SER O. DE

User manual

MSD200A Series Spindle Dedicated Servo

Guangzhou SERVODE Electric Co., Ltd

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# Chapter I Safety Precautions

 DANGER: Indicates a condition that could result in death or serious personal injury.

 CAUTION: Indicates a condition that may result in moderate or minor injury to persons and equipment damage. At the same time, it is also used to indicate wrong or unsafe use.

* Arrival Inspection

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| ◎Do not install or run if the drive is damaged or any part is missing, or else it may result in equipment damage or personal injury. |

* Installation

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| ◎Hold the bottom of the product while installing and moving. Do not hold the shell only, in order to prevent injury or damage to the drive.◎ Keep the drive away from flammable and explosive objects and heat sources, and install it on metal or other fire retardant objects.◎When the drive is installed in a cabinet or other enclosure, install a fan or other cooling devices and set the air vents to ensure that the ambient temperature is below 40°C, or else the drive may be damaged due to the high ambient temperature. |

* Wiring

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| ◎ Wiring must be done by qualified electrical engineer, or else it may cause electric shock or damage to the drive.◎ Make sure the power is disconnected before wiring, or else it may cause electric shock or fire.◎ The grounding terminal  should be grounded reliably, or else the drive housing may be electrified (board and housing silk screen)◎ Do not touch the main circuit terminals, and keep the wiring of the main circuit terminals of the drive away from the housing, or else it may cause electric shock.◎ The connection terminals of braking resistor are P and C. Do not connect other terminals, or else it may cause fire. |

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| ◎ Before wiring, make sure that the rated voltage and the number of phases of the drive are consistent with those of the input power, or else it may cause fire or personal injury.◎Do not connect AC input power to the output terminals U, V and W of the drive, or else it will cause damage to the drive and void the warranty service.◎ Do not carry out electric strength test for the drive, or else it will lead to damage to the drive.◎ The main circuit terminal wiring of the drive and the control circuit wiring should be separated or vertically crossed, or else it will cause interference to the control signal.◎ The wiring cable for main circuit terminals should use cable lugs with insulated sleeve.◎ When the cable length between drive and motor exceeds 50m, it is recommended to use output reactor to protect the drive and motor. |

* Running

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| ◎ Turn on the power after the drive wiring is complete and the cover plate is put on. It is strictly forbidden to remove the cover plate when it is live, or else it may cause electric shock.◎ When auto reset or auto-restart on power failure is enabled for the drive, safety precautions should be taken for the device system to avoid personal injury.◎ “Run/Stop” button may be invalid due to some function settings. A separate emergency power switch can be installed in the drive control system to avoid personal injury.◎ When the drive is powered on, the terminals are still charged even if the drive is stopped; do not touch the terminals, or else it may cause electric shock.◎ Do not control the start and stop of the drive with the circuit breaker, or else it may damage the drive.◎ As the drive running speed increases quickly, please make sure that the motor and the mechanical equipment are in the allowed range before operation, or else the equipment may be damaged.◎ Do not touch the radiator and braking resistor as the temperature is high, or else it may cause burns. |

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| ◎ The factory default parameters of the drive have been able to meet most of the equipment operating requirements. Do not modify the drive parameters unless necessary. Only the necessary parameters can be modified even if some devices have special needs, or else it may cause damage to the equipment. |

* Maintenance and inspection

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| ◎ Do not touch the terminals of the drive when power is on, or else it may cause electric shock.◎ Ask qualified electrical engineer for maintenance, inspection or replacement of parts and other work.◎ Wait at least 10 minutes after power-off or make sure there is no residual voltage before performing maintenance and inspection, or else it may cause personal injury. |

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| ◎ There is a CMOS IC on the PCB. Do not touch it, or else the PCB may be damaged by static electricity. |

* Other

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| ◎ It is forbidden to modify the drive without permission, or else it may cause personal injury. The drive modified without permission will make the warranty service void. |

# Chapter II Basic Wiring Connection

* 1. Wiring Diagram



* 1. Main Circuit Terminals and Functions



|  |  |  |
| --- | --- | --- |
| **Terminal mark** | **Name** | **Description** |
| L1c, L2c | Control circuit power input terminal | Control power input |
| R, S, T | Main circuit power input terminal | Three-phase main power connection point |
| P, N | DC bus positive/negative terminal | Common DC bus input point (connection point of external braking unit above 37kW) |
| P, C | Braking resistor connection terminal | Connection point of braking resistor below 30kW |
| U, V, W | Drive output terminal | Connect to three-phase motor |
|  | Ground terminal | Ground terminal |

**Wiring considerations:**

A: Input power R, S, T:

The input side wiring of the drive, no phase sequence requirements

B: DC bus P & N terminals:

Please note that DC bus terminals P and N still have residual voltage when the power is cut off. Please wait until the power indicator is off and make sure that the voltage is less than 36VDC before contacting, or else it may cause electric shock.

The wiring length of brake unit shouldn’t exceed 10m. Use twisted pair or tight double-wire inparallel for wiring.

Do not connect the braking resistor directly to the DC bus, or else it may damage the drive or even cause a fire.

C: Braking resistor connection terminals P & C:

For the selection of braking resistor, refer to the recommended value and the wiring distance should be less than 5m, or else it may result in damage to the drive.

D: Drive output side U, V & W:

Do not connect capacitor or surge absorber to the output side of the drive, or else it may cause frequent protection of the drive or even damage.

If the motor cable is too long, it is easy to produce electrical resonance due to the impact of distributed capacitance, causing damage to the motor insulation or over-current protection of the drive due to greater leakage current. If the motor cable length is over 100m, an AC output reactor shall be installed.

E: Ground terminal PE :

The terminals must be grounded reliably and the resistance must be less than 0.1Ω. Failure to do so may result in exception or even damage to the equipment.

Do not share the ground terminal  with the neutral N terminal of the power supply.

* 1. Name and function of control circuit signal (CN1 plug)
1. CN1 pin signal

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CN1 Plug Pinout

1. Definition of CN1 terminal symbols

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 16 | GND | Analog power ground |  |
| 1 | DI1 | Digital input 1 | 17 | AI1 | Analog input terminal 1 | 31 | PA- | Command pulse input A- |
| 2 | DI2 | Digital input 2 | 18 | AI2 | Analog input terminal 2 | 32 | PA+ | Command pulse input A+ |
| 3 | DI3 | Digital input 3 | 19 | OCP | Command pulse input 1(optional) | 33 | PB- | Command pulse input B- |
| 4 | DI4 | Digital input 4 | 20 | AI3 | Analog input terminal 3 | 34 | PB+ | Command pulse input B+ |
| 5 | DI5 | Digital input 5 | 21 | AO1 | Analog output terminal 1 | 35 | PZ- | Command pulse input Z- |
| 6 | DI6 | Digital input 6 | 22 | AO2 | Analog output terminal 2 | 36 | PZ+ | Command pulse input Z+ |
| 7 | DI10 | Digital input 10 | 23 | +10V | 10V power | 37 | OA+ | Phase A frequency dividing output + |
| 8 | COM | 24V power ground | 24 | DI7 | Digital input 7 | 38 | OA- | Phase A frequency dividing output - |
| 9 | FM | High speed pulse/ Digital output | 25 | GND | Analog power ground | 39 | OB+ | Phase B frequency dividing output + |
| 10 | DO1 | Digital output 1 | 26 | DO4 | Digital output 4 | 40 | OB- | Phase B frequency dividing output - |
| 11 | DO2 | Digital output 2 | 27 | COM | 24V power ground | 41 | OZ+ | Phase Z frequency dividing output + |
| 12 | DO3 | Digital output 3 | 28 | OCS | Command pulse input 2 (optional) | 42 | OZ- | Phase Z frequency dividing output - |
| 13 | CME | Digital output common terminal | 29 | +5V | Eternal encoder 5V power (reserved) | 43 | OA | Phase A open collector output |
| 14 | 24V | 24V power | 30 | OZ | Phase Z open collector output | 44 | OB | Phase B open collector output |
| 15 | OP | External power input terminal |  |

(3) Function of control terminals:

|  |  |  |  |
| --- | --- | --- | --- |
| **Category** | **Terminal symbol** | **Terminal name** | **Description** |
| **Power** | +10V-GND | External +10V power | Provide +10V power supply outside; maximum output current: 10mAGenerally used as power supply for external potentiometer; potentiometer resistance range: 1kΩ ~ 5kΩ |
| +24V-COM | External +24V power | Provide +24V power supply outside, generally used as the power supply for digital input/output terminals and external sensorMaximum output current: 200mA |
| OP | External power input terminal | If DI is driven by external signals, OP needs to be connected with external power supply. If DI is driven by internal power supply, OP needs to be shorted internally with 24V |
| **Analog input** | AI1-GND | Analog input terminal 1 | 1. Input voltage range: DC 0V ~ 10V2. Input impedance: 22kΩ |
| AI2-GND | Analog input terminal 2 | 1. Input voltage range: DC -10V ~ +10V2. Input impedance: 22KΩ |
| **Digital input** | DI1- OP | Digital input 1 | 1. Photo-coupler isolation, compatible with bipolar input2. Input impedance: 2.4kΩ3. Level input voltage range: 9V ~ 30V |
| DI2- OP | Digital input 2 |
| DI3- OP | Digital input 3 |
| DI4- OP | Digital input 4 |
| DI6- OP | Digital input 6 |
| DI7- OP | Digital input 7 |
| DI10- OP | Digital input 10 |
| DI5- OP | High speed pulse input terminal | In addition to other DI features, it also can be used as high-speed pulse input channel.Maximum input frequency: 50kHz |
| **Analog output**  | AO1-GND | Analog output 1 | Output voltage range: 0V ~ 10V |
| AO2-GND | Analog output 2 |
| **Digital output** | DO1-CME | Digital output 1 | Photo-coupler isolation, open collector outputOutput voltage range: 0V ~ 24VOutput current range: 0mA ~ 50mANote: The digital output ground CME is internally isolated from the digital input ground COM |
| DO2-CME | Digital output 2 |
| DO3-CME | Digital output 3 |
| DO4-CME | Digital output 4 |
| FM- CME | High speed pulse output | Restricted by function code Pn8.00 “FM terminal output mode selection”As high-speed pulse output, the maximum frequency is 50kHz;As open-collector output, same as DO1 specification. |

|  |  |  |  |
| --- | --- | --- | --- |
| **Category** | **Terminal symbol** | **Terminal name** | **Description** |
| **Command pulse input** | OCP | Command pulse input 1 (optional) | Input command pulse interface; the maximum collector input frequency is 200KHz, the maximum differential input is 500KHz |
| PA+ | Command pulse input A+ |
| PA- | Command pulse input A- |
| OCS | Command pulse input 2 (optional) |
| PB+ | Command pulse input B+ |
| PB- | Command pulse input B- |
| PZ+ | Command pulse input Z+ |
| PZ- | Command pulse input Z- |
| **Encoder frequency dividing output** | OA+ | Encoder phase A frequency dividing differential output | Encoder signal when output is divided, phase A pulse and phase B pulse meeting TIA/EIA-422-B standard are still orthogonalOutput signal is not isolated |
| OA- |
| OB+ | Encoder phase B frequency dividing differential output |
| OB- |
| OZ+ | Encoder phase Z frequency dividing differential output |
| OZ- |
| OA | Encoder phase A collector output |
| OB | Encoder phase B collector output |
| OZ | Encoder phase Z collector output |

* 1. Encoder Interface Connection and Signal Definition (CN2 Plug)
		1. Overview



* + - * The distance between servo motor and servo drive should not exceed 20m.
			* Keep the encoder line at least 30cm from the motor and power lines; do not put them in the same pipe or bind them together.



* + 1. Servo drive CN2 pinout and signal definition

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5 | 4 | 3 | 2 | 1 |  |
| 5V | A- | A+ | W+ | V+ |
|  | 10 | 9 | 8 | 7 | 6 |
| B+ | B- | W- | V- | U+ |
| 15 | 14 | 13 | 12 | 11 |  |
| None | Z+ | Z- | GND | U- |

CN2Pinout

* 1. Communication Port Signal Wiring (CN3 Plug)
* The type of encoder plug is divided into aviation plug and cannon plug according to the motor type.
* If you want to make your own encoder line, select a shielded cable with good flexural strength and a core diameter at least 0.18mm2 (AWG24). Please refer to the figure below for correct connection.

