Overview of functions

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

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

Control	Software version
SINUMERIK 828D BASIC T	4.5
SINUMERIK 828D BASIC M	4.5
SINUMERIK 828D	4.5

Control structure and configuration

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D PPU 240/PPU 241 BASIC T	 BASIC M	PPU 260/PPU 261 T	 M	PPU 280/PPU 281 T	 M
Control structure and configuration							
Panel-based control system comprising:		✓	✓	✓	✓	✓	✓
• Compact operator panel CNC		✓	✓	✓	✓	✓	✓
• CNC/PLC Control Unit		✓	✓	✓	✓	✓	✓
• Closed-loop control for drives		5	5	6	6	6	6
Design: • Drive-based/PC-based		–	–	–	–	–	–
Operator panel CNC horizontal/vertical:		✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓
• Color display		8.4"	8.4"	10.4"	10.4"	10.4"	10.4"
• Integrated QWERTY keyboard		✓	✓	✓	✓	✓	✓
SINUMERIK operator panel CNC with TCU		–	–	–	–	–	–
SINUMERIK operator panel CNC with PCU		–	–	–	–	–	–
System software: • SINUMERIK 828D, PPU 240/241 system software Turning, export version, on CF card, with license	**6FC5835-1GY40-2YA0**	O	–	–	–	–	–
• SINUMERIK 828D, PPU 240/241 system software Milling, export version, on CF card, with license	**6FC5835-2GY40-2YA0**	–	O	–	–	–	–
• SINUMERIK 828D, PPU 260/261 system software Turning, export version, on CF card, with license	**6FC5834-1GY40-2YA0**	–	–	O	–	–	–
• SINUMERIK 828D, PPU 260/261 system software Milling, export version, on CF card, with license	**6FC5834-2GY40-2YA0**	–	–	–	O	–	–
• SINUMERIK 828D, PPU 280/281 system software Turning, export version, on CF card, with license	**6FC5833-1GY40-2YA0**	–	–	–	–	O	–
• SINUMERIK 828D, PPU 280/281 system software Milling, export version, on CF card, with license	**6FC5833-2GY40-2YA0**	–	–	–	–	–	O
Embedded HMI SINUMERIK Operate		✓	✓	✓	✓	✓	✓
Windows-based HMI		–	–	–	–	–	–
Drive interface DRIVE-CLiQ		3	3	3	3	3	3
Numeric Control Extension NX10.3 for applications with up to 8 drives or for reducing the current controller cycle clock to 62.5 µs	**6SL3040-1NC00-0AA0**	–	–	–	O	O	O
Channels/mode groups MG: • Mode group MG, maximum		1	1	1	1	1	1
• Machining channel, maximum		1	1	1	1	1	1
CNC user memory (buffered) for CNC part programs in MB		1	1	3	3	5	5
CNC user memory, maximum configuration in MB		1	1	3	3	5	5
Additional CNC user memory on user CompactFlash card	CompactFlash card must be ordered separately.	✓	✓	✓	✓	✓	✓
HMI user memory, additional 256 MB on CompactFlash card of PPU		–	–	–	–	–	–
Axes/spindles or positioning axes/auxiliary spindle: • Basic quantity of axes/spindles		3	4	3	4	3	4
• Maximum configuration axes/spindles		5	5	6	6	8	6
Axis/spindle, each additional	**6FC5800-0AC20-0YB0**	O	O	O	O	O	O
Positioning axis/auxiliary spindle, each additional	**6FC5800-0AC30-0YB0**	O	O	O	O	O	O
PLC-controlled axis		✓	✓	✓	✓	✓	✓
PLC positioning axis via PROFIBUS		–	–	–	–	–	–

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D PPU 240/PPU 241 BASIC T	 BASIC M	PPU 260/PPU 261 T	 M	PPU 280/PPU 281 T	 M
Drives							
SINAMICS S120 Combi		O	O	O	O	O	O
SINAMICS S120 Motor Modules via DRIVE-CLiQ	See Catalog NC 62	O	O	O	O	O	O
SINAMICS S120 DRIVE-CLiQ on motor		O	O	O	O	O	O
SINAMICS S120 Sensor Module Cabinet SMC:	See Catalog NC 62	O	O	O	O	O	O
• SMC10		O	O	O	O	O	O
• SMC20		O	O	O	O	O	O
• SMC30		O	O	O	O	O	O
SINAMICS S120 Sensor Module External SME:	See Catalog NC 62	O	O	O	O	O	O
• SME20		O	O	O	O	O	O
• SME25		O	O	O	O	O	O
• SME120		O	O	O	O	O	O
• SME125		O	O	O	O	O	O
SINAMICS S120 expansion modules:	See Catalog NC 62	O	O	O	O	O	O
• SINAMICS S120 DMC20		O	O	O	O	O	O
SINAMICS S120 Motor Modules in booksize format:	See Catalog NC 62	O	O	O	O	O	O
• Internal air cooling		O	O	O	O	O	O
• External air cooling		O	O	O	O	O	O
• Cold plate cooling		O	O	O	O	O	O
SINAMICS S120 Active Line Modules in booksize format:	See Catalog NC 62	O	O	O	O	O	O
• Internal air cooling		O	O	O	O	O	O
• External air cooling		O	O	O	O	O	O
• Cold plate cooling		O	O	O	O	O	O
SINAMICS S120 Smart Line Modules in booksize format:	See Catalog NC 62	O	O	O	O	O	O
• Internal air cooling		O	O	O	O	O	O
• External air cooling		O	O	O	O	O	O
• Cold plate cooling		O	O	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	O	O
Analog Drive Interface for 4 Axes ADI 4		–	–	–	–	–	–
Connectable measuring systems							
Number of measuring systems per axis, max.		2	2	2	2	2	2
Incremental encoder installed in motors SIMOTICS S-1FT7/S-1FK7/M-1PH8	See Catalog NC 62	O	O	O	O	O	O
Absolute encoder installed in motors SIMOTICS S-1FT7/S-1FK7/M-1PH8	See Catalog NC 62	O	O	O	O	O	O
Absolute encoder with SSI interface		–	–	–	–	–	–
Rotary measuring systems with:	See Catalog NC 62						
• RS422 (TTL)		O	O	O	O	O	O
• sin/cos 1 V_{pp}		O	O	O	O	O	O
• Distance-coded reference marks		O	O	O	O	O	O
• EnDat 2.1		O	O	O	O	O	O
Linear scale LMS with:	See Catalog NC 62						
• sin/cos 1 V_{pp}		O	O	O	O	O	O
• Distance-coded reference marks		O	O	O	O	O	O
• EnDat 2.1		O	O	O	O	O	O

