BECKHOFF

TwinCAT®

Version **3**

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**

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.
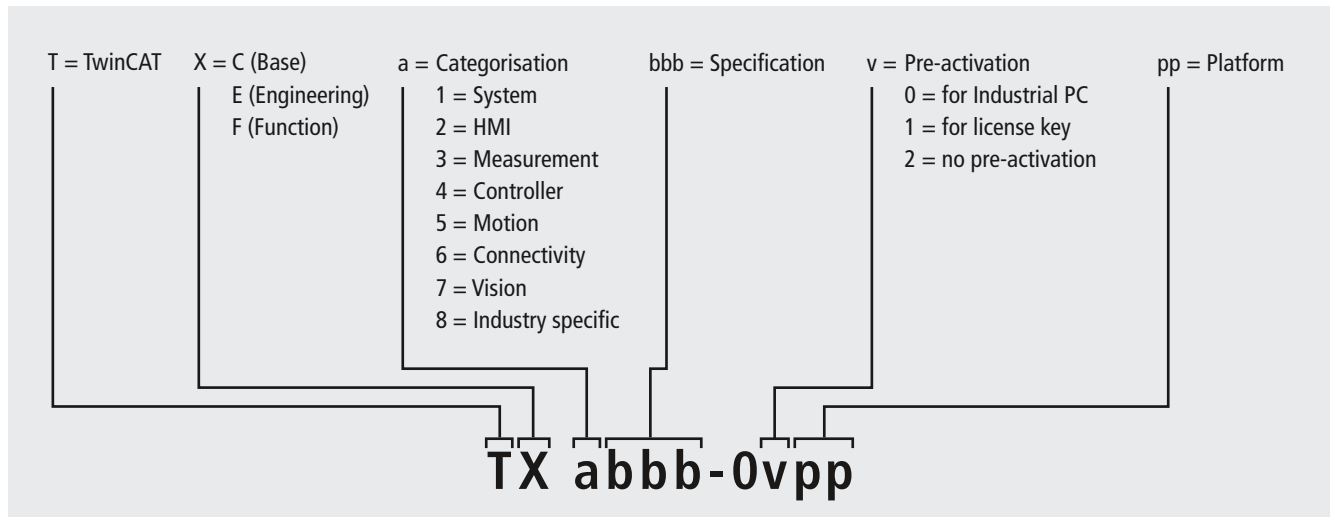
TwinCAT 3 – Platforms

Example of a TwinCAT 3 performance class:
C6920 | Control cabinet Industrial PC with Intel® Core™ i3, 2 cores, processor
TwinCAT 3 performance class: **(TC3: 60)**, corresponds to the TwinCAT 3 platform
P60 Mid Performance

P10
Basic

ARM Cortex™-M7, 400 MHz

P20
Economy

ARM Cortex™-A9, 800 MHz

P30
Economy Plus

ARM Cortex™-A8, 1 GHz

P40
Performance

Intel Atom®

P50
Performance Plus

Intel® Celeron® ULV, Celeron®, Pentium®, Atom® (4 Cores)

P60
Mid Performance

Intel® Core™ i3

P70
High Performance

Intel® Core™ i5

P80
Very High Performance

Intel® Core™ i7

P81
Very High Performance

Many-core, 5…8 Cores

P82
Very High Performance

Many-core, 9…16 Cores

P83
Very High Performance

Many-core, 17…32 Cores

P84
Very High Performance

Many-core, 33…64 Cores

P90
Other

1…4 Cores

P91
Other

Many-core, 5…8 Cores

P92
Other

Many-core, 9…16 Cores

P93
Other

Many-core, 17…32 Cores

P94
Other

Many-core, 33…64 Cores

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

TwinCAT 3 designation system

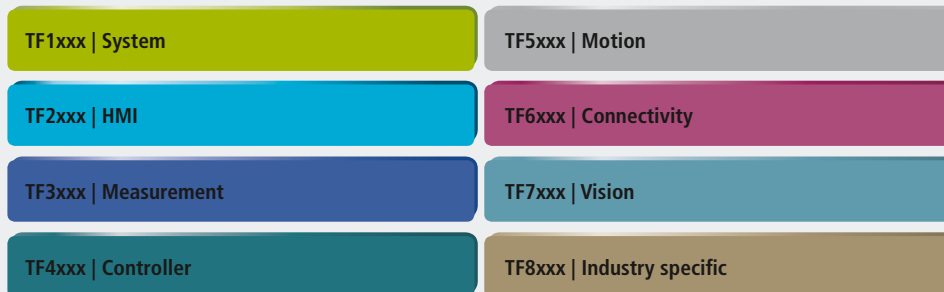| T = TwinCAT	X = C (Base)	a = Categorisation	bbb = Specification	v = Pre-activation	pp = Platform
	E (Engineering)	1 = System		0 = for Industrial PC	
	F (Function)	2 = HMI		1 = for license key	
		3 = Measurement		2 = no pre-activation	
		4 = Controller			
		5 = Motion			
		6 = Connectivity			
		7 = Vision			
		8 = Industry specific			

TX abbb-0vpp

TwinCAT 3 – eXtended Automation Engineering (XAE)

TwinCAT 3 – eXtended Automation Runtime (XAR)

Base

TC1220 | TC3 PLC/C++/MATLAB®/Simulink®

TC1210 | TC3 PLC/C++

TC1100 | TC3 I/O

TC1000 | TC3 ADS

TC1270 | TC3 PLC/NC PTP 10/NC I/CNC

TC1260 | TC3 PLC/NC PTP 10/NC I

TC1250 | TC3 PLC/NC PTP 10

TC1200 | TC3 PLC

TC1100 | TC3 I/O

TC1000 | TC3 ADS

TC1320 | TC3 C++/MATLAB®/Simulink®

TC1300 | TC3 C++

TC1100 | TC3 I/O

TC1000 | TC3 ADS

Functions

TF1xxx | System

TF2xxx | HMI

TF3xxx | Measurement

TF4xxx | Controller

TF5xxx | Motion

TF6xxx | Connectivity

TF7xxx | Vision

TF8xxx | Industry specific

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

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TwinCAT 3 | Engineering

TE1000 | **TC3 Engineering**	TwinCAT 3 engineering environment	508
TE1010 | **TC3 Realtime Monitor**	tool for precise diagnostics and optimisation of the runtime behaviour of tasks in the TwinCAT 3 runtime	508
TE1111 | **TC3 EtherCAT Simulation**	easy configurations of simulation environments with several EtherCAT slaves	508
TE1120 | **TC3 XCAD Interface**	transfer of existing engineering results from ECAD tools	509
TE1130 | **TC3 CAD Simulation Interface**	link between TwinCAT and a 3D CAD system for SiL simulation	509
TE1200 | **TC3 PLC Static Analysis**	analysis tool that tests PLC software on the basis of coding rules	509
TE1300 | **TC3 Scope View Professional**	software oscilloscope for the graphical display of data captured from several target systems	510
TE1310 | **TC3 Filter Designer**	graphic engineering tool for determining coefficient digital filters	510
TE1400 | **TC3 Simulink® Target**	TwinCAT target for Simulink® for generating TwinCAT 3 modules	510
TE1401 | **TC3 MATLAB® Target**	TwinCAT target for MATLAB® for generating TwinCAT 3 modules	511
TE1410 | **TC3 MATLAB®/Simulink® Interface**	communication interface between MATLAB®/Simulink® and the TwinCAT 3 runtime	511
TE1420 | **TC3 Target for FMI**	interface for simulation tools that support the Functional Mockup Interface (FMI)	511
TE1500 | **TC3 Valve Diagram Editor**	graphical tool for designing the characteristic curve of a hydraulic valve	512
TE1510 | **TC3 Cam Design Tool**	graphic design tool for electronic cam plates	512
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	512
TE2000 | **TC3 HMI Engineering**	tool for developing platform-independent user interfaces	513
TE3500 | **TC3 Analytics Workbench**	complete solution for 24/7 monitoring of machines and systems incl. visualisation on analysis dashboards	513
TE3520 | **TC3 Analytics Service Tool**	process data analysis tool for commissioning and service technicians	513
TE5910 | **TC3 Motion Designer**	TC3 Motion Designer for drive dimensioning	482
TE5950 | **TC3 Drive Manager 2**	for commissioning the AX8000 multi-axis servo system or the I/O components EL72xx, EP72xx and EJ72xx	484

TwinCAT 3 | Base

TC1000 | **TC3 ADS**	TwinCAT 3 ADS	514
TC1100 | **TC3 I/O**	TwinCAT 3 I/O	514
TC1200 | **TC3 PLC**	TwinCAT 3 PLC	515
TC1210 | **TC3 PLC/C++**	TwinCAT 3 PLC and C++	515
TC1220 | **TC3 PLC/C++/MATLAB®/Simulink®**	TwinCAT 3 PLC, C++ and modules generated in MATLAB®/Simulink®	515
TC1250 | **TC3 PLC/NC PTP 10**	TwinCAT 3 PLC and NC PTP 10	516
TC1260 | **TC3 PLC/NC PTP 10/NC I**	TwinCAT 3 PLC, NC PTP 10 and NC I	516
TC1270 | **TC3 PLC/NC PTP 10/NC I/CNC**	TwinCAT 3 PLC, NC PTP 10, NC I and CNC	517
TC1275 | **TC3 PLC/NC PTP 10/NC I/CNC E**	TwinCAT 3 PLC, NC PTP 10, NC I and CNC E	517
TC1300 | **TC3 C++**	TwinCAT 3 C++	517
TC1320 | **TC3 C++/MATLAB®/Simulink®**	TwinCAT 3 C++ and modules generated in MATLAB®/Simulink®	517

We reserve the right to make technical changes.