Servo drive provides CAN and RS485 communication ports, which are led through CN3 socket.

CN3 pinout and signal definition:

(6) RS485-

CN3

(5) RS485+

(4) CANL (2) CANH

(3) Reserved

(1) GND

|  |  |  |  |
| --- | --- | --- | --- |
| Pin No | Signal name | Terminal mark | Function & Description |
| 1 | Signal ground | GND | +5V and signal ground |
| 2 | CANH data transfer | CANH | CAN data + terminal |
| 3 | - | - | Reserved |
| 4 | CANL data reception | CANL | CAN data - terminal |
| 5 | RS-485 data transfer | RS-485(+) | Drive data transfers to differential + terminal |
| 6 | RS-485data transfer | RS-485(-) | Driver side data transfer differential - terminal |

# Chapter III Operation and Display

* 1. Introduction to Operation and Display Interface

With the operation panel, you can modify the function parameters of the servo drive and monitor the drive status. The appearance and function area are shown below:

Power indicator

Mode button

Display

Shift button

Set button

Up/Down button



Digital display area:

5-bit LED display shows the set frequency, output frequency, various monitoring data and alarm code, etc.

Button description:

|  |  |  |
| --- | --- | --- |
| **Button** | **Name** | **Function** |
| MODE | Program button | Enter or exit level-1 menu |
| SET | Confirm button | Enter the menu screen step by step, confirm set parameters |
|  | Up button | Increase data or function code, start button of motor parameter self-learning |
|  | Down button | Decrease data or function code, stop button of motor parameter self-learning |
| SHIFT | Shift button | Display parameters in cycle in the stop interface and running interface; select the parameter to be modified |

* 1. Method of Viewing and Modifying Function Codes

The operation panel of MSD200A servo drive adopts three-level menu structure for parameter setting and other operations.

The three menu levels are: Function parameter group (level 1) → function code (level 2) → function code settings (level 3). The operation flow is shown below.

MODE MODE

50.00

Change para group Change function code Change function code



SET SET

Pn2

Pn2.03

050.00

MODE MODE

Level-1 menu Level-2 menu

SET

 Level-3 menu

Note: In level-3 menu, you can press the MODE or SET button to return to level-2. The difference is that you can save the settings, return to level-2 menu and switch to next function code automatically by pressing the SET button; if you press the MODE button, it will return to level-2 menu directly without saving and return to the current function code.

Example: Changing function code Pn2.03 from 10.00Hz to 15.00Hz (bold letters indicate flashing digits)

MODE SET

50.00

Pn0

Pn2

Pn2.00

Pn2.03

MODE

015.00

010.00

010.00

MODE

Pn2

Pn2.04

SET SHIFT

SET

In level-3 menu, if the parameter doesn’t have a flashing digit, this function code can’t be modified. The possible reasons are as follows:

(1)This function code can’t be modified, such as actual test parameters and running record parameters.

(2)This function code can’t be modified in running status, but can be modified when the machine is stopped.

* 1. Viewing Status Parameters

In stop or running status, various status parameters can be displayed separately by pressing the SHIFT button. Whether the parameter is displayed is determined by binary bit of function code Pn0.09 (running parameter 1), Pn0.10 (running parameter 2), and Pn0.11 (stop parameter).

In stop status, 16 stop status parameters are available, including: set frequency, bus voltage, DI input status, DO output status, analog input AI1 voltage, analog input AI2 voltage, analog input AI3 Voltage, actual count value, actual length value, PLC running steps, load speed display, PID setting, PULSE input pulse frequency and 3 reserved parameters; you can press the button to switch the selected parameters in sequence.

In running status, five running status parameters (running frequency, set frequency, bus voltage, output voltage and output current) are displayed by default. Other parameters: output power, output torque, DI input status, DO output status, analog input AI1 voltage, analog input AI2 voltage, analog input AI3 voltage, actual count value, actual length value, line speed, PID setting and PID feedback, are determined by function code Pn0.09 and Pn0.10 (converted to binary) to display or not; you can press the button to switch the selected parameters in sequence.

When the drive is turned off and then turned on again, the displayed parameters are those selected before power-off by default.

* 1. Password Settings

The drive integrates password protection. When Pn0.27 is set as non-zero, it is the user password, and the password protection is enabled when you exit the function code editing status. When you press MODE again, it shows “.....”. You must enter the correct password to enter the menu.

To cancel the password protection, enter the password and set Pn0.27 to 0.

* 1. Motor Parameters Self-learning

Vector control requires self-learning of motor parameters for optimal control. During self-learning, make sure that the motor is under no load or light load.

Self-learning steps are as follows:

* Modify Fn4.62 frequency command resolution, Pn2.05 maximum frequency and Pn2.07 Upper limit frequency according to the specific maximum frequency (if the maximum frequency of operation is lower than 320Hz, the above parameters do not need modification).
* Set acceleration/deceleration time Pn2.10, Pn2.11
* Set motor parameters (Fn2.00 ~ Fn2.05)
* Set encoder parameters (Pn6 group)
* Set Pn0.00 to 1000, current vector control
* Set Fn2.37 (set to 1 static self-learning or 2 rotary self-learning), and press the button when the keyboard displays TUNE (press the button to stop self-learning)
* Waiting for self-learning to finish

The motor runs at high-speed during tuning. Please tune the motor in no-load condition. Tuning with load will affect the accuracy of motor parameters and affect the system control effect.

If the drive alarms “Err19 (motor tuning fault)” during tuning, the motor function parameters are incorrect. Please check the motor-related function parameters and the lead from servo drive to the motor.

If the drive alarms “Err20 (encoder failure)” during tuning, the encoder feedback signal is incorrect. Please check the encoder-related function parameters and signal wiring and manually rotate the motor shaft to check if “dn0.52 (current location)” is displayed normally.

* 1. Motor Test Run

The software forces the servo to run when Fn0.00 is set to 1

The drive enters JOG mode when Fn0.01 is set to 1. Then, you can press the button to jog forward and press to jog reversely.

When the motor has been identified, you can test the drive and motor in speed mode and check if the motor operation is normal at high speed and low speed and if the motor has vibration and large noise. If the simple trial run is successful, connect it to host computer, and control the drive and motor running through the host computer.

Set the running frequency (Pn2.03), run with the operation panel to let the motor run at different speed segments, and monitor whether the output current is normal and whether the motor runs smoothly.

# Chapter IV Troubleshooting

If the system of MSD200A Spindle Servo Drive has any fault during operation, the spindle servo drive will immediately protect the motor to stop output and the fault relay contact will operate. The panel of the spindle servo drive will display the fault code, and the corresponding fault type and common solutions are shown in the table below. The table is for reference only, please do not carry out maintenance or alternation without authorization. If the problem can’t be solved, please contact our company or agent for technical support.

|  |  |  |  |
| --- | --- | --- | --- |
| **Fault** | **Display on operation panel** | **Cause** | **Measures** |
| Inverter unit protection | Err01 | 1. Spindle servo drive output circuit is short-circuited2. The wire of motor and spindle servo drive is too long3. Module is overheating4. Internal wiring of spindle servo drive is loose5. Main control board is abnormal6. Drive board is abnormal7. Inverter module is abnormal | 1. Exclude peripheral problems2. Install reactor or output filter3. Check if the air duct is clogged and if the fan is working properly and exclude the problems4. Plug in all the cables properly5. Seek technical support6. Seek technical support7. Seek technical support |
| Acceleration overcurrent | Err02 | 1. Output circuit of spindle servo drive is grounded or short-circuited2. The control mode is vector and no parameter tuning is ongoing3. Acceleration time is too short4. Manual torque boost or V/F curve is not suitable5. Voltage is too low6. The motor being started is spinning7. Sudden load in the acceleration process8. Spindle servo drive is too small | 1. Exclude peripheral problems2. Perform motor parameter tuning3. Increase the acceleration time4. Adjust manual boost torque or V/F curve5. Adjust the voltage to normal range6. Select speed tracking start or wait for the motor to stop before starting7. Cancel the sudden load8. Use spindle servo drive of higher power level |
| Deceleration overcurrent | Err03 | 1. Output circuit of spindle servo drive is grounded or short-circuited2. The control mode is vector and no parameter tuning3. Deceleration time is too short4. Voltage is too low5. Sudden load in the acceleration process6. No brake unit and brake resistor installed | 1. Exclude peripheral problems2. Perform motor parameter tuning3. Increase the deceleration time4. Adjust the voltage to normal range5. Cancel the sudden load6. Install brake unit and resistor |
| Constant speed overcurrent | Err04 | 1. Output circuit of spindle servo drive is grounded or short-circuited2. The control mode is vector and no parameter tuning is ongoing3. Voltage is too low4. Sudden load in the acceleration process5. Spindle servo drive is too small | 1. Exclude peripheral problems2. Perform motor parameter tuning3. Adjust the voltage to normal range4. Cancel the sudden load5. Use spindle servo drive of higher power level |
| Acceleration overvoltage | Err05 | 1. Input voltage is too high2. The motor is dragged by external force during acceleration3. Acceleration time is too short4. No brake unit and brake resistor installed | 1. Adjust the voltage to normal range2. Cancel the external force or install braking resistor3. Increase the acceleration time4. Install brake unit and resistor |

|  |  |  |  |
| --- | --- | --- | --- |
| **Fault** | **Display on operation panel** | **Cause** | **Measures** |
| Deceleration overvoltage | Err06 | 1. Input voltage is too high2. The motor is dragged by external force during deceleration3. Deceleration time is too short4. No brake unit and brake resistor installed | 1. Adjust the voltage to normal range2. Cancel the external force or install braking resistor3. Increase the deceleration time4. Install brake unit and resistor |
| Constant speed overvoltage | Err07 | 1. Input voltage is too high2. The motor is dragged by external force during running | 1. Adjust the voltage to normal range2. Cancel the external force or install braking resistor |
| Control power fault | Err08 | 1. The input voltage isn’t within standard range | 1. Adjust the voltage to required range |
| Undervoltage fault | Err09 | 1. Instantaneous power failure2. The input voltage of spindle servo drive is not within the required specifications3. Bus voltage is abnormal4. Rectifier bridge and buffer resistor are abnormal5. Drive board is abnormal6. Control board is abnormal | 1. Reset the fault2. Adjust the voltage to normal range3. Seek technical support4. Seek technical support5. Seek technical support6. Seek technical support |
| Spindle servo drive overload | Err10 | 1. The load is too large or a motor stall occurred2. Spindle servo drive is too small | 1. Reduce the load and check the motor and mechanical conditions2. Use spindle servo drive of higher power level |
| Motor overload | Err11 | 1. Check if motor protection parameter PnC.01 is set appropriately2. The load is too large or a motor stall occurred3. Spindle servo drive is too small | 1. Set this parameter correctly2. Reduce the load and check the motor and mechanical conditions3. Use spindle servo drive of higher power level |
| Input phase loss | Err12 | 1. Three-phase input power is abnormal2. Drive board is abnormal3. Lightning protection board is abnormal4. Main control board is abnormal | 1. Check and exclude problems in the peripheral circuit2. Seek technical support3. Seek technical support4. Seek technical support |
| Output phase loss | Err13 | 1. The wire from spindle servo drive to the motor is abnormal2. Three-phase output of the spindle servo drive is unbalanced when the motor is running3. Drive board is abnormal4. Module exception | 1. Exclude peripheral problems2. Check the three-phase winding of the motor and exclude problems3. Seek technical support4. Seek technical support |
| Module overheating | Err14 | 1. Ambient temperature is too high2. Air duct is blocked3. Fan is damaged4. Module thermistor is damaged5. Inverter module is damaged | 1. Reduce the ambient temperature2. Clean the air duct3. Replace the fan4. Replace the thermistor5. Replace the inverter module |
| External device fault | Err15 | 1. External fault signal input via multi-function terminal DI2. External fault signal input via virtual IO function | 1. Reset operation2. Reset operation |
| Communication failure | Err16 | 1. Host computer is not working properly2. Communication line is abnormal3. Communication expansion card PnA.00 isn’t set correctly3. Communication parameter PnA group isn’t set correctly | 1. Check the host computer wiring2. Check the communication line3. Correctly set the communication expansion card4. Set the communication parameters correctly |

