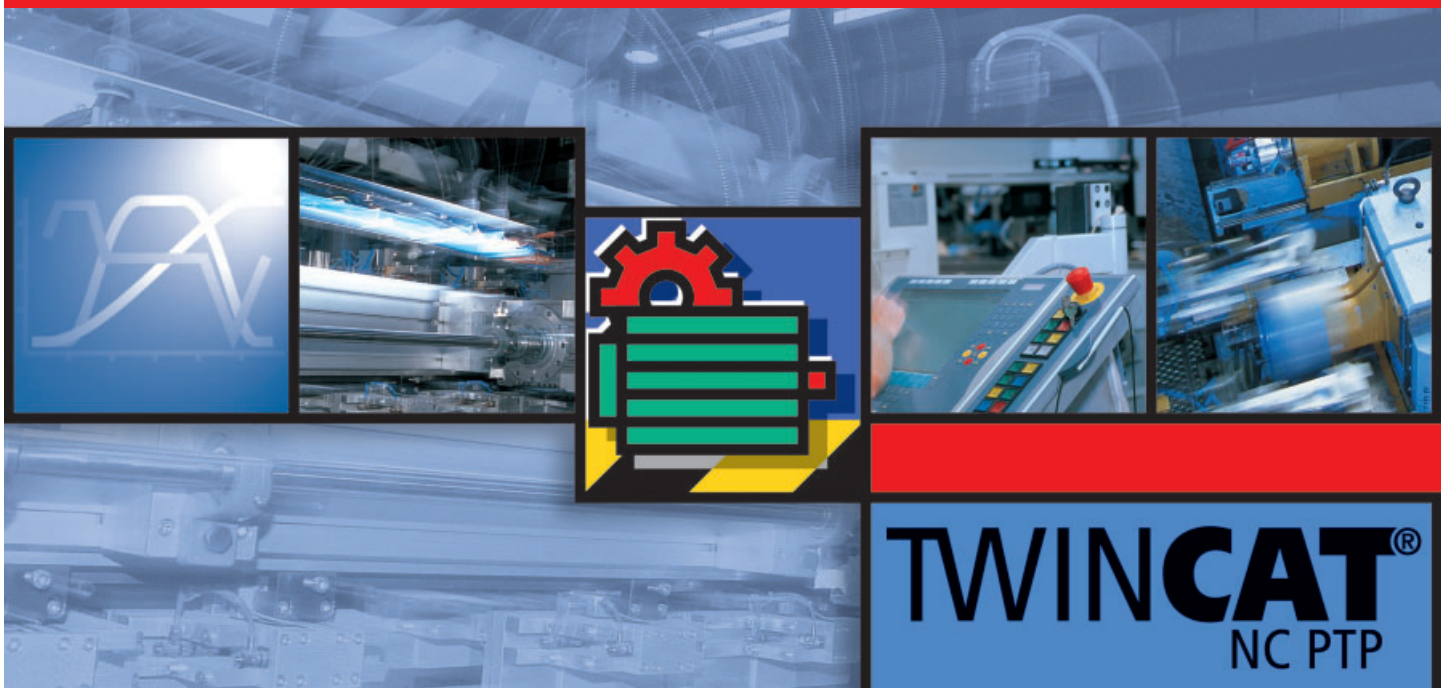


TwinCAT NC PTP – Point-to-point axis positioning

Position control with the PC
TwinCAT NC PTP includes axis positioning software (set value generation, position control), an integrated software PLC with NC interface, operating program for commissioning and an I/O connection to the axes through various fieldbuses. TwinCAT NC PTP replaces conventional positioning modules and NC controllers.

NC PTP software on the PC
The controllers that are simulated by the PC cyclically exchange data with drives and measuring systems via the fieldbus.

The capacity of a PC allows axes to be moved in parallel with the PLC functionality. PC power means that some tens of axes can easily be positioned simultaneously.

System structure
Axes are structured into channels for PTP movement and for interpolated movements.

Axis structure
TwinCAT NC PTP uses variables to operate axes. Each axis has variables for encoder, drive and controller. The axis can be linked to I/O interfaces, and parameters can be set.