TwinCAT 3 | Functions

System

TF1800 | **TC3 PLC HMI**	stand-alone tool for displaying visualisations from the PLC development environment	518
TF1810 | **TC3 PLC HMI Web**	display of visualisations from the PLC development environment in a web browser	518
TF1910 | **TC3 UML**	UML (Unified Modeling Language) for modelling of PLC software	518

HMI

TF2000 | **TC3 HMI Server**	modular web server, includes a client connection and a target connection	519
TF20xx | **TC3 HMI Clients Packs**	optional extension of the TC3 HMI Server with up to 100 additional client connections	519
TF20xx | **TC3 HMI Targets Packs**	optional extension of the TC3 HMI Server with up to 100 additional control systems	519
TF2110 | **TC3 HMI OPC UA**	server extension for access to TwinCAT target systems or other controllers via OPC UA	520
TF2200 | **TC3 HMI Extension SDK**	software development kit (C++/.NET) for programming application-specific solutions	520
TF2300 | **TC3 HMI Scope**	software oscilloscope for graphic display of time sequences	520

Measurement

TF3300 | **TC3 Scope Server**	data preparation for visual display in the TwinCAT 3 Scope View	521
TF3500 | **TC3 Analytics Logger**	The TwinCAT Analytics Logger enables the cyclic archiving of the process image.	521
TF3510 | **TC3 Analytics Library**	PLC library used for online or offline analysis in the PLC runtime of the TwinCAT Analytics Workbench	521
TF3520 | **TC3 Analytics Storage Provider**	IoT client: interface to one or more storage facilities for raw and analysis data from various sources	522
TF3550 | **TC3 Analytics Runtime**	runtime "container" for the Analytics application, which was configured and developed in the Analytics Workbench	522
TF356x | **TC3 Analytics Controller Packs**	extension of the TC3 Analytics Workbench for the analysis of up to 128 additional controllers	522
TF3600 | **TC3 Condition Monitoring Level 1**	PLC library for the implementation of Condition Monitoring for machines	523
TF3601 | **TC3 Condition Monitoring Level 2**	expanded PLC library for the implementation of Condition Monitoring for machines	523
TF3650 | **TC3 Power Monitoring**	TwinCAT Power Monitoring PLC library	523
TF3680 | **TC3 Filter**	PLC library for implementing digital filters	523
TF3900 | **TC3 Solar Position Algorithm**	precise calculation of the sun's position	523

Controller

TF4100 | **TC3 Controller Toolbox**	basic controllers (P, I, D), complex controllers (PI, PID), pulse width modulation, ramps, signal generators and filters	524
TF4110 | **TC3 Temperature Controller**	temperature control for monitoring and controlling different temperature ranges	524
TF4500 | **TC3 TwinCAT Speech**	enables the multilingual input and output of queries or information implemented in an industrially compatible way	524

Motion

TF5000 | **TC3 NC PTP 10 Axes**	NC PTP (point-to-point movements) for up to 10 axes	525
TF5010 | **TC3 NC PTP Axes Pack 25**	extension of TwinCAT 3 NC PTP to up to 25 axes	525
TF5020 | **TC3 NC PTP Axes Pack unlimited**	extension of TwinCAT 3 NC PTP to over 25 axes	525
TF5050 | **TC3 NC Camming**	using the TwinCAT NC cam plate functionality (table coupling)	526
TF5055 | **TC3 NC Flying Saw**	implementing flying saw functionality	526
TF5060 | **TC3 NC FIFO Axes**	implementation of a pre-defined user setpoint generator for an NC axis	527
TF5065 | **TC3 Motion Control XFC**	high-precision logging and switching of digital signals in relation to axis positions	527

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TwinCAT 3 | Functions

Motion

TF5100 | **TC3 NC I**	NC I with 3 interpolating axes and 5 additional axes	527
TF5110 | **TC3 Kinematic Transformation L1**	realisation of different kinematic transformations Level 1	528
TF5111 | **TC3 Kinematic Transformation L2**	realisation of different kinematic transformations Level 2	528
TF5112 | **TC3 Kinematic Transformation L3**	realisation of different kinematic transformations Level 3	528
TF5113 | **TC3 Kinematic Transformation L4**	realisation of different kinematic transformations Level 4	528
TF5120 | **TC3 Robotics mxAutomation**	direct communication between the PLC and the KUKA KR C4 robot control	529
TF5130 | **TC3 Robotics uniVAL PLC**	direct communication between the PLC and the CS8C robotics controller from Stäubli	529
TF5200 | **TC3 CNC**	CNC path control software	529
TF5210 | **TC3 CNC E**	CNC path control software export version	530
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	530
TF5230 | **TC3 CNC Channel Pack**	further CNC channel, extension to a maximum of 12 channels, channel synchronisation, axis transfer between channels	530
TF5240 | **TC3 CNC Transformation**	transformation functionality (5-axis functionality)	531
TF5250 | **TC3 CNC HSC Pack**	extending the CNC with HSC technology (high-speed cutting)	531
TF5260 | **TC3 CNC Spline Interpolation**	path programming via splines with programmable spline type, Akima-spline, B-spline	531
TF5270 | **TC3 CNC Virtual NCK Basis**	virtual TwinCAT CNC for simulation in a Windows environment	531
TF5271 | **TC3 CNC Virtual NCK Options**	virtual TwinCAT CNC for simulation in a Windows environment	532
TF5280 | **TC3 CNC Volumetric Compensation**	extension for compensating geometric machine errors based on an ISO-standardised parametric model	532
TF5290 | **TC3 CNC Cutting Plus**	technology package for extending the CNC functionality for cutting operations	532
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	533
TF5420 | **TC3 Motion Pick-and-Place**	for handling tasks carried out by gantry robots and other kinematics	533
TF5800 | **TC3 Digital Cam Server**	fast cam controller with monitoring for various fieldbuses	533
TF5810 | **TC3 Hydraulic Positioning**	algorithms for control and positioning of hydraulic axes	533
TF5850 | **TC3 XTS Extension**	decouples servo algorithms from the hardware and calculates them centrally	486
TF5890 | **TC3 XPlanar**	calculation of the mover position, precise position control, as well as monitoring and diagnostics	488

Connectivity

TF6010 | **TC3 ADS Monitor**	recording and diagnostics functions for the communication of TwinCAT systems	534
TF6020 | **TC3 JSON Data Interface**	interface for the exchange of data in JSON format between the TwinCAT system and custom applications	534
TF6100 | **TC3 OPC UA**	access to TwinCAT in accordance with OPC UA with UA server (DA/HA/AC) and UA client (DA)	534
TF6120 | **TC3 OPC DA**	access to TwinCAT variables, in accordance with OPC DA and OPC XML DA specification	535
TF6220 | **TC3 EtherCAT Redundancy 250**	extension of the TwinCAT EtherCAT master with cable redundancy capability for up to 250 slaves	535
TF6221 | **TC3 EtherCAT Redundancy 250+**	extension of the TwinCAT EtherCAT master with cable redundancy capability for more than 250 slaves	535
TF6225 | **TC3 EtherCAT External Sync**	extension of the TwinCAT EtherCAT master with an option to synchronise the Beckhoff real-time communication with external signals	535
TF6250 | **TC3 Modbus TCP**	communication with Modbus TCP devices (server and client functionality)	535
TF6255 | **TC3 Modbus RTU**	serial communication with Modbus end devices	536
TF6270 | **TC3 PROFINET RT Device**	communication via PROFINET (PROFINET slave)	536
TF6271 | **TC3 PROFINET RT Controller**	communication via PROFINET (PROFINET master)	536
TF6280 | **TC3 Ethernet/IP Slave**	communication via EtherNet/IP (EtherNet/IP slave)	536
TF6281 | **TC3 Ethernet/IP Master**	communication via EtherNet/IP (EtherNet/IP master)	537

TwinCAT 3 | Functions

Connectivity

TF6300 | **TC3 FTP**	easy access from TwinCAT PLC to FTP server	537
TF6310 | **TC3 TCP/IP**	communication via generic TCP/IP server	537
TF6311 | **TC3 TCP/UDP Realtime**	direct access from real-time to Ethernet communication	537
TF6340 | **TC3 Serial Communication**	communication via serial Bus Terminals or PC COM ports with the 3964R and RK512 protocol	537
TF6350 | **TC3 SMS/SMTP**	sending SMS and e-mails from the PLC	538
TF6360 | **TC3 Virtual Serial COM**	virtual serial COM driver for Windows platforms	538
TF6420 | **TC3 Database Server**	accessing databases from the PLC	538
TF6421 | **TC3 XML Server**	read and write access to XML files from the PLC	538
TF6500 | **TC3 IEC 60870-5-10x**	communication according to IEC 60870-101, -102, -103, -104	539
TF6510 | **TC3 IEC 61850/IEC 61400-25**	communication according to IEC 61850 and IEC 61400-25	539
TF6600 | **TC3 RFID Reader Communication**	connection of RFID readers to the TwinCAT PLC	539
TF6610 | **TC3 S5/S7 Communication**	communication with S5/S7 controllers	539
TF6650 | **TC3 DBC File Import for CAN**	reading of DBC file formats	539
TF6701 | **TC3 IoT Communication (MQTT)**	provides basic publisher/subscriber-based data connectivity via MQTT	540
TF6710 | **TC3 IoT Functions**	provides connectivity for cloud-based communication services	540
TF6720 | **TC3 IoT Data Agent**	gateway application for data connectivity between TwinCAT runtime and IoT services	540
TF672x | **TC3 IoT Data Agent Packs**	extension of the TC3 IoT Data Agent for up to 256 additional ADS target runtimes or OPC UA namespaces	540
TF6730 | **TC3 IoT Communicator**	sends process data and push notifications from TwinCAT to smartphones and tablets through a messaging service	541
TF6735 | **TC3 IoT Communicator App**	smartphone and tablet app to receive and visualise live data and push notifications sent from TwinCAT	541
TF6760 | **TC3 IoT HTTPS/REST**	basic functions for HTTP/HTTPS communication in the form of a PLC library providing the ability to address REST APIs as a client	541

Vision

TF700x | **TC3 GigE Vision Connector**	interface for the configuration and integration of GigE Vision cameras directly into TwinCAT	542
TF7100 | **TC3 Vision Base**	extensive PLC library with a large number of widely varying functions and algorithms for solving image processing tasks	542
TF7200 | **TC3 Vision Matching 2D**	extension to find and compare objects based on learned references, contours, feature points or other properties	543
TF7250 | **TC3 Vision Code Reading**	functions for reading various 1D and 2D codes	543
TF7300 | **TC3 Vision Metrology 2D**	detection of edges, holes and circular arcs as well as the determination of lengths, distances, diameters, angles and coordinates, all with sub-pixel accuracy	543

Industry specific

TF8000 | **TC3 HVAC**	library covering all technical systems in building automation	544
TF8010 | **TC3 Building Automation Basic**	executing basic room automation functions	544
TF8020 | **TC3 BACnet**	communication with data networks of building automation and building control systems	544
TF8040 | **TC3 Building Automation**	software package covering all technical building automation services	545
TF8310 | **TC3 Wind Framework**	framework for the development of operational management software for wind turbines	545
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	545

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Product overview TwinCAT 2

TX1200 | **TwinCAT PLC** `548`

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** `549`

TwinCAT PLC	inclusive `548`
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, velocity override, special functions: master/slave cascading, cam plates, electronic gearings, online distance compensation of segments, flying saw

TX1100 | **TwinCAT I/O** `551`

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** `551`

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.