Overview of functions

CNC controls SINUMERIK 828

Motors that can be connected/Axis functions/ Spindle functions

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D PPU 240/PPU 241 BASIC T	 BASIC M	PPU 260/PPU 261 T	 M	PPU 280/PPU 281 T	 M
Motors that can be connected (preferred versions)							
SIMOTICS S-1FK7 servomotor		O	O	O	O	O	O
SIMOTICS S-1FT7 servomotor		O	O	O	O	O	O
SIMOTICS M-1PH8 spindle motor		O	O	O	O	O	O
SIMOTICS S-1FE1 built-in motor	Not with SINAMICS S120 Combi.	O	O	O	O	O	O
SIMOTICS L-1FN3/L-1FN6 linear motors		–	–	–	–	–	–
SIMOTICS T-1FW6 built-in torque motor	Not with SINAMICS S120 Combi.	O	O	O	O	O	O
Hybrid-spindle/2SP1 motor spindle	www.siemens.com/spindle	O	O	O	O	O	O
Third-party motor	On request.	O	O	O	O	O	O
Axis functions							
Feedrate override of 0 % ... 200 %		✓	✓	✓	✓	✓	✓
Feedrate override, axis-specific of 0 % ... 200 %		✓	✓	✓	✓	✓	✓
Traversing range ± 9 decades		✓	✓	✓	✓	✓	✓
Rotary axis, turning endlessly		✓	✓	✓	✓	✓	✓
Velocity, max. in m/s		300	300	300	300	300	300
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	O	O
Analog axis		–	–	–	–	–	–
Setpoint exchange		–	–	–	–	–	–
Tangential control		–	–	–	–	–	–
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: 10^6 ... 0.0001 (display: ± 999999999.9999)		✓	✓	✓	✓	✓	✓
Spindle override from 0 % ... 200 %		✓	✓	✓	✓	✓	✓
Gear stages		5	5	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 (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		✓	✓	✓	✓	✓	✓

✓ Basic version O Option – Not available	Article No.	SINUMERIK 828D					
		PPU 240/PPU 241		PPU 260/PPU 261		PPU 280/PPU 281	
	Notes	BASIC T	BASIC M	T	M	T	M
Interpolations							
Linear interpolating axes, max.		4	4	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	Basic scope	–	✓	–	✓	–	✓
Spline interpolation (A, B and C splines)	**6FC5800-0AS16-0YB0**	O	O	O	O	O	O
Compressor for 3-axis machining		–	✓	–	✓	–	✓
Polynomial interpolation		–	–	–	–	–	–
Involute interpolation		–	–	–	–	–	–
Crank interpolation CRIP		–	–	–	–	–	–
Couplings							
Pair of synchronized axes (gantry axes), basic	**6FC5800-0AS51-0YB0**	O	O	O	O	O	O
• Gantry line-up		1	1	1	1	1	1
Master-Slave for drives, basic	**6FC5800-0AS52-0YB0**	O	O	O	O	O	O
Generic coupling CP-Static[1] (e.g. counter-spindle):	**6FC5800-0AM75-0YB0**	–	O	–	O	O	O
• 1 × simple synchronous spindle, coupling ratio 1:1, no multi-edge machining							
Generic coupling CP-Basic[2] (e.g. multi-edge turning):	**6FC5800-0AM72-0YB0**						
• 4 axis pairs in simultaneous coupled motion		O	–	O	–	O	–
• 1 × synchronous spindle/multi-edge turning		O	–	O	–	O	–
• Master-value coupling/curve table interpolation		–	–	–	–	–	–
Generic coupling CP-Comfort (e.g. electronic gear):	**6FC5800-0AM73-0YB0**						
• 4 axis pairs in simultaneous coupled motion		O	–	O	–	O	–
• 1 × synchronous spindle/multi-edge turning		O	–	O	–	O	–
• Electronic gear for 3 leading axes, without curve table, without cascading		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	O	O
TRANSMIT/TRACYL without Y axis	**6FC5800-0AS50-0YB0**	O	O	O	O	O	O
Inclined axis[3]	**6FC5800-0AM28-0YB0**	–	–	–	–	O	–
Concatenated transformations (inclined axis TRAANG after TRAORI/cardanic milling head/TRANSMIT/TRACYL)		–	–	–	–	✓	–
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**	O	O	O	O	O	O
Measure kinematics (determine transformation data of rotary axes)	**6FC5800-0AP18-0YB0**	–	O	–	O	–	O

[1] For turning machines with counterspindle.

[2] For multi-edge turning in turning machines.

[3] For non-orthogonal Y-axis in turning machines.

