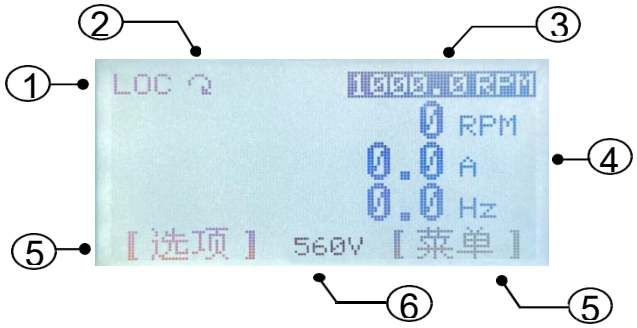
Inomax special motion drive user manual V124

1，Introduction to the display, buttons and status lights



(1) display

In the eight views of the main interface, the following control keyboard elements are displayed on the display：

serial number	Control keyboard display elements	Function
1	Control related icons	Indicates the control mode of the inverter: LOC: Abbreviation for local, the inverter is controlled locally, that is, the control comes from the control keyboard REM: Abbreviation for remote, the inverter is controlled remotely, that is, through I/O or fieldbus control **Note: The mode can be switched by the [5Lo/Re] key** **"Remote REM" and "Local LOC" mode cannot be switched when the drive running light is on**
2	status icon	Indicates the status of the inverter and motor. **The direction of the arrow indicates forward rotation (clockwise) for the drive to rotate forward** **The direction of the arrow indicates reverse rotation (counterclockwise) for the drive to reverse**

status icon	animation	drive status
↻	-	stopped
No arrows to show	-	The drive operation conditions are not met, and the start is prohibited, such as: no operation enable, start enable signal, drive undervoltage, etc.
↻	rotate	Running, but not reaching the given value
↻	rotate	During operation, reaching the given value

serial number	Control keyboard display elements	Function
3	Desired point	Speed, torque, pressure, etc. are displayed in their units. **Actual speed reference rpm** (The speed is set, the default unit is 1rpm. For information on changing the speed reference, please refer to the parameters of group P21) **Actual torque given value %**(To set the torque, % is the torque given mode. For information on changing the torque given value, please refer to the parameters of group P24)
4	content area	Displays the actual content of the interface view in this area. The content of each interface view is different. **Each interface has a total of three lines of status information. By default, there are 8 interfaces displayed in a loop, and the interface can be switched through the left and right arrows.** **The above example view is the first interface view of the control panel, named "Home" view.** **The first interface is motor speed, motor current, and motor frequency.** **The second interface is output voltage, motor magnetic flux, and motor torque.** **Note: long press the OK button to display the Chinese name and parameter address of the current interface monitoring content**
5	Soft key selection	Display softkeys (and) function in a given context 。
6	Monitoring area	Display the current DC bus voltage value

Note: can be found at *menu* →*set up* *Display settings* Adjusting Display Contrast and Backlighting Features。

(2) button

The keys that control the keyboard are described below.

Left soft key (key 1)

Button 1 ( ) is usually used to exit and cancel, such as: exit to the previous menu, cancel editing, fault reset, etc. Press ( )in the main interface to enter the option function**, You can set the local given speed value, switch between forward and reverse, and edit the pointer of the monitoring signal on the page.**

Press You can exit each interface view in turn, until you return to the first interface of the main interface.

NOTE: The soft key selection in the lower left corner of the LCD screen will display its function in a specific situation.

Right soft key (key 2)

key 2 （ ） Usually used to select, save and confirm, enter the next menu, perform functions such as selection or save editing. Press on the first interface to enter the menu， You can view the parameter list (all parameters are in the parameter list), modified parameters, parameter backup, fault record reading;
NOTE: The soft key selection in the lower right corner of the LCD display shows its function in a specific situation.

Start key (key 3) and stop key (key 4)
in local control，**green start button and red stop button Start and stop the drive separately.**

Local/remote switch key (key 5)
The [5Lo/Re] key is used to switch the control between the control keyboard (local) and the remote connection (remote).
Note: When the drive running light is on, the "remote REM" and "local LOC" modes cannot be switched

indicator light
The light off means stop state, the green light means the running is enabled, the red light means the drive is faulty, you need to press the No. 1 key to reset

arrow keys
The up and down arrow keys (▼ and ▲) are used to highlight selections in menus and selection lists, to scroll up and down pages of text, and to adjust values (such as setting parameter sizes, entering passwords, or changing parameter values).
The left and right arrow keys (◀ and ▶) are used to move the cursor left and right in the parameter editing, and the parameters can be paged in the parameter list.

OK key
Confirm key, modify the parameters need to press the OK key to save, in the main interface, you can long press the OK key to display the parameter name and address of the current monitoring content.
Note: In the parameter list, both OK and key can save parameters.

Upload and download of parameters and restore
Parameter reset to factory default: P16.03 = 2;

Parameter copy function
When the parameters need to be copied to another machine, first upload the parameters of the original machine to be copied to the keyboard control panel. Then carry the keyboard control panel to the new machine, select download to copy the parameters.
The uploading steps are: [Menu]->[Parameter Backup]->[Upload to Local]->[Overwrite with Data]->Complete the upload (display the number of uploaded parameters), then the changed parameters of the drive will be stored in the keyboard control panel in the memory.
The download steps are: [Menu]->[Parameter backup]->[Download to drive]->[Overwrite with data]->Complete the download (display the number of downloaded parameters).

