Scoping Main Parameter / Drive Tuning AX5000 2015

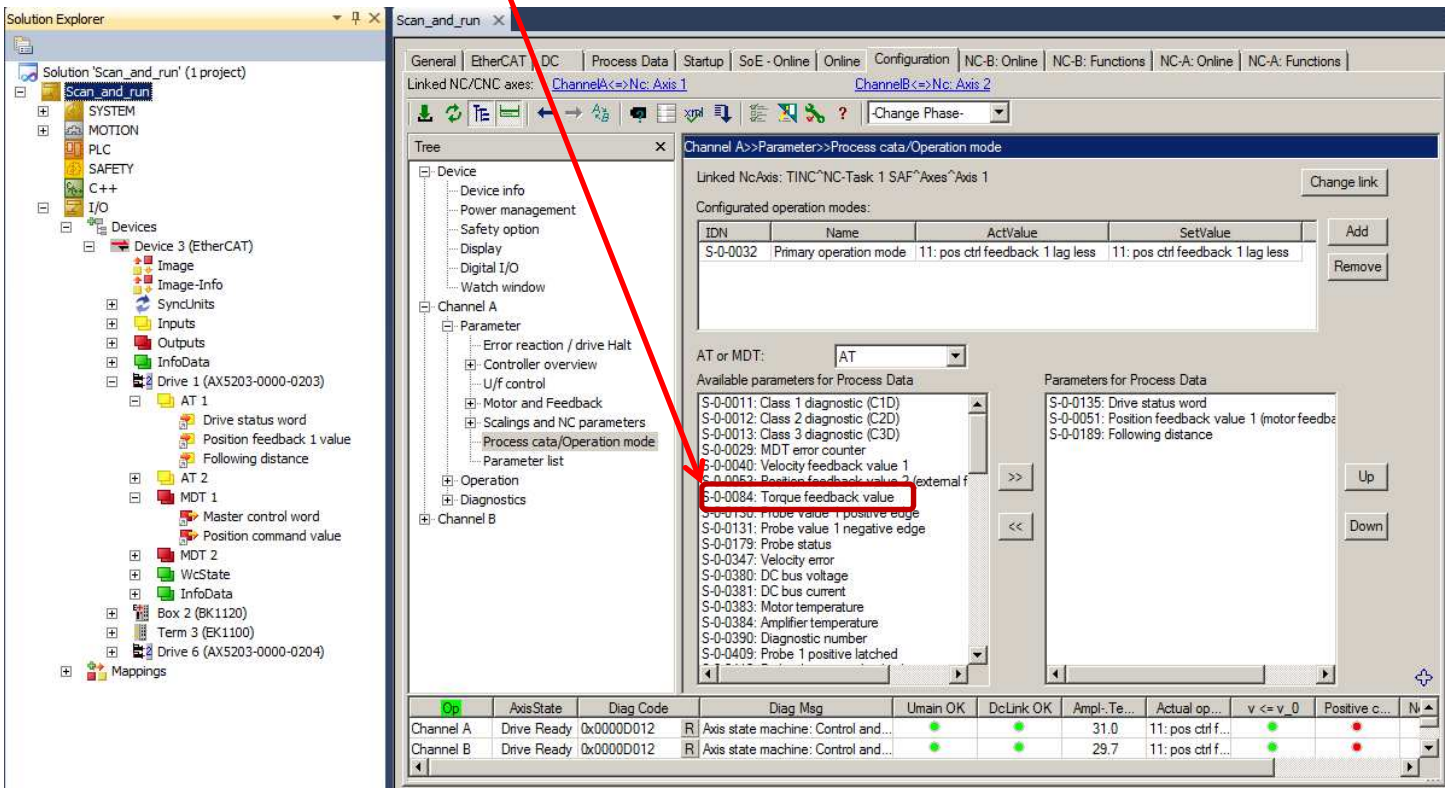
BECKHOFF

1. Scoping main parameter
2. The bode plot in AX5000

Scoping Main Parameter

BECKHOFF

- What parameter we like to see? One is current!



Scoping Main Parameter

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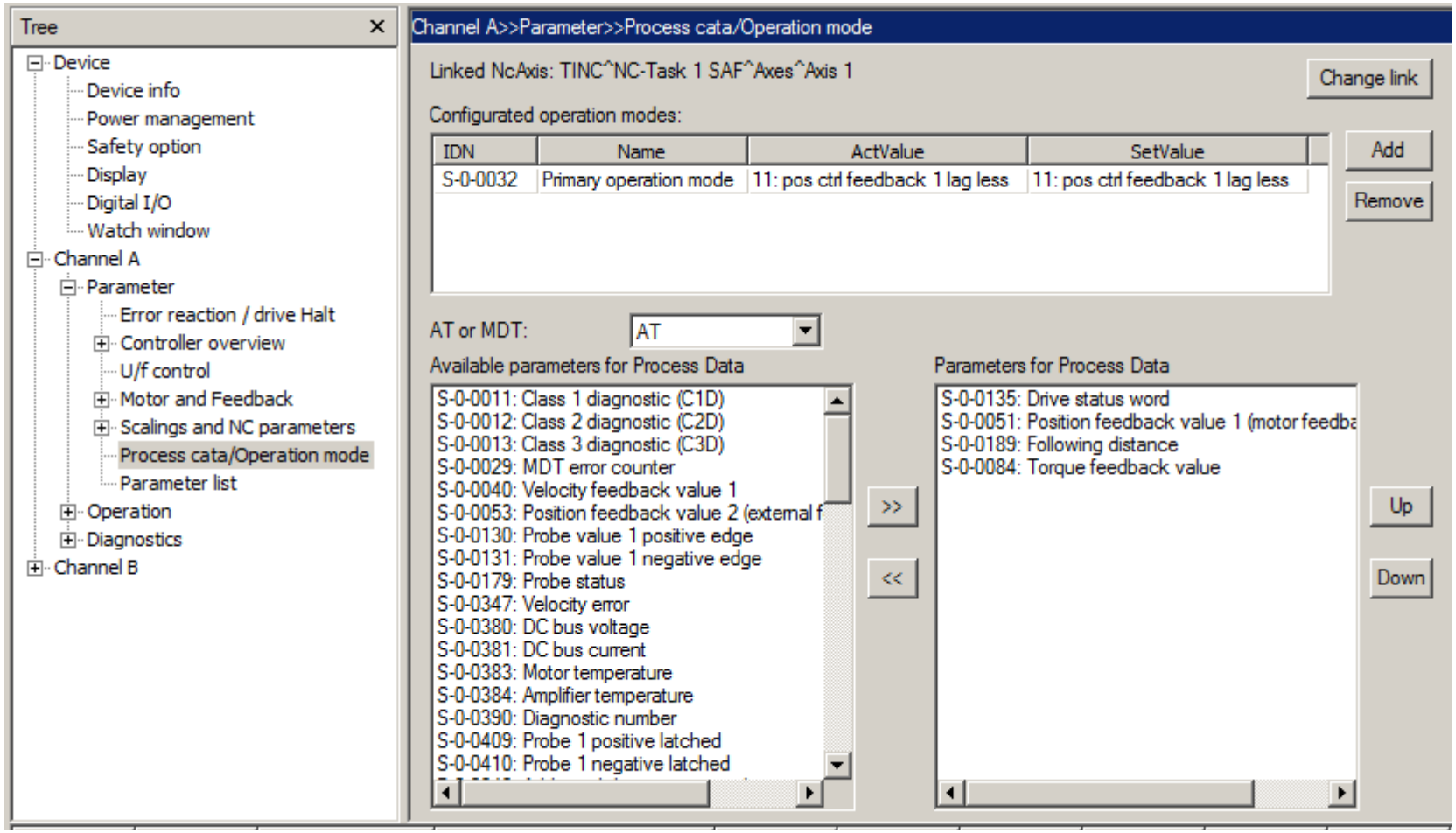
- Add the current into the process data`s



Scoping Main Parameter

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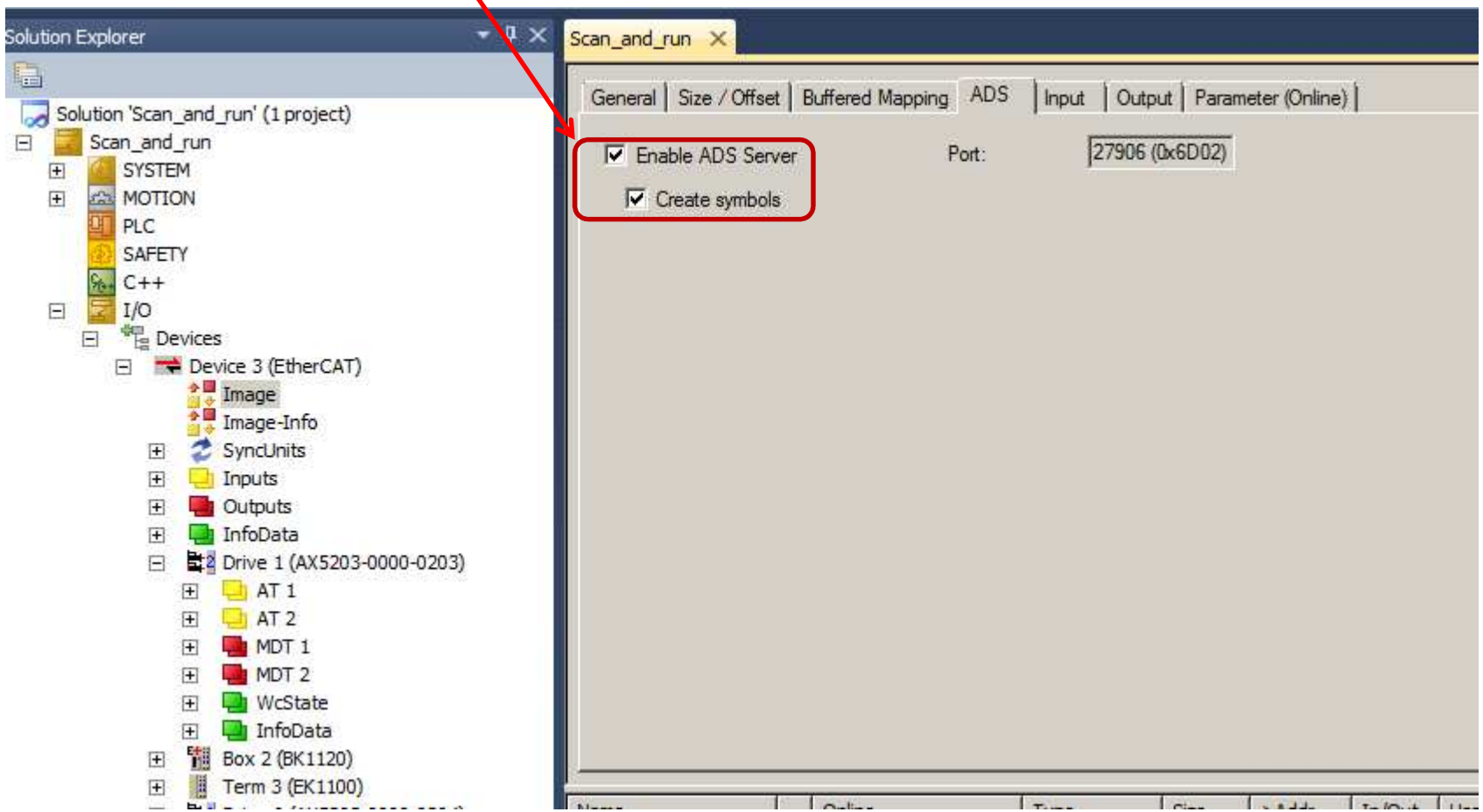
- Make the process data`s ready to scope, to get the data direct from the process image of the AX5000



Scoping Main Parameter

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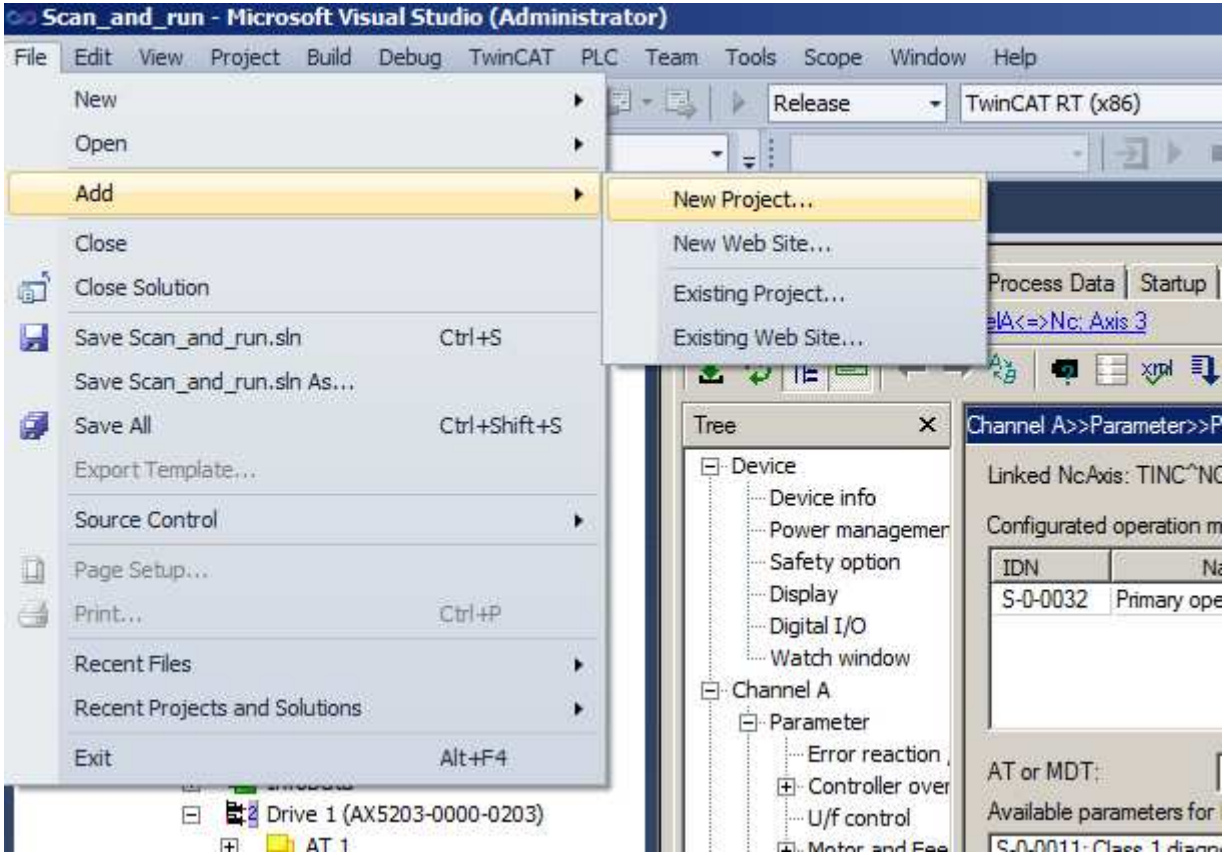
- Create the scope project step 1 -> Add a New Scope Project



