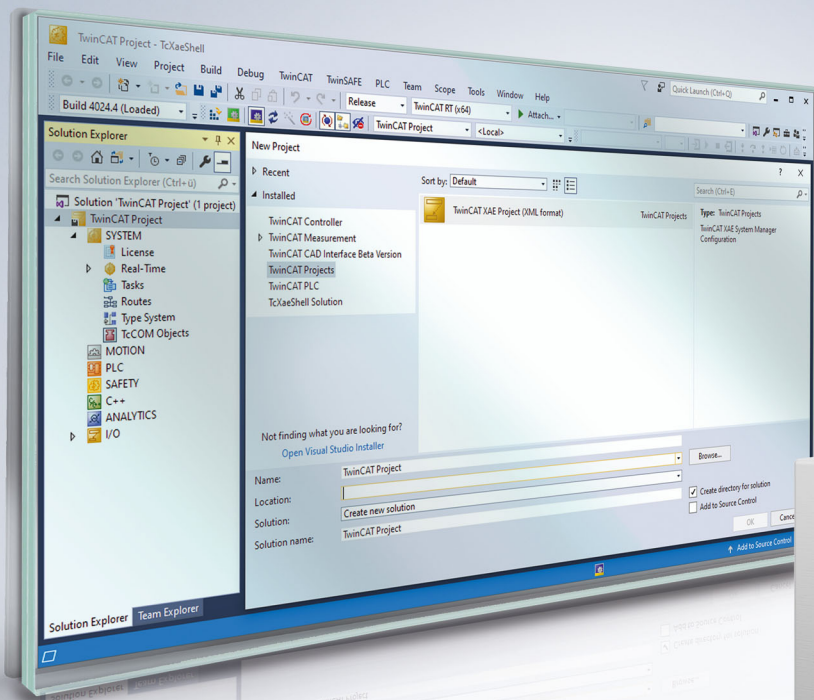


Manual | EN

TF5200 | TwinCAT 3 CNC

System parameter



Notes on the documentation

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with the applicable national standards.

It is essential that the documentation and the following notes and explanations are followed when installing and commissioning the components.

It is the duty of the technical personnel to use the documentation published at the respective time of each installation and commissioning.

The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

Disclaimer

The documentation has been prepared with care. The products described are, however, constantly under development.

We reserve the right to revise and change the documentation at any time and without prior announcement.

No claims for the modification of products that have already been supplied may be made on the basis of the data, diagrams and descriptions in this documentation.

Trademarks

Beckhoff®, TwinCAT®, TwinCAT/BSD®, TC/BSD®, EtherCAT®, EtherCAT G®, EtherCAT G10®, EtherCAT P®, Safety over EtherCAT®, TwinSAFE®, XFC®, XTS® and XPlanar® are registered trademarks of and licensed by Beckhoff Automation GmbH.

Other designations used in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owners.

Patent Pending

The EtherCAT technology is patent protected, in particular by the following applications and patents:

EP1590927, EP1789857, EP1456722, EP2137893, DE102015105702

with corresponding applications or registrations in various other countries.



EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany

Copyright

© Beckhoff Automation GmbH & Co. KG, Germany.

The reproduction, distribution and utilisation of this document as well as the communication of its contents to others without express authorisation are prohibited.

Offenders will be held liable for the payment of damages. All rights reserved in the event of the grant of a patent, utility model or design.

General and safety instructions

Icons used and their meanings

This documentation uses the following icons next to the safety instruction and the associated text. Please read the (safety) instructions carefully and comply with them at all times.

Icons in explanatory text

1. Indicates an action.

⇒ Indicates an action statement.

DANGER

Acute danger to life!

If you fail to comply with the safety instruction next to this icon, there is immediate danger to human life and health.

CAUTION

Personal injury and damage to machines!


If you fail to comply with the safety instruction next to this icon, it may result in personal injury or damage to machines.

NOTICE

Restriction or error

This icon describes restrictions or warns of errors.

Tips and other notes

 This icon indicates information to assist in general understanding or to provide additional information.

General example

Example that clarifies the text.

NC programming example

Programming example (complete NC program or program sequence) of the described function or NC command.

Specific version information


 Optional or restricted function. The availability of this function depends on the configuration and the scope of the version.