At the end of the overall debugging, it is recommended that the user upload the parameters to the local to prevent parameter confusion and prepare for subsequent maintenance.

2, Main circuit wiring (The power grid ground wire should be connected to the driver, pay attention to the mark, the wrong connection of the power motor wire may cause permanent damage)

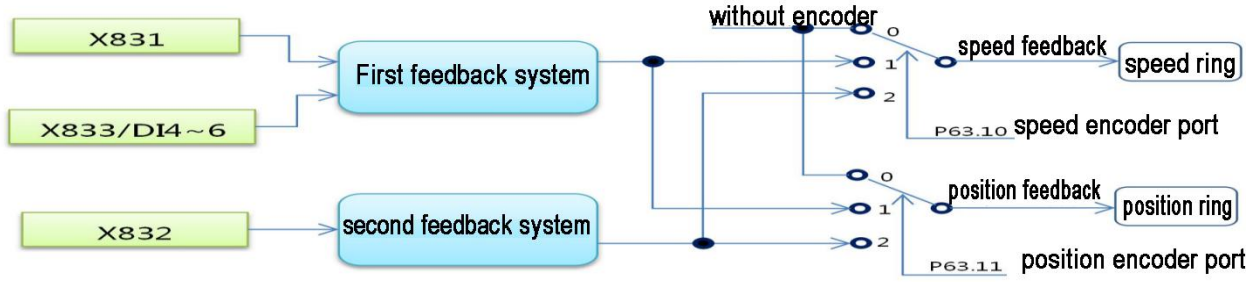
主回路	R/S/T	电源接口	
	U/V/W	电机接口	
	−	直流母线接口−	
	+	直流母线接口+	制动电阻接线端
	PB	制动电阻接口	

3, Encoder wiring and parameter setting

(1) Enable encoder port

Speed encoder port (P63.10) is set to 1: the first position feedback system (corresponding to X831/X833/DI4-6) Position encoder port (P63.11) is set to 1: the first position feedback system (corresponding to X831/X833/DI4-6)

Attachment: The relationship between the physical port of the encoder and the internal speed and position loop



(2) Encoder wiring, parameter setting (Make sure that the shielded wire of the encoder is connected to the port grounding post or the DB head shell to prevent interference.)

Corresponding ports of the encoder: differential, sine and cosine and absolute value encoders connect to X831; resolvers connect to X833; collector encoders connect to XD1 terminal;
Encoder parameter setting: P53 group parameters → X831/X833/XD1 encoder port (encoder parameters are set to P53 group)

The following lists the encoder port wiring pin definitions and encoder setting parameters, which can be set according to the type of the on-site motor encoder.

X833 port: resolver interface, DB9 female

The X833 interface supports winding transformers (transformation ratio 0.5), magnetoresistive transformers (transformation ratio 0.28) without jumper adaptive scaling

Note: X833 has PT± interface for motor temperature sensor, and XPT and X831-X832 also have PT± interface. These four interface signals are shared on the circuit board, so only one interface can be selected for use at any time.

Resolver Pin Definitions								
1	2	3	4	5	6	7	8	9
PT+	EXC-	SIN-	COS+	0V	EXC+	SIN+	COS-	PT-

A. Resolver

The following table lists the setting parameters and monitoring parameters of the resolver

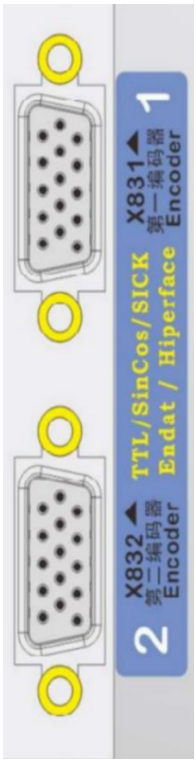
Setting parameters	
P53.00 Encoder type	2: Resolver
P53.06 Number of resolver pole pairs	Manually set according to the actual
Monitoring parameters	
P04.11 Mechanical speed	Real-time encoder feedback speed value
P04.12 Speed pulsation	Motor speed fluctuation value
P04.05 Encoder position integrated value	Display encoder position value
P04.27 Resolver COS voltage value	Used to diagnose the encoder and whether the wiring is abnormal
P04.28 resolver SIN voltage value	
P53.17 Encoder error statistics	It is used to judge the noise intensity of the encoder line, such as frequent accumulation during operation, there will be interference

X831 port: encoder interface, DB15 female

The X831 port supports absolute encoders (Endat2.1, SICK, Hiperface, BISS-B/BISS-C, SSI...) and incremental encoders (sine cosine, differential encoder)

Note: This driver supports dual encoder access. If there is only one set of encoders on site, the X831 port will be connected first.

X831-X832 all have motor temperature sensor PT± interface, and XPT and X833 interfaces also have PT±. These four interface signals are shared on the circuit board, so only one interface can be selected for use at any time.



pin definition	Square wave encoder	Sine wave encoder	Absolute encoder			
	difference	sine cosine	HEIDEN HAIN (EnDat)	SICK (Hiperface)	TAMAGAWA（RS485）	Renishaw（BiSS-C）/SSI
1	/	A+	A+/C0S+	A+/COS+	/	/
2	/	B+	B+/SIN+	B+/SIN+	/	/
3	A+	/	CL0CK+	/	/	CLOCK+(MA+)
4	0V	0V	0V	0V	0V	0V
5	5V	5V	5V	/	5V	5V
6	/	A-	A-/C0S-	A-/COS-	/	/
7	/	B-	B-/SIN-	B-/SIN-	/	/
8	A-	/	CLOCK-	/	/	CLOCK-(MA-)
9	Z+	Z+	/	/	/	/
10	Z-	Z-	/	/	/	/
11	PT+	PT+	PT+	PT+	PT+	PT+
12	/	/	/	+8V	/	/
13	B+	/	DATA+	DATA+	DATA+(SD+)	DATA+(SLO+)
14	B-	/	DATA-	DATA-	DATA-(SD-)	DATA-(SLO-)
15	PT-	PT-	PT-	PT-	PT-	PT-

