

## Directory

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## 1 .Function introduction

The motion command of the slave axis consists of two parts, one part is the motion command following the spindle pulse, and the other part is other motion commands other than following the spindle motion, such as its own jog command and so on. The electronic gear ratio that follows the spindle pulse movement is electronic gear ratio 1. That is to say, spindle pulse unit \* electronic gear ratio 1 = motor encoder unit. Phase refers to the total slave axis movement position minus the movement position other than the tracked master axis movement. There are two units of phase, one is the motor encoder unit and the other is the user unit. User unit \* electronic gear ratio 2 = motor encoder unit. The number of motor pulses corresponding to one rotation of the mechanical slave axis is the maximum value of the phase (motor encoder unit). The previous phase refers to the phase after the last movement following the main axis is completed.

The slave axis includes the following parts of functions:

Zero return function: The zero return method is the same as that of common servo products. After the zero return is completed, the phase is zero.

Fixed speed forward jog: After this bit is valid, the slave axis will jog forward at a fixed speed.

Fixed speed reverse jog: After this bit is valid, the slave axis reverse jog at a fixed speed.

Fixed position forward jog: After the rising edge of this bit is triggered, the slave axis will jog a set position forward.

Fixed position reverse jog: After the rising edge of this bit is triggered, the slave axis reversely jogs a set position.

Go to the specified phase: After the rising edge of this bit is triggered, the slave axis moves to the specified phase.

Return to the previous phase: In addition, after the rising edge is triggered, the slave axis moves to the previous phase. The previous phase refers to the phase after the last following the movement of the spindle.

Automatic alignment function: Connecting two origin switches can automatically adjust the phase of the two origin switches to an appropriate value. After this function is enabled, the motor shaft proximity switch is fixedly connected to DI9, and the spindle proximity switch is fixedly connected to DI10.

## 2. Input function bit and parameter setting

The relevant input function bits are:

input function bit	Trigger method	Function description
INFn.66	rising edge trigger	back to the previous phase
INFn.68	rising edge trigger	go to the designated phase
INFn.69	rising edge trigger	Positive jog fixed position
INFn.70	rising edge trigger	Reverse jog fixed position

INFn.09	level trigger	Jog forward at fixed speed
INFn.10	level trigger	Jog reverse at fixed speed

The relevant parameters are as follows:

No.	name	Description of parameter function
P03.02	Spindle pulse shape	Spindle pulse shape, single word RW 0- pulse plus direction positive logic; 1- Pulse plus direction negative logic 2- AB pulse 3- CW+CCW positive logic 4- CW+CCW negative logic
P03.08	Electronic gear ratio 1 numerator	Electronic gear ratio 1 numerator, DWORD RW
P03.10	Electronic gear ratio 1 denominator	Electronic gear ratio 1 denominator, RW 32bit
P03.12	Electronic gear ratio 2 numerator	Electronic gear ratio 1 numerator, RW 32bit
P03.14	Electronic gear ratio 2 denominator	Electronic gear ratio 1 denominator, RW 32bit
P04.16	Jog speed	The magnitude of the jog speed(rpm), RW 16bit
P04.20	Jog speed acceleration and deceleration time	Jog speed acceleration and deceleration time(ms), RW 16bit
P13.15	Jog fixed phase value	Jog the size of the fixed phase (User units), RW 32bit
P13.17	Jog fixed phase speed	Speed of jogging the fixed phase (rpm), RW 16bit
P13.18	Jog fixed phase acceleration and deceleration time	Acceleration and deceleration time of jog fixed phase(ms), RW 16bit
P13.20	Specify the phase value	Specify the phase value (User units), RW 32bit
P13.22	Return to the speed of the specified phase or the speed of automatic alignment	Return to the speed of the specified phase or the speed of automatic alignment (rpm), RW 16bit
P13.23	Return to the acceleration/ deceleration time of the specified phase or the acceleration/deceleration time of automatic alignment	Return to the acceleration/deceleration time of the specified phase or the acceleration/deceleration time of automatic alignment (ms), RW 16bit
P13.25	Number of pulses per revolution of mechanical slave axis	Number of pulses per revolution of mechanical slave axis, RW 32bit
P13.19	direction of phase change	direction of phase change, RW 16bit 0-The phase change direction is the same as the motor encoder change direction 1-The phase change direction is opposite to the motor encoder change direction
P13.24	Direction of command pulse	0-The change direction of the command pulse is the