Scoping Main Parameter

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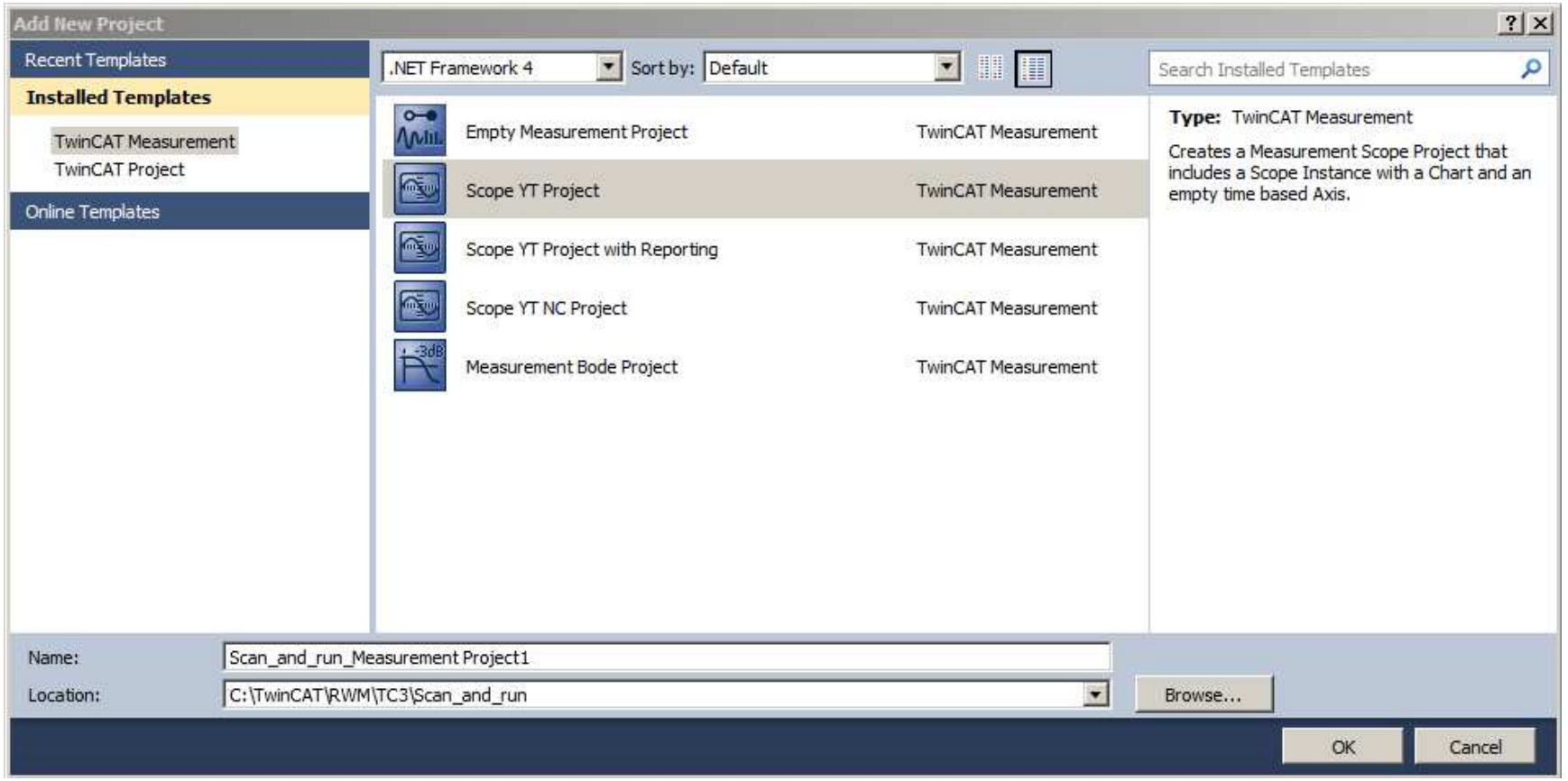
- Create the scope project step 2 -> Choose a YT scope Project



Scoping Main Parameter

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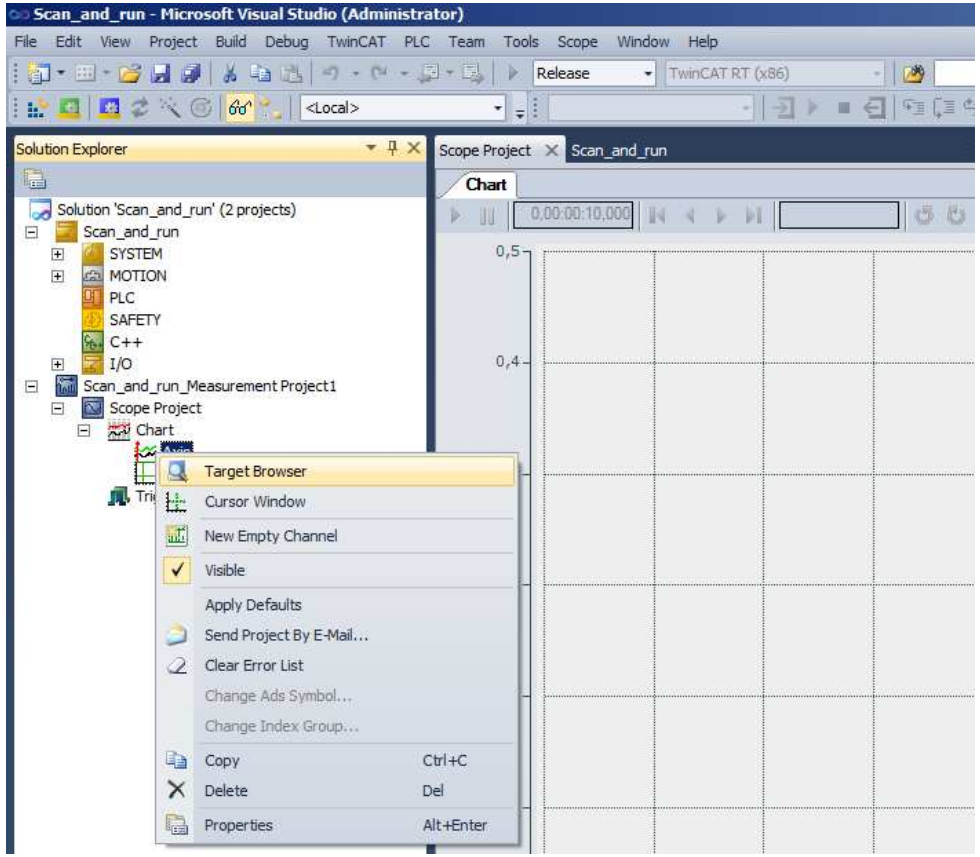
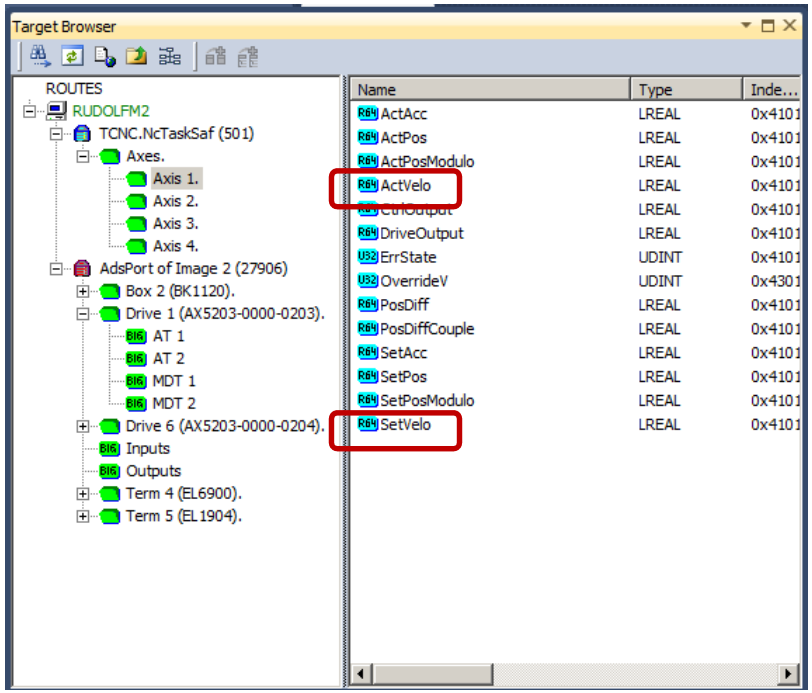
- Create the scope project step 3, select the Axis
  - ActVelo and SetVelo from TCNC.NcTaskSaf
  - Following distance and Torque feedback value from the AdsPort





Scoping Main Parameter

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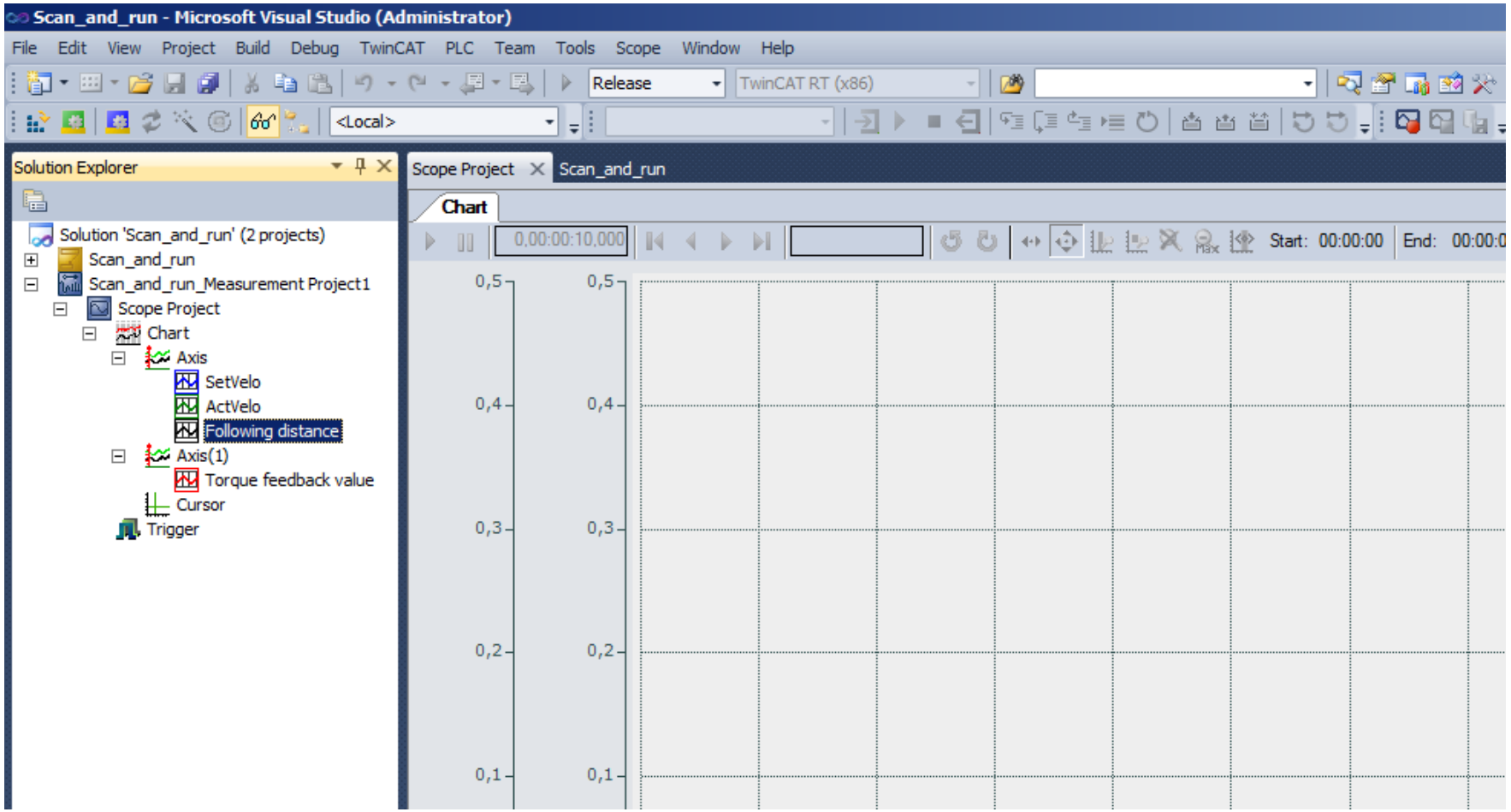
- Ready to scope?



