

Instruction Manual JS_MC_REF with XENAX® Xvi for EtherCAT® and TwinCAT®3

Version 2.4

Edition 26. May 2021



EtherCAT®

XENAX® Ethernet servo controller with
EtherCAT® Busmodul

Functional Safety, TÜV certified
Force processes with „Force Limitation“,
„Force Monitoring“ and „Force Control“

Introduction

This manual describes the integration of the XENAX® servo controller with EtherCAT® bus modules in a Beckhoff system with TwinCAT® 3 by using the Jenny Science **M**otion **C**ontrol **R**eference (JS_MC_REF) function.

This document contains an example of the configuration, program integration and test run.

General

This manual describes only the use of the XENAX® with the internal library of TwinCAT® 3 and the JS_MC_REF function. Additional XENAX® features like Forceteq® basic or pro can be used by applying the **Jenny Science Motion Control Library** (JS_MC_LIB). In addition to that, the Jenny Science motion library allows to operate an axis without the need for a virtual NC-Axis. The manual for the Jenny Science library can be found on the website <http://www.jennyscience.ch> under PLCopen Library.

This document also includes the set-up of an NC_I channel configuration as well as that of a Gantry system.

XENAX® can be simply and quickly operated with the intuitive graphical user interface WebMotion®.

We will gladly answer any questions you may have or provide you with additional information.

Alois Jenny
Jenny Science AG

Contents

1 Development Environment	5
1.1 Beckhoff	5
1.1.1 Programmable Logic Controller	5
1.1.2 TwinCAT® Version 3	5
1.2 Jenny Science	6
1.2.1 XENAX® servo controller	6
1.2.2 LINAX® Linear motors	6
1.2.3 ELAX® Linear motor slides	6
1.2.4 ROTAX® Rotary motor axes	6
1.2.5 WebMotion	7
1.3 Status LED's of EtherCAT bus module	7
1.4 Additional Material	7
1.5 Software Requirements	7
1.6 Cabeling	8
2 Library and Drive Mode	8
2.1 Cyclic Synchronous Position Mode	8
2.2 State Machine	9
2.3 JS_MC_REF	10
3 Example Project in TwinCAT3	10
3.1 List of Demo Applications	10
3.1.1 Sample_TC3_NC_PTP	10
3.1.2 SampleGantry_TC3_NC_PTP	10
3.2 Open Project	11
3.3 ESI XML Installation	11
3.4 JS_MC_REF Library Installation	11
3.5 Choose Target System	12
3.6 Scan for Devices	12
3.7 Realtime Settings	14
3.8 Launch Demo Project	14
4 New Project in TwinCAT3	15
4.1 Create Project	15
4.1 ESI XML Installation	15
4.2 JS_MC_REF Library Installation	16
4.3 Choose Target System	16
4.4 Scan for Devices	17
4.5 Cycle Time	17
4.6 Virtual Axis Configuration	18
4.7 Manual Control	19

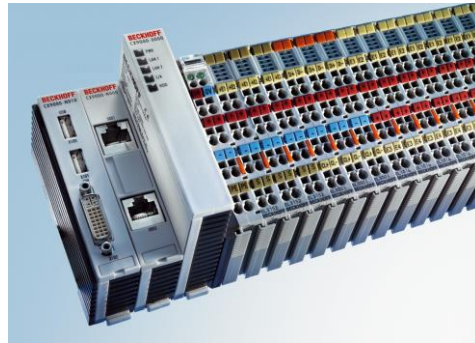
4.8 PDO-Mapping	21
4.8.1 Required PDO's	21
4.8.2 Optional PDO's	21
4.8.3 Target Velocity	22
4.8.4 Torque (Acceleration) Offset	23
5 Replacing Xvi 75V8 by Xvi 75V8S	24
5.1 ESI XML Installation	24
5.2 Change Type	24
6 NC-I Configuration (optional)	25
6.1 Insert NC Channel	25
6.2 SAF cycle time divisor	26
6.3 Assignment	26
6.4 NC Program	27
7 Gantry (optional)	28
7.1 Activate Gantry Mode	28
7.2 Linking Target Position	28

1 Development Environment

1.1 Beckhoff

1.1.1 Programmable Logic Controller

Beckhoff control technology is scalable – from Industrial PCs to PLCs – and can be accurately adapted to your application. The automation software integrates real-time control with PLC, NC and CNC functions.



1.1.2 TwinCAT® Version 3

In order to program Beckhoff PLCs the development software for automation TwinCAT® 3 is required.

TwinCAT® 3 uses the Visual Studio Framework and all explanations in this instruction manual are based on it.



1.2 Jenny Science

1.2.1 XENAX® servo controller

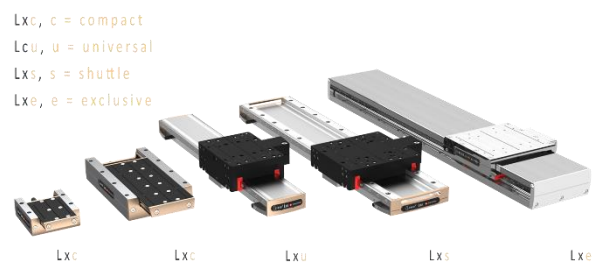
XENAX® servo controller for Jenny Science Axis with integrated EtherCAT® bus module. The bus module is optional but it is required for this application. One XENAX® can control one axis. The XENAX® servo controller recognises all Jenny Science motors and configures the parameters correctly.



1.2.2 LINAX® Linear motors

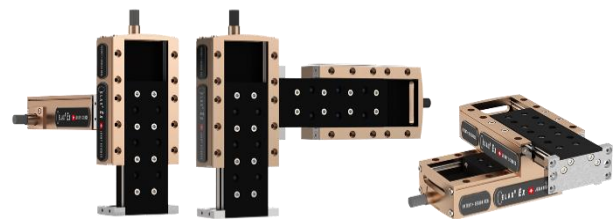
The LINAX® linear motor axes are highly modular and can be flexibly combined amongst each other. Four different series are available.

Lxc = compact
Lxu = universal
Lxs = shuttle
Lxe = exclusive



1.2.3 ELAX® Linear motor slides

Specifically designed for handling and Pick and Place tasks with strokes from 30mm up to 150mm. The configuration is extremely modular and there is only one cable to the XENAX® servo controller.



1.2.4 ROTAX® Rotary motor axes

Specifically designed for fast and precise assembly and handling tasks. It can be equipped with standard gripping tools which enables a 360° rotation and has a hollow shaft feedthrough for vacuum or compressed air.

Rxvp = vacuum pressure
Rxhq = high torque



1.2.5 WebMotion

This is the graphical user interface from Jenny Science. It is stored in the embedded Web server of the XENAX® servo controller.

WebMotion® is launched with a web browser by entering the corresponding TCP/IP address of XENAX®.

LINAX® linear motor axes, ELAX® linear motor slides or ROTAX® rotary motor axes are automatically recognized. The corresponding controller parameters are saved and loaded automatically. With the Quick Start button, the linear motors can operate immediately. No user manual is needed.

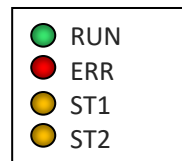
Before the XENAX® controller can be used with the Beckhoff PLC via EtherCAT®, a set-up must be made via WebMotion®. This includes the set-up of a payload, soft limits, etc.

For further information on the set-up of a linear motor axis please refer to the instruction manual or the tutorial video that can be found on

<https://www.jennyscience.ch/en/applications/videos>.



1.3 Status LED's of EtherCAT bus module



LED Status	RUN	ERR	ST1 (Jenny Science specific)	ST2 (Jenny Science specific)
<OFF>	Initialisation state or no power	Bus module operable	-	Bus module ready
<ON>	Operational state	State bus off	No application in the flash	-
<BLINK>	Pre-operational state	Internal Eeprom blank	-	Protocol download in progress

1.4 Additional Material

The following data is needed for a successful operation of the XENAX® servo controller with a EtherCAT bus module:

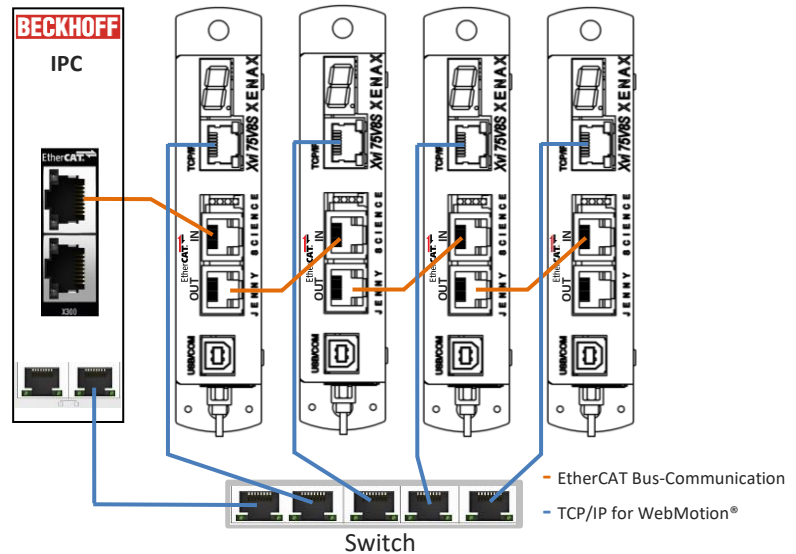
Filename	Description
Xenax_EtherCAT_Xvi_.xml	Jenny Science ESI-File/XML device description for TwinCAT. The ESI-file can be downloaded on our website www.jennyscience.ch „XENAX® Servo controller“ and „Firmware Bus Module“
JS_MC_REF.compiled-library	Jenny Science Motion Control Reference Function as compiled library. The library is part of the folder in which this manual is located.
CANopen Ethernet Manual_.pdf	Manual describes the CANopen communication profile CiA DS301 as well as the device profile CiA DS402 including all available parameters.

