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Overview of functions

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The functionality of the SINUMERIK 828 CNC controls complies with the export list restrictions. Accordingly, these CNC controls do not require official approval as a result of their type in accordance with EU or German law.

The following overview lists all the functions that are available with SINUMERIK 828 controls.

The information in the overview of functions of SINUMERIK 828 is based on the following software versions:

CNC	Software version
SINUMERIK 828D BASIC	4.7
SINUMERIK 828D	4.7

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Overview of functions
CNC controls SINUMERIK 828

Control structure and configuration

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
Control structure and configuration					
Panel-based compact CNC comprising:		✓	✓	✓	✓
• Compact operator-panel CNC		✓	✓	✓	✓
• CNC/PLC control unit		✓	✓	✓	✓
• Closed-loop control for drives		5	6	6	6
Design, drive-based/PC-based		–	–	–	–
Operator-panel CNC:					
• Horizontal		✓	✓	✓	✓
• Vertical		✓	✓	✓	✓
• Color display		8.4"	10.4"	10.4"	10.4"
• Integrated QWERTY keyboard with short-stroke keys		✓	✓	✓	✓
SINUMERIK operator panels with TCU		–	–	–	–
SINUMERIK operator panels with PCU		–	–	–	–
SINUMERIK 828D PPU:					
• PPU 240.3	6FC5370-4AA30-0AA0	O	–	–	–
• PPU 241.3	6FC5370-3AA30-0AA0	O	–	–	–
• PPU 260.3	6FC5370-6AA30-0AA0	–	O	–	–
• PPU 261.3	6FC5370-5AA30-0AA0	–	O	–	–
• PPU 280.3	6FC5370-8AA30-0AA0	–	–	O	O
• PPU 281.3	6FC5370-7AA30-0AA0	–	–	O	O
System software, export version, on CF card, with license					
• SINUMERIK 828D with PPU 240/PPU 241:					
- Turning	6FC5835-1GY40-4YA0	O	–	–	–
- Milling	6FC5835-2GY40-4YA0	O	–	–	–
- G-Tech Cylindrical/G-Tech Surface	6FC5835-3GY40-4YA0	O	–	–	–
• SINUMERIK 828D with PPU 260/PPU 261:					
- Turning	6FC5834-1GY40-4YA0	–	O	–	–
- Milling	6FC5834-2GY40-4YA0	–	O	–	–
- G-Tech Cylindrical/G-Tech Surface	6FC5834-3GY40-4YA0	–	O	–	–
• SINUMERIK 828D with PPU 280/PPU 281:					
- Turning	6FC5833-1GY40-4YA0	–	–	O	–
- Milling	6FC5833-2GY40-4YA0	–	–	O	–
- G-Tech Cylindrical/G-Tech Surface	–	–	–	–	–
• SINUMERIK 828D with PPU 280/PPU 281:					
- Turning advanced	6FC5836-1GY40-4YA0	–	–	–	O
- Milling advanced	6FC5836-2GY40-4YA0	–	–	–	O
- G-Tech Cylindrical advanced /G-Tech Surface advanced	6FC5836-3GY40-4YA0	–	–	–	O
SINUMERIK Operate embedded HMI		✓	✓	✓	✓
Windows-based HMI		–	–	–	–
DRIVE-CLiQ drive interface		✓	✓	✓	✓
Numeric Control Extension NX10.3 for applications with up to 8 axes or for reducing the current controller cycle clock to 62.5 µs:	**6SL3040-1NC00-0AA0**				
• Turning		–	–	O	O
• Milling		–	O	O	O
• G-Tech Cylindrical/G-Tech Surface		–	–	–	O

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✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
Control structure and configuration (continued)					
Numeric Control Extension NX15.3 for applications with up to 10 axes or for reducing the current controller cycle clock to 62.5 µs:	**6SL3040-1NB00-0AA0**				
• Turning		–	–	–	O
• Milling		–	–	–	–
• G-Tech Cylindrical/G-Tech Surface		–	–	–	O
Machining channel, maximum:					
• Turning	Basic scope for SW 28xA	1	1	1	2
• Milling		1	1	1	1
• G-Tech Cylindrical/G-Tech Surface		1	1	–	2
Mode group, maximum:					
• Turning	Basic configuration: 1 mode group	1	1	1	2
• Milling	Basic configuration: 1 mode group	1	1	1	1
• G-Tech Cylindrical/G-Tech Surface	Basic configuration: 1 mode group	1	1	–	2
Mode group, each additional	**6FC5800-0AC00-0YB0**				
• Turning		–	–	–	O
• Milling		–	–	–	–
• G-Tech		–	–	–	O
CNC user memory (buffered) for CNC part programs:					
• Turning		3 MB	5 MB	8 MB	10 MB
• Milling		3 MB	5 MB	8 MB	10 MB
• G-Tech Cylindrical/G-Tech Surface		3 MB	5 MB	–	10 MB
CNC user memory expansion	**6FC5800-0AP77-0YB0**	–	O 100 MB	O 100 MB	O 100 MB
Execution from external storage EES Central part program memory on server or USB stick	**6FC5800-0AP75-0YB0**	–	O	O	O
Additional CNC user memory on user CompactFlash card	The CompactFlash card must be ordered separately.	✓	✓	✓	✓
Additional 256 MB HMI user memory on CompactFlash card of the PPU		–	–	–	–
Axes/spindles or positioning axes/auxiliary spindle:					
• Basic quantity of axes/spindles:					
- Turning		3	3	3	3
- Milling		4	4	4	4
- G-Tech Cylindrical/G-Tech Surface		3	3	–	3
Axes/spindles or positioning axes/auxiliary spindle (continued):					
• Maximum configuration axes/spindles + PLC positioning axes:					
- Turning		5	6 + 2	8 + 2	10 + 2
- Milling		5	6 + 2	6 + 2	8 + 2
- G-Tech Cylindrical/G-Tech Surface		5	6 + 2	–	10 + 2
Axis/spindle, each additional	**6FC5800-0AC20-0YB0**	O	O	O	O
Positioning axis/auxiliary spindle, each additional	**6FC5800-0AC30-0YB0**	O	O	O	O
PLC-controlled axis		✓	✓	✓	✓
PLC positioning axis, e.g. CU310-2 PN via PROFINET, maximum		–	2	2	2
Systems and number of the TOOLCARR:					
• Turning		–	–	–	–
• Milling		–	–	–	–
• G-Tech Cylindrical/G-Tech Surface		2	2	–	4
CNC lock function	**6FC5800-0AP76-0YB0**	O	O	O	O

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Connectable drives

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
Connectable drives					
SINAMICS S120 Motor Modules via DRIVE-CLiQ	See Catalog NC 62	✓	✓	✓	✓
SINAMICS S120 DRIVE-CLiQ on motor	See Measuring systems	✓	✓	✓	✓
SINAMICS S120 Sensor Module Cabinet:	See Catalog NC 62				
• SMC20	**6SL3055-0AA00-5BA3**	O	O	O	O
• SMC30	**6SL3055-0AA00-5CA2**	O	O	O	O
• SMC40	**6SL3055-0AA00-5DA0**	O	O	O	O
SINAMICS S120 Sensor Module External:	See Catalog NC 62				
• SME20	**6SL3055-0AA00-5EA3**	O	O	O	O
• SME25	**6SL3055-0AA00-5HA3**	O	O	O	O
• SME120	**6SL3055-0AA00-5JA3**	O	O	O	O
• SME125	**6SL3055-0AA00-5KA3**	O	O	O	O
SINAMICS S120, supplementary system components:					
• DMC20 DRIVE-CLiQ Hub Module	**6SL3055-0AA00-6AA1**	O	O	O	O
• DME20 DRIVE-CLiQ Hub Module	**6SL3055-0AA00-6AB0**	O	O	O	O
SINAMICS S120 Combi	See SINAMICS S120 drive system.	O	O	O	O
SINAMICS S120 Motor Modules in booksize format:	See SINAMICS S120 drive system.				
• Internal air cooling	6SL3120-...	O	O	O	O
• External air cooling	6SL3121-...	O	O	O	O
SINAMICS S120 Active Line Modules booksize format:	See SINAMICS S120 drive system.				
• Internal air cooling	6SL3130-...	O	O	O	O
• External air cooling	6SL3131-...	O	O	O	O
SINAMICS S120 Smart Line Modules booksize format:	See SINAMICS S120 drive system.				
• Internal air cooling	6SL3130-...	O	O	O	O
• External air cooling	6SL3131-...	O	O	O	O
SINAMICS S120 Motor Modules in booksize compact format, only as expansion axes for SINAMICS S120 Combi:	See SINAMICS S120 drive system.				
• Internal air cooling	3SL3420-...	O	O	O	O
SINAMICS S120 Motor Modules in chassis format, internal air cooling (rated pulse frequency 2 kHz)	On request.	O	O	O	O
Analog Drive Interface for 4 axes ADI 4		–	–	–	–