|  |  |  |  |
| --- | --- | --- | --- |
| **Fault** | **Display on operation panel** | **Cause** | **Measures** |
| Contactor fault | Err17 | 1. Drive board and power supply are abnormal2. The contactor is abnormal | 1. Replace the drive board or power board2. Replace the contactor |
| Current detection fault | Err18 | 1. Check if Hall element is normal2. Drive board is abnormal | 1. Replace the Hall element2. Replace the drive board |
| Motor tuning fault | Err19 | 1. Motor parameters are not set according to the nameplate2. Parameter tuning process timed out | 1. Set the motor parameters correctly according to the nameplate2. Check the wire from spindle servo drive to the motor |
| Encoder fault | Err20 | 1. Encoder model does not match2. Encoder connection error3. Encoder is damaged4. PG card is abnormal | 1. Set the encoder type correctly according to the actual situation2. Exclude the line fault3. Replace the encoder4. Replace the PG card |
| EEPROM reading/writing fault | Err21 | 1. EEPROM chip is damaged | 1. Replace the main control board |
| Spindle servo drive hardware fault | Err22 | 1. Overvoltage2. Overcurrent | 1. Exclude overvoltage fault2. Exclude overcurrent fault |
| Short circuit to ground fault | Err23 | 1. Motor is shorted to ground | 1. Replace the cable or motor |
| Cumulative run-time arrival fault | Err26 | 1. Accumulated running time reaches the set value | 1. Use the parameter initialization function to clear the log information |
| User defined fault 1 | Err27 | 1. User-defined fault 1 signal input via multi-function terminal DI2. User-defined fault 1 signal input via virtual IO function | 1. Reset operation2. Reset operation |
| User defined fault 2 | Err28 | 1. User-defined fault 2 signal input via multi-function terminal DI2. User-defined fault 2 signal input via virtual IO function | 1. Reset operation2. Reset operation |
| Accumulated power-on time arrival fault | Err29 | 1. Accumulated power-on time reaches the set value | 1. Use the parameter initialization function to clear the log information |
| Current limit fault | Err40 | 1. The load is too large or a motor stall occurred2. Spindle servo drive is too small | 1. Reduce the load and check the motor and mechanical conditions2. Use spindle servo drive of higher power level |
| Excessive speed deviation fault | Err42 | 1. Encoder parameter setting is not correct2. No parameter tuning3. Settings of excessive speed deviation detection parameters PnC.36 and PnC.37 are unreasonable | 1. Set the encoder parameters correctly2. Perform motor parameter tuning3. Set the testing parameters correctly according to the actual situation |

|  |  |  |  |
| --- | --- | --- | --- |
| **Fault** | **Display on operation panel** | **Cause** | **Measures** |
| Motor over speed fault | Err43 | 1. Encoder parameter setting is not correct2. No parameter tuning3. Settings of motor overspeed detection parameters PnC.34 and PnC.35 are unreasonable | 1. Set the encoder parameters correctly2. Perform motor parameter tuning3. Set the testing parameters correctly according to the actual situation |
| Homing missing | Err54 | 1. Index positioning home signal is abnormal2. The setting of PnE.23 home judgment deviation pulse is too small3. DI as home and home search frequency is set too high4. DI as home and spindle drive ratio setting is not reasonable5. Home signal is disturbed | 1. Check the home signal wiring2. Reset the appropriate PnE.23 value3. Set the appropriate home search frequency4. Set the correct spindle gear ratio5. Ground motor and drive properly |
| Excessive pulse deviation | Err55 | 1. Follow-up deviation during pulse position synchronization is too large2. Electronic gear ratio for pulse position synchronization is unreasonable | 1. Increase the acceleration of pulse given frequency2. Correct the proportional gain setting of pulse position synchronization3. Set the correct electronic gear ratio |
| Excessive positioning control pulse deviation | Err56 | Follow-up deviation during positioning control is too large | Correct positioning control proportional gain |

# Chapter V Parameter List

“☆”: The set value of this parameter can be changed while the spindle servo drive is in stop or running state.

“★”: The set value of this parameter can’t be changed while the spindle servo drive is in running state.

“●”: The value of this parameter is actual test value and can’t be changed;

“\*”: The parameter is “vendor parameter” and is only set by the manufacturer;

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| **Function code** | **Name** | **Setting range** | **Minimum unit** | **Default** | **Change** |
| **Pn0 System Management Parameter Group** |
| Pn0.00 | Function selection application switch 0 | Ones place: Rotation direction selection (speed control effective)0: CCW direction is the forward direction1: CW direction is the forward direction2~3: ReservedTens place: Control mode selection0: Speed control mode1: Torque control mode2~6: ReservedHundreds place: Running command selection0: Operation panel command channel1: Terminal command channel | 1 | 1000 | ★ |
|  |  | 2: Serial port communication command channelThousands place: Servo control mode0: Voltage vector control1: Current vector control2: V/F control |  |  |  |
| Pn0.01 | Servo current control mode | 0: Voltage SVPWM1: Current SPWM | 1 | 1 | ★ |
| Pn0.03 | Carrier frequency | 0.5kHz~16.0kHz | 0.01kHz | Depending on model | ☆ |
| Pn0.04 | Motor selection | 0: Motor 11: Motor 2 | 1 | 0 | ☆ |
| Pn0.09 | LED running display parameter 1 | Ones place: Running monitoring 01: Running speed2: Set speed4: Bus voltage (V)8: Output voltage (V) Tens place: Running monitoring 11: Output current (A)2: Output power (kW)4: Output torque (%)8: DI input statusHundreds place: Running monitoring 21: DO output status2: AI1 voltage (V)4: AI2 voltage (V)8: AI3 voltage (V)Thousands place: Running monitoring 41: Count value2: Length value4: Motor speed (r/min)8: PID setting | 1111 | 17 | ☆ |

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| **Function code** | **Name** | **Setting range** | **Minimum unit** | **Default** | **Change** |
| Pn0.10 | LED running display parameter 2 | Ones place: Running monitoring 51: PID feedback2: PLC stage4: Feedback speed, unit 0.01KHz8: Feedback speedTens place: Running monitoring 61: Remaining runtime2: AI1 voltage before calibration4: AI2 voltage before calibration8: AI3 voltage before calibrationHundreds place: Running monitoring 71: Line speed2: Current power-on time4: Current running time8: PULSE input pulse speed, unit 1HzThousands place: Running monitoring 81: Communication setting value2: Encoder feedback speed4: Main speed X display8: Auxiliary speed Y display | 1111 | 0 | ☆ |
| Pn0.11 | LED stop display parameters | Ones place: Downtime monitoring 01: Set speed (Hz)2: Bus voltage (V)4: DI input status8: DO output statusTens place: Downtime monitoring 11: AI1 voltage (V)2: AI2 voltage (V)4: AI3 voltage (V)8: Count valueHundreds place: Downtime monitoring 21: Length value2: PLC stage4: Load speed display8: PID settingThousands place: Downtime monitoring 31: PULSE input pulse speed, unit0.01kHz2: Reserved4: Reserved | 1111 | 03 | ☆ |
|  |  | 8: Reserved |  |  |  |
| Pn0.13 | Servo drive temperature | 0.0℃ ~ 100℃ | 0.1℃ |  | ● |
| Pn0.17 | DSP software version | - |  |  | ● |
| Pn0.19 | Accumulated power-on time | 0h ~ 65535h | 1h |  | ● |
| Pn0.20 | Accumulated power consumption | 0° ~ 65535° | 1° |  | ● |
| Pn0.23 | Function code read-only control | 0: Function code read-only invalid1: Function code read-only valid | 1 | 0 | ☆ |
| Pn0.25 | Fault record display times | 0 ~ 150: Last fault1: One fault before last fault2: Two faults before last fault3: Three faults before last fault | 15 | 5 | ☆ |
| Pn0.26 | Parameter initialization | 0: No operation01: Restore default parameters02: Clear record information03: Restore default parameters, including motor parameters | 1 | 0 | ★ |

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| **Function code** | **Name** | **Setting range** | **Minimum unit** | **Default** | **Change** |
| Pn0.27 | User password | 0~65535 | 1 | 0 | ☆ |
| Pn0.28 | UF group password | 0~65535 | 1 | 0 | ☆ |
| **Pn1 Torque Control Parameter Group** |
| Pn1.00 | Drive torque upper limit source | 0: Digital setting 1 (Pn1.03)The following ranges correspond to the upper torque limit (Pn1.03)1: AI12: AI23: AI34: PULSE setting5: Communication given6: MIN (AI1, AI2)7: MAX (AI1, AI2)Full range of option 1-7 corresponds to Pn1.03 | 1 | 0 | ★ |
| Pn1.01 | Reserved |  |  |  |  |
| Pn1.02 | Reserved |  |  |  |  |
| Pn1.03 | Driving torque upper limit digital setting | -200.0% ~ 200.0% | 0.1% | 150.0% | ☆ |
| Pn1.04 | Reserved |  |  |  |  |
| Pn1.05 | Forward maximum frequency for torque control | 0.00Hz ~ Maximum frequency | 0.01Hz | 50.00Hz | ☆ |
| Pn1.06 | Reverse maximum frequency for torque control | 0.00Hz ~ Maximum frequency | 0.01Hz | 50.00Hz | ☆ |
| Pn1.07 | Torque control acceleration time | 0.00s ~ 650.00s | 0.01s | 0.00s | ☆ |
| Pn1.08 | Torque control deceleration time | 0.00s ~ 650.00s | 0.01s | 0.00s | ☆ |
| **Pn2 Speed Control Parameter Group** |
| Pn2.00 | Speed control application switch 0 | Ones place, Tens place: Source of main speed command A0: Digital setting 1 (no power failure memory)1: Digital setting 2 (power failure memory)2: AI13: AI24: AI35: PULSE setting (DI5)6: Multi-speed command7: Simple PLC8: PID9: Communication givenA: Pulse synchronizationB~F: ReservedHundreds place: Choice of upper limit speed source0: Digital setting (Pn2.07)1: AI12: AI23: AI34: PULSE setting (DI5)5: Communication givenThousands place: Reserved | 1 | 0 | ★ |

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| **Function code** | **Name** | **Setting range** | **Minimum unit** | **Default** | **Change** |
| Pn2.01 | Speed control application switch 1 | Ones place, Tens place: Source of auxiliary speed command B0: Digital setting 1 (no power failure memory)1: Digital setting 2 (power failure memory)2: AI13: AI24: AI35: PULSE setting (DI5)6: Multi-speed command7: Simple PLC8: PID9: Communication givenA: Pulse synchronizationB~F: ReservedHundreds place: Source of speed control (drive) torque upper limit 0: Function code Pn2.13 setting1: AI12: AI23: AI34: PULSE setting (DI5)5: Communication given6: MIN (AI1, AI2)7: MAX (AI1, AI2)Thousands place: Reserved | 1 | 0 | ★ |
| Pn2.02 | Speed control application switch 2 | Ones place, Tens place: Choice of speed source0: Main speed A1: Result of main and auxiliary operation (the operation relation is determined by tens place)2: Switch between main speed A and auxiliary speed B3: Switch between main speed A and result of main and auxiliary operation4: Switch between auxiliary speed B and result of main and auxiliary operation5 ~ 14: ReservedHundreds place: Speed source main and auxiliary operation relationship0: Main + auxiliary1: Main - auxiliary2: Bigger of the two3: Smaller of the twoThousands place: Reserved | 11 | 00 | ☆ |
| Pn2.03 | Internal speed command | 0.00Hz ~ Maximum speed Pn2.25 | 0.01Hz | 50.00Hz | ☆ |
| Pn2.05 | Maximum speed  | 50.00Hz ~ 300.00Hz (3000.0Hz) | 0.01Hz | 50.00Hz | ★ |
| Pn2.07 | Upper limit speed | Lower limit speed Pn2.09 ~ Maximum speed Pn2.05 | 0.01Hz | 50.00Hz | ☆ |
| Pn2.08 | Upper limit speed bias | 0.00Hz ~ Maximum speed Pn2.05 | 0.01Hz | 0.00Hz | ☆ |
| Pn2.09 | Lower limit speed | 0.00Hz ~ Upper limit speed Pn2.07 | 0.01Hz | 0.00Hz | ☆ |
| Pn2.10 | Acceleration time 1 | 0.00s ~ 65000s | 0.01s | Depending on model | ☆ |
| Pn2.11 | Deceleration time 1 | 0.00s ~ 65000s | 0.01s | Depending on model | ☆ |
| Pn2.13 | Digital setting of speed control (drive) torque upper limit | 0.0% ~ 200.0% | 0.1% | 150.0% | ☆ |
| Pn2.15 | Digital setting of speed control (braking) torque upper limit | 0.0%~ 200.0% | 0.1% | 150.0% | ☆ |
| Pn2.16 | Jog speed | 0.00Hz ~ Maximum speed | 0.01Hz | 2.00Hz | ☆ |
| Pn2.17 | Jog acceleration time | 0.0s ~ 6500.0s | 0.1s | 20.0s | ☆ |
| Pn2.18 | Jog deceleration time | 0.0s ~ 6500.0s | 0.1s | 20.0s | ☆ |

