



Highlights

- One software platform for engineering and runtime
- Integrated real-time support
- Software modules for PLC, NC, CNC, robotics, HMI, measurement technology, analytics, safety

TwinCAT

PLC and Motion Control on the PC

► www.beckhoff.com/TwinCAT

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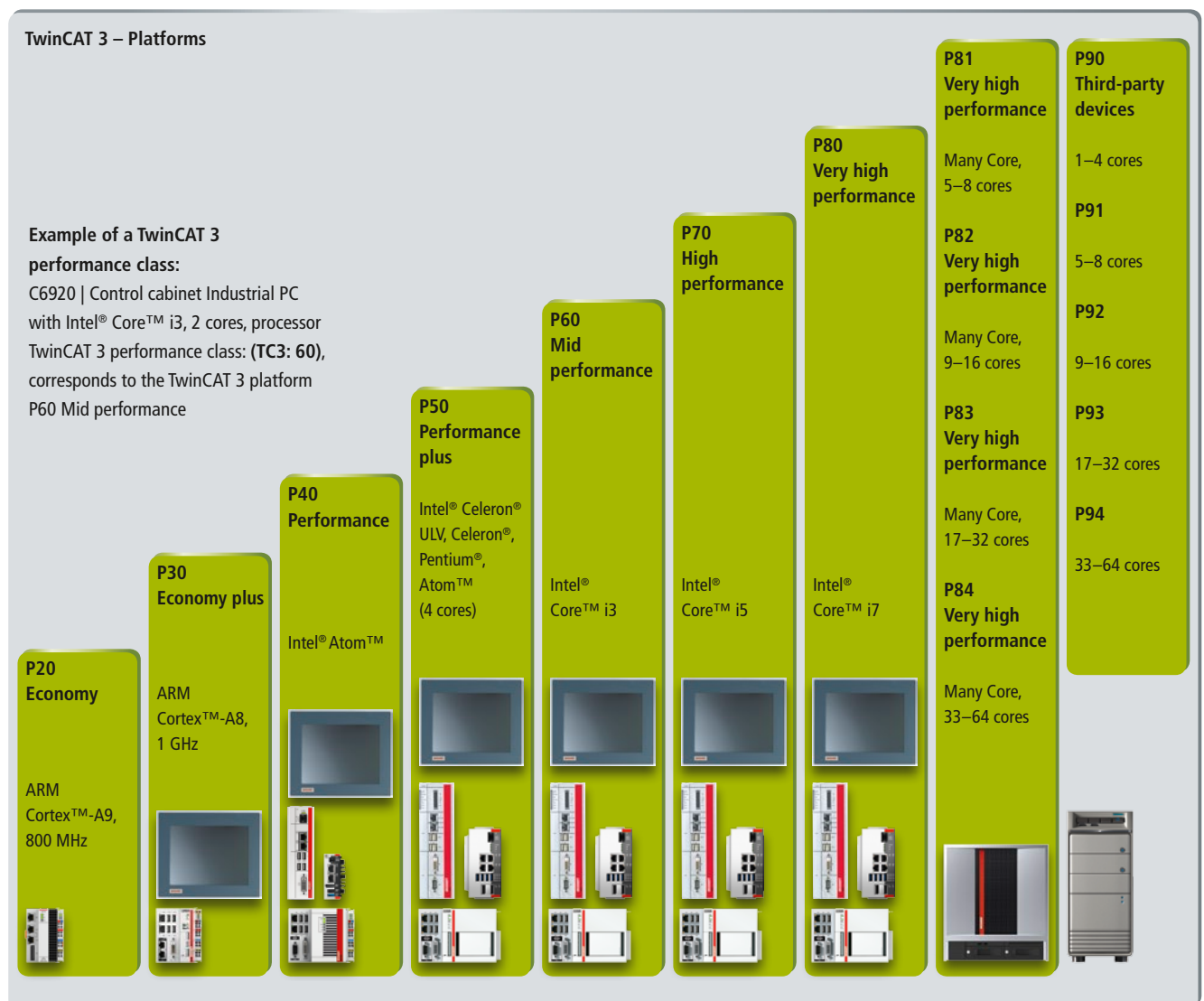
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Product overview TwinCAT 3

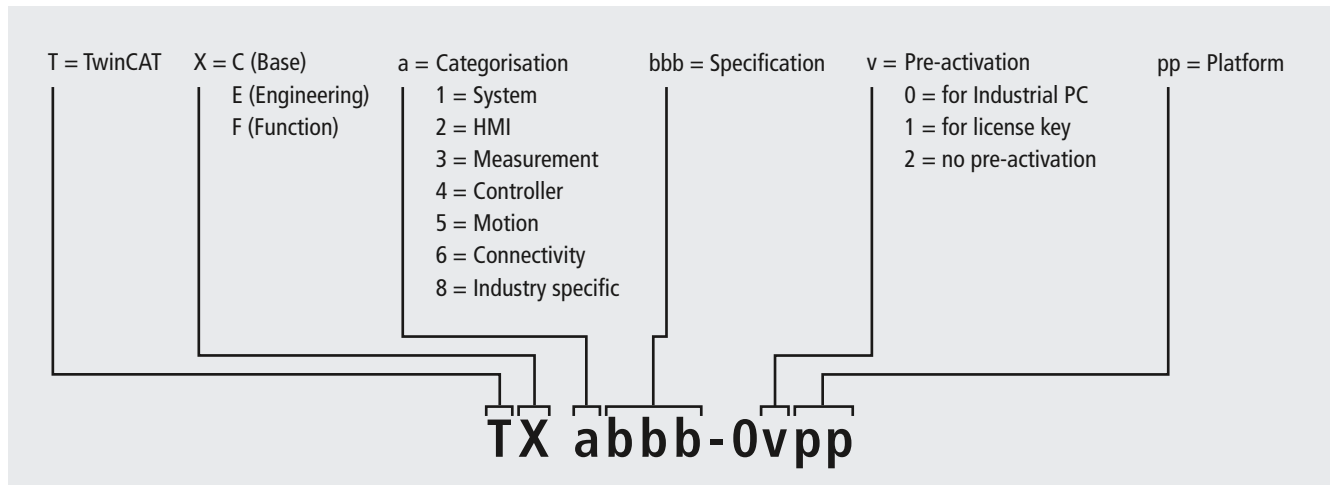
The TwinCAT 3 runtime components are available for different platforms. The platform levels correspond to the various TwinCAT 3 performance classes of the Beckhoff PCs. The TwinCAT 3 performance class of a Beckhoff PC depends on the configuration and the technical data of the PC (including the processor).

The following overview shows the various TwinCAT 3 platforms. The controllers integrated in the platform classifications represent sample configurations. The TwinCAT 3 performance class required for a TwinCAT 3 Runtime component can be found in the product description of the respective Beckhoff PC.



The controllers integrated in the platform categorisation are only example configurations.

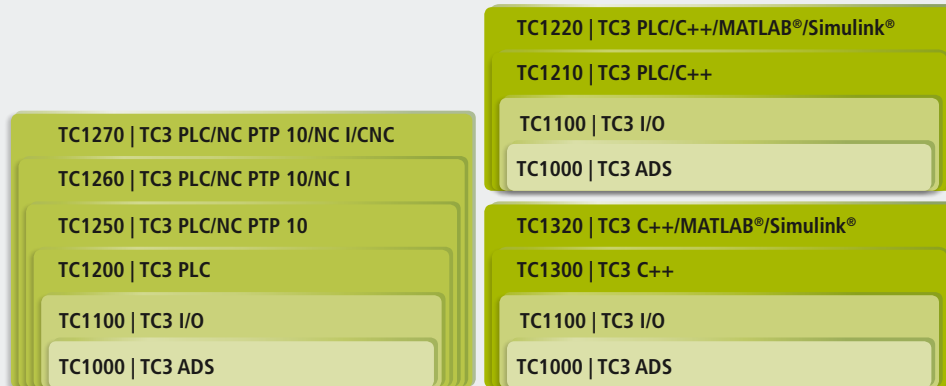
TwinCAT 3 designation system



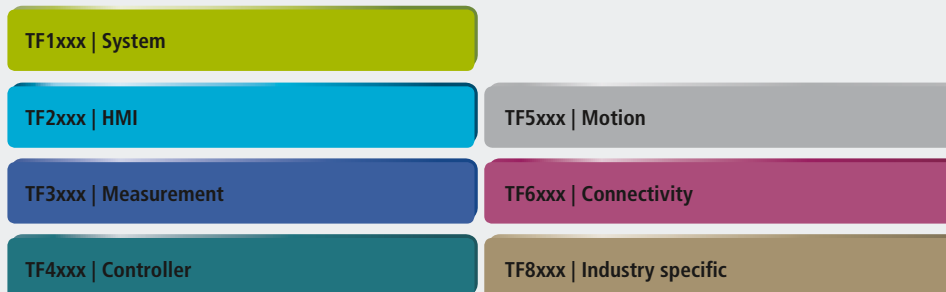
TwinCAT 3 – eXtended Automation Engineering (XAE)

TwinCAT 3 – eXtended Automation Runtime (XAR)

Base



Functions



TwinCAT 3 is divided into components. The TwinCAT 3 engineering components enable the configuration, programming and debugging of applications. The TwinCAT 3 runtime consists of further components – basic components and functions. The basic components can be extended by functions.

TwinCAT 3 Engineering			
TE1000	TC3 Engineering	TwinCAT 3 engineering environment	484
TE1111	TC3 EtherCAT Simulation	easy configurations of simulation environments with several EtherCAT slaves	484
TE1120	TC3 XCAD Interface	transfer of existing engineering results from ECAD tools	484
TE1130	TC3 CAD Simulation Interface	link between TwinCAT and a 3D CAD system for SiL simulation	484
TE1200	TC3 PLC Static Analysis	analysis tool that tests PLC software on the basis of coding rules	485
TE1300	TC3 Scope View Professional	software oscilloscope for the graphical display of data captured from several target systems	485
TE1310	TC3 Filter Designer	graphic engineering tool for determining coefficient digital filters	485
TE1400	TC3 MATLAB®/Simulink® Target	TwinCAT target for MATLAB®/Simulink® for generating TwinCAT 3 modules	485
TE1410	TC3 Interface for MATLAB®/Simulink®	communication interface between MATLAB®/Simulink® and the TwinCAT 3 runtime	486
TE1420	TC3 Target for FMI	interface for simulation tools that support the Functional Mockup Interface (FMI)	486
TE1500	TC3 Valve Diagram Editor	graphical tool for designing the characteristic curve of a hydraulic valve	486
TE1510	TC3 Cam Design Tool	graphic design tool for electronic cam plates	486
TE1610	TC3 EAP Configurator	a tool for visualising and configuring communication networks, in which data exchange based on the EtherCAT Automation Protocol (EAP) takes place or is to be established	487
TE2000	TC3 HMI	tool for developing platform-independent user interfaces	487
TE3500	TC3 Analytics Workbench	complete solution for 24/7 monitoring of machines and systems incl. visualisation on analysis dashboards	487
TE3520	TC3 Analytics Service Tool	process data analysis tool for commissioning and service technicians	487
TE5910	TC3 Motion Designer	TC3 Motion Designer for drive dimensioning	450
TE5950	TC3 Drive Manager 2	for commissioning the AX8000 multi-axis servo system or the I/O components EL72xx, EP72xx and EJ72xx	452

TwinCAT 3 Base			
TC1000	TC3 ADS	TwinCAT 3 ADS	488
TC1100	TC3 I/O	TwinCAT 3 I/O	488
TC1200	TC3 PLC	TwinCAT 3 PLC	489
TC1210	TC3 PLC/C++	TwinCAT 3 PLC and C++	489
TC1220	TC3 PLC/C++/MATLAB®/Simulink®	TwinCAT 3 PLC, C++ and modules generated in MATLAB®/Simulink®	489
TC1250	TC3 PLC/NC PTP 10	TwinCAT 3 PLC and NC PTP 10	490
TC1260	TC3 PLC/NC PTP 10/NC I	TwinCAT 3 PLC, NC PTP 10 and NC I	490
TC1270	TC3 PLC/NC PTP 10/NC I/CNC	TwinCAT 3 PLC, NC PTP 10, NC I and CNC	491
TC1275	TC3 PLC/NC PTP 10/NC I/CNC E	TwinCAT 3 PLC, NC PTP 10, NC I and CNC E	491
TC1300	TC3 C++	TwinCAT 3 C++	491
TC1320	TC3 C++/MATLAB®/Simulink®	TwinCAT 3 C++ and modules generated in MATLAB®/Simulink®	491

TwinCAT 3 Functions			
System			
TF1800	TC3 PLC HMI	stand-alone tool for displaying visualisations from the PLC development environment	492
TF1810	TC3 PLC HMI Web	display of visualisations from the PLC development environment in a web browser	492
TF1910	TC3 UML	UML (Unified Modeling Language) for modelling of PLC software	492
HMI			
TF2000	TC3 HMI Server	modular web server, includes a client connection and a target connection	493
TF2010	TC3 HMI Clients Pack 1	extension of TC3 HMI server for one additional client connection	493
TF2020	TC3 HMI Clients Pack 3	extension of TC3 HMI server for 3 additional client connections	493
TF2030	TC3 HMI Clients Pack 10	extension of TC3 HMI server for 10 additional client connections	493
TF2040	TC3 HMI Clients Pack 25	extension of TC3 HMI server for 25 additional client connections	493
TF2050	TC3 HMI Targets Pack 1	extension of TC3 HMI server for one additional control system	493
TF2060	TC3 HMI Targets Pack 3	extension of TC3 HMI server for 3 additional control systems	493
TF2070	TC3 HMI Targets Pack 10	extension of TC3 HMI server for 10 additional control systems	493
TF2080	TC3 HMI Targets Pack 25	extension of TC3 HMI server for 25 additional control systems	493
TF2090	TC3 HMI Targets Pack 100	extension of TC3 HMI server for 100 additional control systems	493
TF2110	TC3 HMI OPC UA	server extension for access to TwinCAT target systems or other controllers via OPC UA	494
TF2200	TC3 HMI Extension SDK	software development kit (C++/.NET) for programming application-specific solutions	494
TF2210	TC3 HMI Recipe Management	server extension for recipe management	494
TF2300	TC3 HMI Scope	software oscilloscope for graphic display of time sequences	494
Measurement			
TF3300	TC3 Scope Server	data preparation for visual display in the TwinCAT 3 Scope View	495
TF3500	TC3 Analytics Logger	The TwinCAT Analytics Logger enables the cyclic archiving of the process image.	495
TF3510	TC3 Analytics Library	PLC library used for online or offline analysis in the PLC runtime of the TwinCAT Analytics Workbench	495
TF3520	TC3 Analytics Storage Provider	IoT client: interface to one or more storage facilities for raw and analysis data from various sources	496
TF3550	TC3 Analytics Runtime	runtime "container" for the Analytics application, which was configured and developed in the Analytics Workbench	496
TF3560	TC3 Analytics Controller Pack 4	extension of the TC3 Analytics Workbench for the analysis of 4 additional controllers	496
TF3561	TC3 Analytics Controller Pack 8	extension of the TC3 Analytics Workbench for the analysis of 8 additional controllers	496
TF3562	TC3 Analytics Controller Pack 16	extension of the TC3 Analytics Workbench for the analysis of 16 additional controllers	496
TF3563	TC3 Analytics Controller Pack 32	extension of the TC3 Analytics Workbench for the analysis of 32 additional controllers	496
TF3564	TC3 Analytics Controller Pack 64	extension of the TC3 Analytics Workbench for the analysis of 64 additional controllers	496
TF3565	TC3 Analytics Controller Pack 128	extension of the TC3 Analytics Workbench for the analysis of 128 additional controllers	496
TF3600	TC3 Condition Monitoring Level 1	PLC library for the implementation of Condition Monitoring for machines	497
TF3601	TC3 Condition Monitoring Level 2	expanded PLC library for the implementation of Condition Monitoring for machines	497
TF3650	TC3 Power Monitoring	TwinCAT Power Monitoring PLC library	497
TF3900	TC3 Solar Position Algorithm	precise calculation of the sun's position	497
Controller			
TF4100	TC3 Controller Toolbox	basic controllers (P, I, D), complex controllers (PI, PID), pulse width modulation, ramps, signal generators and filters	498
TF4110	TC3 Temperature Controller	temperature control for monitoring and controlling different temperature ranges	498

TwinCAT 3 | Functions

Motion

TF5000	TC3 NC PTP 10 Axes	NC PTP (point-to-point movements) for up to 10 axes	499
TF5010	TC3 NC PTP Axes Pack 25	extension of TwinCAT 3 NC PTP to up to 25 axes	499
TF5020	TC3 NC PTP Axes Pack unlimited	extension of TwinCAT 3 NC PTP to over 25 axes	499
TF5050	TC3 NC Camming	using the TwinCAT NC cam plate functionality (table coupling)	500
TF5055	TC3 NC Flying Saw	implementing flying saw functionality	500
TF5060	TC3 NC FIFO Axes	implementation of a pre-defined user setpoint generator for an NC axis	501
TF5065	TC3 Motion Control XFC	high-precision logging and switching of digital signals in relation to axis positions	501
TF5100	TC3 NC I	NC I with 3 interpolating axes and 5 additional axes	501
TF5110	TC3 Kinematic Transformation L1	realisation of different kinematic transformations Level 1	502
TF5111	TC3 Kinematic Transformation L2	realisation of different kinematic transformations Level 2	502
TF5112	TC3 Kinematic Transformation L3	realisation of different kinematic transformations Level 3	502
TF5113	TC3 Kinematic Transformation L4	realisation of different kinematic transformations Level 4	502
TF5120	TC3 Robotics mxAutomation	direct communication between the PLC and the KUKA KR C4 robot control	503
TF5130	TC3 Robotics uniVAL PLC	direct communication between the PLC and the CS8C robotics controller from Stäubli	503
TF5200	TC3 CNC	CNC path control software	503
TF5210	TC3 CNC E	CNC path control software export version	504
TF5220	TC3 CNC Axes Pack	extension to up to a total of 64 axes/controlled spindles, of which a maximum of 32 can be path axes and a maximum of 12 can be controlled spindles	504
TF5230	TC3 CNC Channel Pack	further CNC channel, extension to a maximum of 12 channels, channel synchronisation, axis transfer between channels	504
TF5240	TC3 CNC Transformation	transformation functionality (5-axis functionality)	505
TF5250	TC3 CNC HSC Pack	extending the CNC with HSC technology (high-speed cutting)	505
TF5260	TC3 CNC Spline Interpolation	path programming via splines with programmable spline type, Akima-spline, B-spline	505
TF5270	TC3 CNC Virtual NCK Basis	virtual TwinCAT CNC for simulation in a Windows environment	505
TF5271	TC3 CNC Virtual NCK Options	virtual TwinCAT CNC for simulation in a Windows environment	506
TF5280	TC3 CNC Volumetric Compensation	extension for compensating geometric machine errors based on an ISO-standardised parametric model	506
TF5290	TC3 CNC Cutting Plus	technology package for extending the CNC functionality for cutting operations	506
TF5410	TC3 Motion Collision Avoidance	collision avoidance and controlled accumulation when operating a number of linearly and/or translationally dependent axes with TC3 NC PTP	507
TF5420	TC3 Motion Pick-and-Place	for handling tasks carried out by gantry robots and other kinematics	507
TF5800	TC3 Digital Cam Server	fast cam controller with monitoring for various fieldbuses	507
TF5810	TC3 Hydraulic Positioning	algorithms for control and positioning of hydraulic axes	507
TF5850	TC3 XTS Extension	decouples servo algorithms from the hardware and calculates them centrally	454

TwinCAT 3 | Functions

Connectivity

TF6100	TC3 OPC UA	access to TwinCAT in accordance with OPC UA with UA server (DA/HA/AC) and UA client (DA)	508
TF6120	TC3 OPC DA	access to TwinCAT variables, in accordance with OPC DA and OPC XML DA specification	508
TF6220	TC3 EtherCAT Redundancy 250	extension of the TwinCAT EtherCAT master with cable redundancy capability for up to 250 slaves	509
TF6221	TC3 EtherCAT Redundancy 250+	extension of the TwinCAT EtherCAT master with cable redundancy capability for more than 250 slaves	509
TF6225	TC3 EtherCAT External Sync	extension of the TwinCAT EtherCAT master with an option to synchronise the Beckhoff real-time communication with external signals	509
TF6250	TC3 Modbus TCP	communication with Modbus TCP devices (server and client functionality)	509
TF6255	TC3 Modbus RTU	serial communication with Modbus end devices	510
TF6270	TC3 PROFINET RT Device	communication via PROFINET (PROFINET slave)	510
TF6271	TC3 PROFINET RT Controller	communication via PROFINET (PROFINET master)	510
TF6280	TC3 Ethernet/IP Slave	communication via EtherNet/IP (EtherNet/IP slave)	510
TF6281	TC3 Ethernet/IP Master	communication via EtherNet/IP (EtherNet/IP master)	511
TF6300	TC3 FTP	easy access from TwinCAT PLC to FTP server	511
TF6310	TC3 TCP/IP	communication via generic TCP server	511
TF6311	TC3 TCP/UDP Realtime	direct access from real-time to Ethernet communication	511
TF6340	TC3 Serial Communication	communication via serial Bus Terminals or PC COM ports with the 3964R and RK512 protocol	511
TF6350	TC3 SMS/SMTP	sending SMS and e-mails from the PLC	512
TF6360	TC3 Virtual Serial COM	virtual serial COM driver for Windows platforms	512
TF6420	TC3 Database Server	accessing databases from the PLC	512
TF6421	TC3 XML Server	read and write access to XML files from the PLC	512
TF6500	TC3 IEC 60870-5-10x	communication according to IEC 60870-101, -102, -103, -104	513
TF6510	TC3 IEC 61850/400-25	communication according to IEC 61850 and IEC 61400-25	513
TF6600	TC3 RFID Reader Communication	connection of RFID readers to the TwinCAT PLC	513
TF6610	TC3 S5/S7 Communication	communication with S5/S7 controllers	513
TF6650	TC3 DBC File Import for CAN	reading of DBC file formats	513
TF6701	TC3 IoT Communication (MQTT)	provides basic publisher/subscriber-based data connectivity via MQTT	514
TF6710	TC3 IoT Functions	provides connectivity for cloud-based communication services	514
TF6720	TC3 IoT Data Agent	gateway application for data connectivity between TwinCAT runtime and IoT services	515
TF6721	TC3 IoT Data Agent Pack 4	extension of TC3 IoT Data Agent for 4 additional ADS target runtimes or OPC UA namespaces	515
TF6722	TC3 IoT Data Agent Pack 16	extension of TC3 IoT Data Agent for 16 additional ADS target runtimes or OPC UA namespaces	515
TF6723	TC3 IoT Data Agent Pack 64	extension of TC3 IoT Data Agent for 64 additional ADS target runtimes or OPC UA namespaces	515
TF6724	TC3 IoT Data Agent Pack 256	extension of TC3 IoT Data Agent for 256 additional ADS target runtimes or OPC UA namespaces	515
TF6730	TC3 IoT Communicator	sends process data and push notifications from TwinCAT to smartphones and tablets through a messaging service	515
TF6735	TC3 IoT Communicator App	smartphone and tablet app to receive and visualise live data and push notifications sent from TwinCAT	515

Industry specific

TF8000	TC3 HVAC	library covering all technical systems in building automation	516
TF8010	TC3 Building Automation Basic	executing basic room automation functions	516
TF8020	TC3 BACnet/IP	communication with data networks of building automation and building control systems	516
TF8040	TC3 Building Automation	software package covering all technical building automation services	517
TF8310	TC3 Wind Framework	framework for the development of operational management software for wind turbines	517
TF8810	TC3 AES70 (OCA)	communication library for the operation of a system as an OCA (Open Control Architecture) controller or OCA device in an OCA network	517

Product overview TwinCAT 2

TX1200 TwinCAT PLC 520	
PC hardware	standard PC/IPC hardware, no extras
Operating systems	Windows 7/10, Windows CE*
Real-time	Beckhoff real-time kernel
I/O system	EtherCAT, Lightbus, PROFIBUS DP/MC, Interbus, CANopen, DeviceNet, SERCOS, Ethernet
Runtime system	4 multi-tasking PLCs each with 4 tasks in each PLC runtime system, development and runtime systems on one PC or separately (CE: only runtime)
Memory	process image size, flags area, program size, POU size, number of variables only limited by the size of the user memory (max. 2 GB with NT/2000/XP/Vista)
Cycle time	adjustable from 50 µs
Link time	1 µs (Intel® Core™ 2 Duo)
Programming	IEC 61131-3: IL, FBD, LD, SFC, ST, powerful library management, convenient debugging

TX1250 TwinCAT NC PTP 521	
TwinCAT PLC	inclusive 520
PC hardware	standard PC/IPC hardware, no extras
Operating systems	Windows 7/10, Windows CE*
Real-time	Beckhoff real-time kernel
I/O system	EtherCAT, Lightbus, PROFIBUS DP/MC, Interbus, CANopen, DeviceNet, SERCOS, Ethernet
Programming	performed using function blocks for TwinCAT PLC according to IEC 61131-3 (standardised PLCopen Motion Control libraries), convenient axis commissioning menus in the System Manager
Runtime system	NC point-to-point including TwinCAT PLC
Number of axes	up to 255
Axis types	electrical and hydraulic servo drives, frequency converter drives, stepper motor drives, switched drives (fast/crawl axes)
Cycle time	50 µs upwards, typically 1 ms (selectable)
Axis functions	standard axis functions: start/stop/reset/reference, speed override, special functions: master/slave cascading, cam plates, electronic gearings, online distance compensation of segments, flying saw



TX1100 TwinCAT I/O 523	
PC hardware	standard PC/IPC hardware, no extras
Operating systems	Windows 7/10, Windows CE*
Real-time	Beckhoff real-time kernel



Multi-purpose I/O interface for all common fieldbus systems, PC Fieldbus Cards and interfaces with integrated real-time driver

TX1000 TwinCAT CP 523	
PC hardware	standard PC/IPC hardware, no extras
Operating systems	Windows 7/10, Windows Embedded WES2009/WES7*
Real-time	Beckhoff real-time kernel

Windows driver for Beckhoff Control Panel

* Version-dependent/older operating system versions are available on request from our service department.