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✓ Basic version O Option – Not available	**Article No.** Notes	**SINUMERIK 828D BASIC** **SW 24x**	**SW 26x**	**SW 28x**	**SW 28xA**
Connectable measuring systems					
Number of measuring systems per axis, maximum	Not valid for PLC drives.	2	2	2	2
Absolute encoders installed in the motors:					
• SIMOTICS S-1FT7		O	O	O	O
• SIMOTICS S-1FK7		O	O	O	O
• SIMOTICS M-1PH8		O	O	O	O
Incremental encoders installed in the motors:					
• SIMOTICS S-1FT7		O	O	O	O
• SIMOTICS S-1FK7		O	O	O	O
• SIMOTICS M-1PH8		O	O	O	O
Resolvers installed in SIMOTICS S-1FK7 motors		O	O	O	O
Rotary measuring systems with:					
• RS422 (TTL)	6FX2001-2...	O	O	O	O
• sin/cos 1 V_{pp}	6FX2001-3...	O	O	O	O
• Distance-coded reference marks		O	O	O	O
• EnDat 2.1/EnDat 2.2		O	O	O	O
• DRIVE-CLiQ	6FX2001-5...	O	O	O	O
Linear measuring systems LMS with:	See Catalog NC 62				
• sin/cos 1 V_{pp}		O	O	O	O
• Distance-coded reference marks RS422 (TTL)		O	O	O	O
• EnDat 2.1		O	O	O	O
Absolute encoder connection with SSI interface		–	–	–	–
Certified DQI encoder (DQI 100)	See measuring systems	O	O	O	O
Connectable motors (preferred versions)					
SIMOTICS S-1FK7 servomotor		O	O	O	O
SIMOTICS S-1FT7 servomotor		O	O	O	O
SIMOTICS M-1PH8 spindle motor		O	O	O	O
SIMOTICS M-1FE1 built-in motor	Not with SINAMICS S120 Combi.	O	O	O	O
SIMOTICS L-1FN3 linear motor		–	–	–	–
SIMOTICS T-1FW6 built-in torque motor	Not with SINAMICS S120 Combi.	O	O	O	O
Hybrid spindle / motor spindle 2SP1	www.siemens.com/spindles	O	O	O	O
Third-party motor	On request.	O	O	O	O

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Overview of functions
CNC controls SINUMERIK 828

Axis functions/Spindle functions

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
Axis functions					
Feedrate override		0 ... 200 %	0 ... 200 %	0 ... 200 %	0 ... 200 %
Feedrate override, axis-specific		0 ... 200 %	0 ... 200 %	0 ... 200 %	0 ... 200 %
Traversing range, decades		± 9	± 9	± 9	± 9
Rotary axis, turning endlessly		✓	✓	✓	✓
Velocity, maximum		300 m/s	300 m/s	300 m/s	300 m/s
Acceleration with jerk limitation		✓	✓	✓	✓
Programmable acceleration		✓	✓	✓	✓
Follow-up mode		✓	✓	✓	✓
Measuring systems 1 and 2, selectable		✓	✓	✓	✓
Feedrate interpolation		✓	✓	✓	✓
Separate feedrate for roundings and chamfers		✓	✓	✓	✓
Travel to fixed stop		✓	✓	✓	✓
Travel to fixed stop with Force Control	**6FC5800-0AM01-0YB0**	O	O	O	O
Analog axis		–	–	–	–
Setpoint exchange		–	–	–	–
Tangential control	**6FC5800-0AM06-0YB0**				
• Turning		–	–	–	–
• Milling		–	–	–	–
• G-Tech Cylindrical/G-Tech Surface		O	O	–	O
Position switching signals/cam controller		–	–	–	–
Advanced Position Control APC		–	–	–	–
Spindle functions					
Spindle speed, analog setpoint		✓	✓	✓	✓
Spindle speed, digital setpoint		✓	✓	✓	✓
Spindle speed, max. programmable value range	Display: ± 999999999.9999	10^6 ... 10^{-4}	10^6 ... 10^{-4}	10^6 ... 10^{-4}	10^6 ... 10^{-4}
Spindle override		0 ... 200 %	0 ... 200 %	0 ... 200 %	0 ... 200 %
Gear stages		5	5	5	5
Intermediate gear		✓	✓	✓	✓
Gear stage selection, automatic		✓	✓	✓	✓
Oriented spindle stop		✓	✓	✓	✓
Spindle speed limitation min./max.		✓	✓	✓	✓
Constant cutting rate		✓	✓	✓	✓
Spindle control via PLC (positioning, oscillation)		✓	✓	✓	✓
Changeover to axis mode		✓	✓	✓	✓
Axis synchronization on-the-fly		✓	✓	✓	✓
Thread run-in and run-out, programmable		✓	✓	✓	✓
Thread cutting with constant or variable pitch		✓	✓	✓	✓
Tapping with compensating chuck/rigid tapping		✓	✓	✓	✓

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✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
Interpolations					
Linear interpolating axes, maximum		4	4	4	4
Circle via center point and end point		✓	✓	✓	✓
Circle via interpolation point		✓	✓	✓	✓
Helical interpolation		✓	✓	✓	✓
Universal interpolator NURBS (non-uniform rational B splines)		✓	✓	✓	✓
Continuous-path mode with programmable rounding clearance		✓	✓	✓	✓
Multi-axis interpolation > 4 interpolating axes		–	–	–	–
Advanced Surface:	**6FC5800-0AS07-0YB0**				
• Turning		–	–	–	–
• Milling		✓	✓	✓	✓
• G-Tech Cylindrical/G-Tech Surface		O	O	–	O
Spline interpolation (A, B and C splines)	**6FC5800-0AS16-0YB0**	O	O	O	O
Compressor for 3-axis machining COMPCAD					
• Turning		–	–	–	–
• Milling		✓	✓	✓	✓
• G-Tech Cylindrical/G-Tech Surface		✓	✓	–	✓
Polynomial interpolation		–	–	–	–
Involute interpolation		–	–	–	–
Crank interpolation CRIP		–	–	–	–
Couplings					
Pair of synchronized axes (gantry axes), Basic	**6FC5800-0AS51-0YB0**	O	O	O	O
• Turning		1	1	1	1
• Milling		1	1	1	2
• G-Tech Cylindrical/G-Tech Surface		1	1	–	1
Master-Slave for drives, basic	**6FC5800-0AS52-0YB0**	O	O	O	O
Generic coupling static, CP-Static, e.g. counterspindle:	**6FC5800-0AM75-0YB0**				
• 1 × simple synchronous spindle, coupling ratio 1:1, no multi-edge machining					
- Turning		–	–	O	O
- Milling		O	O	O	O
- G-Tech Cylindrical/G-Tech Surface		O	O	–	O
Generic coupling basic, CP-Basic, e.g. multi-edge turning:	**6FC5800-0AM72-0YB0**				
• 4 axis pairs in simultaneous coupled motion					
- Turning		O	O	O	O
- Milling		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		O	O	–	O
• 1 × synchronous spindle/multi-edge turning					
- Turning		O	O	O	O
- Milling		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		O	O	–	O
• Master-value coupling/curve table interpolation		–	–	–	–

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Couplings/Transformations

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
Couplings (continued)					
Generic coupling Comfort, CP-Comfort, e.g. electronic gear:	**6FC5800-0AM73-0YB0**				
• 4 axis pairs in simultaneous coupled motion:					
- Turning		O	O	O	O
- Milling		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		O	O	–	O
• 1 x synchronous spindle/multi-edge turning:					
- Turning		O	O	O	O
- Milling		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		O	O	–	O
• Electronic gear for 3 leading axes, without curve table, without cascading:					
- Turning		O	O	O	O
- Milling		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		O	O	–	O
• Axial coupling in the machine coordinate system		–	–	–	–
• Master-value coupling/curve table interpolation		–	–	–	–
Transformations					
Cartesian point-to-point travel PTP		✓	✓	✓	✓
TRANSMIT/cylinder surface transformation	**6FC5800-0AM27-0YB0**	O	O	O	O
TRANSMIT/TRACYL without Y axis	**6FC5800-0AS50-0YB0**	O	O	O	O
Inclined axis for non-orthogonal Y axis for turning machines for non-orthogonal X axis for grinding machines:	**6FC5800-0AM28-0YB0**				
• Turning		–	–	O	O
• Milling		–	–	–	–
• G-Tech Cylindrical		O	O	–	O
• G-Tech Surface		–	–	–	–
Inclined axis Basic, fixed angle for non-orthogonal X axis for grinding machines:	**6FC5800-0AS54-0YB0**				
• Turning		–	–	–	–
• Milling		–	–	–	–
• G-Tech Cylindrical/G-Tech Surface		O	O	–	O
Simple oscillation function, modal					
• Turning		–	–	–	–
• Milling		–	–	–	–
• G-Tech Cylindrical/G-Tech Surface		✓	✓	–	✓
Oscillation function:	**6FC5800-0AM34-0YB0**				
• Turning		–	–	–	–
• Milling		–	–	–	–
• G-Tech Cylindrical/G-Tech Surface		O	O	–	O
Concatenated transformations inclined axis TRAANG after cardanic milling head/TRANSMIT/TRACYL:					
• Turning		–	–	✓	✓
• Milling		–	–	–	–
• G-Tech Cylindrical		✓	✓	–	✓
• G-Tech Surface		–	–	–	–

