

AKD and TwinCAT 3 CNC EtherCAT Communication Test

| | |
|--|---|
| Pre-Work..... | 1 |
| Configuration Step | 2 |
| 1. Install Real-time Ethernet..... | 2 |
| 2. Add XML File..... | 2 |
| 3. Create Project..... | 2 |
| 4. Insert CNC Configuration..... | 3 |
| 5. Add CNC Axis | 4 |
| 6. Insert Channel | 4 |
| 7. Scan Device | 5 |
| 8. Link to CNC Axis..... | 5 |
| 9. Link to Drive and Choose Channel..... | 6 |
| 10. Activation Configuration | 6 |
| 11. Check Process data..... | 7 |
| 12. Modify Axis Parameter..... | 7 |
| 13. Add CNC Program..... | 8 |
| 14. Programming G-Code in HMI | 8 |
| Trouble Shooting..... | 9 |
| 1. Following Error so Big: | 9 |
| 2. F125 in AKD Drive..... | 9 |

AKD 与 TwinCAT 3 CNC 通讯实验

Pre-Work

HW: AKD drive /AKM motor / network card support EtherCAT /EtherCAT cable

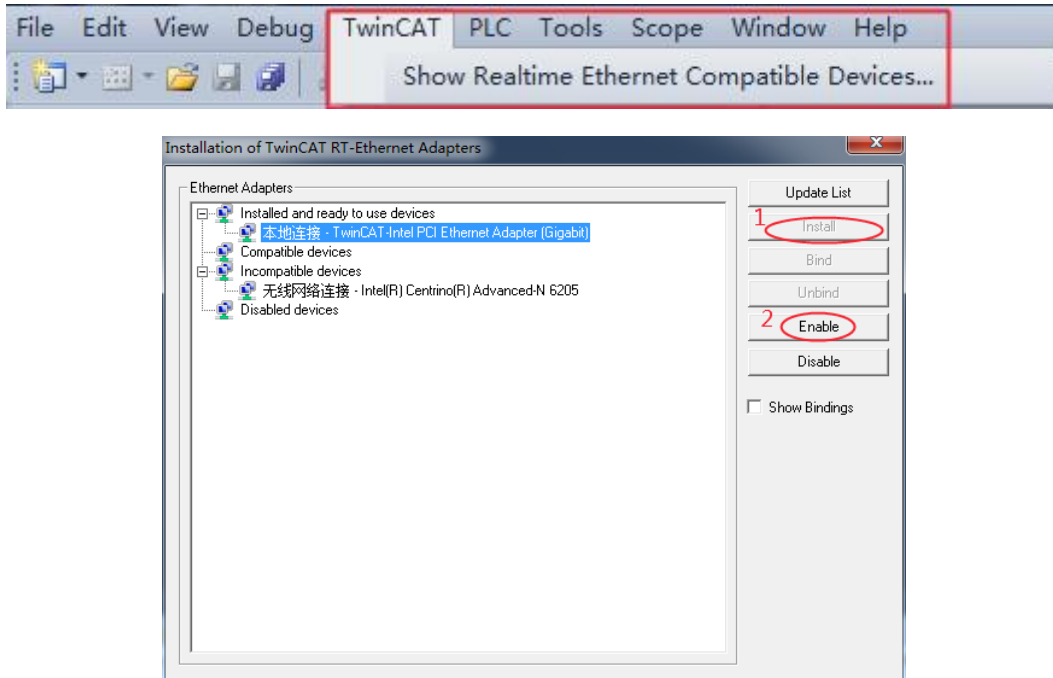
SW: TwinCAT3 /AKD Workbench

Wiring: Reference to AKD installation manual, using cable with shield.

Configuration Step

1. Install Real-time Ethernet

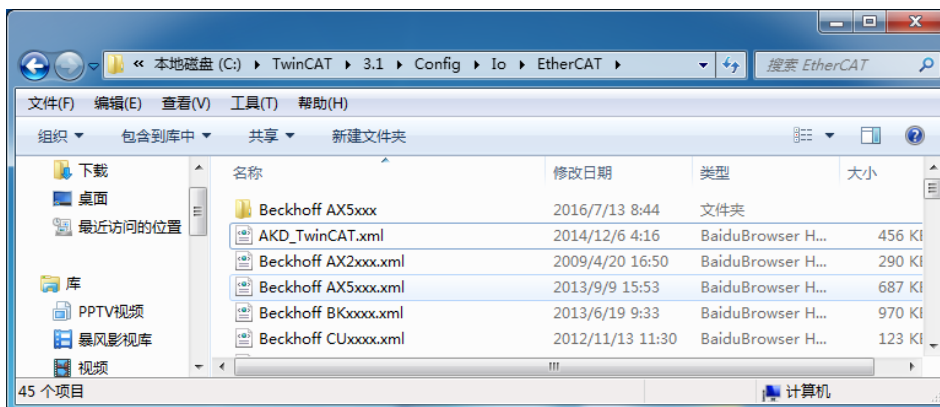
Open TwinCAT 3 software, check whether Ethernet adapters has correctly installed firstly, if not, click install and enable.