		same as the change direction of the motor encoder 1-The change direction of the command pulse is opposite to the change direction of the motor encoder
P03.92	current phase	current phase (User units), RO 32bit
P08.59	The current phase after filtering	The current phase after filtering (User units), RO 32bit
P08.63	Current phase (motor encoder unit)	Current phase (motor encoder unit), RO 32bit
P08.55	Previous Phase (Motor Encoder Units)	Phase after the last spindle stop (motor encoder unit), RO 32bit
P08.57	previous phase	Phase after the last spindle stop (in user units), DWORD RO
P13.30	The count value of the motor encoder before power failure or reset	It is used to store the position of the encoder before power-off, and is used to calculate the size of the moving phase during the power-off process.
P13.35	Count value of the second encoder before power failure or reset	It is used to store the position of the encoder before power-off, and is used to calculate the size of the moving phase during the power-off process.
P13.27	Enable automatic alignment function	1-Enable automatic alignment function 0-Disable Automatic alignment function
P13.40	The target phase value of automatic alignment	The target phase value of automatic alignment (User units), DWORD RW
P08.65	The actual phase value of the automatic alignment	The actual phase value of the automatic alignment (user unit), DWORD RO
P13.32	Maximum automatic alignment speed (rpm)	Maximum automatic alignment speed (rpm), RW
P13.29	Automatic alignment acceleration and deceleration time (ms)	Automatic alignment acceleration and deceleration time (ms), RW
P13.44	Minimum Feed Rate Threshold	Generally set to 1-5
P13.49	Go to the specified phase or return to the mode of the previous phase	0- Forward return to previous phase or specified phase 1- Return to the previous phase or the specified phase according to the principle of proximity 2- Reverse back to previous phase or specified phase
P13.48	The current phase filtering time (P08.59)	The current phase filtering time (P08.59)
P13.47	Latch the delay time of the previous phase	Delay time ms for latching previous phase, Unit: ms
P00.35	The count value of the	Count value of the second encoder

	second encoder	
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### 3. Wiring attention

If the spindle pulse is an absolute value encoder, the absolute value encoder signal must be input from the second encoder interface, and P03.78 is set to 2, and the count value of the external pulse input is P00.35.

After enabling automatic alignment, the proximity switch of the motor shaft can only be connected to DI9, and the proximity switch of the spindle can only be connected to DI10.

### 4. system maintenance

For the absolute value system, if Er.605 (motor absolute value encoder battery undervoltage alarm) is reported, it is necessary to replace the motor absolute value encoder battery (battery specification is 3.6V) when the servo is powered on. If Er. 606 (second absolute encoder battery undervoltage alarm), the second absolute encoder battery (battery specification is 3.6V) needs to be replaced when the servo is powered on. If the absolute encoder is powered off due to the power failure of the servo during the battery replacement, the servo will report Er.227 (motor encoder battery power failure) or Er.232 (second encoder battery failure) at the next power-on. power failure), at this time, manual zero return must be performed again.

### 5. debugging steps

1、 Confirm the following parameters

P02.01=0;P03.01=5; P03.06=0;P03.07=0;P13.01=0;P13.02=1;P13.03=0;P13.04=0;  
P13.14=0;P13.92=1;

If the spindle pulse is an absolute value encoder, the absolute value encoder signal must be input from the second encoder interface, and P03.78 is set to 2. And the count value of external pulse input is P00.35.

2、 Set the type of command pulse P03.02;

- 0: positive logic of pulse plus direction;
- 1: Negative logic of pulse plus direction;
- 2: AB pulse
- 3: CW+CCW positive logic
- 4: CW+CCW negative logic

If the spindle pulse is an absolute value encoder, the absolute value encoder signal must be input from the second encoder interface, and P03.78 is set to 2.

After enabling automatic alignment, the proximity switch of the motor shaft can only be

connected to DI9, and the proximity switch of the spindle can only be connected to DI10.

- 3、 Set the number of pulses of the motor corresponding to one rotation of the mechanical slave axis P13.25.

- 4、 Set electronic gear ratio 1.

The number of pulse commands \* electronic gear ratio 1 = the number of pulses driven by the motor

- 5、 Set electronic gear ratio 2.

User unit value \* electronic gear ratio 2 = the number of pulses the motor travels  
In order to ensure the accuracy, it is better to set the user unit smaller, so that the electronic gear ratio 2 is close to 1.

**Electronic gear ratio 2 is generally set as follows:**

**The numerator is set to the value of P13.25; the denominator is set to the circumference of the reel. That is, P03.12=P13.25, P03.14=the circumference of the scroll.**

**With this setting, the actual phase change range is [0 to the circumference of the reel].**

- 6、 Set the parameters related to the jog speed
- 7、 Set the parameters related to the jogging fixed position
- 8、 Set the DI related parameters
- 9、 Set the phase change direction P13.19 and the command pulse direction P13.24 according to the actual situation.

## 6. common problem

- 1、 The displayed phase and the actual phase do not match

Reconfirm the settings of P13.25, P03.12 and P03.14. Generally set as follows:

First, set P13.25 and P03.12 as the number of pulses of the motor corresponding to one rotation of the mechanical slave axis. The corresponding incremental encoder motor is 10000 pulses per revolution, and the corresponding 23-bit absolute encoder motor is 8388608 pulses per revolution.

Second, set P03.14 as the circumference of the reel.

- 2、 Actual phase change while going sync

Reconfirm the values of P03.08 and P03.10. Set as follows:

Assuming that the feed is 1 meter, the motor needs to turn N pulses, and the feed encoder will turn M pulses. Then P03.08 is set to N. P03.10 is set to M.

## 7. Version Update Record

Manual version number	change date	Modify the content
1.01	2022-3-7	Calibration Manual