1.5 Software Requirements

Software	Version
TwinCAT® 3 Automation Software	3.1.4020.0 or later
XENAX Firmware	V5.08 or later
EtherCAT Bus-Module	V2.66 or later

1.6 Cabeling

The EtherCAT bus is connected with the XENAX® servo controller (IN/OUT). For easy commissioning and maintenance, a TCP/IP connection to each servo controller is recommended for access to the WebMotion®.



2 Library and Drive Mode

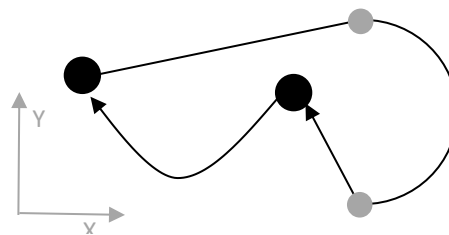
Jenny Science provides a function block (JS_MC_REF) for referencing the axis and use the XENAX® with the internal library of TwinCAT® 3 in Cyclic Synchronous Position Mode.

2.1 Cyclic Synchronous Position Mode

In the cyclic synchronous position mode, the target position is passed to the XENAX® servo controller at cyclic time intervals (for example every millisecond).

The trajectory (driving curve) is calculated on the Beckhoff PLC. For this reason, a virtual Axis for each Axis is needed. This enables full control over the driving curve. Thanks to the **virtual nc-axis**, round curves or other complex driving paths are now possible.

XY-Axis Cyclic Synchronous Position



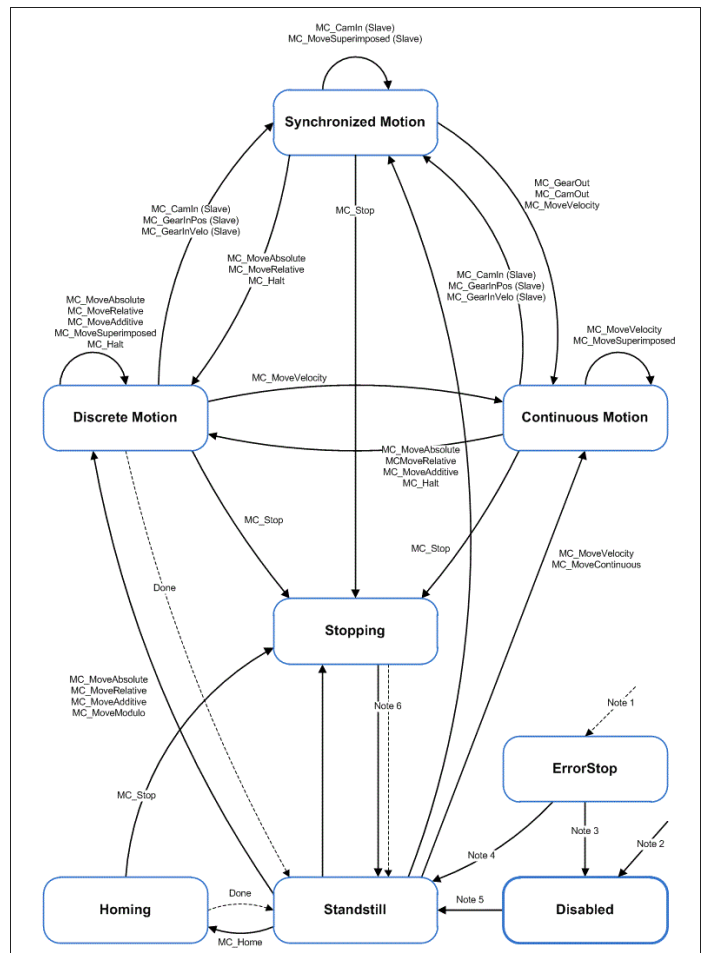
Full control over Axis movement. Two grey circles show a change in direction and speed without a stop.

2.2 State Machine

The following state diagram defines the behaviour of an axis in situations where several function blocks are simultaneously active for this axis. The combination of several function blocks is useful for generating more complex motion profiles or for dealing with exceptional situations during program execution.

Each motion command is a transition that changes the state of the axis and, as a consequence, influences the method of calculation of the current movement.

All function blocks which do not appear in the state diagram, do not affect the state of the axis. The current state of the axis can be determined with the function block “MC_ReadStatus” of the virtual Axis.



Note	Comment
Note 1	From any state in which an error occurs
Note 2	From any state if MC_Power.Enable = FALSE and the axis has no error
Note 3	MC_Reset and MC_Power.Status = FALSE
Note 4	MC_Reset and MC_Power.Status = TRUE and MC_Power.Enable = TRUE
Note 5	MC_Power.Status = TRUE and MC_Power.Enable = TRUE
Note 6	MC_Stop.Done= TRUE and MC_Stop.Execute = FALSE

2.3 JS_MC_REF

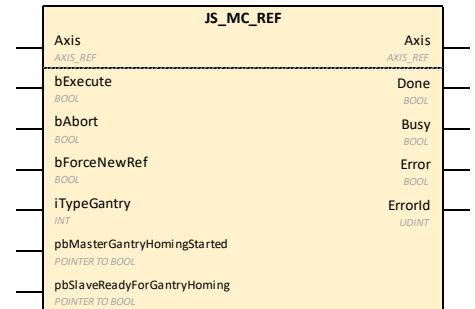
Performs a reference drive. The goal of the reference drive is to find the absolute position of the axis.

The axis either drives to a mechanical stopper or to a Z-Mark indicator on the scale.

Inputs	
bExecute	Executes the reference with positive edge
bAbort	Aborts the function
bForceNewRef	FALSE=Normal (only one homing at the beginning) TRUE=Force a new homing
iTypeGantry	0=Normal, 1=Gantry Master, 2=Gantry Slave
pbMasterGantryHomingStarted	Use only on Gantry-Slave. Pointer to internal variable of GantryMasterBlock to indicate that homing of master has started
pbSlaveReadyForGantryHoming	Use only on Gantry-Master. Pointer to internal variable of GantrySlaveBlock to indicate that slave is ready to started

Outputs	
Done	Reference successfully done
Busy	Busy, not in initial state
Error	Error flag
ErrorId	Error code

IN/OUT	
Axis	Reference to the axis



3 Example Project in TwinCAT3

This chapter describes how to put a Jenny Axis into operation. Example projects are used for this purpose.

3.1 List of Demo Applications

3.1.1 Sample_TC3_NC_PTP

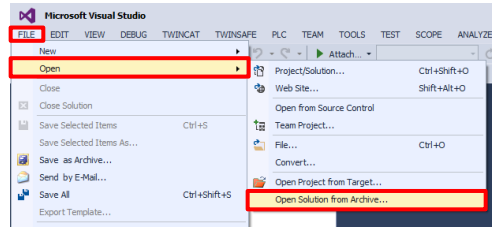
References the axis and moves to two alternating positions.

3.1.2 SampleGantry_TC3_NC_PTP

References a Gantry-System and moves with different speed to alternating positions. A gantry system must first be commissioned using the WebMotion. Please read the details in the chapter "7 Gantry (optional)".

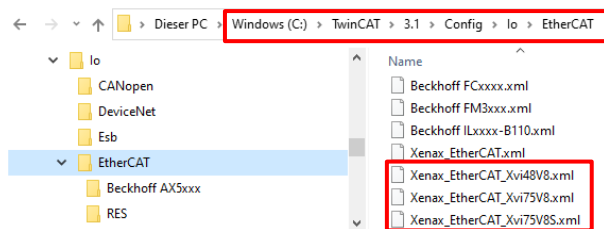
3.2 Open Project

Start TwinCAT3, select “Open Solution from Archive”, choose the demo project and save it to your project folder. It is recommended to start with the “Single Axis” example project.

