

Signal connection and configuration for S110 positioning using pulse/direction

Thanks to the pulse/direction interface, SINAMICS S110 can be used for simple positioning tasks on a controller. The controller is connected to SINAMICS S110 via the encoder interface (connector X23) of the CU305. Figure1 illustrates one kind of applications.

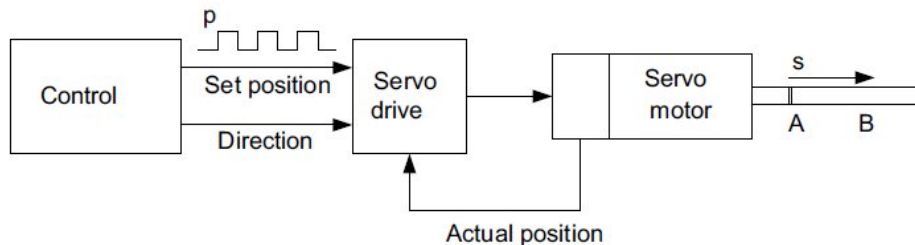


Figure 1. "Position-controlled drive" application

In the article, it is introduced how to correctly connect pulse/direction on the interface in order to implement positioning function.

Mainly, two types of pulse signal are available for pulse/direction positioning control, unipolar 24V HTL signal and bipolar 5V TTL signal. Please refer to figure2.



Figure 2. Pulse/direction - interface configuration wizard in Starter

1. Select the control type: Position control
2. Encoder channel

Pulse/Direction should take one of encoder interfaces. Motor Encoder always takes channel 1 if it is configured. Thereby Pulse/Direction should take Encoder channel 2.

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3. Encoder evaluation

select CU305 integrated HTL/TTL encoder interface as input of Pulse/Direction.

4. Pulses per revolution

Pulses per revolution are calculated from the maximum clock frequency of the controller and the preferred maximum motor speed. The following formula applies:

$$\text{Pulse number} = (\text{max. clock frequency} \cdot 60) / \text{max. speed}$$

Example:

If the controller has a maximum clock frequency of 100 kHz and the motor being used is to run at its maximum rated speed of 3000 rpm, the resulting pulse number will be 2000.

5. Signal shape: select pulse/direction, positive logic, signal graphic as figure3.

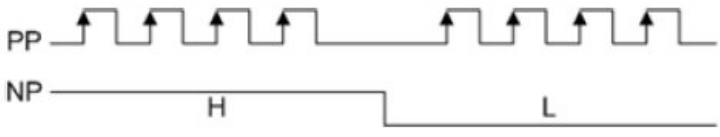
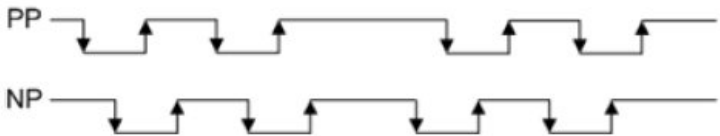
Signal shape	p0405[E].5	Graphic
Pulse/direction positive logic	1	
A and B track positive logic	0	

Figure3. Signal shapes for the pulse/direction interface

6. Voltage level

Select alternative unipolar 24V HTL or bipolar 5V TTL signal. Refer to below parameters after setting in configuration wizard.

154	<input checked="" type="checkbox"/> p405[1]	E	Square-wave encoder track A/B	28H
155	<input checked="" type="checkbox"/> p405[1].0	E	Signal	Unipolar
156	<input checked="" type="checkbox"/> p405[1].1	E	Level	HTL
157	<input checked="" type="checkbox"/> p405[1].2	E	Track monitoring	None
158	<input checked="" type="checkbox"/> p405[1].3	E	Zero pulse	Same as A/B track
159	<input checked="" type="checkbox"/> p405[1].4	E	Switching thresh	Low
160	<input checked="" type="checkbox"/> p405[1].5	E	Pulse/direction	Active
161	<input checked="" type="checkbox"/> p405[1].6	F	Rotary encoder pulse no	2048

Figure4. Parameter setting with example for unipolar 24V THL signal

154	<input checked="" type="checkbox"/> p405[1]	E	Square-wave encoder track A/B	2BH
155	<input checked="" type="checkbox"/> p405[1].0	E	Signal	Bipolar
156	<input checked="" type="checkbox"/> p405[1].1	E	Level	TTL
157	<input checked="" type="checkbox"/> p405[1].2	E	Track monitoring	None
158	<input checked="" type="checkbox"/> p405[1].3	E	Zero pulse	Same as A/B track
159	<input checked="" type="checkbox"/> p405[1].4	E	Switching thresh	Low
160	<input checked="" type="checkbox"/> p405[1].5	E	Pulse/direction	Active
161	<input checked="" type="checkbox"/> p405[1].6	F	Rotary encoder pulse no	2048

Figure5. Parameter setting with example for bipolar 5V THL signal

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The input signals for the pulse/direction interface are wired via connector X23, refer to below tables:

Table 1. X23 connector pin assignment with HTL signal

Pin	Signal name	Technical specifications
1 ... 6	Not relevant	–
7	M	Ground
8 ... 12	Not relevant	–
13	BP Pulse/direction interface: Direction	B track positive
14	Not relevant	–
15	AP_DAT Pulse/direction interface: Pulse	A track positive

Table 2. X23 connector pin assignment with TTL signal

Pin	Signal name	Technical specifications
1 ... 6	Not relevant	–
7	M	Ground
8 ... 11	Not relevant	–
12	Setpoint value specification for encoder signal	B track negative
13		B track positive
14	Setpoint value specification for encoder signal	A track negative
15		A track positive