Overview of functions

CNC controls SINUMERIK 828

Technologies/Motion-synchronous actions/ Open Architecture/CNC programming language

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D PPU 240/PPU 241 BASIC T	 BASIC M	PPU 260/PPU 261 T	 M	PPU 280/PPU 281 T	 M
Technologies							
Handwheel override		✓	✓	✓	✓	✓	✓
Contour handwheel	**6FC5800-0AM08-0YB0**	O	O	O	O	O	O
SINUMERIK MDynamics:							
• Advanced Surface		–	✓	–	✓	–	✓
• High Speed Settings		–	✓	–	✓	–	✓
• Expanded user memory via the optional user CompactFlash card	CompactFlash card must be ordered separately.	–	✓	–	✓	–	✓
Motion-synchronous actions							
CNC inputs/outputs, high-speed:							
• Digital inputs drives onboard		12	12	12	12	12	12
• Digital inputs/outputs drives onboard, parameterizable		8	8	8	8	8	8
• Digital inputs/outputs CNC onboard		8/8	8/8	8/8	8/8	8/8	8/8
Synchronized actions and high-speed 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	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 of active synchronized actions in HMI	Included in CNC option: Extended operator functions. 6FC5800-0AP16-0YB0	O	O	O	O	O	O
Open Architecture							
SINUMERIK Integrate Run MyScreens (OA Easy Screen):							
• Free screens		5	5	5	5	5	5
SINUMERIK Integrate Run MyScreen (SINUMERIK Operate Runtime license OA Easy Screen):							
• > 5 screens, extended functions	**6FC5800-0AP64-0YB0**	O	O	O	O	O	O
CNC programming language							
Programming language DIN 66025 and high-level language expansion		✓	✓	✓	✓	✓	✓
Main program call from main program and subprogram		✓	✓	✓	✓	✓	✓
Subprogram levels/interrupt routines, max.		11/4	11/4	11/4	11/4	11/4	11/4
Number of subprogram repetitions		≤ 9999	≤ 9999	≤ 9999	≤ 9999	≤ 9999	≤ 9999
Number of levels for skip blocks		2	2	2	2	2	2
Number of levels for skip blocks, max.	Included in CNC option: Extended operator functions. 6FC5800-0AP16-0YB0	O 10	O 10	O 10	O 10	O 10	O 10
Polar coordinates		✓	✓	✓	✓	✓	✓
1/2/3-point contours		✓	✓	✓	✓	✓	✓
Dimensions metric/inch, changeover manually or via 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 ex 38 (display ± 999999999.9999) INT -2^{31} ... 2^{31} -1		✓	✓	✓	✓	✓	✓

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D PPU 240/PPU 241 BASIC T	 BASIC M	PPU 260/PPU 261 T	 M	PPU 280/PPU 281 T	 M
CNC programming language (continued)							
High-level CNC language with:							
• User variables, configurable		✓	✓	✓	✓	✓	✓
• Predefined user variables (arithmetic parameters)		✓	✓	✓	✓	✓	✓
• Predefined user variables (arithmetic parameters), configurable		✓	✓	✓	✓	✓	✓
• Read/write system variables		✓	✓	✓	✓	✓	✓
• Indirect programming		✓	✓	✓	✓	✓	✓
• Program jumps and branches		✓	✓	✓	✓	✓	✓
• Program coordination with WAIT, START, INIT		✓	✓	✓	✓	✓	✓
• Arithmetic and trigonometric functions		✓	✓	✓	✓	✓	✓
• Comparison operations and logic operations		✓	✓	✓	✓	✓	✓
• Macro techniques		✓	✓	✓	✓	✓	✓
• Control structures IF-ELSE-ENDIF		✓	✓	✓	✓	✓	✓
• Control structures WHILE, FOR, REPEAT, LOOP		✓	✓	✓	✓	✓	✓
• Commands to HMI		✓	✓	✓	✓	✓	✓
• STRING functions		✓	✓	✓	✓	✓	✓
Program functions:							
• Preprocessing memory, dynamic FIFO		✓	✓	✓	✓	✓	✓
• Look Ahead, number of blocks		1	50	1	100	1	150
• Frame concept		✓	✓	✓	✓	✓	✓
• Inclined-surface machining with swivel cycles		–	✓	–	✓	–	✓
• Axis/spindle interchange		✓	✓	✓	✓	✓	✓
• Geometry axes, switchable online in the CNC program		✓	✓	✓	✓	✓	✓
• Program preprocessing		✓	✓	✓	✓	✓	✓
Online ISO dialect interpreter		✓	✓	✓	✓	✓	✓
Program/workpiece management:							
• Part programs on PPU, max. number	In total max. 512 files per directory.	750	750	750	750	750	750
• Workpieces on PPU, max. number	In total max. 256 directories.	250	250	250	250	250	250
• On additional plug-in CompactFlash card		✓	✓	✓	✓	✓	✓
• On USB storage medium, e.g. memory stick		✓	✓	✓	✓	✓	✓
• On network drive (Windows Share/FTP)	Included in CNC option: Network drive management via Ethernet. 6FC5800-0AP01-0YB0	O	O	O	O	O	O
• Templates for workpieces, programs and INI files		✓	✓	✓	✓	✓	✓
• Job lists		✓	✓	✓	✓	✓	✓
Basic frames, max. number		1	1	1	1	1	1
Settable offsets, max. number		50	50	100	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		–	–	–	–	–	–

Overview of functions
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Programming support/Simulation/ Operating modes