Table of contents

Notes on the documentation.....	3
General and safety instructions	4
1 CNC system parameters.....	7
2 Conformity comparison between DIN ISO programming and CNC programming language syntax	14
2.1 Meaning of G functions	14
2.2 Meaning of other M functions	16
2.3 Address character and special characters	17
3 Support and Service	19

1 CNC system parameters

Functionality overview of TwinCAT CNC

Note: x = function is supported

1	Machining technologies	TwinCAT CNC
1.1	Turning	x
1.2	Milling	x
1.3	Drilling	x
1.4	Grinding	x
1.5	Handling	x
1.6	Special machines (plasma, laser, torch cutting, bending etc.)	x
1.7	Wire erosion	x
1.8	Punching and nibbling	x

2	Axis control	TwinCAT CNC
2.1	Maximum number of axes	64
2.2	Default number of axes	8
2.3	Maximum number of axes/spindles per channel	32
2.4	Number of independent channels	12
2.5	Maximum number of interpolation axes per channel	32
2.6	Maximum number of controlled axes per channel	6
2.7	Maximum number of independent axes per channel	32
2.8	PLC-controlled spindles per channel	6
2.9	Axis identifier in the channel	Each string starting with X, Y, Z, U, V, W, Q, A, B, C
2.10	Maximum number of synchronised spindles per channel	12
2.11	Number of definable coupling groups	7
2.12	Number of programmable axis pairs within a coupling group	15
2.13	Maximum number of gantry combinations	16 (16 masters, with 1 slave each)
2.14	Maximum number of axes within a gantry combination	32 (1 master, with 31 slaves)
2.15	Programmable motion path limiting (software limit switches)	x
2.16	Axis transfer between channels	32
2.17	Programming resolution	0.0001 mm
2.18	Probing signal resolution	0.0001 mm
2.19	Smallest programmable increment	0.0001 mm
2.20	Multiple position measuring systems	
2.21	Programming switchover inch/metric	G70/G71
2.22	Backlash compensation	x <input type="checkbox"/>
2.23	Axis error compensation direction-dependent (bilateral leadscrew error compensation)	1500 points each Parameterisable by P-COMP-00059 as of Build V3.1.3079.06.
2.24	Cross compensation Overhang compensation	1 axis, 1000 points Parameterisable by P-COMP-00060 as of Build V3.1.3079.06.
2.25	Axis homing with limit switch and zero pulse	x

2	Axis control	TwinCAT CNC
2.26	Velocity feedforward control	x
2.27	Acceleration feedforward control	x
2.28	Measuring	x
2.29	Axis position relative to PLC	x
2.30	Parameterisable axis filters	x
2.31	Temperature compensation	x
2.32	Plane compensation	2 axes, 100 points Parameterisable by P-COMP-00061/ P-COMP-00010/ P-COMP-00011 as of Build V3.1.3079.06.
2.33	Jerk feedforward control	x
2.34	Linear axis motion range	-214m to +214m
2.35	Rotary axis motion range	-594 to +594 (revolutions)
2.36	Spindle rotary axis motion range	unlimited
2.37	Circle radius	0 – 10 ⁶ m
2.38	Axis-specific transformation	Crank, e-function
2.39	Maximum number of cycles to couple cross compensation (application-specific)	20
2.40	Volumetric compensation acc. to ISO 230	As of CNC Build 3039.0
2.41	Measurement and calibration cycles for kinematics 80 and 90 (in variants 0, 2, 8)	x
2.42	Maximum number of channels to which a spindle can be attached at start-up	7

3	Interpolation functions	TwinCAT CNC
3.1	Smallest interpolation size As of CNC Build 2806.0:	0.0001 mm 0.00000001 mm
3.2	Rapid traverse	G0
3.3	Linear interpolation	G1
3.4	Exact stop	G60
3.5	Circular interpolation	G2/G3
3.6	Programming absolute/relative centre point	G161/G162
3.7	Radius programming	x
3.8	Helical interpolation	G2/G3
3.9	Feedforward control/motion free from position lag	G135/G137
3.10	Feedforward control percentage weighting	G136
3.11	Dwell time	G4
3.12	Face machining	#FACE ON/OFF
3.13	Lateral surface machining	#CYL ON/OFF
3.14	Thread cutting	G33
3.15	Multi-start thread	G33
3.16	Thread tapping without compensating chuck based on feed rate	G63
3.17	Thread tapping without compensating chuck based on pitch	G331, G332
3.18	Indexing table clamping	
3.19	NC block look ahead	200 (1000)
3.20	Configurable interpolation cycle time	0.5 to 20 ms
3.21	Spline interpolation	AKIMA/BSPLINE