Please be noted that not all of the PC support EtherCAT, you can check if your device support EtherCAT communication on Beckhoff website.

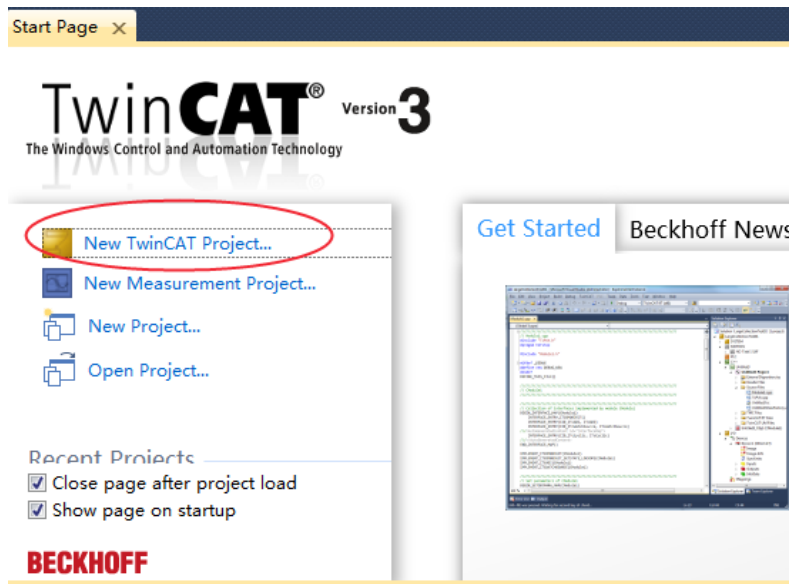
2. Add XML File

Add AKS.XML file in the folder C:\TwinCAT\3.1\Config\Io\EtherCAT, after that, you'd better restart the TwinCAT software before scan the IO device.