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D PPU 240/PPU 241 BASIC T	 BASIC M	PPU 260/PPU 261 T	 M	PPU 280/PPU 281 T	 M
Programming support							
Program editor:							
• Programming support for cycles programGUIDE		✓	✓	✓	✓	✓	✓
• CNC editor 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**	O	O	O	O	O	O
• Backup workpiece setup data	Included in CNC option: Extended operator functions. 6FC5800-0AP16-0YB0	O	O	O	O	O	O
• Multiple clamping of various workpieces	Included in ShopMill	–	✓	–	✓	–	✓
Technology cycles for drilling/milling	Basic scope	✓	✓	✓	✓	✓	✓
Technology cycles for turning	Basic scope	✓	–	✓	–	✓	–
Advanced technology functions[1] (expansion of the technology cycles for turning and milling)	**6FC5800-0AP58-0YB0**	O	O	✓	✓	✓	✓
Pocket milling with free contour definition and islands		O	O	✓	✓	✓	✓
Stock removal cycles with free contour definition		O	–	✓	–	✓	–
Residual material detection and machining for contour pockets and stock removal[1]	**6FC5800-0AP13-0YB0** Requirement: Option Advanced technology functions.	O	O	O	O	O	O
Access protection for cycles		–	–	–	–	–	–
Programming support can be extended, e.g. customer cycles		✓	✓	✓	✓	✓	✓
CAD Reader for PC	See Catalog NC 62	O	O	O	O	O	O
Simulation							
Simulation of program X, while program Y is being executed (simulation parallel to machining)		–	–	–	–	–	–
2D simulation		✓	✓	✓	✓	✓	✓
3D simulation finished part	**6FC5800-0AP25-0YB0**	O	O	O	O	O	O
3D simulation, finished part and working area		–	–	–	–	–	–
3D simulation, finished part with collision check		–	–	–	–	–	–
Simultaneous recording (real-time simulation of current machining operation)	**6FC5800-0AP22-0YB0**	O	O	O	O	O	O
Operating modes							
JOG:							
• Handwheel selection		✓	✓	✓	✓	✓	✓
• Inch/metric changeover		✓	✓	✓	✓	✓	✓
• Manual measurement of work offset		✓	✓	✓	✓	✓	✓
• Additional measuring version beyond standard scope - Standard scope workpiece zero: Set edge, align edge, right-angled corner, 1 hole, and 1 circular spigot - Expansion of the measurement window via combo box	Included in CNC option: Extended operator functions. 6FC5800-0AP16-0YB0	–	O	–	O	–	O
• Manual measurement of tool offset		✓	✓	✓	✓	✓	✓
• Automatic tool/workpiece measurement		✓	✓	✓	✓	✓	✓
• Reference point approach, automatic/via CNC program		✓	✓	✓	✓	✓	✓

[1] 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

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D PPU 240/PPU 241 BASIC T	 BASIC M	 PPU 260/PPU 261 T	 M	 PPU 280/PPU 281 T	 M
Operating modes (continued)							
MDI:							
• Input in text editor		✓	✓	✓	✓	✓	✓
• Load/save MDI program	Included in CNC option: Extended operator functions. 6FC5800-0AP16-0YB0	O	O	O	O	O	O
• Input screen forms for technology and positioning, cycle support		✓	✓	✓	✓	✓	✓
Teach-in	Included in CNC option: Extended operator functions. 6FC5800-0AP16-0YB0	O	O	O	O	O	O
Automatic:							
• Execution from storage medium connected to CompactFlash card interface on the operator panel front		✓	✓	✓	✓	✓	✓
• Execution from storage medium connected to USB interface on operator panel front (e.g. card reader, memory stick)		✓	✓	✓	✓	✓	✓
• Execution from network drive	Included in CNC option: Network drive management via Ethernet. 6FC5800-0AP01-0YB0	O	O	O	O	O	O
• Program control		✓	✓	✓	✓	✓	✓
• Program editing		✓	✓	✓	✓	✓	✓
• Overstoring	Included in CNC option: Extended operator functions. 6FC5800-0AP16-0YB0	O	O	O	O	O	O
• DRF offset	Included in CNC option: Extended operator functions. 6FC5800-0AP16-0YB0	O	O	O	O	O	O
• Block search with/without calculation		✓	✓	✓	✓	✓	✓
• Extended block search (program, search pointer, step up and down, interrupt function)	Included in CNC option: Extended operator functions. 6FC5800-0AP16-0YB0	O	O	O	O	O	O
Repos (repositioning on the contour):							
• With operator command/semi-automatically		✓	✓	✓	✓	✓	✓
• Program-controlled		✓	✓	✓	✓	✓	✓
Preset:							
• Set actual value		✓	✓	✓	✓	✓	✓
Tools							
Tool types:							
• Turning		✓	–	✓	–	✓	–
• Drilling/milling		✓	✓	✓	✓	✓	✓
• Groove sawing		✓	✓	✓	✓	✓	✓
Tool radius compensations in plane with:							
• Approach and retract strategies		✓	✓	✓	✓	✓	✓
• Transition circle/ellipse on outer edges		✓	✓	✓	✓	✓	✓
Configurable intermediate blocks with tool radius compensation active		✓	✓	✓	✓	✓	✓
3D tool radius compensation		–	–	–	–	–	–
Tool carrier with orientation capability		–	✓	–	✓	–	✓
Look-ahead detection of contour violations		✓	✓	✓	✓	✓	✓