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✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
Measuring functions and measuring cycles					
Measuring stage 1 2 probes switching with/without deletion of distance-to-go		✓	✓	✓	✓
Measuring cycles for drilling/milling and turning Calibrate workpiece probe, workpiece measurement, tool measurement:	**6FC5800-0AP28-0YB0**				
• Turning		O	O	O	O
• Milling		O	O	O	O
• G-Tech Cylindrical/G-Tech Surface		–	–	–	–
Measure kinematics Determine transformation data of rotary axes:	**6FC5800-0AP18-0YB0**				
• Turning		–	–	–	–
• Milling		O	O	O	O
• G-Tech Cylindrical/G-Tech Surface		–	–	–	–
Logging of measurement results		✓	✓	✓	✓
Technologies					
Handwheel override		✓	✓	✓	✓
Contour handwheel	**6FC5800-0AM08-0YB0**	O	O	O	O
SINUMERIK MDynamics:					
• Advanced Surface:	**6FC5800-0AS07-0YB0**				
- Turning		–	–	–	–
- Milling		✓	✓	✓	✓
- G-Tech Cylindrical/G-Tech Surface		O	O	–	O
• Top Surface:	**6FC5800-0AS17-0YB0**				
- Turning		–	–	–	–
- Milling		–	O	O	O
- G-Tech Cylindrical/G-Tech Surface		–	–	–	–
• High speed settings:					
- Turning		–	–	–	–
- Milling		✓	✓	✓	✓
- G-Tech Cylindrical/G-Tech Surface		O	O	–	O
• User memory expanded by the user CompactFlash card:	CompactFlash card must be ordered separately.				
- Turning		–	–	–	–
- Milling		✓	✓	✓	✓
- G-Tech Cylindrical/G-Tech Surface		✓	✓	–	✓
SINUMERIK Integrate for engineering Run MyRobot /EasyConnect for easy connection of robots and handling systems		✓	✓	✓	✓

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Motion-synchronous actions/Engineering

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
Motion-synchronous actions					
CNC inputs/outputs, high-speed:					
• Digital inputs drives onboard		12	12	12	12
• Digital inputs or outputs drives onboard, parameterizable		8	8	8	8
• Digital inputs CNC onboard		8	8	8	8
• Digital outputs CNC onboard		8	8	8	8
Synchronized actions and fast auxiliary function output incl. 3 synchronous functions		✓	✓	✓	✓
Positioning axes and spindles via synchronized actions (command axes)		✓	✓	✓	✓
Analog value control in the interpolation cycle		–	–	–	–
Evaluation of internal drive variables, basic	**6FC5800-0AS53-0YB0**	O	O	O	O
Asynchronous subprograms ASUB		✓	✓	✓	✓
Interrupt routines with fast retraction from the contour (with subprogram/ASUB)		✓	✓	✓	✓
Cross-mode actions (ASUBs and synchronized actions in all operating modes)		✓	✓	✓	✓
Display active synchronized actions in HMI:	Included in option: Extended operator functions. 6FC5800-0AP16-0YB0				
• Turning		O	O	O	✓
• Milling		O	O	O	✓
• G-Tech Cylindrical/G-Tech Surface		O	O	–	✓
Engineering					
OA Easy Screen:					
• Free screens		5	5	5	5
SINUMERIK Operate Runtime license OA Easy Screen SINUMERIK Integrate for engineering Run MyScreens:					
• > 5 screens, extended functions	**6FC5800-0AP64-0YB0**	O	O	O	O

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✓ Basic version O Option – Not available	**Article No.** Notes	**SINUMERIK 828D BASIC** **SW 24x**	**SW 26x**	**SW 28x**	**SW 28xA**
CNC programming language					
Programming language DIN 66025 and high-level language expansion		✓	✓	✓	✓
Main program call from main program and subprogram		✓	✓	✓	✓
Subroutine levels, maximum		11	11	11	11
Interrupt routines, maximum		4	4	4	4
Number of subprogram passes		≤ 9999	≤ 9999	≤ 9999	≤ 9999
Number of levels for skip blocks		2	2	2	2
Number of levels for skip blocks, maximum:	Included in option: Extended operator functions 6FC5800-0AP16-0YB0	10	10	10	10
• Turning		O	O	O	✓
• Milling		O	O	O	✓
• G-Tech Cylindrical/G-Tech Surface		O	O	–	✓
Polar coordinates		✓	✓	✓	✓
1/2/3-point contours		✓	✓	✓	✓
Dimensions metric/inch, changeover via operator action or program		✓	✓	✓	✓
Inverse-time feedrate		✓	✓	✓	✓
Auxiliary function output via:					
• M word, max. programmable value range: INT 2^{31} -1 ... 2^{31}		✓	✓	✓	✓
• H word, max. programmable value range: REAL ± 3.4028 ex38, INT -2^{31} ... 2^{31} -1	Display: ± 999999999.9999	✓	✓	✓	✓
CNC high-level language with:					
• User variables, GUD, configurable		✓	✓	✓	✓
• Predefined user variables (R parameters), commentable		300	300	300	300
• Predefined global user variables (global R parameters), commentable					
- Turning		–	–	–	100
- Milling		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		–	–	–	100
• Predefined user variables LUD (R parameters), configurable		✓	✓	✓	✓
• Read/write system variables		✓	✓	✓	✓
• Indirect programming		✓	✓	✓	✓
• Program jumps and branches		✓	✓	✓	✓
• Program coordination with WAIT, START, INIT					
- Turning		–	–	–	✓
- Milling		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		–	–	–	✓
• Arithmetic and trigonometric functions		✓	✓	✓	✓
• Comparison operations and logic combinations		✓	✓	✓	✓
• Macro techniques		✓	✓	✓	✓
• Control structures IF-ELSE-ENDIF		✓	✓	✓	✓
• Control structures WHILE, FOR, REPEAT, LOOP		✓	✓	✓	✓
• Commands to HMI		✓	✓	✓	✓
• STRING functions		✓	✓	✓	✓

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CNC programming language

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
CNC programming language (continued)					
Program functions:					
• Preprocessing memory, dynamic FIFO		✓	✓	✓	✓
• Look Ahead, recorded part program blocks	Milling with MDynamics, Advanced Surface (COMPCAD) active				
- Turning		1	1	1	1
- Milling		> 150	> 300	> 450	> 450
- G-Tech Cylindrical		1	1	–	1
- G-Tech Surface		> 150	> 300	–	> 450
• Look Ahead, IPO blocks, buffered					
- Turning		1	1	1	1
- Milling		50	100	150	150
- G-Tech Cylindrical		1	1	–	1
- G-Tech Surface		50	100	–	150
• Frame concept		✓	✓	✓	✓
• Inclined-surface machining with swivel cycle					
- Turning		–	–	–	–
- Milling		✓	✓	✓	✓
- G-Tech Cylindrical/G-Tech Surface		✓	✓	–	✓
• Axis/spindle interchange		✓	✓	✓	✓
• Geometry axes, switchable online in the CNC program		✓	✓	✓	✓
• Program preprocessing		✓	✓	✓	✓
Online ISO dialect interpreter					
• Turning		✓	✓	✓	✓
• Milling		✓	✓	✓	✓
• G-Tech Cylindrical/G-Tech Surface		–	–	–	–
Program/workpiece management:					
• Part programs on PPU, maximum number	In total maximum 512 files per directory.	750	750	750	750
• Workpieces on PPU, maximum number	In total max. 256 directories.	250	250	250	250
• On additional pluggable CompactFlash card		✓	✓	✓	✓
• On USB storage medium, e.g. USB stick	Hard disk not possible.	✓	✓	✓	✓
• On network drive (Windows Share/FTP)	Included in option: Network drive management via Ethernet. 6FC5800-0AP01-0YB0	O	O	O	O
• Templates for workpieces, programs and INI files		✓	✓	✓	✓
• Job lists		✓	✓	✓	✓
Basic frames, maximum number		1	1	1	1
Settable offsets, maximum number		50	100	100	100
Work offsets, programmable (frames)		✓	✓	✓	✓
Scratching, determining work offset		✓	✓	✓	✓
Work offsets, external via PLC		✓	✓	✓	✓
Global and local user data		✓	✓	✓	✓
Global program user data		✓	✓	✓	✓
Display system variables (also via online configurable display) and log them		–	–	–	–