Scoping Main Parameter

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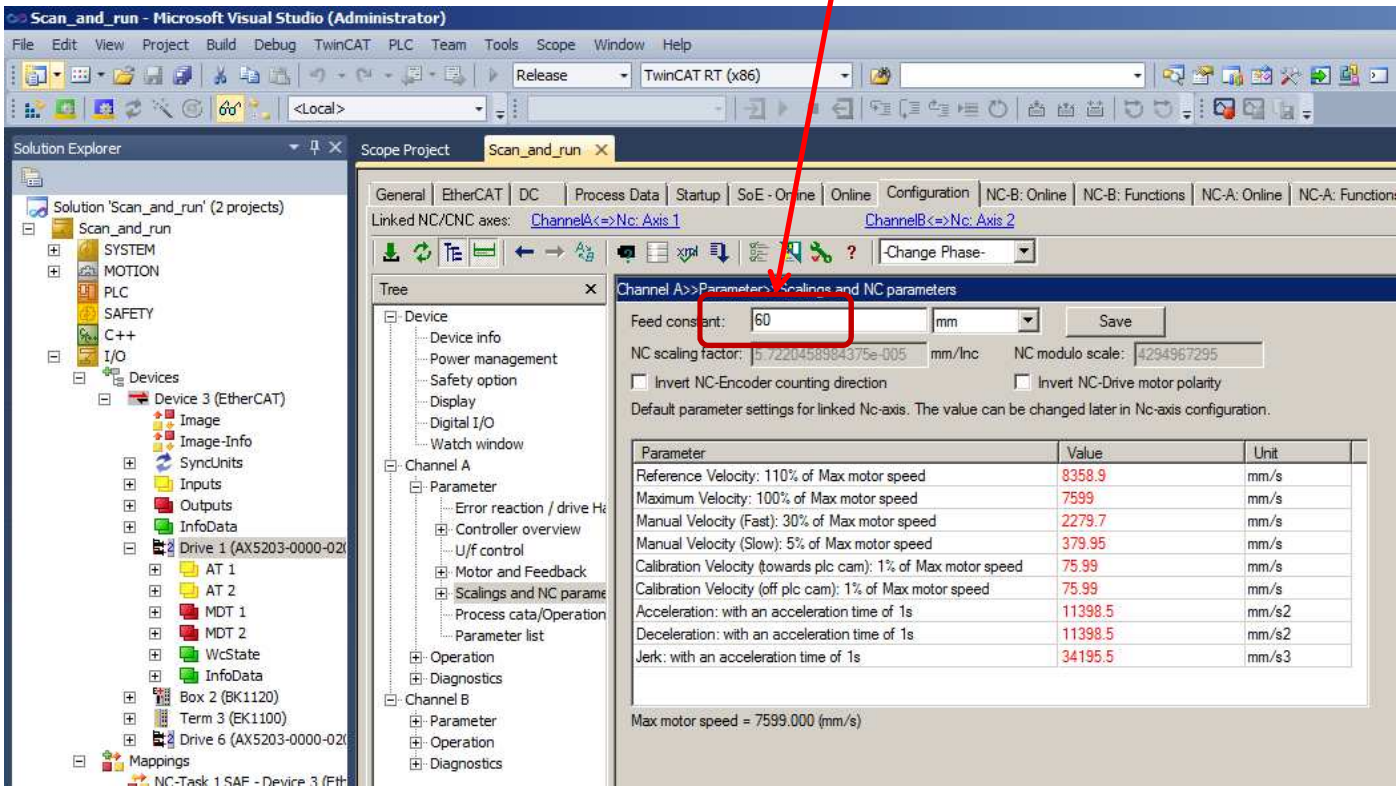
- What it the right scaling? It depends on the application. 60 gives you the speed in rpm.



Scoping Main Parameter

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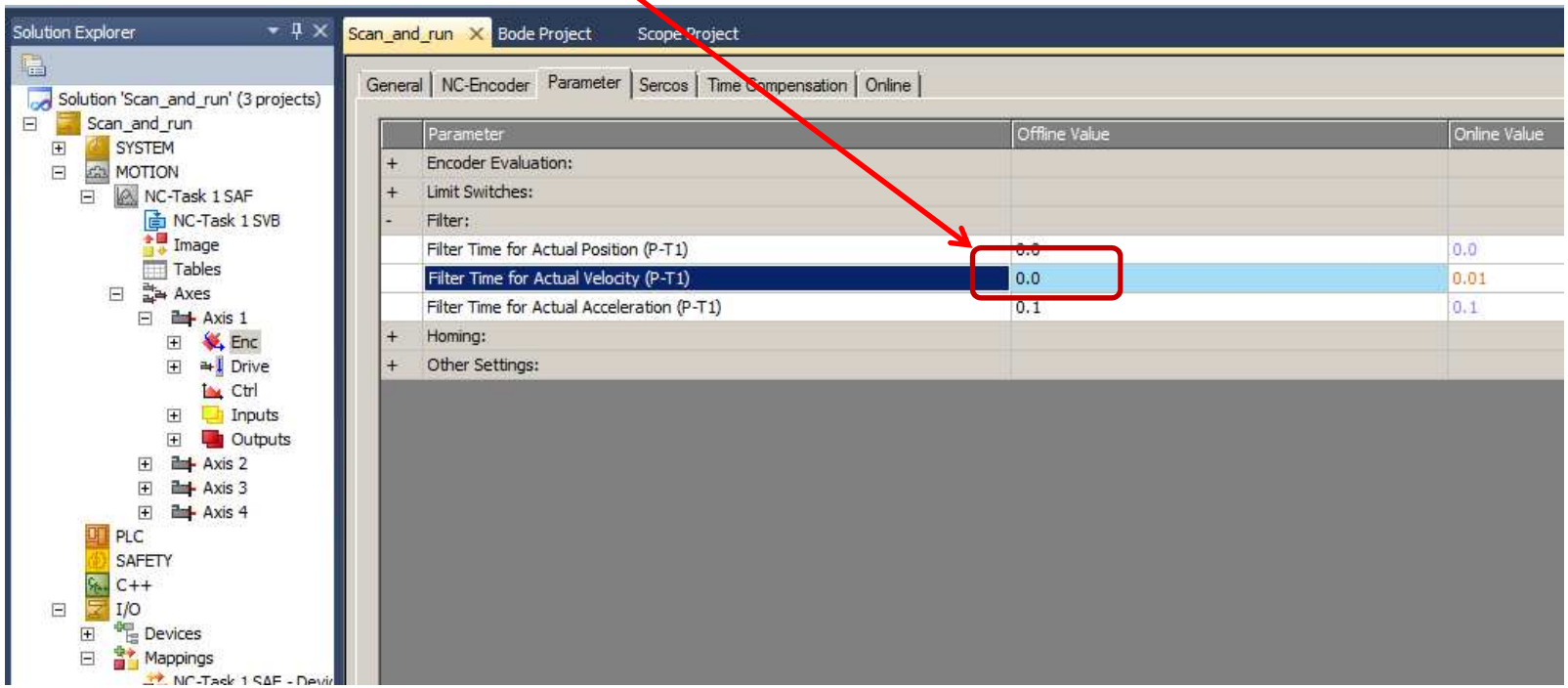
- Set this filter to zero



Scoping Main Parameter

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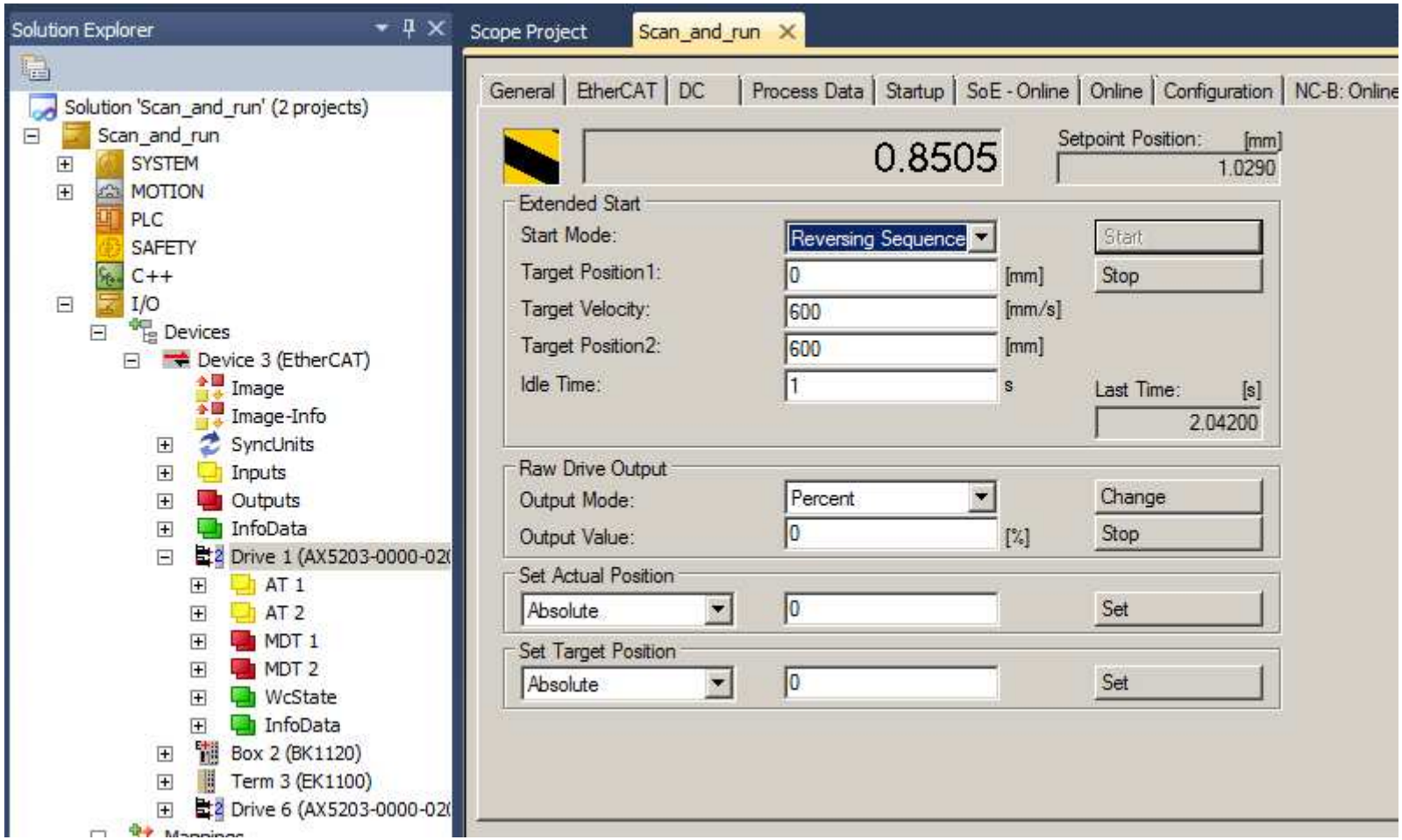
- Start the “Reversing Sequence”. In real application give 1 to 10% of the final speed.



Scoping Main Parameter

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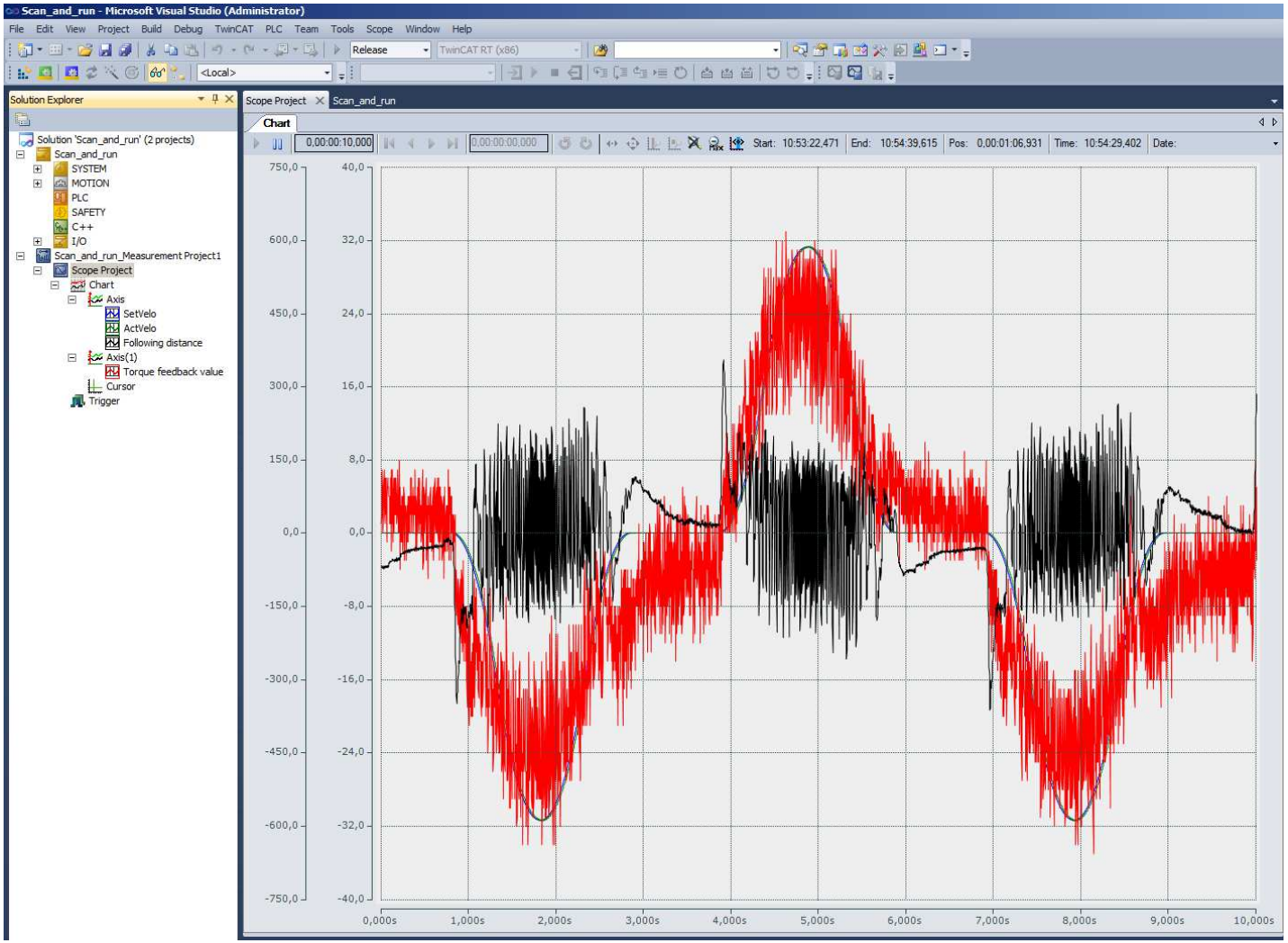
- A step response and no edges?



