value	0.00kw - 650.00kw	**0.00kw**		**0x916**
F9.23	Minimum power protection detection time	0.0sec ~ 3000.0sec	**10.0sec**		**0x917**
F9.24	Minimum power protection auto recovery time	0.0sec ~ 3000.0sec	**10.0sec**		**0x918**
F9.25	Alarm recovery mode	0: automatic recovery; 1: manual recovery LED0: low frequency protection LED1: hit dry protection LED2: overcurrent overload protection LED3: minimum power protection	**0000H**		**0x919**
F9.26	Water full protection detection time	0.0sec ~ 3000.0sec	**10.0sec**		**0x91A**

F9.27	Water full protection exit time	0.0sec ~ 3000.0sec	**10.0sec**		**0x91B**
F9.28	Accessibility	0: Invalid, 1: Valid LED0: 0: Upper limit is limited by the given frequency, 1: Upper limit frequency is limited by the rated frequency of the motor LED1: 0: Upper limit is minimised to 0 1: Upper limit frequency is minimised to 1/4 of the motor LED2: Fault power down save LED3: Reserved	**0110H**		**0x91C**
F9.29	Photovoltaic water pump function selection	0: Invalid, 1: Valid LED0: Constant Torque Frequency Limit Selection LED1: Reserved LED2: Voc Voltage Update for Voltage Surge LED3: Fast Downconversion Function	**1101H**		**0x91D**
F9.30	Fast Downconversion Gain	0-20	**2**		**0x909**
F9.31	Fast downscale threshold	3.0 per cent-15.0 per cent	**5.0 per cent**		**0x91E**
F9.32	Voltage surge threshold	0.0 per cent-20.0 per cent	**5.0 per cent**		**0x920**
F9.33	Constant Torque Frequency Limit	80.0 per cent-150.0 per cent	**150.0 per cent**		
FA Fault and protection parameter set					
FA.00	overpressure suppression point	110 per cent - 150 per cent	**135 per cent**	**Y**	**0xA00**
FA.01	Overvoltage suppression gain	0 - 500 per cent	**100%**	**Y**	**0xA01**
FA.02	Overvoltage suppression filter time	1 - 1000ms	**10ms**	**Y**	**0xA02**
FA.03	frequency limit	0.00Hz - 99.99Hz	**0.00Hz**	**Y**	**0xA03**
FA.04	Fan control	0: the fan runs after the inverter is powered up 1: shutdown is temperature-dependent, running is running 2: shutdown fan stops, running is temperature-dependent	**1**	**Y**	**0xA04**
FA.07	Flux Braking Gain	0 - 500 per cent	**100%**	**Y**	**0xA07**
FA.08	Energy consumption brake operating voltage	115.0 to 140.0 per cent	**125.0 per cent**	**Y**	**0xA08**
FA.09	Energy consumption braking rate	10 to 100 per cent	**100%**	**Y**	**0xA09**
FA.10	Busbar undervoltage protection point	40.0 per cent to 100.0 per cent	**60.0 per cent**	**Y**	**0xA0A**
FA.11	Output power correction factor	0 - 1000 per cent	**100%**	**Y**	**0xA0B**

FA.12	Power display scale selection	0 - Power display percentage (%) 1 - Power display kilowatt (KW)	**0**	**Y**	**0xA0C**
FA.13	Speed tracking current loop gain	0.00 to 100.00	**10.00**	**Y**	**0xA0D**
FA.14	RPM Tracking Speed Gain	0.01 - 10.00	**5.00**	**Y**	**0xA0E**
FA.15	RPM Tracking Current	50 - 200 per cent	**100%**	**Y**	**0xA0F**
FA.16	PWM parameter setting	Single bit: PWM mode selection 0:PZV; 1:7-segment wave generation; Ten bit: turn on voltage prediction compensation Hundred bit: 0:SSSU, 1:DSDU Thousand bit: Random carrier mode 0:Random carrier 1:Random 0 vector	**0110**	**Y**	**0xA10**
FA.17	Hardware current and voltage protection	Single-digit: Hardware current limiting (CBC) 0: Off 1: On Ten-digit: Hardware overvoltage protection 0: Off 1: On Hundred-digit: SC filter time 1 - F Thousand-digit: OC interference suppression function 1 - F	**0000**	**Y**	**0xA11**
FA.18	Power-on short circuit detection to ground	Single digit: Power-on short circuit to ground detection 0: Off 1: On Ten digits: Hundred digits: Thousand digits:	**0**	**X**	**0xA12**
FA.19	phase failure protection	Single digit: Output phase loss protection Ten digits: Input phase loss protection Hundred digits: Motor dropout protection 0: Off 1: On	**11**	**Y**	**0xA13**
FA.20	Out-of-phase protection software detection level	0.0 to 999.9 per cent	**15.0 per cent**		**0xA14**
FA.21	CBC Protection Point	100 to 220 per cent	**200 per cent**		**0xA15**
FA.22	CBC overload protection time	1 to 5000ms	**500ms**		**0xA16**
FA.23	PZV set point	50.0 to 110.0 per cent			**0xA17**
FA.24	software overcurrent point	0.0 to 300.0 per cent	**200.0 per cent**		**0xA18**