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We reserve the right to make technical changes.

TX1260 | TwinCAT NC I — 549

TwinCAT PLC	inclusive — 548
TwinCAT NC PTP	inclusive — 549
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, zeroshifts, tool compensations, M and H functions
Geometries	straight lines and circular paths in 3D space, circular paths in all main planes, helixes 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

Options	TS511x	**TwinCAT Kinematic Transformation** — 560

TX1270 | TwinCAT CNC — 550

TwinCAT PLC	inclusive — 548
TwinCAT NC PTP	inclusive — 549
TwinCAT NC I	inclusive — 549
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

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TwinCAT 2 Supplements | System

TS1010 | **TwinCAT Eventlogger**	alarm and diagnostic system for logging events which occur in the TwinCAT system	552
TS1110 | **TwinCAT Simulation Manager**	simplified preparation and configuration of a simulation environment	553
TS1120 | **TwinCAT ECAD Import**	importing engineering results from an ECAD program	552
TS1140 | **TwinCAT Management Server**	central administration of Beckhoff CE control systems	555
TS1150 | **TwinCAT Backup**	backing up and restoring files, operating system and TwinCAT settings	553
TS1600 | **TwinCAT Engineering Interface Server**	co-ordinating programming tasks via a central source code management system	552
TS1800 | **TwinCAT PLC HMI**	displaying visualisations created in PLC Control	554
TS1800 | **TwinCAT PLC HMI CE** -0030	displaying visualisations created in PLC Control on Windows CE platforms	554
TS1810 | **TwinCAT PLC HMI Web**	displaying visualisations created in PLC Control in a web browser	554
TS3300 | **TwinCAT Scope 2**	graphical analysis tool for displaying time-continuous signals	555
TS3900 | **TwinCAT Solar Position Algorithm**	precise calculation of the sun's position	555
TS622x | **TwinCAT EtherCAT Redundancy**	extension of the TwinCAT EtherCAT master with cable redundancy capability	555
TS6420 | **TwinCAT Database Server**	accessing databases from the PLC	553
TS6420 | **TwinCAT Database Server CE** -0030	accessing databases from the PLC for Windows CE platforms	554
TS6421 | **TwinCAT XML Data Server**	reading and writing of XML-based data by the PLC	552
TS6421 | **TwinCAT XML Data Server CE** -0030	reading and writing of XML-based data by the PLC for Windows CE platforms	553

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	556
TS4110 | **TwinCAT PLC Temperature Controller**	instanced temperature control function block for monitoring and controlling different temperature ranges	556

TwinCAT 2 Supplements | Motion

TS1500 | **TwinCAT Valve Diagram Editor**	graphical tool for designing the characteristic curve of a hydraulic valve	560
TS1510 | **TwinCAT Cam Design Tool**	graphic design tool for electronic cam plates	559
TS5050 | **TwinCAT NC Camming**	using the TwinCAT NC cam plate functionality (table coupling)	559
TS5055 | **TwinCAT NC Flying Saw**	implementing flying saw functionality	558
TS5060 | **TwinCAT NC FIFO Axes**	implementation of a pre-defined user setpoint generator for an NC axis	558
TS5065 | **TwinCAT PLC Motion Control XFC**	high-precision logging and switching of digital signals in relation to axis positions	557
TS5066 | **TwinCAT PLC Remote Synchronisation**	remote synchronisation	558
TS511x | **TwinCAT Kinematic Transformation**	implementation of different kinematic transformations for TwinCAT PTP or TwinCAT NC I	560
TS5800 | **TwinCAT Digital Cam Server**	software implementation of fast cam controller	559
TS5810 | **TwinCAT PLC Hydraulic Positioning**	control and adjustment of hydraulic axes	557

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)	564
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	564
TS6120	**TwinCAT OPC Server**	access to TwinCAT variables in accordance with the OPC DA/OPC XML DA specification	564
TS6250	**TwinCAT Modbus TCP Server**	communication with Modbus TCP devices (server and client functionality)	562
TS6250 -0030	**TwinCAT Modbus TCP Server CE**	communication with Modbus TCP devices (server and client functionality) for Windows CE platforms	562
TS6255	**TwinCAT PLC Modbus RTU**	serial communication with Modbus end devices	561
TS6270	**TwinCAT PROFINET RT Device**	TwinCAT PROFINET RT device turns every PC-based controller into a PROFINET RT device.	566
TS6271	**TwinCAT PROFINET RT Controller**	TwinCAT PROFINET RT controller turns every PC-based controller into a PROFINET RT controller.	566
TS6280	**TwinCAT EtherNet/IP Slave**	TwinCAT EtherNet/IP slave turns every PC-based controller into an EtherNet/IP slave.	566
TS6300	**TwinCAT FTP Client**	basic access from TwinCAT PLC to FTP server	567
TS6310	**TwinCAT TCP/IP Server**	communication via generic TCP servers	565
TS6310 -0030	**TwinCAT TCP/IP Server CE**	communication via generic TCP servers for Windows CE platforms	565
TS6340	**TwinCAT PLC Serial Communication**	communication via serial Bus Terminals or PC COM ports	561
TS6341	**TwinCAT PLC Serial Communication 3964R/RK512**	communication via serial Bus Terminals or PC COM ports with the 3964R and RK512 protocol	561
TS6350	**TwinCAT SMS/SMTP Server**	sending SMS and e-mails from the PLC	565
TS6350 -0030	**TwinCAT SMS/SMTP Server CE**	sending SMS and e-mails from the PLC for Windows CE platforms	565
TS6360	**TwinCAT Virtual Serial COM Driver**	virtual serial COM driver for Windows and Windows CE platforms	567
TS6370	**TwinCAT DriveCOM OPC Server**	fieldbus-independent communication connections between the engineering tool and the drive	563
TS6371	**TwinCAT DriveTop Server**	configuring Indramat SERCOS drives with DriveTop software on TwinCAT systems	563
TS650x	**TwinCAT PLC IEC 60870-5-101, -102, -103, -104 Master**	implementation of IEC 60870-101, -102, -103 and -104 masters	562
TS650x -0030	**TwinCAT PLC IEC 60870-5-104 Master CE**	implementation of IEC 60870-104 masters under Windows CE	562
TS6507	**TwinCAT PLC IEC 60870-5-101, -104 Slave**	implementation of IEC 60870-101 and -104 slaves	562
TS6507 -0030	**TwinCAT PLC IEC 60870-5-104 Slave CE**	implementation of IEC 60870-104 slaves under Windows CE	562
TS6509	**TwinCAT PLC IEC 61400-25 Server**	IEC 61400-25 communication	563
TS6511	**TwinCAT PLC IEC 61850 Server**	IEC 61850 communication	563
TS6600	**TwinCAT PLC RFID Reader Communication**	connection of RFID readers to the TwinCAT PLC	567
TS6610	**TwinCAT PLC S5/S7 Communication**	communication with S5/S7 controllers	567

TwinCAT 2 Supplements | Building Automation

TS8000	**TwinCAT PLC HVAC**	automation of HVAC and sanitary installations	568
TS8010	**TwinCAT PLC Building Automation Basic**	executing basic room automation functions	568
TS8020	**TwinCAT BACnet/IP**	communication with the data networks of the building automation and building control systems	568
TS8035	**TwinCAT FIAS Server**	communication between TwinCAT PLC and a system using the FIAS standard	569
TS8036	**TwinCAT Crestron Server**	communication between a TwinCAT PLC and a Crestron controller	569
TS8040	**TwinCAT Building Automation**	software package covering all technical building automation services	569
TS8100	**TwinCAT Building Automation Framework**	configuration and commissioning of building automation projects	569

BECKHOFF New Automation Technology

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

BECKHOFF New Automation Technology

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.