Note:
The specific power supply voltage should be selected according to the encoder data, such as SSI also has 24V power supply

B. Differential encoder

The following table lists the setting parameters and monitoring parameters of the differential encoder

Setting parameters	
P53.00 Encoder type	1: Square wave ABZ
P53.02 Incremental resolution	The encoder is not connected to the Z-phase signal, it needs to be input manually! ! ! Connect to Z-phase signal, rotate self-learning and automatic identification, no need to set
Monitoring parameters	
P04.11 Mechanical speed	The real-time encoder feedback speed value, which should be the same as the given speed
P04.12 Speed pulsation	Motor speed fluctuation value
P04.05 Encoder position integrated value	Display encoder position value
P04.21 Z pulse capture value	By analyzing whether the value of each change of P04.21 is always fixed at 4 times the encoder resolution, it can be inferred whether the encoder is disturbed. P04.05 count value of Z pulse latch.
P53.17 Encoder error	It is used to judge the noise intensity of the encoder line, such as

statistics	frequent accumulation during operation, there will be interference. Measured in the rotating state, the DC average value of A± and B± to 0V should be about 2.5V, otherwise the wiring may be abnormal

C.SinCos encoder

The following table lists the setting parameters and monitoring parameters of the sine-cosine encoder

Setting parameters	
P53.00 Encoder type	3: sine cosine
P53.02 Incremental resolution	The encoder is not connected to the Z-phase signal, it needs to be manually input!!! Connected to the Z-phase signal, the rotation self-learning automatic identification, no need to set
Monitoring parameters	
P04.11 Mechanical speed	The real-time encoder feedback speed value, which should be the same as the given speed
P04.12 Speed pulsation	Motor speed fluctuation value
P04.05 Encoder position integrated value	Display encoder position value
P04.06 TTL pulse total	Displays the position value before encoder subdivision
P04.21 Z pulse capture value	By analyzing whether the value of each change of P04.21 is always fixed at 4 times the encoder resolution, it can be inferred whether the encoder is disturbed. The count value of P04.06 latched by Z pulse.
P04.23 Sine wave COS voltage value	It is used to diagnose the encoder and whether the wiring is abnormal. The maximum voltage value should exceed 0.8. If it is always less than 0.5 or has almost no change, it is likely that the encoder read head is installed or the encoder wiring is wrong.
P04.24 Sine wave SIN voltage value	
P53.17 Encoder error statistics	It is used to judge the noise intensity of the encoder line, such as frequent accumulation during operation, there will be interference

D.Absolute encoder

The following table lists the setting parameters and monitoring parameters corresponding to various types of absolute encoders

① **HEIDENHAIN（EnDat）**

Setting parameters	
P53.00 Encoder type	4: Absolute value
P53.08 Absolute value category	1: EnDat
P53.09 Absolute value subclass	0 fixed
P53.10 with sine and cosine subdivision	0: No sine wave 1: With sine wave Used to tell the drive whether there is a sine and cosine subdivision based on the absolute value
P53.11 Communication baud rate	2.0MHz (in the case of 53.17 error, you can try to reduce it to 1.OHZ)

P53.12 Trigger phase compensation	20us, the communication read advance time, to realize that the data is just acquired and just used
P53.13 Multi-turn resolution	Multi-turn number, single-turn absolute encoder must be set to 0
P53.14 Single-turn resolution	Must be set manually
Monitoring parameters	
P04.11 Mechanical speed	The real-time encoder feedback speed value, which should be the same as the given speed
P04.12 Speed pulsation	Motor speed fluctuation value
P04.05 Encoder position integrated value	Display encoder position value
P04.07 Absolute value pulse total	Displays the position value before encoder subdivision
P04.23 Sine wave COS voltage value	Used to diagnose the encoder and whether the wiring is abnormal
P04.24 Sine wave SIN voltage value	
P53.17 Encoder error statistics	It is used to judge the noise intensity of the encoder line, such as frequent accumulation during operation, there will be interference. If the standby state accumulates, the encoder communication error, check the setting parameters, or reduce the communication baud rate

Note: For the case of sine wave subdivision, there may be a problem that the counting direction of the incremental AB signal is opposite to the direction of the absolute value communication. A and B may have wiring exchange due to ambiguity. In principle, when the communication value increases, it is forward rotation. A should be ahead of B. Mathematically, COS is ahead of SIN. Strictly speaking, A should be a COS signal, and B should be a SIN signal. The SIN signal of some encoders may lead COS, so it is necessary to set A to SIN and B to COS. Rotate the motor shaft. If the increasing direction of P04.06 and P04.07 are opposite, it indicates a wiring error, and the wiring of A and B needs to be exchanged!