	TX1260 TwinCAT NC I		521
TwinCAT PLC	inclusive		520
TwinCAT NC PTP	inclusive		521
PC hardware	standard PC/IPC hardware, no extras		
Operating systems	Windows 7/10, Windows CE*		
Real-time	Beckhoff real-time kernel		
I/O system	EtherCAT, Lightbus, PROFIBUS DP/MC, Interbus, CANopen, DeviceNet, SERCOS, Ethernet		
Programming	DIN 66025 programs for NC interpolation, access via function blocks from TwinCAT PLC according to IEC 61131-3		
Runtime system	NC interpolation, including TwinCAT NC PTP and PLC		
Number of axes	max. 3 axes and up to 5 auxiliary axes per group, 1 group per channel, max. 31 channels		
Axis types	electrical servo axes, stepper motor drives		
Interpreter functions	subroutines and jumps, programmable loops, zero shifts, tool compensations, M and H functions		
Geometries	straight lines and circular paths in 3D space, circular paths in all main planes, helices with base circles in all main planes linear, circular, helical interpolation in the main lanes and freely definable planes, Bezier splines, look-ahead function		
Axis functions	online reconfiguration of axes in groups, path override, slave coupling to path axes, auxiliary axes, axis error and sag compensation, measuring functions		
Operation	automatic operation, manual operation (jog/inching), single block operation, referencing, handwheel operation (motion/superposition)		
	TS511x TwinCAT NC I Options		532
Options	TS511x TwinCAT Kinematic Transformation		

	TX1270 TwinCAT CNC		522
TwinCAT PLC	inclusive		520
TwinCAT NC PTP	inclusive		521
TwinCAT NC I	inclusive		521
PC hardware	standard PC/IPC hardware, no extras		
Operating systems	Windows 7/10*		
Real-time	Beckhoff real-time kernel		
I/O system	EtherCAT, Lightbus, PROFIBUS DP/MC, CANopen, DeviceNet, SERCOS, Ethernet		
Programming	DIN 66025 programming language with high-level language extensions, access via function blocks from TwinCAT PLC according to IEC 61131-3		
Runtime system	CNC, including TwinCAT NC I, NC PTP, PLC		
Number of axes/spindles	8 path axes/controlled spindles, max. of 64 axes/controlled spindles (optional), max. 12 channels (optional)		
Axis types	electrical servo-axes, analog/encoder interface via fieldbus, digital interface via fieldbus		
Interpreter functions	subroutines and jumps, programmable loops, zero shifts, tool compensations, M and H functions, mathematical functions, programming of parameters/variables, user macros, spindle and help functions, tool functions		
Geometries	linear, circular, helical interpolation in the main planes and freely definable planes, max. 32 interpolating path axes per channel, look-ahead function		
Axis functions	coupling and gantry axis function, override, axis error and sag compensation, measuring functions		
Operation	automatic operation, manual operation (jog/inching), single block operation, referencing, block search, handwheel operation (motion/superposition)		
	TS52xx TwinCAT CNC Options		
Options	TS5220 TwinCAT CNC Axes Pack		
	TS5230 TwinCAT CNC Channel Pack		
	TS5240 TwinCAT CNC Transformation		
	TS5250 TwinCAT CNC HSC Pack		
	TS5260 TwinCAT CNC Spline Interpolation		

TwinCAT 2 Supplements

TwinCAT 2 Supplements System			
TS1010 TwinCAT Eventlogger	alarm and diagnostic system for logging events which occur in the TwinCAT system		524
TS1110 TwinCAT Simulation Manager	simplified preparation and configuration of a simulation environment		525
TS1120 TwinCAT ECAD Import	importing engineering results from an ECAD program		524
TS1140 TwinCAT Management Server	central administration of Beckhoff CE control systems		527
TS1150 TwinCAT Backup	backing up and restoring files, operating system and TwinCAT settings		525
TS1600 TwinCAT Engineering Interface Server	co-ordinating programming tasks via a central source code management system		524
TS1800 TwinCAT PLC HMI	displaying visualisations created in PLC Control		526
TS1800 TwinCAT PLC HMI CE -0030	displaying visualisations created in PLC Control on Windows CE platforms		526
TS1810 TwinCAT PLC HMI Web	displaying visualisations created in PLC Control in a web browser		526
TS3300 TwinCAT Scope 2	graphical analysis tool for displaying time-continuous signals		527
TS3900 TwinCAT Solar Position Algorithm	precise calculation of the sun's position		527
TS622x TwinCAT EtherCAT Redundancy	extension of the TwinCAT EtherCAT master with cable redundancy capability		527
TS6420 TwinCAT Database Server	accessing databases from the PLC		525
TS6420 TwinCAT Database Server CE -0030	accessing databases from the PLC for Windows CE platforms		526
TS6421 TwinCAT XML Data Server	reading and writing of XML-based data by the PLC		524
TS6421 TwinCAT XML Data Server CE -0030	reading and writing of XML-based data by the PLC for Windows CE platforms		525

TwinCAT 2 Supplements Controller			
TS4100 TwinCAT PLC Controller Toolbox	modules for basic controllers (P, I, D), complex controllers (PI, PID), pulse width modulation, ramps, signal generators and filters		528
TS4110 TwinCAT PLC Temperature Controller	instanced temperature control function block for monitoring and controlling different temperature ranges		528

TwinCAT 2 Supplements Motion			
TS1500 TwinCAT Valve Diagram Editor	graphical tool for designing the characteristic curve of a hydraulic valve		532
TS1510 TwinCAT Cam Design Tool	graphic design tool for electronic cam plates		531
TS5050 TwinCAT NC Camming	using the TwinCAT NC cam plate functionality (table coupling)		531
TS5055 TwinCAT NC Flying Saw	implementing flying saw functionality		530
TS5060 TwinCAT NC FIFO Axes	implementation of a pre-defined user setpoint generator for an NC axis		530
TS5065 TwinCAT PLC Motion Control XFC	high-precision logging and switching of digital signals in relation to axis positions		529
TS5066 TwinCAT PLC Remote Synchronisation	remote synchronisation		530
TS511x TwinCAT Kinematic Transformation	implementation of different kinematic transformations for TwinCAT PTP or TwinCAT NC I		532
TS5800 TwinCAT Digital Cam Server	software implementation of fast cam controller		531
TS5810 TwinCAT PLC Hydraulic Positioning	control and adjustment of hydraulic axes		529

TwinCAT 2 Supplements | Communication

TS6100	TwinCAT OPC UA Server	access to TwinCAT in accordance with OPC UA with UA server (DA/HA/AC) and UA client (DA)	536
TS6100-0030	TwinCAT OPC UA Server CE	access to TwinCAT in accordance with OPC UA with UA server (DA/HA/AC) and UA client (DA) for Windows CE platforms	536
TS6120	TwinCAT OPC Server	access to TwinCAT variables in accordance with the OPC DA/OPC XML DA specification	536
TS6250	TwinCAT Modbus TCP Server	communication with Modbus TCP devices (server and client functionality)	534
TS6250-0030	TwinCAT Modbus TCP Server CE	communication with Modbus TCP devices (server and client functionality) for Windows CE platforms	534
TS6255	TwinCAT PLC Modbus RTU	serial communication with Modbus end devices	533
TS6270	TwinCAT PROFINET RT Device	TwinCAT PROFINET RT device turns every PC-based controller into a PROFINET RT device.	538
TS6271	TwinCAT PROFINET RT Controller	TwinCAT PROFINET RT controller turns every PC-based controller into a PROFINET RT controller.	538
TS6280	TwinCAT EtherNet/IP Slave	TwinCAT EtherNet/IP slave turns every PC-based controller into an EtherNet/IP slave.	538
TS6300	TwinCAT FTP Client	basic access from TwinCAT PLC to FTP server	539
TS6310	TwinCAT TCP/IP Server	communication via generic TCP servers	537
TS6310-0030	TwinCAT TCP/IP Server CE	communication via generic TCP servers for Windows CE platforms	537
TS6340	TwinCAT PLC Serial Communication	communication via serial Bus Terminals or PC COM ports	533
TS6341	TwinCAT PLC Serial Communication 3964R/RK512	communication via serial Bus Terminals or PC COM ports with the 3964R and RK512 protocol	533
TS6350	TwinCAT SMS/SMTP Server	sending SMS and e-mails from the PLC	537
TS6350-0030	TwinCAT SMS/SMTP Server CE	sending SMS and e-mails from the PLC for Windows CE platforms	537
TS6360	TwinCAT Virtual Serial COM Driver	virtual serial COM driver for Windows and Windows CE platforms	539
TS6370	TwinCAT DriveCOM OPC Server	fieldbus-independent communication connections between the engineering tool and the drive	535
TS6371	TwinCAT DriveTop Server	configuring Indramat SERCOS drives with DriveTop software on TwinCAT systems	535
TS650x	TwinCAT PLC IEC 60870-5-101, -102, -103, -104 Master	implementation of IEC 60870-101, -102, -103 and -104 masters	534
TS650x-0030	TwinCAT PLC IEC 60870-5-104 Master CE	implementation of IEC 60870-104 masters under Windows CE	534
TS6507	TwinCAT PLC IEC 60870-5-101, -104 Slave	implementation of IEC 60870-101 and -104 slaves	534
TS6507-0030	TwinCAT PLC IEC 60870-5-104 Slave CE	implementation of IEC 60870-104 slaves under Windows CE	534
TS6509	TwinCAT PLC IEC 61400-25 Server	IEC 61400-25 communication	535
TS6511	TwinCAT PLC IEC 61850 Server	IEC 61850 communication	535
TS6600	TwinCAT PLC RFID Reader Communication	connection of RFID readers to the TwinCAT PLC	539
TS6610	TwinCAT PLC S5/S7 Communication	communication with S5/S7 controllers	539

TwinCAT 2 Supplements | Building Automation

TS8000	TwinCAT PLC HVAC	automation of HVAC and sanitary installations	540
TS8010	TwinCAT PLC Building Automation Basic	executing basic room automation functions	540
TS8020	TwinCAT BACnet/IP	communication with the data networks of the building automation and building control systems	540
TS8035	TwinCAT FIAS Server	communication between TwinCAT PLC and a system using the FIAS standard	541
TS8036	TwinCAT Crestron Server	communication between a TwinCAT PLC and a Crestron controller	541
TS8040	TwinCAT Building Automation	software package covering all technical building automation services	541
TS8100	TwinCAT Building Automation Framework	configuration and commissioning of building automation projects	541

The Automation Company

Beckhoff offers comprehensive system solutions in numerous performance classes for all areas of automation. The control technology is exceptionally scalable – from high-performance Industrial PCs to mini-PLCs – and can be adapted precisely to application-specific requirements. TwinCAT automation software integrates real-time control with PLC, NC and CNC functions in a single feature-filled package.

► www.beckhoff.com/Automation

Efficient engineering

- Integration into Microsoft Visual Studio®
- Wide selection of programming languages: IEC 61131-3, C/C++, MATLAB®/Simulink®, Safety C/FBD
- Modular software development
- Automatic code generation interface
- Link to source code control systems

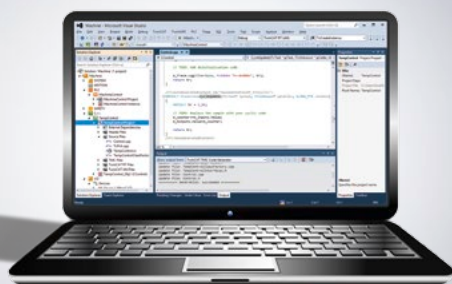
High performance

- Cycle times from 50 µs
- Multi-core support
- Support of 32-bit and 64-bit operating systems
- Pre-emptive multitasking

Connectivity

- Useable with all fieldbus systems
- Open and expandable for IT trends – today and tomorrow
- Adheres to industry-specific and standard protocols
- Ideal for IoT and cloud computing applications

► www.beckhoff.com/TwinCAT3





TwinCAT 3 470

- One software platform for engineering and runtime
- Integrated real-time support
- Software modules for PLC, NC, CNC, robotics, HMI, measurement technology, analytics, safety, machine vision

TwinCAT 2 518

- Open, compatible PC hardware
- Embedded IEC 61131-3 software PLC, software NC and software CNC
- Connection to all common fieldbuses

TwinSAFE 542

- Integrated safety system from I/Os to drives
- Compact safety PLC
- Certified for solutions up to IEC 61508 SIL 3 and DIN EN ISO 13849-1:2008 PL e
- Safety engineering integrated into TwinCAT 3

► www.beckhoff.com/TwinCAT2

► www.beckhoff.com/TwinSAFE



- Efficient, universal engineering
- Programming in different languages
- Open, hardware-independent control system gives freedom of choice in terms of automation and control components.
- Scalable control platform from single- to multi-core CPUs
- All control functions on a single, centralised platform: PLC, motion control, robotics, measurement technology, a.o.

TwinCAT 3 | eXtended Automation Technology (XAT)

► www.beckhoff.com/TwinCAT3



With TwinCAT 3 a PC-based control software is available which will expand the standard automation world considerably. In addition to the object-oriented IEC 61131-3 extensions, the languages of the IT world are available in C and C++. The integration of MATLAB®/Simulink® enables the application in scientific fields. And all of that in just one engineering

environment. The modules run in different languages in a common runtime. The advantage of this modularity is the improved reuse of modules, once they have been written and tested. The runtime runs under harsh real-time conditions with the use of multi-core technology and the support of 32- or 64-bit operating systems.

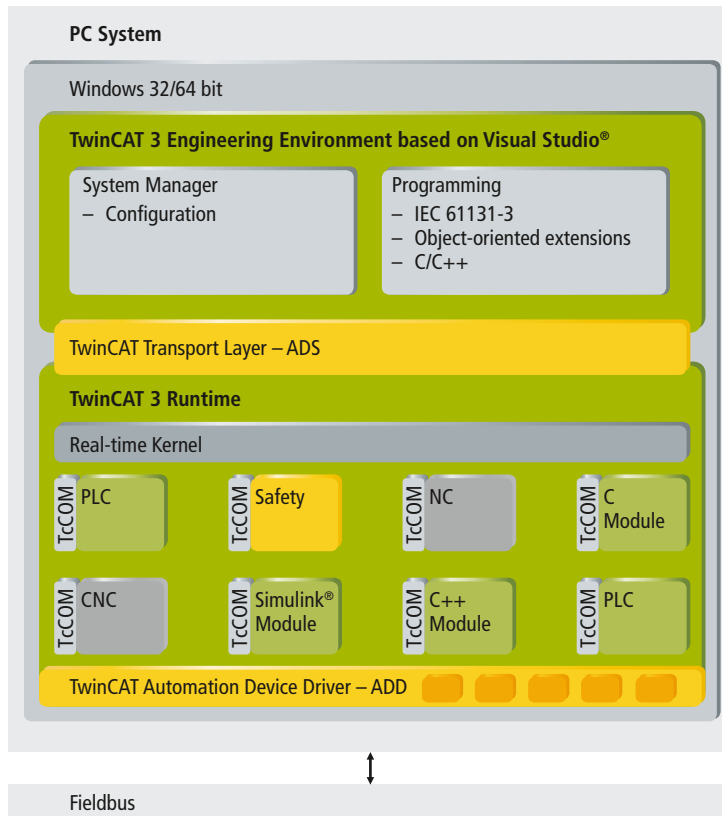
Current operating systems can be found in the respective product tables under target systems. Older operating systems are available on request from our service department.

TwinCAT 3 highlights

- only one software for programming and configuration
- Visual Studio® integration
- more freedom in selecting programming languages
- support for the object-oriented extension of IEC 61131-3
- use of C/C++ as the programming language for real-time applications
- link to MATLAB®/Simulink®
- open interfaces for expandability and adaptation to the tools landscape
- flexible runtime environment
- active support of multi-core and 64-bit systems
- migration of TwinCAT 2 projects
- automatic code generation and project implementation with the TwinCAT Automation Interface



TwinCAT 3 | eXtended Automation Architecture (XAA)



In addition to the possibilities of controller programming according to the 3rd edition of IEC 61131-3, the new TwinCAT 3 architecture allows the use of C and C++ as the programming language. This opens up completely new application possibilities, as well as the expansion of or integration in existing systems. The link to MATLAB®/Simulink® is just one example of this new openness.

TwinCAT 3 extends the standard automation world

eXtended Automation Architecture

- supports all main fieldbuses
- supports IEC 61131, C/C++, MATLAB®/Simulink®
- supports Motion Control: from point-to-point to CNC
- supports TwinSAFE configuration
- supports Scientific Automation: robotics, measurement technology, Condition Monitoring

eXtended Automation Engineering

- one tool – Microsoft Visual Studio®
- integrated: IEC 61131 – worldwide standard in automation

- integrated: C/C++ – worldwide standard in IT
- integrated: TwinCAT System Manager – well-known configuration tool
- link to MATLAB®/Simulink®: worldwide standard in science
- expandable with other tools: editors, compilers
- TwinCAT 2 projects can be migrated.
- TwinCAT 3 modules: standardised programming frames
- using the .NET programming languages for non-real-time capable applications (e.g. HMI)

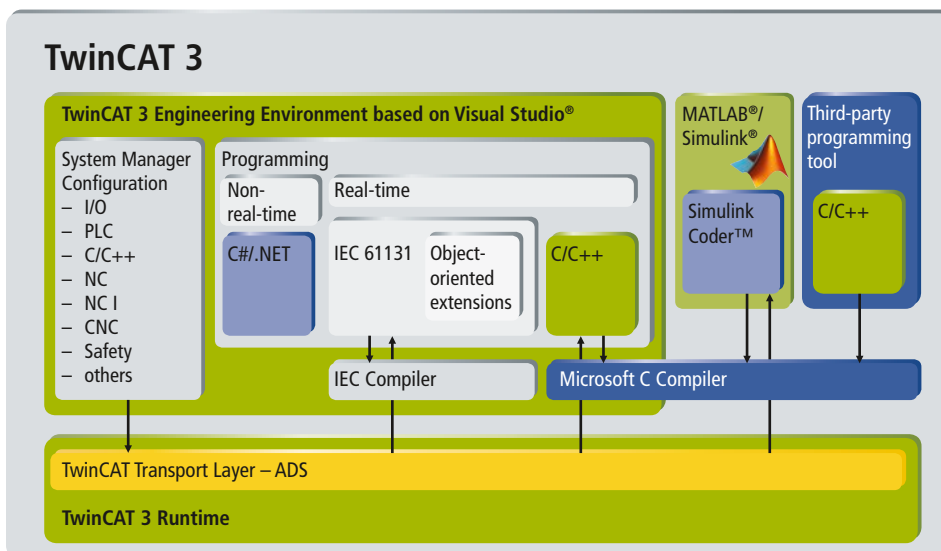
eXtended Automation Runtime

- IEC 61131, C/C++, MATLAB®/Simulink® objects in one runtime
- integrated TwinSAFE runtime
- extended real-time functionality: min. 50 µs cycle time and low jitter
- enhanced performance: support of multi-core CPUs
- future-proof: supports 64-bit operating systems



TwinCAT 3 | eXtended Automation Engineering (XAE)

Integration in Microsoft Visual Studio® makes it possible to program automation objects in parallel with the aid of the 3rd edition of IEC 61131-3 and the C or C++ languages. The objects (modules) generated can exchange data with each other and call each other independently of the language they were written in. The TwinCAT System Manager has been integrated into the development environment. This way, only one software is required to configure, parameterise, program and to diagnose automation devices.



Visual Studio® integration can be accomplished in two different ways. TwinCAT Standard only uses the basic framework of Visual Studio® with all its benefits in terms of handling, connection to source code control software, etc., while TwinCAT Integrated, as the name implies, integrates itself into Visual Studio®. In this version, the C/C++, C#, VB.NET programming languages and link to MATLAB®/Simulink® are available.

Flexible use of programming languages

C and C++ programming languages

- standardised
- widely used programming languages
- very powerful programming languages
- run under the same runtime as PLC programs
- for the implementation of drivers

Extended debugging of C++ programs

- debugging of C++ programs that run in real-time
- use of breakpoints
- use of watch lists
- use of call stacks

.NET programming languages

- used for non-real-time programming (e.g. HMI)
- source code management in the same project

Link to MATLAB®/Simulink®

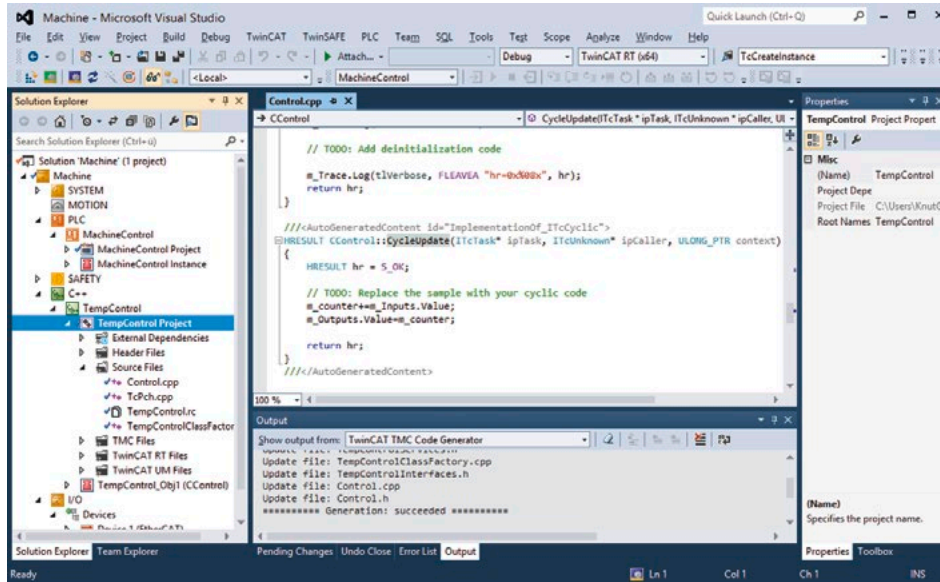
- great variety of toolboxes
- possibilities for use
 - building of control circuits
 - in simulation
 - in optimisation
- automatic code generation
- debug interface between MATLAB®/Simulink® and TwinCAT



TwinCAT 3 | eXtended Automation Language Support

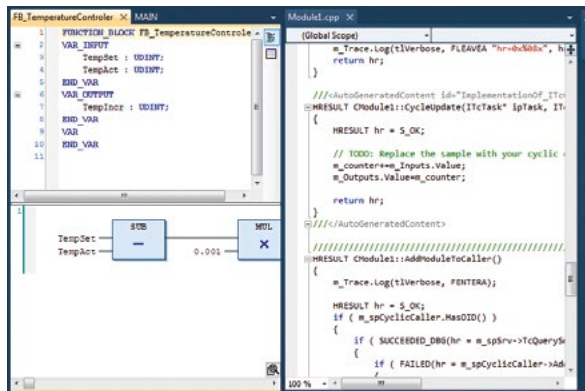
Real-time

- System Manager
- LD editor
- FBD editor
- SFC editor
- IL editor
- ST editor
- CFC editor
- Visual C/C++ editor

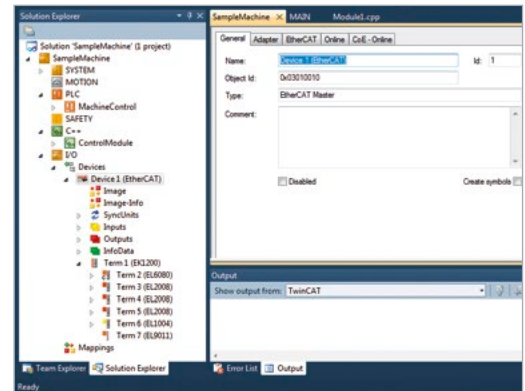


Non-real-time

- C#
- .NET
- Visual Basic
- C++
- Silverlight



Parallel use of the C++ and FBD programming languages



TwinCAT System Manager integrated into Visual Studio®

Integration of Visual Studio®

Automation devices and application programming in one environment

- use of the most famous and best supported development suite
- future-proof
- editing of PLC programs and complex visualisations in one environment
- multi-language support
- modern look and feel
- context-sensitive online help

- automatic syntax checking
- IntelliSense
- syntax highlighting
- use of the well-known source code control tools
- open architecture
- extendable by plug-ins

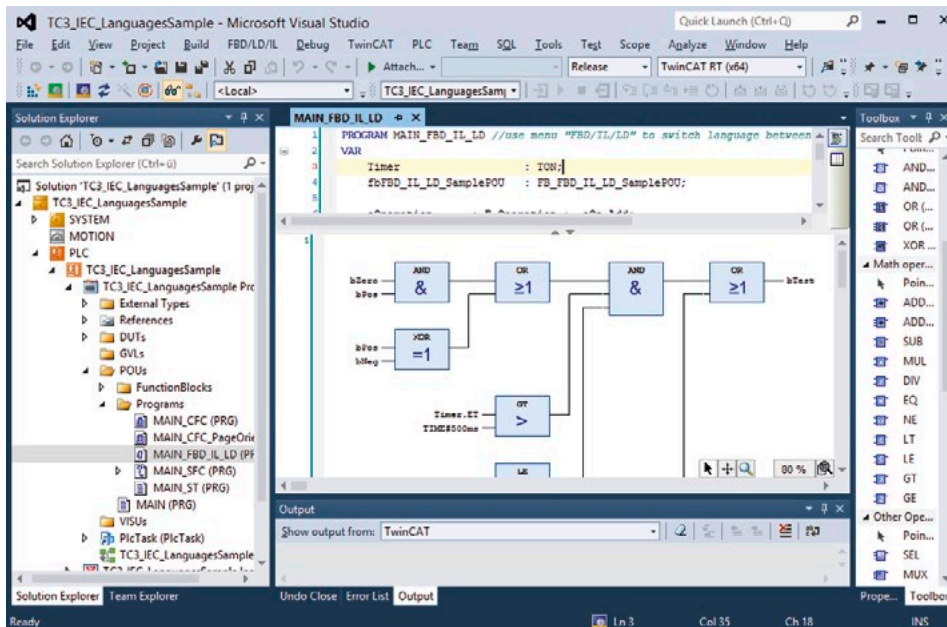




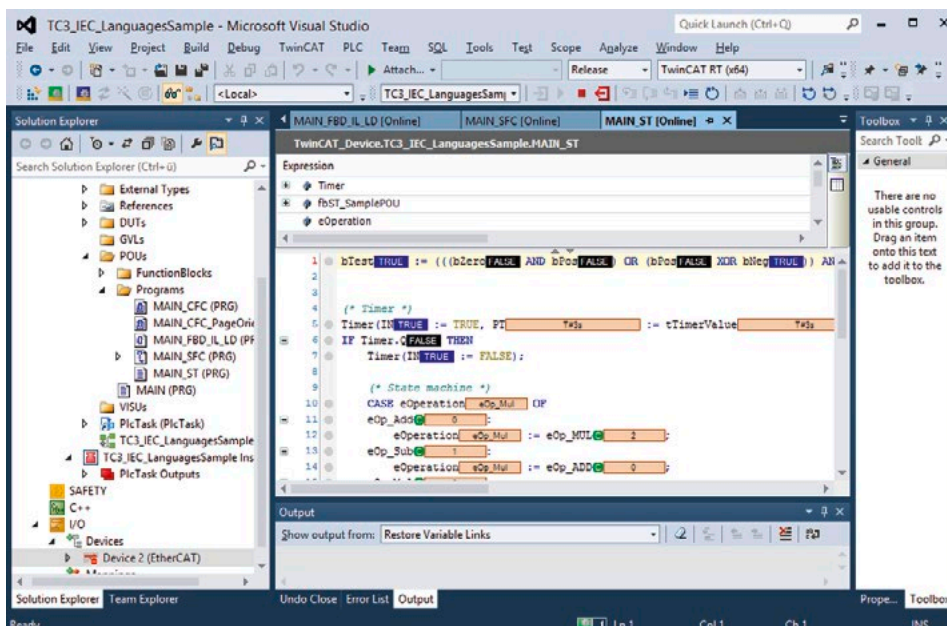
TwinCAT 3 | XA Language Support: IEC 61131-3

For more efficient programming of automation devices, the editors for IEC 61131-3 programming in TwinCAT have been significantly improved. The operability in particular has been optimised and the debugging options have been extended. The new options include improved inline monitoring, conditional break points and more.