FA.25	Motor overload warning factor	20.0 to 250.0 per cent	**80.0 per cent**		**0xA19**
FA.26	Motor overload protection factor	20.0 to 250.0 per cent	**100.0 per cent**		**0xA1A**
FA.27	Failure self-recovery times	0 to 5	**5**		**0xA1B**
FA.28	Failure self-recovery interval	0.1 to 500.0s	**60.0s**		**0xA1C**
FA.29					**0xA1D**
FB Process PID control parameter set					
Fb.00	PID controller given signal source	0: Keypad digital PID given 1: Keypad potentiometer given 2: Voltage analogue VS given 3: Current/voltage analogue AI given 4: Current analogue AS given 5: Terminal pulse PUL given 6: RS485 communication given 7: Option card 8: Terminal selection 9: VS3 (extension)	**0**	**X**	**0xB00**
Fb.01	Keypad Numeric PID Giving	0.00 to 100.0 per cent	**50.0 per cent**	**Y**	**0xB01**
Fb.02	PID controller feedback signal source	0: Keypad digital PID feedback 1: Keypad potentiometer feedback 2: Voltage analogue VS feedback 3: Current/voltage analogue AI feedback 4: Current analogue AS feedback 5: Terminal pulse PUL feedback 6: RS485 communication feedback 7: Option card 8: Terminal selection 9: VS3 (extension)	**2**	**X**	**0xB02**
Fb.03	Feedback signal gain	0.00 to 10.00	**1.00**	**Y**	**0xB03**
Fb.04	Maximum range of feedback signal	0 to 100.0	**100.0**	**Y**	**0xB04**

Fb.05	PID control selection	LED digit: Feedback characteristic selection 0: Positive characteristic 1: Negative characteristic LED ten digits: PID regulation direction selection 0: Inverse forbidden 1: Inverse allowed LED hundred digits: Alignment selection 0: Non-centre alignment 1: Centre alignment LED thousand digits: Reserved	**0100**	**X**	**0xB05**
Fb.06	PID preset output	0.0 to 100.0 per cent	**100.0 per cent**	**Y**	**0xB06**
Fb.07	PID preset output runtime	0.0 to 6500.0s	**0.0s**	**Y**	**0xB07**
Fb.08	Proportional gain P	0.00 to 100.00	**1.00**	**Y**	**0xB08**
Fb.09	Integration time I	0.00 to 10.00s	**0.10s**	**Y**	**0xB09**
Fb.10	Differential gain D	0.00 to 10.00s	**0.00s**	**Y**	**0xB0A**
Fb.11	sampling period	0.00 to 100.00s	**0.10s**	**Y**	**0xB0B**
Fb.12	PID control deviation limit	0.0 to 100.0 per cent	**0.0 per cent**	**Y**	**0xB0C**
Fb.13	reservation			**Y**	**0xB0D**
Fb.14	Feedback disconnection detection time	0.0 to 120.0s	**1.0s**	**Y**	**0xB0E**
Fb.15	Feedback disconnection action selection	0: continue PID operation without reporting fault 1: stop and report fault 2: continue PID operation, output alarm signal 3: run at current frequency, output alarm signal	**0**	**Y**	**0xB0F**
Fb.16	Upper limit of disconnection alarm	0.0 to 100.0 per cent	**100.0 per cent**	**Y**	**0xB10**
Fb.17	Lower limit of disconnection alarm	0.0 to 100.0 per cent	**0.0 per cent**	**Y**	**0xB11**
FC Multi-speed, PLC function and pendulum parameter set					
FC.00	PLC Multi-Segment Speed 1	0.00 to 320.00Hz	**10.00 Hz**	**Y**	**0xC00**
FC.01	PLC Multi-Segment Speed 2	0.00 to 320.00Hz	**20.00 Hz**	**Y**	**0xC01**
FC.02	PLC Multi-Segment Speed 3	0.00 to 320.00Hz	**30.00 Hz**	**Y**	**0xC02**
FC.03	PLC Multi-Segment Speed 4	0.00 to 320.00Hz	**40.00 Hz**	**Y**	**0xC03**
FC.04	PLC Multi-Segment Speed 5	0.00 to 320.00Hz	**50.00 Hz**	**Y**	**0xC04**