② SICK （Hiperface）

Note: Only when the absolute value category of P53.08 is 2, the +8V power supply can enable the output

Setting parameters	
P53.00 Encoder type	4: Absolute value
P53.08 Absolute value category	2: Hiperfae
P53.09 Absolute value subclass	0 fixed
P53.10 with sine and	0: No sine wave 1: With sine wave Used to tell the drive whether there is a

cosine subdivision	sine and cosine subdivision based on the absolute value
P53.13 Multi-turn resolution	Multi-turn number, single-turn absolute encoder must be set to 0
P53.14 Single-turn resolution	Must be set manually
Monitoring parameters	
P04.11 Mechanical speed	The real-time encoder feedback speed value, which should be the same as the given speed
P04.12 Speed pulsation	Motor speed fluctuation value
P04.05 Encoder position integrated value	Display encoder position value
P04.06 TTL pulse total	Displays the position value before encoder subdivision
P04.23 Sine wave COS voltage value	Used to diagnose the encoder and whether the wiring is abnormal
P04.24 Sine wave SIN voltage value	
P53.17 Encoder error statistics	It is used to judge the noise intensity of the encoder line, such as frequent accumulation during operation, there will be interference. If the standby state is accumulated, the encoder communication error, check the setting parameters

Note: For the case of sine wave subdivision, there may be a problem that the counting direction of the incremental AB signal is opposite to the direction of the absolute value communication. A and B may have wiring exchange due to ambiguity. In principle, when the communication value increases, it is forward rotation. A should be ahead of B. Mathematically, COS is ahead of SIN. Strictly speaking, A should be a COS signal, and B should be a SIN signal. The SIN signal of some encoders may lead the COS, so it is necessary to correspond A to SIN and B to COS. Rotate the motor shaft. If the increasing direction of P04.06 and P04.07 are opposite, it indicates a wiring error, and the wiring of A and B needs to be exchanged!

③ TAMAGAWA （RS485）

Note: Multi-turn absolute values may require a separate external battery.

Setting parameters	
P53.00 Encoder type	4: Absolute value
P53.08 Absolute value category	3: Tamagawa
P53.09 Absolute value subclass	0. Fixed
P53.10 with sine and cosine subdivision	0. Fixed
P53.11 Communication baud	Fixed 2.5MHz

rate	
P53.13 Multi-turn resolution	Multi-turn number, single-turn absolute encoder must be set to 0
P53.14 Single-turn resolution	Must be set manually
Monitoring parameters	
P04.11 Mechanical speed	The real-time encoder feedback speed value, which should be the same as the given speed
P04.12 Speed pulsation	Motor speed fluctuation value
P04.05 Encoder position integrated value	Display encoder position value
P04.07 Absolute value pulse total	Displays the position value before encoder subdivision
P53.17 Encoder error statistics	It is used to judge the noise intensity of the encoder line, such as frequent accumulation during operation, there will be interference. If the standby state is accumulated, the encoder communication error, check the setting parameters

④ Renishaw （BiSS-C）

Setting parameters	
P53.00 Encoder type	4: Absolute value
P53.08 Absolute value category	4: BISS
P53.09 Absolute value subclass	0: BISS-C 1: BISS-B
P53.10 with sine and cosine subdivision	0: No sine wave 1: With sine wave Used to tell the drive whether there is a sine and cosine subdivision based on the absolute value
P53.11 Communication baud rate	2.0MHz
P53.12 Trigger phase compensation	20us, the communication read advance time, to realize that the data is just acquired and just used
P53.13 Multi-turn resolution	Multi-turn bits, single-turn absolute encoder must be set to
P53.14 Single-turn resolution	Must be set manually
Monitoring parameters	
P04.11 Mechanical speed	The real-time encoder feedback speed value, which should be the same as the given speed
P04.12 Speed pulsation	Motor speed fluctuation value
P04.05 Encoder position integrated	Display encoder position value

value	
P04.07 Absolute value pulse total	Displays the position value before encoder subdivision
P04.23 Sine wave COS voltage value	Used to diagnose the encoder and whether the wiring is abnormal
P04.24 Sine wave SIN voltage value	
P53.17 Encoder error statistics	It is used to judge the noise intensity of the encoder line, such as frequent accumulation during operation, there will be interference. If the standby state accumulates, the encoder communication error, check the setting parameters, or reduce the communication baud rate

Note: Please refer to the setting of EnDat if it contains sine and cosine

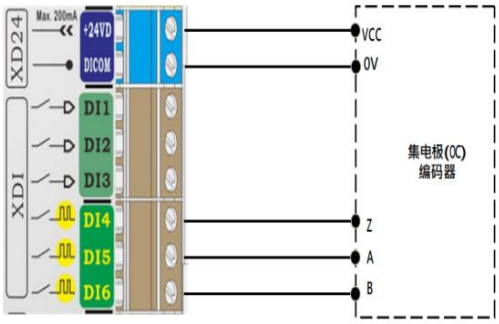
⑤ SSI protocol：

Setting parameters	
P53.00 Encoder type	4: Absolute value
P53.01 Speed filter time	2ms
P53.08 Absolute value category	4: BISS (including SSI)
P53.09 Absolute value subclass	2. SSI (Gray code)
P53.11 Communication baud rate	1.0MHz
P53.13 Multi-turn resolution	Multi-turn number, single-turn absolute encoder must be set to 0
P53.14 Single-turn resolution	Must be set manually
Monitoring parameters	
P04.11 Mechanical speed	The real-time encoder feedback speed value, which should be the same as the given speed
P04.12 Speed pulsation	Motor speed fluctuation value
P04.05 Encoder position integrated value	Display encoder position value
P04.07 Absolute value pulse total	Displays the position value before encoder subdivision
P53.17 Encoder error statistics	It is used to judge the noise intensity of the encoder line, such as frequent accumulation during operation, there will be interference. If the standby state accumulates, the encoder communication error, check the setting parameters, or reduce the communication baud rate