In TwinCAT 3, the editors of the IEC 61131-3 have been integrated seamlessly into the Visual Studio® environment. As a result, the editors use the original Visual Studio® toolbox for the graphical languages, for example.



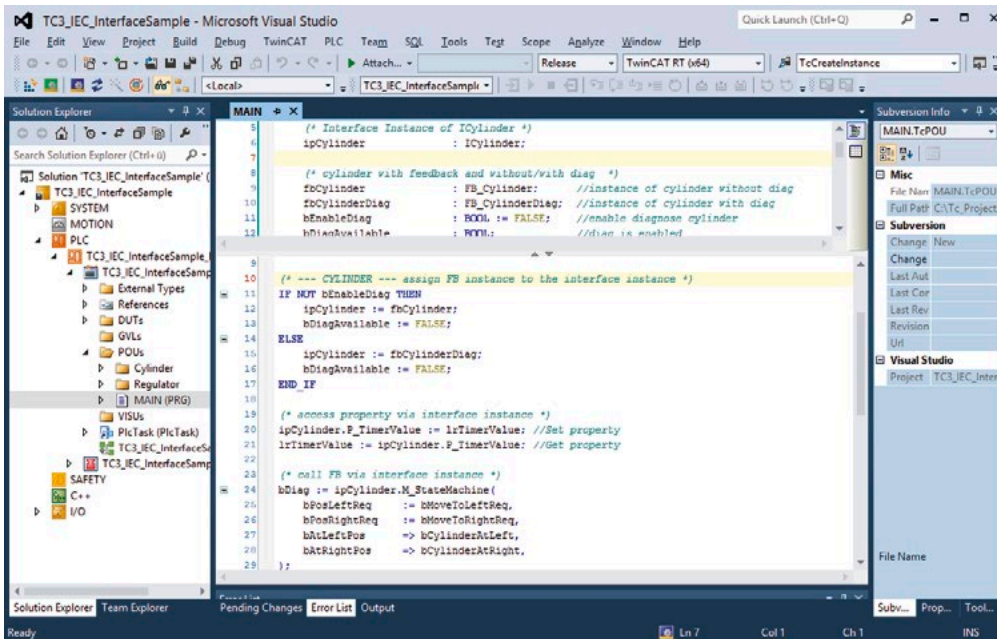
Improved inline monitoring for the Structured Text (ST) programming language





TwinCAT 3 | XA Language Support: IEC 61131-3

TwinCAT 3 completely supports the 3rd edition of the IEC 61131-3. It enables among other things the use of object-oriented techniques such as single inheritance, interfaces, methods and attributes, which significantly increase both the reusability and the quality of the control code.



Example of the use of polymorphism within an IEC 61131-3 POU (Program Organisation Unit)

IEC 61131-3 programming

- supplier-independent programming standard
- PLCopen certification
- portable, reusable software
- 5 graphic and text-based programming languages
 - Structured Text and Instruction List
 - Function Block Diagram and Ladder Diagram
 - Sequential Function Chart
- data encapsulation by user-defined data types

Extended options in TwinCAT 3

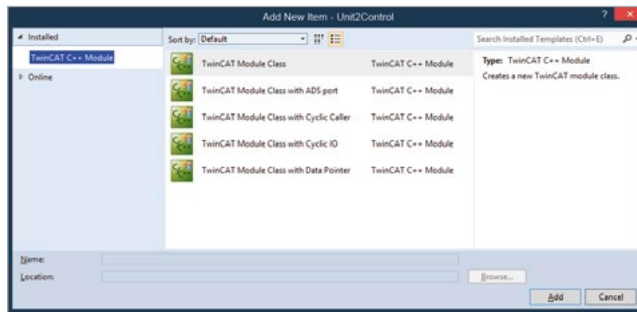
- improved usability
 - auto-complete
 - marking of associated keywords
 - collapsing of programming structures
- extended debugging
 - use of conditional break points
 - improved inline monitoring
- object-oriented extensions
 - single inheritance
 - interfaces
 - methods
 - attributes



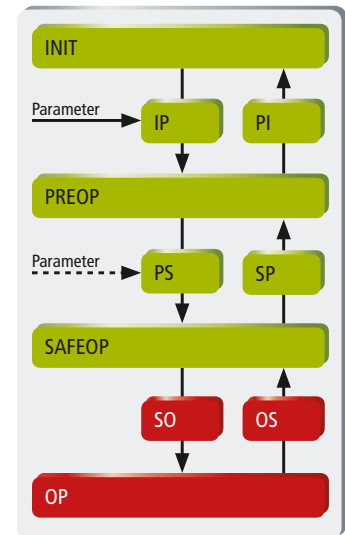
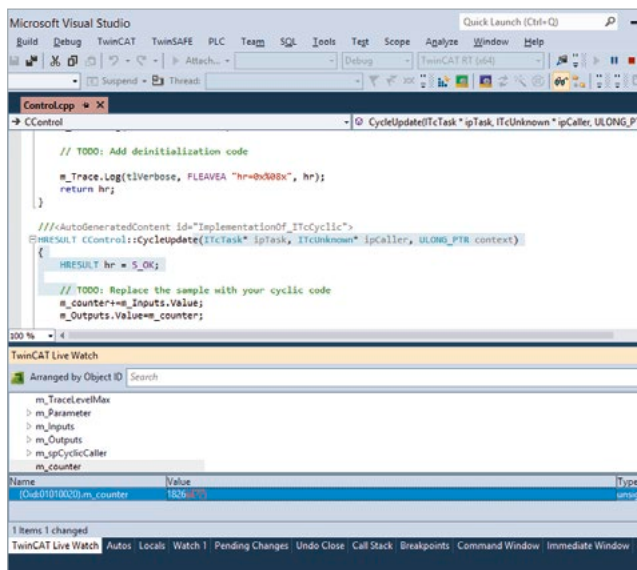
TwinCAT 3 | XA Language Support: C/C++

TwinCAT 3 offers the possibility to program TwinCAT runtime modules in C/C++ languages. For code generation, the C compiler integrated in Microsoft Visual Studio® 2010 is used. With TwinCAT 3 C++ libraries, functions for reading/writing files, starting threads, allocating memory or communicating with a database are provided. This corresponds to the IEC 61131-3 mechanism when using libraries.

Wizards for the creation of basic projects, classes and I/O variables make rapid engineering possible.



The routine CycleUpdate is cyclically processed. The internal variables are available for monitoring in the TwinCAT online watch window even without having to set a breakpoint.



State machine with transitions for the TwinCAT modules

C/C++ as programming languages in automation technology

C and C++ programming languages

- powerful, widely used programming languages
- standardised, object-orientated programming languages
- generation of efficient object code
- run under the same runtime as PLC programs
- for the implementation of drivers

- Beckhoff C++ Libraries for extended functionality in the real-time context

Extended debugging of C++ programs

- debugging of C++ programs that run in real-time
- monitoring, watch lists also without the use of break points

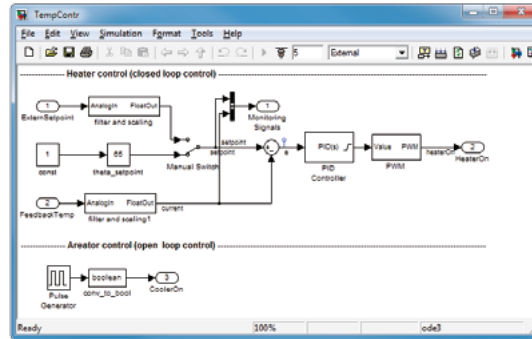
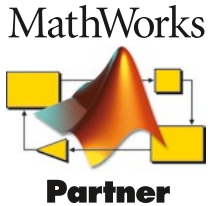
.NET programming languages

- used for non-real-time programming (e.g. HMI)
- source control in the same project

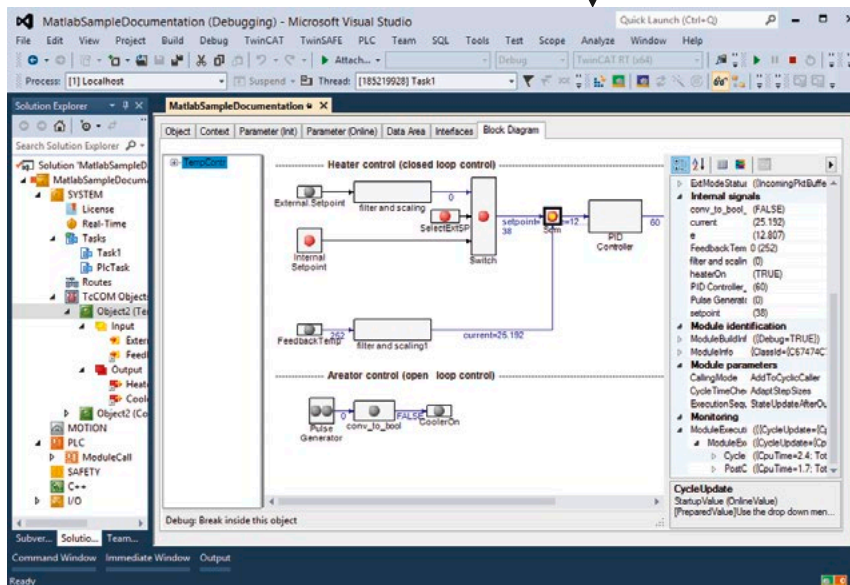


TwinCAT 3 | XA Language Support: MATLAB®/Simulink®

The integration of MATLAB®/Simulink® enables execution of TwinCAT modules that were generated as models in the Simulink® simulation environment. The chosen interfacing type displays the parameters and variables in the graphic interface of TwinCAT 3 and enables viewing and modification in the real-time environment at runtime.



Example for temperature controller in MATLAB®/Simulink®



Parameter view of the generated module in TwinCAT






Integration with the simulation software MATLAB®/Simulink®

- standard tool in scientific and measuring applications
- wide range of toolboxes (e.g. Fuzzy Logic Toolbox)
- development, simulation and optimisation of complex control loops
- automatic code generation via Realtime Workshop
- debug interface between TwinCAT 3 and Simulink®
- parameterisation of the generated module in TwinCAT 3
- download and execution of the module in TwinCAT 3 runtime
- multiple module instantiation possible
- Modules can be used without MATLAB®/Simulink®.



TwinCAT 3 | eXtended Motion Control

With eXtended Motion Control, TwinCAT automation software offers an integrated and scalable solution for Motion Control applications including simple point-to-point movements, CNC and robot control.

Functionality			
 NC PTP	 NC I	 CNC	 Robotics
Point-to-point movement <ul style="list-style-type: none"> – gearing – camming – superposition – flying saw 	Interpolated motion with 3 axes and 5 additional axes <ul style="list-style-type: none"> – programming according to DIN 66025 – technological features – straightforward utilisation through function blocks from the PLC 	Complete CNC functionality <ul style="list-style-type: none"> – interpolated movement for up to 32 axes per channel – various transformations 	Interpolated motion for robotic control <ul style="list-style-type: none"> – support for a wide range of kinematic systems – optional torque pre-control

Interpolated motion for robotic control

Advantages of the integration of robotic control in TwinCAT

- configuration, parameterisation, diagnostics and programming in TwinCAT
- optimum synergy between PLC, Motion Control and robot control system

- high performance and precision through direct interfaces

Kinematic calculation process

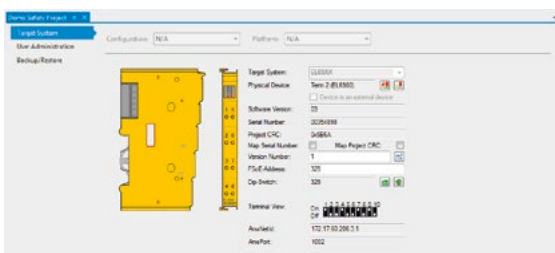
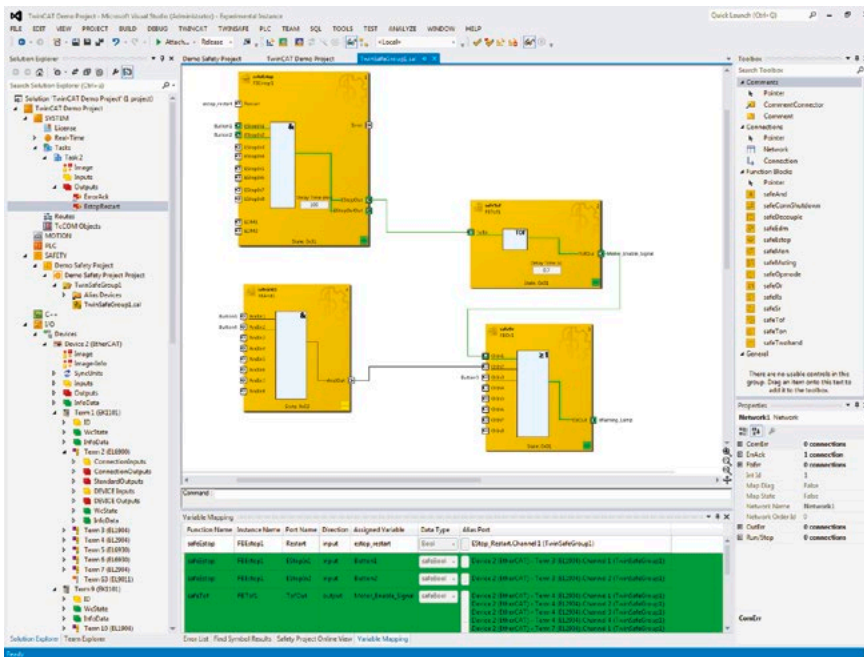
- forward transformation
- inverse transformation
- calculation of the dynamic model



TwinCAT 3 | Safety Editor

The Safety Editor integrated in TwinCAT 3 allows the creation of a safety application in a graphical environment. The user can program the desired logic directly with function blocks. The logic can initially be developed independently of the hardware configuration, leading to increased flexibility and portability. Additionally, the editor can automatically generate documentation for the application, making both the act of documenting and commissioning significantly easier.

For further safety-relevant features of the TwinSAFE system and the TwinSAFE products see page **542**



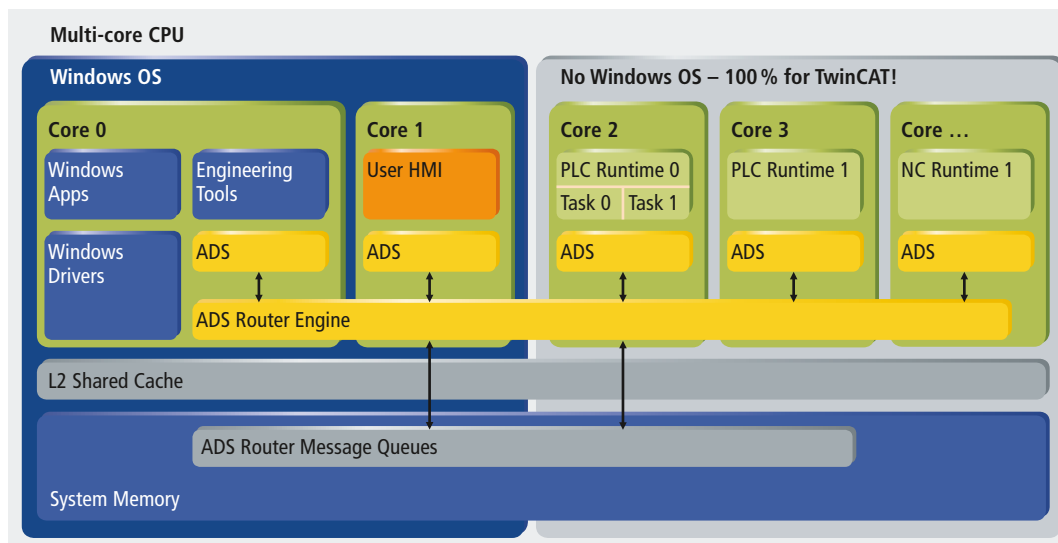
TwinCAT Safety Editor

- fully integrated in TwinCAT 3
- graphical programming
- convenient diagnostics through the direct display of online values in the graphical environment
- overview of the online state of relevant groups, connections and function blocks
- multi-level verification of the application for consistency
- automatic project download verification
- automatic generation of the documentation for acceptance and commissioning

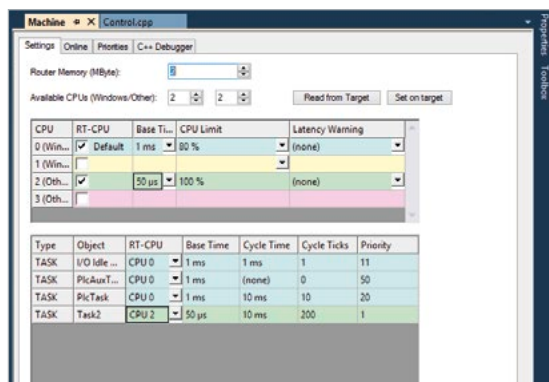


TwinCAT 3 | eXtended Automation Performance

Current developments in computer technology, which offer CPUs with more and more cores, enable the distribution of tasks across different cores. The TwinCAT 3 runtime environment follows this concept. It can be used to distribute functional units such as HMI, PLC runtime or MC to dedicated cores. For each of the cores used by the runtime environment the maximum load as well as the base time and therefore the possible cycle times can be set separately.



Due to the use of multi-core systems, functional units (e.g. PLC and NC runtimes, HMI) are distributed to individual processor cores.



Dialog for the distribution of tasks to processor cores: Moreover, in the so-called "core isolation" mode it is possible to make individual cores exclusively available for the use of TwinCAT. The context change between TwinCAT and the Windows operating system is thus avoided for these cores, which increases the attainable performance still further.

Multi-core and multi-tasking support

Support of multi-core systems

- distribution from applications to cores (e.g. PLC, NC and HMI can run on different cores)

Support of multi-tasking

- preemptive multi-tasking
- parallel processing of tasks

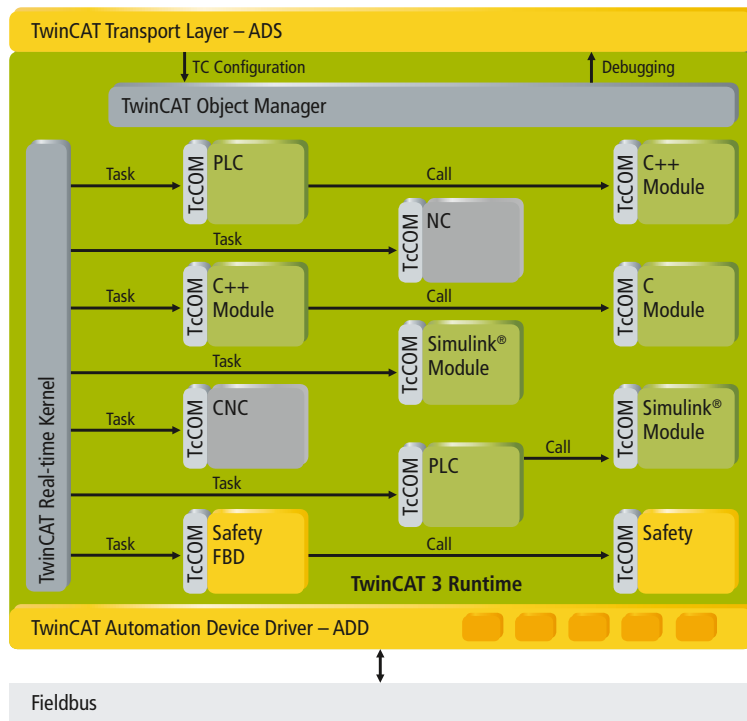
Support of 64-bit operating systems

- usage of more resources (memory)



TwinCAT 3 | eXtended Automation Runtime (XAR)

Standardised modules enable open and flexible design of the TwinCAT 3 runtime. It makes an environment available in which the TwinCAT 3 modules can run. Whether the modules are PLC, NC, CNC, RC (Robotic Control) or C/C++ code-based modules (e.g. created with MATLAB®/ Simulink®) is irrelevant.



Modular TwinCAT 3 runtime

Modular design, openness, extendibility

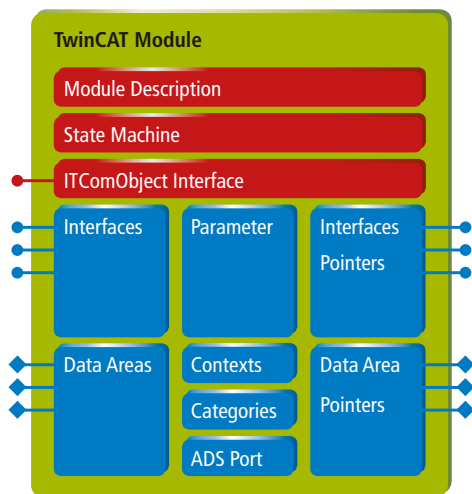
Open runtime interface

- separation of complete functionality into modules
- use of services from system modules (e.g. real-time)

- defined interfaces
- extension of the runtime by own modules (e.g. bus drivers)

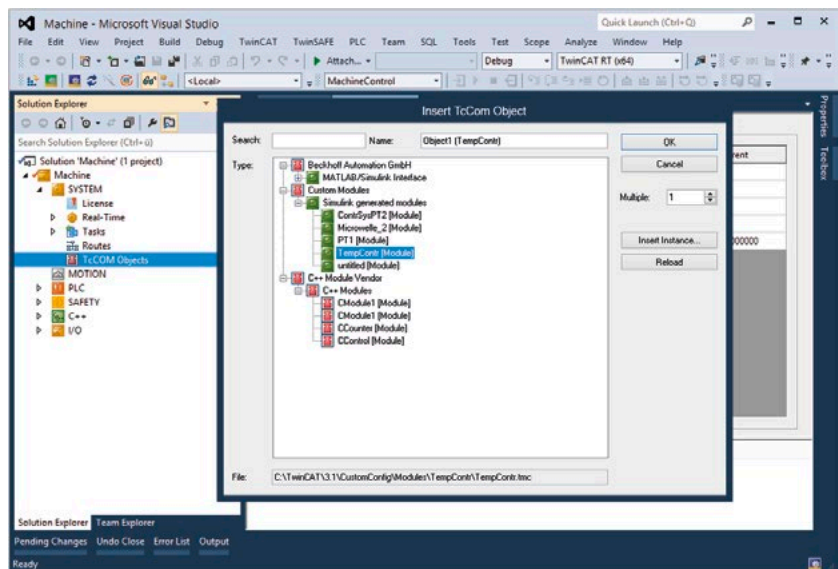
- Scalability: modules can contain simple functions; complex algorithms and real-time tasks.

TwinCAT 3 modules consist of a range of formally defined attributes and interfaces. They enable general application of the modules with each other and externally. The predefined interfaces enable cyclic calling of the internal module logic, for example. Each module implements a state machine that controls the initialisation, parameterisation and linking of the respective module.



Structure of a TwinCAT 3 module

In addition to user modules, a number of system modules are already available which provide basic runtime functionality (e.g. TwinCAT real-time). These modules have fixed object IDs and are therefore accessible from each module.