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| **Function code** | **Name** | **Setting range** | **Minimum unit** | **Default** | **Change** |
| **Pn3 Pulse Synchronization Parameter Group** |
| Pn3.00 | Pulse synchronization mode | 0: Speed synchronization1: Position synchronization | 1 | 0 | ★ |
| Pn3.01 | Pulse mode selection | 0: Pulse + direction1: Two orthogonal pulses | 1 | 1 | ★ |
| Pn3.02 | Orthogonal pulse AB phase sequence | 0: Forward1: Reverse | 1 | 0 | ★ |
| Pn3.03 | Acceleration time (position synchronization) | 0.0 ~ 6500.0s | 0.1s | 0.0s | ☆ |
| Pn3.04 | Deceleration time (position synchronization) | 0.0 ~ 6500.0s | 0.1s | 0.0s | ☆ |
| Pn3.05 | Feedforward gain (position synchronization) | 0.00 ~ 2.00 | 0.01 | 1.00 | ★ |
| Pn3.06 | Proportional gain 1 (position synchronization) | 0.00 ~ 100.00 | 0.01 | 1.50 | ☆ |
| Pn3.07 | Numerator of electronic gear ratio | 1 ~ 30000 | 1 | 1 | ☆ |
| Pn3.08 | Denominator of electronic gear ratio | 1 ~ 30000 | 1 | 1 | ☆ |
| Pn3.09 | Pulse frequency filter time | 0.00 ~ 10.00s | 0.01s | 0 | ☆ |
| Pn3.10 | Reserved |  |  |  |  |
| Pn3.11 | Proportional gain switching choice (position synchronization) | 0: Do not switch1: Switch automatically according to the deviation | 1 | 1 | ☆ |
| Pn3.12 | Proportional gain 2 (position synchronization) | 0.00 ~ 100.00 | 0.01 | 15.00 | ☆ |
| Pn3.13 | Proportional gain switching position deviation level 1 (position synchronization) | 0 ~ 30000 | 1 | 5 | ☆ |
| Pn3.14 | Proportional gain switching position deviation level 2 (position synchronization) | 0 ~ 30000 | 1 | 50 | ☆ |
| Pn3.15 | Acceleration compensation gain | 0.00 ~ 10.00 | 0.01 | 0.00 | ☆ |
| Pn3.16 | Maximum pulse deviation | 0 ~ 10000 | 1 | 500 | ☆ |
| Pn3.17 | Reserved |  |  |  |  |
| Pn3.18 | Deviation limit | 0 ~ 1000 | 1 | 0 | ☆ |
| Pn3.19 | Reserved |  |  |  |  |
| Pn3.20 | Reserved |  |  |  |  |
| Pn3.21 | Detection value of excessive pulse deviation | 0 ~ 2000 | 1 | 600 | ☆ |
| Pn3.22 | Detection time of excessive pulse deviation | 0.00 ~ 10.00s | 0.01s | 1.00s | ☆ |
| **Pn4 Gain Parameter Group** |
| Pn4.00 | Speed loop proportional gain 1 | 1 ~ 100 | 1 | 30 | ☆ |
| Pn4.01 | Speed loop integral time 1 | 0.01s ~ 10.00s | 0.01s | 0.50s | ☆ |
| Pn4.02 | Switching speed 1 | 0.00 ~ Pn4.05 | 0.01Hz | 5.00Hz | ☆ |
| Pn4.03 | Speed loop proportional gain 2 | 1 ~ 100 | 1 | 20 | ☆ |
| Pn4.04 | Speed loop integral time 2 | 0.01s ~ 10.00s | 0.01s | 1.00s | ☆ |
| Pn4.05 | Switching speed 2 | Pn4.02 ~ Maximum speed  | 0.01Hz | 10.00Hz | ☆ |
| Pn4.06 | Slip compensation factor | 50% ~ 200% | 1% | 100% | ☆ |
| Pn4.07 | Speed loop filter time constant | 0.000s ~ 1.000s | 0.001s | 0.016s | ☆ |
| Pn4.08 | Vector control over excitation gain | 0~200 | 1 | 64 | ☆ |
| Pn4.13 | M-axis current loop proportional gain | 0~20000 | 1 | 2000 | ☆ |



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| **Function code** | **Name** | **Setting range** | **Minimum unit** | **Default** | **Change** |
| Pn4.14 | M-axis current loop integral gain | 0 ~ 20000 | 1 | 1300 | ☆ |
| Pn4.15 | T-axis current loop proportional gain | 0 ~ 20000 | 1 | 2000 | ☆ |
| Pn4.16 | T-axis current loop integral gain | 0 ~ 20000 | 1 | 1300 | ☆ |
| Pn4.17 | Speed loop integral property | Ones place: Integral separation0: Invalid1: Valid | 1 | 0 | ☆ |
| **Pn5 Current SPWM Gain Parameter Group** |
| Pn5.00 | Speed loop proportional gain P | 10 ~ 120 | 1 | 80 | ☆ |
| Pn5.01 | Speed loop integral gain limiter I | 10 ~ 150s | 1% | 100 | ☆ |
| Pn5.02 | Frequency point of acceleration and deceleration integral time constant change | 1.00 ~ 100.00 | 0.01Hz | 40.00Hz | ☆ |
| Pn5.03 | Deceleration integral time constant | 0.001s ~ 2.000s | 0.001s | 0.100 | ☆ |
| Pn5.04 | Acceleration integral time constant | 0.001s ~ 2.000s | 0.001s | 0.080 | ☆ |
| Pn5.05 | Frequency point of steady speed integral time constant change | 1.00 ~ 100.00 | 0.01Hz | 50.00Hz | ☆ |
| Pn5.06 | Constant speed integral time constant compensation factor | 0.010s ~ 2.000s | 0.001 | 0.050 | ☆ |
| Pn5.07 | Speed loop integral time constant offset value | 0.010s ~ 2.000s | 0.001s | 0.030s | ☆ |
| Pn5.08 | S-curve time constant when velocity loop integral time constant is changed | 0.010s ~ 2.000s | 0.001s | 0.020s | ☆ |
| Pn5.09 | K2 gain | 1 ~ 500 | 1 | 450 | ☆ |
| Pn5.10 | Zero speed current gain | 5 ~ 100 | 1 | 20 | ☆ |
| Pn5.11 | Zero speed current limit | 5 ~ 150 | 1 | 60 | ☆ |
| Pn5.12 | Current gain transform frequency point | 0.01 ~ 200.00 | 0.01 | 50.00 | ☆ |
| Pn5.13 | Torque limit value | 100 ~ 1000 | 1 | 800 | ☆ |
| Pn5.14 | Motor base frequency point slip frequency | 0.10 ~ 30.00 | 0.01 | 4.00 |  |
| Pn5.15 | Maximum slip at zero motor speed | 10 ~ 100 | 1 | 80 |  |
| Pn5.16 | Maximum slip percentage above the base frequency of motor | 10 ~ 150 | 1 | 100 |  |
| Pn5.17 | Motor high speed slip compensation calculation factor | 1.00 ~ 100.00 | 0.01 | 50.00 |  |
| Pn5.18 | Maximum slip upper limit of motor base frequency | 0.10 ~ 60.00 | 0.01 | 15.00 |  |
| **Pn6 Encoder Parameter Group** |
| Pn6.00 | Number of encoder pulses | 1 ~ 65535 | 1 | 2500 | ★ |
| Pn6.01 | Servo encoder type | 0: ABZ incremental encoder1: UVW incremental encoder2: Resolver3: Sinusoidal encoder4: Wire saving UVW encoder5: Tamagawa serial bus encoder6: Tamagawa absolute encoder | 1 | 0 | ★ |
| Pn6.02 | Speed feedback PG selection | 0: Local PG1: Extended PG2: PULSE input (DI5) | 1 | 0 | ★ |

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| **Function code** | **Name** | **Setting range** | **Minimum unit** | **Default** | **Change** |
| Pn6.03 | Encoder phase sequence / main direction | 0: Forward1: Reverse | 1 | 0 | ★ |
| Pn6.04 | Encoder installation position angle | 0.0 ~ 359.9° | 0.1° | 0.0° | ★ |
| Pn6.05 | UVW signal direction | 0: Forward1: Reverse | 1 | 0 | ★ |
| Pn6.06 | UVW signal home position angle | 0.0 ~ 359.9° | 0.1° | 0.0° | ★ |
| Pn6.07 | Number of spinning pole pairs | 1 ~ 65535 | 1 | 1 | ★ |
| Pn6.08 | Number of UVW pole pairs | 1 ~ 65535 | 1 | 4 | ★ |
| Pn6.09 | Speed feedback PG disconnection detection time | 0.0: No action0.1s ~ 10.0s | 0.1 | 0.0 | ★ |
| Pn6.10 | Numerator of motor gear ratio | 1 ~ 65535 | 1 | 1 | ★ |
| Pn6.11 | Denominator of motor gear ratio | 1 ~ 65535 | 1 | 1 | ★ |
| **Pn7 Terminal Input Parameter Group** |
| Pn7.00 | DI1 terminal function selection | 0: No function1: Forward running (FWD)2: Reverse running (REV)3: Three-wire running control4: Forward jog (FJOG)5: Reverse jog (RJOG)6: Terminal UP7: Terminal DOWN8: Free stop9: Fault reset (RESET)10: Running pause11: External fault normally open input12: Multi-command terminal 113: Multi-command terminal 214: multi-command terminal 315: Multi-command terminal 416: Acceleration / deceleration selection terminal 117: Acceleration / deceleration selection terminal 218: Speed source switch19: UP / DOWN setting reset (terminal & keyboard)20: Running command switch terminal21: Acceleration / deceleration disabled22: PID pause23: PLC status reset24: Swing frequency pause25: Register input26: Counter reset27: Length count input28: Length reset29: Torque control disabled30: PULSE speed input (valid only for DI5)31: Reserved32: Immediate DC braking33: External fault normally closed input34: Speed setting effective terminal35: PID action reversal terminal36: When external stop terminal 1 is controlled with keypad, this terminal can be used to stop, equivalent to STOP button on the keyboard.37: Control command switch terminal 238: PID integral pause terminal39: Speed source X and preset speed switch terminal40: Speed source Y and preset speed switch terminal41: Motor selection terminal 1 | 1 | 1 | ★ |
| Pn7.01 | DI2 terminal function selection | 1 | 2 | ★ |
| Pn7.02 | DI3 terminal function selection | 1 | 52 | ★ |
| Pn7.03 | DI4 terminal function selection | 1 | 55 | ★ |
| Pn7.04 | DI5 terminal function selection | 1 | 51 | ★ |
| Pn7.05 | DI6 terminal function selection | 1 | 9 | ★ |
| Pn7.06 | DI7 terminal function selection | 1 | 0 | ★ |
| Pn7.07 | Reserved | 1 | 0 | ★ |
| Pn7.08 | Reserved | 1 | 0 | ★ |
| Pn7.09 | DI10 terminal function selection |
| 1 | 0 | ★ |