2

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D PPU 240/PPU 241 BASIC T	 BASIC M	PPU 260/PPU 261 T	 M	PPU 280/PPU 281 T	 M
Tool management							
Operation with tool management:		✓	✓	✓	✓	✓	✓
• Real magazines, maximum number		1	1	1	1	2	2
• Tool list		✓	✓	✓	✓	✓	✓
• Expandable tool list		–	–	–	–	–	–
• Tools/cutting edges in tool list		80/160	80/160	128/256	128/256	256/512	256/512
• Tool offset selection via T and D numbers		✓	✓	✓	✓	✓	✓
• Magazine list		✓	✓	✓	✓	✓	✓
• Configurable magazine list		✓	✓	✓	✓	✓	✓
• Magazine data		✓	✓	✓	✓	✓	✓
• Empty location search and location positioning		✓	✓	✓	✓	✓	✓
• Easy empty location search via softkey		✓	✓	✓	✓	✓	✓
• Loading and unloading of tools		✓	✓	✓	✓	✓	✓
• Tool cabinet and tool catalog		–	–	–	–	–	–
• Loading and unloading via code carrier system		–	–	–	–	–	–
• Adapter data		✓	–	✓	–	✓	–
• Location-dependent offsets		–	–	–	–	–	–
• Tool life monitoring and workpiece count		✓	✓	✓	✓	✓	✓
• Replacement tools for tool management	**6FC5800-0AM78-0YB0**	O	O	O	O	O	O
Manage My Tools tool management functions (TDI for individual machines and networked machines)		–	–	–	–	–	–
Communication and data management							
Data on storage medium on rear USB interface of operator panel, e.g. card reader, memory stick		✓	✓	✓	✓	✓	✓
Data on storage medium on front USB interface of operator panel, e.g. card reader, memory stick		✓	✓	✓	✓	✓	✓
Data on the front CF card interface of the operator panel		✓	✓	✓	✓	✓	✓
Process data transfer (WRITE ISOPRINT) to CF card, USB stick or via RS232C		✓	✓	✓	✓	✓	✓
Manage additional drives via Windows Share/FTP:							
• Ethernet, maximum number	**6FC5800-0AP01-0YB0**	O 4	O 4	O 4	O 4	O 4	O 4
• USB interface		✓	✓	✓	✓	✓	✓
• CF card interface on operator panel front		✓	✓	✓	✓	✓	✓
RS232C serial interface		✓	✓	✓	✓	✓	✓
Data backup of system software and user data (backup/restore) on user CF card		✓	✓	✓	✓	✓	✓
I/O interfacing in via PROFINET	Only via PP 72/48D PN and PP 72/48D 2/2A PN I/O modules.	✓	✓	✓	✓	✓	✓
Connection to an external PROFINET network with SIMATIC DP PN/PN coupler	**6ES7158-3AD00-0XA0**	O	O	O	O	O	O
SINUMERIK RPC		–	–	–	–	–	–
ADDM Automation Data Management		–	–	–	–	–	–
Production data evaluation: • Machine Data Acquisition MDA Machine and operating data acquisition		–	–	–	–	–	–

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D PPU 240/PPU 241 BASIC T	 BASIC M	PPU 260/PPU 261 T	 M	PPU 280/PPU 281 T	 M
Operation							
SINUMERIK 828D operator panel CNC, vertical/horizontal:		✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓
• Color display		8.4"	8.4"	10.4"	10.4"	10.4"	10.4"
• Integrated QWERTY keyboard, short-stroke keys		✓	✓	✓	✓	✓	✓
Extended operator functions[1)]	**6FC5800-0AP16-0YB0**	O	O	O	O	O	O
SINUMERIK operator panel CNC with TCU		–	–	–	–	–	–
SINUMERIK operator panel CNC with PCU		–	–	–	–	–	–
SINUMERIK PCU 50.5		–	–	–	–	–	–
Connection for: • Standard monitor (DVI), VGA via ext. adapter, as for PCU 50.5		–	–	–	–	–	–
• SIMATIC OPs		–	–	–	–	–	–
Operating unit management: • One operator panel per CNC		✓	✓	✓	✓	✓	✓
• Combination of multiple operator panels and CNCs		–	–	–	–	–	–
Handheld units: • SINUMERIK HT 8 handheld terminal		–	–	–	–	–	–
• SINUMERIK HT 2 handheld terminal		–	–	–	–	–	–
• Mini handheld unit with coiled connecting cable	**6FX2007-1AD03**	O	O	O	O	O	O
• Mini handheld unit with straight connecting cable	**6FX2007-1AD13**	O	O	O	O	O	O
• Connection kit for mini handheld unit, non-assembled without Industrial Ethernet	**6FX2006-1BG03**	O	O	O	O	O	O
• Connection kit for mini handheld unit, assembled with PROFINET	**6FX2006-1BG20**	O	O	O	O	O	O
• Holder for mini handheld unit	**6FX2006-1BG70**	O	O	O	O	O	O
• Handwheel connection module PROFIBUS		–	–	–	–	–	–
Machine control panels: • SINUMERIK MCP 802D sl		–	–	–	–	–	–
• SINUMERIK MCPA module		–	–	–	–	–	–
• SINUMERIK MCP 310C PN	**6FC5303-0AF23-0AA1**	O	O	O	O	O	O
• SINUMERIK MCP 483C PN	**6FC5303-0AF22-0AA1**	O	O	O	O	O	O
• SINUMERIK customer-specific MCP interface module	**6FC5303-0AF03-0AA0**	O	O	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	O	O
• With 76.2 mm × 76.2 mm front panel, 5 V DC	**6FC9320-5DC01**	O	O	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	O	O
• Without front panel, with setting wheel, 5 V DC	**6FC9320-5DM00**	O	O	O	O	O	O
• Portable in housing, coiled cable	**6FC9320-5DE02**	O	O	O	O	O	O
• Flange socket for portable handwheel	**6FC9341-1AQ**	O	O	O	O	O	O

[1)] The operator functions in the basic scope of the SINUMERIK 828D are designed for standard applications. With the CNC option extended operator functions, the following additional operator functions can be enabled:

- Overstoring
- Teach-in
- DRF offset
- Extended block search
- Backup workpiece setup data
- Additional measuring version beyond the standard scope (only milling)
  - Standard scope workpiece zero: Set edge, align edge, right-angled corner, 1 hole, and 1 circular spigot
  - Expansion of the measurement window via combo box
- Display active synchronized actions in HMI
- Number of levels for skip blocks 10
- Load/save MDI program

Operation/ Functions/Monitoring functions

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D PPU 240/PPU 241 BASIC T	 BASIC M	PPU 260/PPU 261 T	 M	PPU 280/PPU 281 T	 M
Operation (continued)							
Connection for electronic handwheels to, max.:		3	3	3	3	3	3
• PPU		2	2	2	2	2	2
• MCP 310, MCP 483 or MCP interface module		1	1	1	1	1	1
Keyboards:							
• Integrated QWERTY keyboard		✓	✓	✓	✓	✓	✓
• External SINUMERIK keyboards		–	–	–	–	–	–
• KBPC CG US standard PC keyboard		–	–	–	–	–	–
Connection for external memory/storage devices via USB:							
• Card reader for CF/SD storage media	**6FC5335-0AA00-0AA0**	O	O	O	O	O	O
• Memory stick		✓	✓	✓	✓	✓	✓
- e.g. SIMATIC USB FlashDrive 8 GB	**6ES7648-0DC50-0AA0**	O	O	O	O	O	O
Functions							
Plain text display of user variables		✓	✓	✓	✓	✓	✓
Multi-channel display		–	–	–	–	–	–
2D representation of 3D protection areas/work areas		–	–	–	–	–	–
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, 7 levels		✓	✓	✓	✓	✓	✓
Languages of operating software:							
• Chinese Simplified, Chinese Traditional, English, French, German, Italian, Korean, Portuguese, Spanish		✓	✓	✓	✓	✓	✓
• Additional languages, use of language extensions		✓	✓	✓	✓	✓	✓
• Additional languages for operating software SINUMERIK Operate on DVD, without license, e.g. Czech, Danish, Dutch, Finnish, Hungarian, Japanese, Polish, Romanian, Russian, Slovak, Slovene, Swedish, Thai, Turkish	**6FC5860-0YC40-0YA8**	O	O	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		–	–	–	–	–	–
IDM integrated tool monitoring and diagnostics		–	–	–	–	–	–

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D PPU 240/PPU 241 BASIC T	 BASIC M	PPU 260/PPU 261 T	 M	PPU 280/PPU 281 T	 M
Compensations							
Backlash compensation		✓	✓	✓	✓	✓	✓
Leadscrew error compensation		✓	✓	✓	✓	✓	✓
Bidirectional leadscrew error compensation	**6FC5800-0AM54-0YB0** The correctable tolerance band is limited to 1 mm.	O	O	O	O	O	O
Measuring system error compensation		✓	✓	✓	✓	✓	✓
Sag compensation, multi-dimensional	**6FC5800-0AM55-0YB0** The correctable tolerance band is limited to 1 mm.	O	O	O	O	O	O
Quadrant error compensation per operator input		✓	✓	✓	✓	✓	✓
Graphic monitoring of quadrant error compensation using circularity test		✓	✓	✓	✓	✓	✓
Temperature compensation		✓	✓	✓	✓	✓	✓
Feedforward control, velocity-dependent		✓	✓	✓	✓	✓	✓
Feedforward control, acceleration-dependent		✓	✓	✓	✓	✓	✓
PLC							
SIMATIC S7-300		–	–	–	–	–	–
SIMATIC S7-200 based (integrated)		✓	✓	✓	✓	✓	✓
Fixed cycle time for PLC in ms		9	9	6	6	6	6
Reaction time to process events (terminal to terminal) in ms		7.5	7.5	7.5	7.5	4.5	7.5
Memory expansion Ladder Steps		24000	24000	24000	24000	24000	24000
PLC programming language:							
• Ladder diagram LAD		✓	✓	✓	✓	✓	✓
• Function block diagram FBD		–	–	–	–	–	–
• Statement list STL		–	–	–	–	–	–
PLC programming tool for Integrated PLC	On toolbox DVD-ROM.	✓	✓	✓	✓	✓	✓
PLC ladder add-on editor on PPU		✓	✓	✓	✓	✓	✓
I/O modules:							
• PP 72/48D PN digital I/O module, max. number	**6FC5311-0AA00-0AA0**	O 3	O 3	O 4	O 4	O 5	O 5
• PP 72/48D 2/2A PN digital/analog I/O module, max. number	**6FC5311-0AA00-1AA0**	O 3	O 3	O 4	O 4	O 5	O 5
• General I/Os via PROFIBUS/PROFINET		–	–	–	–	–	–
• General SIMATIC PROFINET PLC I/Os		–	–	–	–	–	–
• ADI 4 (Analog Drive Interface for 4 Axes)		–	–	–	–	–	–
Digital inputs, max. number		216	216	288	288	360	360
Digital outputs, max. number		144	144	192	192	240	240
Analog inputs, max. number		6	6	8	8	10	10
Analog outputs, max. number		6	6	8	8	10	10
PLC alarms/messages, max. number		248	248	248	248	248	248
Bit memories, number in bytes		512	512	512	512	512	512
Timers, number		128	128	128	128	128	128
Counters, number		64	64	64	64	64	64
Subroutines		256	256	256	256	256	256
FB, FC		–	–	–	–	–	–
DB, highest number, max. number		64	64	64	64	64	64
Cyclic function block		✓	✓	✓	✓	✓	✓
Cyclic function block, servo-synchronous		✓	✓	✓	✓	✓	✓
User machine data for configuring the PLC user program		✓	✓	✓	✓	✓	✓