Axis functions
Axis functions such as
- start (various modes)
- stop
- new target position and velocity
- constant drive output
- set/call actual position

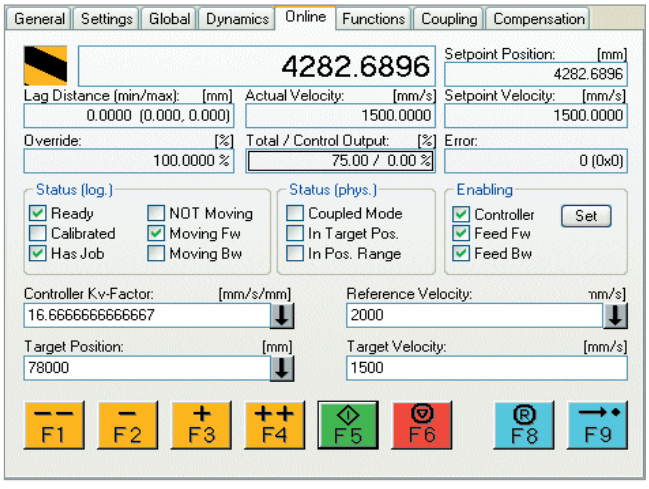
Axis types
- servo axes
- high/low speed axes
- stepper motor axes
- "low-cost" stepper motor axes
- encoder axes
- simulation axes
- DC drives

Position measurement systems
The position controller acquires the actual position through:
- incremental encoders
- absolute encoders
- digital interfaces to the drives

Drive interfaces
- analog
- EtherCAT
- SERCOS
- SSI
- Lightbus
- PROFIBUS DP/MC
- pulse train

Interfaces
- interfacing to all popular fieldbuses, e.g. EtherCAT, Lightbus, SERCOS, PROFIBUS DP/MC, synchron CAN
- Axis functions can be embedded into the IEC 61131-3 PLC system by means of function block libraries; the function blocks comply with the PLCopen standard.
- data interface to Windows NT/2000/XP/Vista/CE or Windows 7 programs by means of open standards (OPC, Beckhoff ADS)

System operation



Positioning
Positioning is executed with a powerful, modern positioning algorithm in which profiles are generated with jerk limitation and with pre-control of speed and acceleration to minimise the following error.
Positioning facilities:
- Controller structures can be adjusted.
  - P controller
  - PID controller
  - PID with speed pre-control
  - PID with speed and acceleration pre-control
- override functions

Commissioning/servicing
The online menu allows important axis parameters such as
- target position,
- set speed,
- acceleration, jerk,
- reference speed,
- controller Kv factor,

to be set, and general axis functions such as
- start,
- stop/emergency stop,
- new target position with new speed,

to be called.

Special functions
- linear coupling (electrical gears)
- distance compensation
- online master/slave and slave/master conversion
- "flying saw" (diagonal saw)
- camming (support through TwinCAT Cam Design Tool)
- FIFO axes
- change over encoders/ controllers
- external axis set value generator
- multi-master coupling

Programming IEC 61131-3 function blocks or standard PLCopen Motion Control libraries

Technical data	TwinCAT NC PTP
PC hardware	standard PC/IPC hardware, no extras
Operating systems	version-dependent: Windows NT/2000/XP/Vista, Windows 7, Windows NT/XP Embedded, Windows CE (only runtime)
Real-time	Beckhoff real-time kernel as a component of TwinCAT
Runtime system	NC point-to-point (NC PTP) including TwinCAT PLC
Number of axes	up to 255 axes
Axis types	electrical and hydraulic servo drives, frequency converter drives, stepper motor drives, DC drives, switched drives
Cycle time	50 µs upwards selectable (typically 1 ms)
Axis functions	standard axis functions: start/stop/reset/reference, speed override, destination override; special functions: master-slave cascading, electronic gearing, online distance compensation
Programming	performed using IEC 61131-3 function blocks in the TwinCAT PLC, convenient methods for axis commissioning
Debugging	online monitoring of all axis state variables such as actual/set value, enable, controller values, online axis tuning, forcing axis variables
Configuration	all axis parameters such as the measuring system, drive parameters and position controller can be conveniently configured
Remanence	remanent data, UPS-supported storage on hard disk
I/O system	free choice of fieldbus: EtherCAT, PROFIBUS DP/MC, CANopen, DeviceNet, Interbus, SERCOS, Lightbus, Ethernet
Connectivity	variable access via OPC, Beckhoff ADS OCX/DLL
Further information	www.beckhoff.com/TwinCAT_NC_PTP

Ordering information	
TwinCAT NC PTP	licence for using the PTP positioning software with integrated IEC 61131-3 TwinCAT PLC, contains programming software and runtime system

Options		
TwinCAT NC Camming	IEC 61131-3 software library for TwinCAT, implemented camshaft functionality (table coupling)	839
TwinCAT NC FIFO Axes	IEC 61131-3 software library for TwinCAT, permits specified FIFO set value generation	838
TwinCAT NC Flying Saw	IEC 61131-3 software library for TwinCAT, implements a "flying saw"	838
TwinCAT Cam Design Tool	graphical development tool for programming cams	839
TwinCAT Valve Diagram Editor	graphics-oriented editor for designing the characteristic curve of a hydraulic valve	840