Scoping Main Parameter

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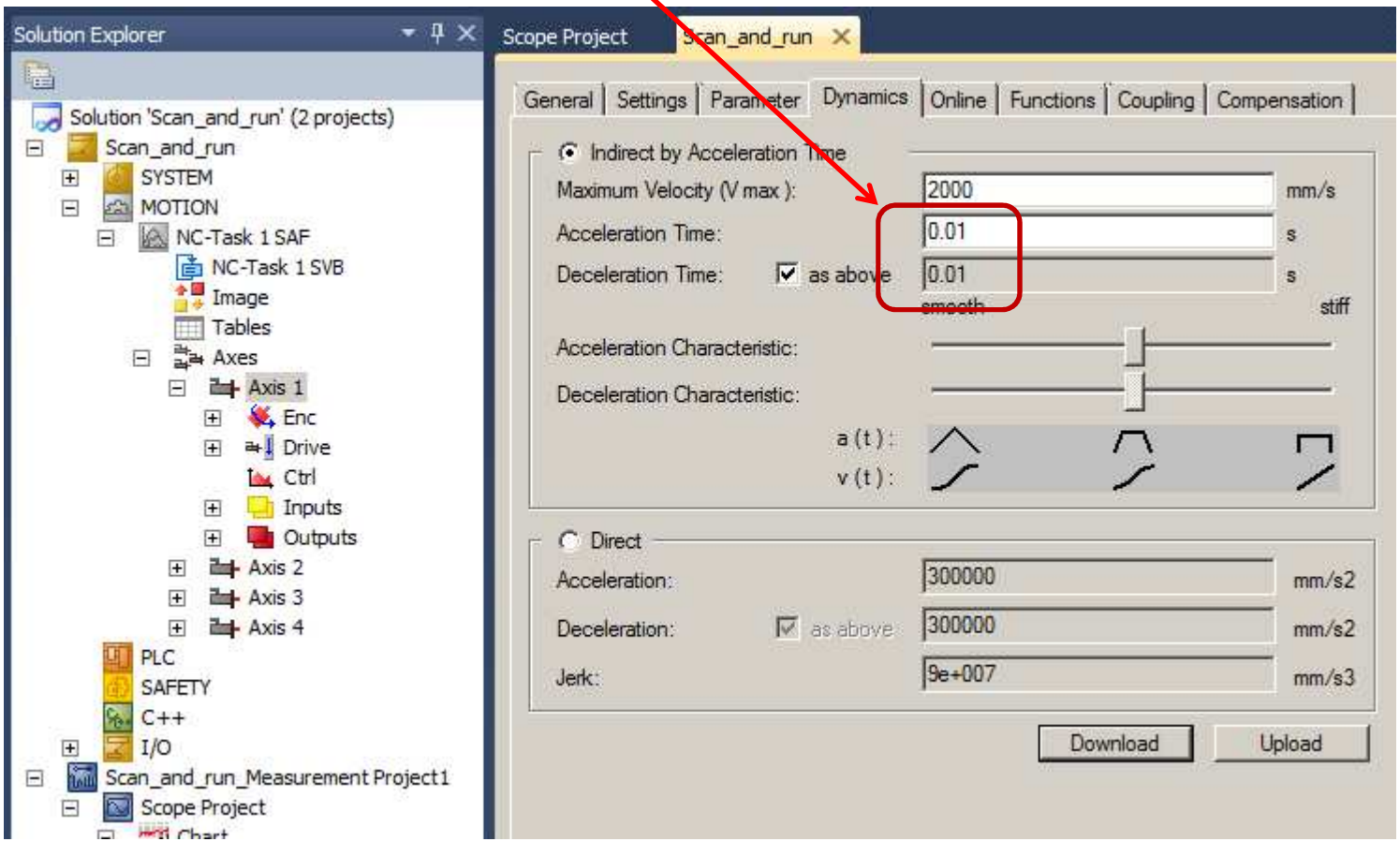
- To see a “real step” take high acceleration



Scoping Main Parameter

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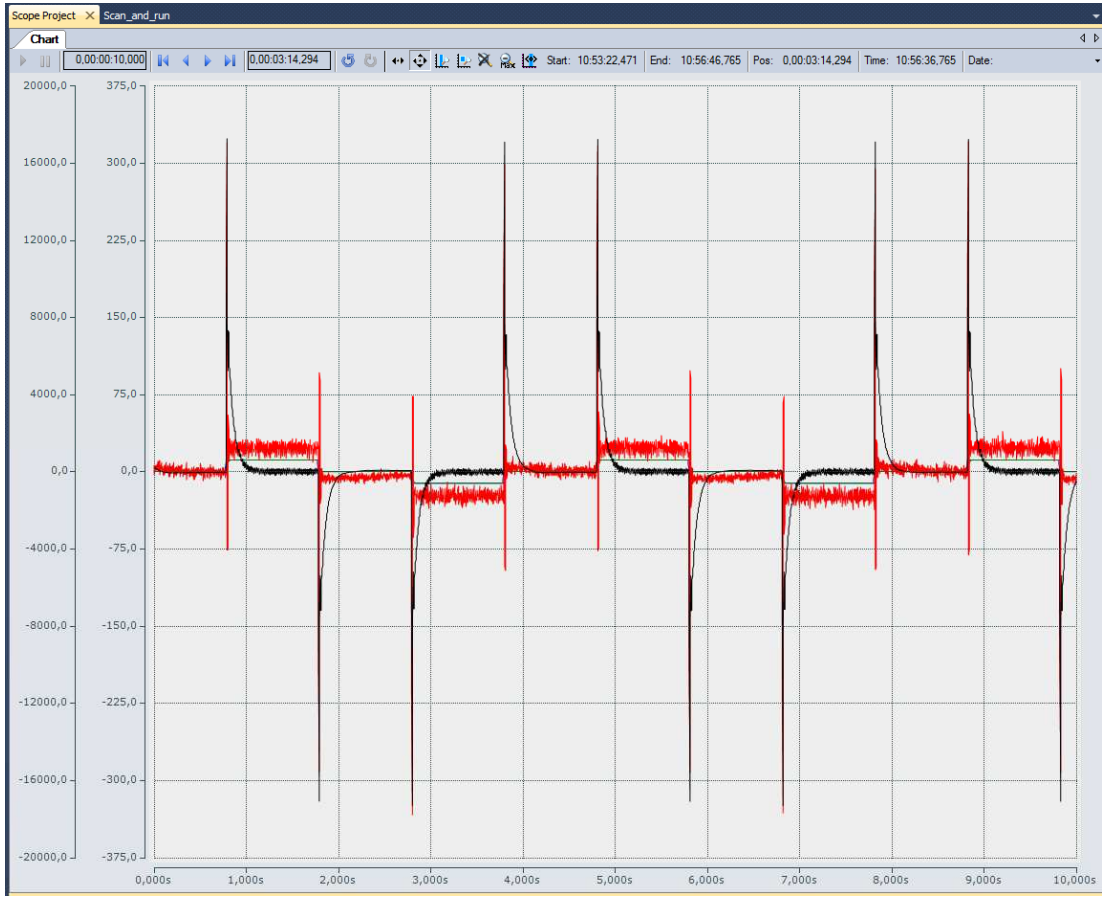
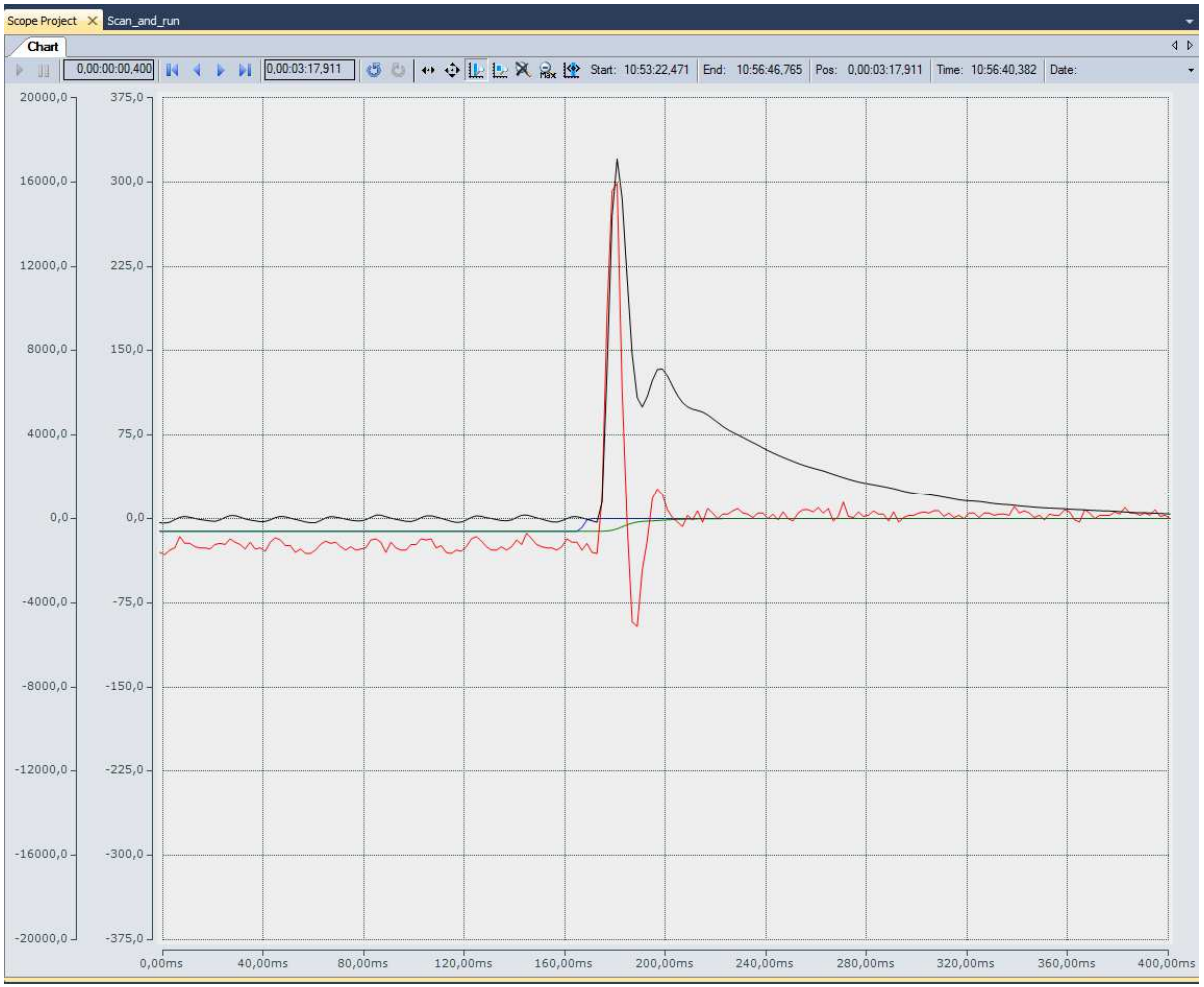
- The step response



Scoping Main Parameter

BECKHOFF

- The step response



Scoping Main Parameter

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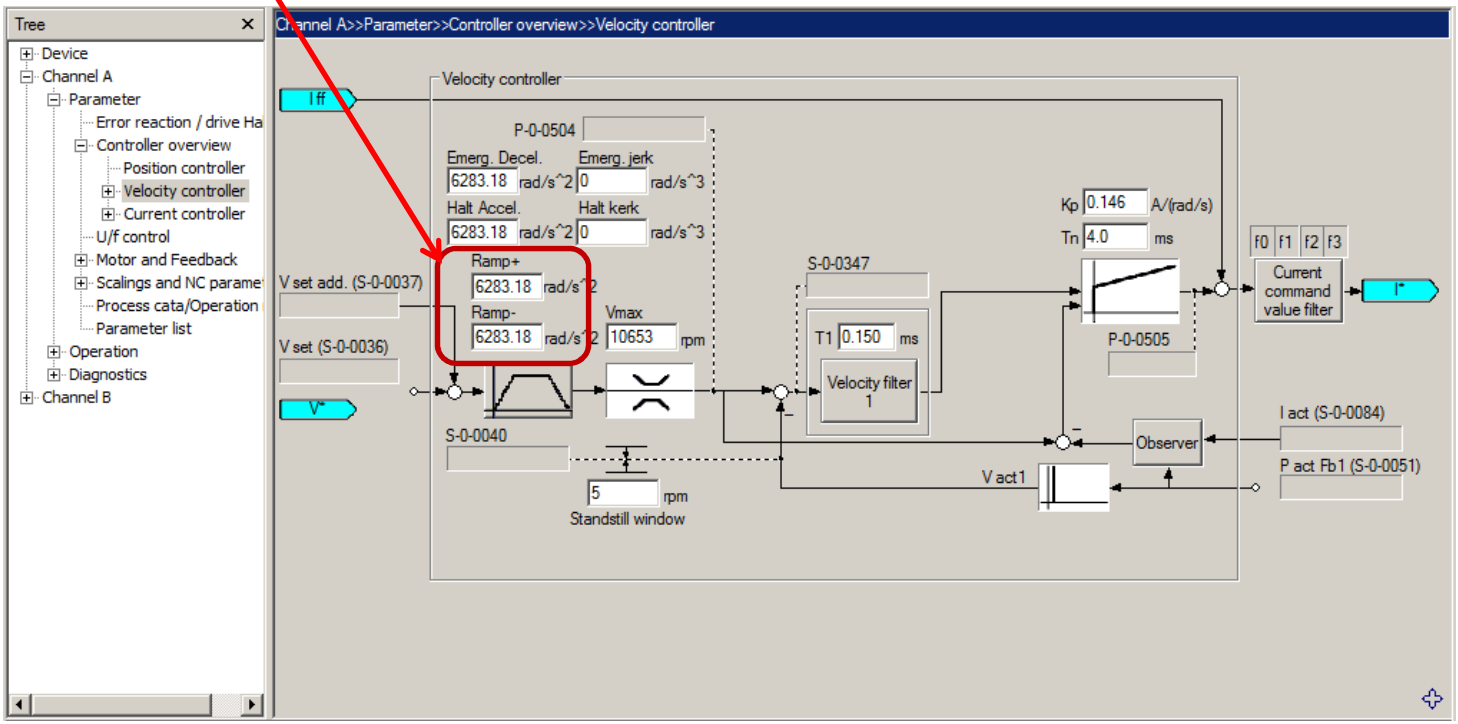
- Some more step limitations?