XD1 port: collector encoder interface

E. Collector encoder

Note: (collector encoder wiring is at the source of XD1 terminal, not corresponding to X831 and X833 ports) The following table lists the setting parameters and monitoring parameters of the collector encoder



Setting parameters	
P53.00 Encoder type	1: Square wave ABZ
P53.02 Incremental resolution	The encoder is not connected to the Z-phase signal, it needs to be input manually! ! ! There is a Z-phase signal, and the rotation self-learning automatically recognizes, no need to set
P53.05 Open collector mode	1: Enable Note that the power supply of the encoder must support 24V
Monitoring parameters	
P04.11 Mechanical speed	The real-time encoder feedback speed value, which should be the same as the given speed
P04.12 Speed pulsation	Motor speed fluctuation value
P04.05 Encoder position integrated value	Display encoder position value
P04.21 Z pulse capture value	By analyzing whether the value of each change of P04.21 is always fixed at 4 times the encoder resolution, it can be inferred whether the encoder is disturbed. P04.05 count value of Z pulse latch.
P53.17 Encoder error statistics	It is used to judge the noise intensity of the encoder line, such as frequent accumulation during operation, there will be interference

Configuration description of other public parameters of the encoder

P53.01	Speed filter time	The recommended filter time settings for different encoders or resolutions are as follows (0.5MS is recommended for belt drive): #1 SinCos encoder: 0.5ms #2 Resolver: 1.00ms #3 Absolute encoder: 0.5ms (more than 16 bits in a single turn or including sine and cosine) 1.0ms (single-turn less than 16 bits and excluding sine and cosine) #4 Square Wave Encoder: 1.0ms (resolution 1024 and above) 2.0ms (resolution below 1024)
P53.03	Phase sequence exchange	Motor rotation parameter identification can be set automatically. The change of the motor line sequence will cause the change of this parameter, be sure to re-learn or manually set
P53.07	Electrical angle offset	**For synchronous motors only, it can be automatically recognized if the rotation self-learning is performed. This mode is suitable for the situation that the motor has load or limit, and cannot perform rotation identification**，PM phase identification can be performed (P63.06 selects PM phase identification to save, press the green start key to carry out). The result of each identification can be viewed through the parameter P53.07, rotate the spindle position several times and then perform the PM phase identification in P63.06 again, until the parameter P53.07 does not change much (the change angle is within 8 degrees). The purpose of this step is to Correct the electrical angle offset, if the electrical angle offset is inaccurate, it will affect the motor output Note: If the electrical angle offset differs greatly each time, check whether the encoder feedback is normal. If it is normal, you need to increase the search current in 60.11 and perform the electrical angle learning again.

After the encoder wiring and encoder parameters are set, proceed to the next step of motor self-learning (encoder wiring and parameters must be correctly corresponding! ! !)

3. Motor self-learning and debugging steps

（1）Set motor rated parameters：

After the encoder wiring, encoder parameters (group P53 parameters) and encoder port are enabled (P63.10 speed encoder port is set to 1; P63.11 position encoder port is selected to 1), the drive will set the motor rated parameters.

Set the motor rated parameters (parameters 63.00-63.05, set the motor type first) in the 63 groups of startup data parameters according to the motor nameplate, and then carry out the motor parameter self-learning;

parameter	name	Predetermined area
63.05	Motor type selection	0. Three-phase asynchronous motor 1. Permanent magnet synchronous motor
63.00	Motor rated	According to the actual motor nameplate
63.01	Motor rated	According to the actual motor nameplate
63.02	Motor rated	According to the actual motor nameplate
63.03	Motor rated	According to the actual motor nameplate
63.04	Motor rated	According to the actual motor nameplate
Note: 1. Correctly setting the motor parameters is the foundation of normal operation. Do not input the maximum speed and frequency here for self-learning, otherwise it will cause abnormal operation.		

（2）Motor parameter identification (one of the following two identification modes is selected according to the field conditions, and the rotation identification is the best)

The local mode (the upper left corner displays LOC) and the remote mode (the upper left corner displays REM) have important uses; in the standby state, press the No. 5 button "LO/RE" on the panel to quickly switch between local and remote. **Self-learning ensures switching to local LOC mode,**

A. Rotation identification: used when the load is disconnected from the motor or the load is light;

After the parameters 63.00-63.05 are set, save the parameter P63.06 as 1 (rotation identification), press the [3] green start button to run, the motor will rotate in this mode, the drive will first perform static identification, then rotate identification and stop automatically. The rotation speed is 25% of the rated speed of the motor, and the time is about 1 minute. The motor parameters can be correctly identified. After the self-learning is completed, it will automatically stop (the operation indicator on the keyboard panel is off, and there is no alarm during the self-learning process. study completed).

B. Static identification: It is used in situations where the load is inconvenient to be disconnected or the motor is limited;

After setting the parameters 63.00-63.05, save the parameter P63.06 to select 2 (static identification), press the [3] green start button to run, the motor will not rotate in this mode, and the self-learning will end in about 10 seconds (the keyboard panel runs The indicator light is off, and there is no alarm during the self-learning process, which means that the self-learning is completed).

