Determining Zero Pulse position For Beckhoff Axis

How to measure the Zero pulse position relative to home switch position to determine if a motor needs mechanically rotating

| 🎛 Difficulty **Hard** | 🕐 Duration **10 minute(s)** |

Contents

Introduction

Problem

If the zero pulse position is very close to the the home switch position, a common fault can occur where the axis datum moves out of position by one rotation.
This manifests itself as a Y/Z axis being 5 / 10mm out or a gripper around 32mm out
The problem is easy to solve once detected, by either moving the home switch flag, or rotating the motor by one quarter turn.
However, this means the fault has to happen before detection.
This tutorial describes how to predict if this will be a problem, so the corrective action can be taken before it creates the issue

Step 1 - Prepare

Enter setup mode and load the TwinCAT project

Step 2 - Navigate to the axis

In TwinCAT, navigate to the Axis->Enc->Parameter->Homing Reference Mode

Check which system the axis is using

PLC - This method uses just the home switch for zero. Fine for low accuracy axes (GY, GZ). The Zero pulse offset will not affect this mode, so STOP HERE.

Software Sync- This method uses the home switch then zero pulse seek. Better for higher accuracy, but opens the risk of this problem

Default - This is not a good setting because it is not clear which mode. It is a good idea to change this to Software Sync to ensure the best possible datuming method is maintained.
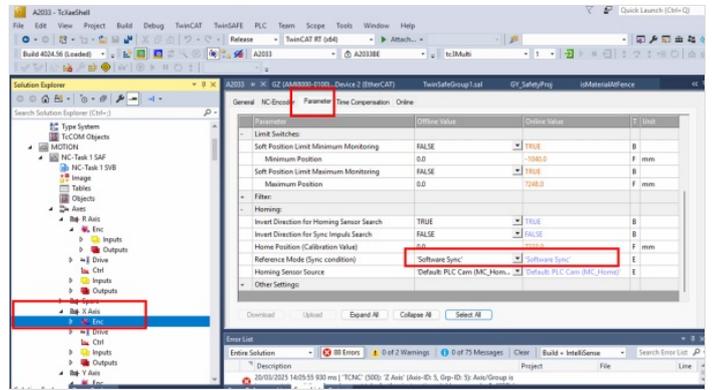
> ℹ ...If the axis uses PLC mode, there is NO NEED to continue this test

Step 3 - Run a home cycle

Home the axis from the drives screen
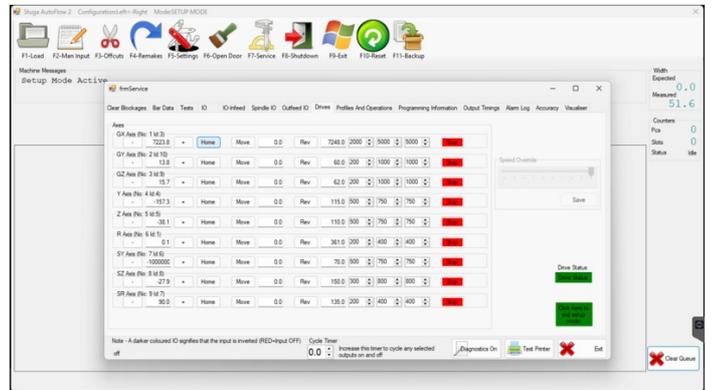
Step 4 - Mark

Mark on the axis where the home position is.
Mark this line with a Z to denote "Zero Pulse".

> ℹ ...The photos show two lines - Sorry!
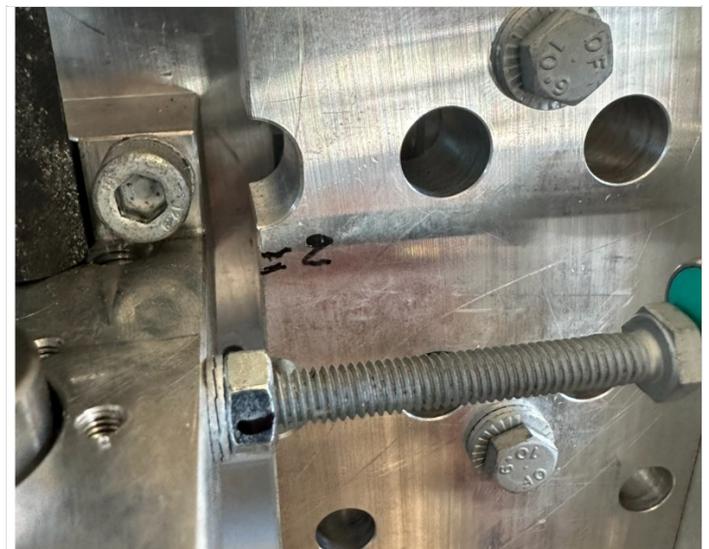
Step 5 - Change the Homing Mode

Change the homing mode to "PLC"
Click Download

Step 6 - Home again and Mark second line

Measure the distance between the two
In this case 18mm

Step 7 - Calculate the units per turn

Using the scaling factor for the axis from the axis parameters, calculate the distance moved for one turn of the motor.

This is 1,048,676 divided by axis scaling factor.

Example - Y axis
1048576 / 104857.6 = 10mm per turn

Example - Autoflow R Axis
1048576 / 296125.6= 3.54 degrees per turn

Example Autoflow Mk4 Infeed GX Axis
1048576 / 52435.78= 20mm per turn

Step 8 - Analyse results

An ideal distance would be equivalent to one half turn (eg for a 10mm pitch leadscrew, the ideal would be 5mm, so the axis has to rotate one half turn.

As a rule of thumb,
- if the difference in distance is less than 25% of the units per turn, it is a good idea to move the datum position.
- If it is less than 10%, it is vital the position is moved.

In the **example**, from an Autoflow GX axis, the distance is 18mm, one turn is 20mm, so the decision was made to turn the motor through 90 degrees

Step 9 - Move datum flag position

Datum position can be moved by
- Moving the flag position (if possible). Depends on the mechanical setup of the system
- Turning the motor by 90 or 180 degrees. Not always possible due to the cable inlet.

⚠ ...Take note if rotating the motor that the zero pulse actually moves in the correct direction. There is a 50 / 50 change it will move the wrong way!

Step 10 - Return the axis to Software Sync

Step 11 - Datum test any axes changed

Vital to check and reset the datum offset after any changes

In the **example**, from an Autoflow GX axis, the datum changed by 5mm (one quarter turn)