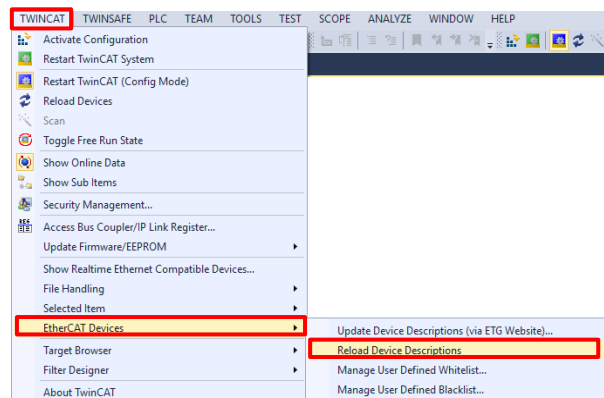


3.3 ESI XML Installation

The EtherCAT Slave Information XML for the XENAX should always be completely unpacked into the ESI-directory of the EtherCAT master. In TwinCAT 3 these files are located in `\TwinCAT\3.1\Config\Io\EtherCAT`. This ESI file can be downloaded from www.jennyscience.ch under “XENAX Servocontroller->Firmware Bus Module->EtherCAT”.

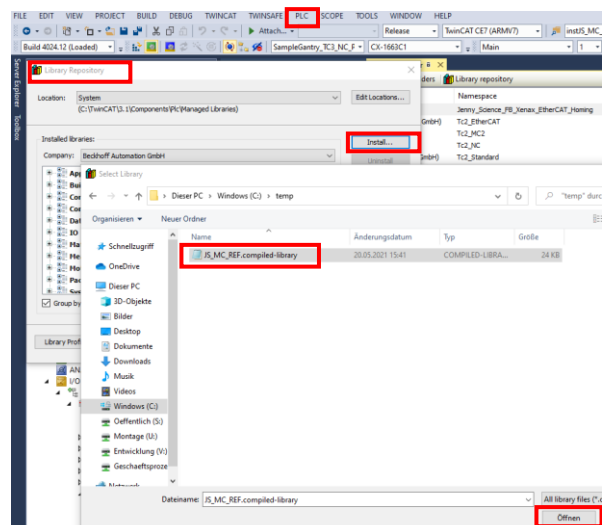


Load ESI file into TwinCAT.
„TwinCAT→EtherCAT Devices→Reload Device Descriptions“



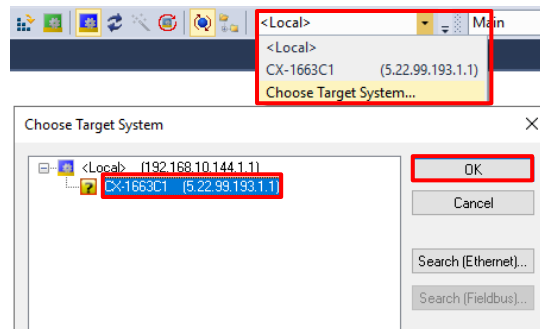
3.4 JS_MC_REF Library Installation

“PLC→Library Repository→Install...”
Open the “JS_MC_REF.compiled-library” from the downloaded folder.

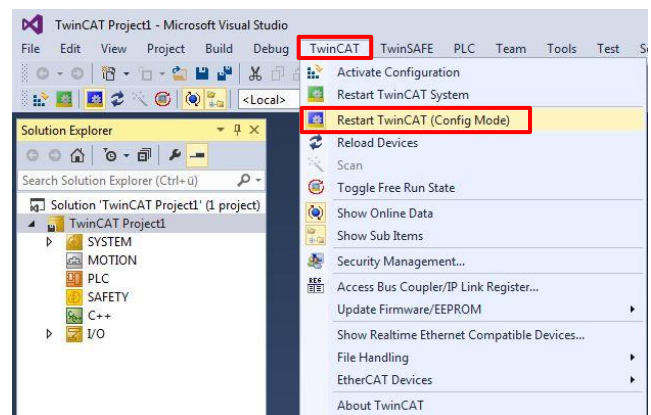


3.5 Choose Target System

Choose the target system to connect to a Beckhoff PLC.

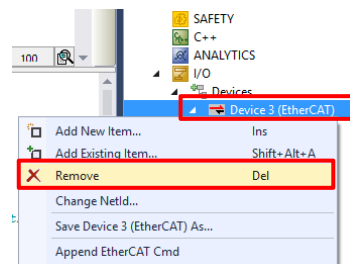


Set the system into Configuration Mode

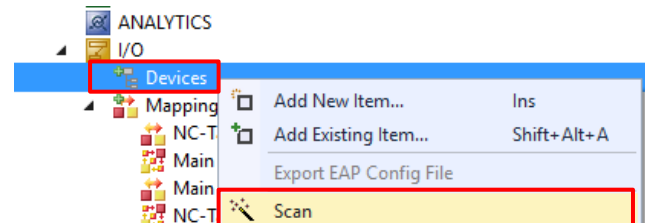


3.6 Scan for Devices

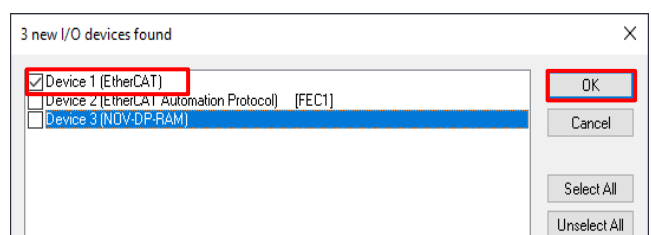
In the example project, the existing devices must be removed first. Right click on "Device X(EtherCAT)" and select remove.



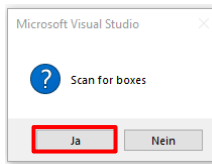
Then right click on Devices and select scan.



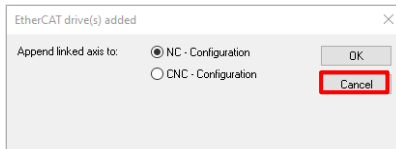
Select desired network interface card.



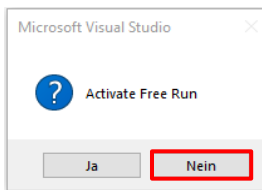
When „Scan for boxes“ appears
→ Press YES (JA)



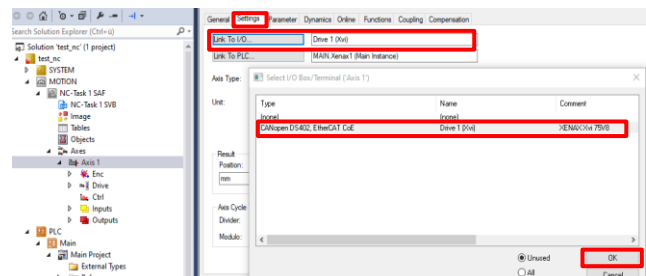
TwinCAT wants to add a Virtual Axis. Press cancel.
The example project already contains a virtual axis if one is needed.



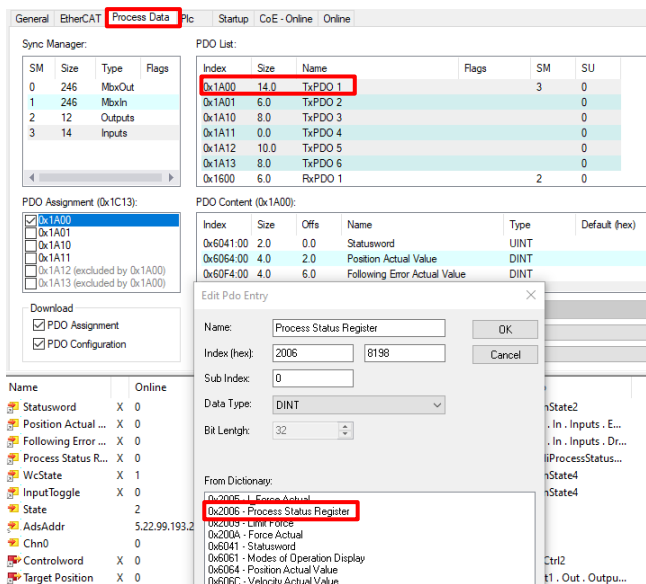
When „Activate Free Run“ appears
→ Press No (Nein)



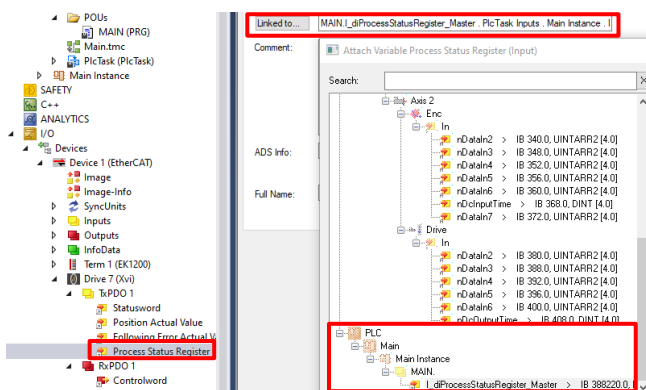
Link the virtual axis with “Link To I/O” to the real axis. The PDO mapping is done automatically.



Only for the “SampleGantry_TC3_NC_PTP”:
The ProcessStatusRegister PDO of both Gantry-Axis
must be added and linked manually.