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✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
Programming support					
Program editor:					
• Programming support for cycles, programGUIDE		✓	✓	✓	✓
• CNC editor with editing functions: selecting, copying, deleting		✓	✓	✓	✓
• Geometry processor with programming graphics/free contour input (contour calculator)		✓	✓	✓	✓
• Screens for 1/2/3-point contours (contour definition programming)		–	–	–	–
• Machining step programming ShopTurn/ShopMill	**6FC5800-0AP17-0YB0**				
- Turning		O	O	O	O
- Milling		O	O	O	O
- G-Tech Cylindrical/G-Tech Surface		–	–	–	–
• programSYNC – multi-channel step sequence programming	**6FC5800-0AP05-0YB0**				
- Turning		–	–	–	O
- Milling		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		–	–	–	–
• Manual machine functions	Included in option: Machining step programming ShopTurn/ShopMill 6FC5800-0AP17-0YB0				
- Turning		O	O	O	O
- Milling		O	O	O	O
- G-Tech Cylindrical/G-Tech Surface		–	–	–	–
• Backup workpiece setup data	Included in option: Extended operator functions 6FC5800-0AP16-0YB0				
- Turning		O	O	O	✓
- Milling		O	O	O	✓
- G-Tech Cylindrical/G-Tech Surface		O	O	–	✓
• Multiple clamping of various workpieces	Included in option: Machining step programming ShopTurn/ShopMill 6FC5800-0AP17-0YB0				
- Turning		–	–	–	–
- Milling		O	O	O	O
- G-Tech Cylindrical/G-Tech Surface		–	–	–	–

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Programming support

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
Programming support (continued)					
Technology cycles for drilling/milling	Basic scope				
• Turning		✓	✓	✓	✓
• Milling		✓	✓	✓	✓
• G-Tech Cylindrical/G-Tech Surface		–	–	–	–
Technology cycles for turning	Basic scope				
• Turning		✓	✓	✓	✓
• Milling		–	–	–	–
• G-Tech Cylindrical/G-Tech Surface		–	–	–	–
Technology cycles for grinding Grinding Basic		–	–	–	–
Technology cycles for grinding Grinding Advanced	**6FC5800-0AS35-0YB0**				
• Turning		–	–	–	–
• Milling		–	–	–	–
• G-Tech Cylindrical/G-Tech Surface		O	O	–	O
Advanced technology functions (expansion of the technology cycles for turning and milling)	**6FC5800-0AP58-0YB0**				
• Pocket milling with free contour definition and islands					
- Turning		O	✓	✓	✓
- Milling		O	✓	✓	✓
- G-Tech Cylindrical/G-Tech Surface		–	–	–	–
• Stock removal cycles with free contour definition					
- Turning		O	✓	✓	✓
- Milling		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		–	–	–	–
Residual material detection and machining for contour pockets and stock removal	**6FC5800-0AP13-0YB0** Requirement: Advanced technology functions option 6FC5800-0AP58-0YB0				
• Turning		O	O	O	O
• Milling		O	O	O	O
• G-Tech Cylindrical/G-Tech Surface		–	–	–	–
Access protection for cycles	**6FC5800-0AP54-0YB0**	O	O	O	O
Programming support can be extended, e.g. customer cycles		✓	✓	✓	✓
DXF Reader for PC integrated in SINUMERIK Operate	**6FC5800-0AP56-0YB0**	O	O	O	O
Balance Cutting	**6FC5800-0AS05-0YB0**				
• Turning		–	–	–	O
• Milling		–	–	–	–
• G-Tech Cylindrical/G-Tech Surface		–	–	–	–

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✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
Simulations					
Simulation of program X, while program Y is being executed (simulation parallel to machining)		–	–	–	–
Simulation finished part in 2D representation		✓	✓	✓	✓
Simulation 1 finished part in 3D representation	**6FC5800-0AP25-0YB0**				
• Turning		O	O	O	O
• Milling		O	O	O	O
• G-Tech Cylindrical/G-Tech Surface		–	–	–	–
Simulation finished part and working area in 3D representation		–	–	–	–
Simulation finished part with collision check in 3D representation		–	–	–	–
Simultaneous recording Real-time simulation of current machining operation	**6FC5800-0AP22-0YB0**	O	O	O	O
Operating modes					
JOG:					
• Handwheel selection		✓	✓	✓	✓
• Inch/metric changeover		✓	✓	✓	✓
• Manual measurement of work offset					
- Turning		✓	✓	✓	✓
- Milling		✓	✓	✓	✓
- G-Tech Cylindrical/G-Tech Surface		–	–	–	–
• Additional measuring version via standard scope - Standard scope workpiece zero: Set edge, align edge, right-angled corner, 1 hole, and 1 circular spigot and rectangular spigot - Expansion of the measurement masks via combo box	Included in option: Extended operator functions. 6FC5800-0AP16-0YB0				
- Turning		–	–	–	–
- Milling		O	O	O	✓
- G-Tech Cylindrical/G-Tech Surface		–	–	–	–
• Manual measurement of tool offset					
- Turning		✓	✓	✓	✓
- Milling		✓	✓	✓	✓
- G-Tech Cylindrical/G-Tech Surface		–	–	–	–
• Automatic tool/workpiece measurement					
- Turning		✓	✓	✓	✓
- Milling		✓	✓	✓	✓
- G-Tech Cylindrical/G-Tech Surface		–	–	–	–
• Reference point approach, automatic/via CNC program		✓	✓	✓	✓
MDI:					
• Input in text editor		✓	✓	✓	✓
• Load/save MDI program	Included in option: Extended operator functions. 6FC5800-0AP16-0YB0				
- Turning		O	O	O	✓
- Milling		O	O	O	✓
- G-Tech Cylindrical/G-Tech Surface		O	O	–	✓
• Input screen forms for technology and positioning, cycle support		✓	✓	✓	✓

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Operating modes

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
Operating modes (continued)					
Teach-in:	Included in option: Extended operator functions. 6FC5800-0AP16-0YB0				
• Turning		O	O	O	✓
• Milling		O	O	O	✓
• G-Tech Cylindrical/G-Tech Surface		O	O	–	✓
Automatic:					
• Execution from storage medium connected to CompactFlash card interface on the operator panel front		✓	✓	✓	✓
• Execution from storage medium connected to the front USB interface of the operator panel, e.g. card reader, USB stick	Hard disk not possible.	✓	✓	✓	✓
• Execution from storage medium connected to the rear USB interface of the operator panel, e.g. card reader, USB stick	Hard disk not possible.	✓	✓	✓	✓
• Execution from network drive	Included in option: Network drive management via Ethernet. 6FC5800-0AP01-0YB0	O	O	O	O
• Program control		✓	✓	✓	✓
• Program editing		✓	✓	✓	✓
• Overstoring	Included in option: Extended operator functions. 6FC5800-0AP16-0YB0				
- Turning		O	O	O	✓
- Milling		O	O	O	✓
- G-Tech Cylindrical/G-Tech Surface		O	O	–	✓
• DRF offset	Included in option: Extended operator functions. 6FC5800-0AP16-0YB0				
- Turning		O	O	O	✓
- Milling		O	O	O	✓
- G-Tech Cylindrical/G-Tech Surface		O	O	–	✓
• Block search with/without calculation		✓	✓	✓	✓
• Extended block search program, search point, step up and down, interrupt function	Included in option: Extended operator functions. 6FC5800-0AP16-0YB0				
- Turning		O	O	O	✓
- Milling		O	O	O	✓
- G-Tech Cylindrical/G-Tech Surface		O	O	–	✓
Repos (repositioning on the contour):					
• With operator command/semi-automatically		✓	✓	✓	✓
• Program-controlled		✓	✓	✓	✓
Preset:					
• Set actual value		✓	✓	✓	✓

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✓ Basic version O Option – Not available	**Article No.** Notes	**SINUMERIK 828D BASIC** **SW 24x**	**SW 26x**	**SW 28x**	**SW 28xA**
Tools					
Tool types:					
• Turning					
- Turning		✓	✓	✓	✓
- Milling		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		–	–	–	–
• Drilling/milling					
- Turning		✓	✓	✓	✓
- Milling		✓	✓	✓	✓
- G-Tech Cylindrical/G-Tech Surface		–	–	–	–
• Groove sawing					
- Turning		✓	✓	✓	✓
- Milling		✓	✓	✓	✓
- G-Tech Cylindrical/G-Tech Surface		–	–	–	–
• Grinding/dressing					
- Turning		–	–	–	–
- Milling		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		✓	✓	–	✓
• Multi-tool					
- Turning		✓	✓	✓	✓
- Milling		✓	✓	✓	✓
- G-Tech Cylindrical/G-Tech Surface		–	–	–	–
Tool radius compensations in plane with:					
• Approach and retract strategies		✓	✓	✓	✓
• Transition circle/ellipse on outer edges		✓	✓	✓	✓
Configurable intermediate blocks with tool radius compensation active		✓	✓	✓	✓
Tool radius compensation in 3D representation		–	–	–	–
Tool carrier with orientation capability					
- Turning		–	–	–	–
- Milling		✓	✓	✓	✓
- G-Tech Cylindrical/G-Tech Surface		✓	✓	–	✓
Look-ahead detection of contour violations		✓	✓	✓	✓