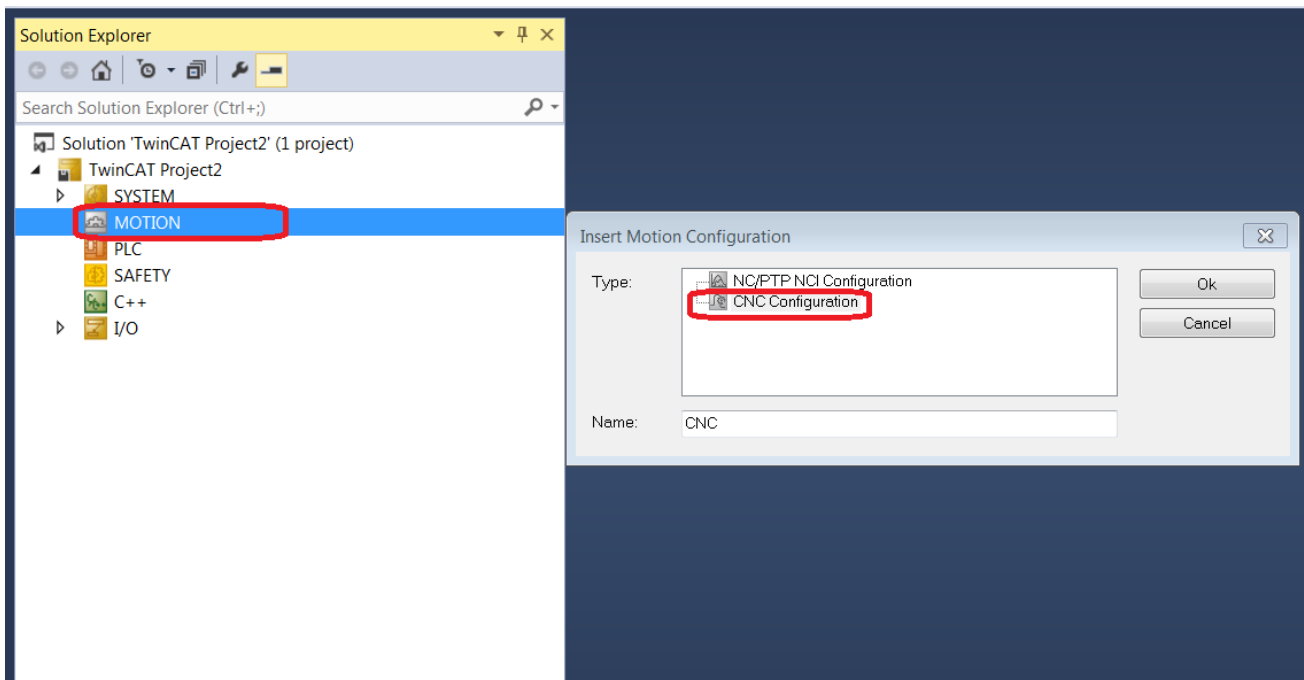


3. Create Project

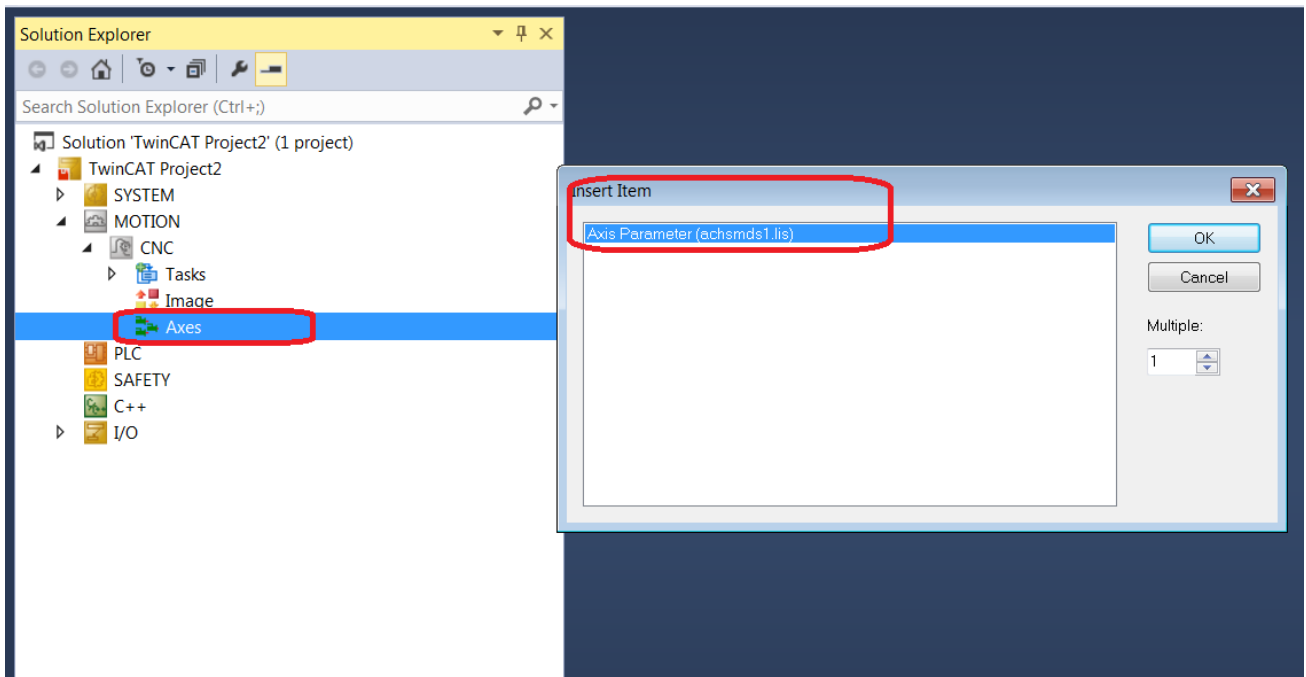
Add new project on the get started page.