Selection and parameterisation of a MATLAB®/Simulink® module

Fast communication, reusability


- Functionality of the modules is scalable.
- direct and therefore very fast communication between modules
- Modules are sealed.
- Modules can be developed, serviced and tested independent of each other.
- high reusability

TE1xxx | TwinCAT 3 Engineering




	TC3 Engineering	TC3 EtherCAT Simulation	TC3 XCAD Interface	TC3 CAD Simulation Interface
Technical data	TE1000	TE1111	TE1120	<i>i</i> TE1130
	<p>TwinCAT Engineering contains the engineering environment of the TwinCAT 3 control software:</p> <ul style="list-style-type: none"> – integration into Visual Studio® 2010/2012/2013/2015/2017 (if available) – support for the native Visual Studio® interfaces (e.g. connection to source code management systems) – IEC 61131-3 (IL, ST, LD, FBD, SFC) and CFC editors – IEC 61131-3 compiler – integrated system manager for the configuration of the target system – instancing and parameterisation of TwinCAT modules – integrated C++ debugger – user interface for the parameterisation of modules generated by MATLAB®/Simulink® – if integrated into Visual Studio®, instancing of .NET projects in the same solution (e.g. for HMI) – integrated Scope View Base as charting tool for machine commissioning in Visual Studio® – integrated Bode Plot Base for the optimisation of drive axes 	<p>Virtual machine commissioning becomes possible if the EtherCAT cable of the machine computer can simply be plugged into a simulation computer, without the need for reconfiguration. With the TC3 EtherCAT Simulation function and a network adapter the simulation computer can simulate a number of EtherCAT slaves. For configuration purposes the EtherCAT slaves of the original machine configuration are inverted. All EtherCAT features necessary for machine simulation are modelled – including distributed clocks. Since the communication protocols CoE and SoE are implemented, acyclic commands can also be processed in the simulation environment.</p>	<p>TC3 XCAD Interface serves the purpose of importing already existing engineering results from an ECAD program. The TC3 XCAD Interface enables the import of information about the structure of the I/Os and their links to PLC variables, which is exported from the ECAD tool by means of XML description. On the basis of this information a system manager configuration and a basic PLC program with the I/O variables used are generated. The generation of NC and CNC axes is also possible.</p>	<p>The TC3 CAD Simulation Interface is a user-friendly tool that can be used to configure a link between TwinCAT and a 3D CAD system. The aim of this connection is a software-in-the-loop simulation (SiL) of the intended sequence on a machine or system to support virtual commissioning.</p> <p>The 3D simulation of machine and system components is a key element in the implementation of virtual commissioning. In the simulation, the movements and interactions of all individual installed components are represented in combination, so that collisions as well as critical system states can be determined in advance. In addition, simulation can be used to train operators and maintenance personnel in advance for regular operation and to define troubleshooting instructions based on simulated critical machine states. Another typical application would be pre-sales training courses on machines or machine components for sales personnel using 3D simulations.</p> <p>The TC3 CAD Simulation interface facilitates the implementation of a 3D simulation, in that it uses the design data of the CAD tool and establishes links to the corresponding automation data. As usual, convenient drag-and-drop functions can be used for link configuration. The parameterisation can be extended to map complex relationships if required. This means that software-in-the-loop simulation of machines, systems or installed components is easily and conveniently possible, even in the event of system expansions.</p>
Required	TC1000	TC1000	TC1000	TC1000
Target system	Windows 7/8/10	Windows 7/8/10	Windows 7/8/10	Windows 7/8/10
Further information	www.beckhoff.com/TE1000	www.beckhoff.com/TE1111	www.beckhoff.com/TE1120	www.beckhoff.com/TE1130

i For availability status see Beckhoff website at: www.beckhoff.com

	TC3 PLC Static Analysis	TC3 Scope View Professional	TC3 Filter Designer	TC3 Target for MATLAB®/Simulink®
	TE1200	TE1300	 TE1310	TE1400
	<p>With the integration of the static code analysis, a further tool is available in TwinCAT 3.1 that supports the PLC software development process.</p> <p>The static code analysis is an analysis tool that tests PLC software on the basis of coding rules and identifies potential weak points of an implementation even during the development stage. The analysis extends from checking compliance with naming conventions through to examining the use of objects and operators. Easier readability and an improved program structure are achieved through the analysis. Furthermore, the user's attention is drawn to possibly unintentional and faulty implementations, so that these program points can be optimised at an early stage.</p>	<p>TwinCAT 3 Scope View is a software oscilloscope for the graphical display of data in a YT, XY or bar chart. Scope View Professional extends the Scope View Base version which is included in TwinCAT 3 XAE by further functionalities. It can be used for tracking and monitoring processes over a longer period of time.</p> <p>Long-term recordings, print-out function, trigger-controlled data logging are part of the functionality. With multi-core support Scope View ensures optimised performance in the display of signals.</p> <p>Like TwinCAT 3 XAE, Scope View integrates itself into Microsoft Visual Studio®. It can be used as a stand-alone project or in combination with a TwinCAT project within a solution.</p> <p>Furthermore, Scope View Professional can be integrated into a user's .NET-based visualisation. Thus, seamless integration into an existing machine visualisation is possible.</p>	<p>The TC3 Filter Designer is a graphic engineering tool for determining coefficient digital filters. In Microsoft Visual Studio® it integrates seamlessly with the existing TwinCAT engineering landscape.</p> <p>Selectable filter designs are Butterworth, Chebyshev and Inverse-Chebyshev, while the possible filter types are lowpass, highpass, bandpass and bandstop. The filter coefficients can be modified graphically or by means of a tabular specification. Once the filter coefficients have been determined, they can be used in the PLC as an input for digital filter function blocks or transferred into the ELM measurement modules by drag & drop. Each channel of an ELM measurement module has two freely configurable digital filters connected in series, which as a result are very easy to adjust using the Filter Designer.</p>	<p>The TwinCAT MATLAB®/Simulink® Target offers System Target Files for the use of the MATLAB®/Simulink® coder. It enables the generation of TwinCAT 3 runtime modules, which can be instantiated and parameterised in the TwinCAT 3 engineering environment.</p>
	TC1200	TC1000	TC1000	TC1000
	Windows 7/8/10	Windows 7/8/10	Windows 7/8/10	Windows 7/8/10
	www.beckhoff.com/TE1200	www.beckhoff.com/TE1300	www.beckhoff.com/TE1310	www.beckhoff.com/TE1400



TExxxx | TwinCAT 3 Engineering



	TC3 Interface for MATLAB®/Simulink®	TC3 Target for FMI	TC3 Valve Diagram Editor	TC3 Cam Design Tool
Technical data	TE1410	 TE1420	TE1500	TE1510
	<p>The interface for MATLAB®/Simulink® provides a communication interface between MATLAB®/Simulink® and the TwinCAT 3 runtime. It supports the acquisition and visualisation of real-time parameters. It can be used both for software-in-the-loop simulation (SiL) and (in combination with TE1400) hardware-in-the loop simulation (HiL) of the controller.</p> <p>Features</p> <ul style="list-style-type: none"> – data exchange between fieldbus devices and MATLAB®/Simulink®, for example for the simple realisation of control loops with low real-time requirements – Data exchange between the TwinCAT controller and MATLAB®/Simulink®; this enables controller testing by SiL simulation, for example. – acquisition and visualisation of process data via MATLAB®/Simulink® – configuration via graphic editor – various data exchange options, access via: <ul style="list-style-type: none"> – symbol name of a variable – configurable interface module 	<p>The TC3 Target for FMI provides an interface for simulation tools that support the Functional Mockup Interface (FMI). The interface enables the generation of TwinCAT 3 runtime modules, which can be instantiated and parameterised in the TwinCAT 3 engineering environment. Models exported with FMI 2.0 – both Model Exchange and Co-Simulation – are supported. There are already a number of solvers available in TwinCAT 3 for the calculations of models exported as Model Exchange.</p>	<p>The TwinCAT Valve Diagram Editor allows the linearisation of non-linear curves of hydraulic valves with the aid of a graphical editor. On the basis of a few base points, straight lines or 5th degree polynomials can be determined that connect the points. The characteristic linearisation curve thus determined can be loaded into the TwinCAT NC real-time and taken into account when the voltages are output in the drive.</p>	<p>The TC3 Cam Design Tool allows the generation and modification of cam plates with the aid of a graphical editor. These are composed of sections of laws of motion such as modified sine waves, harmonic combinations, or of various polynomial functions. Velocity, acceleration and jerk are displayed in addition to the slave position. The generated cam plates can be transferred to the NC as tables with specified step size or as so-called motion functions.</p>
Required	TC1000	TC1000	TC1000	TC1000
Target system	Windows 7/8/10	Windows 7/8/10	Windows 7/8/10	Windows 7/8/10
Further information	www.beckhoff.com/TE1410	www.beckhoff.com/TE1420	www.beckhoff.com/TE1500	www.beckhoff.com/TE1510



For availability status see Beckhoff website at: www.beckhoff.com

	TC3 EAP Configurator	TC3 HMI	TC3 Analytics Workbench	TC3 Analytics Service Tool
	TE1610	TE2000	 TE3500	 TE3520
	<p>The TwinCAT 3 EAP Configurator is a tool for visualising and configuring communication networks, in which data exchange based on the EtherCAT Automation Protocol (EAP) takes place or is to be established. EAP is used for master/master communication.</p>	<p>The TC3 HMI (human-machine interface) integrates itself into the well-known Visual Studio® development environment. Based on the latest web technologies (HTML5, JavaScript), it allows the user to develop platform-independent user interfaces that are "responsive", i.e. they automatically adapt to the screen resolution, size and orientation at hand. With the graphical WYSIWYG (what-you-see-is-what-you-get) editor, controls can be easily arranged via drag-and-drop and linked with real-time variables.</p> <p>The HMI is extensible on all levels. Mixing standard controls with custom design elements makes designing your own HMI easy. User controls can also be created and configured by modifying the standard controls to create your own toolbox. To create more complex pages, predefined designer templates can be integrated.</p> <p>On the client side, the HMI logic can be implemented in JavaScript or as a so-called server extension in C++ or .NET, which allows users to protect their know-how.</p>	<p>The TwinCAT 3 Analytics Workbench is a TC3 engineering product for the creation of continual data analyses from various spatially distributed machine controllers. The configuration of the workbench is integrated in Microsoft Visual Studio® and serves as the graphic user interface. Many algorithms are available in a toolbox for the configuration of the analysis, such as cycle time monitoring, life count, lifetime and minimum/maximum/mean value.</p> <p>The TC3 Analytics Workbench contains the TE1300 TC3 Scope View Professional for the simple visualisation of the signal curves: The user can drag the analysis results from the analytics configurator and drop them into the charting tool in order to mark significant points in the data stream. Such markings can be simple minima or maxima, counter values or, for example, the results of a logic operator that logically links the results from the machine controller so that they can be found in the data stream. Correlation with other signals in the Scope View is thus possible to the exact cycle.</p> <p>The MQTT input data are selected via the TwinCAT Target Browser, in which live data and, via the TF3520 TC3 Analytics Storage Provider, historical data are available. If the created analysis is complete and has been tested in the graphic editor, this configuration can be converted into readable PLC code with just one click. The automatically generated PLC code can be downloaded directly to a device with the TF3550 TC3 Analytics Runtime, where it can run 24/7 in parallel to the actual production machine and supply analysis results. The use of Beckhoff standard PLC libraries is also possible. In conjunction with TwinCAT 3 HMI, individual HTML 5 dashboards can be created and used to display the results for machine operators, production managers and machine manufacturers.</p>	<p>The TwinCAT 3 Analytics Service Tool is used for commissioning the machine and for service engineers. Live and historical data can be retrieved for an analysis via the IoT connection. The analysis is configured in Microsoft Visual Studio® where the user has access to a toolbox of algorithms for implementing the relevant life time, cycle time, envelope or component counter analysis. The outputs of the algorithms can be used as inputs for other algorithms or can be output as a result directly in the graphical editor. Signal paths can be visualised with ease by means of parallel recording with the TwinCAT Scope. Analysis results can be dragged by the user from the analytics configurator and dropped in the charting tool so as to mark the significant positions in the data stream. The interaction between the product components offers advantages in particular for diagnosing machine behavior and can highlight optimisation potential. The user's location is immaterial owing to the IoT technologies used, which means that service technicians can perform system and machine diagnostics from practically any location.</p>
	TC1000	TC1000	TC1000	TC1000
	Windows 7/8/10	Windows 7/8/10	Windows 7/8/10	Windows 7/8/10
	www.beckhoff.com/TE1610	www.beckhoff.com/TE2000	www.beckhoff.com/TE3500	www.beckhoff.com/TE3520

TC1xxx | TwinCAT 3 Base



TC3 ADS

TC3 I/O

Technical data

TC1000-00pp

TC1100-00pp

The Automation Device Specification (ADS) is the communication protocol of TwinCAT. It enables the data exchange and the control of TwinCAT systems. ADS is media-independent and can communicate via serial or network connections.

ADS enables:

- access to the process image
- consistent data exchange
- access to I/O tasks
- detection of status changes
- read-out of the PLC symbol information
- access by variable name
- sum commands
- synchronous and asynchronous access
- cyclic and event-based messages

Libraries and runtime components are provided for common programming languages (including .NET, C/C++, Delphi and Java). In addition, interfaces are provided for communication with third-party software (e.g. MATLAB®, NI LabView, Office). The ADS web services enable the development of device-independent web applications (HTML5, WCF).

The message router manages multiple connections and efficiently distributes the messages. The data packets can be recorded via the ADS monitor using the integrated diagnostic interface.

The free TC3 ADS supplies the basic components required in order to communicate with TwinCAT systems. The setup can be integrated in your own installation routines.

Using TwinCAT I/O, cyclic data can be collected by different fieldbuses in process images. Cyclic tasks drive the corresponding fieldbuses. Various fieldbuses can be operated with different cycle times on one CPU. Applications can directly access the process image. The fieldbuses and the process images are configured in TwinCAT Engineering.

- provides variable-oriented linkage of I/O devices to tasks
- tasks are variable-oriented among each other
- the smallest unit is one bit
- supports both synchronous and asynchronous relationships
- consistent exchange of data areas and process images
- online display in the directory tree
- online watch window
- “Force and Write” for commissioning and for testing task variables and I/O devices
- supported fieldbuses:
 - EtherCAT
 - Lightbus
 - PROFIBUS DP (master and slave)
 - Interbus
 - CANopen
 - SERCOS interface
 - DeviceNet
 - Ethernet
 - USB
- SMB (System Management Bus)

Performance class (pp)

20	30	40	50	20	30	40	50
x	x	x	x	x	x	x	x
60	70	8x	9x	60	70	8x	9x
x	x	x	x	x	x	x	x

Target system

Windows 7/8/10, Windows CE

Windows 7/8/10, Windows CE

Further information

www.beckhoff.com/TC1000

www.beckhoff.com/TC1100

TC3 PLC					TC3 PLC/C++				TC3 PLC/C++/MATLAB®/Simulink®			
TC1200-00pp					TC1210-00pp				TC1220-00pp			
<p>TwinCAT PLC realises one or more PLCs with the international standard IEC 61131-3 3rd edition on one CPU. All programming languages described in the standard can be used for programming. The blocks of the type PROGRAM can be linked with real-time tasks. Various convenient debugging options facilitate fault-finding and commissioning. Program modifications can be carried out at any times and in any size online, i.e. when the PLC is running. All variables are available symbolically by ADS and can be read and written in appropriate clients.</p> <ul style="list-style-type: none"> – process image size, flag range, program size, POU size and number of variables are limited only by size of RAM – cycle times from 50 µs – link time: typically 1 µs (Intel® Core™ 2 Duo) – IEC 61131-3: IL, FBD, LD, SFC, ST, CFC – online changes in programs and variables – remote debugging via TCP/IP – online connection with PLC runtime system worldwide via TCP/IP or fieldbus – online monitoring of variables in variable lists, watch windows, editors – online status and powerflow (accumulator contents) of programs and instances – triggering, forcing and setting variables – powerful debugging with single cycle, break points, step in, step over, display of the current call stack, watchlist shows selection of variable, trace functions – online management of all variable names and structures across the whole system – remanent and persistent data, UPS supported storage on hard disk, storage in NOVRAM as option – variable reading and writing access via ADS, OPC – certified in accordance with PLCopen base level (IL/ST) – structured programming with modular program management – source code is stored in the target system – convenient library management – powerful compiler with incremental compilation – all common data types, structures, arrays, including multi-dimensional arrays – convenient creation of programs with: autoformat, autodeclare, cross-reference, search/replace, project comparison – simple linking to source code administration tools by embedding in Microsoft Visual Studio® 					<p>Extension of the TwinCAT PLC TC1200 with additional C++ functionalities:</p> <ul style="list-style-type: none"> – online connection to PLC/C++ runtime system locally or worldwide via TCP/IP or via fieldbus – online monitoring of variables in variable lists, watch windows and editors without setting break points – online setting of variables 				<p>Extension of the TwinCAT PLC/C++ TC1210 by the possibility to execute modules generated in MATLAB®/Simulink®:</p> <ul style="list-style-type: none"> – contains the TwinCAT 3 PLC and C++ runtime – allows the execution of modules generated in MATLAB®/Simulink® – multiple instancing of modules – parameterisation of these modules at runtime – online access to all parameters (can be deactivated) – generic modules (no hardware connection necessary within the models) – connection to the external mode of Simulink® – connection to the TwinCAT C++ debugger, with graphical representation of the blocks – modules can be called from other modules or directly by tasks 			
20	30	40	50		20	30	40	50	20	30	40	50
x	x	x	x		–	–	x	x	–	–	x	x
60	70	8x	9x		60	70	8x	9x	60	70	8x	9x
x	x	x	x		x	x	x	x	x	x	x	x
Windows 7/8/10, Windows CE					Windows 7/8/10 (Windows CE is not supported)				Windows 7/8/10 (Windows CE is not supported)			
www.beckhoff.com/TC1200					www.beckhoff.com/TC1210				www.beckhoff.com/TC1220			

TC1xxx | TwinCAT 3 Base



TC3 PLC/NC PTP 10

TC3 PLC/NC PTP 10/NC I

Technical data

TC1250-00pp

TC1260-00pp

Extension of the TwinCAT PLC TC1200 by the possibility to realise point-to-point movements in software (TwinCAT Motion Control PTP 10). The axes are represented by axis objects and provide a cyclic interface, e.g. for the PLC. This axis object is then linked to a corresponding physical axis. In this way the most diverse axis types with the most diverse fieldbus interfaces can be connected abstractly with the axis objects, which always offer an identical configuration interface. The control of the axes can be configured in various constellations (position or velocity interface) and various controllers. The axes are configured in TwinCAT Engineering.

- up to a maximum of 255 axes on one CPU
- supports electrical and hydraulic Servo Drives, frequency converter drives, stepper motor drives, DC drives, switched drives (fast/slow axes), simulation axes and encoder axes
- supports various encoders such as incremental encoder, absolute encoder, digital interface to the drives such as EtherCAT, SERCOS, SSI, Lightbus, PROFIBUS DP/MC, pulse train
- standard axis functions such as start/stop/reset/reference, velocity override, master/slave couplings, electronic gearbox, online distance compensation, programming is carried out via PLCopen-compliant IEC 61131-3 function blocks
- convenient axis commissioning options
- online monitoring of all axis state variables such as actual/set values, releases, control values
- online axis tuning
- forcing of axis variables
- configuration of all axis parameters, such as measuring system, drive parameters and position controller
- configurable controller structures: P control, PID control, PID with velocity pre-control, PID with velocity and acceleration pre-control
- online master/slave and slave/master conversion
- flying saw (diagonal saw [optional])
- cam plates (support by TC3 Cam Design Tool [optional])
- FIFO axes (optional)
- external set value generators
- multi-master coupling

Extension of the TwinCAT PLC/NC PTP 10 by the possibility to realise movements with up to three interpolating and up to five auxiliary axes. Various axis types with various fieldbus interfaces are supported. The movement is usually programmed in DIN 66025, but it can also alternatively be carried out via PLC function blocks.

- max. 3 path axes and up to 5 auxiliary axes per group
- 1 group per channel, max. 31 channels
- supports electric servo axes, stepper motor drives
- interpreter functions such as subroutine and jump technology, programmable loops, zero point shifts, tool corrections, M and H functions
- geometry functions: straight lines and circles in 3D space, circles at all main levels, helices with base circles at all main levels, linear, circular and helical interpolation at the main levels and freely definable levels, Bezier splines, look-ahead function
- online reconfiguration of axes in groups, path override, slave coupling to path axes, auxiliary axes, axis error and sag compensation, measuring functions
- programming in DIN 66025
- access alternatively via function blocks according to IEC 61131-3
- operation in automatic mode, manual mode (jog/inch), single block mode, referencing, handwheel mode (movement/overlay)
- convenient debugging with online monitoring of current set/actual position (position lag of all axes), NC program line currently being processed, NC program line currently being interpreted, channel status
- support of kinematic transformations in combination with TF511x

Performance class (pp)

20	30	40	50
–	x	x	x
60	70	8x	9x
x	x	x	x

20	30	40	50
–	–	x	x
60	70	8x	9x
x	x	x	x

Target system

Windows 7/8/10, Windows CE

Windows 7/8/10, Windows CE

Further information

www.beckhoff.com/TC1250

www.beckhoff.com/TC1260

TC3 PLC/NC PTP 10/NC I/CNC					TC3 PLC/NC PTP 10/NC I/CNC E				TC3 C++				TC3 C++/ MATLAB®/Simulink®			
TC1270-00pp					TC1275-00pp				TC1300-00pp				TC1320-00pp			
<p>Extension of the TwinCAT PLC/NC PTP 10 by the possibility to realise an interpolation with up to 32 simultaneously interpolating axes. The number of axes and/or the number of channels can be adapted to the requirements of the application via the option packages. Various transformations can be supplemented via option packages. Programming takes place according DIN 66025. The axes and channels are configured in TwinCAT Engineering.</p> <ul style="list-style-type: none"> – 8 path axes/controlled spindles, max. 64 axes/controlled spindles (optional), max. 12 channels (optional) – supports electric servo axes, stepper motor drives subroutine and jump technology, programmable loops, zero point shifts, tool corrections, M and H functions, mathematical functions, programming of parameters/variables, user macros, spindle and auxiliary functions, zero point shifts, tool functions – geometry functions: linear, circular and helical interpolation at the main levels and freely definable levels, max. 32 interpolating path axes per channel (optional), look-ahead function – axis functions, coupling and gantry axis function, override, axis error and sag compensation, measuring functions – programming in DIN 66025 with high-level language extension – access via function blocks from TwinCAT PLC according to IEC 61131-3 – operation with automatic mode, manual mode (jog/inch), single block mode, referencing, block advance, handwheel mode (movement/overlay) – convenient debugging with online monitoring of all states 					<p>TwinCAT CNC export version (E version): extension of the TwinCAT PLC/NC PTP 10 by the possibility to realise an interpolation with up to 4 simultaneously interpolating axes. The number of axes and/or the number of channels can be adapted to the requirements of the application via the option packages. Various transformations can be supplemented via option packages. Programming takes place according DIN 66025. The axes and channels are configured in TwinCAT Engineering.</p> <ul style="list-style-type: none"> – max. 8 path axes/controlled spindles, max. 64 axes/controlled spindles (optional), max. 12 channels (optional) – max. 4 simultaneously interpolating path axes – supports electric servo axes, stepper motor drives subroutine and jump technology, programmable loops, zero point shifts, tool corrections, M and H functions, mathematical functions, programming of parameters/variables, user macros, spindle and auxiliary functions, zero point shifts, tool functions – geometry functions: linear, circular and helical interpolation at the main levels and freely definable levels, max. 4 interpolating path axes per channel (optional), look-ahead function – axis functions, coupling and gantry axis function, override, axis error and sag compensation, measuring functions – programming in DIN 66025 with high-level language extension – access via function blocks from TwinCAT PLC according to IEC 61131-3 – operation with automatic mode, manual mode (jog/inch), single block mode, referencing, block advance, handwheel mode (movement/overlay) – convenient debugging with online monitoring of all states 				<p>The TwinCAT 3 C++ runtime environment enables the execution of real-time modules written in C++.</p> <p>The following functions are supported, among others:</p> <ul style="list-style-type: none"> – online connection to C++ runtime system locally or worldwide via TCP/IP or via fieldbus – online monitoring of variables in variable lists, watch windows and editors without setting break points – online setting of variables 				<p>Extension of the TC1300 by the possibility to execute modules generated by MATLAB®/Simulink®.</p> <ul style="list-style-type: none"> – contains the TwinCAT 3 C++ runtime – allows the execution of modules generated in MATLAB®/Simulink® – multiple instancing of modules – parameterisation of these modules at runtime – online access to all parameters (can be deactivated) – generic modules (no hardware connection necessary within the models) – connection to the external mode of Simulink® – connection to the TwinCAT C++ debugger with graphical representation of the blocks – modules can be called from other modules or directly by tasks 			
20	30	40	50		20	30	40	50	20	30	40	50	20	30	40	50
–	–	–	x		–	–	–	x	–	–	x	x	–	–	x	x
60	70	8x	9x		60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x
Windows 7/8/10					Windows 7/8/10				Windows 7/8/10 (Windows CE is not supported)				Windows 7/8/10 (Windows CE is not supported)			
www.beckhoff.com/TC1270					www.beckhoff.com/TC1275				www.beckhoff.com/TC1300				www.beckhoff.com/TC1320			

TF1xxx | TwinCAT 3 System



	TC3 PLC HMI				TC3 PLC HMI Web				TC3 UML			
Technical data	TF1800-00pp				TF1810-00pp				TF1910-00pp			
	<p>TC3 PLC HMI is a stand-alone tool for the presentation of visualisations which are created in the TwinCAT PLC development environment. They are shown in full-screen as soon as the system starts up.</p>				<p>TC3 PLC HMI Web is a web-based visualisation system. The TwinCAT PLC development environment can be used as an editor for creating web pages. The web pages are hosted by the Internet Information Server (IIS). For display of the web pages HTML5 and JavaScript is needed.</p>				<p>With the integration of UML (Unified Modeling Language) in TwinCAT 3.1, two additional editors for modelling of PLC software are available. The existing TwinCAT PLC programming languages are extended with the UML state and UML class diagrams.</p> <p>Generally speaking, UML is a modelling language for software analysis, design and documentation. UML is particularly suitable for object-oriented implementations. The unified modelling of the PLC application creates an easy to follow software documentation, which can also be analysed by other departments.</p> <p>The UML class diagram belongs to the group of UML structure diagrams and can be used for schematic representation of the software architecture. In this way, it is possible to represent object classes and the elements contained within them, as well as object relationships in a transparent manner. The UML state diagram is part of the UML behaviour diagrams and is used for dynamic software modelling. It can be used for a graphic specification of the dynamic response or the state-dependent system behaviour. Compilation of the state diagram generates program code, so that the state machine can be executed directly. The development process is supported by an online debugging option.</p>			
Performance class (pp)	20	30	40	50	20	30	40	50	20	30	40	50
	x	x	x	x	x	x	x	x	—	x	x	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x
Required	TC1200				TC1200				TC1200			
Target system	Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE			
Further information	www.beckhoff.com/TF1800				www.beckhoff.com/TF1810				www.beckhoff.com/TF1910			