TwinCAT 3

TwinCAT 3 Engineering Environment based on Visual Studio®

System Manager Configuration
– I/O
– PLC
– C/C++
– NC
– NC I
– CNC
– Safety
– others

Programming

Non-real-time | Real-time

C#/.NET | IEC 61131 | Object-oriented extensions | C/C++

IEC Compiler

Microsoft C Compiler

MATLAB®/Simulink®

Simulink Coder™

Third-party programming tool

C/C++

TwinCAT Transport Layer – ADS

TwinCAT 3 Runtime
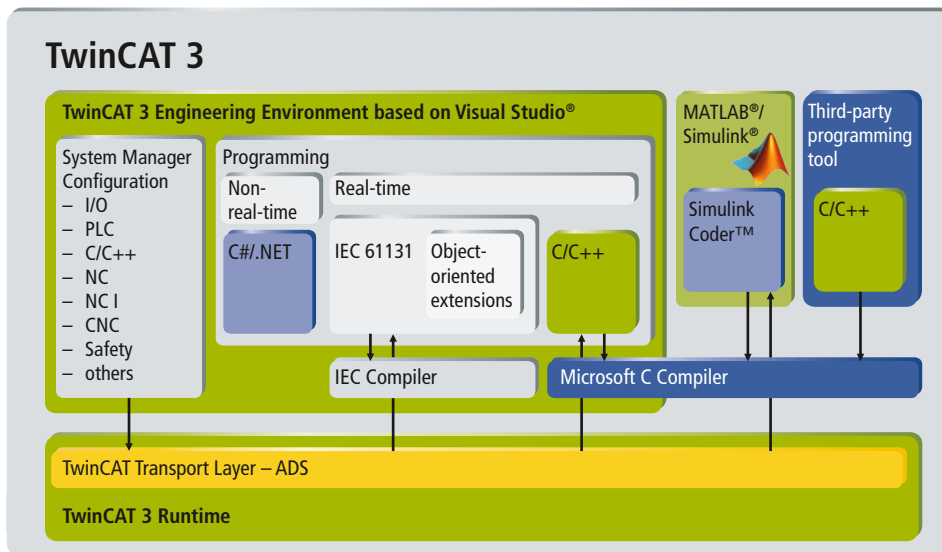
Visual Studio® integration can be accomplished in two different ways. TwinCAT Standard only uses the basic framework of Visual Studio® with all its benefits in terms of handling, connection to source code control software, etc., while TwinCAT Integrated, as the name implies, integrates itself into Visual Studio®. In this version, the C/C++ programming languages and link to MATLAB®/Simulink® are available.

TwinCAT 3 extends the standard automation world

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
– FMI interface: worldwide standard in simulation
– 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)

We reserve the right to make technical changes.

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
MATLAB®/Simulink®
FMI
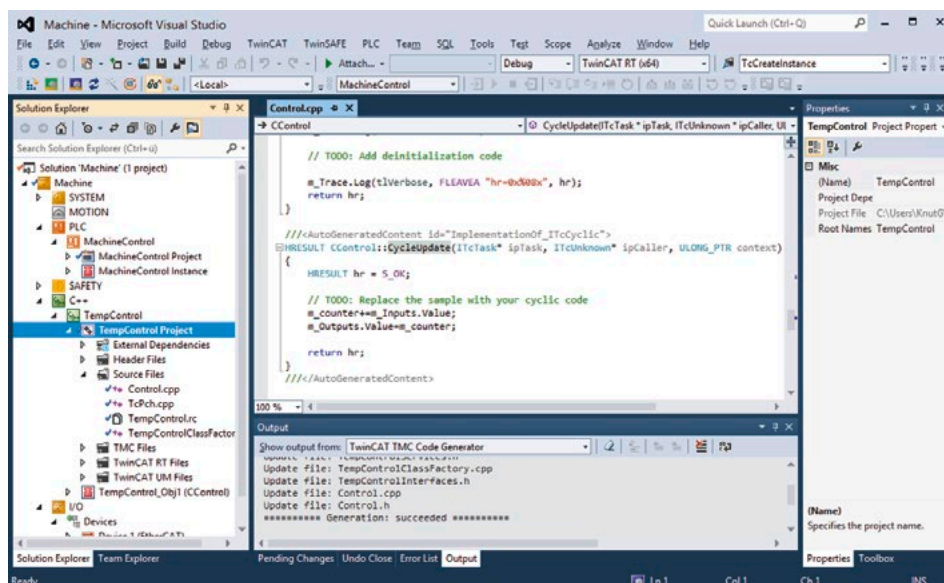
Flexible use of programming languages

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

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TwinCAT 3 | eXtended Automation Language Support

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® 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. In addition, the C++ interface provides a connection to the MATLAB®/Simulink® tool chain or to the Functional Mockup Interface (FMI).
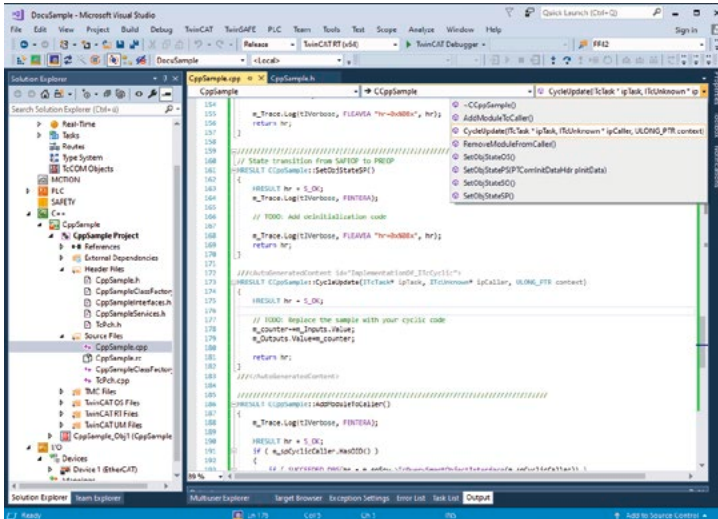
The routine CycleUpdate is processed cyclically. Even without setting breakpoints, the internal variables are available for monitoring in the TwinCAT online watch window.
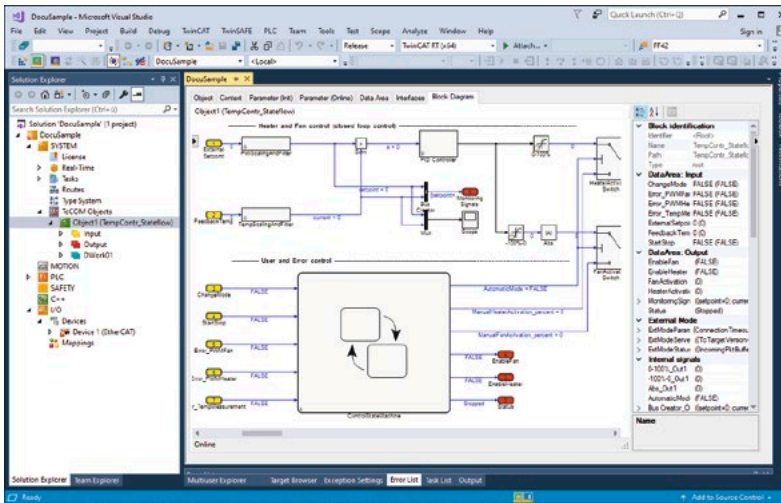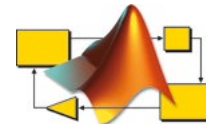
Example of a TcCom module generated from MATLAB®/Simulink®. The block diagram from Simulink® is used as an interactive user view, allowing easy parameter adjustment in the real-time module.

C and C++ programming languages
– extended debugging
– standardised
– widely used programming languages
– very powerful programming languages
– run under the same runtime as PLC programs
– for the implementation of drivers

Link to MATLAB®/Simulink®
– great variety of toolboxes
– application
  – building of control circuits
  – in simulation
  – in optimisation
– automatic code generation
– debug interface between MATLAB®/Simulink® and TwinCAT

Link to FMI interface
– great variety of simulation tools
– application: physical simulation of machines and plants
– automatic code generation

We reserve the right to make technical changes.

TwinCAT 3 | eXtended Automation Runtime (XAR)

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.
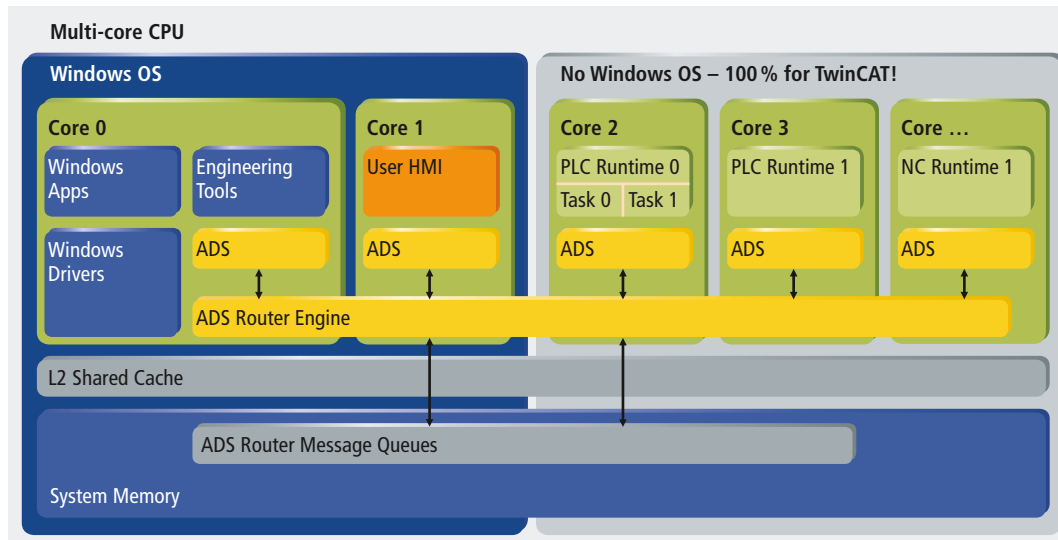
Due to the use of multi-core systems, functional units (e.g. PLC and NC runtimes, HMI) are distributed to individual processor cores.
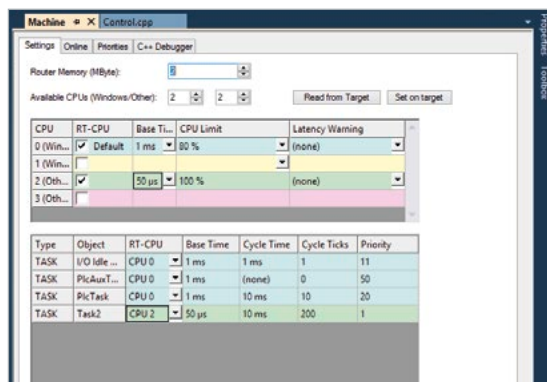
Dialog for the distribution of tasks to processor cores: Moreover, in the so-called "core isolation" mode it is possible to make individual cores exclusively available for the use of TwinCAT. The context change between TwinCAT and the Windows operating system is avoided for these cores, which increases 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 core isolation
– no need to switch to host operating system
– TwinCAT receives the complete computing time on these cores.