3	Interpolation functions	TwinCAT CNC
3.22	Block-specific parameterisation of acceleration slope	#SLOPE [TYPE..]
3.23	Forward/reverse motion on the contour	x
3.24	Lead axis interpolation	#LEAD ON/OFF
3.25	Dynamic coordinate systems	x

4	Feed rate functions	TwinCAT CNC
4.1	Rapid traverse velocity	0.000001 - 1000 m/min
4.2	Rapid traverse override	x
4.3	F word (feed rate in block)	0.000001 - 1000 m/min
4.4	Speed	0.0002 – 100000 rpm
4.5	Manual rapid traverse	0 - 1000 m/min
4.6	Manual feed rate	0 - 1000 m/min
4.7	Axis-specific override	x
4.8	Feed per minute	G94
4.9	Feed rate per revolution	G95
4.10	Programming the machining time	G93
4.11	Transmission response	G8/G9
4.12	Feed stop	x
4.13	Acceleration ramp for rapid traverse	x
4.14	Weighting factors for acceleration ramp	G132/G133
4.15	Constant cutting speed	G96
4.16	Adjusting the feed rate when tool radius compensation is active	G10/G11
4.17	Feed rate specified by PLC	x
4.18	Feed rate reduction by PLC signal	x
4.19	Weighting of geometrical ramp time	G134
4.20	E word (feed rate at block end)	x

5	5-axis functions	TwinCAT CNC
5.1	RTCP (rotation tool centre point)	#RTCP ON/OFF
5.2	TLC (tool length compensation)	#TLC ON/OFF
5.3	Tool orientation	#TOOL ORI CS
5.4	Selecting the kinematic	#KIN ID
5.5	Definition of a machining coordinate system	#CS ON/OFF
5.6	Definition of a coordinate system for fixture adaptation	#ACS ON/OFF
5.7	Linkage of coordinate systems	8
5.8	Effector coordinate system	#ECS ON/OFF
5.9	Temporary transition to the machine coordinate system	#MCS ON/OFF
5.10	Kinematic library	x
5.11	Manual mode in machining coordinate system	x
5.12	Round pipe/section tube machining	x
5.13	Universal serial kinematics	x
5.14	Free definition of rotation rules for coordinate systems	x
5.15	Cascading 2 kinematic transformations	x

6	Programming inputs	TwinCAT CNC
6.1	Skipped block	/
6.2	Number of programs	Load from hard disc/network
6.3	Any block numbering	x

6	Programming inputs	TwinCAT CNC
6.4	Radius/diameter programming	G51/G52
6.5	Interpolation planes	G17/G18/G19
6.6	-	
6.7	Rotary axis mode	x
6.8	Endlessly rotating rotary axis	x
6.9	Freely definable machine coordinate system per channel	G53
6.10	Workpiece coordinate system per channel	#CS ON
6.11	Workpiece zero points per channel	G54 – G59
6.12	Extended workpiece zero points	90
6.13	Twisting the coordinate system	x
6.14	Clamping offsets	150 groups
6.15	Position preset	#PSET/#PRESET
6.16	Reference point offset	G92
6.17	Number of definable coordinate systems (CS, ACS, BCS (as of Build V3.1.3079.36))	5 each
6.18	Insert chamfers and roundings	G301/G302
6.19	Number of P parameters per channel	1000
6.20	Dimension of parameter arrays	4
6.21	Global variables V.P (not cross-program)	1000
6.22	Global variables V.S (cross-program)	400
6.23	Local variables V.L (not cross-program)	50
6.24	Number of subroutine levels	50
6.25	Number of user macros per channel	100 Parameterisable by P-CHAN-00509 as of Build V3.1.3079.17.
6.26	Mirroring	G20/G21/G22/G23
6.27	Absolute/incremental data	G90/G91
6.28	Machining time calculation	x
6.29	Mathematical functions	+, -, *, /, **, MOD, ABS, SQR, SQRT, EXP, LN, DEXP, &, , ^, INV, LN, ==, !=, >=, <=, <, AND, OR, XOR, NOT TRUE, FALSE, SIN, COS, TAN, ASIN, ACOS, ATAN, ATAN2, ACOT, LOG, INT, FRACT, ROUND, CEIL, FLOOR, EXIST, SIZEOF, MIN, MAX, SIGN
6.30	Time measurements	#TIMER
6.31	Control block statements (high-level language constructs)	BREAK, CONTINUE, REPEAT, DO, FOR, GOTO, IF; ELSE; ENDIF, SWITCH, CASE, DEFAULT, ENDSWITCH, WHILE, ENDWHILE
6.32	Programming axis names	x
6.33	Messages from the NC program	#MSG
6.34	Cross-channel synchronisation with parameter transfer	#SIGNAL/WAIT
6.35	Clamping position compensation	#ACS ON/OFF
6.36	Definition and activation of a machining coordinate system	#CS ON/OFF