（3）The limitations of static identification：

#1：Asynchronous motor does not recognize no-load current. Be sure to enter it manually before identification. If it is unknown, after the first static identification, the local low speed test run, for example, given 25% of the rated speed, check that the output voltage P01.21 should be close to 25% of the rated voltage (take a 380V asynchronous motor as an example, the output voltage It should be around 95V. If it does not correspond, the no-load current has deviation and needs to be adjusted.) After correcting 62.01 no-load

current, perform static identification again, run again to check the output voltage, and ensure that it corresponds. Generally, the no-load current will be <50 % rated current;

#2：Synchronous motors do not recognize back EMF coefficients. If it is unknown, run at low speed locally, check the output voltage P01.21, and then divide it by the actual speed to get the approximate back EMF coefficient and set it to P62.08;

#3：All parameters of the motor encoder are not recognized. Including resolution, phase, electrical angle offset, etc., must be set manually, but it is very difficult;

Self-learning process alarm processing：

1. If the output phase loss alarm occurs during self-learning, it indicates that the motor is not connected or the winding impedance is seriously abnormal; if an alarm occurs (such as speed feedback error, motor overspeed, etc.), please check whether the encoder wiring is correct, whether the wiring is disconnected, and the motor parameters. Is it reasonable (whether the rated voltage is set too high and does not match the actual back EMF)
2. When the back-EMF corresponding to the manual input frequency is quite different from the real back-EMF of the motor, the system will automatically correct the rated frequency and speed of the motor to match the rated voltage point, which is normal.
3. Check whether P53.02 encoder resolution is correct, P04.21 Z-phase signal feedback is correct, and P53.17 encoder error statistics are accumulated (if the encoder resolution is wrong in this step, there may be a wrong wiring problem); the resolution is correct, and the encoder error statistics continue to accumulate, then check the 53 sets of encoder parameter settings and encoder interference problems;

If you have other questions, please skip to step 6 [Encoder status detection and closed-loop trial operation]

After the self-learning is completed without problems, go to the fifth step to continue setting

5, Accuracy setting of synchronous motor angle search and electrical angle offset detection (no need to set for asynchronous motor, skip this step)：

(1) Accuracy setting of angle search：

Only for synchronous motors： For the first operation after power-on, you need to search for the initial direction of the magnetic pole before running. The driver obtains magnetic pole phase information by automatically injecting a series of voltage sequences and provides signal-to-noise diagnostics. Too low signal-to-noise ratio may cause inaccurate search, and it is recommended to further increase the search current, and the limit can be added to 100% of the rated current.

Set 63.07 to 0: open-loop vector, the local given speed is 500 rpm, after each start and stop, observe whether the differential mode value of 01.32 > 1, and whether the common mode value of 01.33 > 2.0 (the value will change every time it starts). Small, to increase 60.11 (search current) repeated tests, the maximum search current is 100%. **After setting, please set 63.07 back to 1: direct torque control.**

Note： In some cases, the display value of the differential mode and common mode signals of the motor is normal, but the alarm condition still exists when the power is turned on for the first time, and the search current needs to be increased;

This parameter solves the search for the position of the upper electromagnetic pole each time. If the setting is incorrect, the first power-on operation will reverse or report a fault;

(2) Electrical angle offset detection: PM phase identification

Only for synchronous motors ： Automatic recognition if rotation self-learning is performed，This mode is suitable for the situation where the motor is loaded or the limit cannot perform rotation identification. PM phase identification operation steps (P63.06 select PM phase identification and save, press the green start key to carry out). The result of each identification can be viewed through the parameter P53.07, rotate the spindle position several times and then perform the PM phase identification again in P63.06, until the parameter P53.07 does not change much (the change angle is within 5 degrees). The purpose of this step is to Correct the electrical angle offset, if the electrical angle offset is inaccurate, it will affect the motor output

Note：If the electrical angle deviation differs greatly each time, please skip to step 6 [encoder state detection and closed-loop trial operation] to see if the encoder feedback is normal.

6,Encoder state detection and closed-loop trial operation：

Local given 500RPM closed-loop operation (press the No. 1 function key on the main interface to enter options→local setting→save after setting the speed→green start key to start), observe the first interface of the main interface (motor speed, motor current, motor frequency) and Whether the running status of the second interface (output voltage, motor magnetic flux, motor torque) and the feedback status of the encoder are normal.

The encoder feedback status parameters are monitored as follows：

1, 04.11 is the feedback value of the X831/X833/XD1 port encoder, it should be the same as the given speed during operation, and the fluctuation is within 2RPM.
(If there is no numerical feedback, check whether the encoder wiring is wrong)

2, 04.12 is the rotational speed fluctuation value of X831/X833/XD1 port, which should fluctuate within 2RPM during operation.
(The fluctuation is large, check whether the encoder installation is eccentric, and whether the coaxiality is deviated. Occasionally, extremely large or extremely small values will flash. Please check whether the shielding wire of the encoder and the metal shell of the driver are properly grounded, or temporarily connect the motor grounding wire on the driver. removed)

3, 04.21 is the Z pulse capture value of the X831/XD1 port encoder (only the encoder with Z-phase signal will display the value)
(Normally, the value is accumulated once for each revolution of the motor, and the value of each increase is 4 times the resolution of the corresponding port encoder)
There are several common reasons that cause the no-Z pulse capture value signal to be abnormal:
1. Whether the encoder Z+ and Z- signals are reversed
2. Whether the Z-phase point of the encoder magnetic ring is aligned with the read head during installation
3. Whether the installed encoder is installed in reverse
4. Installation deviation of encoder read head
5. Whether the Z signal parameter of P53.04 is enabled

4, 04.23 and 04.24 are X831 port encoder sine wave phase A and B voltage values, 04.27 and 04.28 are X833 port encoder sine wave phase A and B voltage values (the voltage value will only be displayed for encoders with sine and cosine voltages, no sine wave The encoder with cosine voltage signal can ignore this parameter) Gently rotate the motor shaft, the maximum voltage value should exceed 0.8, if it is always less than 0.5 or there is almost no change, it is likely that the encoder read head is installed incorrectly or the encoder wiring is wrong

5，53.17 is the accumulated communication error of X831/X833/XD1 port encoder
(Under normal circumstances, the value of 53.17 is 1, to ensure that this value cannot be accumulated)
There are two common reasons for the accumulation of errors:
1. Configuration errors, such as encoder type, baud rate, single-turn or multi-turn resolution. Errors accumulate quickly regardless of whether the motor is running.