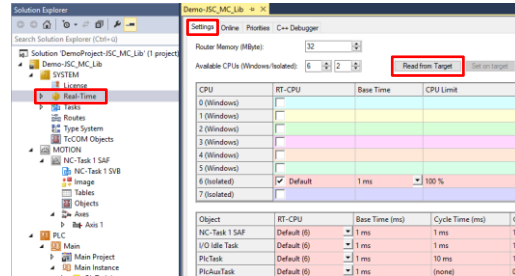


Link to I-dProcessStatusRegister_Master or Slave of
the Main.

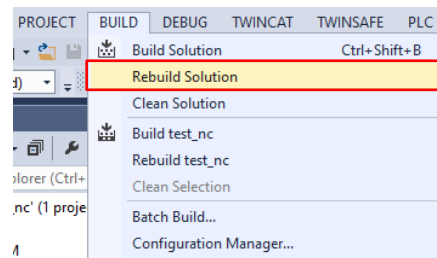


3.7 Realtime Settings

Double click Real-Time and press “Read from Target”.
This will assign the PLC tasks to a free CPU on the target device.



Compile project with
„Build→Rebuild Solution“
There must be 0 errors!

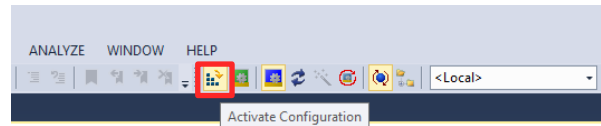


Sometimes, the project must be closed and opened again to apply the new realtime settings.

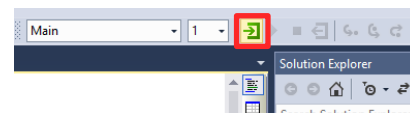


3.8 Launch Demo Project

Launch the example project by activating the configuration.

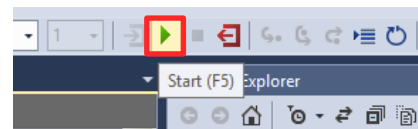


go online



start program

The Axis will start moving. Make sure that nothing can be damaged.

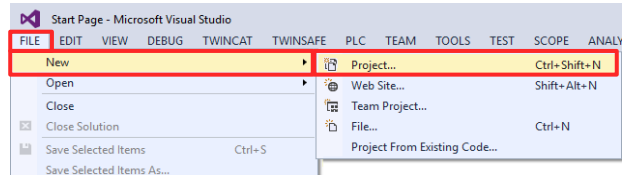


4 New Project in TwinCAT3

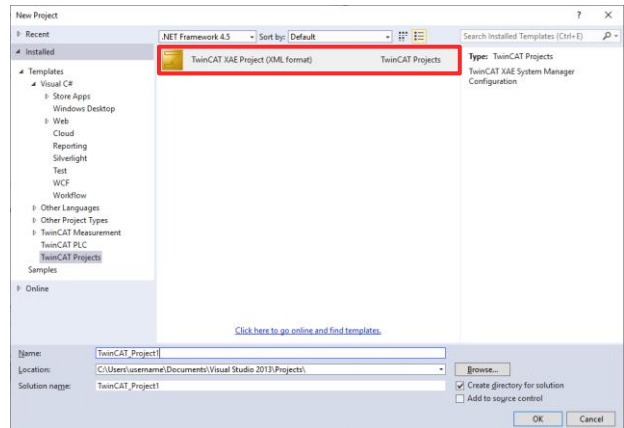
This chapter describes how to put a Jenny Science axis into operation without a demo project. It is possible to create a new project or to add a Jenny Science axis into an existing project.

4.1 Create Project

File→New→Project...

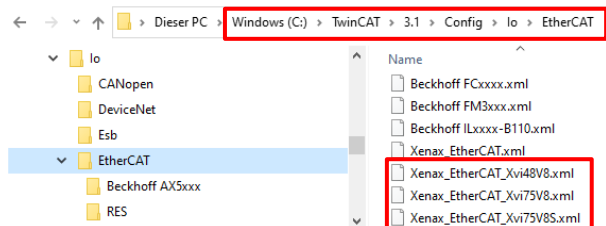


Create a new TwinCAT XAE Project.

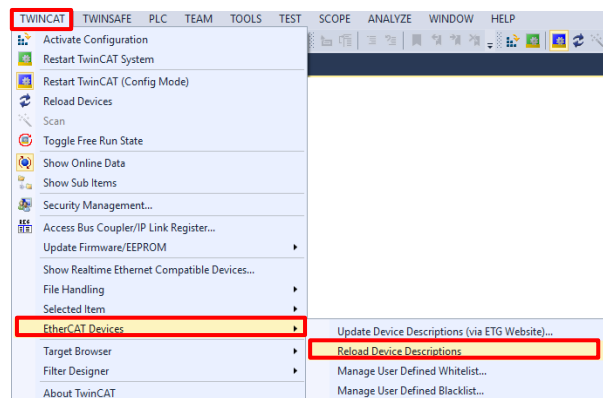


4.1 ESI XML Installation

The EtherCAT Slave Information XML for the XENAX should always be completely unpacked into the ESI-directory of the EtherCAT master. In TwinCAT 3 these files are located in `\TwinCAT\3.1\Config\Io\EtherCAT`. This ESI file can be downloaded from www.jennyscience.ch under "XENAX Servocontroller->Firmware Bus Module ->EtherCAT".

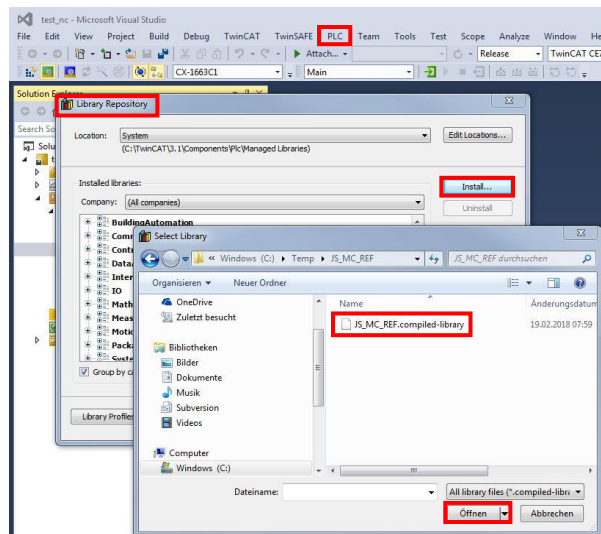


Load ESI file into TwinCAT.
„TwinCAT→EtherCAT Devices→Reload Device Descriptions“



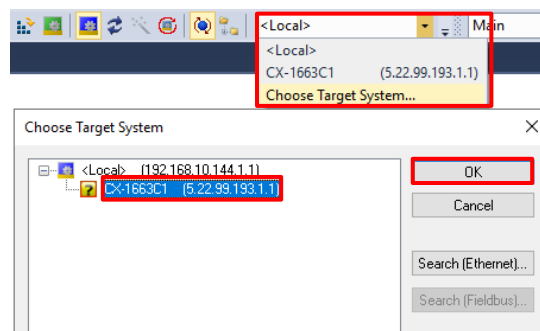
4.2 JS_MC_REF Library Installation

“PLC→Library Repository→Install...”
Open the “JS_MC_REF.compiled-library” from the
downloaded folder.

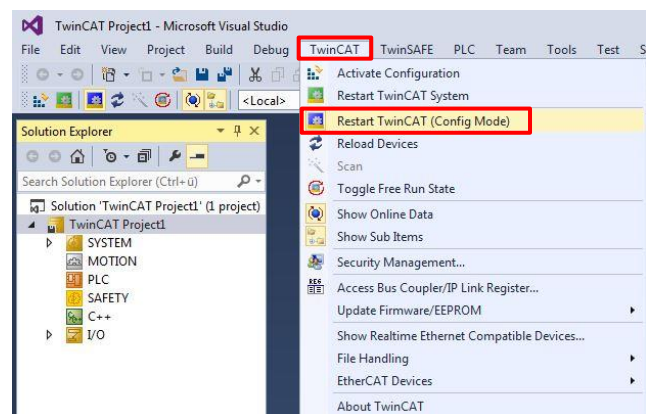


4.3 Choose Target System

Choose the target system to connect to a Beckhoff
PLC.

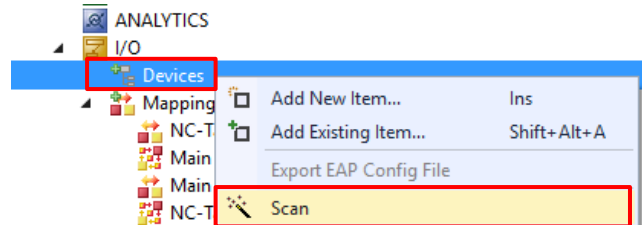


Set the system into Configuration Mode

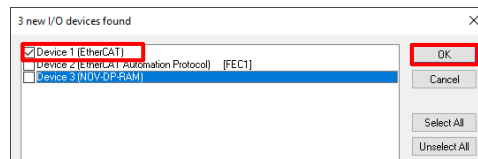


4.4 Scan for Devices

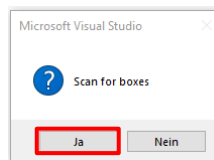
Right click on Devices and select scan.