Scoping Main Parameter

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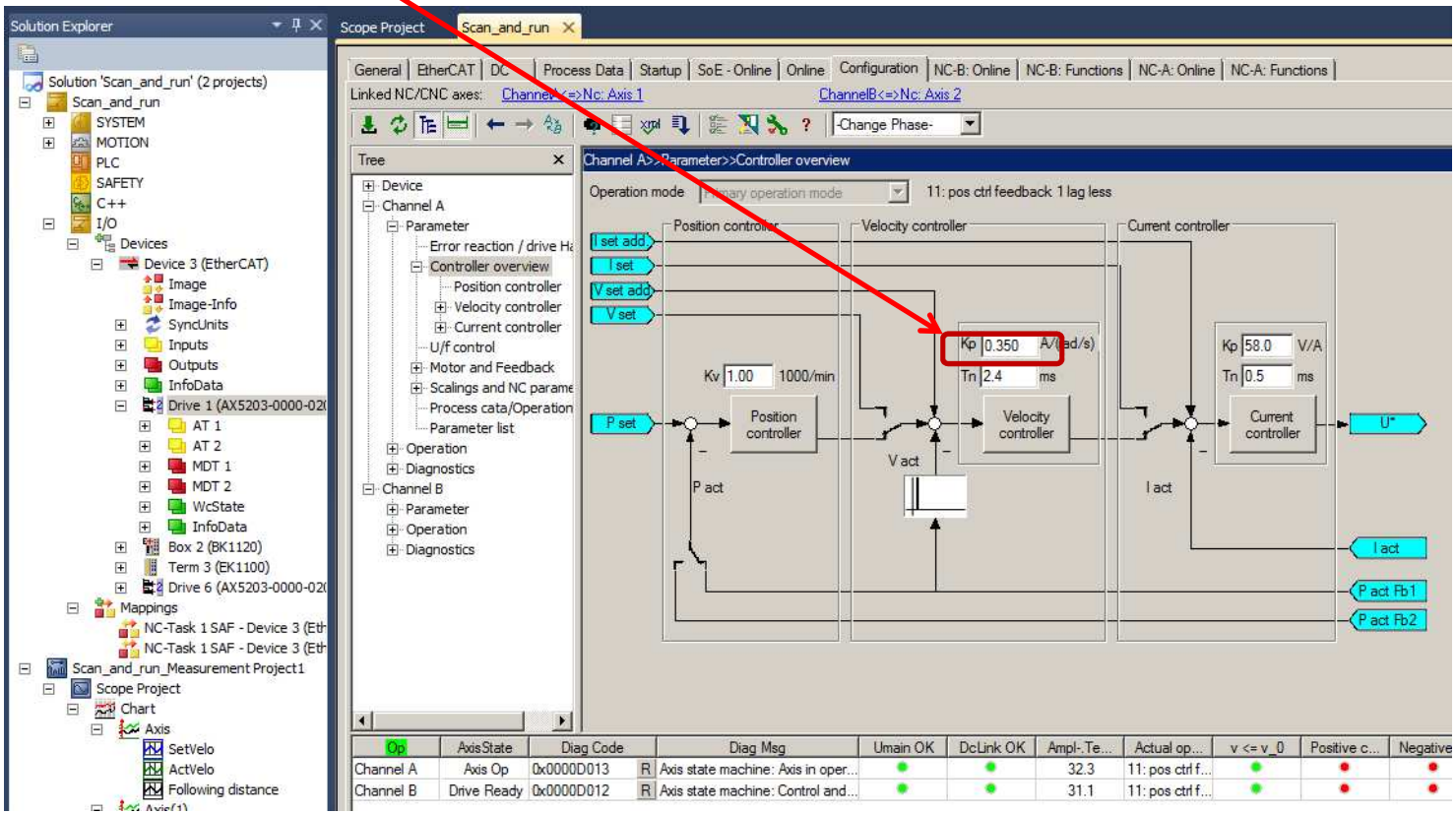
- Increasing velo Kp



Scoping Main Parameter

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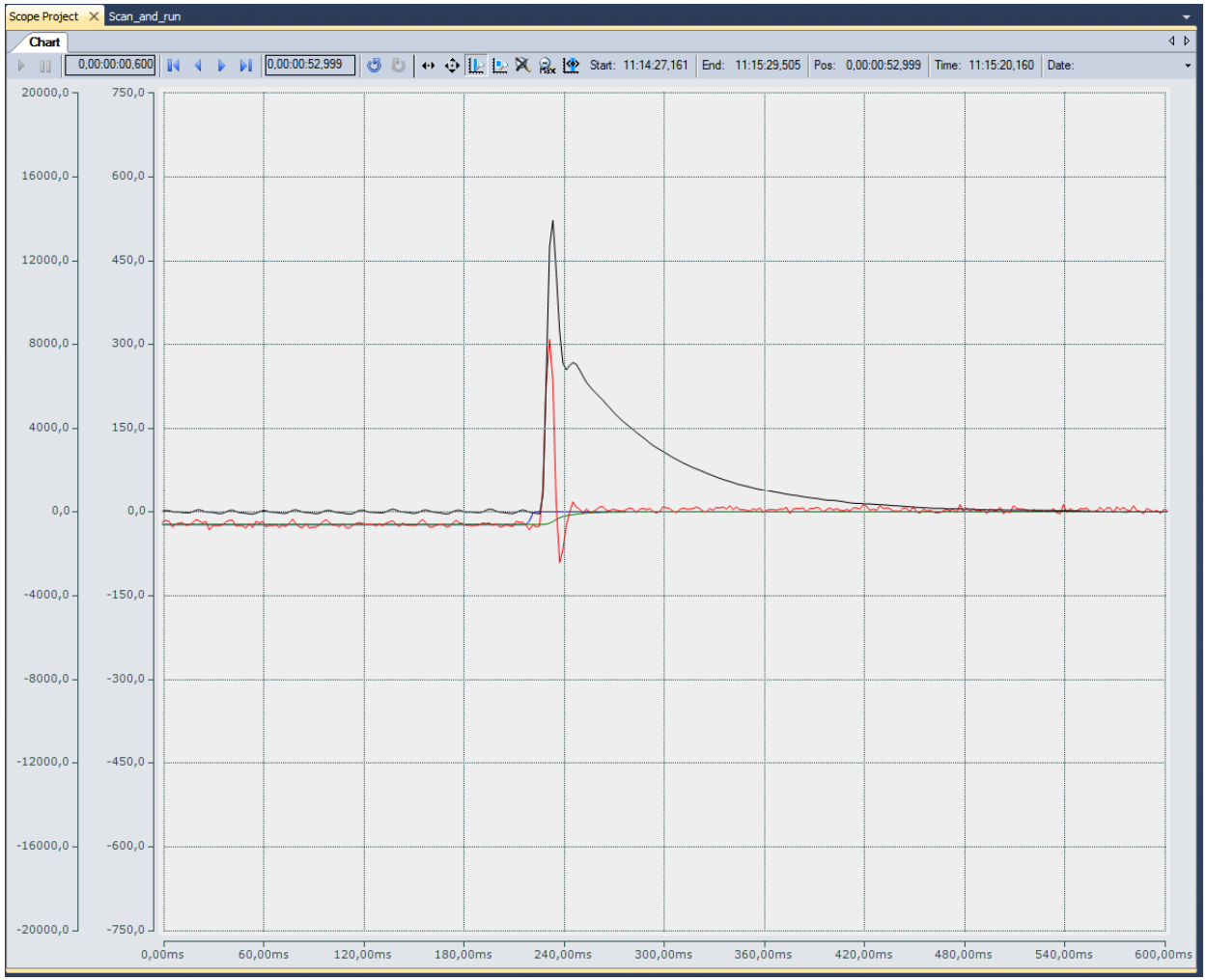
- Increasing velo Kp it gives this affect.



Scoping Main Parameter -> Settings

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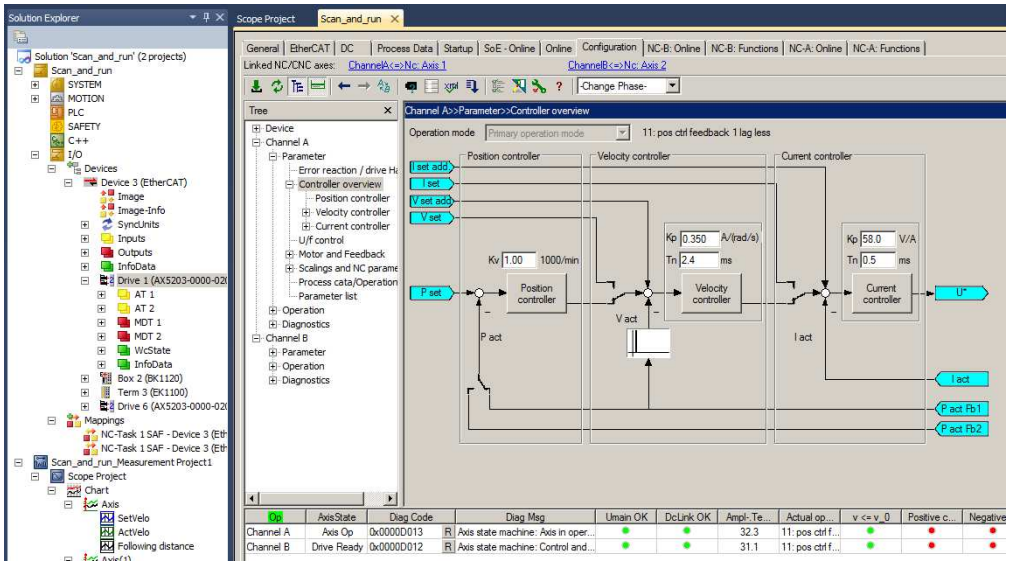
- Possible Strategy for controller setting
  - Set the Kv of the Position controller nearly to 0 -> 0.01 to nearly switch off the Position control
  - Lift up the Tn to switch off the effect of tn (in this case double it)
  - Then try step response and have a look at torque feedback and the following distance
  - Lift up Kp of the velocity controller until torque feedback or velocity feedback start to oscillate
  - Go down with Kp by 5 to 10%
  - Lower Tn of the velocity controller until torque feedback or velocity feedback start to oscillate
  - Go up with Tn until it is stable again
  - Do the same with Kv of the position controller as Kp
  - -> Now you made it !!!!



Scoping Main Parameter

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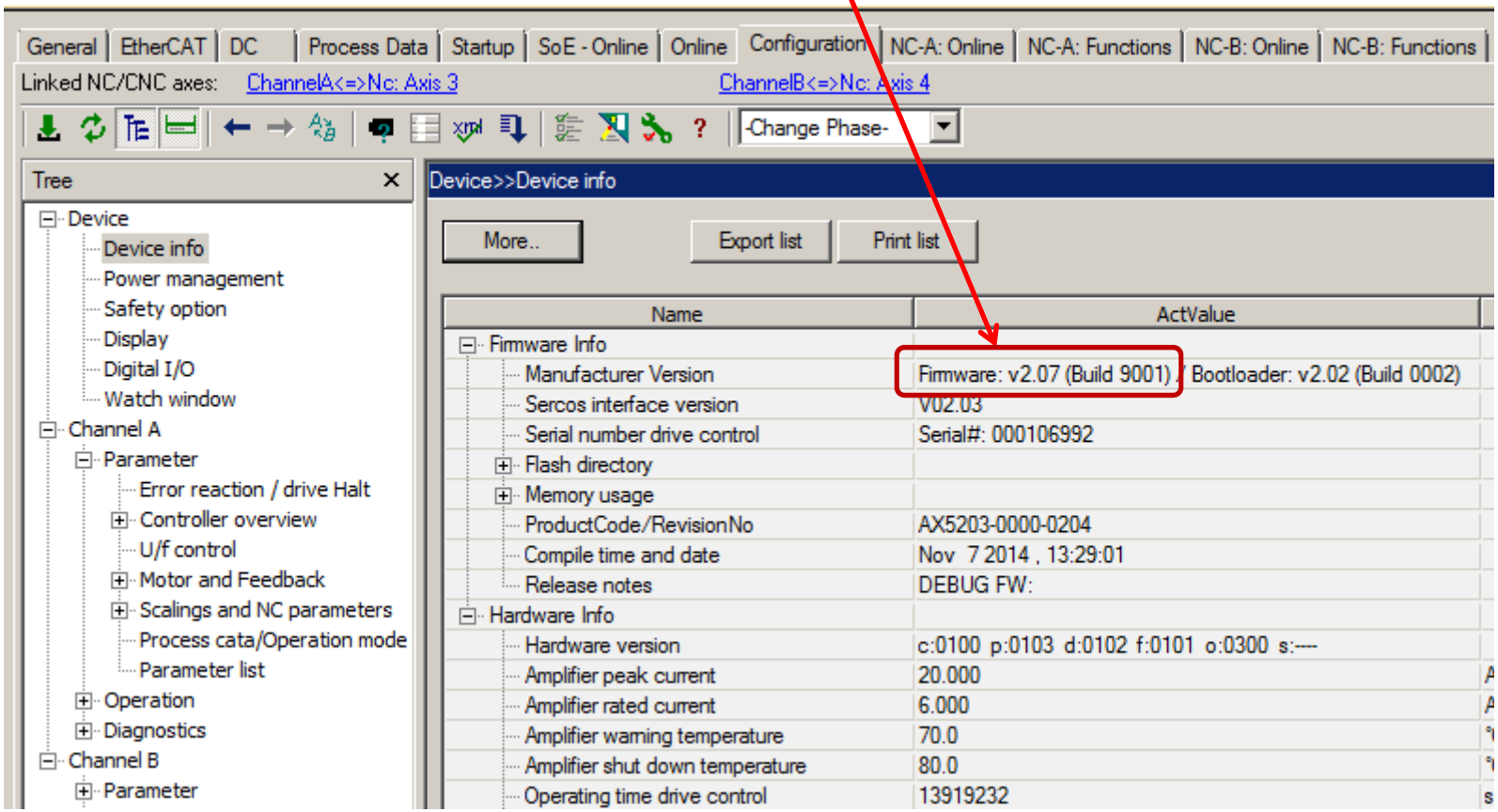
- Just some things to think about
  - A drive system that makes awful noise after tuning has to be checked
  - A drive system where you can feel the oscillation with your hand after tuning has to be checked

The bode plot in AX5000

BECKHOFF

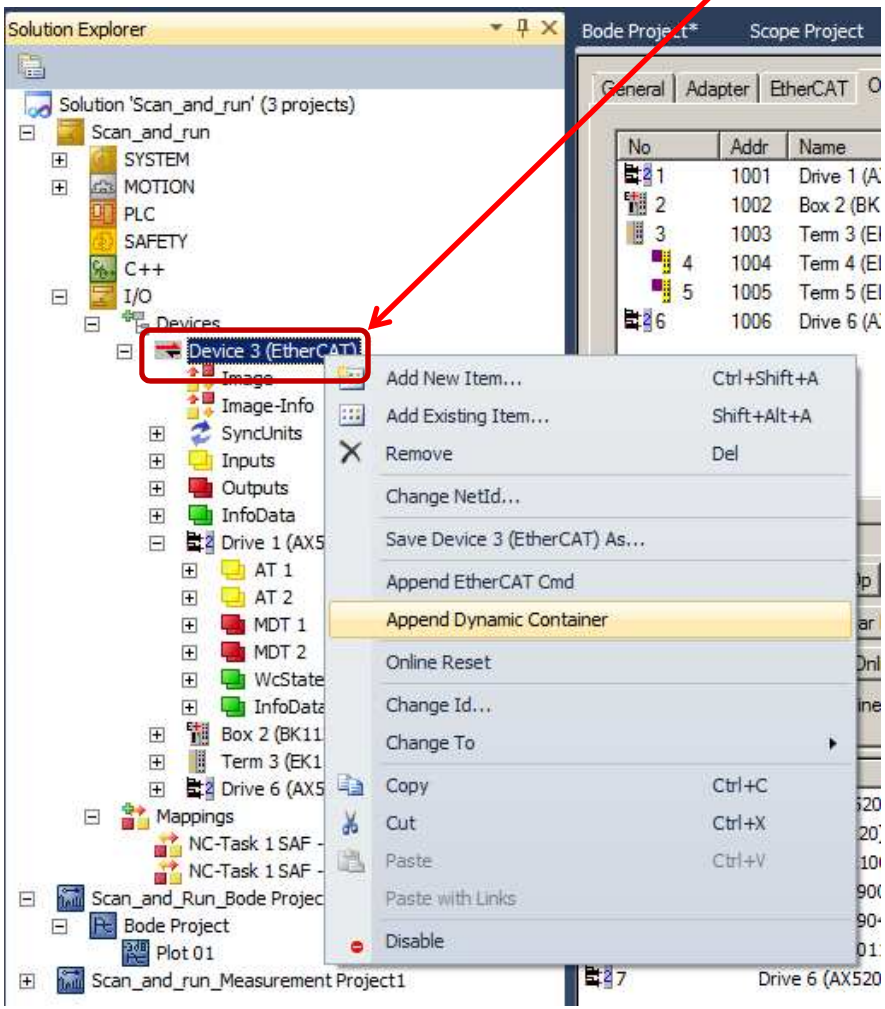
- To create a Bode plot by AX5000 you need a special firmware