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Tool management

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
Tool management					
Operation with tool management:					
• Real magazines, maximum number					
- Turning		1	1	2	2
- Milling		1	1	2	2
- G-Tech Cylindrical/G-Tech Surface		1	2	–	2
• Tool list		✓	✓	✓	✓
• Expandable tool list		–	–	–	–
• Tools in tool list					
- Turning		128	256	512	768
- Milling		128	256	512	768
- G-Tech Cylindrical/G-Tech Surface		128	256	–	768
• Cutting edges in tool list					
- Turning		256	512	1024	1536
- Milling		256	512	1024	1536
- G-Tech Cylindrical/G-Tech Surface		256	512	–	1536
• Tool offset selection via T and D numbers		✓	✓	✓	✓
• Magazine list		✓	✓	✓	✓
• Configurable magazine list		✓	✓	✓	✓
• Magazine data		✓	✓	✓	✓
• Empty location search and place positioning		✓	✓	✓	✓
• Easy empty location search using softkeys		✓	✓	✓	✓
• Loading and unloading of tools		✓	✓	✓	✓
• Tool cabinet and tool catalog		–	–	–	–
• Loading and unloading via code carrier system		–	–	–	–
• Adapter data					
- Turning		✓	✓	✓	✓
- Milling		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		–	✓	–	✓
• Location-dependent offsets, reference point on disk					
- Turning		–	–	–	–
- Milling		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		✓	✓	–	✓
• Tool life monitoring and workpiece count		✓	✓	✓	✓
• Replacement tools for tool management	6FC5800-0AM78-0YB0				
- Turning		O	O	O	✓
- Milling		O	O	O	✓
- G-Tech Cylindrical/G-Tech Surface		–	–	–	–
• Multi-tool tool holder		–	–	–	–
Manage tools SINUMERIK Integrate for production Manage MyTools		–	–	–	–

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✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
Communication and data management					
Transfer data to storage medium connected to rear USB interface of operator panel, e.g. card reader, USB stick:	Hard disk not possible.				
• Turning		✓	✓	✓	✓
• Milling		✓	✓	✓	✓
• G-Tech Cylindrical/G-Tech Surface		–	–	–	–
Transfer data to storage medium connected to front USB interface of operator panel, e.g. card reader, USB stick	Hard disk not possible.	✓	✓	✓	✓
Transfer data to the front CF card interface of the operator panel		✓	✓	✓	✓
Transfer process data (WRITE ISOPRINT) to the CF card, USB stick or via RS232C interface		✓	✓	✓	✓
Manage additional drives via:					
• Ethernet (Windows Share/FTP), maximum	**6FC5800-0AP01-0YB0**	O 21	O 21	O 21	O 21
• USB interface		✓	✓	✓	✓
• CF card interface on the operator panel front		✓	✓	✓	✓
RS232C serial interface		✓	✓	✓	✓
Data backup of the system software and user data (backup/restore) on the user CF card		✓	✓	✓	✓
I/O interface via PROFINET	Only via PP 72/48D PN or PP 72/48D 2/2A PN I/O modules.	✓	✓	✓	✓
Connection to an external PROFINET network with SIMATIC DP PN/PN coupler	**6ES7158-3AD01-0XA0**	O	O	O	O
SINUMERIK Integrate for production Create MyInterface		–	–	–	–
SINUMERIK Integrate for production Access MyBackup		–	–	–	–
Production data evaluation:					
• SINUMERIK Integrate for production Analyze MyPerformance		–	–	–	–
Host computer connection Server for OPC UA in SINUMERIK Operate SINUMERIK Integrate for engineering Access MyMachine:					
• Access MyMachine /OPC UA Variables, maximum	**6FC5800-0AP67-0YB0**	O 100	O 100	O 100	O 100

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Overview of functions
CNC controls SINUMERIK 828

Operation

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
Operation					
SINUMERIK operator panels with PCU/TCU		–	–	–	–
SINUMERIK PCU 50.5		–	–	–	–
Connection for:					
• Standard monitor (DVI), VGA via ext. adapter, as for PCU 50.5		–	–	–	–
• SIMATIC OPs		–	–	–	–
Control unit management:					
• One operator panel per CNC		✓	✓	✓	✓
• Combinations of several operator panels and several CNCs		–	–	–	–
Handheld units:					
• SINUMERIK HT 2/HT 8 handheld terminal		–	–	–	–
• Mini handheld unit with coiled connecting cable	**6FX2007-1AD03**	O	O	O	O
• Mini handheld unit with straight cable	**6FX2007-1AD13**	O	O	O	O
• Connection kit for mini handheld unit, non-assembled without Industrial Ethernet	**6FX2006-1BG03**	O	O	O	O
• Connection kit for mini handheld unit, assembled with PROFINET	**6FX2006-1BG20**	O	O	O	O
• Holder for mini handheld unit	**6FX2006-1BG70**	O	O	O	O
Machine control panels:					
• SINUMERIK MCP 310C PN	**6FC5303-0AF23-0AA1**	O	O	O	O
• SINUMERIK MCP 310 USB	**6FC5303-0AF33-0AA0**	O	O	O	O
• SINUMERIK MCP 483C PN	**6FC5303-0AF22-0AA1**	O	O	O	O
• SINUMERIK MCP 483 USB	**6FC5303-0AF32-0AA0**	O	O	O	O
• SINUMERIK MCP Interface PN for customer-specific machine control panel	**6FC5303-0AF03-0AA0**	O	O	O	O
• SINUMERIK MPP Machine Push Button Panel		–	–	–	–
Electronic handwheels:					
• With 120 mm × 120 mm front panel, 5 V DC	**6FC9320-5DB01**	O	O	O	O
• With 76.2 mm × 76.2 mm front panel, 5 V DC	**6FC9320-5DC01**	O	O	O	O
• With 76.2 mm × 76.2 mm front panel, 24 V DC	6FC9320-5DH01	–	–	–	–
• Without front panel, without setting wheel, 5 V DC	**6FC9320-5DF01**	O	O	O	O
• Without front panel, with setting wheel, 5 V DC	**6FC9320-5DM00**	O	O	O	O
• Portable in housing, coiled cable	**6FC9320-5DE02**	O	O	O	O
• Flange socket for portable handwheel	**6FC9341-1AQ**	O	O	O	O
Connection for electronic handwheels to, max.:		3	3	3	3
• SINUMERIK PPU		2	2	2	2
• SINUMERIK MCP Interface PN	Application: Manual machine	1	1	1	1
Keyboards:					
• Integrated QWERTY keyboard with short-stroke keys		✓	✓	✓	✓
• SINUMERIK keyboards		–	–	–	–
• KBPC CG US standard PC keyboard		–	–	–	–
Connection for external storage devices via USB:					
• Card reader USB 2.0 for memory media CF/SD/MMC:	**6FC5335-0AA00-0AA0**	O	O	O	O
- 2 GB CompactFlash card	**6FC5313-5AG00-0AA2**	O	O	O	O
• Memory stick SIMATIC IPC USB FlashDrive 8 GB Output current, maximum 100 mA	**6ES7648-0DC50-0AA0**	O	O	O	O