Support of multi-tasking
– preemptive multi-tasking
– parallel processing of tasks

Support of 64-bit operating systems
– usage of more resources (memory)

BECKHOFF New Automation Technology

TE1xxx | TwinCAT 3 Engineering

	TC3 Engineering	TC3 Realtime Monitor	TC3 EtherCAT Simulation
Technical data	**TE1000**	**TE1010**	**TE1111**
	TwinCAT Engineering contains the engineering environment of the TwinCAT 3 control software: – 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 The basic version of TC3 Engineering is free of charge.	The TwinCAT 3 Realtime Monitor enables precise diagnostics and optimisation of the runtime behaviour of tasks in the TwinCAT 3 runtime. It offers a graphic representation of the temporal processing of real-time tasks and their modules across all processor cores. In addition to that, user-defined processes and their dependencies can also be visualised through appropriate implementation of the control software. The real-time monitor makes the temporal behaviour of the control software on a target system fully transparent and enables a comprehensive time analysis. It thus supports both error diagnostics and a temporal optimisation of the configuration, in particular for multi-core systems.	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.
Required	TC1000	TC1000	TC1000
Target system	Windows 7/8/10	Windows 7/8/10	Windows 7/8/10
Further information	www.beckhoff.com/TE1000	www.beckhoff.com/TE1010	www.beckhoff.com/TE1111

ℹ For availability status see Beckhoff website at: www.beckhoff.com/TE1130

TC3 XCAD Interface	TC3 CAD Simulation Interface	TC3 PLC Static Analysis
TE1120	**ⓘ TE1130**	**TE1200**
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.	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. 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 presales training courses on machines or machine components for sales personnel using 3D simulations. 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.	With the integration of the static code analysis, a further tool is available in TwinCAT 3.1 that supports the PLC software development process. 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.
TC1000	TC1000	TC1200
Windows 7/8/10	Windows 7/8/10	Windows 7/8/10
www.beckhoff.com/TE1120	www.beckhoff.com/TE1130	www.beckhoff.com/TE1200

TwinCAT 3

509

TE1xxx | **TwinCAT 3 Engineering**

	TC3 Scope View Professional	TC3 Filter Designer	TC3 Target for Simulink®
Technical data	**TE1300**	**TE1310**	**TE1400**
	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. 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. 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. Furthermore, Scope View Professional can be integrated into a user's .NET-based visualisation. Thus, seamless integration into an existing machine visualisation is possible.	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. 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.	The TwinCAT Simulink® Target offers System Target Files for the use of the Simulink® coder. It enables the generation of TwinCAT 3 runtime modules, which can be instanced and parameterised in the TwinCAT 3 engineering environment.
Required	TC1000	TC1000	TC1000
Target system	Windows 7/8/10	Windows 7/8/10	Windows 7/8/10
Further information	www.beckhoff.com/TE1300	www.beckhoff.com/TE1310	www.beckhoff.com/TE1400

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

TC3 Target for MATLAB®	TC3 Interface for MATLAB®/Simulink®	TC3 Target for FMI
ⓘ TE1401	TE1410	ⓘ TE1420
The TwinCAT MATLAB® Target offers System Target Files for the use of the MATLAB® coder. It enables the generation of TwinCAT 3 runtime modules, which can be instanced and parameterised in the TwinCAT 3 engineering environment.	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. Features – 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: 　– symbol name of a variable 　– configurable interface module	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.
TC1000	TC1000	TC1000
Windows 7/8/10	Windows 7/8/10	Windows 7/8/10
www.beckhoff.com/TE1401	www.beckhoff.com/TE1410	www.beckhoff.com/TE1420

BECKHOFF New Automation Technology

TExxxx | TwinCAT 3 Engineering

	TC3 Valve Diagram Editor	TC3 Cam Design Tool	TC3 EAP Configurator
Technical data	**TE1500**	**TE1510**	**TE1610**
	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.	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.	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.
Required	TC1000	TC1000	TC1000
Target system	Windows 7/8/10	Windows 7/8/10	Windows 7/8/10
Further information	www.beckhoff.com/TE1500	www.beckhoff.com/TE1510	www.beckhoff.com/TE1610

TC3 HMI Engineering	TC3 Analytics Workbench	TC3 Analytics Service Tool
TE2000	**TE3500**	**TE3520**
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. 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. 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. TC3 HMI Engineering is free of charge.	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. 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. 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.	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.
TC1000	TC1000	TC1000
Windows 7/8/10	Windows 7/8/10	Windows 7/8/10
www.beckhoff.com/TE2000	www.beckhoff.com/TE3500	www.beckhoff.com/TE3520

TC1xxx | TwinCAT 3 Base

	TC3 ADS	TC3 I/O
Technical data	**TC1000-0vpp**	**TC1100-0vpp**

	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
		– upports 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®
TC1200-0vpp	**TC1210-0vpp**	**TC1220-0vpp**

<table>
<tr><td>

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.
– 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®

</td><td>

Extension of the TwinCAT PLC TC1200 with additional C++ functionalities:
– 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

</td><td>

Extension of the TwinCAT PLC/C++ TC1210 by the possibility to execute modules generated in MATLAB®/Simulink®:
– 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

</td></tr>
</table>

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			

TwinCAT 3

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TC1xxx | TwinCAT 3 Base

	TC3 PLC/NC PTP 10	TC3 PLC/NC PTP 10/NC I
Technical data	**TC1250-0vpp**	**TC1260-0vpp**

	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	20	30	40	50
	–	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/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®
TC1270-0vpp	**TC1275-0vpp**	**TC1300-0vpp**	**TC1320-0vpp**
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. – 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	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. – 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	The TwinCAT 3 C++ runtime environment enables the execution of real-time modules written in C++. The following functions are supported, among others: – 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	Extension of the TC1300 by the possibility to execute modules generated by MATLAB®/Simulink®. – 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

TwinCAT 3

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TF1xxx | TwinCAT 3 System

	TC3 PLC HMI	TC3 PLC HMI Web	TC3 UML
Technical data	**TF1800-0vpp**	**TF1810-0vpp**	**TF1910-0vpp**
	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.	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.	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. 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. 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.

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

TwinCAT 3

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TF2xxx | TwinCAT 3 HMI

	TC3 HMI Server	TC3 HMI Clients Pack	TC3 HMI Targets Pack
Technical data	**TF2000-0vpp**	**TF2010-0vpp, TF2015-0vpp, TF2020-0vpp, TF2025-0vpp, TF2030-0vpp, TF2035-0vpp, TF2040-0vpp, TF2045-0vpp**	**TF2050-0vpp, TF2055-0vpp, TF2060-0vpp, TF2065-0vpp, TF2070-0vpp, TF2075-0vpp, TF2080-0vpp, TF2090-0vpp**
	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.

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.

The HMI is linked to respective controllers via automation protocols like the Automation Device Specification (ADS) or OPC UA.

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.

The TC3 HMI Server includes a connection to one client (browser) and a connection to one controller as standard. | 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. Optional packets are available for 1, 2, 3, 5, 10, 20, 25 or 100 clients. The number of supported clients is not tied to the devices employed, the HMI Server only counts simultaneous (browser) connections. | The TC3 HMI Server includes a connection to one controller as standard. Optional target packages for 1, 2, 3, 5, 10, 20, 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. |
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

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TF2xxx | TwinCAT 3 HMI

	TC3 HMI OPC UA	TC3 HMI Extension SDK	TC3 HMI Scope
Technical data	**TF2110-0vpp**	**TF2200-0vpp**	ⓘ **TF2300-0vpp**
	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.	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).	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.

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	TF2000				TF2000				TF2000			
Target system	Windows 7/8/10, Windows CE				Windows 7/8/10				Windows 7/8/10, Windows CE			
Further information	www.beckhoff.com/TF2110				www.beckhoff.com/TF2200				www.beckhoff.com/TF2300			

ⓘ For availability status see Beckhoff website at: www.beckhoff.com/TF2300

TF3xxx | TwinCAT 3 Measurement

	TC3 Scope Server	TC3 Analytics Logger	TC3 Analytics Library
Technical data	**TF3300-0vpp**	**TF3500-0vpp**	**TF3510-0vpp**

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.

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.

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.

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.

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.

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			

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TF3xxx | TwinCAT 3 Measurement

	TC3 Analytics Storage Provider	TC3 Analytics Runtime	TC3 Analytics Controller Packs
Technical data	**TF3520-0vpp**	**TF3550-0vpp**	**TF3560-0vpp, TF3561-0vpp, TF3562-0vpp, TF3563-0vpp, TF3564-0vpp, TF3565-0vpp**
	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.	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.	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. Optional packs are available for 4, 8, 16, 32, 64 or 128 further controllers.
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/TF3601

We reserve the right to make technical changes.

TC3 Condition Monitoring Level 1	TC3 Condition Monitoring Level 2	TC3 Power Monitoring	TC3 Filter	TC3 Solar Position Algorithm
TF3600-0vpp	ⓘ TF3601-0vpp	TF3650-0vpp	TF3680-0vpp	TF3900-0vpp

TF3600-0vpp (TC3 Condition Monitoring Level 1)

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.

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.

Condition Monitoring Level 1 contains the following algorithms:
– signal processing
– statistics
– classification
– frame-based buffer handling

TF3601-0vpp (TC3 Condition Monitoring Level 2)

TwinCAT Condition Monitoring Level 2 includes further algorithms in addition to the Level 1 functions.