6	Programming inputs	TwinCAT CNC
6.37	User macros: Max. number of characters in macro name	30 Parameterisable by P-CHAN-00511 as of Build V3.1.3079.17.
6.38	User macros: Max. number of characters in macro content	80 Parameterisable by P-CHAN-00512 as of Build V3.1.3079.17.
6.39	Overwritable user macros	x
6.40	Nesting depth user macros	14
6.41	Number of expression labels	200 Parameterisable by P-CHAN-00516 as of Build V3.1.3079.42.
06:42:00	Number of string labels	200 Parameterisable by P-CHAN-00515 as of Build V3.1.3079.42.
6.43	Max. string label length	30
6.44	Only P for parameters	x
6.45	Max. number of transfer parameters for cross-channel synchronisation	12
6.46	Max. string length of axis name	16
6.47	Workspace monitoring	20 spaces, 20 points each
6.48	Changing absolute/incremental in NC block	x
6.49	Axis-independent cycle programming	x
6.50	User macros: Initialisation via file	50
6.51	Use of multiple tool (fitting cycle)	x
6.52	String operations:	LEFT, MID, LEN, ...
6.53	Scaling contours	#SCALE ON/OFF
6.54	Calling block sequences	L SEQUENCE..
6.55	Axis-specific polynomial programming (max. 2 axes)	X[POLY...]
6.56	Max. string length of an NC program row	4000
6.57	Max. string length of a manual block	300
6.58	Max. index of user-defined variable or parameter arrays	0 .. 65535
6.59	Cross-channel variable V.I. (cross-program)	Memory

7	Operation	TwinCAT CNC
7.1	MDI mode per channel	x
7.2	Block search	x
7.3	Axis homing	x
7.4	Single-block mode	x
7.5	Manual mode	x
7.6	Absolute position determination	x
7.7	Homing position offset	x
7.8	Handwheel superimposition per channel	x
7.9	Handwheel superimposition per axis	x
7.10	Handwheel sensitivity	x

7	Operation	TwinCAT CNC
7.11	Handwheel interrupt	x
7.12	jog mode	x
7.13	Continuous jog mode	x
7.14	Programmed stop	M0
7.15	Optional stop	M1

8	Spindles and auxiliary functions	TwinCAT CNC
8.1	Configurable M functions per channel	M0 – M999
8.2	Configurable H functions per channel	H0 – H999
8.3	Maximum number of M/H functions per NC block	20
8.4	Constant cutting speed per channel	x
8.5	Tool-specific limit speed per spindle	x
8.6	Tool-specific limit acceleration per spindle	x
8.7	Spindle synchronisation	x
8.8	Multiple spindle control	6
8.9	Spindle interpolation (C axis)	x
8.10	Block global synchronisation of M/H function at NC command	x
8.11	Block global synchronisation of M/H function at G1	x
8.12	Automatic determination of gear speed	M40 – M45

9	Tool functions	TwinCAT CNC
9.1	Number of internal tool locations per channel	200
9.2	Connecting to external tool management system	x
9.3	Tool number	T0 to T2000000000
9.4	Sister tools and variants	x
9.5	Support for tool life calculation	x
9.6	Programmable tool data	x
9.7	Free tool-specific parameters	60
9.8	Tool-specific minimum and maximum speeds	x
9.9	Tool-specific acceleration	x
9.10	Tool-specific kinematic	x
9.11	Tool offsets in all axes	x
09:12:00	Tool-specific kinematic parameters	x
9.13	Tool length compensation	D
9.14	Tool radius compensation	G40/G41/G42
9.15	Transition elements rounding/chamfer	x
9.16	Direct and indirect tool selection	x
9.17	Cutter radius compensation	x
9.18	Number of sister tools and variants	3
9.19	Tool wear compensation	x
9.20	Selection types of tool radius compensation	G05/G138/G139/G236/G237/ G238/G239