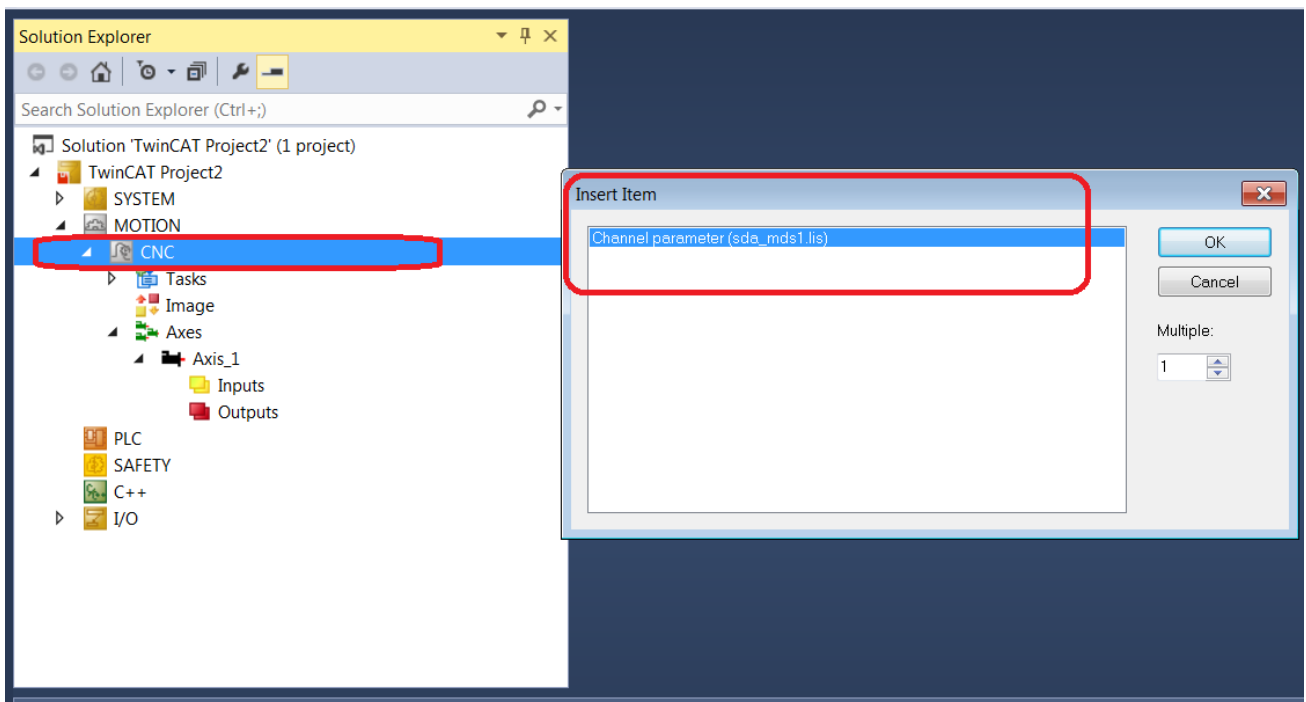
4. Insert CNC Configuration



5. Add CNC Axis

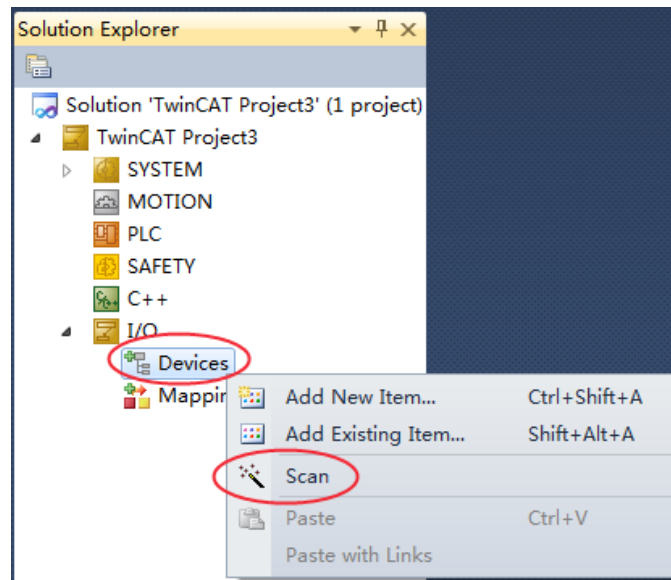


6. Insert Channel

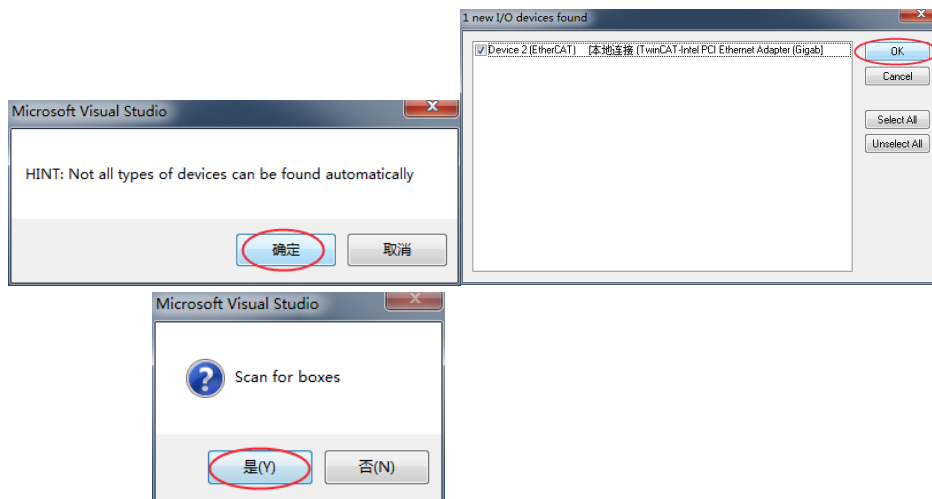


7. Scan Device

On configuration mode, ensure right wiring and add a right version XML file, then scan device.