FC.05	PLC Multi-Segment Speed 6	0.00 to 320.00Hz	**40.00 Hz**	**Y**	**0xC05**
FC.06	PLC Multi-Segment Speed 7	0.00 to 320.00Hz	**30.00 Hz**	**Y**	**0xC06**
FC.07	PLC Multi-Segment Speed 8	0.00 to 320.00Hz	**20.00 Hz**	**Y**	**0xC07**
FC.08	PLC Multi-Segment Speed 9	0.00 to 320.00Hz	**10.00 Hz**	**Y**	**0xC08**
FC.09	PLC Multi-Segment Speed 10	0.00 to 320.00Hz	**20.00 Hz**	**Y**	**0xC09**
FC.10	PLC Multi-Segment Speed 11	0.00 to 320.00Hz	**30.00 Hz**	**Y**	**0xC0A**
FC.11	PLC Multi-Segment Speed 12	0.00 to 320.00Hz	**40.00 Hz**	**Y**	**0xC0B**
FC.12	PLC Multi-Segment Speed 13	0.00 to 320.00Hz	**50.00 Hz**	**Y**	**0xC0C**
FC.13	PLC Multi-Segment Speed 14	0.00 to 320.00Hz	**40.00 Hz**	**Y**	**0xC0D**
FC.14	PLC Multi-Segment Speed 15	0.00 to 320.00Hz	**30.00 Hz**	**Y**	**0xC0E**
FC.15	PLC operation mode selection	LED digit: cycling mode 0: stop after single cycle 1: continuous cycle 2: hold final value after single cycle LED ten digits: timing unit 0: seconds 1: minutes 2: hours LED hundred digits: power-down storage mode 0: no storage 1: storage LED thousand digits: start-up mode 0: rerun from the first stage 1: rerun from the stage of the moment of shutdown 2: continue with the remaining time of the stage of the moment of shutdown Running	**0**	**Y**	**0xC0F**
FC.16	PLC segment 1 runtime	0.0 to 6500.0 (s/m/h)	**10.0**	**Y**	**0xC10**
FC.17	PLC segment 2 runtime	0.0 to 6500.0 (s/m/h)	**10.0**	**Y**	**0xC11**
FC.18	PLC segment 3 runtime	0.0 to 6500.0 (s/m/h)	**10.0**	**Y**	**0xC12**
FC.19	PLC segment 4 runtime	0.0 to 6500.0 (s/m/h)	**10.0**	**Y**	**0xC13**
FC.20	PLC segment 5 runtime	0.0 to 6500.0 (s/m/h)	**10.0**	**Y**	**0xC14**
FC.21	PLC segment 6 runtime	0.0 to 6500.0 (s/m/h)	**10.0**	**Y**	**0xC15**
FC.22	PLC segment 7 runtime	0.0 to 6500.0 (s/m/h)	**10.0**	**Y**	**0xC16**

FC.23	PLC segment 8 runtime	0.0 to 6500.0 (s/m/h)	**10.0**	**Y**	**0xC17**
FC.24	PLC paragraph 9 runtime	0.0 to 6500.0 (s/m/h)	**10.0**	**Y**	**0xC18**
FC.25	PLC paragraph 10 runtime	0.0 to 6500.0 (s/m/h)	**10.0**	**Y**	**0xC19**
FC.26	PLC paragraph 11 runtime	0.0 to 6500.0 (s/m/h)	**10.0**	**Y**	**0xC1A**
FC.27	PLC segment 12 runtime	0.0 to 6500.0 (s/m/h)	**10.0**	**Y**	**0xC1B**
FC.28	PLC paragraph 13 runtime	0.0 to 6500.0 (s/m/h)	**10.0**	**Y**	**0xC1C**
FC.29	PLC paragraph 14 runtime	0.0 to 6500.0 (s/m/h)	**10.0**	**Y**	**0xC1D**
FC.30	PLC paragraph 15 runtime	0.0 to 6500.0 (s/m/h)	**10.0**	**Y**	**0xC1E**
FC.31	PLC section 1 direction and acceleration/deceleration time	LED digit: direction of operation of this segment 0: forward 1: reverse LED ten digits: acceleration/deceleration time of this segment 0: acceleration/deceleration time 1 1: acceleration/deceleration time 2 2: acceleration/deceleration time 3 3: acceleration/deceleration time 4 LED hundred digits: reserved LED thousand digits: reserved	**0**	**Y**	**0xC1F**
FC.32	PLC section 2 direction and acceleration/deceleration time		**0**	**Y**	**0xC20**
FC.33	PLC section 3 direction and acceleration/deceleration time		**0**	**Y**	**0xC21**
FC.34	PLC section 4 direction and acceleration/deceleration time		**0**	**Y**	**0xC22**
FC.35	PLC section 5 direction and acceleration/deceleration time		**0**	**Y**	**0xC23**
FC.36	PLC segment 6 direction and acceleration/deceleration time		**0**	**Y**	**0xC24**
FC.37	PLC segment 7 direction and acceleration/deceleration time		**0**	**Y**	**0xC25**
FC.38	PLC Section 8 Direction and Acceleration/Deceleration Times		**0**	**Y**	**0xC26**
FC.39	PLC Section 9 Direction and Acceleration/Deceleration Times		**0**	**Y**	**0xC27**
FC.40	PLC paragraph 10 direction and acceleration/deceleration time		**0**	**Y**	**0xC28**
FC.41	PLC paragraph 11 direction and		**0**	**Y**	**0xC29**