Safety functions/Commissioning/ Diagnostic functions

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D PPU 240/PPU 241 BASIC T	 BASIC M	PPU 260/PPU 261 T	 M	PPU 280/PPU 281 T	 M
Safety functions							
SINUMERIK Safety Integrated Safety functions for personnel and machine protection:							
• Safe Torque Off (STO)		✓	✓	✓	✓	✓	✓
• Safe Brake Control (SBS)		✓	✓	✓	✓	✓	✓
• 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)	**6FC5800-0AC50-0YB0**	O	O	O	O	O	O
• SINAMICS S120 Terminal Module Cabinet TM54F to control SOS, SS2, SLS, SSM and SAM	**6SL3055-0AA00-3BA0**	O	O	O	O	O	O
Commissioning							
Commissioning software for drive system is integrated:							
• SINAMICS S120		✓	✓	✓	✓	✓	✓
Auto Servo Tuning AST fully automatic speed and position controller optimization		✓	✓	✓	✓	✓	✓
Commissioning trace (drive optimization without an additional oscilloscope):							
• Integrated		✓	✓	✓	✓	✓	✓
• Commissioning software for SINAMICS S120	On toolbox DVD-ROM.	✓	✓	✓	✓	✓	✓
Standard commissioning via:							
• RS232C serial interface		–	–	–	–	–	–
• USB interface with storage medium, e.g. memory stick	Read in/out INI file	✓	✓	✓	✓	✓	✓
• Network drive		✓	✓	✓	✓	✓	✓
• User CF card		✓	✓	✓	✓	✓	✓
• SINUMERIK Integrate Access MyMachine /P2P for PC/PG (MCIS RCS Commander for PC/PG)	**6FC5860-7YC00-0YA0**	O	O	O	O	O	O
STARTER drive commissioning tool on PC/PG for SINAMICS S120	**6SL3072-0AA00-0AG0**	O	O	O	O	O	O
SinuCom commissioning/service tools for SINUMERIK 840Di sl/840D sl		–	–	–	–	–	–
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		✓	✓	✓	✓	✓	✓
Easy Message Machine status transfer using text messages (SMS) requires an optional SINAUT system with antenna and connecting cable	**6NH9720-3AA00** **6NH9860-1AA00** **6NH7701-5AN**	O	O	O	O	O	O
Remote diagnostics and file transfer:							
• SINUMERIK Integrate Access MyMachine /P2P (MCIS RCS Host remote diagnostics function for connection of a modem router to the X127)	**6FC5800-0AP30-0YB0**	O	O	O	O	O	O
• SINUMERIK Integrate Access MyMachine /P2P (MCIS RCS Commander for PC/PG) Principally permits file transfer between PC/PG and CNCs	**6FC5860-7YC00-0YA0** RCS Commander for PC/PG on CD-ROM.	O	O	O	O	O	O

✓ Basic version O Option – Not available	Article No. Notes	SINUMERIK 828D PPU 240/PPU 241 BASIC T	 BASIC M	PPU 260/PPU 261 T	 M	PPU 280/PPU 281 T	 M
Service and maintenance							
SINUMERIK Integrate Access MyMachine (ePS Network Services)		–	–	–	–	–	–
Total Productive Maintenance TPM Servicing and maintenance support		–	–	–	–	–	–
Integrated service planner for monitoring of service intervals		✓	✓	✓	✓	✓	✓
Easy Extend Simply extend optional machine components		✓	✓	✓	✓	✓	✓
SINUMERIK Ctrl-Energy							
Intelligent standby control of the machine		✓	✓	✓	✓	✓	✓
Measurement and evaluation of the energy usage of the drive system		✓	✓	✓	✓	✓	✓
Flux reduction		✓	✓	✓	✓	✓	✓
Reactive current compensation only with SINAMICS S120 Active Line Module		O	O	O	O	O	O
Measurement and evaluation of the total usage of the machine:							
• SENTRON PAC3200 power monitoring device for front panel mounting records 50 measuring values	**7KM2112-0BA00-3AA0**	O	O	O	O	O	O
• SENTRON PAC4200 power monitoring device for front panel mounting records 200 measuring values	**7KM4212-0BA00-3AA0**	O	O	O	O	O	O

Overview of CNC options

✓ Basic version O Option – Not available	Article No.	SINUMERIK 828D PPU 240.2/PPU 241.2		PPU 260.2/PPU 261.2		PPU 280.2/PPU 281.2	
		BASIC T	BASIC M	T	M	T	M
Manufacturer options							
Axis/spindle, each additional	**6FC5800-0AC20-0YB0**	O	O	O	O	O	O
Positioning axis/auxiliary spindle, each additional	**6FC5800-0AC30-0YB0**	O	O	O	O	O	O
TRANSMIT/cylinder surface transformation	**6FC5800-0AM27-0YB0**	O	O	O	O	O	O
TRANSMIT/TRACYL without Y axis	**6FC5800-0AS50-0YB0**	O	O	O	O	O	O
Inclined axis[1)]	**6FC5800-0AM28-0YB0**	–	–	–	–	O	–
Pair of synchronized axes (gantry axes), basic	**6FC5800-0AS51-0YB0**	O	O	O	O	O	O
Travel to fixed stop with Force Control	**6FC5800-0AM01-0YB0**	O	O	O	O	O	O
Generic coupling Static CP-Static[2)]	**6FC5800-0AM75-0YB0**	–	O	–	O	O	O
Generic coupling Basic CP-Basic[3)]	**6FC5800-0AM72-0YB0**	O	–	O	–	O	–
Generic coupling Comfort CP-Comfort	**6FC5800-0AM73-0YB0**	O	–	O	–	O	–
Bidirectional leadscrew error compensation	**6FC5800-0AM54-0YB0**	O	O	O	O	O	O
Sag compensation, multi-dimensional	**6FC5800-0AM55-0YB0**	O	O	O	O	O	O
Master-Slave for drives, basic	**6FC5800-0AS52-0YB0**	O	O	O	O	O	O
Evaluation of internal drive variables, basic	**6FC5800-0AS53-0YB0**	O	O	O	O	O	O
SINUMERIK Integrate Run MyScreen (SINUMERIK Operate runtime license OA Easy Screen)	**6FC5800-0AP64-0YB0**	O	O	O	O	O	O
Safety Integrated Extended Functions for one CNC axis	**6FC5800-0AC50-0YB0**	O	O	O	O	O	O