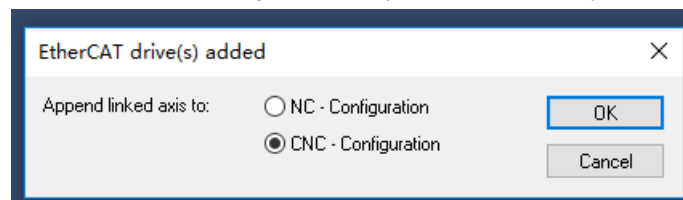


Choose as below

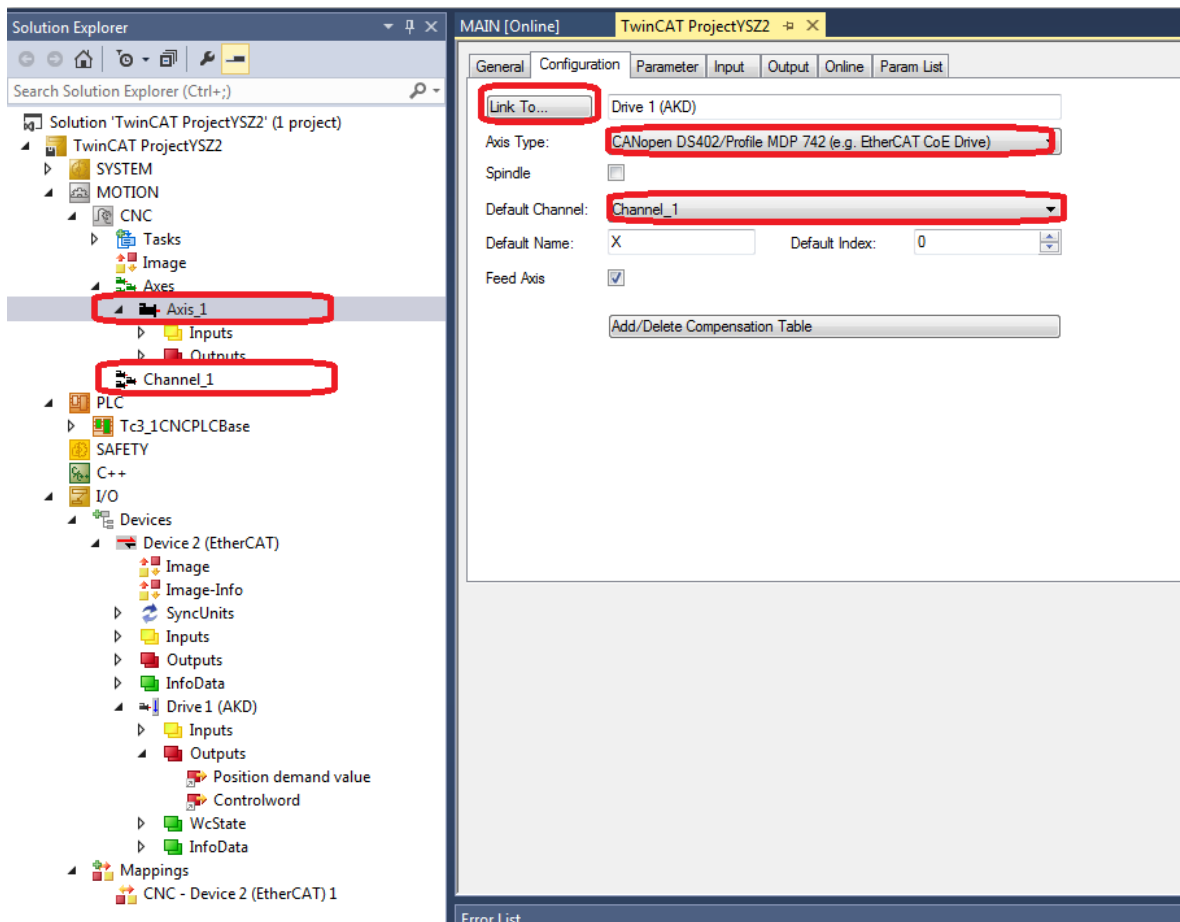


8. Link to CNC Axis

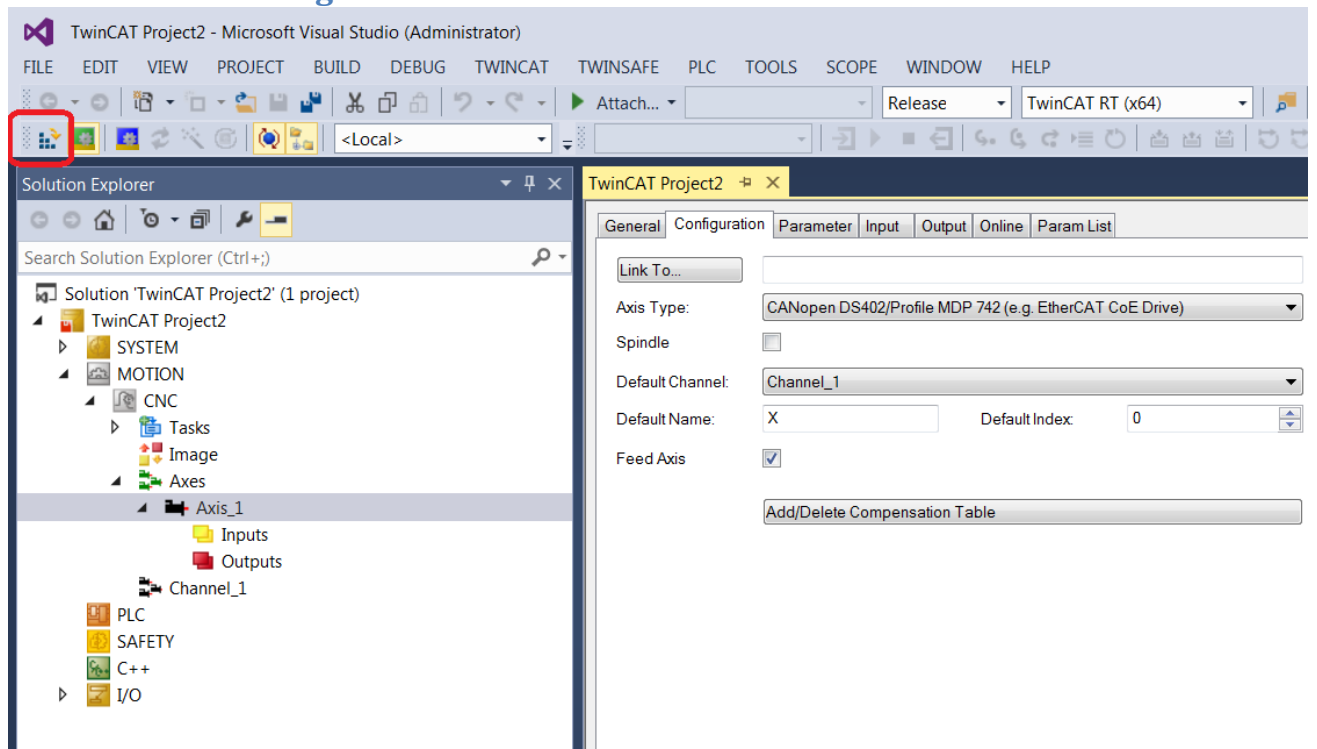
For NC control, you need to link to NC configuration, my document mainly talk about how to link to CNC.