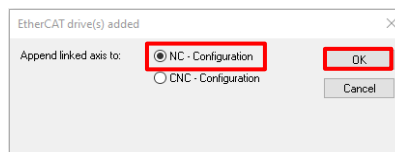
Select desired network interface card.



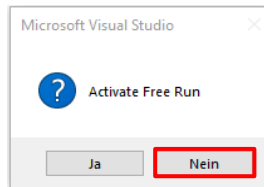
When „Scan for boxes“ appears
→ Press YES (JA)



Choose “NC – Configuration” for cyclic synchronous position mode. A virtual NC-Axis will be generated and linked automatically.

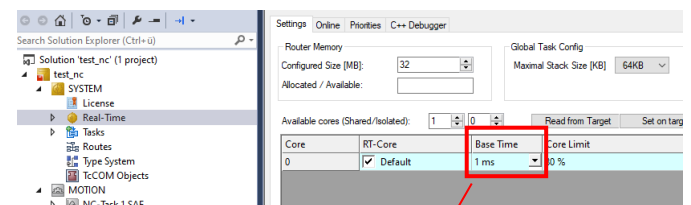


When „Activate Free Run“ appears
→ Press No (Nein)

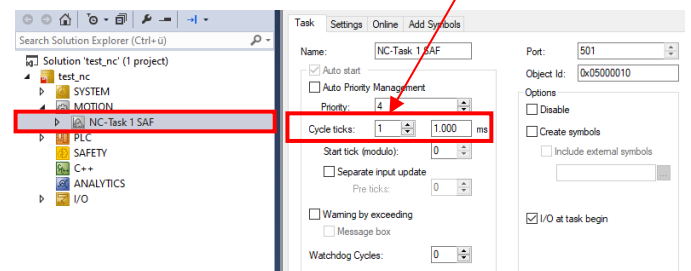


4.5 Cycle Time

In „SYSTEM→Real-Time“ (Tab Settings) set the base time of the CPU.



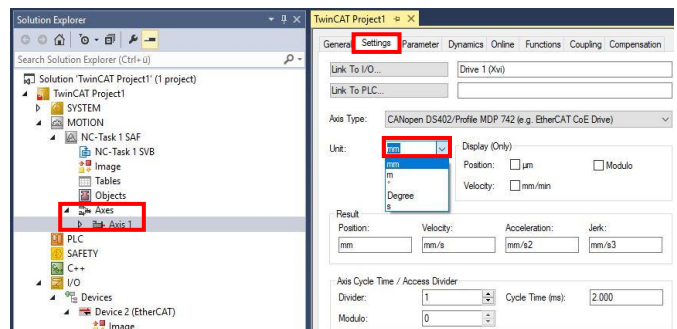
In the cyclic synchronous position mode, the cycle tick on the bus can be set in „MOTION→NC-Task 1 SAF“. This time can only be greater than or equal to the base time. This is the objects transmission cycle.
Possible values are from 200us to 2ms.
Typical is 1ms.
Only multiples of 100us are allowed.



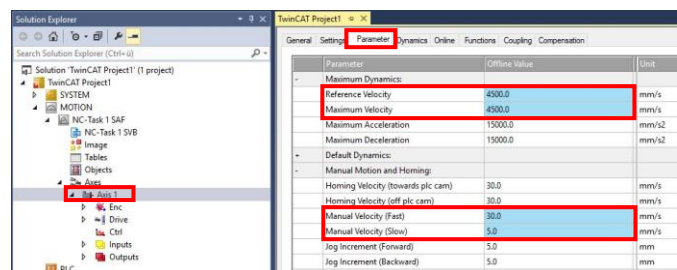
4.6 Virtual Axis Configuration

Select the position measuring unit in the NC-Axis Settings.

Linear Axis: **mm**
Rotary Axis: **Degree**



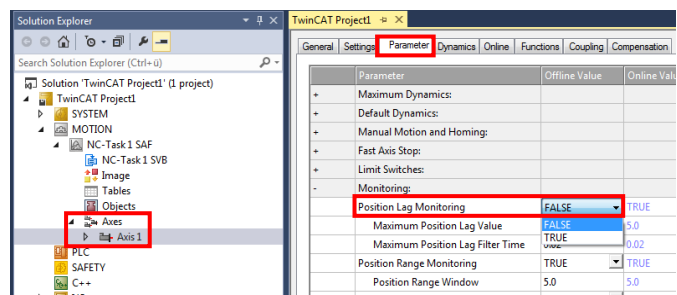
Set the velocity parameters according to the table



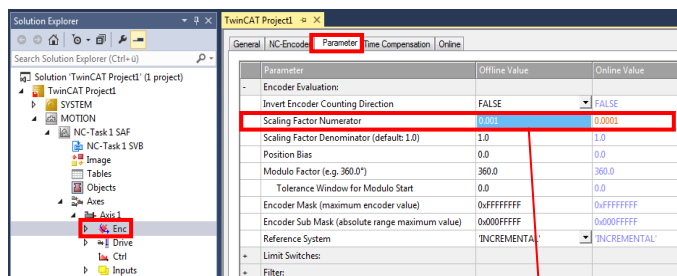
Motor typ	Scale resolution	Reference Velocity [mm/s]	Maximum Velocity [mm/s]	Manual Velocity (Fast) [mm/s]	Manual Velocity (Slow) [mm/s]
LINAX®, ELAX®	1 um/inc	4500.0	4500.0	30.0	5.0
LINAX®	100 nm/inc	900.0	900.0	30.0	5.0
ROTAX® Rxvp	0.005625 deg/inc	9000.0	9000.0	90.0	15.0
ROTAX® Rxhq	0.003 deg/inc	7200.0	7200.0	90.0	15.0

Before referencing the axis with the XENAX® servo controller, „Position Lag Monitoring” has to be disabled.

Set “Position Lag Monitoring” to FALSE under Parameters.

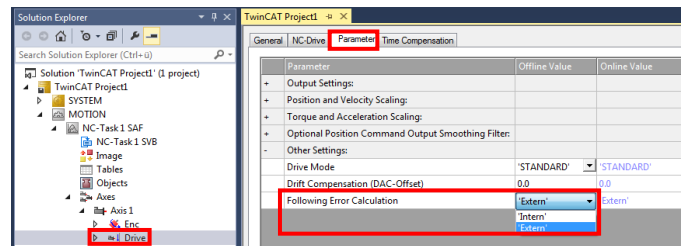


Adjust „Scaling Factor Numerator” to the resolution of the used motor.

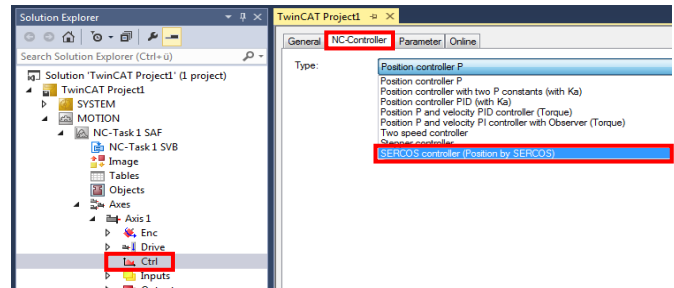


Motor typ	Scale resolution	Scaling factor Numerator
LINAX®, ELAX®	1 um/inc	0.001
LINAX®	100 nm/inc	0.0001
ROTAX® Rxvp	0.005625 deg/inc	0.005625
ROTAX® Rxhq	0.003 deg/inc	0.003

In Axis Drive set, „Following Error Calculation“ to „Extern“

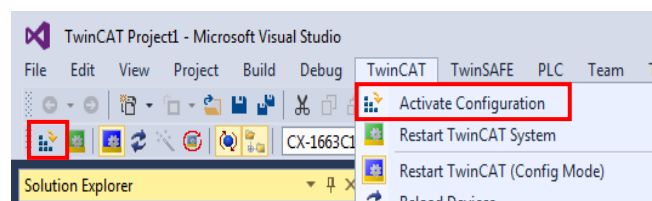


Since the XENAX® servo controller has an integrated NC-controller, the internal controller has to be disabled by selecting „SERCOS controller (Position by SERCOS)“ under „CN-Controller“, „Ctrl“.



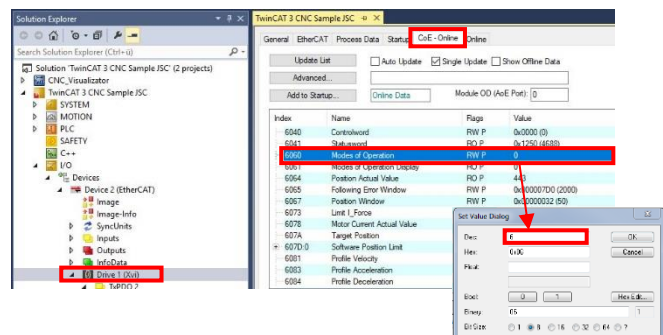
4.7 Manual Control

The configuration is activated by pressing on the highlighted icon.
The following two messages “Activate Configuration” and “Restart TwinCAT System in Run Mode” can be answered with OK.