The bode plot in AX5000

BECKHOFF

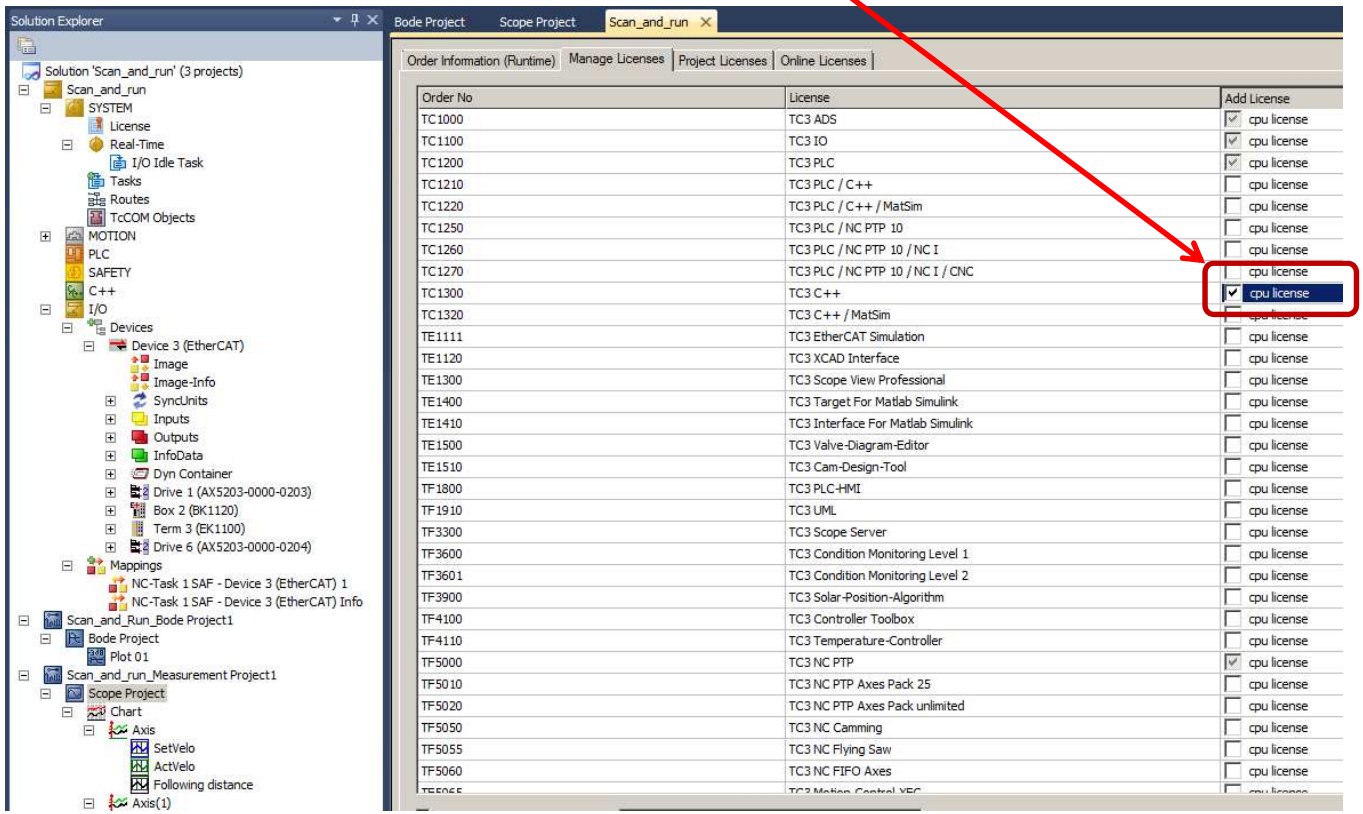
- Preparation to run Bode plot in AX5000, right mouse click here, add the “Dynamic Container”



The bode plot in AX5000

BECKHOFF

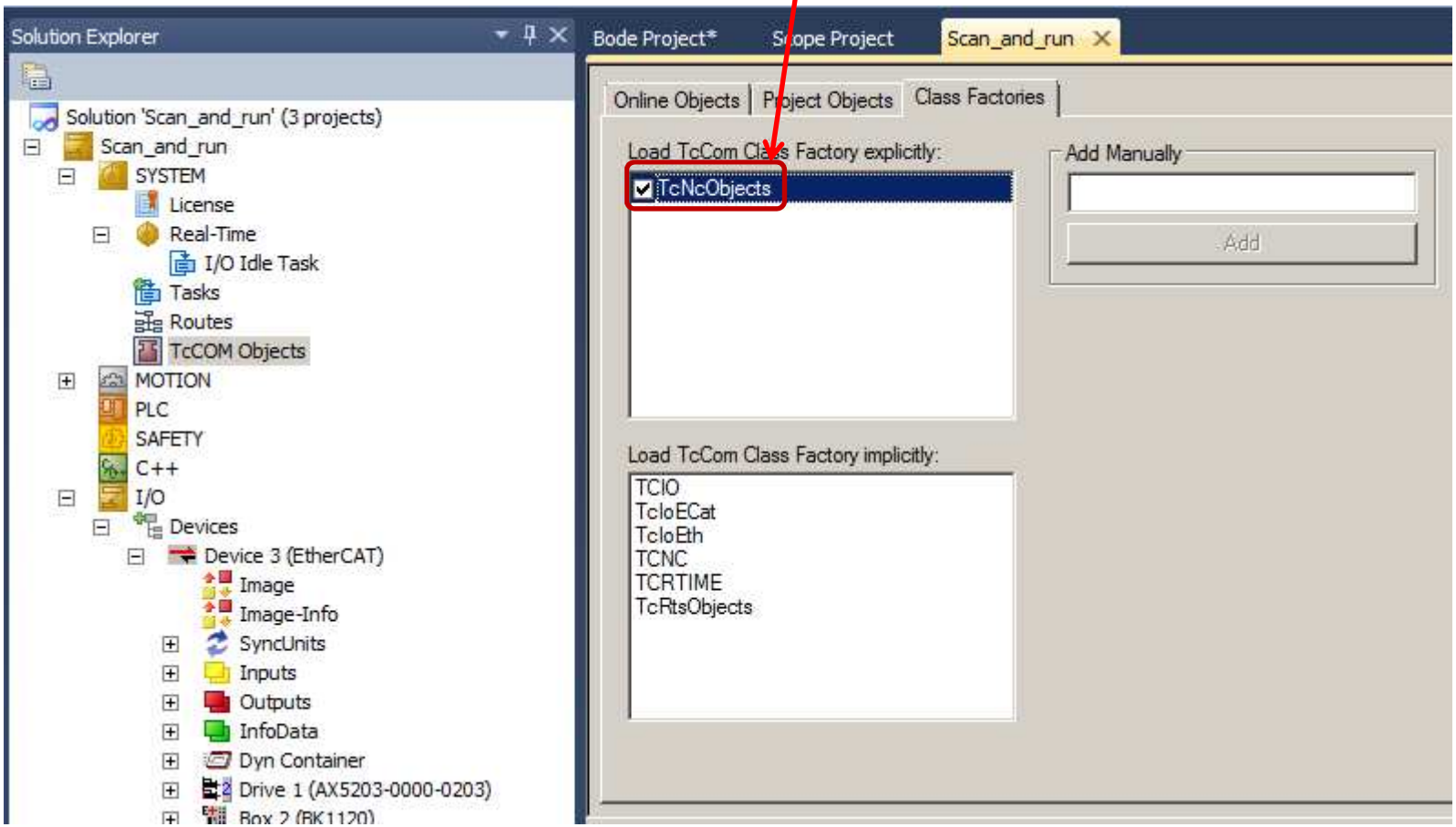
- Preparation to run Bode plot in AX5000 add this C++ License



The bode plot in AX5000

BECKHOFF

- Preparation to run Bode plot in AX5000, enable the “TcNcObjects”



The bode plot in AX5000

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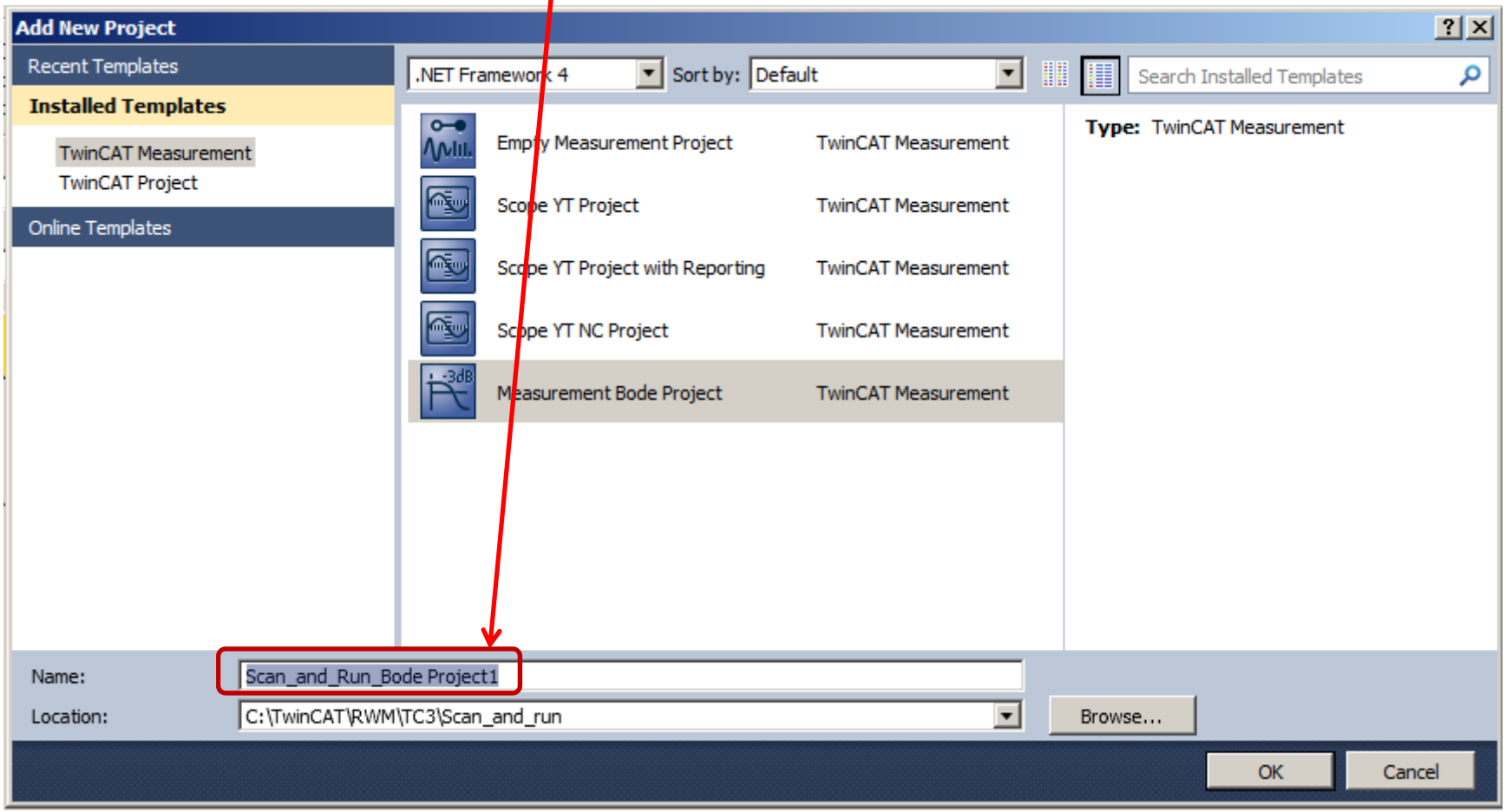
- Create a Bode plot by AX5000 and name it.



The bode plot in AX5000

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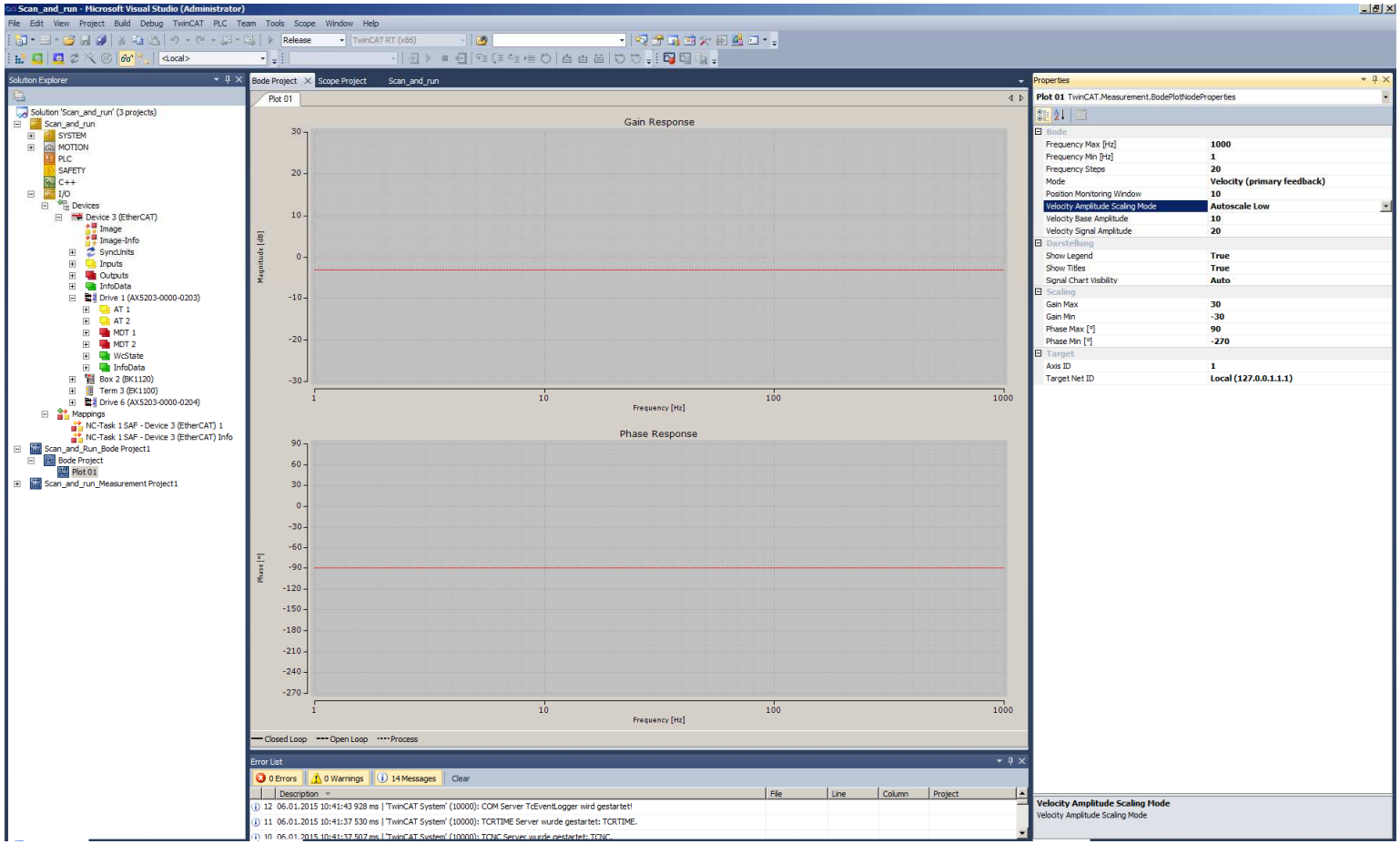
- Bode plot in AX5000, start view.