TF3650-0vpp (TC3 Power Monitoring)

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). 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.

TF3680-0vpp (TC3 Filter)

The TwinCAT 3 Function TF3680 TC3 Filter provides various function blocks for implementing digital filters. Digital filters are used to manipulate digitised signals. They can be used, for example, to boost or to repress certain signal components in the frequency range.

The library comprises function blocks for realising filters with Butterworth or Chebyshev characteristics as well as function blocks for general use with freely definable filter coefficients. Furthermore, the library includes delay elements of different orders and a moving average filter.

TF3900-0vpp (TC3 Solar Position Algorithm)

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 ±0.001°.

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
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	TC1200
Windows 7/8/10	Windows 7/8/10	Windows 7/8/10	Windows 7/10, Windows CE	Windows 7/8/10, Windows CE
www.beckhoff.com/TF3600	www.beckhoff.com/TF3601	www.beckhoff.com/TF3650	www.beckhoff.com/TF3680	www.beckhoff.com/TF3900

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TF4xxx | TwinCAT 3 Controller

	TC3 Controller Toolbox	TC3 Temperature Controller	TC3 TwinCAT Speech
Technical data	**TF4100-0vpp**	**TF4110-0vpp**	**i TF4500-0vpp**
	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	TC3 TwinCAT Speech enables the multi-lingual input and output of queries or information implemented in an industrially compatible way. This makes interaction with TwinCAT much more efficient and convenient – in the widest variety of applications across all industries, from mechanical engineering to building automation. The speech input is available as an offline function implemented via built-in functions of the Windows operating system, i.e. without Internet and cloud connection. The speech output of TC3 TwinCAT Speech is available both as an offline and an online function. In the first case this is supported by the corresponding Windows functions and in the second case by the Polly text-to-speech service from Amazon. Realistic sounding speech output is synthesised with the aid of deep-learning technologies. Different voices are supported as well as caching of audio files generated online.

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
	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 10			
Further information	www.beckhoff.com/TF4100				www.beckhoff.com/TF4110				www.beckhoff.com/TF4500			

i   For availability status see Beckhoff website at: www.beckhoff.com/TF4500

TwinCAT 3

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TF5xxx | TwinCAT 3 Motion Control

	TC3 NC PTP 10 Axes	TC3 NC PTP Axes Pack 25	TC3 NC PTP Axes Pack unlimited
Technical data	**TF5000-0vpp**	**TF5010-0vpp**	**TF5020-0vpp**
	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. – 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 up to a maximum of 25 axes	Extension of TF5000 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			

TwinCAT 3

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BECKHOFF New Automation Technology

TF5xxx | TwinCAT 3 Motion Control

	TC3 NC Camming	TC3 NC Flying Saw
Technical data	**TF5050-0vpp**	**TF5055-0vpp**
	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	20	30	40	50
	–	–	x	x	–	–	x	x
	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	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
	TF5060-0vpp	**TF5065-0vpp**	**TF5100-0vpp**

TC3 NC FIFO Axes — TF5060-0vpp

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.

TC3 Motion Control XFC — TF5065-0vpp

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.
– 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
In conjunction with TwinCAT NC I, function blocks are available for high-precision switching of signals depending on the path position.

TC3 NC I — TF5100-0vpp

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.
– 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			

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	TC3 Kinematic Transformation L1	TC3 Kinematic Transformation L2	TC3 Kinematic Transformation L3	TC3 Kinematic Transformation L4
Technical data	TF5110-0vpp	TF5111-0vpp	TF5112-0vpp	TF5113-00vp
	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. – 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	Extension of the TwinCAT Kinematic Transformation L1 with additional kinematics: – 2D parallel kinematics – shear kinematics – crane and roll kinematics	Extension of the TwinCAT Kinematic Transformation L1/L2 with additional kinematics: – 3D Delta – SCARA	Extension of the TwinCAT Kinematic Transformation L1/L2/L3 with additional kinematics: – 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

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	TC3 Robotics mxAutomation	TC3 Robotics uniVAL PLC	TC3 CNC
	TF5120-0vpp	**TF5130-0vpp**	**TF5200-0vpp**

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.

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.

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.

The communication takes place via EtherCAT, with TwinCAT and the CS8C controller from Stäubli exchanging the data as master and slave, respectively.

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.

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 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

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			

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	TC3 CNC E	**TC3 CNC Axes Pack**	**TC3 CNC Channel Pack**
Technical data	TF5210-0vpp	TF5220-0vpp	TF5230-0vpp

	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 DIN 66025. The axes and channels are configured in TwinCAT Engineering. – maximum 8 path axes/controlled spindles, max. 64 axes/controlled spindles (optional), max. 12 channels – maximum 4 interpolationg 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	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.	Using TwinCAT CNC Channel Pack, a further CNC channel can be extended to a maximum of 12 channels. – 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
	TF5240-0vpp	TF5250-0vpp	TF5260-0vpp	TF5270-0vpp
	TwinCAT CNC Transformation is an optional function for the TwinCAT CNC. – 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	TwinCAT CNC HSC Pack is an optional high-speed cutting solution for the TwinCAT CNC: – 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	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.	TwinCAT CNC Virtual NCK Basis is a virtual TwinCAT CNC for simulation in a Windows environment as an option for the TwinCAT CNC.

	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			

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	TC3 CNC Virtual NCK Options	TC3 CNC Volumetric Compensation	TC3 CNC Cutting Plus
Technical data	TF5271-0vpp	TF5280-0vpp	TF5290-0vpp

	TC3 CNC Virtual NCK Options	TC3 CNC Volumetric Compensation	TC3 CNC Cutting Plus
	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	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	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			

ℹ️ For availability status see Beckhoff website at: www.beckhoff.com/TF5800

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	TC3 Motion Collision Avoidance	TC3 Motion Pick-and-Place	TC3 Digital Cam Server	TC3 Hydraulic Positioning
	TF5410-0vpp	TF5420-0vpp	[i] TF5800-0vpp	TF5810-0vpp

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).
   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.

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.
   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).

The TwinCAT Digital Cam Server is a fast cam controller with monitoring for various fieldbuses. The cams are configured in TwinCAT Engineering.
– 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

Algorithms for the control and positioning of hydraulic axes are combined in TwinCAT Hydraulic Positioning and are available as PLCopen-compliant PLC blocks.
– 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
   – 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	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			

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TF6xxx | TwinCAT 3 Connectivity

	TC3 ADS Monitor	**TC3 JSON Data Interface**	**TC3 OPC UA**
Technical data	**TF6010-0vpp**	**ⓘ TF6020-0vpp**	**TF6100-0vpp**

The free-of-charge TC3 ADS Monitor provides recording and diagnostics functions for the communication of TwinCAT systems. It is integrated into the TwinCAT 3 engineering environment. In addition, it can be used to configure and execute user-specific commands for testing ADS servers.	The TC3 JSON Data Interface is an interface for the exchange of data in JSON format between the TwinCAT system and custom applications. The JSON format enables access with different programming languages to the ADS interface. It is possible to access all symbols of the runtime that are also available with the standard ADS interface. Communication between the TwinCAT system and the custom applications can be realised in different ways. An integrated MQTT client in the TwinCAT system enables the communication with MQTT brokers. The MQTT broker is configured in the TwinCAT system and supports TLS encryption.	OPC UA 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. **TwinCAT OPC UA Server** – supports the following OPC UA functions: Data Access, Historical Data Access, Alarms & Conditions – Intermediate storage of data on the server: interruption of the communication connection does not lead to loss of data. – graphical configurator for simple handling of local and remote OPC UA servers – definition of user/groups-based access rights at namespace and node level – support of client/server certificates to establish secure communication **TwinCAT OPC UA Gateway** – high-performance, free-of-charge OPC COM DA server – enables aggregation of multiple, subordinate TwinCAT OPC UA servers – support of client/server certificates to establish secure communication – replaces the TF6120 TwinCAT product **TwinCAT OPC UA Client** – supports OPC UA communication with remote OPC UA servers – available as PLCopen-compliant PLC function block or as TwinCAT I/O device – support of client/server certificates to establish secure communication

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
	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	TE1000				TC1000				TC1000			
Target system	Windows 7/8/10				Windows 7/8/10, Windows CE				Windows 7/8/10, Windows CE			
Further information	www.beckhoff.com/TF6010				www.beckhoff.com/TF6020				www.beckhoff.com/TF6100			

ⓘ For availability status see Beckhoff website at: www.beckhoff.com/TF6020

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	TC3 OPC DA	TC3 EtherCAT Redundancy 250	TC3 EtherCAT Redundancy 250+	TC3 EtherCAT External Sync	TC3 Modbus TCP
	TF6120-0vpp	**TF6220-0vpp**	**TF6221-0vpp**	**TF6225-0vpp**	**TF6250-0vpp**
	OPC is the standard for supplier-independent communication in automation technology. OPC DA (Data Access) is based on the Microsoft COM/DCOM standard. TwinCAT OPC DA Server – specifications OPC-DA2x and OPC-XML-DA – configurator for the set-up – demo DA client for diagnostic purposes and the loading of recipes TF6120 can be replaced by the software component TwinCAT OPC UA Gateway of the TF6100 product.	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	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	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

	TC1000	TC1100	TC1100	TC1100	TC1200
	Windows XP	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/TF6120	www.beckhoff.com/TF6220	www.beckhoff.com/TF6221	www.beckhoff.com/TF6225	www.beckhoff.com/TF6250

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TF6xxx | TwinCAT 3 Connectivity

	TC3 Modbus RTU	TC3 PROFINET RT Device	TC3 PROFINET RT Controller	TC3 EtherNet/IP Slave
Technical data	**TF6255-0vpp**	**TF6270-0vpp**	**TF6271-0vpp**	**TF6280-0vpp**
	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.	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.	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.	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. 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.
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

We reserve the right to make technical changes.