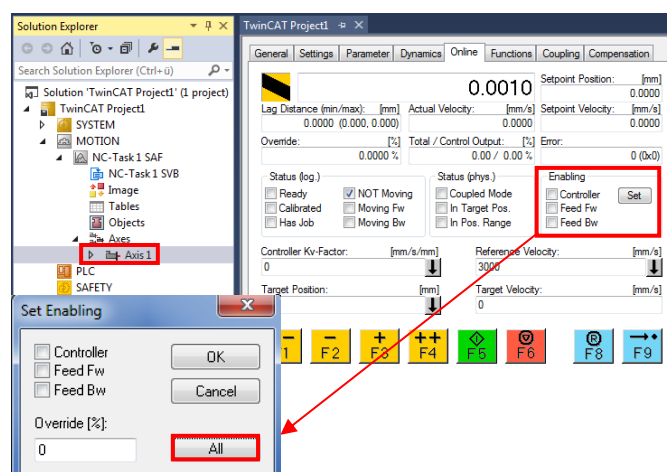


In “I/O→Devices→Device 1(EtherCAT)→Drive 1”, tab: CoE – Online, double-click on object “6060”.

When the window “Set Value Dialog” is opened, activate the reference mode by putting the object “6060” on 6. This reference mode has to be activated each time the XENAX® servo controller is restarted.

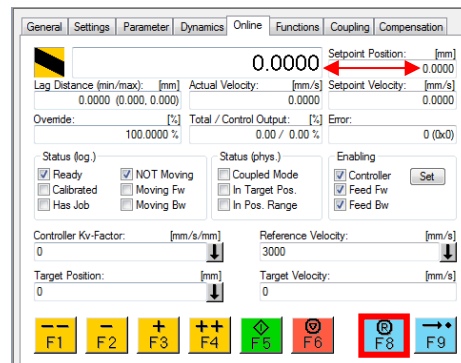


In “MOTION→NC-Task 1 SAF→Axes→Axis 1”, tab: Online, the value (position) in the picture, should appear in black. If the value (position) appears in grey, there are communication problems between Beckhoff and XENAX® over EtherCAT. Please check the connection, the power supply and the settings.

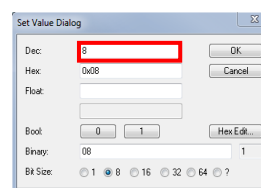


In “Enabling”, press “Set”. Then press “All” in the window that was opened. This window will be closed automatically. The motor will be unlocked and the reference will be executed.

Please wait until the linear motor axis is again in standstill.
Transfer the absolute position of the axis to TwinCAT by pressing the button “Reset” (F8).

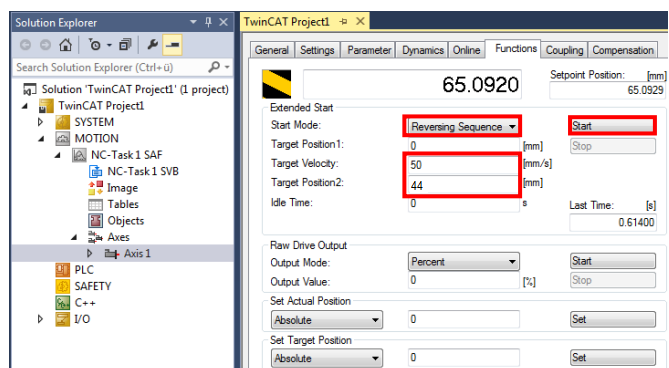


Activating “Cyclic Synchronous Position Mode”:
“I/O→Devices→Device 1 (EtherCAT)→Drive 1 (Xvi)”, tab: „CoE – Online” double click on object “6060”.
“Cyclic Synchronous Position Mode” is activated by setting the object 6060 on 8.
The motor is now ready to drive.



Under “MOTION→NC-Task 1 SAF→Axes→Axis 1”, open the “Functions” tab. Select the start mode such as positive motion, negative motion, reversing sequence etc. Enter the remaining parameters such as target positions and set the LINAX® linear motor axis in motion by pressing “Start”.

In the picture on the right side, the motor moves back and forth from the Target Position 1 to Target Position 2.



This is a function test to check the communication between Beckhoff and XENAX®.

4.8 PDO-Mapping

4.8.1 Required PDO's

If chapter “4.4 Scan for Devices” is followed, no manual PDO mapping is necessary to control the axis (basic function). The required PDOs are automatically added and mapped.
See under Drive X→Process Data

Output PDO 0x1600

General	EtherCAT	Process Data	PIC	Startup	CoE - Online	Online
Sync Manager:						
SM	Size	Type	Flags			
0	246	MbxOut				
1	246	MbxIn				
2	6	Outputs				
3	10	Inputs				
PDO List:						
Index	Size	Name	Flags	SM	SU	
0x1A01	6.0	TxPDO 2		0	0	
0x1A10	8.0	TxPDO 3		0	0	
0x1A11	0.0	TxPDO 4		0	0	
0x1A12	10.0	TxPDO 5		0	0	
0x1A13	8.0	TxPDO 6		0	0	
0x1600	6.0	RxPDO 1		2	0	
0x1601	0.0	RxPDO 2		0	0	
PDO Assignment (0x1C12):						
<input checked="" type="checkbox"/> 0x1600						
<input type="checkbox"/> 0x1601						
<input type="checkbox"/> 0x1611						
<input type="checkbox"/> 0x1612						
<input type="checkbox"/> 0x1613 (excluded by 0x1600)						
<input type="checkbox"/> 0x1614 (excluded by 0x1600)						
PDO Content (0x1600):						
Index	Size	Offs	Name	Type	Default (hex)	
0x6040.00	2.0	0.0	Controlword	UINT		
0x607A.00	4.0	2.0	Target Position	DINT		
		6.0				

Input PDO 0x1A00

General	EtherCAT	Process Data	Pic	Startup	CoE - Online	Online
Sync Manager:						
SM	Size	Type	Flags			
0	246	MbxOut				
1	246	MbxIn				
2	6	Outputs				
3	10	Inputs				
PDO List:						
Index	Size	Name	Flags	SM	SU	
0x1A00	10.0	TxPDO 1		3	0	
0x1A01	6.0	TxPDO 2		0	0	
0x1A10	8.0	TxPDO 3		0	0	
0x1A11	0.0	TxPDO 4		0	0	
0x1A12	10.0	TxPDO 5		0	0	
0x1A13	8.0	TxPDO 6		0	0	
0x1600	6.0	RxPDO 1		2	0	
PDO Assignment (0x1C13):						
<input checked="" type="checkbox"/> 0x1A00						
<input type="checkbox"/> 0x1A01						
<input type="checkbox"/> 0x1A10						
<input type="checkbox"/> 0x1A11						
<input type="checkbox"/> 0x1A12 (excluded by 0x1A00)						
<input type="checkbox"/> 0x1A13 (excluded by 0x1A00)						
PDO Content (0x1A00):						
Index	Size	Offs	Name	Type	Default (hex)	
0x6041.00	2.0	0.0	Statusword	UINT		
0x6064.00	4.0	2.0	Position Actual Value	DINT		
0x60F4.00	4.0	6.0	Following Error Actual Value	DINT		
		10.0				

4.8.2 Optional PDO's

Optional PDO's can be mapped to utilise the full scope of the Axis. Enable additional PDO's according to your needs.

Inputs:

PDO Entry Name	Parameter	Description
I_Force Actual	0x2005	Provides the motor current in [mA], e.g. for monitoring a force process.
Force Actual	0x200A	Provides the actual Force value in [mA], e.g. for monitoring a force process. (Only with Xvi 75V8S and Signateq® measuring amplifier)
Process Status Register	0x2006	Provides additional information about the Axis (See XENAX® Manual command “TPSR” for detailed information)
Following Error Actual Value	0x60F4	Provides the actual deviation of calculated trajectory position and measured position on encoder.
Digital Inputs	0x60FD	Provides the digital input status of the XENAX®.