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✓ Basic version O Option – Not available	**Article No.** Notes	**SINUMERIK 828D BASIC** **SW 24x**	**SW 26x**	**SW 28x**	**SW 28xA**
Operation (continued)					
Extended operator functions	**6FC5800-0AP16-0YB0**	O	O	O	✓
Plain text display of user variables		✓	✓	✓	✓
Multi-channel display:					
• Turning		–	–	–	✓
• Milling		–	–	–	–
• G-Tech Cylindrical/G-Tech Surface		–	–	–	–
2D representation of the 3D protection/working areas		–	–	–	–
Collision check	6FC5800-0AS02-0YB0	–	–	–	–
Workpiece-related actual value system		✓	✓	✓	✓
Menu selection via the PLC		✓	✓	✓	✓
CNC program messages		✓	✓	✓	✓
Online help for programming, alarms and machine data, expandable		✓	✓	✓	✓
Screen blanking		✓	✓	✓	✓
Access protection		8 levels	8 levels	8 levels	8 levels
Operating software languages:					
• Chinese Simplified, Chinese Traditional, English, French, German, Italian, Korean, Portuguese, Spanish		✓	✓	✓	✓
• Additional languages, use of language extensions		✓	✓	✓	✓
• Language extensions on DVD-ROM, without license e.g. Czech, Danish, Dutch, Finnish, Hungarian, Japanese, Polish, Romanian, Russian, Slovakian, Slovenian, Swedish, Thai, Turkish - SINUMERIK Operate operating software - SINUMERIK 828	**6FC5860-0YC40-0YA8**	O	O	O	O
Monitoring functions					
Working area limitation		✓	✓	✓	✓
Limit switch monitoring Software and hardware limit switches		✓	✓	✓	✓
Position monitoring		✓	✓	✓	✓
Standstill monitoring		✓	✓	✓	✓
Clamping monitoring		✓	✓	✓	✓
2D/3D protection areas		✓	✓	✓	✓
Contour monitoring		✓	✓	✓	✓
Contour monitoring with tunnel function		–	–	–	–
Path length evaluation		–	–	–	–
Axis limitation from the PLC		✓	✓	✓	✓
Spindle speed limitation		✓	✓	✓	✓
Collision check		–	–	–	–
Generator operation		✓	✓	✓	✓
Extended stop and retract ESR, incl. generator operation	6FC5800-0AM61-0YB0	–	–	–	–
Drive-autonomous extended stop and retract ESR, including generator operation	**6FC5800-0AM60-0YB0**	O	O	O	O
IDM integrated tool monitoring and diagnostics		–	–	–	–

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✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
Compensations					
Backlash compensation		✓	✓	✓	✓
Leadscrew error compensation		✓	✓	✓	✓
Leadscrew error compensation, bidirectional	**6FC5800-0AM54-0YB0** The correctable tolerance band is restricted to 1 mm.	O	O	O	O
Measuring system error compensation		✓	✓	✓	✓
Sag compensation, multi-dimensional	**6FC5800-0AM55-0YB0** The correctable tolerance band is restricted to 1 mm.	O	O	O	O
Quadrant error compensation:					
• Conventional		✓	✓	✓	✓
• With neural networks		✓	✓	✓	✓
Graphic monitoring of the quadrant error compensation using circularity test		✓	✓	✓	✓
Friction compensation with adaptive characteristics	**6FC5800-0AS06-0YB0**	O	O	O	O
Temperature compensation		✓	✓	✓	✓
Feedforward control, velocity-dependent		✓	✓	✓	✓
Feedforward control, acceleration-dependent:					
• Turning		✓	✓	✓	✓
• Milling		✓	✓	✓	✓
• G-Tech Cylindrical/G-Tech Surface		–	–	–	–
Backlash compensation, dynamic		✓	✓	✓	✓
Cylinder fault compensation:	**6FC5800-0AS35-0YB0**				
• Turning		–	–	–	–
• Milling		–	–	–	–
• G-Tech Cylindrical/G-Tech Surface		O	O	–	O
PLC area					
SIMATIC S7-300		–	–	–	–
SIMATIC S7-200 based (integrated)		✓	✓	✓	✓
Cycle time for PLC		9 ms	6 ms	6 ms	6 ms
Reaction time to process events: Terminal to terminal					
• Turning		7.5 ms	7.5 ms	4.5 ms	4.5 ms
• Milling		7.5 ms	7.5 ms	7.5 ms	7.5 ms
• G-Tech Cylindrical		7.5 ms	7.5 ms	–	4.5 ms
• G-Tech Surface		7.5 ms	7.5 ms	–	7.5 ms
Memory expansion Ladder Steps, maximum	Basic configuration: 24000	32000	32000	32000	32000
Memory expansion to 32000 Ladder Steps	**6FC5800-0AD40-0YB0**	O	O	O	O
PLC programming language:					
• Ladder diagram LAD		✓	✓	✓	✓
• Function block diagram FBD		–	–	–	–
• Statement list STL		–	–	–	–
PLC programming tool for integrated PLC	On toolbox DVD-ROM.	O	O	O	O
PLC Ladder Viewer in SINUMERIK Operate		✓	✓	✓	✓
PLC re-wire Editor in SINUMERIK Operate	INT100/101 only	✓	✓	✓	✓
PLC Ladder Editor in SINUMERIK Operate	PLC program editor	✓	✓	✓	✓

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✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
PLC area (continued)					
I/O modules:					
• PP 72/48D PN digital I/O module, maximum number	**6FC5311-0AA00-0AA0**	O	O	O	O
- Turning		3	4	5	5
- Milling		3	4	5	5
- G-Tech Cylindrical/G-Tech Surface		3	5	–	5
• PP 72/48D 2/2A PN digital/analog I/O module, maximum number	**6FC5311-0AA00-1AA0**	O	O	O	O
- Turning		3	4	5	5
- Milling		3	4	5	5
- G-Tech Cylindrical/G-Tech Surface		3	5	–	5
• General I/Os via PROFIBUS/PROFINET		–	–	–	–
• General SIMATIC PROFINET PLC I/Os		–	–	–	–
• Analog Drive Interface for 4 axes ADI 4		–	–	–	–
Digital inputs, maximum number		216	288	360	360
Digital outputs, maximum number		144	192	240	240
Analog inputs, maximum number:					
• Turning		6	8	10	10
• Milling		6	8	10	10
• G-Tech Cylindrical/G-Tech Surface		6	10	–	10
Analog outputs, maximum number:					
• Turning		6	8	10	10
• Milling		6	8	10	10
• G-Tech Cylindrical/G-Tech Surface		6	10	–	10
PLC alarms/messages, maximum number		248	248	248	248
Bit memories, number		512 bytes	512 bytes	512 bytes	512 bytes
Timers, number		128	128	128	128
Counters, number		64	64	64	64
Subroutines		256	256	256	256
FB, FC		–	–	–	–
DB, highest number, maximum number		64	64	64	64
Cyclic function block		✓	✓	✓	✓
Cyclic block, servo-synchronous:					
• Turning		✓	✓	✓	✓
• Milling		✓	✓	✓	✓
• G-Tech Cylindrical/G-Tech Surface		–	✓	–	✓
User machine data for configuring the PLC user program		✓	✓	✓	✓
NCVar selector					
• Turning		✓	✓	✓	✓
• Milling		✓	✓	✓	✓
• G-Tech Cylindrical/G-Tech Surface		–	–	–	–
Import and export of PLC projects PLC file handling via archives					
• Turning		✓	✓	✓	✓
• Milling		✓	✓	✓	✓
• G-Tech Cylindrical/G-Tech Surface		–	–	–	–
Freely configurable PLC interface		✓	✓	✓	✓

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Safety functions/Commissioning

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
Safety functions					
SINUMERIK Safety Integrated Safety functions for personnel and machine protection:					
• Safe Torque Off (STO)		✓	✓	✓	✓
• Safe Brake Control (SBC)		✓	✓	✓	✓
• Safe Stop 1 (SS1)		✓	✓	✓	✓
• Safety Integrated, extended functions for one CNC axis: - Safe Operating Stop (SOS) - Safe Stop 2 (SS2) - Safely Limited Speed (SLS) - Safe Speed Monitor (SSM) - Safe Acceleration Monitor (SAM) - Safe Direction (SDI) - Safely Limited Position (SLP) - Safe Brake Management (SBM) - Safe Brake Control (SBC) - Safe Brake Test (SBT)	**6FC5800-0AC50-0YB0**	O	O	O	O
• SINAMICS S120 Terminal Module Cabinet TM54F to control SOS, SS2, SLS and SSM	**6SL3055-0AA00-3BA0** Required for each PPU and NX.	O	O	O	O
Commissioning					
Commissioning software for the drive system integrated:					
• SINAMICS S120		✓	✓	✓	✓
Auto Servo Tuning AST Fully automatic speed and position controller optimization		✓	✓	✓	✓
Commissioning trace integrated Drive optimization without an additional oscilloscope		✓	✓	✓	✓
Standard commissioning via:					
• RS232C serial interface		–	–	–	–
• USB interface with storage medium, e.g. USB stick	Hard disk not possible. Read in/out INI file	✓	✓	✓	✓
• Network drive		✓	✓	✓	✓
• User CompactFlash card		✓	✓	✓	✓
• SINUMERIK Integrate for engineering Access MyMachine /P2P for PC/PG	**6FC5860-7YC00-0YA0**	O	O	O	O
STARTER commissioning tool for PC/PG for SINAMICS S120	On toolbox DVD-ROM.	O	O	O	O
SinuCom commissioning/service tools for SINUMERIK 840D sl		–	–	–	–