TF2xxx | TwinCAT 3 HMI



	TC3 HMI Server				TC3 HMI Clients Pack				TC3 HMI Targets Pack			
Technical data	i TF2000-00pp				i TF2010-00pp, TF2020-00pp, TF2030-00pp, TF2040-00pp				i TF2050-00pp, TF2060-00pp, TF2070-00pp, TF2080-00pp, TF2090-00pp			
	<p>The TC3 HMI Server is a modular web server that provides the human-machine interface (HMI). It supports all CPU classes from ARM to multi-core. The powerful architecture enables a wide range of application scenarios from local panel solutions to multi-client, multi-server and multi-runtime concepts.</p> <p>All that is needed to start an HMI Client is an HTML5-capable browser, which is available for all major operating systems. Accordingly, clients can run on PCs as well as on mobile devices such as tablets and smartphones. Whatever the platform, security is of the utmost importance, which is why the data traveling between client and server is encrypted. The integrated user management features a configurable user rights system that can be linked to the user's own IT infrastructure.</p> <p>The HMI is linked to respective controllers via automation protocols like the Automation Device Specification (ADS) or OPC UA.</p> <p>The HMI Server can be extended with so-called server extensions like an alarms & events system or a recipe management system. Server extensions can also be developed in C++ or .NET with a software development kit, which allows users to develop their own logic and implement additional communication protocols.</p> <p>The TC3 HMI Server includes a connection to one client (browser) and a connection to one controller as standard.</p>				<p>The TC3 HMI Server includes a connection to one client (browser) as standard. Optional client packages are available for establishing further connections at the same time, e.g. to a mobile device or panel. The number of supported clients is not tied to the devices employed, the HMI Server only counts simultaneous (browser) connections.</p> <p>Optional packets are available for 1, 3, 10 or 25 clients.</p>				<p>The TC3 HMI Server includes a connection to one controller as standard. Optional target packages for 1, 3, 10, 25 or 100 targets are available for connecting further control systems. The HMI Server only stores the number of physical targets, based on the unique addressing. The engineering process can be more flexible and modular, and the efficiency increased.</p>			
Performance class (pp)	20	30	40	50	20	30	40	50	20	30	40	50
	x	x	x	x	—	—	x	x	—	x	x	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x
Required	TC1000				TF2000				TF2000			
Target system	Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE			
Further information	www.beckhoff.com/TF2000				www.beckhoff.com/TF2010				www.beckhoff.com/TF2050			

i For availability status see Beckhoff website at: www.beckhoff.com

TF2xxx | TwinCAT 3 HMI



	TC3 HMI OPC UA				TC3 HMI Extension SDK				TC3 HMI Recipe Management				TC3 HMI Scope			
Technical data	TF2110-00pp				TF2200-00pp				TF2210-00pp				TF2300-00pp			
	<p>OPC Unified Architecture is a vendor-independent communication interface for linking TwinCAT or other controllers. The extension includes the OPC UA client, which enables integration of an OPC UA server.</p>				<p>The TwinCAT HMI Server can be expanded modularly and flexibly via extensions. The software development kit (C++/.NET) can be used for programming application-specific solutions (e.g. business logics, proprietary protocols). In addition, user IP (intellectual property) is protected, and existing functions can be accessed by the server (e.g. ADS, logging).</p>				<p>The TwinCAT HMI Recipe Management offers the possibility to manage machine data in various recipes. General descriptions can be created by means of recipe definitions so that machine data for different states can be saved in recipes derived from them. It is possible to load these recipe data to the PLC runtime both for engineering and at the visualisation runtime. When optimising production processes, recipes can additionally be changed at runtime.</p> <p>TF2210 is integrated in TE2000 and cannot be ordered separately.</p>				<p>The TwinCAT Scope software oscilloscope can be used to display time sequences with high resolution. The extension enables integration of the software oscilloscope into the TwinCAT HMI and provides ready-made scope control.</p>			
Performance class (pp)	20	30	40	50	20	30	40	50	20	30	40	50	20	30	40	50
	–	x	x	x	–	x	x	x	–	x	x	x	–	x	x	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Required	TF2000				TF2000				TE2000				TF2000			
Target system	Windows 7/8/10, Windows CE				Windows 7/8/10				Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE			
Further information	www.beckhoff.com/TF2110				www.beckhoff.com/TF2200				www.beckhoff.com/TF2210				www.beckhoff.com/TF2300			

For availability status see Beckhoff website at: www.beckhoff.com

TF3xxx | TwinCAT 3 Measurement



	TC3 Scope Server				TC3 Analytics Logger				TC3 Analytics Library			
Technical data	TF3300-00pp				TF3500-00pp				TF3510-00pp			
	<p>The TwinCAT 3 Scope Server prepares data for visual display in the TwinCAT 3 Scope View. It can be used for autarkic data recordings in distributed systems within production, plant or machine networks. The Scope Server not only features TwinCAT-specific communication interfaces, it also offers support for the OPC UA communication standard.</p>				<p>The TwinCAT 3 Analytics Logger records process and application data of the machine controller in synchronisation with machine cycles. The logger is characterised by its high performance as it operates directly in the real-time context of the TwinCAT controller.</p> <p>The recorded data can optionally be stored locally in a file on the hard disk of the machine controller and played back with ring buffer functionality or transmitted to a message broker by means of the IoT communication protocol. The configuration required in this instance is performed in Microsoft Visual Studio®. All variables of the process image and the PLC application can be added easily to the configuration via a check box without the need for programming.</p>				<p>The TwinCAT 3 Analytics Library is a PLC library with analysis functions and application data. The library can be used locally on the machine controller or on a remote analysis system with IoT communication connection. In particular for the second application, PLC code can be generated automatically on the basis of this library with the engineering tool TE3500 TC3 Analytics Workbench.</p> <p>Function modules are available with simple and more complex functions. The spectrum ranges from flank counters, life time monitoring, machine cycle analysis through to mathematical functions and envelope curve monitoring. Minimum and maximum input signal values can be calculated in just the same way and linked together by means of logical operators. All modules are suitable for object-oriented application design and use the features of IEC 61131-3 programming.</p>			
Performance class (pp)	20	30	40	50	20	30	40	50	20	30	40	50
	—	—	x	x	—	x	x	x	—	x	x	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x
Required	TC1000				TC1000				TC1200			
Target system	Windows 7/8/10				Windows 7/8/10				Windows 7/8/10			
Further information	www.beckhoff.com/TF3300				www.beckhoff.com/TF3500				www.beckhoff.com/TF3510			

i For availability status see Beckhoff website at: www.beckhoff.com

TF3xxx | TwinCAT 3 Measurement



	TC3 Analytics Storage Provider				TC3 Analytics Runtime				TC3 Analytics Controller Packs			
Technical data	i TF3520-00pp				i TF3550-00pp				i TF3560-00pp, TF3561-00pp, TF3562-00pp, TF3563-00pp, TF3564-00pp, TF3565-00pp			
	<p>The TwinCAT 3 Analytics Storage Provider is an IoT client and forms the interface to one or more storage facilities or databases for raw and analysis data from various sources. The data is stored as a binary blob in the storage medium. Microsoft Azure Blob supports a public cloud, while Microsoft SQL supports an on-premises database. In this way, both applications can be covered. The Analytics Storage Provider automatically structures and stores the data. The storage interface can be configured via TwinCAT Engineering in Microsoft Visual Studio®. Data is selected centrally for reading and writing via the TwinCAT Target Browser. The user selects the data via the user-defined variable name in the machine application and the corresponding time period; no complex SQL commands are required. Historical data can be sourced via the TF3500 TC3 Analytics Logger, the TF6720 TC3 IoT Data Agent or the EK9160 IoT Bus Coupler. The corresponding data sinks are the TE3520 TC3 Analytics Service Tool and the TE3500 TC3 Analytics Workbench.</p>				<p>The TwinCAT 3 Analytics Runtime is the runtime "container" for the Analytics application, which was configured and developed in the TE3500 TC3 Analytics Workbench. The runtime can be installed locally, on remote hardware or in a virtual machine. It also contains the TF2000 TC3 HMI Server, which hosts the analytics dashboard. In summary, the TC3 Analytics Runtime represents a bundle of different licenses. It contains a PLC runtime, the Analytics PLC library, the IoT connection, the TC3 HMI Server and a corresponding client package, so that several users can view the designed Analytics Dashboard simultaneously.</p>				<p>The TC3 Analytics Runtime enables the parallel analysis of up to four controllers as standard. With the TC3 Analytics Controller Packs, the analysis can be extended to further controllers for each application individually.</p> <p>Optional packs are available for 4, 8, 16, 32, 64 or 128 further controllers.</p>			
Performance class (pp)	20	30	40	50	20	30	40	50	20	30	40	50
	–	–	x	x	–	–	x	x	–	–	x	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x
Required	TC1000				TC1000				TE3500			
Target system	Windows 7/8/10				Windows 7/8/10				Windows 7/8/10			
Further information	www.beckhoff.com/TF3520				www.beckhoff.com/TF3550				www.beckhoff.com/TF3560			

i For availability status see Beckhoff website at: www.beckhoff.com

TC3 Condition Monitoring Level 1					TC3 Condition Monitoring Level 2				TC3 Power Monitoring				TC3 Solar Position Algorithm			
TF3600-00pp					TF3601-00pp				TF3650-00pp				TF3900-00pp			
<p>In order to implement Condition Monitoring for machines and plants, the TwinCAT Condition Monitoring library offers a modular construction kit of mathematical algorithms using which measured values can be analysed. The functionality of the library is independent of the physical background of the measured data, however, a focus is placed on vibration measurement. From the available range of components, users can select software modules to suit specific application requirements and to develop solutions that are scaled to different platforms.</p> <p>The library's functions primarily cover the areas of signal analysis or signal transformation, statistics and classification. In addition to spectral analysis via FFT or using, for instance, an envelope spectrum, it is possible to calculate key statistical values such as the kurtosis or the crest factor. Combining these algorithms with limit value monitoring is, for instance, ideally suited to monitoring roller bearings. Moreover, it is possible to implement an evaluation of machine vibrations according to DIN ISO 10816.</p> <p>Condition Monitoring Level 1 contains the following algorithms:</p> <ul style="list-style-type: none"> – signal processing – statistics – classification – frame-based buffer handling 					<p>TwinCAT Condition Monitoring Level 2 includes further algorithms in addition to the Level 1 functions.</p>				<p>The TwinCAT Power Monitoring function is a PLC library for the evaluation of raw current and voltage data, which are usually supplied by EL3773 and EL3783 EtherCAT Terminals. Function blocks are available for the calculation of RMS values for current, voltage and power. These can be output as a momentary or average values. Maximum and minimum values are also available on the function block. Frequency and frequency spectra can be determined, such as e.g. harmonics in the network and their load in the form of the Total Harmonic Distortion (THD).</p> <p>All function blocks are available for single-phase and three-phase systems. The TwinCAT products TE1300 Scope View Professional and TF6420 Database Server are suitable for displaying or permanently saving acquired data.</p>				<p>With the TwinCAT Solar Position Algorithm it is possible to determine the sun angle using the date, time, geographical longitude and latitude as well as further parameters (depending on the desired accuracy). The function block works with a maximum inaccuracy of $\pm 0.001^\circ$.</p>			
20	30	40	50		20	30	40	50	20	30	40	50	20	30	40	50
–	–	x	x		–	–	x	x	–	x	x	x	x	x	x	x
60	70	8x	9x		60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x
TC1200					TC1200				TC1200				TC1200			
Windows 7/8/10					Windows 7/8/10				Windows 7/8/10				Windows 7/8/10, Windows CE			
www.beckhoff.com/TF3600					www.beckhoff.com/TF3601				www.beckhoff.com/TF3650				www.beckhoff.com/TF3900			

TF4xxx | TwinCAT 3 Controller



TC3 Controller Toolbox

TC3 Temperature Controller

Technical data

TF4100-00pp

TF4110-00pp

The TwinCAT Controller Toolbox covers all essential blocks for control applications.

- controllers satisfy industrial requirements such as anti-reset windup
- simple basic controllers (P, I, D)
- complex controllers (PI, PID, switching controllers)
- filter blocks
- control value generators (limiters, PWM)
- ramp and signal generator blocks

Temperature controllers can be simply implemented using TwinCAT Temperature Controller. Simple commissioning through self-adjustment of the controller (auto-tuning) is included.

- automatic and manual operation with shock-free set up
- control value analog or pulse-width modulated signal
- tolerance monitoring, absolute value monitoring
- scalable reaction to sensor error and heating power faults
- limitation of set and control values
- optional ramping of the set value
- optional start-up phase for the setpoint variables
- industrial PID controller as base control algorithm inside the temperature controller

Performance class (pp)

20	30	40	50	20	30	40	50
x	x	x	x	x	x	x	x
60	70	8x	9x	60	70	8x	9x
x	x	x	x	x	x	x	x

Required

TC1200

TC1200

Target system

Windows 7/8/10, Windows CE

Windows 7/8/10, Windows CE

Further information

www.beckhoff.com/TF4100

www.beckhoff.com/TF4110

TF5xxx | TwinCAT 3 Motion Control



	TC3 NC PTP 10 Axes				TC3 NC PTP Axes Pack 25				TC3 NC PTP Axes Pack unlimited			
Technical data	TF5000-00pp				TF5010-00pp				TF5020-00pp			
	<p>TC3 NC PTP 10 Axes implements Motion Control for point-to-point movements in software. The axes are represented by axis objects and provide a cyclic interface, e.g. for the PLC. This axis object is then linked to a corresponding physical axis. In this way, the most diverse axis types with the most diverse fieldbus interfaces can be connected abstractly with the axis objects, which always offer an identical configuration interface. The control of the axes can be configured in various conformations (position or velocity interface) and various controllers. The axes are configured in TwinCAT Engineering.</p> <ul style="list-style-type: none"> – up to 10 axes, developable to a maximum of 255 axes – supports electrical and hydraulic servo drives, frequency converter drives, stepper motor drives, DC drives, switched drives (fast/slow axes), simulation axes and encoder axes – supports various encoders such as incremental encoder, absolute encoder, digital interface to the drives such as EtherCAT, SERCOS, SSI, Lightbus, PROFIBUS DP/MC, pulse train – standard axis functions such as start/stop/reset/reference, velocity override, master/slave couplings, electronic gearbox, online distance compensation – programming is carried out via PLCopen-compliant IEC 61131-3 function blocks – convenient axis commissioning options – online monitoring of all axis state variables such as actual/setpoint values, releases, control values, online axis tuning – forcing of axis variables – configuration of all axis parameters, such as measuring system, drive parameters and position controller – configurable controller structures: P control, PID control, PID with velocity pre-control, PID with velocity and acceleration pre-control – online master/slave and slave/master conversion – flying saw (diagonal saw) – cam plates (support by TC3 Cam Design Tool [optional]) – FIFO axes (optional) – external set point value generators – multi-master coupling – OMAC PackML PLC library 				Extension of TF5000-00pp up to a maximum of 25 axes				Extension of TF5000-00pp up to a maximum of 255 axes			
Performance class (pp)	20	30	40	50	20	30	40	50	20	30	40	50
	–	x	x	x	–	–	x	x	–	–	x	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x
Required	TC1200				TC1250				TC1250			
Target system	Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE			
Further information	www.beckhoff.com/TF5000				www.beckhoff.com/TF5010				www.beckhoff.com/TF5020			

TF5xxx | TwinCAT 3 Motion Control



TC3 NC Camming

TC3 NC Flying Saw

Technical data

TF5050-00pp

TF5055-00pp

TwinCAT NC Camming (cam plate) is a non-linear relationship between a master and a slave axis. The camming package offers various options for the storage of cam plates. Convenient PLC blocks enable the loading, coupling and uncoupling of cam plates. It is possible to load new cam plates or to modify cam plates during operation. The TwinCAT Cam Design Tool offers support for the creation of the cam plates.

- position tables with master interpolation points and corresponding slave positions; interpolation between the points is done linearly or by splines
- motion function table describing a cam plate via motion laws according to VDI guideline 2143
- cyclic or linear processing
- cam plate with offset and scale, can be modified on the master or slave side
- high flexibility through online change of the motion functions

TwinCAT NC Flying Saw implements the coupling of a slave axis to a master axis in a certain synchronous position (flying saw). PLC function blocks enable coupling and uncoupling as well as parameterisation.

- The master axis can be a real axis, a virtual axis, or some other external source of actual values.
- synchronisation of the slave axis from any motion situation (stop, forward or reverse travel) with the master in motion
- simple synchronisation with the master velocity
- precise position synchronisation with the master axis (velocity and position)
- synchronous velocity can be set via a coupling factor
- optional return prevention as additional safety function
- superimposed section compensation during the synchronous phase for dynamic position correction

Performance class (pp)

20	30	40	50
–	–	x	x
60	70	8x	9x
x	x	x	x

20	30	40	50
–	–	x	x
60	70	8x	9x
x	x	x	x

Required

TC1250

TC1250

Target system

Windows 7/8/10, Windows CE

Windows 7/8/10, Windows CE

Further information

www.beckhoff.com/TF5050

www.beckhoff.com/TF5055

TC3 NC FIFO Axes					TC3 Motion Control XFC				TC3 NC I			
TF5060-00pp					TF5065-00pp				TF5100-00pp			
<p>Using TwinCAT NC FIFO Axes, externally generated set position values can be output to the axes in the form of a velocity pre-control. The set value generation is designed in such a way that both the set position and the set velocity are determined as the FIFO inputs are worked through in sequence. It is also possible, if necessary, to interpolate between two neighbouring FIFO inputs.</p>					<p>eXtreme Fast Control (XFC) is the technique that enables very fast, temporally high-precision reactions using EtherCAT, special I/O terminals and TwinCAT on the PC. Using EtherCAT Distributed Clocks (DC) and appropriate terminals, distributed latches or cam controllers can be implemented simply in this way.</p> <ul style="list-style-type: none"> – function blocks for the high-precision acquisition and switching of digital signals related to axis positions – EtherCAT Distributed Clocks with the timestamp-based EtherCAT EL1252, EL2252 or EL2262 input and output terminals – blocks for the conversion of DC time to position and vice versa – convenient PLCopen-compliant TouchProbe block – digital cam controller as PLCopen-compliant block <p>In conjunction with TwinCAT NC I, function blocks are available for high-precision switching of signals depending on the path position.</p>				<p>Using TwinCAT NC I, movements can be implemented with up to three interpolating and up to five auxiliary axes in the interpolation package. Various axis types with various fieldbus interfaces are supported. The movement is usually programmed in DIN 66025, but it can also alternatively be carried out via PLC function blocks.</p> <ul style="list-style-type: none"> – max. 3 path axes and up to 5 auxiliary axes per group – 1 group per channel, max. 31 channels – supports electric servo axes, stepper motor drives – interpreter functions such as subroutine and jump technology, programmable loops, zero point shifts, tool corrections, M and H functions – geometry functions: straight lines and circles in 3D space, circles at all main levels, helices with base circles at all main levels, linear, circular and helical interpolation at the main levels and freely definable levels, Bezier splines, look-ahead function – online reconfiguration of axes in groups, path override, slave coupling to path axes, auxiliary axes, axis error and sag compensation, measuring functions – programming in DIN 66025 – access alternatively via function blocks according to IEC 61131-3 – operation of automatic mode, manual mode (jog/inch), single block mode, referencing, handwheel mode (movement/overlay) – convenient debugging with online monitoring of current setpoint/actual position (position lag of all axes), NC program line currently being processed, NC program line currently being interpreted, channel status – support of kinematic transformations in combination with TF511x 			
20	30	40	50		20	30	40	50	20	30	40	50
–	–	x	x		–	–	x	x	–	–	x	x
60	70	8x	9x		60	70	8x	9x	60	70	8x	9x
x	x	x	x		x	x	x	x	x	x	x	x
TC1250					TC1250, TC1260				TC1250			
Windows 7/8/10, Windows CE					Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE			
www.beckhoff.com/TF5060					www.beckhoff.com/TF5065				www.beckhoff.com/TF5100			

TF5xxx | TwinCAT 3 Motion Control



	TC3 Kinematic Transformation L1				TC3 Kinematic Transformation L2				TC3 Kinematic Transformation L3				TC3 Kinematic Transformation L4			
Technical data	TF5110-00pp				TF5111-00pp				TF5112-00pp				TF5113-00pp			
	<p>Various robot types kinematics can be realised using TwinCAT Kinematic Transformation. The programming of the robot movements takes place in Cartesian coordinates using either DIN 66025 instructions or the PLCopen-compliant blocks from the PLC. An integrated dynamic pre-control ensures high precision of the movement even at high accelerations and speeds. Configuration takes place in TwinCAT Engineering.</p> <ul style="list-style-type: none"> – supports various parallel and also serial kinematics, e.g. for pick-and-place tasks – supports the programming of interpolating movements in G-code (DIN 66025) – alternatively, standard PTP and cam plate applications can be realised – simple programming in the Cartesian coordinate system – automatic calculation of the inverse kinematic for the relevant motor positions – kinematics configured in TwinCAT 3 Engineering; in addition to the type (e.g. delta), the bar lengths and offsets must also be parameterised – mass and mass inertia values can be specified for dynamic pre-control – optimised for the Beckhoff Servo Drives from the AX5000 series – basic package integrating the following kinematics: cartesian portals 				<p>Extension of the TwinCAT Kinematic Transformation L1 with additional kinematics:</p> <ul style="list-style-type: none"> – 2D parallel kinematics – shear kinematics – crane and roll kinematics 				<p>Extension of the TwinCAT Kinematic Transformation L1/L2 with additional kinematics:</p> <ul style="list-style-type: none"> – 3D Delta – SCARA 				<p>Extension of the TwinCAT Kinematic Transformation L1/L2/L3 with additional kinematics:</p> <ul style="list-style-type: none"> – 5D kinematics – serial 6-axis kinematics – Stewart platform 			
Performance class (pp)	20	30	40	50	20	30	40	50	20	30	40	50	20	30	40	50
	–	–	x	x	–	–	x	x	–	–	x	x	–	–	x	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Required	TC1260				TC1260				TC1260				TC1260			
Target system	Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE			
Further information	www.beckhoff.com/TF5110				www.beckhoff.com/TF5111				www.beckhoff.com/TF5112				www.beckhoff.com/TF5113			



For availability status see Beckhoff website at: www.beckhoff.com/TF5130

TC3 Robotics mxAutomation					TC3 Robotics uniVAL PLC				TC3 CNC			
TF5120-00pp					TF5130-00pp				TF5200-00pp			
<p>TC3 Robotics mxAutomation allows direct communication between the PLC and the KUKA KR C4 robot control via a common interface. The robot movements can be programmed directly in the PLC, and the actual values of the robot can be synchronised in real time. TC3 Robotics mxAutomation combines PLC control and robot on a single platform and enables programming from an existing system without knowledge of a specific robot programming language.</p> <p>Communication takes place via EtherCAT, with the TwinCAT EtherCAT master and the KR C4 controller from KUKA exchanging data via the EL6695-1001 EtherCAT bridge terminal. In doing so, drive commands are transmitted from the controller to the robot and actual values from the robot to the controller. The robot position data are transmitted to the PLC in every cycle. In addition, the PLC programmer has access to the robot position data at all times in real-time.</p>					<p>The TC3 Robotics uniVAL PLC allows direct communication between the PLC and the CS8C robotics controller from Stäubli via a common interface. The robot's movements can be programmed directly in the PLC and compared with the robot's actual values in real-time. The TC3 Robotics uniVAL PLC combines PLC control and robotics on a single platform and enables programming from a single system without having to know a special robot programming language.</p> <p>The communication takes place via EtherCAT, with TwinCAT and the CS8C controller from Stäubli exchanging the data as master and slave, respectively.</p> <p>TwinCAT sends the motion commands to the robot via EtherCAT. Thanks to this efficient communication, commands can be sent from the PLC to the robot at high speed. In addition, the PLC programmer has real-time access to the robot's position data at all times. Other motion programs which are located in the robot controller's database can also be activated via this interface.</p>				<p>TwinCAT CNC offers the option to implement interpolation with up to 32 simultaneously interpolating axes. The number of axes and/or the number of channels can be adapted to the requirements of the application via the option packages. Various transformations can be supplemented via option packages. Programming takes place according to DIN 66025. The axes and channels are configured in TwinCAT Engineering.</p> <ul style="list-style-type: none"> – 8 path axes/controlled spindles, max. 64 axes/controlled spindles (optional), max. 12 channels (optional) – supports electric servo axes, stepper motor drives – subroutine and jump technology, programmable loops, zero point shifts, tool corrections, M and H functions, mathematical functions, programming of parameters/variables, user macros, spindle and auxiliary functions, tool functions – geometry functions linear, circular and helical interpolation at the main levels and freely definable levels, max. 32 interpolating path axes per channel (optional), look-ahead function – axis functions, coupling and gantry axis function, override, axis error and sag compensation, measuring functions – programming in DIN 66025 with high-level language extension – access via function blocks from TwinCAT PLC according to IEC 61131-3 – operation with automatic mode, manual mode (jog/inch), single block mode, referencing, block advance, handwheel mode (movement/overlay) – convenient debugging with online monitoring of all states 			
20	30	40	50		20	30	40	50	20	30	40	50
–	–	–	x		–	–	–	x	–	–	–	x
60	70	8x	9x		60	70	8x	9x	60	70	8x	9x
x	x	x	x		x	x	x	x	x	x	x	x
TC1200					TC1200				TC1260			
Windows 7/8/10, Windows CE					Windows 7/8/10, Windows CE				Windows 7/8/10			
www.beckhoff.com/TF5120					www.beckhoff.com/TF5130				www.beckhoff.com/TF5200			

TF5xxx | TwinCAT 3 Motion Control



	TC3 CNC E				TC3 CNC Axes Pack				TC3 CNC Channel Pack			
Technical data	TF5210-00pp				TF5220-00pp				TF5230-00pp			
	<p>TwinCAT CNC in the export version (E-version) offers the option to implement an interpolation with up to four simultaneously interpolating axes. The number of axes and/or the number of channels can be adapted to the requirements of the application via the option packages. Various transformations can be supplemented via option packages. Programming takes place according to DIN 66025. The axes and channels are configured in TwinCAT Engineering.</p> <ul style="list-style-type: none"> – maximum 8 path axes/controlled spindles, max. 64 axes/controlled spindles (optional), max. 12 channels – maximum 4 interpolation path axes – supports electric servo axes, stepper motor drives – subroutine and jump technology, programmable loops, zero point shifts, tool corrections, M and H functions, mathematical functions, programming of parameters/variables, user macros, spindle and auxiliary functions, tool functions – geometry functions linear, circular and helical interpolation at the main levels and freely definable levels, max. 64 path axes per channel, look-ahead function – axis functions, coupling and gantry axis function, override, axis error and sag compensation, measuring functions – programming in DIN 66025 with high-level language extension – access via function blocks from TwinCAT PLC according to IEC 61131-3 – operation with automatic mode, manual mode (jog/inch), single block mode, referencing, block advance, handwheel mode (movement/overlay) – convenient debugging with online monitoring of all states 				<p>Using the TwinCAT CNC Axes Pack, extension is possible up to a total of 64 axes/controlled spindles, of which a maximum of 32 can be path axes and a maximum of 12 can be controlled spindles.</p>				<p>Using TwinCAT CNC Channel Pack, a further CNC channel can be extended to a maximum of 12 channels.</p> <ul style="list-style-type: none"> – channel synchronisation – axis transfer between channels 			
Performance class (pp)	20	30	40	50	20	30	40	50	20	30	40	50
	–	–	–	x	–	–	–	x	–	–	–	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x
Required	TC1260				TC1270				TC1270			
Target system	Windows 7/8/10				Windows 7/8/10				Windows 7/8/10			
Further information	www.beckhoff.com/TF5210				www.beckhoff.com/TF5220				www.beckhoff.com/TF5230			

	TC3 CNC Transformation				TC3 CNC HSC Pack				TC3 CNC Spline Interpolation				TC3 CNC Virtual NCK Basis			
	TF5240-00pp				TF5250-00pp				TF5260-00pp				TF5270-00pp			
	<p>TwinCAT CNC Transformation is an optional function for the TwinCAT CNC.</p> <ul style="list-style-type: none"> – transformation functionality (5-axis functionality) – kinematics selection from the kinematics library – RTCP function – TLC function – definition of different coordinate systems, linking/transition of coordinate systems 				<p>TwinCAT CNC HSC Pack is an optional high-speed cutting solution for the TwinCAT CNC:</p> <ul style="list-style-type: none"> – cross-block velocity and acceleration control for optimum utilisation of the axis dynamics and thus higher path speeds – high surface quality through smoothed dynamics and associated reduction of vibrational excitation of the machine – effective control of specified contour tolerances – path programming via splines with programmable spline type (Akima-spline, B-spline) for reduction of NC blocks for free-form surfaces 				<p>TwinCAT CNC Spline Interpolation is an optional package for the TwinCAT CNC for path programming via splines with programmable spline type, Akima-spline, B-spline.</p>				<p>TwinCAT CNC Virtual NCK Basis is a virtual TwinCAT CNC for simulation in a Windows environment as an option for the TwinCAT CNC.</p>			
	20	30	40	50	20	30	40	50	20	30	40	50	20	30	40	50
	–	–	–	x	–	–	–	x	–	–	–	x	–	–	–	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	TC1270				TC1270				TC1270				TC1000			
	Windows 7/8/10				Windows 7/8/10				Windows 7/8/10				Windows 7/8/10			
	www.beckhoff.com/TF5240				www.beckhoff.com/TF5250				www.beckhoff.com/TF5260				www.beckhoff.com/TF5270			

TF5xxx | TwinCAT 3 Motion Control



TC3 CNC Virtual NCK Options

TC3 CNC Volumetric Compensation

TC3 CNC Cutting Plus

Technical data

TF5271-00pp

i TF5280-00pp

i TF5290-00pp

TwinCAT CNC Virtual NCK Options is a virtual TwinCAT CNC for simulation in a Windows environment as a further option package for the TwinCAT CNC and TwinCAT CNC Virtual NCK Basis.