Outputs:

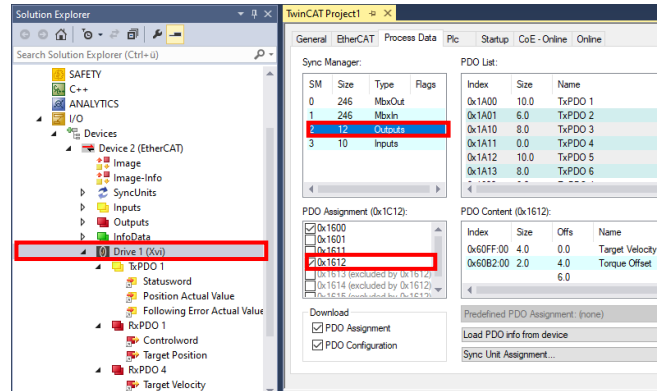
PDO Entry Name	Parameter	Description
Limit I_Force	0x6073	Limits the motor current in [x10mA] which corresponds to the motor force or torque.
Limit Force	0x2009	Force limitation in [mN] based on the value measured by the Signateq® measuring amplifier. (Only with Xvi 75V8S and Signateq® measuring amplifier)
Torque Offset	0x60B2	Sends the target acceleration along with the target position and velocity, resulting in an even smoother and more accurate drive. (See more details in chapter “4.8.4 Torque (Acceleration) Offset”).
Target Velocity	0x60FF	Sends the target velocity along with the target position resulting in a smoother and more accurate drive. (See more details in chapter “4.8.3 Target Velocity”).
Physical Outputs	0x60FE	Control the digital output signals of the XENAX®.

4.8.3 Target Velocity

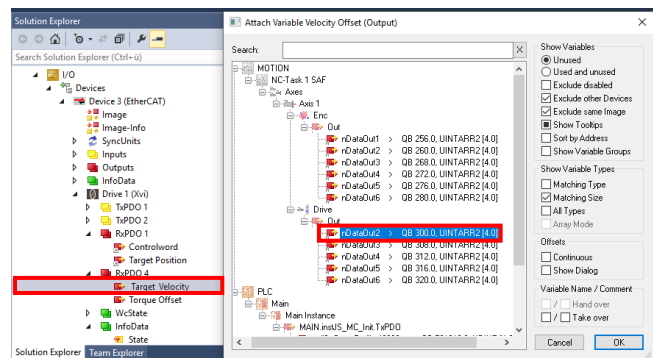
Hint:

Target Velocity is optional. It sends the target velocity along with the target position to the XENAX®. This results in a smoother drive and a lower deviation from the target position.

Make sure that PDO 0x1612 is enabled.



The link is automatically made to nDataOut2 of the corresponding Axis.



Under Axis→Drive set the Output Scaling Factor (Velocity) to 125.0. This parameter does not depend on the motor type.



Attention:

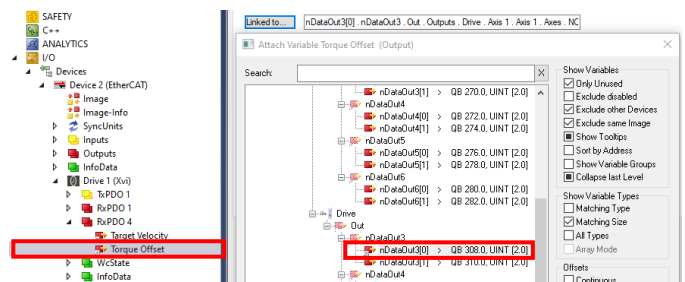
This link often gets lost when another PDO is added or removed. An unlinked Target Velocity PDO increases deviation from the target position and results in a rougher drive. An unlinked Torque Offset PDO has similar results.

4.8.4 Torque (Acceleration) Offset

Hint:

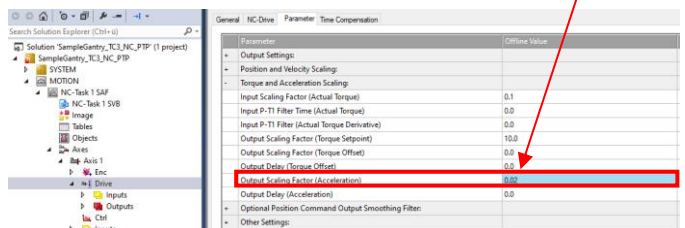
Acceleration feed forward is optional. It sends the target acceleration along with the target position and target velocity to the XENAX®. This is necessary if the Axis must follow a contour path with high precision.

The link is automatically made to nDataOut3[0] of the corresponding Axis.



Adjust „Output Scaling Factor (Acceleration)” to the resolution of the used motor.

Motor type	Scale resolution	Output Scaling Factor
LINAX®, ELAX®	1 um/inc	0.02
LINAX®	100 nm/inc	0.2
ROTAX® Rxvp	0.005625 deg/inc	0.0035
ROTAX® Rxhq	0.003 deg/inc	0.0066



Attention:

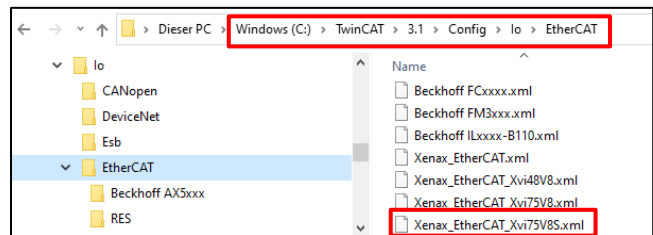
This link often gets lost when another PDO is added or removed. An unlinked Torque Offset PDO increases deviation from the target position and results in a rougher drive. Note that the Torque Offset PDO requires the Target Velocity PDO to be mapped and linked.

5 Replacing Xvi 75V8 by Xvi 75V8S

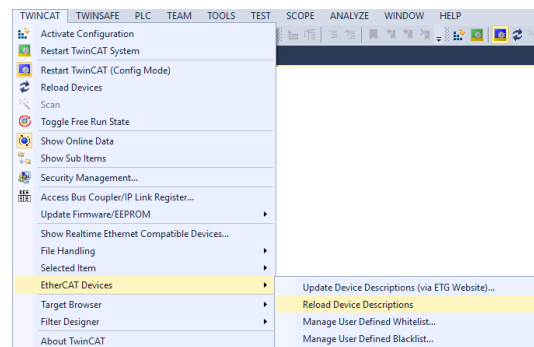
To replace a XENAX® Xvi 75V8 with an Xvi 75V8S in an existing project, the following steps must be done.

5.1 ESI XML Installation

The EtherCAT Slave Information XML for the XENAX Xvi 75V8S should always be completely unpacked into the ESI-directory of the EtherCAT master. In TwinCAT 3 these files are located in `\TwinCAT\3.1\Config\Io\EtherCAT`. This ESI file can be downloaded from www.jennyscience.ch under “XENAX Servocontroller->Firmware Bus Module->EtherCAT”.

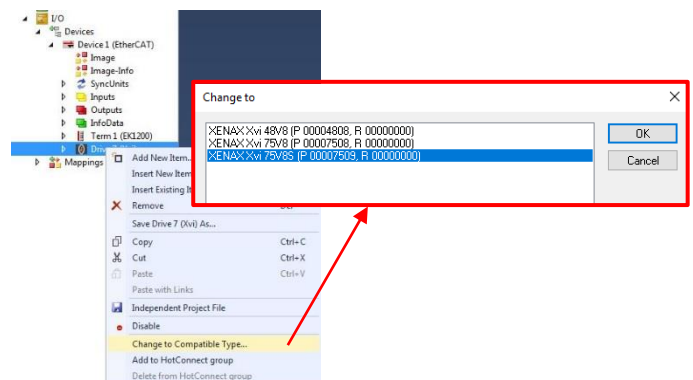


Load ESI file into TwinCAT.
„TwinCAT→EtherCAT Devices→Reload Device Descriptions“



5.2 Change Type

Change the type of the selected XENAX® controller („Change to Compatible Type...“), then choose the right entry and press OK.



6 NC-I Configuration (optional)

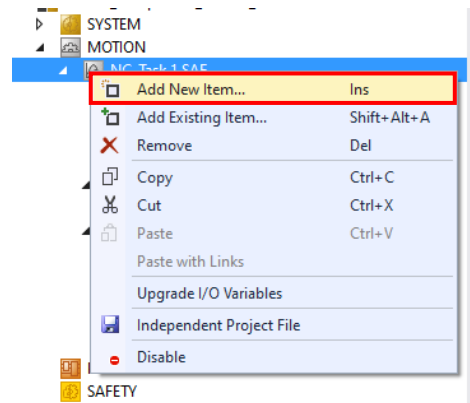
The TwinCAT® NC I operating modus stands for “Numerical Control Interpolation” and can be used to drive 2D or 3D coordinated interpolated paths based on DIN 66025 G-Code instructions.

The prerequisite for the operation of the NC-I channel is a previous correct configuration of the 2 or 3 NC-PTP used axes (chapter “4 New Project in TwinCAT3”).

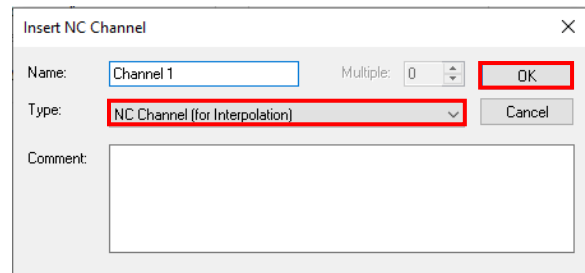
6.1 Insert NC Channel

A superimposed interpolation channel has to be added in order to coordinate the 2D or 3D motion.