9. Link to Drive and Choose Channel



10. Activation Configuration



11. Check Process data

Solution Explorer

Search Solution Explorer (Ctrl+)

- Solution 'TwinCAT Project2' (1 project)
 - TwinCAT Project2
 - SYSTEM
 - MOTION
 - CNC
 - Tasks
 - Image
 - Axes
 - Axis 1
 - Inputs**
 - Outputs
 - Channel_1
 - PLC
 - SAFETY
 - C++
 - I/O

TwinCAT Project2

| Name | Type | Size | >Ad... | In/O... | User... | Linked to |
|--|------|------|--------|---------|---------|-----------|
| If your all of configuration is right, you could see PDOs data from here. | | | | | | |
| Inputs: here you can see position feedback and statuses work | | | | | | |
| Outputs: here you can see position command and control work | | | | | | |

12. Modify Axis Parameter

For my drive and motor feedback, 1 motor rev=2²⁰=1048576

Solution Explorer

Search Solution Explorer (Ctrl+)

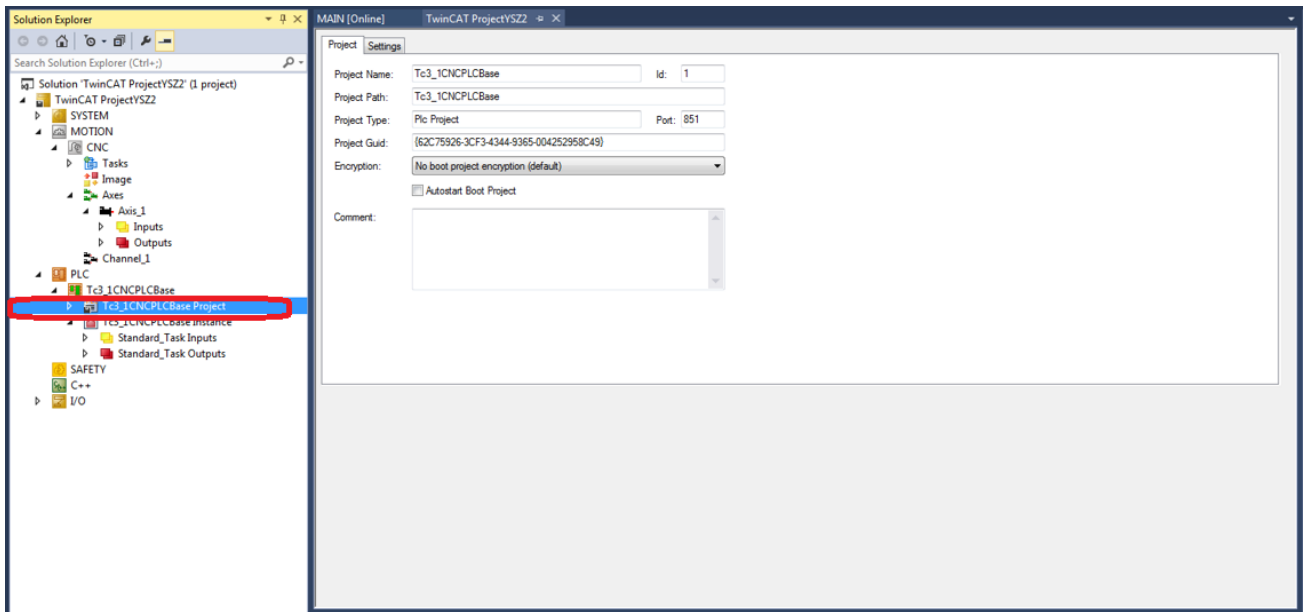
- Solution 'TwinCAT ProjectYSZ2' (1 project)
 - TwinCAT ProjectYSZ2
 - SYSTEM
 - MOTION
 - CNC
 - Tasks
 - Image
 - Axes
 - Axis_1
 - Channel_1
 - PLC
 - Tc3_1CNCPLCBase
 - SAFETY
 - C++
 - I/O
 - Devices
 - Device 2 (EtherCAT)
 - Image-Info
 - SyncUnits
 - Inputs
 - Outputs
 - InfoData
 - Drive 1 (AKD)
 - Inputs
 - Outputs
 - Position demand value
 - Controlword
 - WcState
 - InfoData
 - Mappings
 - CNC - Device 2 (EtherCAT) 1