	acceleration/deceleration time				
FC.42	PLC Section 12 Direction and Acceleration/Deceleration Times		**0**	**Y**	**0xC2A**
FC.43	PLC Section 13 Direction and Acceleration/Deceleration Times		**0**	**Y**	**0xC2B**
FC.44	PLC paragraph 14 direction and acceleration/deceleration time		**0**	**Y**	**0xC2C**
FC.45	PLC Section 15 Direction and Acceleration/Deceleration Times		**0**	**Y**	**0xC2D**
FC.46	reservation			**Y**	**0xC2E**
FC.47	reservation			**Y**	**0xC2F**
FC.48	reservation			**Y**	**0xC30**
FC.49	Oscillation frequency control	LED digit: pendulum frequency control 0: pendulum frequency control is invalid 1: pendulum frequency control is valid LED ten digits: pendulum frequency input mode 0: automatic input 1: manual input LED hundred digits: pendulum amplitude control 0: variable pendulum amplitude 1: fixed pendulum amplitude LED thousand digits: reservation	**0**	**Y**	**0xC31**
FC.50	Oscillation preset frequency	0.00 to maximum frequency	**0.00Hz**	**Y**	**0xC32**
FC.51	Preset frequency duration	0.00 to 650.00s	**0.00s**	**Y**	**0xC33**
FC.52	swing amplitude	0.0 to 100.0 per cent	**0.0 per cent**	**Y**	**0xC34**
FC.53	Burst frequency amplitude	0.0 to 50.0 per cent	**0.0 per cent**	**Y**	**0xC35**
FC.54	Oscillator Rise Time	0.00 to 650.00s	**5.00s**	**Y**	**0xC36**
FC.55	Oscillation frequency fall time	0.00 to 650.00s	**5.00s**	**Y**	**0xC37**
FD Communication Control Function Parameter Group					
Fd.00	Master-slave selection (Modbus and Can)	LED digit: Modbus communication master-slave selection LED ten digits: Can communication master-slave selection 0: Slave 1: Master	**0**	**X**	**0xD00**
Fd.01	485 Communication Address	1 to 247	**1/165**	**X**	**0xD01**

Fd.02	Baud rate selection	LED digits: 485 communication: 0: 1200 bps 1: 2400 bps 2: 4800 bps 3: 9600 bps 4: 19200 bps 5: 38400 bps LED ten digits: Can (CanOpen and VTech Can) 0: 20 kbps 1: 50 kbps 2: 100 kbps 3: 125 kbps 4. 250 kbps 5: 500 kbps 6: 1Mbps	**0x43**	**X**	**0xD02**
Fd.03	Modbus data format	0: (N, 8, 1) No parity, data bit: 8, stop bit: 1 1: (E, 8, 1) Even parity, data bit: 8, stop bit: 1 2: (O, 8, 1) Odd parity, data bit: 8, stop bit: 1 3: (N, 8, 2) No parity, data bit: 8, stop bit: 2 4: (E, 8, 2) Even parity, data bit: 8, stop bit: 2 5: (O, 8, 2) Odd parity, data bit: 8, stop bit: 2 5: (O, 8, 2) Odd parity , data bit: 8, stop bit : 2	**0**	**X**	**0xD03**
Fd.04	Communication ratio setting	0.00 to 5.00	**1.00**	**Y**	**0xD04**
Fd.05	Modbus communication response delay	0 to 500ms	**0ms**	**Y**	**0xD05**
Fd.06	Modbus Communication Timeout Failure Time	0.1 to 100.0s	**1.0s**	**Y**	**0xD06**

Fd.07	Modbus communication fault action mode selection	0: Alarm and free stop 1: No alarm and continue running 2: Stop, no alarm (run command given by communication) 3: Stop, no alarm (run given by all channels)	**1**	**Y**	**0xD07**
Fd.08	Modbus transmission response processing	0: Write operation responds 1: Write operation does not respond	**0**	**Y**	**0xD08**
Fd.09	Host Send Selection	LED digits: first group send frame selection 0: invalid 1: run command given 2: host given frequency 3: host output frequency 4: host upper limit frequency 5: reserved 6: host output torque 7: reserved 8: reserved 9: host given PID A: host feedback PID LED ten digits: second group send frame selection same as above LED hundred digits: third group send frame selection same as above LED thousand digits: fourth group send frame selection same as above LED thousand digits: fourth group send frame selection same as above Transmit frame selection Same as above	**31**	**Y**	**0xD09**
Fd.10	RS485 communication port configuration	0: configure for Modbus communication; 1: configure for serial communication; 2: UART_OSC	**0**	**Y**	**0xD0A**
E0 -E4 Fault parameter set (E0 is the most recent fault recorded parameter)					
E0.00	Fault type	See Fault Message Code Table for details	**--**		
E0.01	Frequency of faulty operation	0.00 to maximum frequency	**--**		
E0.02	Fault Output Current	0.1 ~ 2000.0A	**--**		
E0.03	Fault bus voltage	0~3000V	**--**		
E0.04	Fault input terminal status	See input terminal status diagram	**--**		
E0.05	Fault output terminal status	See output terminal status diagram	**--**		
E0.06	Fault Module Temperature	0 to 100°C	**--**		