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| **Function code** | **Name** | **Setting range** | **Minimum unit** | **Default** | **Change** |
| Pn7.09 | DI10 terminal function selection | 42: Motor selection terminal 243: PID parameter switch terminal44: User defined fault 145: User defined fault 246: Clear running time47: Emergency stop48: External stop terminal 249: Deceleration DC braking50: Speed control/torque control switch51: Analog command gain switching52: Pulse synchronous mode switching (pulse speed synchronization <-> pulse position synchronization)53: Pulse position synchronous control switching (with forward command)54: Positioning control switch (without command)55: Positioning control switch (with forward command)56: Positioning control switch (with reverse command)57: Index / incremental positioning mode switching58: Relocate59: Terminal home signal input60: Multi-section positioning length command 161: Multi-section positioning length command 262: Multi-section positioning length command 363: Reserved | 1 | 0 | ★ |
| Pn7.10 | DI filter time | 0.000s ~ 1.000s | 1 | 0.010s | ☆ |
| Pn7.11 | Terminal command mode | 0: Two-wire type 11: Two-wire type 22: Three-wire type 13: Three-wire type 2 | 1 | 0 | ★ |
| Pn7.12 | Rate of change per second of terminal UP/DOWN | 0.001Hz ~ 65.535Hz | 1 | 1.00Hz | ☆ |
| Pn7.13 | Curve 1minimum input | 0.00V ~ Pn7.15 | 0.01 | 0.00V | ☆ |
| Pn7.14 | Curve 1minimum input setting | -100.0% ~ +100.0% | 0.1 | 0.0% | ☆ |
| Pn7.15 | Curve 1 maximum input | Pn7.13 ~ +10.00V | 0.01 | 10.00V | ☆ |
| Pn7.16 | Curve 1maximum input setting | -100.0% ~ +100.0% | 0.1 | 100.0% | ☆ |
| Pn7.17 | AI1 filter time | 0.00s ~ 10.00s |  | 0.10s | ☆ |
| Pn7.18 | Curve 2minimum input | -10.00V ~ Pn7.20 |  | -10.00V | ☆ |
| Pn7.19 | Curve 2 minimum input setting | -100.0% ~ +100.0% |  | -100.0% | ☆ |
| Pn7.20 | Curve 2maximum input | Pn7.18 ~ +10.00V |  | 10.00V | ☆ |
| Pn7.21 | Curve 2 maximum input setting | -100.0% ~ +100.0% |  | 100.0% | ☆ |
| Pn7.22 | AI2 filter time | 0.00s ~ 10.00s |  | 0.10s | ☆ |
| Pn7.23 | Curve 3minimum input | -10.00V ~ Pn7.25 |  | -10.00V | ☆ |
| Pn7.24 | Curve 3 minimum input setting | -100.0% ~ +100.0% |  | -100.0% | ☆ |
| Pn7.25 | Curve 3 maximum input | Pn7.23 ~ +10.00V |  | 10.00V | ☆ |
| Pn7.26 | Curve 3 maximum input setting | -100.0% ~ +100.0% |  | 100.0% | ☆ |
| Pn7.27 | AI3 filter time | 0.00s ~ 10.00s |  | 0.10s | ☆ |
| Pn7.28 | PULSE minimum input | 0.00kHz ~ Pn7.30 |  | 0.00kHz | ☆ |
| Pn7.29 | PULSE minimum input setting | -100.0% ~ 100.0% |  | 0.0% | ☆ |
| Pn7.30 | PULSE maximum input | Pn7.28 ~ 100.00kHz |  | 50.00kHz | ☆ |
| Pn7.31 | PULSE maximum input setting | -100.0% ~ 100.0% |  | 100.0% | ☆ |

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| **Function code** | **Name** | **Setting range** | **Minimum unit** | **Default** | **Change** |
| Pn7.32 | PULSE filter time | 0.00s ~ 10.00s |  | 0.10s | ☆ |
| Pn7.33 | AI setting curve selection | Ones place: AI1 curve selection1: Curve 1 (2 points, see Pn7.13 ~ Pn7.16)2: Curve 2 (2 points, see Pn7.18 ~ Pn7.21)3: Curve 3 (2 points, see Pn7.23 ~ Pn7.26)4: Curve 4 (4 points, see Fn6.00 ~ Fn6.07)5: Curve 5 (4 points, see Fn6.08 ~ Fn6.15)Tens place: AI2 curve selection, same as aboveHundreds place: AI3 curve selection, same as above |  | 321 | ☆ |
| Pn7.34 | AI lower than minimum input setting selection | Ones place:AI1 lower than minimum input setting selection0: Corresponding setting of minimum input1:0.0%Tens place: AI2 lower than minimum input setting selection0: Corresponding setting of minimum input1:0.0%Hundreds place: AI3 lower than minimum input setting selection 0: Corresponding setting of minimum input1:0.0% |  | 000 | ☆ |
| Pn7.35 | DI1 delay time | 0.0s ~ 3600.0s |  | 0.0s | ★ |
| Pn7.36 | DI2 delay time | 0.0s ~ 3600.0s |  | 0.0s | ★ |
| Pn7.37 | DI3 delay time | 0.0s ~ 3600.0s |  | 0.0s | ★ |
| Pn7.38 | DI input terminal valid status setting 1 | 0: High level1: Low levelOnes place: DI1Tens place: DI2Hundreds place: DI3Thousands place: DI4Ten-thousands place: DI5 |  | 00000 | ★ |
| Pn7.39 | DI input terminal valid state setting 2 | 0: High level1: Low levelOnes place: DI6Tens place: DI7Hundreds place: DI8Thousands place: DI9 Ten-thousands place: DI10 |  | 00000 | ★ |
| **Pn8 Terminal Output Parameter Group** |
| Pn8.00 | FM terminal output selection | 0: Pulse output (FMP)1: Open collector on-off output(FMR) | 1 | 1 | ☆ |
| Pn8.01 | FMR output selection | 0: No output1: Drive is running2: Fault output (fault stop)3: FDT1 output of speed level detection4: Speed reached5: Zero speed running (no output during stop)6: Motor overload pre-alarm7: Drive overload pre-alarm8: Set count value reached9: Specified count value reached10: Length reached11: PLC cycle completed12: Accumulated running time reached13: In speed limit14: In torque limit15: Operation is ready16: AI1 > AI217: Upper limit speed reached | 1 | 4 | ☆ |
| Pn8.02 | DO4 output selection | 1 | 0 | ☆ |
| Pn8.03 | DO3 output selection | 1 | 0 | ☆ |
| Pn8.04 | DO1 output selection | 1 | 21 | ☆ |
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| **Function code** | **Name** | **Setting range** | **Minimum unit** | **Default** | **Change** |
| Pn8.05 | DO2output selection | 18: Lower limit speed reached (operation related)19: Undervoltage status output20: Communication settings21: Positioning completed22: Positioning close23: Zero speed running 2 (output during stop)24: Cumulative power-on time reached25: FDT2 output of speed level detection26: Speed arrival 1 output27: Speed arrival2 output28: Current arrival1 output29: Current arrival2 output30: Timing arrival output31: AI1 input exceeds upper/lower limits32: Unloading33: Running direction34: Zero current detection35: Module temperature reached36: Software overcurrent output37: Lower limit speed reached (operation irrelevant)38: Fault output (operation continues)39: Motor overtemperature pre-alarm40: Running time reached41: User-defined output 142: User-defined output 243: Incremental positioning completed (500ms high level)44: Absolute positioning completed (500ms high level)45: Indexing positioning completed (500ms high level) | 1 | 2 | ☆ |
| Pn8.06 | FMP output selection | 0: Running speed1: Set speed2: Output current3: Output torque4: Output power5: Output voltage6: PULSE input (100.% corresponds to 100.0kHz)7: AI18: AI29: AI310: Length11: Count value12: Communication Settings13: Motor speed14: Output current (100.0% corresponds to 1000.0A)15: Output voltage (100.0% corresponds to 1000.0V)16: Reserved | 1 | 0 | ☆ |
| Pn8.07 | AO1 output selection | 1 | 0 | ☆ |
| Pn8.08 | AO2 output selection | 1 | 1 | ☆ |
| Pn8.09 | FMP output maximum speed | 0.01kHz ~ 100.00kHz | 0.01kHz | 50.00kHz | ☆ |
| Pn8.10 | AO1 zero offset coefficient | -100.0% ~ 100.0% | 0.1% | 0.0% | ☆ |
| ☆ |
| Pn8.11 | AO1 gain | -10.00 ~ 10.00 | 0.01 | 1.00 |
| Pn8.12 | AO2 zero offset coefficient | -100.0% ~ 100.0% | 0.1% | 0.0% | ☆ |
| Pn8.13 | AO2 gain | -10.00 ~ 10.00 | 0.01 | 1.00 | ☆ |
| Pn8.14 | Reserved |  |  |  | ● |
| Pn8.15 | Reserved |  |  |  | ● |
| Pn8.16 | Reserved |  |  |  | ● |
| Pn8.17 | FMR output delay time | 0.0s ~ 3600.0s | 0.1s | 0.0s | ☆ |
| Pn8.18 | DO4 output delay time | 0.0s ~ 3600.0s | 0.1s | 0.0s | ☆ |



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| **Function code** | **Name** | **Setting range** | **Minimum unit** | **Default** | **Change** |
| Pn8.19 | DO3 output delay time | 0.0s ~ 3600.0s | 0.1s | 0.0s | ☆ |
| Pn8.20 | DO1 output delay time | 0.0s ~ 3600.0s | 0.1s | 0.0s | ☆ |
| Pn8.21 | DO2 output delay time | 0.0s ~ 3600.0s | 0.1s | 0.0s | ☆ |
| Pn8.22 | DO output terminal valid status selection | 0. Positive logic1. Inverse logicOnes place: FMRTens place: DO4Hundreds place: DO3Thousands place: DO1Ten-thousands place: DO2 | 11111 | 00000 | ☆ |
| Pn8.23 | User-defined output variable selection(EX)1 | 0: Running speed1: Set speed2: Bus voltage3: Output voltage4: Output current5: Start/stop status flag6: Control status flag7: Count value8: Meter value9: Inverter module temperature10: AI1 input11: AI2 input | None | 0 | ☆ |
| Pn8.24 | User-selected comparison method 1 | Ones place: Comparison and test method0: Equal to (EX == X1)1: Greater than or equal to2: Less than or equal to3: Interval comparison (X1 ≤ EX ≤ X2)4: Bit test (EX & X1 = X2)Tens place: Output method0: False value output1: True value output | None | 00 | ☆ |
| Pn8.25 | User-defined dead zone 1 | 0 ~ 65535 | None | 0 | ☆ |
| Pn8.26 | User-defined first comparison value 1 | 0 ~ 65535 | None | 0 | ☆ |
| Pn8.27 | User-defined second comparison value 1 | 0 ~ 65535 | None | 0 | ☆ |
| Pn8.28 | User-defined output variable selection(EX)2 | 0: Running speed1: Set speed2: Bus voltage3: Output voltage4: Output current5: Start / stop status flag6: Control status flag7: Count value8: Meter value9: Inverter module temperature10: AI1 input11: AI2 input | None | 0 | ☆ |
| Pn8.29 | User-selected comparison method 2 | Ones place: Comparison and test method0: Equal to (EX == X1)1: Greater than or equal to2: Less than or equal to3: Interval comparison (X1 ≤ EX ≤ X2)4: Bit test (EX & X1 = X2)Tens place: Output method0: False value output1: True value output | None | 00 | ☆ |