10	PLC functions	TwinCAT CNC
10.1	Configurable CNC/PLC variables and variable arrays V.E.	215 per channel (Build 15xx: 225 per channel)
10.2	M function look ahead	Distance/time
10.3	Structure definition for CNC/PLC variables	50 per channel
10.4	CNC/PLC variables: Elements per structure	50 per channel

10	PLC functions	TwinCAT CNC
10.5	CNC/PLC variables: Structure nodes reserved for variable structures	750 per channel
10.6	Extended string length of CNC/PLC variables	127 characters

11	Other system parameters	TwinCAT CNC
11.1	Maximum axis velocity	2000 m/s
11.2	Maximum axis acceleration	1000 m/s ²
11.3	Minimum ramp time	0 s
11.4	Maximum ramp time	100 s
11.5	Maximum override	2000 ‰

2 Conformity comparison between DIN ISO programming and CNC programming language syntax

The comparison is based on DIN 66025 Part 1 (last edition January 1983) and Part 2 (last edition September 1988):

2.1 Meaning of G functions

No.	DIN/ISO code	Description	TwinCAT code	Conformity check
1	G00	Rapid traverse	G00	compliant
2	G01	Linear interpolation with programmed feed rate	G01	compliant
3	G02	Clockwise circular interpolation with programmed feed rate	G02	compliant
4	G03	Anti-clockwise circular interpolation with programmed feed rate	G03	compliant
5	G04	Programmable dwell time	G04	compliant
6	G05	Not assigned	G05	Direct tangential selection/deselection of tool radius compensation
7	G06	Selecting spline interpolation	G151	compliant
8	G07	Not assigned	Not assigned	
9	G08	Acceleration at block start	G08	compliant
10	G09	Deceleration at block end	G09	compliant
11	G10	Not assigned	G10	Constant feed rate with tool radius compensation
12	G11	Not assigned	G11	Adapted feed rate with tool radius compensation
13	G12	Not assigned	G12	Deselect corner deceleration
14	G13	Not assigned	G13	Select corner deceleration
15	G14	Not assigned	Not assigned	

16	G15	Not assigned	Not assigned	
17	G16	Not assigned	Not assigned	
18	G17	Select working plane XY	G17	compliant
19	G18	Select working plane ZX	G18	compliant
20	G19	Select working plane YZ	G19	compliant
21	G20	Not assigned	G20	Deselect mirroring
22	G21	Not assigned	G21	Mirroring programmed path on the Y axis
23	G22	Not assigned	G22	Mirroring programmed path on the X axis
24	G23	Not assigned	G23	Superimposing G21 and G22
25	G24	Not assigned	Not assigned	
26	G25	Not assigned	G25	Linear transitions with TRC

27	G26	Not assigned	G26	Circular transitions with TRC
28	G27	Not assigned	Not assigned	
29	G28	Not assigned	Not assigned	
30	G29	Not assigned	Not assigned	
31	G30	Not assigned	Not assigned	
32	G31	Not assigned	Not assigned	
33	G32	Not assigned	Not assigned	
34	G33	Thread cutting, constant pitch	G33	compliant
35	G34	Thread cutting, increasing pitch	Not assigned	
36	G35	Thread cutting, decreasing pitch	Not assigned	
37	G36	Not assigned	Not assigned	
38	G37	Not assigned	Not assigned	
39	G38	Not assigned	Not assigned	
40	G39	Not assigned	Not assigned	
41	G40	Deactivate tool radius compensation	G40	compliant
42	G41	Activate tool radius compensation on left of contour	G41	compliant
43	G42	Activate tool radius compensation on right of contour	G42	compliant
44	G43	Not assigned	Not assigned	
45	G44	Not assigned	Not assigned	
46	G45	Not assigned	Not assigned	
47	G46	Not assigned	Not assigned	
48	G47	Not assigned	Not assigned	
49	G48	Not assigned	Not assigned	
50	G49	Not assigned	Not assigned	
51	G50	Not assigned	Not assigned	
52	G51	Not assigned	G51	Selection of diameter programming
53	G52	Not assigned	G52	Deselection of diameter programming
54	G53	Cancel zero offset	G53	compliant
55	G54	Select zero offset 1	G54	compliant
56	G55	Select zero offset 2	G55	compliant
57	G56	Select zero offset 3	G56	compliant
58	G57	Select zero offset 4	G57	compliant
59	G58	Select zero offset 5	G58	compliant
60	G59	Select zero offset 6	G59	compliant
61	G60	Not assigned	G60	Exact stop (stop at block end, then continue motion in next block)
62	G61	Not assigned	G61	Select polynomial contouring
63	G62	Not assigned	Not assigned	
64	G63	Tapping	G63	compliant
65	G64	Not assigned	Not assigned	
66	G65	Not assigned	Not assigned	
67	G66	Not assigned	Not assigned	
68	G67	Not assigned	Not assigned	
69	G68	Not assigned	Not assigned	