	TC3 EtherNet/IP Master	TC3 FTP Client	TC3 TCP/IP	TC3 TCP/UDP Realtime	TC3 Serial Communication
	TF6281-0vpp	TF6300-0vpp	TF6310-0vpp	TF6311-0vpp	TF6340-0vpp
	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. 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.	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.	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.	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. 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.	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. 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.

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
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

TwinCAT 3

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BECKHOFF New Automation Technology

TF6xxx | TwinCAT 3 Connectivity

Technical data	TC3 SMS/SMTP	TC3 Virtual Serial COM	TC3 Database Server	TC3 XML Server
	TF6350-0vpp	**TF6360-0vpp**	**TF6420-0vpp**	**TF6421-0vpp**
	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.	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.	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. 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.	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.

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
	TF6500-0vpp	ⓘ TF6510-0vpp	TF6600-0vpp	TF6610-0vpp	ⓘ TF6650-0vpp
	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. PLC library for the realisation of masters for – IEC 60870-5-101 – IEC 60870-5-102 – IEC 60870-5-103 – IEC 60870-5-104 PLC library for the realisation of slaves for – IEC 60870-5-101 – IEC 60870-5-104	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.	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.	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.	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.

	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

TwinCAT 3

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TF6xxx | TwinCAT 3 Connectivity

	TC3 IoT Communication (MQTT)	TC3 IoT Functions	TC3 IoT Data Agent
Technical data	**TF6701-0vpp**	**TF6710-0vpp**	**TF6720-0vpp**
	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.	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. The data agent picks up config-ured 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 pro-cess 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. To reduce the amount of traf-fic and associated costs, the data agent supports advanced sampling mechanisms, such as on-data-change transmissions. 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. 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.

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 7/8/10			
Further information	www.beckhoff.com/TF6701				www.beckhoff.com/TF6710				www.beckhoff.com/TF6720			

ℹ For availability status see Beckhoff website at: www.beckhoff.com/TF6760

TC3 IoT Communicator	TC3 IoT Communicator App	TC3 IoT HTTPS/REST
TF6730-0vpp	**TF6735**	ⓘ **TF6760-0vpp**

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.

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.

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.

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.

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.

So-called REST (Representational State Transfer) APIs are frequently offered by web servers in IoT communication in order to channel certain communication processes via a uniform and stateless interface. Although REST is basically independent of the transport system, the Internet of Things mainly uses the HTTP/HTTPS protocol established in web communication as, among other things, it enables better compatibility with firewalls. There are many different application scenarios for connecting an HTTP/REST interface from within the controller, ranging from the simple determination of weather data through to complex communication processes.

The TwinCAT 3 Function TF6760 TC3 IoT HTTPS/REST provides users with basic functions for HTTP/HTTPS communication in a PLC library enabling them to address REST APIs as a client and providing HTTP commands such as GET, PUT and POST. The communication channel (HTTPS) is secured by SSL/TLS mechanisms, which are also provided. Message contents can be defined, interpreted and used for communication directly from the PLC context via XML and JSON parsers.

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
TC1200				TF6730				TC1200			
Windows 7/8/10				–				Windows 7/8/10, Windows CE			
www.beckhoff.com/TF6730				www.beckhoff.com/TF6735				www.beckhoff.com/TF6760			

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TF7xxx | TwinCAT 3 Vision

	TC3 GigE Vision Connector	**TC3 Vision Base**
Technical data	TF7000-0vpp, TF7001-0vpp, TF7002-0vpp, TF7003-0vpp	TF7100-0vpp

TC3 GigE Vision Connector offers the possibility to integrate GigE Vision cameras directly into the TwinCAT architecture. TF700x is also GigE Vision certified. The cameras are configured in the same development environment as fieldbus components or axes without any third-party software. Triggered from the real-time, image capture and PLC or motion control can be operated in a highly synchronised way.

The configuration is carried out completely in TwinCAT Engineering. Wizards are available for setting the camera parameters and for calibration and simulation. Via the source control file it is possible to read images stored on a drive and to make them available to the real-time. The programming of image processing tasks can be prepared and tested offline in advance.

TF7000 TC3 GigE Vision Connector Base provides the basis for communication and features two camera connections. Optional packages are available for two, four or eight additional cameras.

TC3 Vision Base provides an extensive PLC library with a large number of widely varying functions and algorithms for solving image processing tasks, such as e.g. algebraic image operations, filters, Fourier analyses, colour image processing, segmentation, contour and blob analysis or results presentation, as well as for reading and writing camera parameters. In addition to PLC, motion control, robotics and measurement technology, image processing is now also available as directly integrated functionality in the TwinCAT system.

The image processing algorithms are computed in the TwinCAT real-time environment, executed task-synchronously and monitored in real time via watchdogs. TwinCAT Vision is multi-core capable and executes algorithms automatically on several cores if available. Direct response to image processing results is possible in the PLC without the time loss that would be caused by additional interfaces to external devices.

PLC programming is carried out in the IEC 61131-3 languages so that no knowledge of specific programming languages is required. All known debugging options in the PLC are available. Intermediate results and associated images can be displayed at any time in the engineering or in the TwinCAT HMI.

Performance class (pp)	20	30	40	50	20	30	40	50
	–	–	–	x	–	–	–	x
	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x
Required	TC1200, TC1300				TC1200			
Target system	Windows 7/8/10				Windows 7/8/10			
Further information	www.beckhoff.com/TF7000				www.beckhoff.com/TF7100			

TC3 Vision Matching 2D	TC3 Vision Code Reading	TC3 Vision Metrology 2D
TF7200-0vpp	**TF7250-0vpp**	**TF7300-0vpp**

TC3 Vision Matching 2D expands the TwinCAT Vision functionality by the possibility to find and compare objects based on learned references, contours, feature points or other properties (template matching/keypoint detection and descriptor matching).

These functions enable the controller to determine whether certain objects or features exist in an image in order to implement functions such as good/bad part detection, for example. In the same way, objects can be recognised to be sorted or individually handled and further processed in the production process.

TC3 Vision Code Reading includes functions for reading various 1D and 2D codes. This provides the basis for being able to check code content directly in real time and to track products during the manufacturing process. It eleminates the need for additional interfaces and runtime delays in communication with external devices.

The reading results can be displayed as an image at any time for process monitoring purposes or saved for continuous quality assurance.

TC3 Vision Metrology 2D offers various options for the detection of edges, holes and circular arcs as well as the determination of lengths, distances, diameters, angles and coordinates, all with sub-pixel accuracy.

By means of various calibration functions, it is possible to correct, for example, optical distortions or distortions of perspective that may be caused by the geometrical structure, and to convert pixel values to world coordinates, lengths or distances. This enables, for example, the metric display or output of values as well as the direct presetting of gripping points for robots in their coordinate systems.

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
TF7100				TF7100				TF7100			
Windows 7/8/10				Windows 7/8/10				Windows 7/8/10			
www.beckhoff.com/TF7200				www.beckhoff.com/TF7250				www.beckhoff.com/TF7300			

TwinCAT 3

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TF8xxx | TwinCAT 3 Industry specific

	TC3 HVAC	TC3 Building Automation Basic	TC3 BACnet
Technical data	**TF8000-0vpp**	**TF8010-0vpp**	**TF8020-0vpp**
	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.	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.	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 B-BC (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). TF8020 requires TC1100 from Build 4022.25.

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				TC1100			
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			

TwinCAT 3

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TC3 Building Automation	TC3 Wind Framework	TC3 AES70 (OCA)
TF8040-0vpp	**TF8310-0vpp**	**TF8810-0vpp**
The TF8040 TC3 Building Automation 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. 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.	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. 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. 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. 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.	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. More information on our webpage Applications & Solutions for Stage and Show Technology.

<div style="text-align: right">TwinCAT 3</div>
<div style="text-align: right">**545**</div>