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✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
Diagnostic functions					
Alarms and messages		✓	✓	✓	✓
Action log can be activated for diagnostic purposes		✓	✓	✓	✓
PLC status		✓	✓	✓	✓
LAD display		✓	✓	✓	✓
PLC remote diagnostics via modem		✓	✓	✓	✓
PLC remote diagnostics via Ethernet		✓	✓	✓	✓
Integrated spindle monitor ISM	**6FC5800-0AP55-0YB0**				
• Turning		–	O	O	O
• Milling		–	O	O	O
• G-Tech Cylindrical/G-Tech Surface		–	–	–	–
Easy Message Machine status transfer using text messages (SMS) requires a SINAUT system with antenna and modem cable					
• SINAUT MD720-3 GSM/GPRS modem	**6NH9720-3AA00**	O	O	O	O
• SINAUT ANT 794-4MR antenna	**6NH9860-1AA00**	O	O	O	O
• Modem cable	**6NH7701-5AN**	O	O	O	O
Remote diagnostics and file transfer:					
• SINUMERIK Integrate for engineering Access MyMachine /P2P	**6FC5800-0AP30-0YB0**	O	O	O	O
	Connection of a modem router to X127.				
• SINUMERIK Integrate for engineering Access MyMachine /P2P for PC/PG – data transfer between PC/PG and CNCs	**6FC5860-7YC00-0YA0**	O	O	O	O
Service and maintenance					
Integrated service planner for monitoring service intervals		✓	✓	✓	✓
Easy Extend Simply extend optional machine components		✓	✓	✓	✓
SINUMERIK Ctrl-Energy					
Intelligent standby control of the machine Ctrl-E profiles		✓	✓	✓	✓
Measurement and evaluation of the consumption of the machine and the drive system Ctrl-E analysis					
• Transfer of manual values from the PLC		✓	✓	✓	✓
• SENTRON PAC3200 Power Monitoring Device for front panel mounting records 50 measured values	**7KM2112-0BA00-3AA0**	O	O	O	O
• SENTRON PAC4200 Power Monitoring Device for front panel mounting records 200 measured values	**7KM4212-0BA00-3AA0**	O	O	O	O
Flux reduction					
• Turning		✓	✓	✓	✓
• Milling		✓	✓	✓	✓
• G-Tech Cylindrical/G-Tech Surface		–	–	–	–
Reactive-current compensation	Only with SINAMICS S120 Active Line Module.	–	–	–	–

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✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
Industrial software for CNC					
SINUMERIK Integrate for production Complete software package on DVD-ROM	**6FC5864-0YD00-0AA8**	O	O	O	O
Increase service productivity					
Diagnostic functions in case of machine faults, workflow services, remote control and remote monitoring of machine control systems SINUMERIK Integrate for production Access MyMachine:					
• Access MyMachine /Ethernet - Single Access					
- Machine Connect Single license for each machine, current software version	**6FC5864-4AP00-0YB0**	O	O	O	O
- Machine Connect Upgrade license for each machine, current software version	**6FC5864-4AP00-0YF0**	O	O	O	O
- Server Access Software update service/year per machine	**6FC5864-4AP00-0YM0**	O	O	O	O
• Access MyMachine /Ethernet - Conferencing					
- Machine Connect Single license for each machine, current software version	**6FC5864-4BP00-0YB0**	O	O	O	O
- Machine Connect Upgrade license for each machine, current software version	**6FC5864-4BP00-0YF0**	O	O	O	O
- Server Access Software update service/year per machine	**6FC5864-4BP00-0YM0**	O	O	O	O
• Access MyMachine /Ethernet - Remote STEP 7 - Diagnostics of the PLC via Access MyMachine /Ethernet - Single Access or Access MyMachine /Ethernet - Conferencing - Edit with LADDER EDIT					
- Machine Connect Single license for each machine, current software version	**6FC5864-4CP00-0YB0**	O	O	O	O
- Machine Connect Upgrade license for each machine, current software version	**6FC5864-4CP00-0YF0**	O	O	O	O
- Server Access Software update service/year per machine	**6FC5864-4CP00-0YM0**	O	O	O	O

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✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
Manufacturer options					
Axis/spindle, each additional	**6FC5800-0AC20-0YB0**	O	O	O	O
Positioning axis/auxiliary spindle, each additional	**6FC5800-0AC30-0YB0**	O	O	O	O
Mode group, each additional	**6FC5800-0AC00-0YB0**				
• Turning		–	–	–	O
• Milling		–	–	–	–
• G-Tech		–	–	–	O
TRANSMIT/cylinder surface transformation	**6FC5800-0AM27-0YB0**	O	O	O	O
TRANSMIT/TRACYL without Y axis	**6FC5800-0AS50-0YB0**	O	O	O	O
Inclined axis for non-orthogonal Y axis for turning machines for non-orthogonal X axis for grinding machines:	**6FC5800-0AM28-0YB0**				
• Turning		–	–	O	O
• Milling		–	–	–	–
• G-Tech Cylindrical		O	O	–	O
• G-Tech Surface		–	–	–	–
Inclined axis Basic, fixed angle for non-orthogonal X axis for grinding machines:	**6FC5800-0AS54-0YB0**				
• Turning		–	–	–	–
• Milling		–	–	–	–
• G-Tech Cylindrical/G-Tech Surface		O	O	–	O
Oscillation function:	**6FC5800-0AM34-0YB0**				
• Turning		–	–	–	–
• Milling		–	–	–	–
• G-Tech Cylindrical/G-Tech Surface		O	O	–	O
Pair of synchronized axes (gantry axes), Basic	**6FC5800-0AS51-0YB0**	O	O	O	O
• Turning		1	1	1	1
• Milling		1	1	1	2
• G-Tech Cylindrical/G-Tech Surface		1	1	–	1
Travel to fixed stop with Force Control	**6FC5800-0AM01-0YB0**	O	O	O	O
Tangential control	**6FC5800-0AM06-0YB0**				
• Turning		–	–	–	–
• Milling		–	–	–	–
• G-Tech Cylindrical/G-Tech Surface		O	O	–	O
Generic coupling static, CP-Static, e.g. counterspindle:	**6FC5800-0AM75-0YB0**				
• 1 × simple synchronous spindle, coupling ratio 1:1, no multi-edge machining					
- Turning		–	–	O	O
- Milling		O	O	O	O
- G-Tech Cylindrical/G-Tech Surface		O	O	–	O
Generic coupling basic, CP-Basic, e.g. multi-edge turning:	**6FC5800-0AM72-0YB0**				
• 4 axis pairs in simultaneous coupled motion					
- Turning		O	O	O	O
- Milling		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		O	O	–	O
• 1 × synchronous spindle/multi-edge turning					
- Turning		O	O	O	O
- Milling		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		O	O	–	O
• Master-value coupling/curve table interpolation		–	–	–	–

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Overview of CNC options – Manufacturer options

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
Manufacturer options (continued)					
Generic coupling Comfort, CP-Comfort, e.g. electronic gear:	**6FC5800-0AM73-0YB0**				
• 4 axis pairs in simultaneous coupled motion:					
- Turning		O	O	O	O
- Milling		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		O	O	–	O
• 1 x synchronous spindle/multi-edge turning:					
- Turning		O	O	O	O
- Milling		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		O	O	–	O
• Electronic gear for 3 leading axes, without curve table, without cascading:					
- Turning		O	O	O	O
- Milling		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		O	O	–	O
• Axial coupling in the machine coordinate system		–	–	–	–
• Master-value coupling/curve table interpolation		–	–	–	–
Leadscrew error compensation, bidirectional	**6FC5800-0AM54-0YB0** The correctable tolerance band is restricted to 1 mm.	O	O	O	O
Sag compensation, multi-dimensional	**6FC5800-0AM55-0YB0** The correctable tolerance band is restricted to 1 mm.	O	O	O	O
Master-Slave for drives, basic	**6FC5800-0AS52-0YB0**	O	O	O	O
Evaluation of internal drive variables, basic	**6FC5800-0AS53-0YB0**	O	O	O	O
SINUMERIK Operate Runtime license OA Easy Screen SINUMERIK Integrate for engineering Run MyScreens:					
• > 5 screens, extended functions	**6FC5800-0AP64-0YB0**	O	O	O	O
Safety Integrated extended functions for one CNC axis	**6FC5800-0AC50-0YB0**	O	O	O	O
Access protection for cycles	**6FC5800-0AP54-0YB0**	O	O	O	O
Drive-autonomous extended stop and retract ESR, including generator operation	**6FC5800-0AM60-0YB0**	O	O	O	O
Integrated spindle monitor ISM	**6FC5800-0AP55-0YB0**				
• Turning		–	O	O	O
• Milling		–	O	O	O
• G-Tech Cylindrical/G-Tech Surface		–	–	–	–
Collision check	6FC5800-0AS02-0YB0	–	–	–	–
Memory expansion to 32000 Ladder Steps	**6FC5800-0AD40-0YB0**	O	O	O	O
Balance Cutting	**6FC5800-0AS05-0YB0**				
• Turning		–	–	–	O
• Milling		–	–	–	–
• G-Tech Cylindrical/G-Tech Surface		–	–	–	–
Friction compensation with adaptive characteristics	**6FC5800-0AS06-0YB0**	O	O	O	O
CNC lock function	**6FC5800-0AP76-0YB0**	O	O	O	O