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| **Function code** | **Name** | **Setting range** | **Minimum unit** | **Default** | **Change** |
| Pn8.30 | User-defined dead zone 2 | 0 ~ 65535 | None | 0 | ☆ |
| Pn8.31 | User-defined first comparison value 1 | 0 ~ 65535 | None | 0 | ☆ |
| Pn8.32 | User-defined second comparison value 2 | 0 ~ 65535 | None | 0 | ☆ |
| **PnA Communication Parameter Group** |
| PnA.00 | Type of communication | 0: 485 communication1: Reserved2: Reserved3: CAN.LINK4: Reserved | 1 | 0 | ☆ |
| PnA.01 | Baud rate | Ones place: MODBUS 0: 300BPS1: 600BPS2: 1200BPS3: 2400BPS4: 4800BPS5: 9600BPS6: 19200BPS7: 38400BPS8: 57600BPS9: 115200BPSTens place: ReservedHundreds place: ReservedThousands place: CAN.LINK baud rate0: 20Kbps1: 50Kbps2: 100Kbps3: 125Kbps4: 250Kbps5: 500Kbps6: 1M | 1 | 6005 | ☆ |
| PnA.02 | Data Format | 0: No parity (8.N.2)1: Even parity (8.E.1)2: Odd parity (8.O.1)3: 8.N.1 | 1 | 0 | ☆ |
| PnA.03 | Local address | 1 ~ 247, 0 is the broadcast address | 1 | 1 | ☆ |
| PnA.04 | Response delay | 0ms ~ 20ms | 1ms | 2 | ☆ |
| PnA.05 | Communication timeout | 0.0(Invalid), 0.1s ~ 60.0s | 0.1s | 0.0 | ☆ |
| PnA.06 | Data transfer format options | Ones place: MODBUS0: Non-standard MODBUS protocol1: Standard MODBUS protocolTens place: Reserved | 1 | 01 | ☆ |
| PnA.07 | Communication reading current resolution | 0: 0.01A1: 0.1A | 1 | 0 | ☆ |
| **PnC Fault and Protection Parameter Group** |
| PnC.00 | Motor overload software protection options | 0: Disabled1: Enabled | 1 | 1 | ☆ |
| PnC.01 | Motor overload software protection gain | 0.20 ~ 10.00 | 0.01 | 1.00 | ☆ |
| PnC.02 | Motor overload warning factor | 50% ~ 100% | 1% | 80% | ☆ |
| PnC.03 | Overvoltage stall gain | 0 ~ 100 | 1 | 0 | ☆ |
| PnC.04 | Overvoltage stall protection voltage | 120% ~ 150% | 1% | 130% | ☆ |
| PnC.05 | Overcurrent stall gain | 0 ~ 100 | 1 | 20 | ☆ |



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| **Function code** | **Name** | **Setting range** | **Minimum unit** | **Default** | **Change** |
| PnC.06 | Overcurrent stall protection current | 100% ~ 200% | 1% | 150% | ☆ |
| PnC.07 | Ground short-circuit protection options after power-on | 0: Invalid1: Valid | 1 | 1 | ☆ |
| PnC.08 | Reserved | － | － | － | ● |
| PnC.09 | Fault auto reset times | 0 ~ 20 | 1 | 0 | ☆ |
| PnC.10 | Fault DO during fault auto reset | 0: No action | 1 | 0 | ☆ |
|  | Action selection | 1: Action |  |  |  |
| PnC.11 | Fault auto reset interval | 0.1s ~ 100.0s | 0.1s | 1.0s | ☆ |
| PnC.12 | Input phase loss protection options | 0: Disabled1: Enabled | 1 | 0 | ☆ |
| PnC.13 | Output phase loss protection options | 0: Disabled1: Enabled | 1 | 1 | ☆ |
| PnC.14 | Fault protection action selection 1 | Ones place: Motor overload (Er011)0: Free stop1: Stop according to stop mode2: Continue to runTens place: Input phase loss (Er012)Hundreds place: Output phase loss (Er013)Thousands place: External fault (Er015)Ten-thousands place: Communication error (Er016) | 11111 | 00000 | ☆ |
| PnC.15 | Fault protection action selection 2 | Ones place: Encoder error (Er020)0: Free stopTens place: Function code reading/writing error (Er021)0: Free stop1: Stop according to stop modeHundreds place: ReservedThousands place: Motor overheating (Er025)Ten-thousands place: Running time reached (Err26) | 11111 | 00000 | ☆ |
| PnC.16 | Fault protection action selection 3 | Ones place: User-defined fault 1(Err27)0: Free stop1: Stop according to stop mode2: Continue to runTens place: User-defined fault 2(Err28)0: Free stop1: Stop according to stop mode2: Continue to runHundreds place: Power-on time reached (Err29)0: Free stop1: Stop according to stop mode2: Continue to runThousands place: Unload (Err30)0: Free stop1: Deceleration stop2: Decelerate to 7% of the rated motor speed and continue running; automatically return to set speed if the load isn’t removedTen-thousands place: PID feedback lost during running (Err31)0: Free stop1: Stop according to stop mode2: Continue to run | 11111 | 00000 | ☆ |
| PnC.17 | Fault protection action selection 4 | Ones place: Speed deviation is too large (Err42)0: Free stop1: Stop according to stop mode2: Continue to runTens place: Motor over speed (Err43) Hundreds place: Initial position error (Err51) | 11111 | 00000 | ☆ |

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| **Function code** | **Name** | **Setting range** | **Minimum unit** | **Default** | **Change** |
| PnC.18 | Reserved | － | － | － | ● |
| PnC.19 | Reserved | － | － | － | ● |
| PnC.20 | Reserved | － | － | － | ● |
| PnC.21 | Continuing running speed options when fault occurs | 0: Run at current running speed1: Run at set speed2: Run at upper speed limit3: Run at lower speed limit4: Run at abnormal standby speed | 1 | 0 | ☆ |
| PnC.22 | Abnormal standby speed setting | 60.0% ~ 100.0% (current target speed) | 0.1% | 100.0% | ☆ |
| PnC.23 | Motor temperature sensor type | 0: No temperature sensor1: PT1002: PT1000 | 1 | 0 | ☆ |
| PnC.24 | Motor over-temperature protection threshold | 0℃ ~ 200℃ | 1℃ | 110℃ | ☆ |
| PnC.25 | Motor overheating pre-alarm threshold | 0℃ ~ 200℃ | 1℃ | 90℃ | ☆ |
| PnC.26 | Instantaneous stop action selection | 0: Invalid1: Decelerate according to deceleration time 12: Decelerate according to deceleration time 23: Decelerate according to deceleration time 34: Decelerate according to deceleration time 45: Decelerate according to current deceleration time6: Automatic deceleration | 1 | 0 | ☆ |
| PnC.27 | Automatic deceleration switching point at instantaneous stop | 0.00Hz ~ Maximum speed  | 0.01Hz | 0.00Hz | ☆ |
| PnC.28 | Instantaneous stop voltage rise judgment time | 0.00s ~ 100.00s | 0.01s | 0.50s | ☆ |
| PnC.29 | Instantaneous stop action judgment voltage | 60.0% ~ 100.0% (standard bus voltage ) | 0.1% | 80.0% | ☆ |
| PnC.30 | Unload protection options | 0: Invalid1: Valid | 1 | 0 | ☆ |
| PnC.31 | Unload detection level | 0.0 ~ 100.0% | 0.1% | 10.0% | ☆ |
| PnC.32 | Unload detection time | 0.0 ~ 60.0s | 0.1s | 1.0s | ☆ |
| PnC.33 | Reserved |  |  |  |  |
| PnC.34 | Over speed detection value | 0.0% ~ 50.0% (Maximum speed) | 0.1% | 20.0% | ☆ |
| PnC.35 | Over speed detection time | 0.0s ~ 60.0s | 0.1s | 5.0s | ☆ |
| PnC.36 | Excessive speed deviation detection value | 0.0% ~ 50.0% (Maximum speed) | 0.1% | 20.0% | ☆ |
| PnC.37 | Excessive speed deviation detection time | 0.0s ~ 60.0s | 0.1s | 0.0s | ☆ |
| **PnE Positioning Control Parameter Group** |
| PnE.00 | Positioning control effective | 0: Invalid1: Valid | 1 | 0 | ☆ |
| PnE.01 | Positioning mode options | 0: Incremental1: Absolute2: Indexing plate | 1 | 2 | ★ |
| PnE.02 | Index plate positioning encoder options | 0: Motor encoder1: Spindle encoder | 1 | 0 | ★ |
| PnE.03 | Lines of spindle positioning dedicated encoder | 1 ~ 65535 | 1 | 1024 | ★ |
| PnE.04 | Numerator of spindle gear ratio (spindle side gear) | 1 ~ 10000 | 1 | 1 | ★ |
| PnE.05 | Denominator of spindle gear ratio (motor side gear) | 1 ~ 10000 | 1 | 1 | ★ |

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| **Function code** | **Name** | **Setting range** | **Minimum unit** | **Default** | **Change** |
| PnE.06 | Index positioning home source options | 0: Position encoder Z signal1: DI terminal (DI5) | 1 | 0 | ★ |
| PnE.07 | Home search direction | 0: Forward1: Reverse2: Current direction | 1 | 2 | ★ |
| PnE.08 | Home search frequency | 0.01 ~ Maximum frequency | 0.01Hz | 10.00Hz | ☆ |
| PnE.09 | Positioning control start frequency | 0.00 ~ Maximum frequency | 0.01Hz | 20.00Hz | ☆ |
| PnE.10 | Acceleration time (positioning control) | 0.01 ~ 655.35s | 0.01s | 3.00s | ☆ |
| PnE.11 | Deceleration time (positioning control) | 0.01 ~ 655.35s | 0.01s | 3.00s | ☆ |
| PnE.12 | Proportional gain 1 (positioning control) | 0.00 ~ 100.00 | 0.01 | 1.00 | ☆ |
| PnE.13 | DI terminal home filter coefficient | 0 ~ 200 | 1 | 10 | ☆ |
| PnE.14 | Positioning completion deviation range | 0 ~ 1000 | 1 | 10 | ☆ |
| PnE.15 | Positioning completion deviation limit | 0 ~ 1000 | 1 | 2 | ☆ |
| PnE.16 | Proportional gain switch options | 0: Do not switch1: Switch automatically according to the deviation | 1 | 1 | ☆ |
| PnE.17 | Proportional gain 2 (positioning control) | 0.00 ~ 100.00 | 0.01 | 10.00 | ☆ |
| PnE.18 | Proportional gain switching pulse deviation 1 | 0 ~ 30000 | 1 | 5 | ☆ |
| PnE.19 | Proportional gain switching pulse deviation 2 | 0 ~ 30000 | 1 | 50 | ☆ |
| PnE.20 | Index plate position command | 0 ~ 65535 | 1 | 0 ☆ |
| PnE.21 | Index plate position command source options | 0: Specified by PnE.201: Specified by multi-position command (PnE.38~PnE.53) | 1 | 0 | ☆ |
| PnE.22 | Maximum frequency of positioning operation | 0.00Hz ~ Maximum frequency | 0.01Hz | 50.00Hz | ☆ |
| PnE.23 | Home detection judgment error | 0 ~ 1000 | 1 | 10 | ☆ |
| PnE.24 | Positioning proximity judgment pulse | 0 ~ 10000 | 1 | 100 | ☆ |
| PnE.28 | Encoder Z phase detection judgment error | 1~ 1000 | 1 | 4 |  |
| PnE.25~PnE.37 | Reserved |  |  |  |  |
| PnE.38 | Location-control position command 1 low order | 0 ~ 65535 | 1 | 0 | ☆ |
| PnE.39 | Location-control position command 1 high order | 0 ~ 65535 | 1 | 0 | ☆ |
| PnE.40 | Location-control position command 2 low order | 0 ~ 65535 | 1 | 0 | ☆ |
| PnE.41 | Location-control position command 2 high order | 0 ~ 65535 | 1 | 0 | ☆ |
| PnE.42 | Location-control position command 3 low order | 0 ~ 65535 | 1 | 0 | ☆ |
| PnE.43 | Location-control position command 3 high order | 0 ~ 65535 | 1 | 0 | ☆ |
| PnE.44 | Location-control position command 4 low order | 0 ~ 65535 | 1 | 0 | ☆ |
| PnE.45 | Location-control position command 4 high order | 0 ~ 65535 | 1 | 0 | ☆ |
| PnE.46 | Location-control position command 5 low order | 0 ~ 65535 | 1 | 0 | ☆ |
| PnE.47 | Location-control position command 5 high order | 0 ~ 65535 | 1 | 0 | ☆ |
| PnE.48 | Location-control position command 6 low order | 0 ~ 65535 | 1 | 0 | ☆ |
| PnE.49 | Location-control position command 6 high order | 0 ~ 65535 | 1 | 0 | ☆ |
| PnE.50 | Location-control position command 7 low order | 0 ~ 65535 | 1 | 0 | ☆ |