E0.07	Faulty inverter status	LED digit: operation direction 0: forward rotation 1: reverse rotation LED ten digits: operation status 0: stop 1: steady speed 2: accelerate 3: decelerate LED hundred digits: reserved LED thousand digits: reserved			
E0.08	Failure runtime (from this power-up)	0 to 6553.5H	**--**		
E0.09	Failure runtime (from total runtime)	0 to 65535H	**--**		
E0.10	Fault Output Voltage	0 to 1500V	**--**		
E0.11	Troubleshooting information	See Fault Message Code Table for details	**--**		
D Monitoring parameters					
D-00	output frequency	0.01Hz		**R**	**0x2100**
D-01	given frequency	0.01Hz		**R**	**0x2101**
D-02	busbar voltage	0.1V		**R**	**0x2102**
D-03	output voltage	1V		**R**	**0x2103**
D-04	Output Current	0.1A		**R**	**0x2104**
D-05	output power	0.1KW		**R**	**0x2105**
D-06	Output torque	0.1%		**R**	**0x2106**
D-07	Input terminal X on state	See input terminal status diagram		**R**	**0x2107**
D-08	Output terminal Y on state	See output terminal status diagram		**R**	**0x2108**
D-09	Analogue AI1 input value	0.01V/0.01mA		**R**	**0x2109**
D-10	operational state	0: Shutdown 1: Running 2: Dormant 3: Low frequency protection 4: Playing dry protection in 5: Overcurrent protection in 6: Low power protection in		**R**	**0x210A**
D-11	VOC Voltage	0.1V		**R**	**0x210B**
D-12	Inverter temperature	1°C		**R**	**0x210C**

D-13	Rectifier Bridge Temperature	1°C		**R**	**0x210D**
D-14	mechanical speed	1RPM		**R**	**0x210E**
D-15	PID dosing	0.1%		**R**	**0x210F**
D-16	PID feedback amount	0.1%		**R**	**0x2110**
D-17	Input Voltage	0.1V		**R**	**0x2111**
D-18	Pulse signal PUL input value	0.01kHz		**R**	**0x2112**
D-19	Pulse signal FM output value	0.01kHz		**R**	**0x2113**
D-20	Analogue output AO1	0.01V		**R**	**0x2114**
D-22	counter value	1		**R**	**0x2116**
D-23	Inverter Power Rating	kW		**R**	**0x2117**
D-24	Rated voltage of inverter	V		**R**	**0x2118**
D-25	Running time of this power-up	0.1 hour		**R**	**0x2119**
D-26	Accumulated running time of the machine	hours		**R**	**0x211A**
D-27	Inverter rated current	A		**R**	**0x211B**
D-28	software version	00.00		**R**	**0x211C**
D-29	Number of OC false triggers	0		**R**	**0x211D**
D-33	Driver usage time CLK				
D-35	Timer time	Seconds/minutes/hours			
D-36	Inverter status				
D-37	Cumulative electricity consumption (low)	1 - 9999	**1°**		
D-38	Cumulative electricity consumption (high)	1 - 9999			
D-43	RPM Tracking Signal Frequency	0.01Hz	**0.1%**		
D-44	Z signal status	00 00	**0000**		

Chapter 6 EMC (Electromagnetic Compatibility)

6.1 Definition of EMC

Electromagnetic compatibility refers to the ability of electrical equipment to operate in an environment of electromagnetic interference without disturbing the electromagnetic environment and to achieve its function in a stable manner.

6.2 Introduction to EMC Standards

According to the national standard GB/T12668.3, the products need to meet the requirements of electromagnetic interference and anti-electromagnetic interference. Our existing products implement the latest international standard: IEC/EN61800-3:2004 (Adjustable speed electrical power drive systems part 3: EMC requirements and specific test methods), which is equivalent to the national standard GB/T12668.3. GB/T12668.3.

IEC/EN61800-3 mainly from the electromagnetic interference and anti-electromagnetic interference two aspects of the product to investigate, electromagnetic interference is mainly on the product of radiated interference, conducted interference and harmonic interference testing (corresponding to the products used for civilian use have this requirement). Anti-electromagnetic interference is mainly on the product's conducted immunity, radiation immunity, surge immunity, fast mutation pulse group immunity, ESD immunity and power supply low-frequency end immunity (specific test items are: 1, the input voltage dips, interruptions, and changes in the immunity test; 2, the phase change notch immunity test; 3, the harmonic input immunity test; 4, the input frequency change test; 5, the input voltage imbalance test; 6, the input voltage fluctuation test). Input voltage unbalance test; 6, input voltage fluctuation test) for testing. In accordance with the strict requirements of the above IEC/EN61800-3 test, our products are installed and used in accordance with the guidance shown in 6.3, in the general industrial environment will have good electromagnetic compatibility.

6.3 EMC Guidance

6.3.1 Electromagnetic interference and installation considerations:

Electromagnetic interference there are two kinds of electromagnetic interference, one is the surrounding environment of electromagnetic noise on the product interference, another kind of interference is generated by the product on the surrounding equipment interference, for the interference is relatively large occasions, it is recommended to install the input reactor.