2. If the shielding layer is not connected or there is serious interference, the error will accumulate every time the motor runs.

Troubleshooting： Change 63.10 and 63.11 to 0 (turn off the encoder), run the panel at 500RPM, and check whether the feedback speed of the encoder in parameter P04.11 fluctuates around 500 rpm (±5RPM is normal, no big sudden change). If the feedback speed fluctuates greatly (>500±5RPM), please check whether the shielding layer of the encoder is grounded and the coaxiality of the encoder, and whether there is vibration.
1.If the speed feedback is about 0, please check the wiring and the quality of the encoder
2. If the speed difference is large, please check whether the encoder resolution is true and correct, and whether the encoder wiring definition is correct;
3. If the speed deviation is small but the feedback speed is -500RPM, reverse the encoder direction of P53.03. **After everything is normal, change 63.10 to 1 and 63.11 to 1 (enable X831/X833/XD1 encoder) to enter the closed-loop state, and skip to step 6 for closed-loop trial operation again.**

After the closed-loop trial operation is no problem, proceed to the next step

7，Limit setting of speed and torque：

After modifying the rated speed or rated frequency, the drive will automatically modify the speed limit (the speed limit can be set according to the actual requirements of the site).
The torque limit is based on the rated torque of the motor.
P20.00: Maximum forward speed, must be greater than or equal to 0
P20.01: Reverse speed maximum value, must be less than or equal to 0
P20.06: Maximum forward torque, must be greater than or equal to 0, default +150.0%
P20.07: Reverse torque maximum value, must be less than or equal to 0, default -150.0%

The above content is a local control test. After normal, switch to REM and hand it over to the host computer and numerical control system.

Quick handling of common problems

1. Running report overvoltage 03
① Stop and observe whether the bus voltage is higher than 700V. If you want to obtain a shorter shutdown time, please connect the braking resistor (the selection of the braking resistor should be within the normal range), and set the overvoltage suppression enable in 60.07 DC voltage control to 0 (disabled), that is, the braking resistor takes effect. Or take the common DC bus of multiple drives to consume the shutdown energy.
②Properly extend the deceleration time of 22.01
2. Running overcurrent 02 (OC)
① The acceleration and deceleration time is set too short, so prolong the deceleration time
② Check whether the rated parameters of the 63 groups of motors are consistent with the motor nameplate, and whether the self-learning is performed before starting
③ **During stable operation**, whether the feedback value of the encoder (04.11) is normal, and

whether 53.17 reports an error, you can temporarily exclude the 63.10=0 shielded encoder

④ Check whether the encoder feedback (04.11) and speed measurement pulsation (04.12) fluctuate too much **during the rapid acceleration and deceleration process** (more than 5RPM is abnormal), if the fluctuation is larger, the overcurrent fault will be triggered, which proves the belt tightness on site and the set rigidity value of the drive If it does not correspond, the elastic deformation and vibration of the belt will trigger the overcurrent alarm, and the tightness of the belt needs to be adjusted.

3. Running report 05 (earth leakage)

Check whether the cable at the output end of the driver is broken or whether the on-site environment is wet and the insulation is not enough. If no abnormality is found, change 30.02 (ground fault action selection) to no action to observe whether the operation is normal.

4. Running report 17 (output phase loss)/input phase loss

Note: **The drive will report output phase loss when the motor is not connected to the motor, which is normal**

Others: ① Check whether the motor/power line is actually missing phase

② Change 30.03 Phase loss protection to no action to observe whether the operation is normal, if it is normal, it will be a false alarm

5. Speed feedback error 24

This fault is probably caused by no feedback from the encoder

① Manually input the encoder resolution (53.02), then change 63.10 and 63.11 to 0 (turn off the encoder), run the panel at 300RPM, check the parameters, 04.11 Whether the encoder feedback speed fluctuates around 300 rpm (±5RPM) (if it is High-speed motorized spindle needs to change 63.07 to 0, run 10% of rated speed, check 04.11 feedback). If the feedback speed fluctuates greatly (>5RPM), please check whether the shielding layer of the encoder is grounded, whether the coaxiality of the encoder is shaken, and whether the count value of the encoder in 53.17 is accumulating. If the accumulation is interference, check whether the shielding layer of the encoder is not Ground it with the driver, and check whether the shielding layer of the encoder is grounded. If necessary, the encoder wire can be wound around the magnetic ring three times.

② If the feedback speed is quite different from the actual speed, and the speed jumps randomly, it may be caused by wrong wiring or interference.