MAIN [Online] TwinCAT ProjectYSZ2

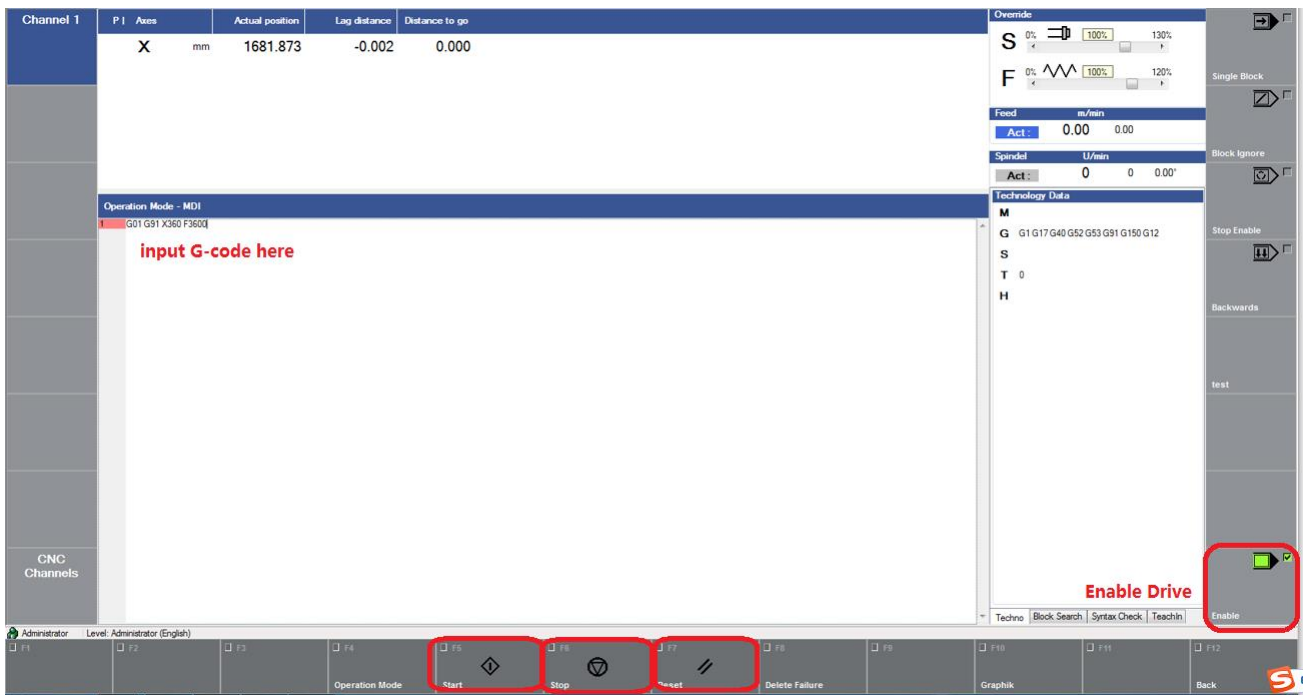
| Name | Value | Comment |
|-------------------------------------|---------|--|
| getriebe[0].besch_kernlinie n_grenz | 0 | (P-AXIS-00130: [10-3degree/s] Limit speed from which onwards the acceleration is specified in a polynomial form |
| getriebe[0].besch_kernlinie a_konst | 0 | (P-AXIS-00007: [degree/s ²] Constant acceleration in the range n-rn_grenz |
| getriebe[0].besch_kernlinie typ | 0 | (P-AXIS-00002: Type of the characteristic acceleration curve: 0=not active, 1=hyperbola, 2=polynomial, 3=asyn... |
| getriebe[0].besch_kernlinie a_min | 0 | (P-AXIS-00010: [degree/s ²] Minimum value of acceleration for high speed |
| getriebe[0].besch_kernlinie b.1 | 0 | (P-AXIS-00026: [1/s] Parameter 1 of the a(t) polynomial |
| getriebe[0].besch_kernlinie b.2 | 0 | (P-AXIS-00027: [1/degree] Parameter 2 of the a(t) polynomial |
| getriebe[0].besch_kernlinie b.3 | 0 | (P-AXIS-00028: [1/degree ²] Parameter 3 of the a(t) polynomial |
| ## | | |
| getriebe[0].vb_min_null | 10 | (P-AXIS-00216: [10-3degree/s] Limit for spindle speed "zero" |
| getriebe[0].vb_elgang | 100000 | (P-AXIS-00209: [um/s] or [10-3degree/s] Rapid mode velocity |
| getriebe[0].vb_max_red | 5000 | (P-AXIS-00214: [um/s] or [10-3degree/s] Reduced maximum speed at active G01,G2,G3 |
| getriebe[0].rapid_speed_red | 10000 | (P-AXIS-00155: [um/s] or [10-3degree/s] Reduced maximum speed at active G00 |
| getriebe[0].vb_refmax | 20000 | (P-AXIS-00219: [um/s] or [10-3degree/s] Maximum homing velocity |
| getriebe[0].vb_reflow | 2000 | (P-AXIS-00218: [um/s] or [10-3degree/s] Minimum homing velocity |
| getriebe[0].vb_regelgrenze | 3600000 | (P-AXIS-00220: [um/s] or [10-3degree/s] Limiting velocity for the measuring system |
| getriebe[0].kv | 4000 | (P-AXIS-00099: [0.01/s] Proportional factor kv for positional control in CNC |
| getriebe[0].m.ri_gain_z | 1800 | (P-AXIS-00129: Manipulated variable of drive (numerator) |
| getriebe[0].m.ri_gain_n | 1 | (P-AXIS-00128: Manipulated variable of drive (denominator) |
| getriebe[0].wegaufl | 1048576 | (P-AXIS-00234: [mm] Path resolution of the measuring system (numerator) |
| getriebe[0].wegaufln | 3600000 | (P-AXIS-00233: [0.1um] or [10-4degree] Path resolution of the measuring system (denominator) |
| getriebe[0].window | 1000 | (P-AXIS-00236: [0.1um] or [10-4degree] Control window at "Accuracy Stop" G50 |
| getriebe[0].pos_refpkt | 0 | (P-AXIS-00152: [0.1um] or [10-4degree] Position of the reference point with CNC controlled homing |
| getriebe[0].getr_schal_pos | 0 | (P-AXIS-00078: [0.1um] or [10-4degree] Gear change position, when switching is permitted |
| getriebe[0].acha_position[0] | 0 | (P-AXIS-00017: Special axis positions - not used at the moment |
| getriebe[0].acha_position[1] | 0 | (P-AXIS-00017: Special axis positions - not used at the moment |
| getriebe[0].acha_position[2] | 0 | (P-AXIS-00017: Special axis positions - not used at the moment |
| getriebe[0].wsl_meldung | 0 | (P-AXIS-00237: [mm] or [Degree] or [Rev.] Traverse distance |
| ## | | |
| getriebe[0].moduloo | 3600000 | (P-AXIS-00126: [10-4degree] Upper modulo limit |