Installation Notes:

1) The grounding wire of the product and other electrical products should be well grounded;

2) The power input and output power lines and weak electrical signal lines (e.g., control lines) of the

product should not be arranged in parallel as far as possible, and should be arranged vertically when possible;

3) The output power line of the product is recommended to use shielded cable, or use steel pipe shielded power line, and the shielding layer should be reliably grounded, and for the lead of the interfering equipment it is recommended to use twisted shielded control line, and the shielding layer should be reliably grounded;

4) For motor cable lengths longer than 100m, an output filter or reactor is required.

6.3.2 Handling of interference with products caused by peripheral electromagnetic equipment:

The general cause of electromagnetic influences on the product is a large number of relays, contactors or electromagnetic brakes installed in the vicinity of the product. When the product is interfered with as a result and malfunctions, the following solutions are recommended:

1) Add a surge suppressor to the device generating the interference;

2) Product inputs are added with filters, refer to 6.3.5 for details;

3) Use shielded cables for the product control signal lines and the leads of the detection lines and ground the shield reliably.

6.3.3 Treatment of product interference with peripheral equipment:

There are two types of noise in this section: one is radiated interference from the product, while the other is conducted interference from the product. These two types of interference make the peripheral electrical equipment subject to electromagnetic or electrostatic induction. In turn, the equipment produces a false action. For several different interference situations, refer to the following methods to solve:

1) Instruments for measuring, receivers and sensors, etc., the general signal is relatively weak, if the product and the closer distance or in the same control cabinet, easy to be interfered with and malfunction, it is recommended to use the following solutions: try to stay away from the source of interference; do not arrange the signal line and the power line in parallel, especially do not equal bundled together; the signal line and power line with a shielded cable, and a good grounding; in the output side of the product with a Ferrite magnet ring (select the suppression frequency in the range of 30 ~ 1000MHz), and winding 2 ~ 3 turns, for the bad situation, you can choose to add the EMC output filter;

2) When the disturbed equipment and the product use the same power supply, it causes conduction interference, if the above methods can not eliminate the interference, it should be installed between the product and the power supply EMC filter (specifically refer to 6.3.5 for selection operation);

3) Separate grounding of peripheral equipment eliminates interference due to leakage currents in the product earth wire when common ground is used.

6.3.4 Leakage currents and treatment:

There are two forms of leakage current when using the product: one is leakage current to ground; the other is leakage current between wires.

1) Factors affecting leakage current to ground and solutions:

Distributed capacitance exists between the conductor and the earth, the larger the distributed capacitance, the larger the leakage current; effectively reduce the distance between the product and the motor to reduce the distributed capacitance. The larger the carrier frequency, the larger the leakage current. The carrier frequency can be reduced to reduce the leakage current. However, lowering the carrier frequency will lead to an increase in motor noise, please note that adding a reactor is also an effective way to solve the leakage current.

Leakage current increases as the circuit current increases, so when the motor power is high, the corresponding leakage current is high.

2) Factors causing leakage current between wires and solutions:

There is distributed capacitance between the output wiring of the product, and if the current through the line contains high harmonics, it may cause resonance and generate leakage current. If a thermal relay is used in this case, it may operate incorrectly.

The solution is to reduce the carrier frequency or add an output reactor. It is recommended to use the product without a thermal relay in front of the motor and use the electronic overcurrent protection function of the product.

6.3.5 Precautions for adding EMC input filters to the power supply input:

1) When using the filter, please use it in strict accordance with the rated value; because the filter belongs to Class I electrical appliances, the filter metal casing ground should be in good contact with the metal ground of the mounting cabinet over a large area, and it is required to have a good conductive continuity, otherwise there will be a danger of electric shock and serious impact on the EMC effect;

2) Through EMC testing, it was found that the filter ground must be connected to the same common ground as the product's PE terminal ground, otherwise the EMC effect will be seriously affected.

Chapter 7 Troubleshooting and Abnormal Handling

7.1 Faults Causes and their countermeasures

If the inverter has an abnormal fault, please handle it carefully, investigate the cause of the fault carefully and record the fault phenomenon in detail. When you need to seek service, please contact the seller. You can view the latest, previous and previous two fault records by function code U1 parameter group, the faults are recorded by numerical code (1-29), the corresponding fault display and fault name of each numerical fault code are shown in the following table.

Table 7.1 List of Fault Codes

Trouble code	Malfunctions demonstrate	Malfunctions name (of a thing)	Reason	Policy
1	**E. OC1**	acceleration overcurrent	Torque boost too large for V/f control	Reduced torque increase value
			Starting frequency too high	Reducing the starting frequency value
			Acceleration time is too short	Extended acceleration time
			Improper setting of motor parameters	Correct setting according to the motor nameplate
			overloaded	Reduced load
			V/f control with inappropriate V/f curve	Setting the V/f curve correctly
			Restart of rotating motors	Decrease the limit value or use speed search for start-up
			Output shorted between phases or to ground	Check motor wiring and output to ground impedance
2	**E. OC2**	deceleration overcurrent	Too much inertia in the load	Use of energy brakes
			Deceleration time too short	Extended deceleration time
			Low grid input voltage	Check grid voltage
			Output shorted between phases or to ground	Check motor wiring and output to ground impedance
3	**E. OC3**	Constant speed overcurrent	overloaded	Reduced load
			Inverter power rating too small	Selecting the right inverter power
			Low grid input voltage	Check grid voltage
			Output shorted between	Check motor wiring and