③ If the feedback speed is stable and the difference is large, and the feedback speed is stable, please check whether the encoder resolution is true and correct, and whether the motor parameter settings are correct (number of poles)

④ If the feedback speed fluctuates around 0RPM and the motor is rotating normally, please check the encoder type and wiring is correct

⑤ If the feedback speed deviation is small but the feedback speed is negative, reverse the encoder direction of 53.03 and re-learn

⑥ Check whether the encoder feedback (04.11) and the speed measurement pulsation (04.12) fluctuate too much **during the rapid acceleration and deceleration** (more than 5RPM is abnormal), if the fluctuation is larger, the speed feedback error will be triggered, which proves the belt tightness on site and the set rigidity value of the drive If it does not correspond, the elastic deformation of the belt will cause the vibration to trigger an alarm, and the tightness of the belt needs to be adjusted.

After everything is normal, change 63.10 to 1 and 63.11 to 1 (enable dual encoders) to enter the closed-loop state and try running.

6. 24. Speed feedback error/9. IGBT overload is reported when the synchronous motor is powered on for the first time

Set 63.07 to 0 for open-loop operation, the speed is set to 500 rpm, start and stop several times to observe whether the spindle reverses and rotates forward. If so, set 60.10 (synchronous motor type) to the reverse to confirm which mode has a lower probability of reverse rotation. , or the inversion angle is smaller. After confirming the mode, check whether the differential mode value of 01.32 > 2 and whether the common mode value of 01.33 > 2.0 (the value will change each time it is started) after starting and stopping several times. If it is too small, increase 60.11 (search current) and repeat the test. , the maximum search current is 100%. Please set 63.07 back to 1 after the setting is completed.

In some cases, the display value of the motor differential mode and common mode signal is normal, but the start-up alarm still exists, and the search current needs to be increased.

7. Drive overload possibility

① If there is an encoder and the running current is very large, the overload may be reported suddenly, which may be a problem with the encoder. Go to FAQ 5 to troubleshoot according to the steps.

② Change 30.16 to 0 for self-learning report overload, this is the speed deviation alarm, just ignore it

③ Change 30.16 to 0 when the overload is reported during acceleration, this is the speed deviation alarm caused by the acceleration inertia too large

④ Check whether the motor is overloaded due to brake or stuck

⑤ Check whether the output torque and current exceed the range of the drive

8. Sincos encoder signal overrange

The amplitudes of P04.23 and P04.24 of the first feedback system, or P04.25 and P04.26 of the second feedback system, reach ±1.0, indicating that the signal is too large to cause saturation distortion. Usually caused by inaccurate installation of the read head and gear. The read head installation needs to be adjusted so that the signal amplitude is within 0.95. 1.0 is the measurement range, change the rotor position repeatedly to observe whether the sine wave amplitude reaches the standard.

9. The encoder installation is not concentric

The rigidity of the velocity loop is limited, and the closed loop is prone to vibration. Observe the speed feedback pulse value P04.12, which is greater than 3.0rpm. A feedback pulsation of less than 2.0rpm is considered a good installation. Do not use hoses to connect the encoder and motor shaft.

10. Short circuit fault 01

① Change P63.07 to open-loop vector, remove the motor wire at the drive, start running at the local given low speed, whether it alarms, if it is still short-circuited, the drive hardware is damaged

② The cable is abnormal or the motor cable is loose, resulting in a spark. Check whether the motor cable and insulation are normal, and check the connection between the grid ground wire and the encoder shield wire.

③ Check whether the encoder feedback (04.11) and speed measurement pulsation (04.12) fluctuate too much during the process of rapid acceleration and deceleration (more than 5RPM is abnormal). If the fluctuation is larger, a short-circuit fault will be triggered, which proves that the belt tightness on site is not consistent with the rigidity value set by the drive. Correspondingly, the elastic deformation and vibration of the belt will trigger a short circuit alarm, and the tightness of the belt needs to be adjusted.

④ **When the new machine is debugged, a short circuit fault is reported, most of which are encoder wiring errors, unplug the encoder plug, and set 63.10=0 to measure the speed**

11. Running under voltage 23

① Check whether the power supply voltage and soft starter are normal. The normal 380V power supply bus voltage value (01.02) is around 536V. If it is much lower than the value, check the on-site power supply voltage

② If there is no abnormality, the undervoltage point of the 63.15 DC bus can be lowered to 250v under observation

12. Running report motor overheating 13

Check whether the temperature sensor connected to the driver on site is normal, and whether the setting parameter (31.01) corresponds to its sensor type. If the drive is not connected to a temperature sensor, 31.01 will estimate the motor temperature based on the running current by default. If the running current exceeds the rated current of the motor for a long time, an overheat alarm will be triggered by default. If the actual measured motor temperature is not high, it is necessary to check whether other reasons cause the excessive current to trigger the motor overheat alarm by mistake when the drive is running.

13. Unable to return to origin

① Whether the encoder Z+ and Z- signal wiring is reversed

② Whether the Z-phase point of the encoder magnetic ring is aligned during installation

③ Whether the installed encoder is installed in reverse

④ Whether the installation of the encoder read head is deviated

⑤ Whether the Z signal parameter of P53.04 is enabled

⑥ 04.21 and 04.22 are the encoder Z pulse capture values of X831 port and X832 port respectively. Is the running accumulation correct?

(Normally, the value is accumulated once for each revolution of the motor, and the value of each increase is 4 times the resolution of the corresponding port encoder)

⑦ Whether the system is in position mode, check whether the parameter (37.05/37.06) is displayed as 8, if it shows other, it means it is not in position mode, you need to check whether the encoder port assignment and the system PLC send instructions are correct

14. The operation reports fault No. 52

Encoder 53 or 54 is not set, 63.10 and 63.11 are enabled, not 0