TC3 CNC Volumetric Compensation is an optional package for compensating geometric machine errors based on an ISO-standardised parametric model.

Application

- highly effective option for increasing the machine accuracy and therefore the manufacturing accuracy, simply through control measures
- correction of the TCP position through dynamic calculation of axis correction values
- suitable for machines with 3 Cartesian and up to 3 rotary axes
- any kinematic axis order (head/table kinematics)

Features

- several parameter files per compensation, several compensations per controller
- parameter update via NC command or HMI
- interpolation of parameter sets (sag compensation, etc.)
- smoothing of parameter step changes during modulo transitions
- diagnostics possible via ADS, Microsoft Excel file

Safety

- configurable limitation of the compensating values
- configurable limitation of the travel-out velocity of the compensating values

Supported file formats

- tabular CSV format
- Etalon exchange format

Standards

- DIN ISO 230 "Test code for machine tools"
- ISO/TR 16907 "Machine tools – Numerical compensation of geometric errors"

TC3 CNC Cutting Plus is a technology package and enhances the CNC functionality for cutting.

Automatic lifting/lowering of an axis (lifts)

- block-overlapping automatic lifting and lowering of an axis
- to prevent collisions between the tool head and ridges or cut-out parts
- jerk-limited profile without affecting the path speed

Microsteps, fast laser switching signal

- highly accurate output of an M function (1 µs) at a certain position
- use of time stamps
- supports various types of synchronisation
- parameterisation by configuration of the M functions or programming the M functions via NC programs

Tube transformation

- multi-axis transformation for sheath surface processing
- supports various profiles such as multi-edge pipes and profile pipes
- processing of the programmed contour on the surface of the profile

Performance class (pp)

20	30	40	50
–	–	–	x
60	70	8x	9x
x	x	x	x

20	30	40	50
–	–	–	x
60	70	8x	9x
x	x	x	x

20	30	40	50
–	–	–	x
60	70	8x	9x
x	x	x	x

Required

TC1000

TC1270

TC1270

Target system

Windows 7/8/10

Windows 7/8/10

Windows 7/8/10

Further information

www.beckhoff.com/TF5271

www.beckhoff.com/TF5280

www.beckhoff.com/TF5290



For availability status see Beckhoff website at: www.beckhoff.com

TC3 Motion Collision Avoidance					TC3 Motion Pick-and-Place				TC3 Digital Cam Server				TC3 Hydraulic Positioning			
TF5410-00pp					TF5420-00pp				TF5800-00pp				TF5810-00pp			
<p>TC3 Motion Collision Avoidance is an optional package that prevents collisions when operating a number of linearly and/or translationally dependent axes with TC3 NC PTP. The underlying algorithm ensures the maintenance of a minimum distance from the previous axis. In this way, TC3 Motion Collision Avoidance actively prevents collisions when a number of motors are using e.g. the same rail. As well as active collision avoidance, TF5410 can also be used to allow axes to accumulate in a controlled way, for example when carrying out linear movements such as with XTS (eXtended Transport System).</p> <p>Programming of the PLC's movement commands is based on the standard PTP motion library with an additional input "gap". For example, when using TC3 Motion Collision Avoidance, all the axes can be given the same target position. The algorithm then ensures that only the first axis actually moves to that position. The remaining axes automatically line up while maintaining their minimum distance. This means that no further programming effort is needed in order to implement a dynamic buffer in which products can accumulate.</p>					<p>TC3 Motion Pick-and-Place is an extension of TC3 NC I (TF5100) and was especially designed for handling tasks carried out by gantry robots and other kinematics. It smooths the transition of complex path segments. Special methods are used to blend movement commands, facilitating optimised cycle times when they are processed. This reduces the bumpiness of motion along the path, making it run more smoothly, which is vital for high cycle times, gentle treatment of the robot and careful handling of the products.</p> <p>The TF5420 is programmed using a PLC library. There is no limit on the number of axes in a pick-and-place group, the only limiting factor is the processing power of the controller. Given an appropriate level of processing power, interpolating movement commands can be processed even for complex machines with more than three or eight axes (three path plus five auxiliary axes).</p>				<p>The TwinCAT Digital Cam Server is a fast cam controller with monitoring for various fieldbuses. The cams are configured in TwinCAT Engineering.</p> <ul style="list-style-type: none"> – high-performance fieldbus-independent cam controller with many functions – up to 320 outputs – up to 180 cams per output – path-path cams, path-time cams, brake cams – dynamic speed correction – measurement and monitoring of rotary speed 				<p>Algorithms for the control and positioning of hydraulic axes are combined in TwinCAT Hydraulic Positioning and are available as PLCopen-compliant PLC blocks.</p> <ul style="list-style-type: none"> – programming via certified PLCopen motion blocks – set value generators especially for hydraulic applications – coupling of the set value generators to NC PTP/NC I/CNC possible – free profile design through connection of customer-specific set value generators – support of non-linear gears – multiple-segmented movements (blending) – support of all necessary interfaces via Beckhoff I/O system – support of all common fieldbus systems – all process values in physical units, determination of force true to surface – support of standardised and application-specific controllers for position, force/pressure – bumpless transfer of force and position control – automatic identification of valve characteristics and axis properties – linearisation of characteristic curves – maintenance and commissioning tool for <ul style="list-style-type: none"> – axis parameterisation – valve parameterisation incl. characteristic curves – controller parameterisation – triggering of test commands – display of actual values 			
20	30	40	50		20	30	40	50	20	30	40	50	20	30	40	50
–	–	x	x		–	–	x	x	–	–	x	x	–	–	x	x
60	70	8x	9x		60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x
TC1250					TC1260				TC1200				TC1200			
Windows 7/8/10					Windows 7/8/10				Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE			
www.beckhoff.com/TF5410					www.beckhoff.com/TF5420				www.beckhoff.com/TF5800				www.beckhoff.com/TF5810			

TF6xxx | TwinCAT 3 Connectivity



	TC3 OPC UA				TC3 OPC DA			
Technical data	TF6100-00pp				TF6120-00pp			
	<p>OPC Unified Architecture offers secure, reliable and manufacturer-neutral transport of raw data and pre-processed information from the manufacturing level into the production planning or ERP system. With OPC UA, all desired information is available to every authorised application and every authorised person at any time and in any place.</p> <p>TwinCAT OPC UA Server</p> <ul style="list-style-type: none"> – certified in the OPC Laboratory, Europe – functions: DataAccess/HistoricalAccess/Alarm&Condition – PLC blocks for diagnosis and restart – intermediate storage of data on the server: interruption of the communication connection does not lead to loss of data – configurator for simple handling and diagnostics of local/remote OPC UA servers <p>TwinCAT OPC UA Gateway</p> <ul style="list-style-type: none"> – wrapper technology for an OPC DA (Data Access) interface according to OPC UA – high-performance OPC DA access – aggregation of TwinCAT OPC UA servers <p>TwinCAT OPC UA Client</p> <ul style="list-style-type: none"> – PLCopen PLC function blocks for OPC UA Data Access – demo OPC UA client for diagnostic purposes <p>Security</p> <ul style="list-style-type: none"> – secured access to name spaces, variables, structures and the OPC UA Server in general – authorisation levels and a configuration option for consistently encrypted access <p>OPC UA Pub/Sub UDP Realtime</p> <ul style="list-style-type: none"> – deterministic and real-time capable communication channel – ideal for heterogeneous M2M scenarios 				<p>OPC is the standard for supplier-independent communication in automation technology. OPC DA (Data Access) is based on the Microsoft COM/DCOM standard.</p> <p>TwinCAT OPC DA Server</p> <ul style="list-style-type: none"> – specifications OPC-DA2x and OPC-XML-DA – configurator for the set-up – demo DA client for diagnostic purposes and the loading of recipes <p>TF6120 can be replaced by the software component TwinCAT OPC UA Gateway of the TF6100 product.</p>			
Performance class (pp)	20	30	40	50	20	30	40	50
	x	x	x	x	–	x	x	x
	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x
Required	TC1000				TC1000			
Target system	Windows 7/8/10, Windows CE				Windows XP			
Further information	www.beckhoff.com/TF6100				www.beckhoff.com/TF6120			

TC3 EtherCAT Redundancy 250					TC3 EtherCAT Redundancy 250+				TC3 EtherCAT External Sync				TC3 Modbus TCP			
TF6220-00pp					TF6221-00pp				TF6225-00pp				TF6250-00pp			
TwinCAT EtherCAT Redundancy 250 extends the TwinCAT EtherCAT Master by the possibility to implement cable redundancy for up to 250 EtherCAT devices: from the last logical device a cable is returned back to the master. Configuration and diagnostics take place in the TwinCAT 3 engineering environment.					TwinCAT EtherCAT Redundancy 250+ extends the TwinCAT EtherCAT Master by the possibility to implement cable redundancy for more than 250 EtherCAT devices: from the last logical device a cable is returned back to the master. Configuration and diagnosis take place in the TwinCAT 3 engineering environment.				TC3 EtherCAT External Sync extends the TwinCAT EtherCAT master with an option to synchronise the Beckhoff real-time communication with external digital signals. The digital signals are read via terminals supporting timestamping, such as the EL1252 EtherCAT Terminal.				TwinCAT Modbus acts as gateway between Modbus TCP devices and TwinCAT runtime systems. It provides both server and client functionalities. In server mode the memory areas of several TwinCAT runtime systems can be mapped directly to the Modbus memory areas. A PLC library is provided for implementing a Modbus TCP client, so that the memory areas of a Modbus TCP device can be accessed.			
20	30	40	50		20	30	40	50	20	30	40	50	20	30	40	50
–	–	x	x		–	–	x	x	x	x	x	x	x	x	x	x
60	70	8x	9x		60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x
TC1100					TC1100				TC1100				TC1200			
Windows 7/8/10, Windows CE					Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE			
www.beckhoff.com/TF6220					www.beckhoff.com/TF6221				www.beckhoff.com/TF6225				www.beckhoff.com/TF6250			

TF6xxx | TwinCAT 3 Connectivity



	TC3 Modbus RTU				TC3 PROFINET RT Device				TC3 PROFINET RT Controller				TC3 EtherNet/IP Slave			
Technical data	TF6255-00pp				TF6270-00pp				TF6271-00pp				TF6280-00pp			
	<p>TwinCAT Modbus RTU implements Modbus RTU communication via a serial RS232, RS422 or RS485 interface and is thus suitable both for the PC/CX interfaces and for operation with the KL6xxx serial Bus Terminals. It contains function blocks for master and slave operating mode with simple configuration.</p>				<p>The TwinCAT PROFINET RT Device (slave) is a supplement that turns any PC-based controller with an Intel® chipset and the real-time Ethernet driver developed by Beckhoff into a PROFINET RT device. By installing the function, a standard Ethernet interface becomes a PROFINET slave.</p>				<p>The TwinCAT PROFINET RT Controller (master) is a supplement that turns any PC-based controller with an Intel® chipset and the real-time Ethernet driver developed by Beckhoff into a PROFINET RT controller. By installing the function, a standard Ethernet interface becomes a PROFINET master.</p>				<p>The TwinCAT EtherNet/IP Slave is a supplement that turns any PC-based controller with an Intel® chipset and the real-time Ethernet driver developed by Beckhoff into an EtherNet/IP slave. Through this supplement the Ethernet interface becomes an EtherNet/IP slave. The product can be used on all PC controllers and Embedded PC controllers with an Intel® chipset.</p> <p>A further feature of the supplements is that it enables up to eight slaves to be parameterised using a single physical interface. For this purpose, a virtual MAC address is created in order to be able to operate a total of up to eight EtherNet/IP slaves on one PC via a single Ethernet interface. This feature can be used, for example, to exchange larger amounts of data using one EtherNet/IP master or to establish a connection to several EtherNet/IP masters in different subnets.</p>			
Performance class (pp)	20	30	40	50	20	30	40	50	20	30	40	50	20	30	40	50
	x	x	x	x	—	—	x	x	—	—	x	x	—	—	x	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Required	TC1200				TC1100				TC1100				TC1100			
Target system	Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE			
Further information	www.beckhoff.com/TF6255				www.beckhoff.com/TF6270				www.beckhoff.com/TF6271				www.beckhoff.com/TF6280			

	TC3 EtherNet/IP Master				TC3 FTP Client				TC3 TCP/IP				TC3 TCP/UDP Realtime				TC3 Serial Communication			
	TF6281-00pp				TF6300-00pp				TF6310-00pp				TF6311-00pp				TF6340-00pp			
	<p>The TwinCAT EtherNet/IP Master is a supplement that turns any PC-based controller with an Intel® chipset and the real-time Ethernet driver developed by Beckhoff into an EtherNet/IP master. Through this supplement, the Ethernet interface becomes an EtherNet/IP master. The product can be used on all PC controllers and Embedded PC controllers with an Intel® chipset.</p> <p>The process data is configured using TwinCAT 3 allowing various process data and various sizes. The supplement supports both multicast and unicast connections. Up to 16 simple EtherNet/IP slave devices can be connected via one generic node.</p>				<p>TwinCAT FTP enables easy access from the PLC to one or several FTP servers with the aid of various function blocks. Files can be loaded to or from a server after the establishment of a connection (optional with authentication). Additional function blocks allow files or directories to be searched for, created, deleted and renamed.</p>				<p>TwinCAT TCP/IP enables the implementation and realisation of one or several TCP/IP servers and/or TCP/IP clients within the TwinCAT 3 PLC. Corresponding blocks exist for the establishment/disconnection of communication as well as for the pure exchange of data (send and receive). The function blocks also support the use of multicast addresses.</p>				<p>TwinCAT 3 already offers an option to access the network card of the operating system (TF6310) from the PLC via the user mode. As an enhancement, TC3 TCP/UDP Realtime (TF6311) now enables fast and convenient access from the real-time directly to the network card. The TwinCAT 3 network card driver handles the access via a dedicated stack. The implementation facilitates cooperative use of the network card by the operating system. TF6311 provides both server and client functionality, so that the TCP/IP, UDP/IP and Ping/ARP protocols can be implemented.</p> <p>Unlike the TF6310 function modules, TF6311 is realised as a TcCOM (TwinCAT Component Object Model) module and directly implements the TwinCAT 3 philosophy: modules encapsulate functionality and can be used without knowledge of the internal workings. In addition, this approach enables seamless integration of the module in the two PLC and C++ programming environments. Examples of client and server applications in different protocols illustrate the use of the TcCOM module, making implementation of an application efficient and easy.</p>				<p>TwinCAT Serial Communication implements communication with serial devices such as printers, bar code scanners, etc. The serial interface of the PC and the serial Beckhoff EL6xxx EtherCAT Terminals and KL6xxx Bus Terminals are supported.</p> <p>Via the network-based fieldbus system from Beckhoff the serial terminals can be accessed over a distance of up to 100 m. In addition, it is possible to address virtual COM interfaces of the operating system from the PLC.</p>			
	20	30	40	50	20	30	40	50	20	30	40	50	20	30	40	50	20	30	40	50
	–	–	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	TC1100				TC1200				TC1200				TC1200, TC1300				TC1200			
	Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE			
	www.beckhoff.com/TF6281				www.beckhoff.com/TF6300				www.beckhoff.com/TF6310				www.beckhoff.com/TF6311				www.beckhoff.com/TF6340			

TF6xxx | TwinCAT 3 Connectivity



	TC3 SMS/SMTP				TC3 Virtual Serial COM				TC3 Database Server				TC3 XML Server			
Technical data	TF6350-00pp				TF6360-00pp				TF6420-00pp				TF6421-00pp			
	<p>TwinCAT SMS/SMTP enables the transmission of SMS messages or e-mails using PLC function blocks. The latter also allows the transmission of file attachments, HTML texts and the setting of message priorities. Support for STARTTLS/SSL enables encrypted e-mail communication to be configured.</p>				<p>TwinCAT Virtual Serial COM allows the EL60xx EtherCAT Terminals or EP6002 EtherCAT Box modules to be integrated into Windows XP, Windows 7/8/10 or Windows CE as normal serial interfaces. The computer on which a serial interface is to be generated for it is defined individually for each EL60xx/EP6002. Access to the device connected to the terminal takes place via Windows API for serial interfaces.</p>				<p>TwinCAT Database Server enables the exchange of data between databases and the TwinCAT system. PLC variables or direct values of the EtherCAT I/Os can be logged cyclically when changes occur or event-controlled by means of PLC function blocks.</p> <p>A TwinCAT 3 PLC library for the Database Server utilises the object-oriented extensions of the IEC 61131-3. As a result, the program code is more structured and much simpler to extend. The performance of command processing is also considerably higher. Furthermore, a C++ interface is implemented for the Database Server. This allows the user to communicate with the Database Server not just from the PLC, but also directly from a C++ application.</p>				<p>The TwinCAT XML Server provides a PLC library enabling write/read access for XML data. The user-friendly XML Server facilitates e.g. the loading of initialisation data, which is often required at machine startup.</p>			
Performance class (pp)	20	30	40	50	20	30	40	50	20	30	40	50	20	30	40	50
	x	x	x	x	—	x	x	x	x	x	x	x	x	x	x	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Required	TC1200				TC1100				TC1200				TC1200			
Target system	Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE			
Further information	www.beckhoff.com/TF6350				www.beckhoff.com/TF6360				www.beckhoff.com/TF6420				www.beckhoff.com/TF6421			

i For availability status see Beckhoff website at: www.beckhoff.com

	TC3 IEC 60870-5-10x				TC3 IEC 61850/ IEC 61400-25				TC3 RFID Reader Communication				TC3 S5/S7 Communication				TC3 DBC File Import for CAN			
	TF6500-00pp				i TF6510-00pp				TF6600-00pp				TF6610-00pp				i TF6650-00pp			
	<p>TwinCAT IEC 60870-5-10x enables communication according to the IEC standard 60870-5-10x from the PLC. Both server and client operating modes are possible.</p> <p>PLC library for the realisation of masters for</p> <ul style="list-style-type: none"> – IEC 60870-5-101 – IEC 60870-5-102 – IEC 60870-5-103 – IEC 60870-5-104 <p>PLC library for the realisation of slaves for</p> <ul style="list-style-type: none"> – IEC 60870-5-101 – IEC 60870-5-104 				<p>For the standard-compliant communication between client and server, corresponding servers can be realised directly in the TwinCAT PLC with IEC 61850/IEC 61400-25 Telecontrol in TwinCAT 3. IEC 61850 provides data models for substation communication. IEC 61400-25 is based on IEC 61850 and offers specific extensions of the data model for wind farm communication. The respective server is configured using the TwinCAT telecontrol configurator. This decouples the configuration work from the programming work in the PLC and generates the corresponding PLC code. The PLC code can be imported into new or existing PLC projects.</p>				<p>RFID Reader Communication allows various RFID readers to be addressed via a serial interface. The new TwinCAT RFID reader library offers a general abstract interface that can be used for all readers. The configuration can easily be adapted to a specific reader.</p>				<p>TwinCAT S5/S7 Communication allows the simple connection of TwinCAT to an S5 or S7 controller. The data blocks, flags, inputs, outputs, counters and timers of an S5 or S7 controller can be accessed using function blocks. The communication takes place using TCP/IP.</p>				<p>The TwinCAT 3 Function enables the reading of DBC file formats (.dbc). The DBC data format is a CAN network description and allows the definition of attributes as well as the assignment of these attributes to the elements of a network. DBC files are text files that contain e.g. scaling information for CAN data and signal definitions. The TF6650 Function can be used for data import and pre-processing according to the parameters that are stored in the DBC file. As an additional function, network nodes can also be simulated according to the DBC files. The function uses the EL6751 CANopen master terminal as hardware interface.</p>			
	20	30	40	50	20	30	40	50	20	30	40	50	20	30	40	50	20	30	40	50
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	TC1200				TC1200				TC1200				TC1200				TC1100, EL6751			
	Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE			
	www.beckhoff.com/TF6500				www.beckhoff.com/TF6510				www.beckhoff.com/TF6600				www.beckhoff.com/TF6610				www.beckhoff.com/TF6650			

TF6xxx | TwinCAT 3 Connectivity



TC3 IoT Communication (MQTT)

TC3 IoT Functions

Technical data

TF6701-00pp

TF6710-00pp

TC3 IoT Communication provides basic functionalities in the form of PLC libraries for sending and receiving data via the so-called MQ Telemetry Transport (MQTT) protocol.

By enabling the transmission and receipt of publisher/subscriber-based MQTT messages directly from the controller, this function makes easy data communication between diverse devices possible. MQTT is an open, standardised communication protocol that is becoming increasingly popular for fast and efficient data transmission applications due to its low overhead. Many IT providers, but particularly those in the cloud computing field, provide access to their services via this protocol.

The TwinCAT 3 Function can be used to establish connectivity for cloud-based communication services.

The focus is not on the protocol implementation itself (such as with the TF6701, for example), but on targeted communication with a cloud-based system, e.g. the Microsoft Azure IoT hub or Amazon Web Services IoT. Several PLC function blocks are available for sending process data from the TwinCAT runtime to such cloud-based communication services or receiving data from such services.