70	G69	Not assigned	Not assigned	
71	G70	Inputs in inch (inch)	G70	compliant
72	G71	Inputs in metric units	G71	compliant
73	G72	Not assigned	Not assigned	
74	G73	Not assigned	Not assigned	
75	G74	Homing	G74	compliant
76	G75	Not assigned	Not assigned	
77	G76	Not assigned	Not assigned	
78	G77	Not assigned	Not assigned	
79	G78	Not assigned	Not assigned	
80	G79	Not assigned	Not assigned	
81	G80	End machining cycle	G80 or not assigned	Implicit subroutine call (if name was configured)
82	G81	Drilling, centring cycle	G81 or not assigned	Implicit subroutine call (if name was configured)
83	G82	Drilling, spot facing cycle	G82 or not assigned	Implicit subroutine call (if name was configured)
84	G83	Deep hole drilling, chip breaking cycle	G83 or not assigned	Implicit subroutine call (if name was configured)
85	G84	Thread tapping cycle	G84 or not assigned	Implicit subroutine call (if name was configured)
86	G85	Boring 1 cycle	G85 or not assigned	Implicit subroutine call (if name was configured)
87	G86	Boring 2 cycle	G86 or not assigned	Implicit subroutine call (if name was configured)
88	G87	Boring 3 cycle	G87 or not assigned	Implicit subroutine call (if name was configured)
89	G88	Boring 4 cycle	G88 or not assigned	Implicit subroutine call (if name was configured)
90	G89	Boring 5 cycle	G89 or not assigned	Implicit subroutine call (if name was configured)
91	G90	Absolute dimension	G90	compliant
92	G91	Incremental dimension	G91	compliant
93	G92	Reference point offset	G92	compliant
94	G93	Inverse-time feed rate in 1/mm	G93	Machining time in seconds
95	G94	Feed rate in mm/min, inch/min, degrees/min	G94	compliant
96	G95	Feed rate in mm/revolution, inch/revolution	G95	compliant
97	G96	Constant cutting speed m/min	G96	compliant
98	G97	Spindle speed in rpm.	G97	compliant
99	G98	Not assigned	G98	Setting negative software limit switch
100	G99	Not assigned	G99	Setting positive software limit switch
End of DIN/ISO definition				

2.2 Meaning of other M functions

No.	DIN/ISO code	Description	TwinCAT code	Conformity check
1	M00	Programmed stop	M00	compliant
2	M01	Optional stop	M01	compliant

No.	DIN/ISO code	Description	TwinCAT code	Conformity check
3	M02	Program end	M02	compliant
4	M03	Clockwise spindle rotation (Classes 1 - 3) or cutting on (Class 4)	M03	Compliant (meaning is configurable)
5	M04	Anticlockwise spindle rotation (Classes 1 - 3) or cutting off (Class 4)	M04	Compliant (meaning is configurable)
6	M05	Spindle stop (Classes 1 - 3) or not assigned (Class 4)	M05	Compliant (meaning is configurable)
7	M06	Tool change	M6 or not assigned	Implicit subroutine call (if name was configured)
8	M10	Clamp	M10	
9	M11	Release	M11	
10	M17	Not assigned	M17	Subroutine end
11	M19	Spindle positioning (Classes 1 - 3) or not assigned (Class 4)	M19	Compliant (meaning is configurable)
12	M29	Not assigned	M29	Subroutine end
13	M30	Program end	M30	compliant