1) For non-orthogonal Y-axis in turning machines.

2) For turning machines with counterspindle.

3) For multi-edge turning in turning machines.
No master-value coupling/curve table interpolation.

✓ Basic version O Option – Not available	Article No.	SINUMERIK 828D PPU 240.2/PPU 241.2 BASIC T	 BASIC M	PPU 260.2/PPU 261.2 T	 M	PPU 280.2/PPU 281.2 T	 M
User options							
Advanced technology functions (expansion of the technology cycles for turning and milling)[1]	**6FC5800-0AP58-0YB0**	O	O	✓	✓	✓	✓
Extended operator functions[2]	**6FC5800-0AP16-0YB0**	O	O	O	O	O	O
Machining step programming ShopTurn/ShopMill	**6FC5800-0AP17-0YB0**	O	O	O	O	O	O
Multiple clamping of various workpieces (included in ShopMill)	Basic scope	–	✓	–	✓	–	✓
Residual material detection and machining for contour pockets and stock removal[3]	**6FC5800-0AP13-0YB0**	O	O	O	O	O	O
3D simulation finished part	**6FC5800-0AP25-0YB0**	O	O	O	O	O	O
Simultaneous recording (real-time simulation of current machining)	**6FC5800-0AP22-0YB0**	O	O	O	O	O	O
Measuring cycles for drilling/milling and turning (calibrate workpiece probe, workpiece measurement, tool measurement)	**6FC5800-0AP28-0YB0**	O	O	O	O	O	O
Network drive management via Ethernet	**6FC5800-0AP01-0YB0**	O	O	O	O	O	O
Replacement tools for tool management	**6FC5800-0AM78-0YB0**	O	O	O	O	O	O
SINUMERIK Integrate Access MyMachine /P2P (MCIS RCS Host remote diagnostics function for connection of a modem routers to the X127)	**6FC5800-0AP30-0YB0**	O	O	O	O	O	O
Contour handwheel	**6FC5800-0AM08-0YB0**	O	O	O	O	O	O
Advanced Surface	Basic scope	–	✓	–	✓	–	✓
Spline interpolation (A, B and C splines)	**6FC5800-0AS16-0YB0**	O	O	O	O	O	O
Measure kinematics (determine transformation data of rotary axes)	**6FC5800-0AP18-0YB0**	–	O	–	O	–	O

[1] 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

[2] The operator functions in the basic scope of the SINUMERIK 828D are designed for standard applications. With the CNC option extended operator functions, the following additional operator functions can be enabled:
- Overstoring
- Teach-in
- DRF offset
- Extended block search
- Backup workpiece setup data
- Additional measuring version beyond the standard scope (only milling)
  - Standard scope workpiece zero: Set edge, align edge, right-angled corner, 1 hole, and 1 circular spigot
  - Expansion of the measurement window via combo box
- Display active synchronized actions in HMI
- Number of levels for skip blocks 10
- Load/save MDI program

[3] Requirement: Option Advanced technology functions.

System overview

	SINUMERIK 828D PPU 240/PPU 241		PPU 260/PPU 261		PPU 280/PPU 281	
	BASIC T	**BASIC M**	**T**	**M**	**T**	**M**
DRIVE-CLiQ ports	3	3	3	3	3	3
Number of axes/spindles (basic version)	3	4	3	4	3	4
Number of axes/spindles, max.	5	5	6	6	6/8[1)]	6
Number of axes with Drive Based Extended Safety, max.	5	5	6	6	6/8[1)]	6
IPO cycle for max. configuration	9 ms	9 ms	6 ms	6 ms	6 ms	3 ms
Minimum block change time, approx.	9 ms	9 ms	6 ms	6 ms	6 ms	3 ms
• Milling with compressor	–	3 ms	–	2 ms	–	1 ms
Position control cycle	3 ms	3 ms	3 ms	3 ms	1.5 ms	3 ms
Velocity/current controller cycle	125 µs	125 µs	125 µs	125 µs	125 µs	125 µs
Velocity/current controller clock cycle for a high-speed spindle	–	–	–	62.5 µs	–	62.5 µs
• Mixed operation 4 × 125 µs and 1 × 62.5 µs (max. number of axes = 5)						
• With NX10.3 (max. number of axes = 6)						
Non Volatile Random-Access Memory (NVRAM) for:						
• OEM	512 KB	512 KB	512 KB	512 KB	512 KB	512 KB
• User data	1 MB	1 MB	3 MB	3 MB	5 MB	5 MB
Numeric Control Extension NX10.3	–	–	–	1	1	1
PP 72/48D I/O modules, max.	3	3	4	4	5	5

1) The following can be achieved with a NX10.3:
- The maximum number of axes can be increase to 8, 6 of which can be connected to the PPU and 2 to the NX10.3 .