Trouble code	Malfunctions demonstrate	Malfunctions name (of a thing)	Reason	Policy
			phases or to ground	output to ground impedance
4	**E.OU1**	Accelerated overpressure	Too much inertia in the load	Use of energy brakes
			Abnormal input voltage	Check grid voltage
			Output shorted between phases or to ground	Check motor wiring and output to ground impedance
5	**E. OU2**	deceleration overpressure	Too much inertia in the load	Use of energy brakes
			Deceleration time too short	Extended deceleration time
			Abnormal input voltage	Check grid voltage
			Improper setting of regulator parameters during vector operation	Setting the regulator parameters correctly
			Output shorted between phases or to ground	Check motor wiring and output to ground impedance
6	**E.OU3**	Constant speed overpressure	Improper setting of regulator parameters during vector operation	Setting the regulator parameters correctly
			Abnormal input voltage	Check grid voltage
			Too much load fluctuation	Checking the load
			Output shorted between phases or to ground	Check motor wiring and output to ground impedance
7	**E.SG**	Inverter side module protection	Output overcurrent fault	Handling in accordance with overcurrent
			Busbar voltage overvoltage faults	Follow the treatment of overpressure
			Output side short circuit fault	Module short-circuit faults are handled in the same way
			Inverter module abnormality	Seeking services
8	**E. LU**	undervoltage protection	Low DC bus voltage	Check that the input voltage is not too low or that the inverter is not in the process of powering down.
10	**E. OL2**	Inverter overload	Torque boost too large for V/f control	Reduced torque increase value
			Starting frequency is too high	Reducing the starting frequency value
			Acceleration and deceleration	Extended acceleration and

Trouble code	Malfunctions demonstrate	Malfunctions name (of a thing)	Reason	Policy
			times are too short	deceleration times
			Improper setting of motor parameters	Correct setting according to the motor nameplate
			overloaded	Reduced load
			V/f control with inappropriate V/f curve	Setting the V/f curve correctly
			Restart of rotating motors	Reduced current limit or speed-search starting
			Output shorted between phases or to ground	Check motor wiring and output to ground impedance
11	**E.OL1**	Motor overload	Torque boost too large for V/f control	Reduced torque increase value
			V/f control with inappropriate V/f curve	Setting the V/f curve correctly
			Improper setting of motor parameters	Correct setting according to the motor nameplate
			Improper setting of motor overload protection time	Setting the motor overload protection time correctly
			Motor blocking or sudden change of load is too large	Check the cause of motor blockage or check the load
			Long-term low-speed heavy load operation of ordinary motors	Selection of inverter motors
12	**E. OLF**	Output out of phase	Abnormal motor cable connection	Check motor wiring
			Motor three-phase unbalance	Check motor or replace motor
			Incorrect setting of vector control parameters	Correct setting of vector control parameters
14	**E.EF**	External equipment failure	External fault terminal active	Checking the status of the external fault terminals
			The stall condition lasts too long.	Check for load abnormalities
15	**E.OH**	Radiator overheat protection	Fan damage	Replacement of the fan
			Clogged air ducts	clear the air ducts
			Temperature sensor abnormality	Seeking services

Trouble code	Malfunctions demonstrate	Malfunctions name (of a thing)	Reason	Policy
			Inverter module installation abnormality	Seeking services
			Inverter module installation abnormality	Seeking services
16	**E.CE**	port communication abnormality	Communication baud rate is not set properly	correct setting
			Communication port cable disconnected	reconnect
			The host computer is not working.	make the host computer work
			Error in communication parameters of the inverter itself	correct setting
17	**E. EEP**	EEPROM read/write failure	An exception occurred in the parameter read/write on the control board	Seeking services
19	**E.TE**	Parameter recognition failure	Bad motor wiring	Check motor wiring
			Recognition of motor rotation	Recognition when the motor is at standstill
			Motor parameter setting deviation is too large	Correct setting according to the motor nameplate
20	**E.TA1**	Continuous running time to	Continuous operation time arrival function is set	
21	**E. PID**	PID feedback lost	PID feedback channel abnormality	Checking feedback channels
			PID parameter setting is not reasonable	correct setting
24	**E.SG**	Output shorted to ground	Output wiring shorted to ground	Check motor wiring and output to ground impedance
			Motor insulation abnormality	Check the motor
			Inverter module abnormality	Seeking services
			Output leakage current to ground too high	Seeking services
25	**E. HAL**	Current Detection Fault		
26	**E. SPD**	Motor stall fault		

Trouble code	Malfunctions demonstrate	Malfunctions name (of a thing)	Reason	Policy
27	**A.LU7**	work as amateur for a living		

Attention:

When a malfunction occurs, please confirm the cause and countermeasures one by one first, and do not power up the product by yourself if the malfunction cannot be eliminated. Please contact the supplier or manufacturer in time.

Appendix Communication Protocol

8.1 Address Codes

Inverter slave address. Setting range 1 to 247, 0 is the broadcast address.