The bode plot in AX5000

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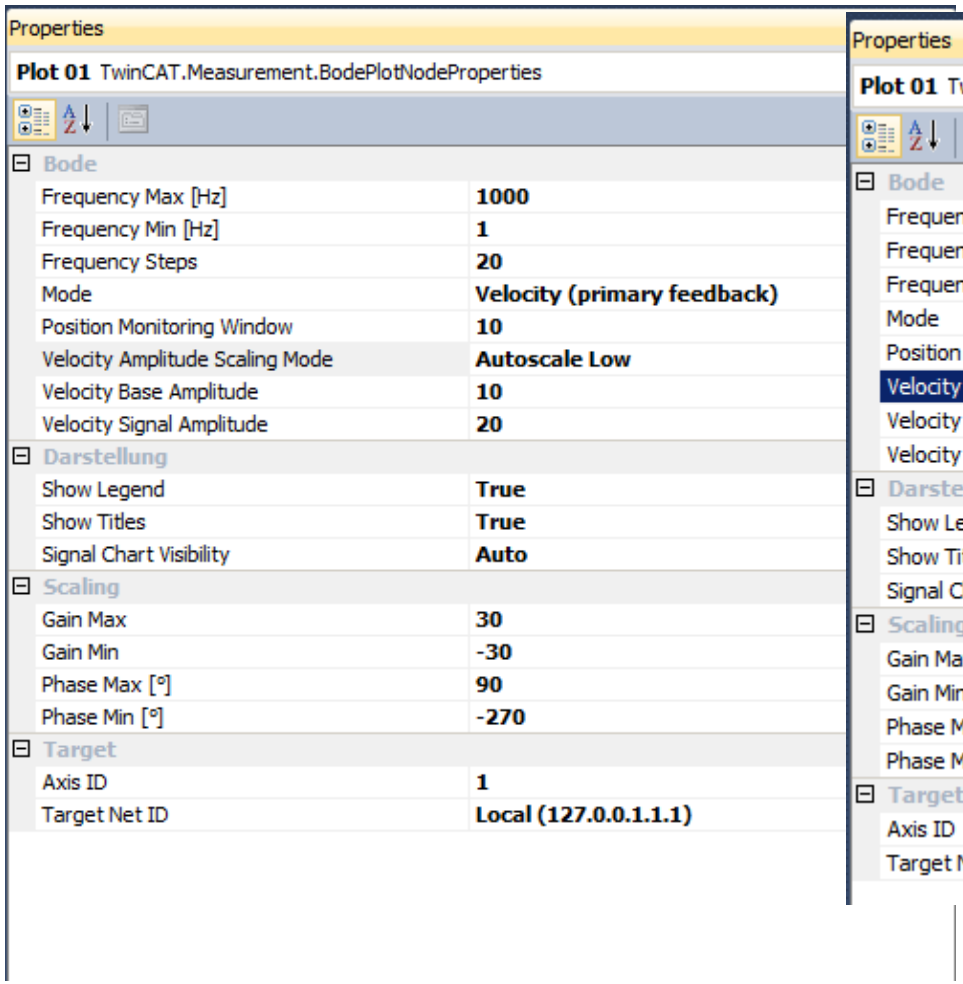
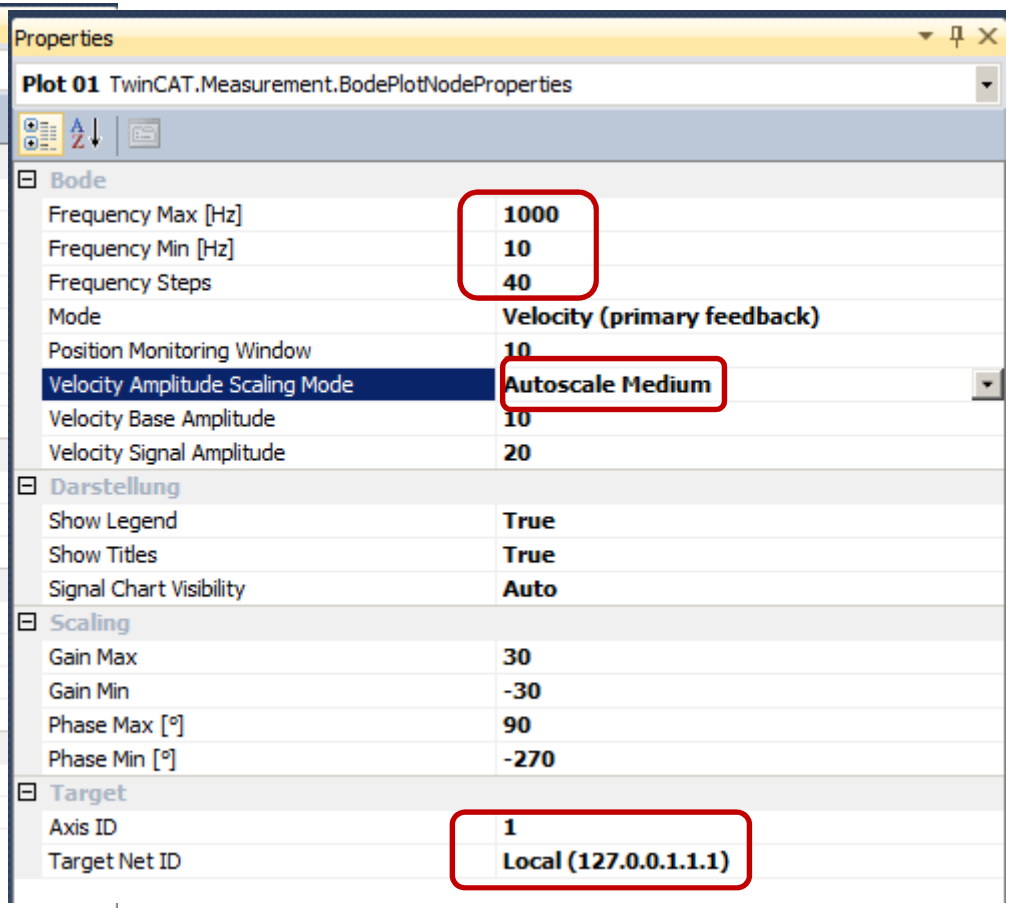
- Bode plot in AX5000. Give the basic settings.





The bode plot in AX5000

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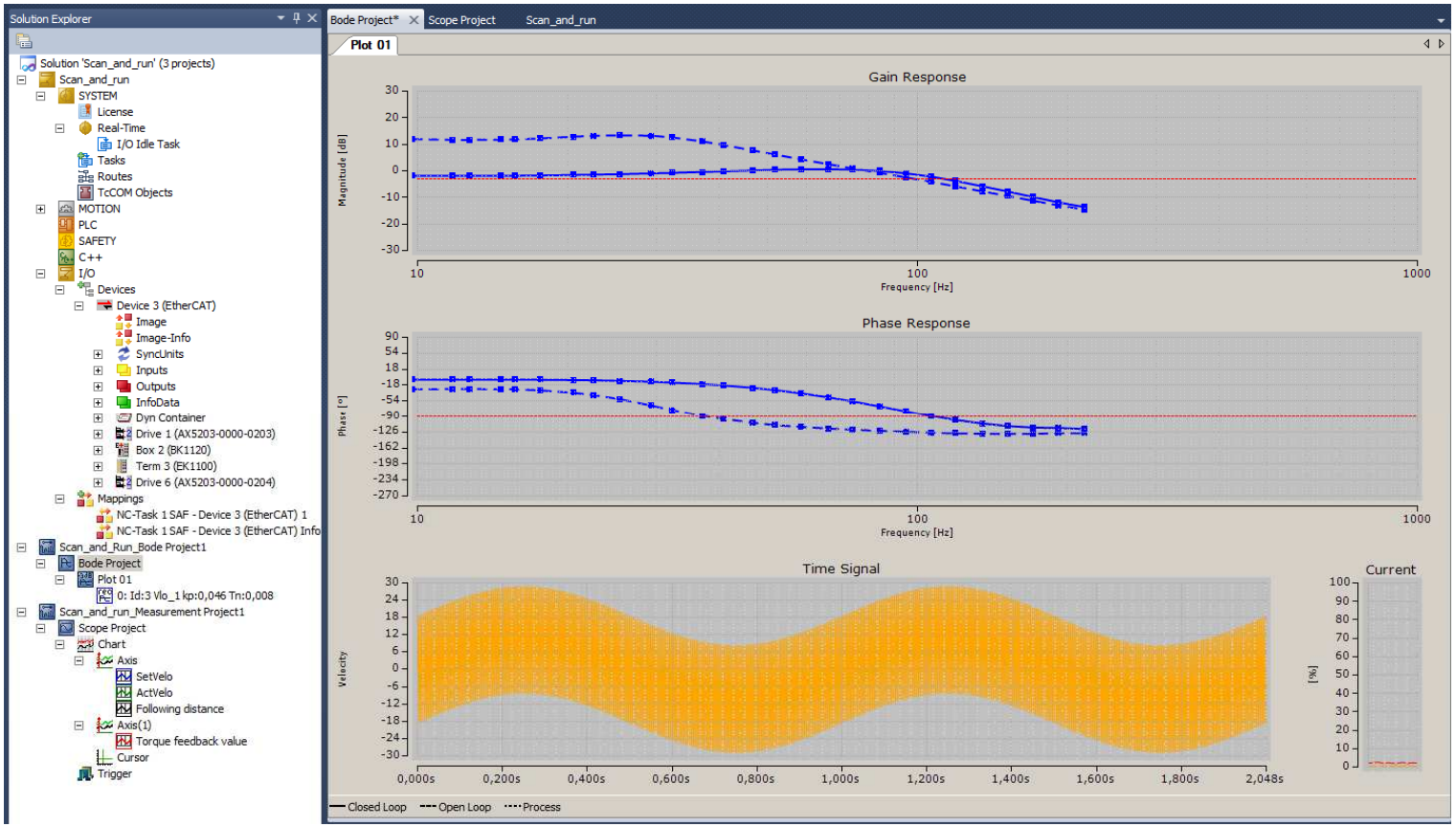
- Bode plot in AX5000 during oscillation



The bode plot in AX5000

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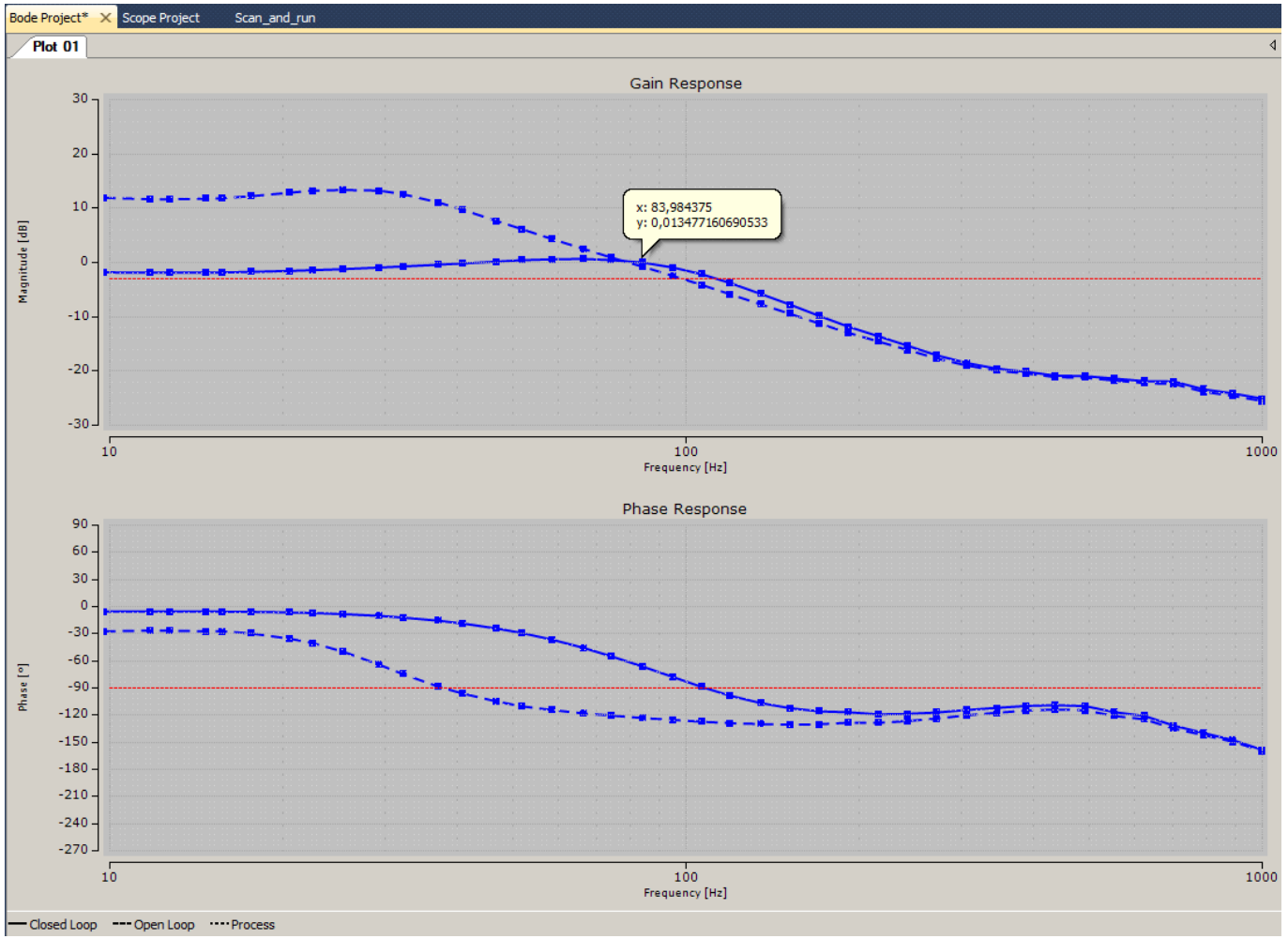
- Bode plot in AX5000, the final result.