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✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
User options					
Technology cycles for grinding Grinding Basic		–	–	–	–
Technology cycles for grinding Grinding Advanced:[1]	**6FC5800-0AS35-0YB0**				
• Turning		–	–	–	–
• Milling		–	–	–	–
• G-Tech Cylindrical/G-Tech Surface		O	O	–	O
Advanced technology functions (expansion of the technology cycles for turning and milling)[2]	**6FC5800-0AP58-0YB0**	O	✓	✓	✓
Extended operator functions[3]	**6FC5800-0AP16-0YB0**	O	O	O	✓
Program editor:					
• Machining step programming ShopTurn/ShopMill:	**6FC5800-0AP17-0YB0**				
- Turning		O	O	O	O
- Milling		O	O	O	O
- G-Tech Cylindrical/G-Tech Surface		–	–	–	–
• programSYNC – multi-channel step sequence programming:	**6FC5800-0AP05-0YB0**				
- Turning		–	–	–	O
- Milling		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		–	–	–	–
Residual material detection and machining for contour pockets and stock removal:	**6FC5800-0AP13-0YB0** Requirement: Advanced technology functions option 6FC5800-0AP58-0YB0				
• Turning		O	O	O	O
• Milling		O	O	O	O
• G-Tech Cylindrical/G-Tech Surface		–	–	–	–
Simulation 1 finished part in 3D representation:	**6FC5800-0AP25-0YB0**				
• Turning		O	O	O	O
• Milling		O	O	O	O
• G-Tech Cylindrical/G-Tech Surface		–	–	–	–
Simultaneous recording Real-time simulation of current machining operation	**6FC5800-0AP22-0YB0**	O	O	O	O
Measuring cycles for drilling/milling and turning Calibrate workpiece probe, workpiece measurement, tool measurement:	**6FC5800-0AP28-0YB0**				
• Turning		O	O	–	O
• Milling		O	O	–	O
• G-Tech Cylindrical/G-Tech Surface		–	–	–	–

[1] The CNC option Grinding Advanced provides you with the following functions:
- Dressing (paraxial form-truing) with stock removal cycles (basic Cycle95)
- Cylinder fault compensation

[2] The CNC option Advanced technology functions provides you with technology cycles for the following additional machining operations:
- Asymmetric grooves (only turning)
- Drill and thread milling
- Thread milling
- Multi-edge milling
- Engraving
- Extended stock removal along contour with segmentation of blank (only turning)
- Contour grooving and plunge turning (only turning)
- Milling of contour pockets and spigots with up to 12 islands
- Position pattern - hide position
- Asymmetrically turn a shoulder
- DIN thread undercut

[3] The operator functions in the basic scope of the SINUMERIK 828D are designed for standard applications.
The CNC option Extended operator functions enables the following additional operator functions:
- Overstoring
- Teach-in
- DRF function
- Extended block search
- Extended skip levels > 2
- Backup workpiece setup data
- Additional measuring version via standard scope (only milling)
  - Standard scope workpiece zero: Set edge, align edge, right-angled corner, 1 hole, and 1 circular spigot and rectangular spigot
  - Expansion of the measurement masks via combo box
- Synchronized actions softkey
- MDI load/save
- G code converter (turning and milling only)

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Overview of CNC options – User options

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
User options (continued)					
Manage additional drives via:					
• Ethernet (Windows Share/FTP), maximum	**6FC5800-0AP01-0YB0**	O 21	O 21	O 21	O 21
Operation with tool management:					
• Replacement tools for tool management:	**6FC5800-0AM78-0YB0**				
- Turning		O	O	O	✓
- Milling		O	O	O	✓
- G-Tech Cylindrical/G-Tech Surface		–	–	–	–
Remote diagnostics and file transfer:					
• SINUMERIK Integrate for engineering Access MyMachine /P2P	**6FC5800-0AP30-0YB0**	O	O	O	O
	Connection of a modem router to X127.				
Contour handwheel	**6FC5800-0AM08-0YB0**	O	O	O	O
SINUMERIK MDynamics:					
• Advanced Surface:	**6FC5800-0AS07-0YB0**				
- Turning		–	–	–	–
- Milling		✓	✓	✓	✓
- G-Tech Cylindrical/G-Tech Surface		O	O	–	O
• Top Surface:	**6FC5800-0AS17-0YB0**				
- Turning		–	–	–	–
- Milling		–	O	O	O
- G-Tech Cylindrical/G-Tech Surface		–	–	–	–
Spline interpolation (A, B and C splines)	**6FC5800-0AS16-0YB0**	O	O	O	O
Measure kinematics Determine transformation data of rotary axes:	**6FC5800-0AP18-0YB0**				
• Turning		–	–	–	–
• Milling		O	O	O	O
• G-Tech Cylindrical/G-Tech Surface		–	–	–	–
Host computer connection Server for OPC unified architecture:					
• SINUMERIK Integrate Access MyMachine /OPC UA	**6FC5800-0AP67-0YB0**	O	O	O	O
DXF Reader for PC integrated in SINUMERIK Operate	**6FC5800-0AP56-0YB0**	O	O	O	O
CNC user memory expansion	**6FC5800-0AP77-0YB0**	–	O 100 MB	O 100 MB	O 100 MB
Execution from external storage EES	**6FC5800-0AP75-0YB0**	–	O	O	O

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Product name	SINUMERIK 828D BASIC SW 24x	SW 26x	SW 28x	SW 28xA
Number of DRIVE-CLiQ ports	3	3	3	3
Number of axes/spindles basic scope				
• Turning	3	3	3	3
• Milling	4	4	4	4
• G-Tech Cylindrical/G-Tech Surface	2	2	–	2
Number of axes/spindles, maximum				
• Turning	5	6	6 / 8[1)]	6 / 10[2)]
• Milling	5	6	6	6 / 8[1)]
• G-Tech Cylindrical/G-Tech Surface	5	6	–	6 / 10[2)]
Number of axes with Drive Based Safety Integrated, maximum (Extended Safety Integrated functions)				
• Turning	5	6	6 / 8[1)]	6 / 10[2)]
• Milling	5	6	6	6 / 8[1)]
• G-Tech Cylindrical/G-Tech Surface	5	6	–	6 / 10[2)]
IPO cycle for max. configuration				
• Turning	9 ms	6 ms	6 ms	6 ms
• Milling	9 ms	6 ms	3 ms	3 ms
• G-Tech Cylindrical/G-Tech Surface	9 ms	6 ms	–	3 ms
Minimum block change time, approx.				
• Turning	9 ms	6 ms	6 ms	6 ms
• Milling	9 ms	6 ms	3 ms	3 ms
• G-Tech Cylindrical/G-Tech Surface	9 ms	6 ms	–	3 ms
Minimum block change time with compressor, approx.				
• Turning	9 ms	6 ms	6 ms	6 ms
• Milling	3 ms	2 ms	1 ms	1 ms
• G-Tech Cylindrical/G-Tech Surface	–	–	–	–
Position control cycle				
• Turning	3 ms	3 ms	1.5 ms	1.5 ms
• Milling	3 ms	3 ms	3 ms	3 ms
• G-Tech Cylindrical/G-Tech Surface	3 ms	3 ms	–	3 ms
PLC cycle time	9 ms	6 ms	6 ms	6 ms
Velocity and current controller clock cycle	125 µs	125 µs	125 µs	125 µs
Velocity and current controller clock cycle for a high-speed spindle				
Mixed operation without NX: 4 × 125 µs and 1 × 62.5 µs, max. number of axes = 5				
• Turning	–	–	–	–
• Milling	–	62.5 µs	62.5 µs	62.5 µs
• G-Tech Cylindrical/G-Tech Surface	62.5 µs	62.5 µs	–	62.5 µs
Non-Volatile Random-Access Memory (NVRAM) for:				
• OEM	512 KB	512 KB	512 KB	512 KB
• User data	3 MB	5 MB	8 MB	10 MB
Number of Numeric Control Extensions NX10.3				
• Turning	–	–	1	1
• Milling	–	1	1	1
• G-Tech Cylindrical/G-Tech Surface	–	1	–	1
Number of Numeric Control Extensions NX15.3				
• Turning	–	–	–	1
• Milling	–	–	–	–
• G-Tech Cylindrical/G-Tech Surface	–	–	–	1
Number of I/O modules PP 72/48D PN or PP 72/48D 2/2A PN, maximum				
• Turning	3	4	5	5
• Milling	3	4	5	5
• G-Tech Cylindrical/G-Tech Surface	3	5	–	5

[1)] The maximum number of axes can be increased to 8, of which 6 axes can be connected to the PPU and 2 axes to the NX10.3.

[2)] The maximum number of axes can be increased to 10, of which 6 axes can be connected to the PPU and 4 axes to the NX15.3.

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Notes