8.2 Function Code Register Address Distribution

The high byte is the function code group number: F0 to FF is the EEPROM read/write address, C0-CF is the read/write RAM address.

The fault parameter reading address is E000H-EF00H.

The monitoring parameter D0 parameter group starts at address 2100H.

The low byte is the serial number of the function code in the group, and the low byte of the address corresponding to 0 to 99 is 00H to 63H.

Frequent modification of the EEPROM reduces the life of the EEPROM. If modifying the value of this function code requires power-down storage, you can make this function code high address the highest position 1.

Function code group	RAM address high byte	EEPROM address high byte
F0	0x00	0xF0
F1	0x01	0xF1
F2	0x02	0xF2
F3	0x03	0xF3
F4	0x04	0xF4
F5	0x05	0xF5
F6	0x06	0xF6
F7	0x07	0xF7
F8	0x08	0xF8
F9	0x09	0xF9
FA	0x0A	0xFA
FB	0x0B	0xFB
FC	0x0C	0xFC
FD	0x0D	0xFD
FE	0x0E	0xFE
FF	0x0F	0xFF
E0~E4	0XE0~0XE4	
A00	0x30	0xB0
D0 (read-only)	0X21	--

8.3 Control command address and description of its function: (write only)

Command word address	Command Function
2000H	0001:Forward running 0002:Reverse running 0003:Forward Tap 0004:Reverse Tap 0005:Deceleration stop 0006:Free stop 0007:Fault reset
2001H	Communication setting frequency (0 to Fmax (unit: 0.01Hz))
2002H	Inverter status word
2003H	trouble code
2004H	Upper limit of the frequency given by the communication
2005H	Communication torque feeding
2006H	Torque control forward maximum frequency
2007H	Torque control reverse maximum frequency
2008H	Communication PID setting

2009H	Communication PID feedback
200AH	V/F Voltage Separation Voltage Command Communication Given

8.4 Status reading address and description of its function: (read-only)

Status word address	Status word function
1001H-1028H	

8.5 Error Message Response

When the host sends incorrect data or external interference causes the inverter to receive incorrect data, the inverter will send back an error message.

When an error occurs in communication, the slave responds to the master by placing the highest position 1 of the command code and appending the error code.

Structure of the data frame in response to a communication error.

Part of ADU	Byte count	Realm
Error response.		
Slave address	1	0 to 127
Error command code	1	Command Code Highest Position 1
Error code	1	0x01 to 0x13
CRC checksum (low byte first)	2	

Command codes for normal communication and communication error.

Command code for normal communication response	Command code to respond to a communication error
03H	83H
06H	86H
08H	88H

Error Code Meaning.

Error code	Hidden meaning	Error code	Hidden meaning
01H	Illicit command code	03H	Illegal data
02H	Illicit data address (computing)	04H	Failure of an operation

For example, write data to D0.00 50.00 HZ frequency. The host sends the data frame as (in hexadecimal).

01H	06H	30H	00H	13H	88H	8BH	9CH

Since D0.00 only allows reading, not writing. At this time the inverter responds with an error message. Inverter response data frame (hexadecimal).

01H	86H	02H	C3H	A1H

The command code in the error message is 86H,i.e., 06H highest position 1; the error code content of 02H indicates an illegal address because the parameter is read-only.

After the master device receives the error message data response, it can make changes to the master device programme in response by re-sending the data frame or according to the error message responded by the inverter.

Warranty Agreement

1、 The warranty period of this product is eighteen months (based on the body of the bar code information shall prevail), the warranty period in accordance with the instructions for normal use of the product malfunction or damage, our company is responsible for free maintenance.

2、 During the warranty period, a repair fee will be charged for damages caused by

A. Damage to the machine caused by errors in use and unauthorised repairs or modifications on your own;

B. Damage to the machine due to fire, flood, abnormal voltage, other acts of God and secondary disasters;

C. Hardware damage due to human drop and transport after purchase;

D. Damage to the machine caused by not operating according to the user manual provided by our company;

E. Malfunctions and damages caused by obstacles other than the machine (e.g. external equipment factors);

3、 When the product malfunctions or is damaged, please fill in the contents of the Product Warranty Card correctly and in detail.

4、 Maintenance fees are always charged in accordance with our latest adjusted "Maintenance Price List".

5、 This warranty card will not be reissued under normal circumstances. You are kindly requested to keep this card and present it to the service personnel at the time of warranty.

6、 If you have any problems during the service, please contact our agent or our company in time.

7、 The right of interpretation of this agreement belongs to our company.

Product Warranty Card

<table>
<tr><td rowspan="3">Customer Information</td><td colspan="2">Unit Address:</td></tr>
<tr><td rowspan="2">Unit Name:</td><td>Contact Person:</td></tr>
<tr><td>Contact number:</td></tr>
<tr><td rowspan="3">Product Information</td><td colspan="2">Product Model:</td></tr>
<tr><td colspan="2">Body Barcode (paste here):</td></tr>
<tr><td colspan="2">Agent Name:</td></tr>
<tr><td>Error Message</td><td colspan="2">(When and what to repair):

Maintenancer:</td></tr>
</table>