

Application Note 058



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Position Feedback Control 2nd Encoder

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Translation of the german original User Manual

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Table of Contents

1 Parameterization..... 4

 1.1 Application 4

 1.2 Parameterization of the drive train..... 4

 1.3 Linear measuring sensor as 2nd Position sensor..... 5

 1.4 Rotary application..... 6

 1.5 Switching position encoders for position control..... 6

1 Parameterization

1.1 Application

A second position encoder is primarily used when too much inaccuracy can occur due to the mechanical transmission from the motor shaft to the load.

This can be the case, for example, due to possible slip (e.g., in a roller feed) or due to changing thermal expansion of large mechanical transmission paths.

In this case, an additional position encoder is installed on the load, which directly detects the position of the load. The motor position encoder (encoder 1) is then used to control the speed and current, while the position control works with the position of the second position encoder (encoder 2).

In this way, the position of the load is controlled directly, thereby compensating for the inaccuracies of the mechanical transmission.

A roller feed with a friction measuring wheel to which the second position encoder is attached serves as an illustrative example.

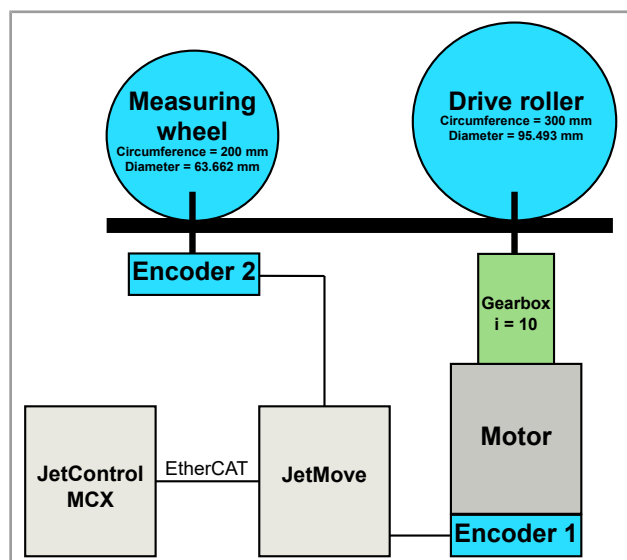


Fig. 1: Roller feed

1.2 Parameterization of the drive train

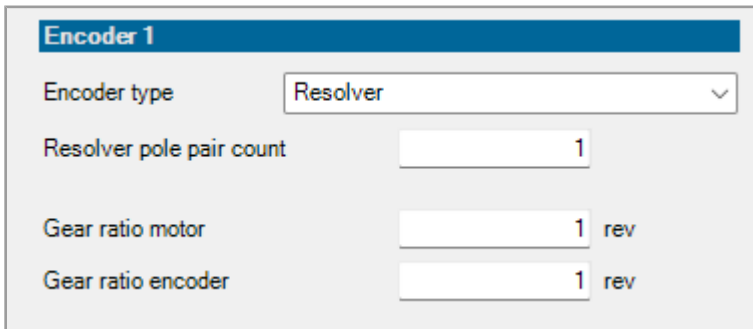
First, the drive train is parameterized with the gearbox and the linear rotation ratio, just as the system would be set up without a second position encoder:

Parameterization of the mechanics:

Gear ratio, motor	10	rev
Gear ratio, mechanism	1	rev
Linear / rotation ratio	300.00	mm/rev

Fig. 2: Parameterization of the mechanics

Parameterization Encoder 1 and 2



Encoder 1

Encoder type: Resolver

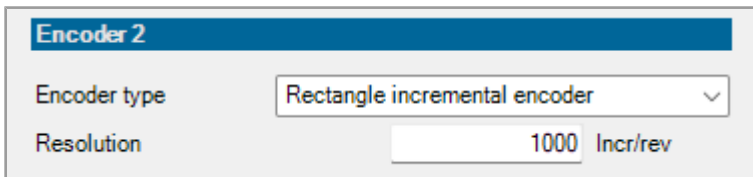
Resolver pole pair count: 1

Gear ratio motor: 1 rev

Gear ratio encoder: 1 rev

Fig. 3: Rotary encoder Encoder 1, mechanics

Now the second position encoder is parameterized. The encoder type and resolution are set to match the actual encoder. In this example, it is an incremental encoder with a line count of 1000:



Encoder 2

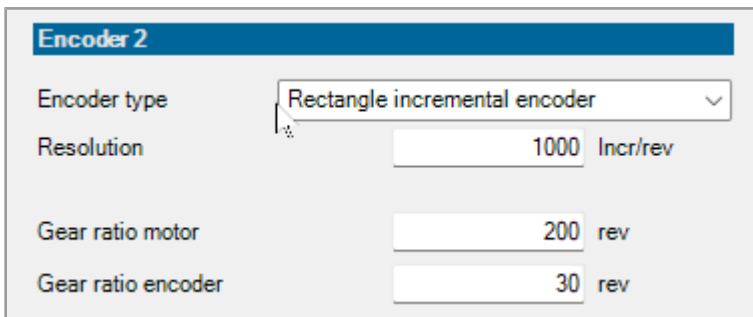
Encoder type: Rectangle incremental encoder

Resolution: 1000 Incr/rev

Fig. 4: Rotary encoder Encoder 2, type and resolution

The gear parameters of encoder 2 can now be used to adjust the mechanical conditions. Both the distance traveled by the drive roller and the distance traveled by the measuring wheel must be related to the motor shaft.

The encoder 2 gearbox must be adjusted so that the distance traveled by the drive roller during one rotation of the motor also results in one rotation of encoder 2 after the (virtual) encoder gearbox:



Encoder 2

Encoder type: Rectangle incremental encoder

Resolution: 1000 Incr/rev

Gear ratio motor: 200 rev

Gear ratio encoder: 30 rev

Fig. 5: Rotary encoder Encoder 2, mechanics

Motor ratio: Linear distance per measuring wheel rotation

Encoder ratio: Linear distance per load rotation / Gear ratio of the load

If this does not result in whole numbers, the fraction of the motor ratio / encoder ratio must be expanded until this is the case.

1.3 Linear measuring sensor as 2nd Position sensor

In this application, the encoder resolution parameter provides an additional degree of freedom for parameterization.

The JetMove calculates the path of one “rotation” of the second position encoder so that it travels the distance specified by the value entered in the resolution parameter.

Accordingly, the three parameters Encoder Resolution, Motor Gear Ratio, and Encoder Gear Ratio can be extended or shortened to produce integer values.

1.4 Rotary application

If the position of the load is only used rotatably, this implies that the second position encoder also detects the angle.

In this application, the distance traveled by the load and the measuring wheel are the same, and only the transmission ratio of the load gear must be transferred to the transmission ratio of the encoder gear.

1.5 Switching position encoders for position control

On the motion setup page for position control, you can now switch between the 1st encoder (motor encoder) and the 2nd encoder.

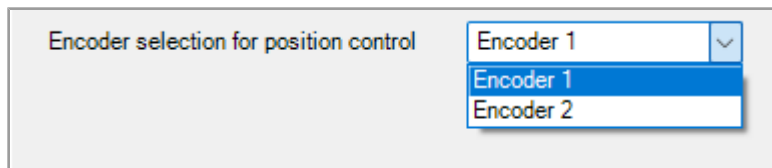


Fig. 6: Encoder selection Position control

In the STX program, the switchover is performed using a Motion API command:

```
MCAxis.Drive.Control.Position.FeedbackSource := DriveFeedbackSources.Encoder1; //Encoder2;
```

NOTICE! This is only possible when the drive is disabled.

It should also be noted that after switching, the actual position indicates the position of the selected position encoder, which does not necessarily correspond to the value previously used. Therefore, in most cases, it is advisable to note the actual position in a variable, e.g., "currentPosition," before switching, and to execute the following command after switching:

```
MCAxis.MoveHome.SetReference(currentPosition);
```

List of figures

Fig. 1	Roller feed	4
Fig. 2	Parameterization of the mechanics	4
Fig. 3	Rotary encoder Encoder 1, mechanics	5
Fig. 4	Rotary encoder Encoder 2, type and resolution	5
Fig. 5	Rotary encoder Encoder 2, mechanics	5
Fig. 6	Encoder selection Position control	6

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