Buttons: Import..., Export..., Notepad..., Append..., Insert..., Download..., Upload..., Comment..., Delete..., Edit...

13. Add CNC Program

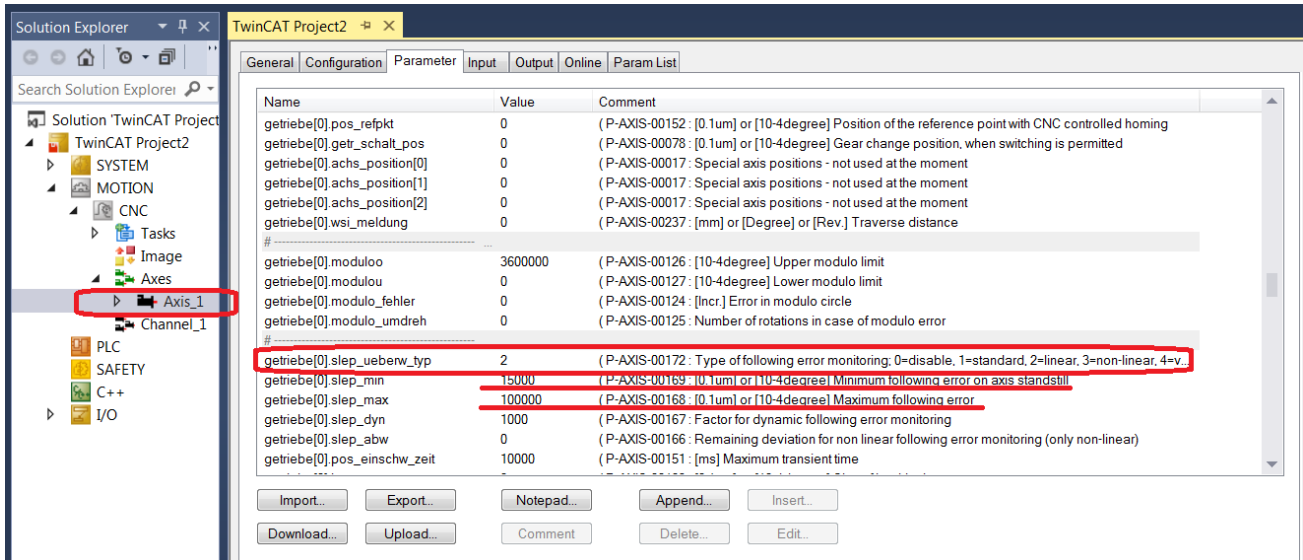


14. Programming G-Code in HMI



Trouble Shooting

1. Following Error so Big:



Set maximum following error bigger or disable following error monitor

2. F125 in AKD Drive

Check EtherCAT cable or Check AKD drive Fieldbus.Parameter set up.