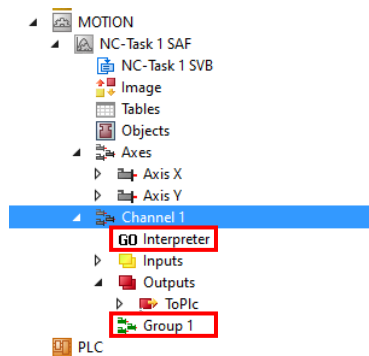
Right-click on “NC-Task 1 SAF” under “MOTION” menu and select “Add New Item...”



In the “Insert NC Channel” pop-up window select “NC Channel (for Interpolation)” as “Type”, then click on OK.

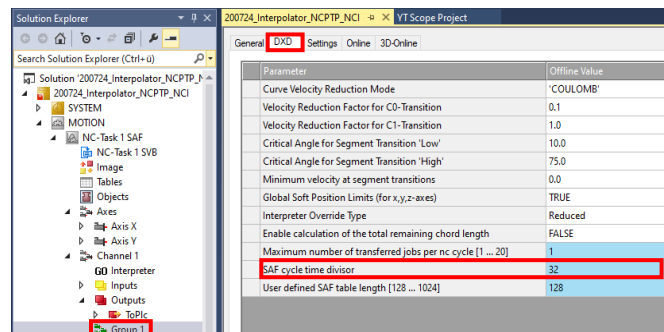


A new “Channel n” is created with a G-Code Interpreter and the assigned axes group.



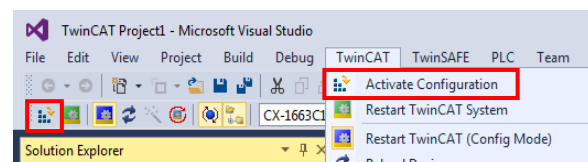
6.2 SAF cycle time divisor

Under “Group n→DXD” menu set “SAF cycle time divisor” to **32**. This is the value which allows the best iterated trajectory generation for the internal interpolation in XENAX® servo controller.

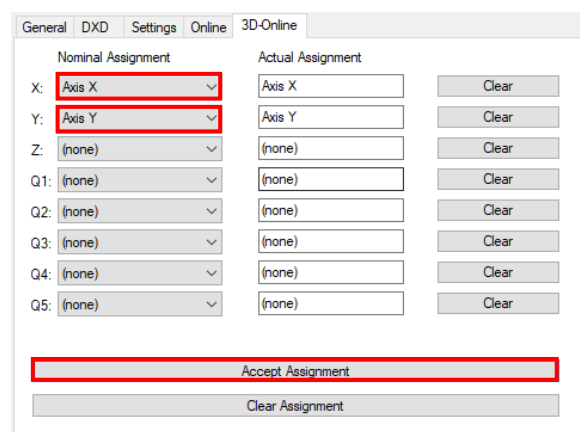


6.3 Assignment

Activate the configuration.

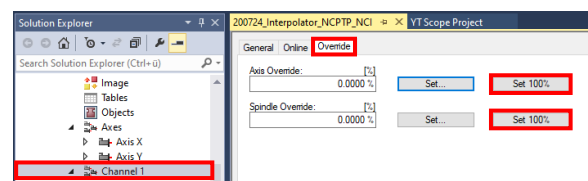


After being in “Run Mode” assign the desired axes (i.e. Axis X and Y) to the Group n in the “3D-Online” menu pressing “Accept Assignment”.



After enabling all the axes set the “Axis Override” and the “Spindle Override” to 100% under the “Channel n→Override” menu.

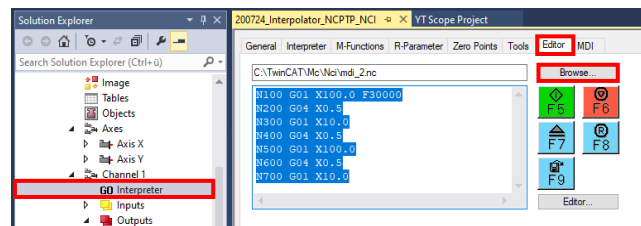
The axes “Group n” is then ready for motion.



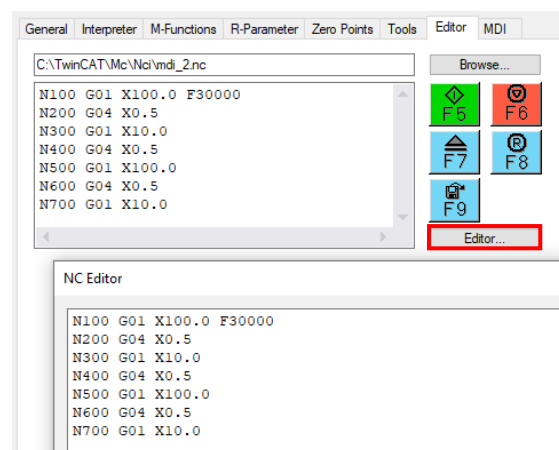
6.4 NC Program

Under “GO Interpreter→Editor” it is possible to import G-Coded programs for coordinated motion.

Press “Browse...” and import the selected .nc file or program your own G-Code procedure.



For editing the NC program press on “Editor...” and the G-Code can be modified in the “NC Editor”.

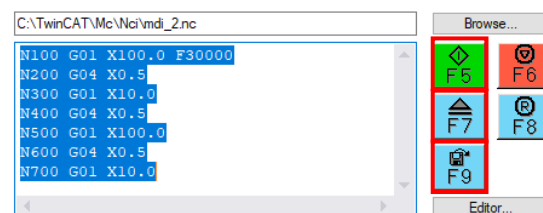


For launching the program press on F9 (save), then on F7 (load) and finally on F5 (start).

The program can be interrupted pressing F6 (stop).

NOTE:

If an axis error is pending can be reset pressing F8.

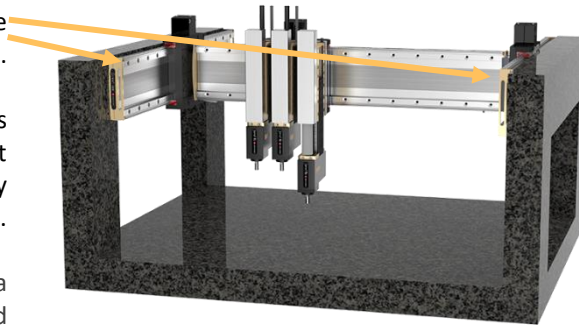


7 Gantry (optional)

In the gantry mode there are two linear motor axes mounted with the same driving direction. Those two axes have to move synchronously. In this example these are the y-axes marked with the arrows.

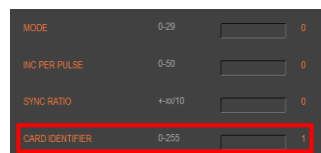
When switching on the system, these two Y-axes have to be aligned in order to move without mechanical tension. The alignment is automatically completed with the function "REFERENCE".

The prerequisite for the operation of a Gantry is a previous correct configuration of the 2 NC-PTP used axes (chapter "4 New Project in TwinCAT3").



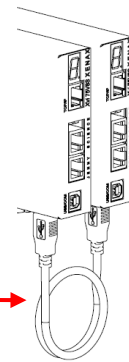
7.1 Activate Gantry Mode

Master and Slave Axes must be connected via the USB A-A cable. The Card Identifier 0 must be set on the master and the Card Identifiers 1-3 on the slave by the WebMotion®.



Corresponds to CI

Master-Slave
USB A-A cable



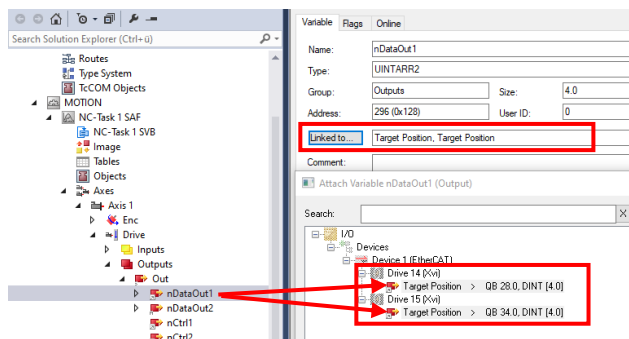
In addition, the reference setting of the direction must be made on the master. The master must be informed of the card identifier number of the slave. You can find more information about these settings in the XENAX manual.



7.2 Linking Target Position

Both Gantry Axes receive the same "Target Position" of the Master-NC-Axis. To do this, the link of the "Target Position" of the Slave must be deleted and the "nDataOut1" of the Master-NC-Axis must be linked with both "Target Positions" (Master and Slave). Use the "CTRL" key to do this when linking.

When the PDO's "Target Velocity" and "Torque Offset" are used, do the same for the corresponding data.



Please use the procedure of phasing and referencing as realised in the demo project "SampleGantry_TC3_NC_PTP". The demo project is contained in this folder and can be opened according to chapter "3 Example Project in TwinCAT3".



Notes

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