The bode plot in AX5000

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- Why using a Bode plot?

The bode plot in AX5000

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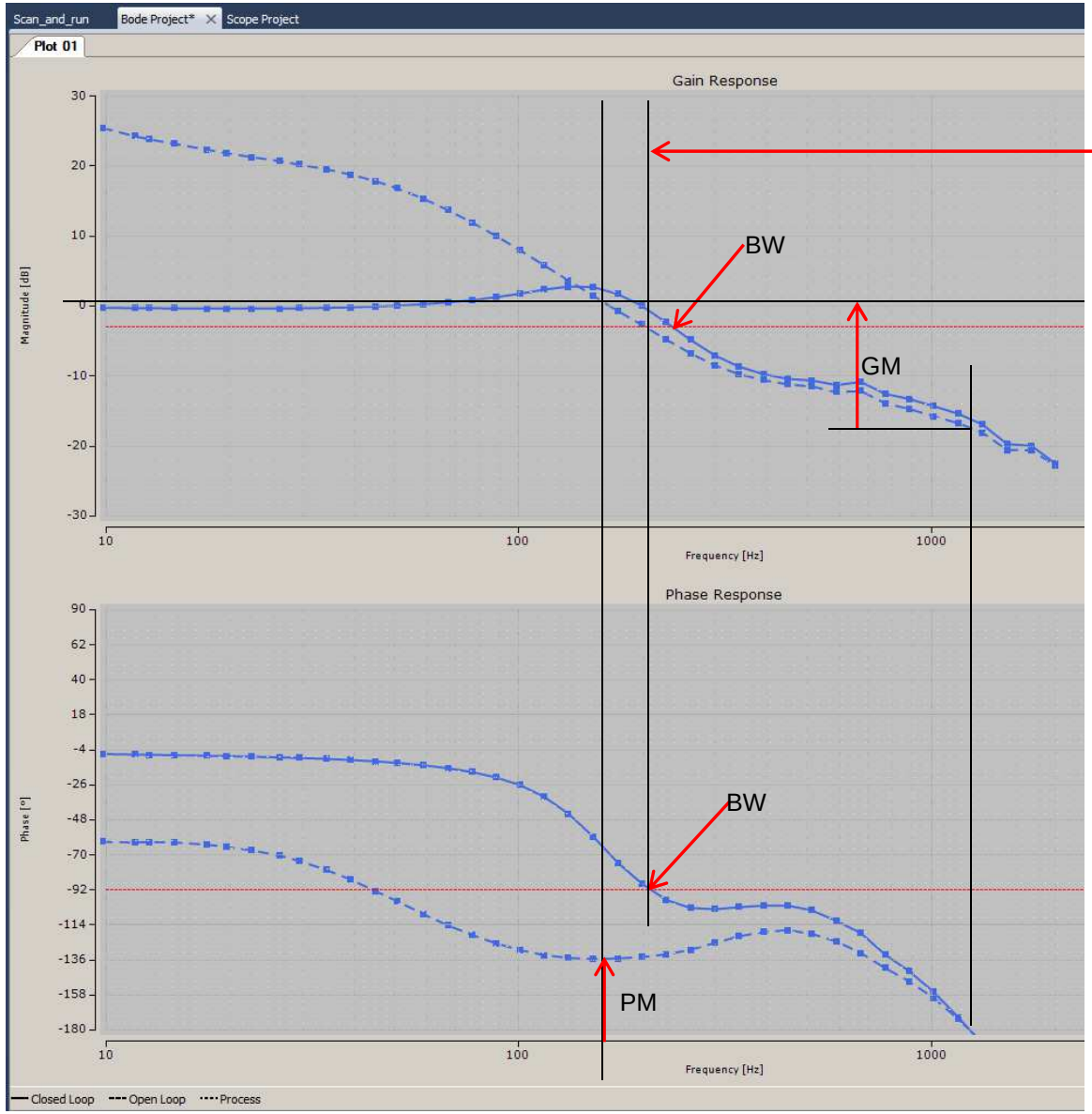

The bandwidth BW is taken from the closed loop result.

Bandwidth at -3db or -90deg phase shift, depending what is first. In this case we take the point of -90 deg. It is at 205 Hz.

The phase-margin PM and gain-margin GM measured by open loop.

PM at the point gain reached 0dB.
GM at the point phase reached -180 deg

PM = 180deg – 130deg = 50deg

GM = 18 dB

The gain margin GM should be in a range of 10 to 25 dB.

The phase margin PM should be in a range of 35 to 80 deg.

The bode plot in AX5000

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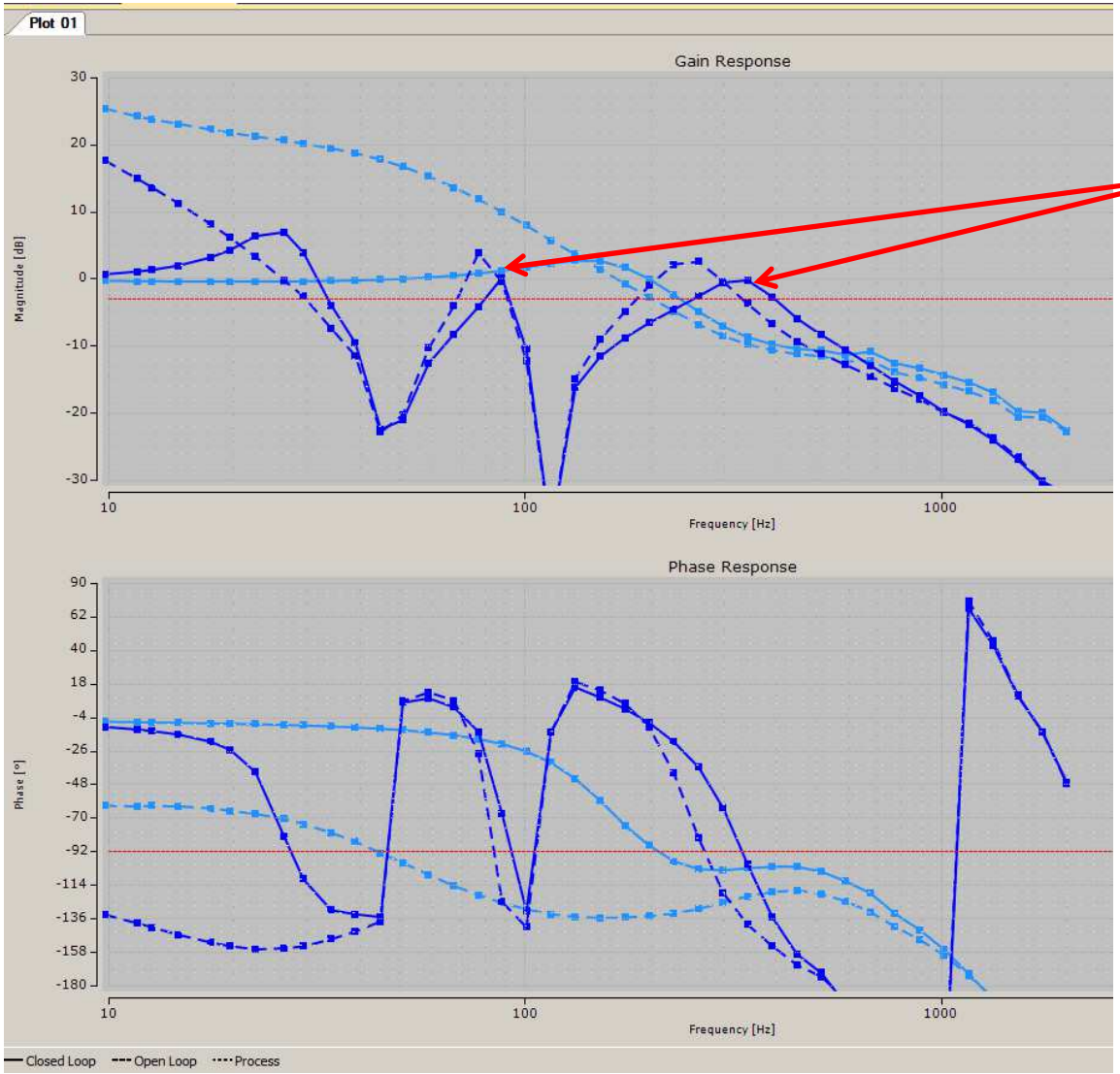

- What is this?
- You can see two resonance points

The bode plot in AX5000

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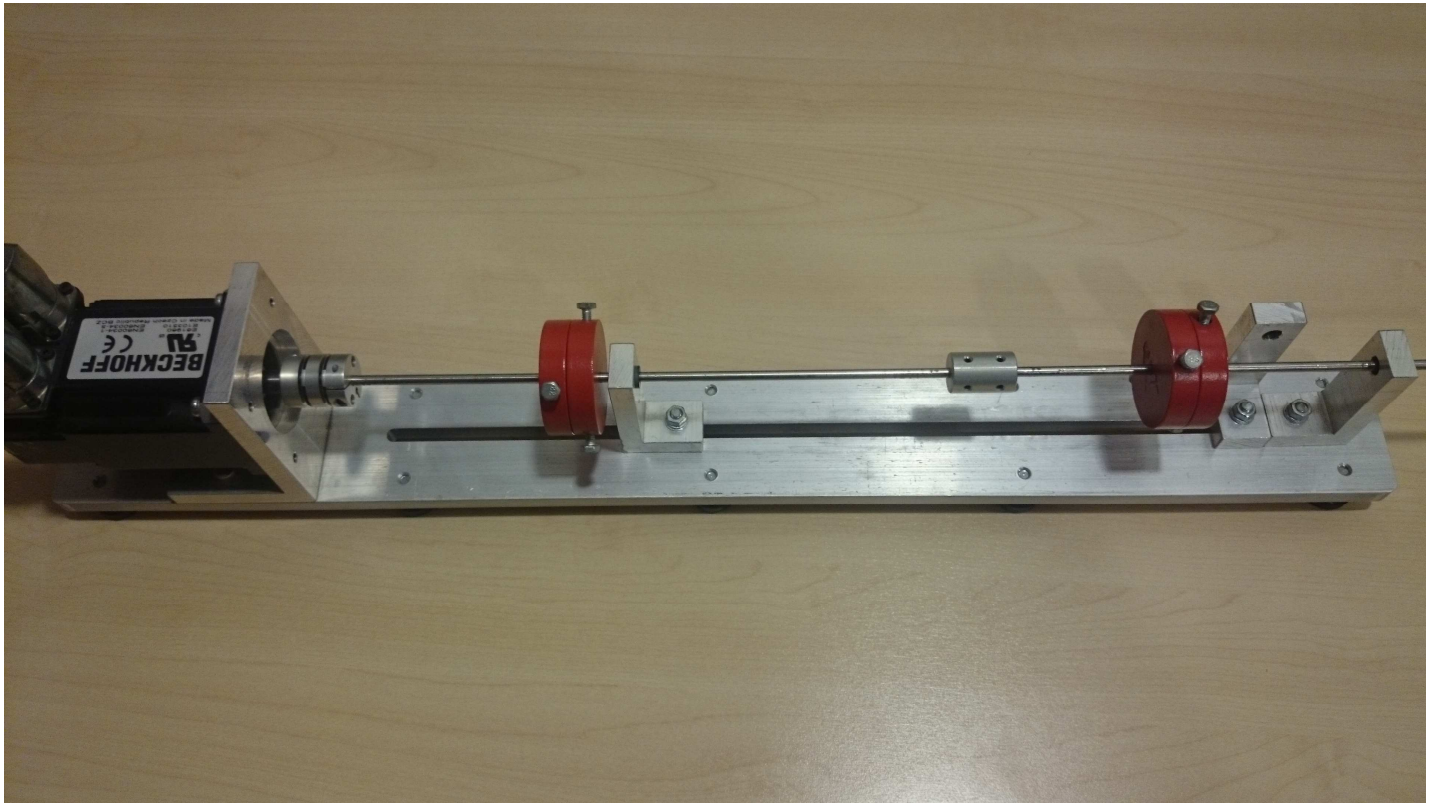
- A mechanic like this gives you two resonance points.



Some Questions?

The bode plot in AX5000

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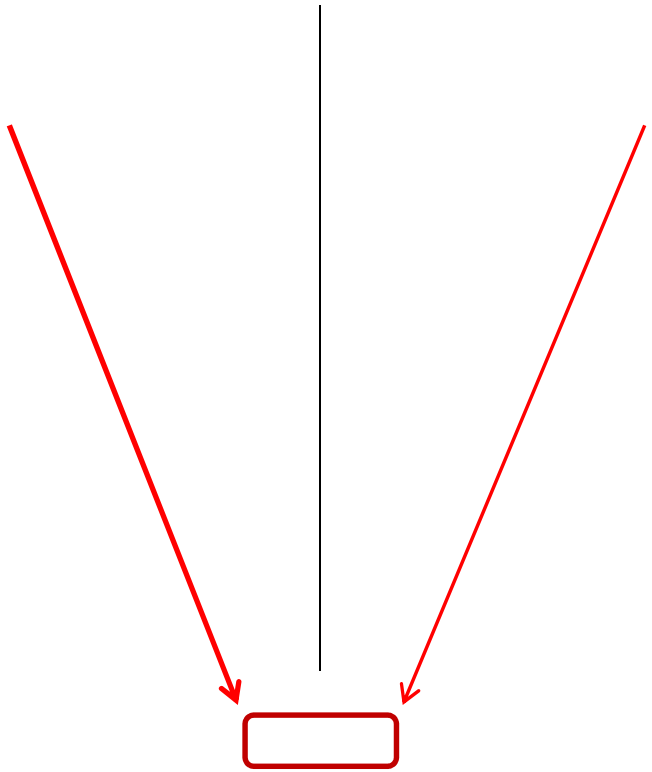
- Hope that you take more as this empty picture?



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