3915 Software full closed loop（With full closed loop and half closed loop switching function，Increased PN25A full closed loop feedback position filtering time）

1. After restoring the FACTORY Settings of FN003，Set the electronic gear ratio,Whether the trial operation is normal（Ok, semi-closed loop debugging ok）

2. Confirm PN250 （Direction of the external encoder）after using full closed loop ，Set the full closed loop feedback pulse counter（Un012）and feedback pulse counter（Un007）in the same direction ,Going in the opposite direction could lead to flying cars。(The parameters take effect only after the PN250 is powered on again)

3. Set the resolution of PN253 external encoder grating ruler correctly.（The parameters take effect only after PN253 is powered on again）

4. 3915 software, electronic gear ratio do not change，Parameter Settings calculated in a semi-closed loop.

5. Full closed loop opening needs to be initiated by the terminal function.（By default, it is started by semi-closed loop）

6. Run with jitter can be appropriately increased Pn25A（Full closed loop feedback position filtering time，The parameter unit is ms）

A fully closed loop system is one that uses an external position feedback device（External encoder or grating ruler, etc），To check out the actual machine location of the controlled object，And feedback to the servo unit the actual position of the machine system。By feeding the actual position of the machine directly back to the driver,Therefore, high precision positioning control can be achieved.

The closed-loop servo system can eliminate the errors caused by the mechanical transmission mechanism, While the semi-closed loop servo system can only compensate for part of the error,Therefore, the accuracy of the semi-closed loop servo system is lower than that of the full closed loop system. Due to the use of position detection devices,So after the other factors are determined ,The accuracy of the closed-loop system mainly depends on the resolution and accuracy of the detection device (grating ruler, etc.).

The system is composed as follows:

光栅尺
grating ruler

电机编码器反馈信号
Motor encoder feedback signal
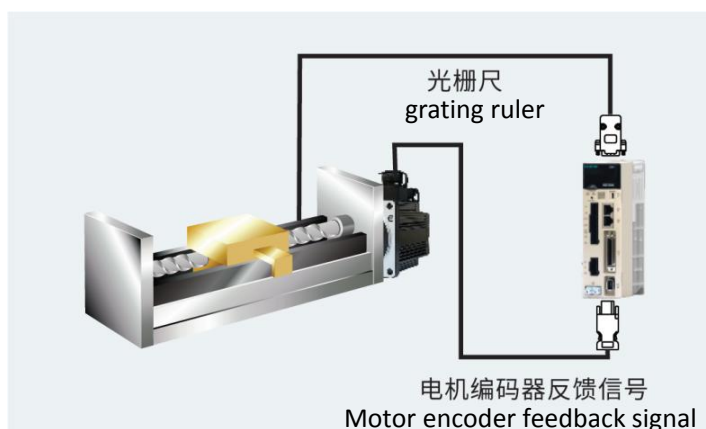
Full closed loop port pin definition:

2500 wire encoder with full closed loop interface (differential input)					
Pin	Name of the pins	function	Pin	Name of the pins	function
1	EA-	Fully closed loop signal EA-	9	-	-
2	EB-	Fully closed loop signal EB-	10	-	-
3	EZ-	Fully closed loop signal EZ-	11	-	-
4	-	-	12	-	-
5	-	-	13	0V	Encoder power supply 0V
6	EA+	Fully closed loop signal EA+	14		
7	EB+	Fully closed loop signal EB+	15	5V	Encoder power supply 5V
8	EZ+	Fully closed loop signal EZ+	ground	shielded cable	-

Parameter setting for full closed loop control:

Parameter	function	Set Value
Pn002	Motor rotation direction selection	Fill as needed
Pn250	Use of external encoder in full closed loop control	
Pn253	External raster ruler resolution	
Pn204/Pn206	Electronic gear ratio numerator/denominator	
Pn252	The deviation coefficient between the motor loads when the closed loop motor rotates 1 turn	
Pn257	Excessive motor - load deviation setting	
PN25A	Full closed loop feedback position filtering time	

Full closed loop feedback position filtering time motor rotation direction and machine movement direction setting :

◆Pn002(motor rotation direction selection)

Facing motor face: 0 – counterclockwise is positive   1– Clockwise is positive

◆Pn250 Use of external encoder in full closed loop control

Fully closed loop control，Pn250 =1 (positive direction) and Pn250 =3 (negative direction)

✧ Turn the motor shaft by hand ,monitoring parameter Un007(Feedback pulse counter) and Un012（External encoder feedback pulse counter）In the same direction，The value Settings for pN250 remain unchanged （Pn250 = 1）

✧ Turn the motor shaft by hand ,monitoring parameter(Feedback pulse counter) and Un012（External encoder feedback pulse counter）The direction of change is inconsistent，Set the Pn250 = 3