Performance class (pp)

20	30	40	50
x	x	x	x
60	70	8x	9x
x	x	x	x

20	30	40	50
—	—	x	x
60	70	8x	9x
x	x	x	x

Required

TC1200

TC1200

Target system

Windows 7/8/10, Windows CE

Windows 7/8/10

Further information

www.beckhoff.com/TF6701

www.beckhoff.com/TF6710

TC3 IoT Data Agent					TC3 IoT Communicator				TC3 IoT Communicator App
TF6720-00pp					TF6730-00pp				TF6735
<p>The TC3 IoT Data Agent provides IoT communication functions bi-directional in the form of a gateway application that can be configured and operated independently from the TwinCAT real-time environment.</p> <p>The data agent picks up configured process data and transmits it to a specific communication or data service in the Microsoft Azure or Amazon Web Services (AWS) cloud, or it sends the process data to an MQTT or AMQP message broker. To pick up the process data, both TwinCAT ADS and the OPC UA IEC standard with their security mechanisms are available. This ensures data protection down to the controller or the respective end device.</p> <p>To reduce the amount of traffic and associated costs, the data agent supports advanced sampling mechanisms, such as on-data-change transmissions.</p> <p>If the connection is interrupted, buffering algorithms are available to prevent the loss of data. The entire parameterisation of the data agent can be done via a graphical editor. This makes it easy to use and reduces set-up times when commissioning the system.</p> <p>The TF672x TC3 IoT Data Agent Packs extend the TC3 IoT Data Agent with 4, 16, 64 or 256 additional ADS target runtimes or OPC UA namespaces.</p>					<p>The TC3 IoT Communicator makes it possible to easily transmit process data to multiple end devices, monitor status changes, and send information back to the machine.</p> <p>The TC3 IoT Communicator connects the TwinCAT controller to a messaging service, making it easy to set it up within the TwinCAT engineering environment to send and receive push messages and process data between the PLC and mobile operating systems. Since each end device is registered with a unique ID, messages can be transmitted to specific people and/or controllers. A flag within the message indicates whether messages and status data is buffered in the messaging service and available on demand.</p> <p>Since the TC3 IoT Communicator is based on the publish-subscribe pattern, it does not require any special firewall settings but can be easily integrated into an existing IT network. To receive, send and display such messages, apps can be downloaded from the app stores free of charge.</p>				<p>The TC3 IoT Communicator App provides a simple solution for monitoring and analysing TwinCAT process data on mobile end devices. To receive, send and display selected TwinCAT messages, apps can be downloaded from the app stores free of charge.</p> <p>The TC3 IoT Communicator App communicates with the TwinCAT controller via a messaging service in the cloud or in a local network. Various mechanisms are available for authentication and encryption.</p>
20	30	40	50		20	30	40	50	–
x	x	x	x		x	x	x	x	
60	70	8x	9x		60	70	8x	9x	
x	x	x	x		x	x	x	x	
TC1000					TC1200				TF6730
Windows 7/8/10					Windows 7/8/10				–
www.beckhoff.com/TF6720					www.beckhoff.com/TF6730				www.beckhoff.com/TF6735

TF8xxx | TwinCAT 3 Industry specific



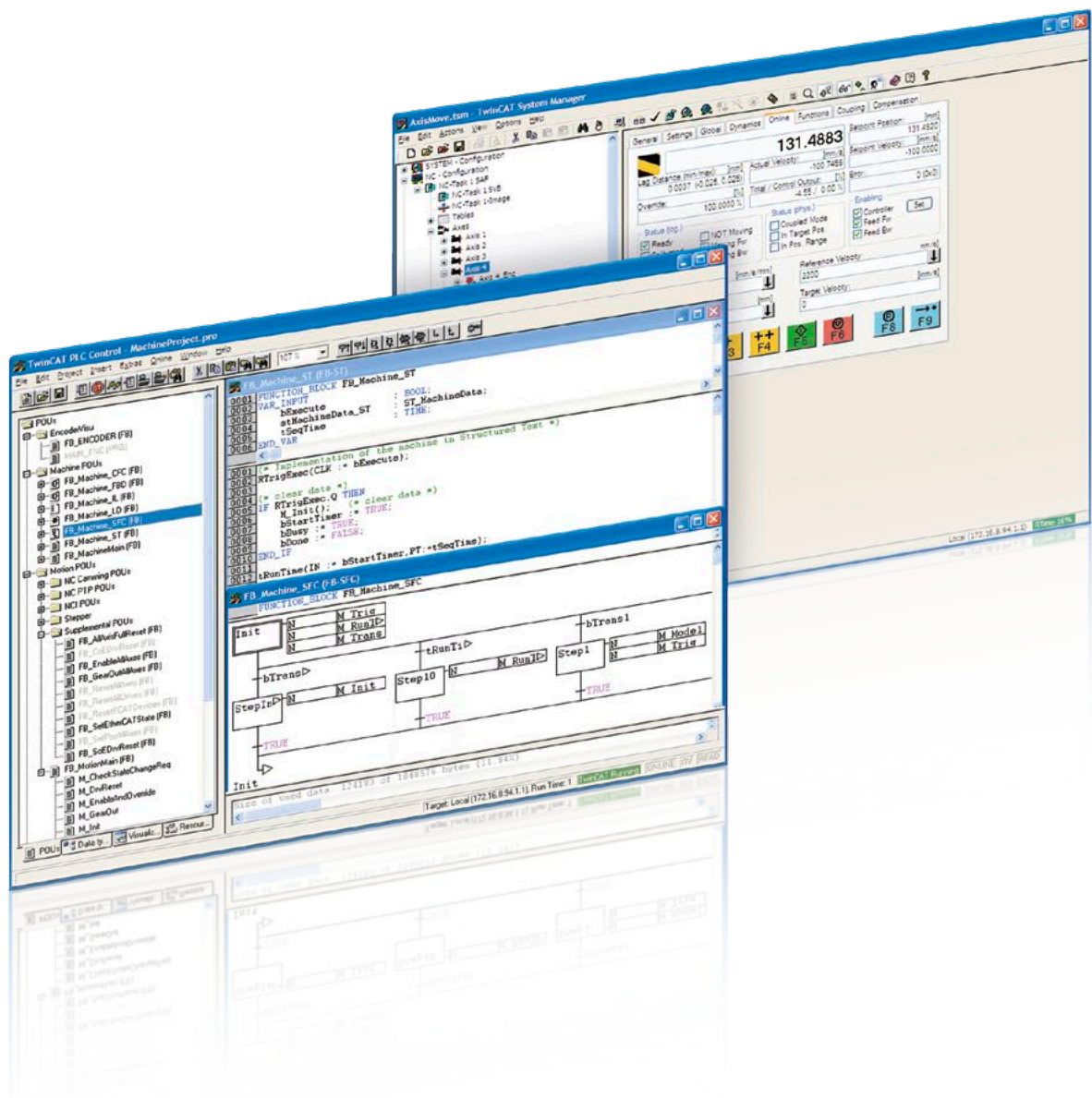
	TC3 HVAC				TC3 Building Automation Basic				TC3 BACnet/IP			
Technical data	TF8000-00pp				TF8010-00pp				TF8020-00pp			
	<p>The TF8000 TC3 HVAC software library allows the implementation of all functions for automating all building services. In addition to conventional HVAC functions relating to energy generation and distribution, it also includes room automation functions for lighting, shading and air-conditioning.</p>				<p>The TC3 Building Automation Basic software library allows the implementation of all functions which are important for room automation. Among these are lighting (constant light control, light dimmer...), facade control, scaling functions, filter blocks, timer functions and peak load limiter for energy optimisation.</p>				<p>BACnet (Building Automation Control Network) is a standardised, manufacturer-independent communication protocol for building automation. Areas of application include HVAC, lighting control, safety and fire alarm technology. Implementation of this protocol is carried out as server as well as client and can be run on all Beckhoff Industrial PCs and Embedded PCs. All services of a BBC (BACnet Building Controller) are supported such as for example, common data use (DS), alarm and event processing (AE), time-tabling (SCHED), trend recording (T) as well as device and network management (DM).</p>			
Performance class (pp)	20	30	40	50	20	30	40	50	20	30	40	50
	x	x	x	x	x	x	x	x	x	x	x	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x
Required	TC1200				TC1200				TC1000			
Target system	Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE			
Further information	www.beckhoff.com/TF8000				www.beckhoff.com/TF8010				www.beckhoff.com/TF8020			

i For availability status see Beckhoff website at: www.beckhoff.com/TF8020

TC3 Building Automation					TC3 Wind Framework				TC3 AES70 (OCA)			
TF8040-00pp					TF8310-00pp				TF8810-00pp			
<p>TC3 Building Automation TF8040 is the latest and most comprehensive software package for building automation applications. The library contains around 180 function blocks. The wide range of functions covered by this library enables system integrators to implement all conceivable heating, ventilation, air conditioning and room automation projects. Extensive templates offer support for system integrators in familiarisation and application.</p> <p>TF8040 meets the high requirements of advanced, interoperable building automation and provides the basis for safe and energy-efficient operation of building services such as HVAC, lighting, air conditioning and shading devices.</p>					<p>The TwinCAT 3 Wind Framework is based on the modular architecture of TwinCAT 3 and provides control technology and industry expertise in the form of encapsulated modules and an application template. TcCOM modules provide higher-level system services. The status module enables the monitoring of all components and includes error detection, event management, error handling and reporting. The parameter and command modules provide services for configuration and interaction with the system.</p> <p>The acquisition of signals and their statistical analysis is supported by the capture and statistic module. The user module checks, manages and logs all interactions by the user. The recording of all events and signals as well as the saving and loading of the entire configuration are enabled by the database module, which is based on an SQL database.</p> <p>The programming of the operational management using these services is simplified by a PLC library and a complete sample application. When using the TC3 Wind Framework, each subsystem of the wind turbine system (such as converters, pitch, etc.) is representing an individual module. Each subsystem module comes with a specific set of information and settings. These properties integrate themselves via specific objects from the framework into the higher-level services and operational management.</p> <p>When replacing a subsystem module, the associated objects are automatically integrated into the services. In this way a group of objects is created that represent the complete system and enable the monitoring and parametrisation of the turbine. Nevertheless, these subsystem modules are self-contained and reusable in another operational management or test environment.</p>				<p>The TC3 AES70 (OCA) communication library provides functions for the operation of a system as an OCA (Open Control Architecture) controller in an OCA network. Such various function modules as gain, mute or switch are available. These function modules can be used to implement arbitrary OCA architectures and to represent any type of OCA devices. With the TF8810, OCA-enabled audio systems can be connected to the PC-based control platform from Beckhoff and combined with components from the wide range of operating panels and I/O components.</p> <p>More information on our webpage Applications & Solutions for Stage and Show Technology.</p>			
20	30	40	50		20	30	40	50	20	30	40	50
x	x	x	x		—	—	x	x	x	x	x	x
60	70	8x	9x		60	70	8x	9x	60	70	8x	9x
x	x	x	x		x	x	x	—	x	x	x	x
TC1200					TC1000				TC1200			
Windows 7/8/10, Windows CE					Windows 7/8/10				Windows 7/8/10, Windows CE			
www.beckhoff.com/TF8040					www.beckhoff.com/TF8310				www.beckhoff.com/TF8810			

TwinCAT 2

► www.beckhoff.com/TwinCAT2



The Windows Control and Automation Technology

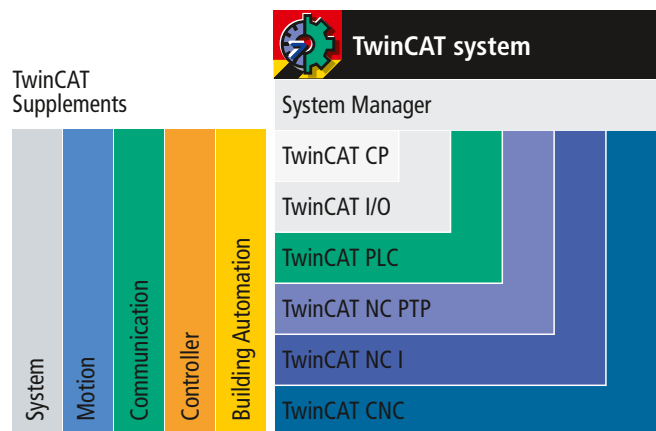
The Beckhoff TwinCAT software system transforms almost any compatible PC into a real-time controller with multi-PLC system, NC axis control, programming environment and operating station. At the same time, TwinCAT integrates the programming environment for all Beckhoff controllers: from high-end Industrial PC control to embedded controller.

TwinCAT architecture

TwinCAT consists of runtime systems for real-time execution of control programs and development environments for programming, configuration and diagnostics:

- TwinCAT I/O: versatile I/O interface for all common fieldbuses
- TwinCAT PLC: enables programming of up to four PLC runtimes on a single PC. The PLC program can optionally be written in one or several IEC 61131-3 languages (IL, LD, FBD, SFC, ST) or CFC.
- TwinCAT NC: enables simultaneous positioning of many axes. The levels NC PTP (point-to-point positioning), NC I (linear and circular interpolating movements of axis groups with up to eight drives) and CNC (extension of NC I with conventional CNC features for up to 32 interpolating axes per channel) are available for this purpose.

Current operating systems can be found in the respective product tables under target systems. Older operating systems are available on request from our service department.



TX12xx | TwinCAT 2



TwinCAT PLC

Technical data

TX1200

TwinCAT PLC realises one or more PLCs with the international standard IEC 61131-3 on one CPU. All programming languages described in the standard can be used for programming. The blocks of the type PROGRAM can be linked with real-time tasks. Various convenient debugging options facilitate fault-finding and commissioning. Program modifications can be carried out at any times and in any size online, i.e. when the PLC is running. All variables are available symbolically by ADS and can be read and written in appropriate clients.

- process image size, flag range, program size, POU size and number of variables are limited only by size of RAM
- cycle times from 50 µs
- link time: typically 1 µs (Intel® Core™ 2 Duo)
- IEC 61131-3: IL, FBD, LD, SFC, ST, CFC
- online changes in programs and variables
- remote debugging via TCP/IP
- online connection with PLC runtime system worldwide via TCP/IP or fieldbus
- online monitoring of variables in variable lists, watch windows, editors
- online status and powerflow (accumulator contents) of programs and instances
- triggering, forcing and setting variables
- powerful debugging with single cycle, break points, step in, step over, display of the current call stack, watchlist shows selection of variable, trace functions
- online management of all variable names and structures across the whole system
- remanent and persistent data, UPS supported storage on hard disk, storage in NOVDRAM as option
- variable reading and writing access via ADS, OPC
- certified in accordance with PLCopen base level (IL/ST)
- source code is stored in the target system
- convenient library management
- powerful compiler with incremental compilation
- all common data types, structures, arrays, including multi-dimensional arrays
- convenient creation of programs with autoformat, autodeclare, cross-reference, search/replace, project comparison

Target system

version-dependent: Windows 7/10, Windows CE

Further information

www.beckhoff.com/TX1200

TwinCAT NC PTP	TwinCAT NC I
TX1250	TX1260
<p>TwinCAT NC PTP implements Motion Control for point-to-point movements in software. The axes are represented by axis objects and provide a cyclic interface, e.g. for the PLC. This axis object is then linked to a corresponding physical axis. In this way, the most diverse axis types with the most diverse fieldbus interfaces can be connected abstractly with the axis objects, which always offer an identical configuration interface. The control of the axes can be configured in various conformations (position or velocity interface) and various controllers. The axes are configured in TwinCAT Engineering.</p> <ul style="list-style-type: none"> – max. 255 axes – supports electrical and hydraulic servo drives, frequency converter drives, stepper motor drives, DC drives, switched drives (fast/slow axes), simulation axes and encoder axes – supports various encoders such as incremental encoder, absolute encoder, digital interface to the drives such as EtherCAT, SERCOS, SSI, Lightbus, PROFIBUS DP/MC, pulse train – standard axis functions such as start/stop/reset/reference, velocity override, master/slave couplings, electronic gearbox, online distance compensation – programming is carried out via PLCOpen-compliant IEC 61131-3 function blocks – convenient axis commissioning options – online monitoring of all axis state variables such as actual/setpoint values, releases, control values, online axis tuning – forcing of axis variables – configuration of all axis parameters, such as measuring system, drive parameters and position controller – configurable controller structures: P control, PID control, PID with velocity pre-control, PID with velocity and acceleration pre-control – online master/slave and slave/master conversion – flying saw (diagonal saw [optional]) – cam plates (support by TwinCAT Cam Design Tool [optional]) – FIFO axes – external set point value generators – multi-master coupling 	<p>Using TwinCAT NC I, movements can be implemented with up to three interpolating and up to five auxiliary axes in the interpolation package. Various axis types with various fieldbus interfaces are supported. The movement is usually programmed in DIN 66025, but it can also alternatively be carried out via PLC function blocks.</p> <ul style="list-style-type: none"> – max. 3 path axes and up to 5 auxiliary axes per group – 1 group per channel, max. 31 channels – supports electric servo axes, stepper motor drives – interpreter functions such as subroutine and jump technology, programmable loops, zero point shifts, tool corrections, M and H functions – geometry functions: straight lines and circles in 3D space, circles at all main levels, helices with base circles at all main levels, linear, circular and helical interpolation at the main levels and freely definable levels, Bezier splines, look-ahead function – online reconfiguration of axes in groups, path override, slave coupling to path axes, auxiliary axes, axis error and sag compensation, measuring functions – programming in DIN 66025 – access alternatively via function blocks according to IEC 61131-3 – operation of automatic mode, manual mode (jog/inch), single block mode, referencing, handwheel mode (movement/overlay) – convenient debugging with online monitoring of current setpoint/ actual position (position lag of all axes), NC program line currently being processed, NC program line currently being interpreted, channel status
version-dependent: Windows 7/10, Windows CE	version-dependent: Windows 7/10, Windows CE
www.beckhoff.com/TX1250	www.beckhoff.com/TX1260

TX1xxx | TwinCAT 2



TwinCAT CNC

Technical data

TX1270

- TwinCAT CNC offers the option to implement interpolation with up to 32 simultaneously interpolating axes. The number of axes and/or the number of channels can be adapted to the requirements of the application via the option packages. Various transformations can be supplemented via option packages. Programming takes place according to DIN 66025. The axes and channels are configured in TwinCAT Engineering.
- 8 path axes/controlled spindles, max. 64 axes/controlled spindles (optional), max. 12 channels (optional)
 - supports electric servo axes, stepper motor drives
 - subroutine and jump technology, programmable loops, zero point shifts, tool corrections, M and H functions, mathematical functions, programming of parameters/variables, user macros, spindle and auxiliary functions, tool functions
 - geometry functions linear, circular and helical interpolation at the main levels and freely definable levels, max. 32 interpolating path axes per channel (optional), look-ahead function
 - axis functions, coupling and gantry axis function, override, axis error and sag compensation, measuring functions
 - programming in DIN 66025 with high-level language extension
 - access via function blocks from TwinCAT PLC according to IEC 61131-3
 - operation with automatic mode, manual mode (jog/inch), single block mode, referencing, block advance, handwheel mode (movement/overlay)
 - convenient debugging with online monitoring of all states

Target system

version-dependent: Windows 7/10

Further information

www.beckhoff.com/TX1270

TwinCAT I/O	TwinCAT CP
TX1100	TX1000
<p>Using TwinCAT I/O, cyclic data can be collected by different fieldbuses in process images. Cyclic tasks drive the corresponding fieldbuses. Various fieldbuses can be operated with different cycle times on one CPU. Applications can directly access the process image. The fieldbuses and the process images are configured in TwinCAT Engineering.</p> <ul style="list-style-type: none"> – provides variable-oriented linkage of I/O devices to tasks – tasks are variable-oriented among each other – the smallest unit is one bit – supports both synchronous and asynchronous relationships – consistent exchange of data areas and process images – online display in the directory tree – online watch window – "Force and Write" for commissioning and for testing task variables and I/O devices – supported fieldbuses: <ul style="list-style-type: none"> – EtherCAT – Lightbus – PROFIBUS DP (master and slave) – Interbus – CANopen – SERCOS interface – DeviceNet – Ethernet – USB – SMB (System Management Bus) 	<p>TwinCAT CP is a driver for the Beckhoff Control Panels CP6xxx and CP7xxx, the industrial operating and display devices.</p> <p>Control Panels are optimised for use as a human-machine interface. Operating and display elements create an independent unit, separated from the PC by a simple cable link.</p> <p>TwinCAT CP creates the driver connection between general Windows programs and the operating and display elements on the Beckhoff Control Panel:</p> <ul style="list-style-type: none"> – direct switches for fast machine functions – switch feedback by LEDs – UPS support <p>The driver permits variable-oriented operation of the Control Panel's functions by the Windows programs.</p>
version-dependent: Windows 7/10, Windows CE	version-dependent: Windows 7/10, Windows Embedded WES2009/WES7
www.beckhoff.com/TX1100	www.beckhoff.com/TX1000

TSxxxx | TwinCAT 2 Supplements, System



	TwinCAT ECAD Import	TwinCAT Engineering Interface Server	TwinCAT Eventlogger	TwinCAT XML Data Server
Technical data	TS1120	TS1600	TS1010	TS6421
	<p>TwinCAT ECAD Import serves the purpose of importing already existing engineering results from an ECAD program. It enables the import of information about the structure of the I/Os and their links to PLC variables, which is exported from the ECAD tool by means of XML description. On the basis of this information a system manager configuration and a basic PLC program with the I/O variables used are generated. The generation of NC devices is also possible.</p>	<p>With the TwinCAT Engineering Interface (ENI) server it is possible for the work of a number of programmers to be coordinated via a central source code management system. The TwinCAT ENI server offers interfaces with Microsoft Visual Source Safe and a driver for Subversion (SVN). A user and rights management is as much part of the product as a database-independent diagnostic tool, which gives an overview of all current tasks of the various users.</p>	<p>The TwinCAT Eventlogger is an alarm and diagnostic system for TwinCAT-based controllers. The TwinCAT Eventlogger has the task of managing all messages (events) appearing in the TwinCAT system; to forward them and where necessary to write them into the TwinCAT log file. In this context "events" are understood to comprise alarms, warnings, notes or instructions. Messages can be acknowledged. The Message Formatter produces the connection between the actual event and its message text. This is stored in an external database.</p> <p>By integration of the TcEventViewer type library it is possible, to create your own message display. Configuration of the message text is done by the TcEvent configurator. The event logger is included in the main TwinCAT delivery.</p>	<p>The TwinCAT XML Data Server permits direct access to an XML file from the PLC. The values of variables can be read by the PLC or written to the XML file. Access to structures in the PLC is also possible.</p>
Target system	Windows 7/10	Windows NT/2000/XP	Windows 7/10, Windows CE	Windows 7/10
Min. TwinCAT level	TwinCAT PLC/ TwinCAT NC PTP (for NC devices)	TwinCAT PLC	TwinCAT PLC	TwinCAT PLC
Further information	www.beckhoff.com/TS1120	www.beckhoff.com/TS1600	www.beckhoff.com/TS1010	www.beckhoff.com/TS6421

	TwinCAT XML Data Server CE	TwinCAT Backup	TwinCAT Simulation Manager	TwinCAT Database Server
	TS6421-0030	TS1150	TS1110	TS6420
	<p>The TwinCAT XML Data Server CE permits direct access to an XML file from the PLC. The values of variables can be read by the PLC or written to the XML file. Access to structures in the PLC is also possible.</p>	<p>Files, directories, OS-specific information, settings and TwinCAT configurations can be backed up and restored using the TwinCAT Backup Server. This can be carried out on all connected media and also via the network.</p>	<p>The TwinCAT Simulation Manager is a tool for simplified configuration of a simulation environment, which integrates into the TwinCAT system environment. It supports the creation of a "virtual machine", which corresponds to a real one in its runtime performance.</p>	<p>TwinCAT Database Server enables the exchange of data between databases and the TwinCAT system. PLC variables or direct values of the EtherCAT I/Os can be logged cyclically when changes occur or event-controlled by means of PLC function blocks.</p>
	Windows CE	Windows NT/2000/XP	Windows 7/10	Windows 7/10
	TwinCAT PLC	TwinCAT PLC	TwinCAT PLC	TwinCAT PLC
	www.beckhoff.com/TS6421-0030	www.beckhoff.com/TS1150	www.beckhoff.com/TS1110	www.beckhoff.com/TS6420

TSxxxx | TwinCAT 2 Supplements, System



TwinCAT Database
Server CE

TwinCAT PLC HMI

TwinCAT PLC HMI CE

TwinCAT PLC HMI Web

Technical data

TS6420-0030

TS1800

TS1800-0030

TS1810

The TwinCAT Database Server CE has the same functional attributes as the version which runs on non-CE operating systems. The only difference is the range of supported databases: MS SQL, MS SQL Compact and ASCII files.

TwinCAT PLC HMI is a stand-alone tool for the presentation of visualisations which are created in TwinCAT PLC Control. They are shown in full-screen as soon as the system starts up.

TwinCAT PLC HMI CE is a stand-alone tool for the presentation of visualisations which are created in TwinCAT PLC Control. They are shown in full-screen as soon as the system starts up.

TwinCAT PLC HMI Web is a web-based visualisation system. The TwinCAT PLC Control acts as an editor for the generation of web pages. Activation is carried out simply by setting an option in the TwinCAT PLC Control. The web pages are hosted by the Internet Information Server (IIS). For display of the web pages a Java VM is needed.

Target system

Windows CE

Windows 7/10

Windows CE

Windows 7/10, Windows CE

Min. TwinCAT level

TwinCAT PLC

TwinCAT PLC

TwinCAT PLC

TwinCAT PLC

Further information

www.beckhoff.com/TS6420-0030

www.beckhoff.com/TS1800

www.beckhoff.com/TS1800-0030

www.beckhoff.com/TS1810

	TwinCAT Management Server	TwinCAT Scope 2	TwinCAT EtherCAT Redundancy	TwinCAT Solar Position Algorithm
	TS1140	TS3300	TS622x	TS3900
	<p>The TwinCAT Management Server enables the central administration of Beckhoff CE controllers. Software updates, for example, can thus be loaded onto controllers in the network from a central location. In addition to operating system updates, device-specific components (PLC boot projects) can also be loaded. By the option of separating known network devices into groups, individual actions can be defined for each group.</p>	<p>With the TwinCAT Scope 2 Beckhoff offers a graphical tool for signal analysis and data collection. Due to the separation of the data logger and viewer it is possible to show the signal processes of multiple systems in the field in a central Scope 2 view. Depending on the system it is possible to browse, for example in the PLC, NC or directly in the connected EtherCAT I/Os, in order to select the corresponding values. Alongside the possibility of long-term recording, various trigger functionalities and cursors are available in the TwinCAT Scope 2.</p>	<p>With TwinCAT EtherCAT Redundancy the TwinCAT EtherCAT master offers the possibility of implementing cable redundancy. From the last logical device a cable is returned back to the master. The TwinCAT System Manager is used for configuration and diagnostics.</p>	<p>With the TwinCAT Solar Position Algorithm it is possible to determine the sun angle using the date, time, geographical longitude and latitude as well as further parameters (depending on the desired accuracy). The function block works with a maximum inaccuracy of $\pm 0.001^\circ$.</p>
	Windows 7/10	Windows 7/10	Windows 7/10, Windows CE	Windows CE
	TwinCAT I/O	TwinCAT I/O	TwinCAT I/O	TwinCAT PLC
	www.beckhoff.com/TS1140	www.beckhoff.com/TS3300	www.beckhoff.com/TS622x	www.beckhoff.com/TS3900

TS4xxx | TwinCAT 2 Supplements, Controller



TwinCAT PLC Controller Toolbox

TwinCAT PLC Temperature Controller

Technical data

TS4100

TS4110

The TwinCAT Controller Toolbox covers all essential blocks for control applications.

- controllers satisfy industrial requirements such as anti-reset windup
- simple basic controllers (P, I, D)
- complex controllers (PI, PID, switching controllers)
- filter blocks
- control value generators (limiters, PWM)
- ramp and signal generator blocks

Temperature controllers can be simply implemented using TwinCAT Temperature Controller. Simple commissioning through self-adjustment of the controller (auto-tuning) is included.

- automatic and manual operation with shock-free set up
- control value analog or pulse-width modulated signal
- tolerance monitoring, absolute value monitoring
- scalable reaction to sensor error and heating power faults
- limitation of set and control values
- optional ramping of the set value
- optional start-up phase for the setpoint variables
- industrial PID controller as base control algorithm inside the temperature controller

Target system

Windows 7/10, Windows CE

Windows 7/10, Windows CE

Min. TwinCAT level

TwinCAT PLC

TwinCAT PLC

Further information

www.beckhoff.com/TS4100

www.beckhoff.com/TS4110

TS5xxx | TwinCAT 2 Supplements, Motion



	TwinCAT PLC Motion Control XFC	TwinCAT PLC Hydraulic Positioning
Technical data	TS5065	TS5810
	<p>eXtreme Fast Control (XFC) is the technique that enables very fast, temporally high-precision reactions using EtherCAT, special I/O terminals and TwinCAT on the PC. Using EtherCAT Distributed Clocks (DC) and appropriate terminals, distributed latches or cam controllers can be implemented simply in this way.</p> <ul style="list-style-type: none"> – function blocks for the high-precision acquisition and switching of digital signals related to axis positions – EtherCAT Distributed Clocks with the timestamp-based EtherCAT EL1252, EL2252 or EL2262 input and output terminals – blocks for the conversion of DC time to position and vice versa – convenient PLCopen-compliant TouchProbe block – digital cam controller as PLCopen-compliant block 	<p>Algorithms for the control and positioning of hydraulic axes are combined in TwinCAT Hydraulic Positioning and are available as PLCopen-compliant PLC blocks.</p> <ul style="list-style-type: none"> – programming via certified PLCopen motion blocks – set value generators especially for hydraulic applications – coupling of the set value generators to NC PTP/NC I/CNC possible – free profile design through connection of customer-specific set value generators – support of non-linear gears – multiple-segmented movements (blending) – support of all necessary interfaces via Beckhoff I/O system – support of all common fieldbus systems – all process values in physical units, determination of force true to surface – support of standardised and application-specific controllers for position, force/pressure – bumpless transfer of force and position control – automatic identification of valve characteristics and axis properties – linearisation of characteristic curves – maintenance and commissioning tool for <ul style="list-style-type: none"> – axis parameterisation – valve parameterisation incl. characteristic curves – controller parameterisation – triggering of test commands – display of actual values
Target system	Windows 7/10, Windows CE	Windows 7/10, Windows CE
Min. TwinCAT level	TwinCAT NC PTP	TwinCAT PLC
Further information	www.beckhoff.com/TS5065	www.beckhoff.com/TS5810

TSxxxx | TwinCAT 2 Supplements, Motion



TwinCAT NC FIFO Axes

TwinCAT NC Flying Saw

TwinCAT PLC Remote Synchronisation

Technical data

TS5060

TS5055

TS5066

Using TwinCAT NC FIFO Axes, externally generated set position values can be output to the axes in the form of a velocity pre-control. The set value generation is designed in such a way that both the set position and the set velocity are determined as the FIFO inputs are worked through in sequence. It is also possible, if necessary, to interpolate between two neighbouring FIFO inputs.