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| **Function code** | **Name** | **Setting range** | **Minimum unit** | **Default** | **Change** |  |
| PnE.51 | Location-control position command 7 high order | 0 ~ 65535 | 1 | 0 | ☆ |
| PnE.52 | Location-control position command 8 low order | 0 ~ 65535 | 1 | 0 | ☆ |
| PnE.53 | Location-control position command 8 high order | 0 ~ 65535 | 1 | 0 | ☆ |
| PnE.54 | Positioning control command direction 1 | 0: Forward1: ReverseOnes place: Positioning control command 1 directionTens place: Positioning control command 2 directionHundreds place: Positioning control command 3 directionThousands place: Positioning control command 4 directionTen-thousands place: Positioning control command 5 direction | 1 | 00000 | ☆ |
| PnE.55 | Positioning control command direction 2 | 0: Forward1: ReverseOnes place: Positioning control command 6 directionTens place: Positioning control command 7 directionHundreds place: Positioning control command 8 direction | 1 | 00000 | ☆ |
| **Fn2 Motor 1 Parameter Group** |  |
| Fn2.00 | Motor type selection | 0: Common asynchronous motor1: Spindle servo motor2: Permanent magnet servo motor | 1 | 0 | ★ |  |
| Fn2.01 | Motor rated power | 0.1kW ~ 630.0kW | 0.1kW | Depending on model | ★ |
| Fn2.02 | Motor rated voltage | 0V ~ 1140V | 1V | Depending on model | ★ |
| Fn2.03 | Motor rated current | 0.01A ~ 655.35A (power <= 55kW)0.1A ~ 6553.5A (power > 55kW) | 0.01A | Depending on model | ★ |
| Fn2.04 | Motor rated frequency | 0.00Hz ~ Pn2.05 | 0.01Hz | Depending on model | ★ |
| Fn2.05 | Motor rated speed | 0rpm ~ 65535rpm | 1rpm | Depending on model | ★ |
| Fn2.06 | Asynchronous motor stator resistance | 0.001Ω ~ 65.535Ω (power <=55kW)0.0001Ω ~ 6.5535Ω (power >55kW) | 0.001Ω | Depending on model | ★ |
| Fn2.07 | Asynchronous motor rotor resistance | 0.001Ω ~ 65.535Ω (power <=55kW)0.0001Ω ~ 6.5535Ω (power >55kW) | 0.001Ω | Depending on model | ★ |  |  |
| Fn2.08 | Asynchronous motor leakage inductance | 0.01mH ~ 655.35mH (power <=55kW)0.001mH ~ 65.535mH (power >55kW) | 0.01mH | Depending on model | ★ |  |
| Fn2.09 | Asynchronous motor mutual inductance | 0.1mH ~ 6553.5mH (power <=55kW)0.01mH ~ 655.35mH (power >55kW) | 0.1mH | Depending on model | ★ |
| Fn2.10 | Asynchronous motor no-load current | 0.01A ~ Fn2.03 (power <=55kW)0.1A ~ Fn2.03 (power >55kW) | 0.01 | Depending on model | ★ |
| Fn2.16 | Permanent magnet servo motor stator resistance | 0.001Ω ~ 65.535Ω | 0.001Ω | Depending on model | ★ |
| Fn2.17 | Permanent magnet servo motor d-axis inductance | 0.01mH ~ 655.35mH | 0.01mH | Depending on model | ★ |
| Fn2.18 | Permanent magnet servo motor q-axis inductance | 0.01mH ~ 655.35mH | 0.01mH | Depending on model | ★ |
| Fn2.20 | Permanent magnet servo motor back EMF | 0.1V ~ 6553.5V | 0.1V | Depending on model | ★ |
| Fn2.37 | Tuning options | 0: No operation1: Asynchronous machine stationary tuning2: Asynchronous machine complete tuning11: Synchronous machine no-load tuning12: Synchronous machine loaded tuning | 1 | 0 | ★ |

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| **Function code** | **Name** | **Setting range** | **Minimum unit** | **Default** | **Change** |
| **Fn4 Auxiliary Function Parameter Group** |
| Fn4.00 | Reserved |  |  |  |  |
| Fn4.01 | Reserved |  |  |  |  |
| Fn4.02 | Reserved |  |  |  |  |
| Fn4.03 | Acceleration time 2 | 0.0s ~ 6500.0s | 0.1s | Depending on model | ☆ |
| Fn4.04 | Deceleration time 2 | 0.0s ~ 6500.0s | 0.1s | Depending on model | ☆ |
| Fn4.05 | Acceleration time 3 | 0.0s ~ 6500.0s | 0.1s | Depending on model | ☆ |
| Fn4.06 | Deceleration time 3 | 0.0s ~ 6500.0s | 0.1s | Depending on model | ☆ |
| Fn4.07 | Acceleration time 4 | 0.0s ~ 6500.0s | 0.1s | Depending on model | ☆ |
| Fn4.08 | Deceleration time 4 | 0.0s ~ 6500.0s | 0.1s | Depending on model | ☆ |
| Fn4.09 | Jump speed 1 | 0.00Hz ~ Maximum speed | 0.01Hz | 0.00Hz | ☆ |
| Fn4.10 | Jump speed 2 | 0.00Hz ~ Maximum speed | 0.01Hz | 0.00Hz | ☆ |
| Fn4.11 | Jump speed range | 0.00Hz ~ Maximum speed | 0.01Hz | 0.01Hz | ☆ |
| Fn4.12 | Positive / negative dead time | 0.0s ~ 3000.0s | 0.1s | 0.0s | ☆ |
| Fn4.13 | Reverse control | 0: Reverse enabled1: Reverse disabled | 1 | 0 | ☆ |
| Fn4.14 | Speed lower than lower speed operation | 0: 0: Run at lower speed limit1: Downtime2: Zero speed running | 1 | 0 | ☆ |
| Fn4.15 | Droop control | 0.00Hz ~ 10.00Hz | 0.01Hz | 0.00Hz | ☆ |
| Fn4.16 | Set cumulative power-on reached time | 0h ~ 65000h | 1h | 0h | ☆ |
| Fn4.17 | Set cumulative running reached time | 0h ~ 65000h | 1h | 65000h | ☆ |
| Fn4.18 | Start protection options | 0: No1: Yes | 1 | 0 | ☆ |
| Fn4.19 | Speed detection value (FDT1) | 0.00Hz ~ Maximum speed | 0.01Hz | 50.00Hz | ☆ |
| Fn4.20 | Speed detection hysteresis value (FDT1) | 0.0% ~ 100.0% (FDT1 level) | 0.1% | 5.0% | ☆ |
| Fn4.21 | Speed arrival detection width | 0.0% ~ 100.0% (Maximum speed ) | 0.1% | 0.0% | ☆ |
| Fn4.22 | Whether jump speed is valid during acceleration / deceleration | 0: Invalid1: Valid | 1 | 0 | ☆ |
| Fn4.23 | Cumulative running time reached action options | 0: Continue to run1: Fault tips | 1 | 0 | ★ |
| Fn4.24 | Cumulative power-on time reached action options | 0: Continue to run1: Fault tips | 1 | 0 | ★ |
| Fn4.25 | Acceleration time 1/2 speed switching point | 0.00Hz ~ Maximum speed | 0.01Hz | 0.00Hz | ☆ |
| Fn4.26 | Deceleration time 1/2 speed switching point | 0.00Hz ~ Maximum speed | 0.01Hz | 0.00Hz | ☆ |
| Fn4.27 | Terminal jog priority | 0: Invalid1: Valid | 1 | 0 | ☆ |
| Fn4.28 | Speed detection value (FDT2) | 0.00Hz ~ Maximum speed | 0.01Hz | 50.00Hz | ☆ |
| Fn4.29 | Speed detection hysteresis value (FDT2) | 0.0% ~ 100.0% (FDT2 level) | 0.1% | 5.0% | ☆ |
| Fn4.30 | Arbitrary arrival speed detection value 1 | 0.00Hz ~ Maximum speed | 0.01Hz | 50.00Hz | ☆ |
| Fn4.31 | Arbitrary arrival speed detection range 1 | 0.0% ~ 100.0% (Maximum speed) | 0.1% | 0.0% | ☆ |
| Fn4.32 | Arbitrary arrival speed detection value 2 | 0.00Hz ~ Maximum speed  | 0.01Hz | 50.00Hz | ☆ |



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| **Function code** | **Name** | **Setting range** | **Minimum unit** | **Default** | **Change** |
| Fn4.33 | Arbitrary arrival speed detection value 2 | 0.0% ~ 100.0% (Maximum speed ) | 0.1% | 0.0% | ☆ |
| Fn4.34 | Zero current detection level | 0.0% ~ 300.0%100.0% corresponds to no output when motor rated current is stopped | 0.1% | 5.0% | ☆ |
| Fn4.35 | Zero current detection delay time | 0.01s ~ 600.00s | 0.01s | 0.10s | ☆ |
| Fn4.36 | Software overcurrent point | 0.0% (not detected)0.1% ~ 300.0% (motor rated current) | 0.1% | 200.0% | ☆ |
| Fn4.37 | Software overcurrent detection delay time | 0.00s ~ 600.00s | 0.01s | 0.00s | ☆ |
| Fn4.38 | Arbitrary arrival current 1 | 0.0% ~ 300.0% (motor rated current) | 0.1% | 100.0% | ☆ |
| Fn4.39 | Arbitrary arrival current 1 width | 0.0% ~ 300.0% (motor rated current) | 0.1% | 0.0% | ☆ |
| Fn4.40 | Arbitrary arrival current 2 | 0.0% ~ 300.0% (motor rated current) | 0.1% | 100.0% | ☆ |
| Fn4.41 | Arbitrary arrival current 2 width | 0.0% ~ 300.0% (motor rated current) | 0.1% | 0.0% | ☆ |
| Fn4.42 | Timed function options | 0: Invalid1: Valid | 1 | 0 | ☆ |
| Fn4.43 | Timed running time options | 0: Fn4.44 setting1: AI12: AI23: AI3Analog input range corresponds to Fn4.44 | 1 | 0 | ☆ |
| Fn4.44 | Timed running time | 0.0Min ~ 6500.0Min | 0.1Min | 0.0Min | ☆ |
| Fn4.45 | AI1 input voltage protection value lower limit | 0.00V ~ Fn4.46 | 0.01V | 3.10V | ☆ |
| Fn4.46 | AI1 input voltage protection value upper limit | Fn4.45 ~ 10.00V | 0.01V | 6.80V | ☆ |
| Fn4.47 | Module temperature reached | 0℃ ~ 100℃ | 1℃ | 75℃ | ☆ |
| Fn4.48 | Cooling fan control | 0: Cooling fan is running when the motor is running1: Cooling fan is always running after power on | 1 | 0 | ☆ |
| Fn4.49 | Wake up speed | Sleeping speed (Fn4.51) ~ Maximum speed (Pn2.25) | 0.01Hz | 0.00Hz | ☆ |
| Fn4.50 | Wake-up delay time | 0.0s ~ 6500.0s | 0.1s | 0.0s | ☆ |
| Fn4.51 | Sleeping speed | 0.00Hz ~ Wake up speed (Fn4.49) | 0.01Hz | 0.00Hz | ☆ |
| Fn4.52 | Sleep delay time | 0.0s ~ 6500.0s | 0.1s | 0.0s | ☆ |
| Fn4.53 | Set running arrival time | 0.0Min ~ 6500.0Min | 0.1Min | 0.0Min | ☆ |
| Fn4.54 | Auxiliary speed source Y range options when superimposed | 0: Relative to maximum speed1: Relative to speed source X | 1 | 0 | ☆ |
| Fn4.55 | Auxiliary speed source Y range when superimposed | 0% ~ 150% | 1% | 100% | ☆ |
| Fn4.56 | Command source binding to speed source | Ones place: Operation panel command, bound to speed source options0: No binding1: Digital setting speed2: AI13: AI24: AI35: PULSE setting (DI5)6: Multi-speed7: Simple PLC8: PID9: Communication givenTens place: Terminal command, bound to speed source optionsHundreds place: Serial port communication command, bound to speed source optionsThousands place: Automatic running, bound to speed source options | 1 | 0000 | ☆ |