14	M40	Automatic gear changes (Classes 1 - 3) or unassigned	M40 or not assigned	compliant
15	M41	Gear stage 1 (Classes 1 - 3) or free	M41 or not assigned	compliant
16	M42	Gear stage 2 (Classes 1 - 3) or free	M42 or not assigned	compliant
17	M43	Gear stage 3 (Classes 1 - 3) or free	M43 or not assigned	compliant
18	M44	Gear stage 4 (Classes 1 - 3) or free	M44 or not assigned	compliant
19	M45	Gear stage 5 (Classes 1 - 3) or free	M45 or not assigned	compliant
20	M48	Effective superimposition (e.g. override)	G166/G167	Select path/spindle override 100% (blockwise)
21	M49	Ineffective superimposition	not assigned	
22	M60	Tool change	not assigned	

The meanings of all other M functions are settable depending on the specific class used and defined in the DIN/ISO code.

2.3 Address character and special characters

No.	DIN/ISO code	Description	TwinCAT code	Conformity check
1	A	Rotation about X	A	compliant
2	B	Rotation about Y	B	compliant
3	C	Rotation about Z	C	compliant
4	D	Tool data	D	compliant
5	E	Not assigned	E	Feed at block end
6	F	Feedrate	F	compliant
7	G	Path preparatory functions	G	compliant
8	H	Not assigned	H	Additional technology functions
9	I	Interpolation parameter for X	I	compliant
10	J	Interpolation parameter for Y	J	compliant
11	K	Interpolation parameter for Z	K	compliant
12	R	Not assigned	L/LL	Definition/call of subroutines
13	M	Technology functions	M	compliant

No.	DIN/ISO code	Description	TwinCAT code	Conformity check
14	N	Block number	N	compliant
15	O	Not assigned	not assigned	
16	P	Not assigned	P	Calculation parameter
17	Q	Not assigned	Q	Freely configurable axis
18	R	Not assigned	R	Circle radius
19	B	Spindle speed	B	compliant
20	T	Selecting tool position	T	compliant
21	U	Motion parallel to X axis	U	compliant
22	V	Motion parallel to Y axis	V	compliant
23	W	Motion parallel to Z axis	W	compliant
24	X	Motion in direction of X axis	X	compliant
25	Y	Motion in direction of Y axis	Y	compliant
26	Z	Motion in direction of Z axis	Z	compliant
27	%	Program start	%	compliant
28	(Start of a comment	(compliant
29)	End of a comment)	compliant
30	+	Plus	+	compliant
31	-	Minus	-	compliant
32	.	Decimal point	.	compliant
33	/	Skip block	/	compliant
34	:	Main block, also conditional stop of program reset	:	Marker to define a jump label (block number) or 2-path programming
35	;	Start of a comment	;	Comment up to block end

3 Support and Service

Beckhoff and their partners around the world offer comprehensive support and service, making available fast and competent assistance with all questions related to Beckhoff products and system solutions.

Download finder

Our [download finder](#) contains all the files that we offer you for downloading. You will find application reports, technical documentation, technical drawings, configuration files and much more.

The downloads are available in various formats.

Beckhoff's branch offices and representatives

Please contact your Beckhoff branch office or representative for [local support and service](#) on Beckhoff products!

The addresses of Beckhoff's branch offices and representatives round the world can be found on our internet page: www.beckhoff.com

You will also find further documentation for Beckhoff components there.

Beckhoff Support

Support offers you comprehensive technical assistance, helping you not only with the application of individual Beckhoff products, but also with other, wide-ranging services:

- support
- design, programming and commissioning of complex automation systems
- and extensive training program for Beckhoff system components

Hotline: +49 5246 963-157
e-mail: support@beckhoff.com

Beckhoff Service

The Beckhoff Service Center supports you in all matters of after-sales service:

- on-site service
- repair service
- spare parts service
- hotline service

Hotline: +49 5246 963-460
e-mail: service@beckhoff.com

Beckhoff Headquarters

Beckhoff Automation GmbH & Co. KG

Huelshorstweg 20
33415 Verl
Germany

Phone: +49 5246 963-0
e-mail: info@beckhoff.com
web: www.beckhoff.com

More Information:
www.beckhoff.com/TF5200

Beckhoff Automation GmbH & Co. KG
Hülshorstweg 20
33415 Verl
Germany
Phone: +49 5246 9630
info@beckhoff.com
www.beckhoff.com