TwinCAT NC Flying Saw implements the coupling of a slave axis to a master axis in a certain synchronous position (flying saw). PLC function blocks enable coupling and uncoupling as well as parameterisation.

- The master axis can be a real axis, a virtual axis, or some other external source of actual values.
- synchronisation of the slave axis from any motion situation (stop, forward or reverse travel) with the master in motion
- simple synchronisation with the master velocity
- precise position synchronisation with the master axis (velocity and position)
- synchronous velocity can be set via a coupling factor
- optional return prevention as additional safety function
- superimposed section compensation during the synchronous phase for dynamic position correction

Due to the increasing use of decentralised controllers, time synchronisation of different systems is becoming an increasingly important issue. The implementation of cyclically-sent information on systems without identical timebase leads to a beat effect. These manifest themselves for example as periodic operational faults in the synchronisation of drives, whose axis information is transferred via network.

The TwinCAT PLC Remote Synchronisation library offers options for general time synchronisation of information with distributed systems as well as special techniques for synchronising NC axes ("distributed axes").

Target system

Windows 7/10, Windows CE

Windows 7/10, Windows CE

Windows 7/10, Windows CE

Min. TwinCAT level

TwinCAT NC PTP

TwinCAT NC PTP

TwinCAT PLC

Further information

www.beckhoff.com/TS5060
www.beckhoff.com/TS5055
www.beckhoff.com/TS5066

	TwinCAT NC Camming	TwinCAT Cam Design Tool	TwinCAT Digital Cam Server
	TS5050	TS1510	TS5800
	<p>TwinCAT NC Camming (cam plate) is a non-linear relationship between a master and a slave axis. The camming package offers various options for the storage of cam plates. Convenient PLC blocks enable the loading, coupling and uncoupling of cam plates. It is possible to load new cam plates or to modify cam plates during operation. The TwinCAT Cam Design Tool offers support for the creation of the cam plates.</p> <ul style="list-style-type: none"> – position tables with master interpolation points and corresponding slave positions; interpolation between the points is done linearly or by splines – motion function table describing a cam plate via motion laws according to VDI guideline 2143 – cyclic or linear processing – cam plate with offset and scale, can be modified on the master or slave side – high flexibility through online change of the motion functions 	<p>The TwinCAT CAM Design Tool allows the generation and modification of cam plates with the aid of a graphical editor. These are composed of sections of laws of motion such as modified sine waves, harmonic combinations, or of various polynomial functions. Velocity, acceleration and jerk are displayed in addition to the slave position. The generated cam plates can be transferred to the NC as tables with specified step size or as so-called motion functions.</p>	<p>The TwinCAT Digital Cam Server is a fast cam controller with monitoring for various fieldbuses. The cams are configured in TwinCAT Engineering.</p> <ul style="list-style-type: none"> – high-performance fieldbus-independent cam controller with many functions – up to 320 outputs – up to 180 cams per output – path-path cams, path-time cams, brake cams – dynamic speed correction – measurement and monitoring of rotary speed
	Windows 7/10, Windows CE	Windows 7/10	Windows 7/10, Windows CE
	TwinCAT NC PTP	TwinCAT NC PTP	TwinCAT NC PTP
	www.beckhoff.com/TS5050	www.beckhoff.com/TS1510	www.beckhoff.com/TS5800

TSxxxx | TwinCAT 2 Supplements, Motion



TwinCAT Valve Diagram Editor

TwinCAT Kinematic Transformation

Technical data

TS1500

The TwinCAT Valve Diagram Editor allows the linearisation of non-linear curves of hydraulic valves with the aid of a graphical editor. On the basis of a few base points, straight lines or 5th degree polynomials can be determined that connect the points. The characteristic linearisation curve thus determined can be loaded into the TwinCAT NC real-time and taken into account when the voltages are output in the drive.

TS511x

Various robot types kinematics can be realised using TwinCAT Kinematic Transformation. The programming of the robot movements takes place in Cartesian coordinates using either DIN 66025 instructions or the PLCopen-compliant blocks from the PLC. An integrated dynamic pre-control ensures high precision of the movement even at high accelerations and speeds. Configuration takes place in the TwinCAT Engineering Interface Server.

- supports various parallel and also serial kinematics, e.g. for pick-and-place tasks
- supports the programming of interpolating movements in G-code (DIN 66025)
- alternatively, standard PTP and cam plate applications can be realised
- simple programming in the Cartesian coordinate system
- automatic calculation of the inverse kinematic for the relevant motor positions
- kinematics configured in the TwinCAT Engineering Interface Server; in addition to the type (e.g. delta), the bar lengths and offsets must also be parameterised
- mass and mass inertia values can be specified for dynamic pre-control
- tracking with the aid of flying saw and cam plates for synchronisation (e.g. to conveyor belts)
- optimised for the Beckhoff Servo Drives from the AX5000 series
- The following kinematics are integrated:
 - cartesian portals
 - 2D parallel kinematics
 - shear kinematics
 - crane and roll kinematics
 - 3D Delta
 - SCARA
- separated in different product levels, depending on the complexity of the kinematics

Target system

Windows 7/10

Windows 7/10, Windows CE

Min. TwinCAT level

TwinCAT NC PTP

TwinCAT NC I

Further information

www.beckhoff.com/TS1500

www.beckhoff.com/TS511x

TS6xxx | TwinCAT 2 Supplements, Communication



	TwinCAT PLC Serial Communication	TwinCAT PLC Serial Communication 3964R/RK512	TwinCAT PLC Modbus RTU
Technical data	TS6340	TS6341	TS6255
	<p>TwinCAT Serial Communication implements communication with serial devices such as printers, bar code scanners, etc. The serial interface of the PC and the serial Beckhoff EL6xxx EtherCAT Terminals and and KL6xxx Bus Terminals are supported.</p> <p>Via the network-based fieldbus system from Beckhoff the serial terminals can be accessed over a distance of up to 100 m. In addition, it is possible to address virtual COM interfaces of the operating system from the PLC.</p>	<p>Serial communication via the 3964R or the RK512 protocols is implemented via the TwinCAT PLC Serial Communication 3964R/RK512 software library. The PCs serial interface and the Beckhoff KL6xxx serial Bus Terminals are supported. The library also contains the TwinCAT PLC Serial Communication library.</p> <p>The TwinCAT Serial Communication RK512 PLC library supports transmission and reception of PLC variables of any type. Data up to 128 bytes long is transferred transparently in the form of data blocks. To ensure secure data transmission, the 3964R protocol is used underneath the RK512 protocol.</p>	<p>TwinCAT Modbus RTU implements Modbus RTU communication via a serial RS232, RS422 or RS485 interface and is thus suitable both for the PC/CX interfaces and for operation with the KL6xxx serial Bus Terminals. It contains function blocks for master and slave operating mode with simple configuration.</p>
Target system	Windows 7/10, Windows CE	Windows 7/10, Windows CE	Windows 7/10, Windows CE
Min. TwinCAT level	TwinCAT PLC	TwinCAT PLC	TwinCAT PLC
Further information	www.beckhoff.com/TS6340	www.beckhoff.com/TS6341	www.beckhoff.com/TS6255

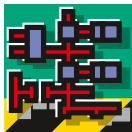
TS6xxx | TwinCAT 2 Supplements, Communication



	TwinCAT Modbus TCP Server	TwinCAT Modbus TCP Server CE	TwinCAT PLC IEC 60870-5-10x	TwinCAT PLC IEC 60870-5-104 CE
Technical data	TS6250	TS6250-0030	TS650x	TS650x-0030
	<p>TwinCAT Modbus TCP Server acts as gateway between Modbus TCP devices and TwinCAT runtime systems. It provides both server and client functionalities. In server mode the memory areas of several TwinCAT runtime systems can be mapped directly to the Modbus memory areas. A PLC library is provided for implementing a Modbus TCP client, so that the memory areas of a Modbus TCP device can be accessed.</p>	<p>TwinCAT Modbus TCP Server CE acts as gateway between Modbus TCP devices and TwinCAT runtime systems. It provides both server and client functionalities. In server mode the memory areas of several TwinCAT runtime systems can be mapped directly to the Modbus memory areas. A PLC library is provided for implementing a Modbus TCP client, so that the memory areas of a Modbus TCP device can be accessed.</p>	<p>The TS650x enable IEC 60870-5-10x-compliant communication from the TwinCAT PLC. Both master and slave libraries are available.</p> <p>PLC library for the realisation of masters for</p> <ul style="list-style-type: none"> – IEC 60870-5-101 – IEC 60870-5-102 – IEC 60870-5-103 – IEC 60870-5-104 <p>PLC library for the realisation of slaves for</p> <ul style="list-style-type: none"> – IEC 60870-5-101 – IEC 60870-5-104 	<p>The TS650x-0030 enable IEC 60870-5-10x-compliant communication from the TwinCAT PLC. Both master and slave libraries are available for applications under Windows CE.</p> <p>PLC library for the realisation of masters for</p> <ul style="list-style-type: none"> – IEC 60870-5-104 <p>PLC library for the realisation of slaves for</p> <ul style="list-style-type: none"> – IEC 60870-5-104
Target system	Windows 7/10	Windows CE	Windows 7/10, Windows CE	Windows CE
Min. TwinCAT level	TwinCAT PLC	TwinCAT PLC	TwinCAT PLC	TwinCAT PLC
Further information	www.beckhoff.com/TS6250	www.beckhoff.com/TS6250-0030	www.beckhoff.com/TS650x	www.beckhoff.com/TS650x-0030

	TwinCAT PLC IEC 61850 Server	TwinCAT PLC IEC 61400-25 Server	TwinCAT DriveTop Server	TwinCAT DriveCOM OPC Server
	TS6511	TS6509	TS6371	TS6370
	<p>IEC 61850 defines a communication protocol which is used particularly in electrical switchgears. Such standardised communication can be implemented using the PLC library TwinCAT IEC 61850 Server. The communication stack developed by Beckhoff is based on the MMS protocol and as well as the basic IEC 61850 standard also supports the related specialisations. For easy configuration the TwinCAT Telecontrol Configurator can be used, which is delivered with the PLC library. Thanks to the created configuration a PLC code export can be carried out, which can be integrated into existing PLC projects.</p>	<p>IEC 61400-25 is a specialisation of IEC 61850 for wind turbines. The data model is especially extended for objects, such as, for example wind turbine generators. The TwinCAT Telecontrol Configurator can also be used here. Beside PLC codes it can also generate TwinCAT Scope 2 configurations.</p>	<p>The TwinCAT DriveTop Server is a communication server for linking the Indramat DriveTop Tools to TwinCAT. This means that the DriveTop tool can be used for configuration and commissioning of Indramat drives. Configuration with a number of SERCOS rings is also supported.</p>	<p>The DriveCOM user organisation has set itself the aim of facilitating uniform, standardised communication between configuration, commissioning and diagnostic tools from different drive manufacturers, independent of the fieldbus. The TwinCAT DriveCOM OPC Server offers precisely this type of communication connection. It enables data flow from the engineering tool to the drive, independent of the fieldbus. Based on the network-capable ADS TwinCAT communication system, distributed drives can be configured and diagnosed from a central point.</p> <p>The TwinCAT DriveCOM OPC Server requires a subordinate TwinCAT system with an FCxxx-type Beckhoff fieldbus card. The TwinCAT DriveCOM configurator finds supported drives in the TwinCAT configuration and makes this information available for the engineering tool. The configurator features an automation interface and can therefore be operated remotely by other tools.</p>
	Windows 7/10, Windows CE	Windows 7/10, Windows CE	Windows 7/10	Windows 7/10
	TwinCAT PLC	TwinCAT PLC	TwinCAT NC PTP	TwinCAT NC PTP
	www.beckhoff.com/TS6511	www.beckhoff.com/TS6509	www.beckhoff.com/TS6371	www.beckhoff.com/TS6370

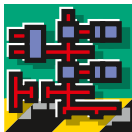
TS6xxx | TwinCAT 2 Supplements, Communication



	TwinCAT OPC Server	TwinCAT OPC UA Server	TwinCAT OPC UA Server CE
Technical data	TS6120	TS6100	TS6100-0030
	<p>The TwinCAT OPC Server is a standardised data exchange interface. It supports the DataAccess (DA) and XML DA specifications. DataAccess is based on the Microsoft COM technology and provides data for the client. The OPC XML DA specification enables data exchange through XML via HTTP. Configuration of the server is carried out in a configuration tool or via XML.</p>	<p>OPC Unified Architecture (IEC 62541) is the newest technology generation of the OPC Foundation for the secure, reliable and manufacturer-neutral transport of raw data and pre-processed information from the manufacturing level into the production planning or ERP system. With OPC UA, all desired information is available to every authorised application and every authorised person at any time and in any place.</p> <p>TwinCAT OPC UA Server</p> <ul style="list-style-type: none"> – certified in the OPC Laboratory, Europe – functions: DataAccess/ HistoricalAccess/Alarm&Condition – PLC blocks for diagnosis and restart – intermediate storage of data on the server: interruption of the communication connection does not lead to loss of data <p>TwinCAT OPC UA Client</p> <ul style="list-style-type: none"> – PLC function blocks for UA DataAccess – Demo UA client for diagnostic purposes 	<p>OPC Unified Architecture (IEC 62541) is the newest technology generation of the OPC Foundation for the secure, reliable and manufacturer-neutral transport of raw data and pre-processed information from the manufacturing level into the production planning or ERP system. With OPC UA, all desired information is available to every authorised application and every authorised person at any time and in any place.</p> <p>TwinCAT OPC UA Server CE</p> <ul style="list-style-type: none"> – certified in the OPC Laboratory, Europe – functions: DataAccess/ HistoricalAccess/Alarm&Condition – PLC blocks for diagnosis and restart – intermediate storage of data on the server: interruption of the communication connection does not lead to loss of data <p>TwinCAT OPC UA Client CE</p> <ul style="list-style-type: none"> – PLC function blocks for UA DataAccess – Demo UA client for diagnostic purposes
Target system	Windows NT/2000/XP	Windows 7/10	Windows CE
Min. TwinCAT level	TwinCAT I/O	TwinCAT I/O	TwinCAT I/O
Further information	www.beckhoff.com/TS6120	www.beckhoff.com/TS6100	www.beckhoff.com/TS6100-0030

	TwinCAT SMS/SMTP Server	TwinCAT SMS/SMTP Server CE	TwinCAT TCP/IP Server	TwinCAT TCP/IP Server CE
	TS6350	TS6350-0030	TS6310	TS6310-0030
	<p>TwinCAT SMS/SMTP Server enables the transmission of SMS messages or e-mails using PLC function blocks. The latter also allows the transmission of file attachments, HTML texts and the setting of message priorities. Support for STARTTLS/SSL enables encrypted e-mail communication to be configured.</p>	<p>TwinCAT SMS/SMTP Server CE enables the transmission of SMS messages or e-mails using PLC function blocks. The latter also allows the transmission of file attachments, HTML texts and the setting of message priorities. Support for STARTTLS/SSL enables encrypted e-mail communication to be configured.</p>	<p>TwinCAT TCP/IP Server enables the implementation and realisation of one or several TCP/IP servers and/or clients within the TwinCAT PLC. Corresponding blocks exist for the establishment/disconnection of communication as well as for the pure exchange of data (send and receive). The SNMP library provided enables messages to be sent (traps) and queries to be answered (get) for monitoring TwinCAT runtimes.</p>	<p>TwinCAT TCP/IP Server CE enables the implementation and realisation of one or several TCP/IP servers and/or clients within the TwinCAT PLC. Corresponding blocks exist for the establishment/disconnection of communication as well as for the pure exchange of data (send and receive). The SNMP library provided enables messages to be sent (traps) and queries to be answered (get) for monitoring TwinCAT runtimes.</p>
	Windows 7/10	Windows CE	Windows 7/10	Windows CE
	TwinCAT PLC	TwinCAT PLC	TwinCAT PLC	TwinCAT PLC
	www.beckhoff.com/TS6350	www.beckhoff.com/TS6350-0030	www.beckhoff.com/TS6310	www.beckhoff.com/TS6310-0030

TS6xxx | TwinCAT 2 Supplements, Communication



	TwinCAT PROFINET RT Controller	TwinCAT PROFINET RT Device	TwinCAT EtherNet/IP Slave	TwinCAT EtherNet/IP Slave CE
Technical data	TS6271	TS6270	TS6280	TS6280-0030
	<p>The TwinCAT PROFINET RT Controller (master) is a supplement that turns any PC-based controller with an Intel® chipset and the real-time Ethernet driver developed by Beckhoff into a PROFINET RT controller. An Ethernet interface becomes a PROFINET controller by enabling a key. The PROFINET supplement is part of the TwinCAT installation and can be operated without key in Config mode. It runs on PCs and Embedded PCs and can be used from TwinCAT 2.11 R3. In conjunction with the EL6631 PROFINET terminal for the EtherCAT I/O system, PROFINET can also be tunnelled via EtherCAT. In this case the supplement is not required. In this way, any EtherCAT network can exchange data with PROFINET RT devices.</p>	<p>The TwinCAT PROFINET RT Device (slave) is a supplement that turns any PC-based controller with an Intel® chipset and the real-time Ethernet driver developed by Beckhoff into a PROFINET RT device. By installing the supplement, an Ethernet interface becomes a PROFINET slave. The supplement can be used on PCs and Embedded PCs. PROFINET can also be tunnelled via EtherCAT in conjunction with the EL6631-0010 PROFINET terminal for the EtherCAT I/O system. In this way, any EtherCAT network can exchange data with PROFINET IO controllers. If the EL6631-0010 is used, the TwinCAT PROFINET RT controller supplement is not required.</p>	<p>The TwinCAT EtherNet/IP Slave is a supplement turns any PC-based controller with an Intel® chipset and the real-time Ethernet driver developed by Beckhoff into an EtherNet/IP slave. By installing the supplement, the Ethernet interface becomes an EtherNet/IP slave. This product can be used on all PC controllers and Embedded PC controllers running Windows XP and Windows CE.</p>	<p>The TwinCAT EtherNet/IP Slave is a supplement turns any PC-based controller with an Intel® chipset and the real-time Ethernet driver developed by Beckhoff into an EtherNet/IP slave. By installing the supplement, the Ethernet interface becomes an EtherNet/IP slave. This product can be used on all PC controllers and Embedded PC controllers running Windows CE.</p>
Target system	Windows 7/10, Windows CE	Windows 7/10, Windows CE	Windows 7/10, Windows CE	Windows CE
Min. TwinCAT level	TwinCAT I/O	TwinCAT I/O	TwinCAT I/O	TwinCAT I/O
Further information	www.beckhoff.com/TS6271	www.beckhoff.com/TS6270	www.beckhoff.com/TS6280	www.beckhoff.com/TS6280

	TwinCAT Virtual Serial COM Driver	TwinCAT FTP Client	TwinCAT PLC RFID Reader Communication	TwinCAT PLC S5/S7 Communication
	TS6360	TS6300	TS6600	TS6610
	<p>TwinCAT Virtual Serial COM Driver allows the EL60xx EtherCAT Terminals or EP6002 EtherCAT Box modules to be integrated into Windows CE or Windows as normal serial interfaces. The computer on which a serial interface is to be generated for it is defined individually for each EL60xx/EP6002. Access to the device connected to the terminal takes place via Windows API for serial interfaces.</p>	<p>TwinCAT FTP Client enables simple access from the PLC to several FTP servers with the aid of various function blocks. This way, files can be loaded to or from a server after the establishment of a connection (optional with authentication). Additional function blocks allow files or directories to be searched for, created, deleted and renamed.</p>	<p>TwinCAT PLC RFID Reader Communication allows various RFID readers to be addressed via a serial interface. The new TwinCAT RFID reader library offers a general abstract interface that can be used for all readers. The configuration can easily be adapted to a specific reader.</p>	<p>TwinCAT PLC S5/S7 Communication allows the simple connection of TwinCAT to an S5 or S7 controller. The data blocks, flags, inputs, outputs, counters and timers of an S5 or S7 controller can be accessed using function blocks. The communication takes place using TCP/IP.</p>
	Windows 7/10, Windows CE	Windows 7/10, Windows CE	Windows 7/10, Windows CE	Windows 7/10, Windows CE
	TwinCAT I/O	TwinCAT PLC	TwinCAT PLC	TwinCAT PLC
	www.beckhoff.com/TS6360	www.beckhoff.com/TS6300	www.beckhoff.com/TS6600	www.beckhoff.com/TS6610

TS8xxx | TwinCAT 2 Supplements, Building Automation



	TwinCAT PLC HVAC	TwinCAT PLC Building Automation Basic	TwinCAT BACnet/IP
Technical data	TS8000	TS8010	TS8020
	<p>TwinCAT PLC HVAC is an extensive TwinCAT PLC library with function blocks for automating all building services. In addition to conventional HVAC functions relating to energy generation and distribution, it also includes room automation functions for lighting, shading and air-conditioning.</p>	<p>The TwinCAT PLC Building Automation Basic software library allows the implementation of all functions which are important for room automation. Among these are lighting (constant light control, light dimmer...), facade control, scaling functions, filter blocks, timer functions and peak load limiter for energy optimisation.</p>	<p>BACnet (Building Automation Control Network) is a standardised, manufacturer-independent communication protocol for building automation. Areas of application include HVAC, lighting control, safety and fire alarm technology. Implementation of this protocol is carried out as server as well as client and can be run on all Beckhoff Industrial PCs and Embedded PCs. All services of a BBC (BACnet Building Controller) are supported such as for example, common data use (DS), alarm and event processing (AE), time-tabling (SCHED), trend recording (T) as well as device and network management (DM).</p> <p>BACnet revision 12 Embedded PCs corresponding to the ISO 16484-5:2012 standard:</p> <p>Ordering information CX8091 and CX9020 with BACnet/IP image (license key included)</p> <ul style="list-style-type: none"> – ordering number of the CX8091 (no further ordering option necessary) (see page 203) – ordering number of the CX9020-xxxx (see page 210) + CX1800-1052 <p>Ordering information CX5010/CX5020 (see page 220)</p> <ul style="list-style-type: none"> – CX50x0 with Windows CE Ordering number of the CX + CX1800-1052 (BACnet/IP image, license key included) – CX50x0 with Windows XPe Ordering number of the CX + supplement TwinCAT BACnet/IP (TS8020, license key necessary), TwinCAT 2.11 R3 <p>BACnet revision 6 Embedded PCs corresponding to the ISO 16484-5:2010 standard:</p> <p>Ordering information CX5010/CX5020 (see page 220)</p> <ul style="list-style-type: none"> – CX50x0 with Windows CE Ordering number of the CX + CX1800-1044 (BACnet/IP image, license key included) – CX50x0 with Windows XPe Ordering number of the CX + Supplement TwinCAT BACnet/IP (TS8020, license key necessary), TwinCAT 2.11 R3
Target system	Windows 7/10, Windows CE	Windows 7/10, Windows CE	Windows 7/10, Windows CE
Min. TwinCAT level	TwinCAT PLC	TwinCAT PLC	TwinCAT PLC
Further information	www.beckhoff.com/TS8000	www.beckhoff.com/TS8010	www.beckhoff.com/TS8020

	TwinCAT FIAS Server	TwinCAT Crestron Server	TwinCAT Building Automation	TwinCAT Building Automation Framework
	TS8035	TS8036	TS8040	TS8100
	<p>The FIAS (Fidelio Interface and Application Specification) interface is a world-leader in hotel management software. The TwinCAT FIAS Server is a software package for communication between TwinCAT PLC and a system with a FIAS standard interface. The communication takes place using TCP/IP. The connection of hotel management software and automation system helps to optimise the energy consumption: e.g. the climate control is automatically adjusted for an unoccupied room; if there is strong sunlight the shading is automatically activated.</p>	<p>Crestron is one of the leading manufacturers of AV control systems. The TwinCAT Crestron Server enables communication between a TwinCAT PLC and a Crestron control. Both systems are connected by Ethernet. SIMPL user macros are available for programming the Crestron controller. The required function blocks are included in the TwinCAT PLC library. Read and write access to the other device is available from the Crestron controller and the TwinCAT PLC.</p>	<p>TwinCAT Building Automation is a software package that covers all technical building automation services. In addition to modules for conventional HVAC applications it also covers room automation including lighting, air-conditioning and shading. Essentially, the software package consists of three components:</p> <p>TwinCAT BA PLC Libraries The TwinCAT BA PLC libraries contain basic functions for control, signal processing, special mathematical functions, alarm processing and general system functions.</p> <p>TwinCAT BA PLC Templates TwinCAT BA PLC templates consist of ready-made TwinCAT program blocks for sensors, actuators, complete modules for system components and for entire heating, ventilation and air-conditioning system installations/plants.</p> <p>TwinCAT BA Project Builder The TwinCAT BA Project Builder is a configuration program for defining system components and assigning them to individual templates. Based on this information, the project files for TwinCAT PLC Control functions and the TwinCAT System Manager can be generated for each controller.</p>	<p>The TwinCAT Building Automation Framework includes a configuration program (TwinCAT Building Automation Manager) and a PLC library.</p> <p>The PLC library is configured such that a complete application program with the main room automation functions is available, including lighting, shading, climate control, time switching functions, scene management, weather stations and energy consumption monitoring.</p> <p>All actuators and sensors are registered in the TwinCAT Building Automation Manager, grouped together and linked with the Bus Terminals. The logical ordering of sensors to actuators is also done in the TwinCAT Building Automation Manager. From this information the configuration program generates and activates the I/O links for all devices entered in the system and writes all necessary parameters in the controller.</p>
	Windows 7/10, Windows CE	Windows 7/10, Windows CE	Windows 7/10, Windows CE	Windows 7/10, Windows CE
	TwinCAT PLC	TwinCAT PLC	TwinCAT PLC	TwinCAT PLC
	www.beckhoff.com/TS8035	www.beckhoff.com/TS8036	www.beckhoff.com/TS8040	www.beckhoff.com/TS8100