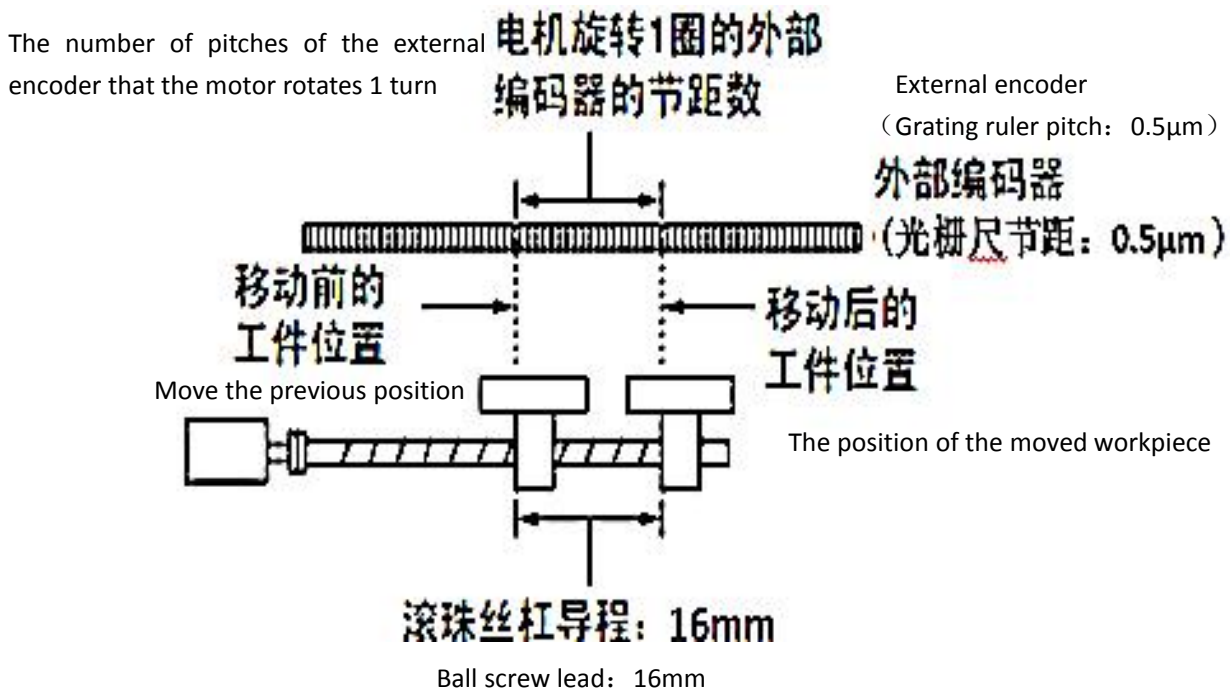## External raster ruler resolution （Pulse/r）

When the motor and the machine are in the same direction ,The external encoder grating ruler pitch value when the motor rotates 1 turn ,Also called raster ruler resolution（That is, the number of pulses fed by the external encoder when the motor rotates one circle）

Illustrate（1）：

External encoder grating ruler pitch：0.5μm

Ball screw lead： 16mm

Connect the motor directly without reducing mechanism，so 16mm/0.0005mm = 32000，pn253=32000.

The number of pitches of the external encoder that the motor rotates 1 turn

External encoder （Grating ruler pitch：0.5μm）

电机旋转1圈的外部编码器的节距数

外部编码器（光栅尺节距：0.5μm）

移动前的工件位置

Move the previous position

移动后的工件位置

The position of the moved workpiece

滚珠丝杠导程：16mm

Ball screw lead：16mm

(attention) 1.When mantissa appears, please round the number after the decimal point

Illustrate（2）：

1、In the case of semi-closed loop, the motor runs one turn to calculate the number of units.

Number of feedback instruction units for motor running one turn = Number of pulses in one turn of the motor encoder * Electronic gear ratio denominator / Electron gear ratio molecules

Take the feedback instruction unit number of 10000 for example.

attention：When the electron gear ratio molecule Pn204=0，Pn206 (electronic gear ratio female) is the number of instruction unit pulses that the motor runs a loop.

2、After PN792=2 , power off and restart，The drive's JOG mode inching motor runs a certain distance，View Un007 and Un012。

Take Un007=21084, Un012=8357 as an example.

3、Pn253 can be calculated according to the following formula:

PN253 = Number of feedback instruction units for motor running one turn * Un012 / Un007

Pn253=10000*8357/21084=3963

Then the resolution of Pn253 grating ruler is 3963.

Function switch between full closed loop and semi-closed loop:

Terminal function	explain
0x22	full closed-loop/Semi-closed loop control switching 0-Semi-closed loop control 1-full-closed loop control

Illustrate：

When Pn604 = 0x22：

When pin 41 of CN1 terminal has signal input , Switch to the full closed-loop control state;

When no input is given to pin 41 of CN1 terminal , Switch to the semi-closed loop control state.