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**
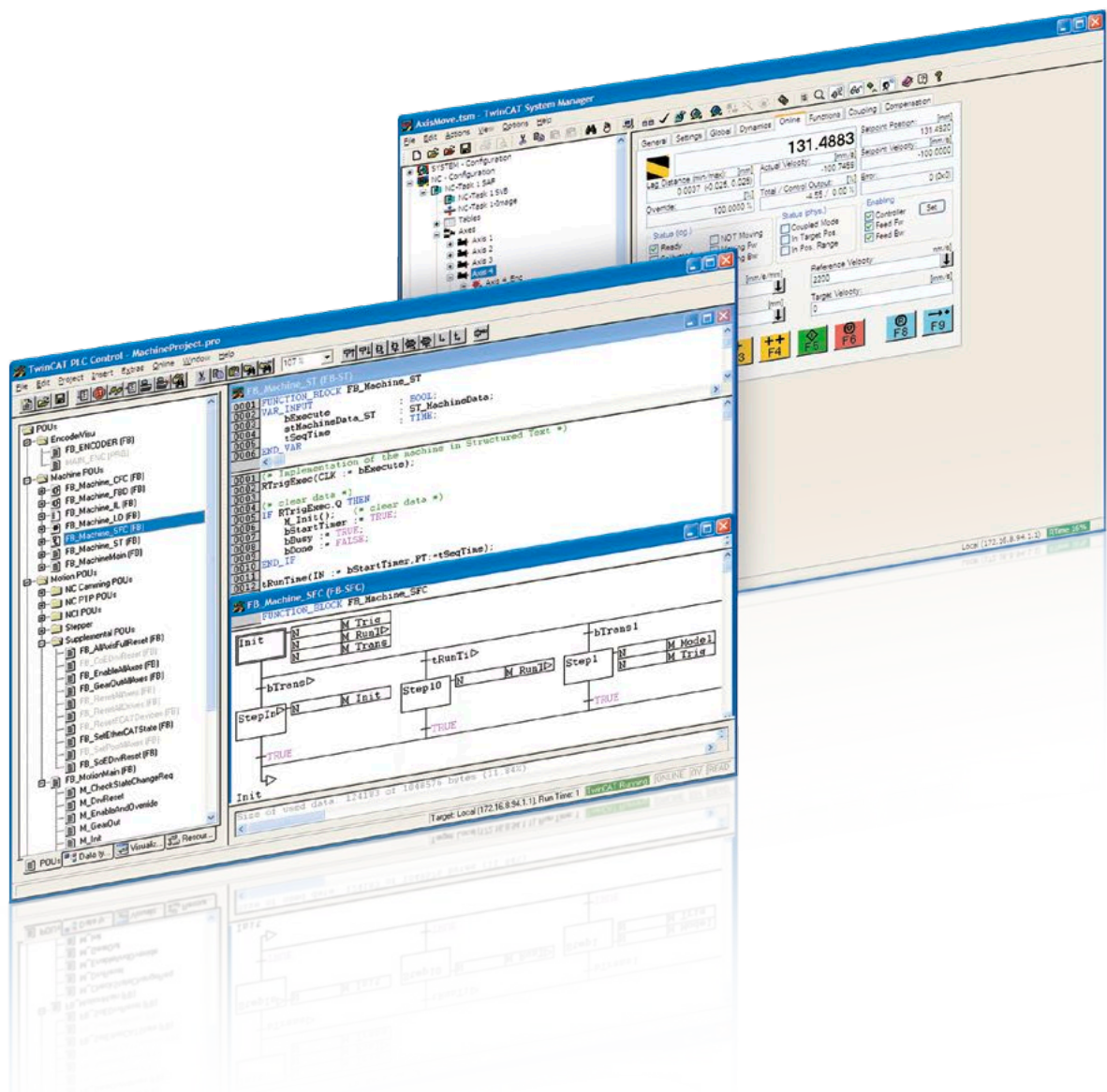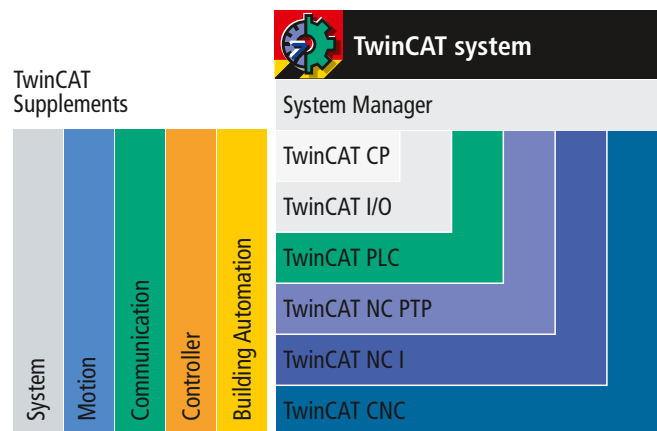
The Windows Control and Automation Technology

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.

TwinCAT Supplements

System | Motion | Communication | Controller | Building Automation

TwinCAT system

System Manager

TwinCAT CP

TwinCAT I/O

TwinCAT PLC

TwinCAT NC PTP

TwinCAT NC I

TwinCAT CNC

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 NOVRAM 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**
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. – 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	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. – 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

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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 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

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TwinCAT I/O	TwinCAT CP
TX1100	**TX1000**

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)
	TwinCAT CP is a driver for the Beckhoff Control Panels CP6xxx and CP7xxx, the industrial operating and display devices.
	    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.
	    TwinCAT CP creates the driver connection between general Windows programs and the operating and display elements on the Beckhoff Control Panel:
	– direct switches for fast machine functions
	– switch feedback by LEDs
	– UPS support
	The driver permits variable-oriented operation of the Control Panel's functions by the Windows programs.

version-dependent: Windows 7/10, Windows CE	version-dependent: Windows 7/10, Windows Embedded WES2009/WES7
www.beckhoff.com/TX1100	www.beckhoff.com/TX1000

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TSxxxx | TwinCAT 2 Supplements, System

	TwinCAT ECAD Import	TwinCAT Engineering Interface Server	TwinCAT Eventlogger	TwinCAT XML Data Server
Technical data	**TS1120**	**TS1600**	**TS1010**	**TS6421**
	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.	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.	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. 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.	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.
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

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	TwinCAT XML Data Server CE	TwinCAT Backup	TwinCAT Simulation Manager	TwinCAT Database Server
	TS6421-0030	**TS1150**	**TS1110**	**TS6420**
	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.	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.	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.	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.
	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

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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

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	TwinCAT Management Server	TwinCAT Scope 2	TwinCAT EtherCAT Redundancy	TwinCAT Solar Position Algorithm
	TS1140	**TS3300**	**TS622x**	**TS3900**
	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.	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.	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.	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 ±0.001°.
	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

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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**

	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.
	– 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
		Algorithms for the control and positioning of hydraulic axes are combined in TwinCAT Hydraulic Positioning and are available as PLCopen-compliant PLC blocks.
		– 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
		   – 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

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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

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TwinCAT NC Camming	TwinCAT Cam Design Tool	TwinCAT Digital Cam Server
TS5050	**TS1510**	**TS5800**
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	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.	The TwinCAT Digital Cam Server is a fast cam controller with monitoring for various fieldbuses. The cams are configured in TwinCAT Engineering. – 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

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TSxxxx | TwinCAT 2 Supplements, Motion

	TwinCAT Valve Diagram Editor	TwinCAT Kinematic Transformation
Technical data	**TS1500**	**TS511x**
	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.	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

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TS6xxx | TwinCAT 2 Supplements, Communication

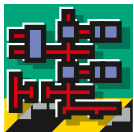|	TwinCAT PLC Serial Communication	TwinCAT PLC Serial Communication 3964R/RK512	TwinCAT PLC Modbus RTU
Technical data	**TS6340**	**TS6341**	**TS6255**
	TwinCAT Serial Communication implements communication with serial devices such as printers, bar code scanners, etc. The serial interface of the PC and the serial Beckhoff EL6xxx EtherCAT Terminals and and KL6xxx Bus Terminals are supported. 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.	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. 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.	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.
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

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TS6xxx | TwinCAT 2 Supplements, Communication

Technical data	**TwinCAT Modbus TCP Server**	**TwinCAT Modbus TCP Server CE**	**TwinCAT PLC IEC 60870-5-10x**	**TwinCAT PLC IEC 60870-5-104 CE**
	TS6250	**TS6250-0030**	**TS650x**	**TS650x-0030**
	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.	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.	The TS650x enable IEC 60870-5-10x-compliant communication from the TwinCAT PLC. Both master and slave libraries are available. PLC library for the realisation of masters for – IEC 60870-5-101 – IEC 60870-5-102 – IEC 60870-5-103 – IEC 60870-5-104 PLC library for the realisation of slaves for – IEC 60870-5-101 – IEC 60870-5-104	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. PLC library for the realisation of masters for – IEC 60870-5-104 PLC library for the realisation of slaves for – 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

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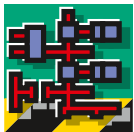| TwinCAT PLC IEC 61850 Server	TwinCAT PLC IEC 61400-25 Server	TwinCAT DriveTop Server	TwinCAT DriveCOM OPC Server
TS6511	TS6509	TS6371	TS6370
IEC 61850 defines a communication protocol which is used particularly in electrical switchgears. Such standardised communication can be implemented using the 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.	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.	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.	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.　　The TwinCAT DriveCOM OPC Server requires a subordinate TwinCAT system with an FCxxxx-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.
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

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TS6xxx | TwinCAT 2 Supplements, Communication

	TwinCAT OPC Server	TwinCAT OPC UA Server	TwinCAT OPC UA Server CE
Technical data	**TS6120**	**TS6100**	**TS6100-0030**
	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.	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. TwinCAT OPC UA Server – 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 TwinCAT OPC UA Client – PLC function blocks for UA DataAccess – Demo UA client for diagnostic purposes	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. TwinCAT OPC UA Server CE – 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 TwinCAT OPC UA Client CE – 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

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	TwinCAT SMS/SMTP Server	TwinCAT SMS/SMTP Server CE	TwinCAT TCP/IP Server	TwinCAT TCP/IP Server CE
	TS6350	**TS6350-0030**	**TS6310**	**TS6310-0030**
	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.	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 START-TLS/SSL enables encrypted e-mail communication to be configured.	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.	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.
	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

TwinCAT 2

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BECKHOFF New Automation Technology

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**
	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.	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.	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.	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.
Target system	Windows XP, Windows XP Embedded, Windows CE	Windows XP, Windows XP Embedded, Windows CE	Windows XP, Windows XP Embedded, 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

We reserve the right to make technical changes.

TwinCAT Virtual Serial COM Driver	TwinCAT FTP Client	TwinCAT PLC RFID Reader Communication	TwinCAT PLC S5/S7 Communication
TS6360	**TS6300**	**TS6600**	**TS6610**
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.	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.	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.	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.
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

TwinCAT 2

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BECKHOFF New Automation Technology

TS8xxx | TwinCAT 2 Supplements, Building Automation

	TwinCAT PLC HVAC	TwinCAT PLC Building Automation Basic	TwinCAT BACnet/IP
Technical data	**TS8000**	**TS8010**	**TS8020**
	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.	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.	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 B-BC (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). BACnet revisions 6 and 12 are supported for TwinCAT 2. Therefore the use for new projectes is not recommended. **BACnet revision 12** **Ordering information CX8091 and CX9020 with BACnet/IP image (license key included)** – ordering number of the CX8091 (no further ordering option necessary) (see page 215) – ordering number of the CX9020-xxxx (see page 222) + CX1800-1052 **Ordering information CX5010/CX5020 (see page 232)** – 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 **BACnet revision 6** **Ordering information CX5010/CX5020 (see page 232)** – 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**
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.	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.	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: **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. **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. **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.	The TwinCAT Building Automation Framework includes a configuration program (TwinCAT Building Automation Manager) and a PLC library. 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. 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.
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

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