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| **Function code** | **Name** | **Setting range** | **Minimum unit** | **Default** | **Change** |
| Fn4.57 | Auxiliary speed source bias options | 0 | 0 | 0 | ● |
| Fn4.58 | Auxiliary speed source bias speed when superimposed | 0.00Hz ~ Maximum speed Pn2.05 | 0.01Hz | 0.00Hz | ☆ |
| Fn4.59 | Digital setting speed stop memory options | 0: No1: Yes | 1 | 1 | ★ |
| Fn4.60 | Acceleration / deceleration time unit | 0: 1 sec1: 0.1 sec2: 0.01 sec | 1 | 1 | ★ |
| Fn4.61 | Acceleration / deceleration time reference speed | 0: Maximum speed (Pn2.05)1: Set speed2: 100Hz | 1 | 0 | ★ |
| Fn4.62 | Speed command resolution | 1: 0.1Hz2: 0.01HzWhen changing the decimal point of the speed command, please note to change the maximum speed and upper limit speed. | 1 | 2 | ★ |
| Fn4.63 | Speed command UP / DOWN reference during running | 0: Running speed1: Set speed | 1 | 1 | ★ |
| Fn4.64 | Carrier speed adjusted with temperature | 0: No1: Yes | 1 | 0 | ☆ |
| Fn4.65 | Analog gain switching value | 0.00 ~ 100.00% | 0.01% | 100.00% | ☆ |
| **FnA Start / Stop Control Parameter Group** |
| FnA.00 | Startup mode | 0: Start directly1: Speed tracking and restart2: Asynchronous machine pre-excitation start | 1 | 0 | ☆ |
| FnA.01 | Speed tracking mode | 0: Start from stop speed1: Start from zero speed2: Start from the maximum speed | 1 | 0 | ★ |
| FnA.02 | Revolution tracking speed | 1 ~ 100 | 1 | 20 | ☆ |
| FnA.03 | Start speed | 0.00Hz ~ 10.00Hz | 0.01Hz | 0.00Hz | ☆ |
| FnA.04 | Start speed hold time | 0.0s ~ 100.0s | 0.1s | 0.0s | ★ |
| FnA.05 | Start DC braking/ pre-excitation current | 0% ~ 100% | 1% | 0% | ★ |
| FnA.06 | Start DC braking/ pre-excitation time | 0.0s ~ 100.0s | 0.1s | 0.0s | ★ |
| FnA.07 | Acceleration and deceleration mode | 0: Linear acceleration/deceleration1: S curve acceleration/deceleration A2: S curve acceleration/deceleration B | 1 | 0 | ★ |
| FnA.08 | S curve start period time proportion | 0.0% ~ (100.0%.FnA.09) | 0.1% | 30.0% | ★ |
| FnA.09 | S curve end period time proportion | 0.0% ~ (100.0%.FnA.08) | 0.1% | 30.0% | ★ |
| FnA.10 | Stop mode | 0: Deceleration stop1: Free stop | 1 | 0 | ☆ |
| FnA.11 | Stop DC braking start speed | 0.00Hz ~ Maximum speed  | 0.01Hz | 0.00Hz | ☆ |
| FnA.12 | Stop DC braking waiting time | 0.0s ~ 100.0s | 0.1s | 0.0s | ☆ |
| FnA.13 | Stop DC braking current | 0% ~ 100% | 1% | 0% | ☆ |
| FnA.14 | Stop DC braking time | 0.0s ~ 100.0s | 0.1s | 0.0s | ☆ |
| FnA.15 | Braking usage | 0% ~ 100% | 1% | 100% | ☆ |

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| **Function code** | **Name** | **Setting range** | **Minimum unit** | **Default** | **Change** |
| **dn0 Monitoring Parameter Group** |
| dn0.00 | Running speed (Hz) |  | 0.01Hz |  | ● |
| dn0.01 | Set speed (Hz) |  | 0.01Hz | ● |
| dn0.02 | Bus voltage (V) |  | 0.1V |  | ● |
| dn0.03 | Output voltage (V) |  | 1V |  | ● |
| dn0.04 | Output current (A) |  | 0.01A |  | ● |
| dn0.05 | Output power (kW) |  | 0.1kW |  | ● |
| dn0.06 | Output torque (%) |  | 0.1% |  | ● |
| dn0.07 | DI input status |  | 1 |  | ● |
| dn0.08 | DO output status |  | 1 |  | ● |
| dn0.09 | AI1 voltage (V) |  | 0.01V |  | ● |
| dn0.10 | AI2 voltage (V) |  | 0.01V |  | ● |
| dn0.11 | AI3 voltage (V) |  | 0.01V |  | ● |
| dn0.12 | Count value |  | 1 |  | ● |
| dn0.13 | Length value |  | 1 |  | ● |
| dn0.14 | Motor speed |  | 1r/min |  | ● |
| dn0.15 | PID setting |  | 1 |  | ● |
| dn0.16 | PID feedback |  | 1 |  | ● |
| dn0.17 | PLC stage |  | 1 |  | ● |
| dn0.18 | PULSE input pulse speed(Hz) |  | 0.01kHz |  | ● |
| dn0.19 | Feedback speed (unit 0.1Hz) |  | 0.1Hz |  | ● |
| dn0.20 | Remaining runtime |  | 0.1Min |  | ● |
| dn0.21 | AI1 voltage before correction |  | 0.001V |  | ● |
| dn0.22 | AI2 voltage before correction |  | 0.001V |  | ● |
| dn0.23 | AI3 voltage before correction |  | 0.001V |  | ● |
| dn0.24 | Line speed |  | 1m/Min |  | ● |
| dn0.25 | Current power-on time |  | 1Min |  | ● |
| dn0.26 | Current running time |  | 0.1Min |  | ● |
| dn0.27 | PULSE input pulse speed |  | 1Hz |  | ● |
| dn0.28 | Communication settings |  | 0.01% |  | ● |
| dn0.29 | Encoder feedback speed |  | 0.01Hz |  | ● |
| dn0.30 | Main speed X display |  | 0.01Hz |  | ● |
| dn0.31 | Auxiliary speed Y display |  | 0.01Hz |  | ● |
| dn0.32 | View any memory address value |  | 1 |  | ● |
| dn0.33 | Synchronous machine rotor position |  | 0.0° |  | ● |
| dn0.34 | Motor temperature value |  |  |  | ● |
| dn0.35 | Target torque (%) |  | 0.1% |  | ● |
| dn0.36 | Spinning position |  | 1 |  | ● |



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| **Function code** | **Name** | **Setting range** | **Minimum unit** | **Default** | **Change** |
| dn0.37 | Power factor angle |  | 0.1° |  | ● |
| dn0.38 | ABZ location |  |  |  | ● |
| dn0.39 | VF separation target voltage |  | 1V |  | ● |
| dn0.40 | VF separation output voltage |  | 1V |  | ● |
| dn0.41 | DI input status intuitive display |  |  |  | ● |
| dn0.42 | DO input status intuitive display |  |  |  | ● |
| dn0.43 | DI function status intuitive display 1 |  |  |  | ● |
| dn0.44 | DI function status intuitive display 2 |  |  |  | ● |
| dn0.45~ dn0.49 | Reserved |  |  |  | ● |
| dn0.50 | Positioning control tracking error (quadruplicated frequency) |  | 1pulse |  | ● |
| dn0.51 | Pulse position tracking error (quadruplicated frequency) |  | 1pulse |  | ● |
| dn0.52 | Relative home position (quadruplicated frequency) |  | 1pulse |  | ● |
| dn0.53 | External pulse given motor running frequency (after transmission ratio calculation) |  | 0.01Hz |  | ● |
| dn0.54 | Reserved |  |  |  | ● |
| dn0.55 | External pulse given frequency |  | 0.01kHz |  | ● |
| dn0.56 | Positioning complete signal |  | 1 |  | ● |
| dn0.57 | Positioning close |  | 1 |  | ● |
| dn0.58 | Home retrieved |  | 1 |  | ● |
| dn0.59 | Interval pulses of two home signals (quadruplicated frequency) |  | 1pulse |  | ● |
| dn0.60 | Relative home position low order (quadruplicated frequency) |  | 1pulse |  | ● |
| dn0.61 | Relative home position high order (quadruplicated frequency) |  | 1pulse |  | ● |
| dn0.62 | Relative home position direction |  | 1 |  | ● |
| dn0.63 | Pulses given number low order (quadruplicated frequency) |  | 1pulse |  | ● |
| dn0.64 | Pulse given number high order (quadruplicated frequency) |  | 1pulse |  | ● |
| **En0 Last Fault Record Parameter Group** |
| En0.00 | Type of last fault | 0: No fault1: Reserved2: Acceleration overcurrent (ERR02)3: Deceleration overcurrent (ERR03)4: Constant speed overcurrent (ERR04)5: Acceleration overvoltage (ERR05)6: Deceleration overvoltage (ERR06)7: Constant speed overvoltage (ERR07)8: Buffer resistor overload fault (ERR08)9: Undervoltage fault (ERR09)10: Drive overload (ERR10)11: Motor overload (ERR11) | － | － | ● |



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| **Function code** | **Name** | **Setting range** | **Minimum unit** | **Default** | **Change** |
| En0.00 | Type of last fault | 12: Input phase loss (ERR12)13: Output phase loss (ERR13)14: Module overheating (ERR14)15: External fault (ERR15)16: Communication error (ERR16)17: Contactor fault (ERR17)18: Current detection fault (ERR18)19: Motor tuning fault (ERR19)20: Encoder/PG card fault (ERR20)21: Parameter reading/writing fault (ERR21)22: Drive hardware fault (ERR22)23: Motor short to ground fault (ERR23)24: Reserved (ERR24)25: Reserved (ERR25)26: Running time reached (ERR26)27: User-defined fault 1 (ERR27)28: User-defined fault 2 (ERR28)29: Power-on time reached (ERR29)30: Unload (ERR30)31: PID feedback lost during running (ERR31)40: Fast current limit timeout fault (ERR40)41: Switching motor fault during running (ERR41)42: Excessive speed deviation (ERR42)43: Motor overspeed (ERR43)45: Motor overtemperature (ERR45)51: Initial position error (ERR51)54: Home missing (ERR54)55: Excessive follow-up deviation during pulse position synchronization (ERR55)56: Excessive deviation indirectional control position (ERR56)90: Number of encoder lines set incorrectly (Fn90, alarm only)91: Encoder not connected (Fn91, alarm only) | － | － | ● |
| En0.01 | Speed during last fault | － | － | － | ● |
| En0.02 | Current during last fault | － | － | － | ● |
| En0.03 | Bus voltage during last fault | － | － | － | ● |
| En0.04 | Status of input terminal during last fault | － | － | － | ● |
| En0.05 | Status of output terminal during last fault | － | － | － | ● |
| En0.06 | Drive status during last fault | － | － | － | ● |
| En0.07 | Time of last fault (start counting from power-on) | － | － | － | ● |
| En0.08 | Time of last fault (start counting from running) | － | － | － | ● |
| **En1 Previous Fault Record Parameter Group (same as En0 parameter group)** |
| **En2 Previous Two Faults Record Parameter Group (same as En0 parameter group)** |
| **En3 Previous Three Faults Records Parameter Group (same as En0 parameter group)** |
| **En4 Previous Four Faults Records Parameter Group (same as En0 parameter group)** |

Accessory Mounting Dimensions

113.7(4.47)

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B6(0.23)

70(2.76

198.2(7.8)

5.5(0.21)

102(4.01)

GROUNDING

SCREW: M4X0.7

MOUNTING SCREW TORGUE: 14(kgf-cm)

Single phase 220V: 2.2kW

Three-phase 220V: 2.2kW-4kW

Three-phase 380V: 2.2kW-7.5kW

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