CNC control
Overview of functions

		SINUMERIK 802D sl				
● Standard (basic functionality) ○ Option − Not available	Order No.	T/M value	T/M plus	T/M pro	G/N plus	G/N pro

Control structure/application

		T/M value	T/M plus	T/M pro	G/N plus	G/N pro
Panel-based design		●	●	●	●	●
Drives	See Drive System					
• SINAMICS S120 in booksize format linked via DRIVE-CLiQ		●	●	●	●	●
Channels/mode groups (MGs)		1	1	1	1	1
• Maximum configuration		1	1	1	1	1
CNC main memory (buffered) for programs and data in MB		0.5	1	3	1	3
CNC main memory, maximum configuration in MB		0.5	1	3	1	3
CNC memory, expansion with CF card		●	●	●	●	●
Axes/spindles		● [3]	● [1]	● [1]	● [4]	● [4]
• Maximum configuration of axes		4	5	5	5	5
• Maximum configuration of spindles		1	2	2	2	2
• Maximum configuration of axes and spindles		4	5	5	5	5
• Configuration per channel axes incl. spindles		4	5	5	5	5
PLC-controlled axis		−	1	1	1	1

Measuring systems that can be connected

		T/M value	T/M plus	T/M pro	G/N plus	G/N pro
Max. number, with DMC20 DRIVE-CLiQ Hub Module	See Catalog NC61	4	5	5	5	5
Incremental rotary measuring systems with RS 422 (TTL)		● [2]	● [2]	● [2]	● [2]	● [2]
Linear scale LMS with sin/cos 1 V_{pp} • via SINAMICS Sensor Module SMC		●	●	●	●	●
Linear scale LMS with distance-coded reference marks • via SINAMICS Sensor Module SMC		●	●	●	●	●
Linear scale LMS with EnDat • via SINAMICS Sensor Module SMC		●	●	●	●	●
Rotary measuring systems with distance-coded reference marks • via SINAMICS Sensor Module SMC		●	●	●	●	●
Absolute encoder connection with EnDat • via SINAMICS Sensor Module SMC		●	●	●	●	●
Absolute/incremental encoder installed in 1FK7 • integrated in motor via SINAMICS S120 + Sensor Module		●	●	●	●	●
Incremental encoder with sin/cos 1 V_{pp} • via SINAMICS Sensor Module SMC		●	●	●	●	●
Resolver integrated in 1FK7 • via SINAMICS S120 with Sensor Module SMC/motor-integrated		−	−	−	−	−

[1] 4 axes + 1 spindle or 3 axes + 1 spindle + 2nd spindle for rotating tool and one additional PLC axis.
[2] SINAMICS Sensor Module SMC required for max. one measuring system (spindle).
[3] 3 axes + 1 spindle.
[4] N = 5 axes, no spindle; G = 4 (3) axes, 1 (2) spindle(s) and one additional PLC axis each.

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• Standard (basic functionality) ○ Option − Not available		T/M value	T/M plus	T/M pro	G/N plus	G/N pro
CNC functionality: Program functions						
Dynamic preprocessing memory (FIFO)[1]		●	●	●	●	●
Look ahead		20	50	100	50	100
Frame system		●	●	●	●	●
CNC functionality: Axis functions						
Feedrate override of 0 ... 200 %		●	●	●	●	●
Traversing range 9 decades (display: 999999999)		●	●	●	●	●
Rotary axis, turning endlessly		−	●	●	●	●
Velocity, max. 300 m/s		●	●	●	●	●
Acceleration with jerk limitation		−	●	●	●	●
Programmable acceleration		●	●	●	●	●
Follow-up mode		●	●	●	●	●
Separate path feed for corners and chamfers		●	●	●	●	●
Travel to fixed stop		−	●	●	●	●
Tagential control		−	−	●	−	●
CNC functionality: Spindle functions						
Analog spindle speed		● 2)	● 2)	● 2)	● 2)	● 2)
Digital spindle speed		●	●	●	●	●
Spindle speed, max. programmable value range (display: 999999999.9)		●	●	●	●	●
Spindle override of 0 ... 200 %		●	●	●	●	●
5 gear stages		●	●	●	●	●
Automatic gear stage selection		●	●	●	●	●
Oriented spindle stop		●	●	●	●	●
Spindle speed limitation (min./max.)		●	●	●	●	●
Constant cutting rate		●	●	●	●	●
Spindle control via PLC (positioning, oscillation)		●	●	●	−	−
Thread cutting with constant or variable pitch		●	●	●	−	−
Tapping with compensating chuck/rigid tapping		●	●	●	−	−
CNC functionality: Interpolations						
Linear interpolation axes		● 3	● 4	● 4	● 4	● 4
• Maximum		3	4	4	4	4
Circle via center point and end point		●	●	●	●	●
Circle via interpolation point		●	●	●	●	●
Helical interpolation		2D+1	2D+2	2D+2	2D+1	2D+1
Spline interpolation (A, B and C splines/compressor) for 3-axis machining		−	−	●	−	−

[1] Cannot be changed.
[2] With ADI4 or MCPA module.

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● Standard (basic functionality) ○ Option − Not available		T/M value	T/M plus	T/M pro	G/N plus	G/N pro
CNC functionality: Transformations						
TRANSMIT and peripheral surface transformation		−	●	●	−	−
Inclined axis		−	−	−	●	●
CNC functionality: Measuring						
Measuring stage 1 1 probe (switching)		−	●	●	●	●
CNC functionality: Motion-synchronous actions						
High-speed CNC inputs/outputs						
• Digital inputs (on-board)		−	8	8	8	8
• Digital inputs or outputs (on-board)		−	8	8	8	8
Punching/nibbling		−	−	−	●	●
Oscillation functions block-related, modal and asynchronous		−	−	−	●	●
More than one feed in block, e. g. for calipers		−	−	−	●	●
Handwheel override		−	−	−	●	●
CNC programming: Language						
Programming language (DIN 66025 and high-level language expansion)		●	●	●	●	●
Subroutine levels/interrupt routines, max.		8/0	8/0	8/0	8/0	8/0
Number of subroutine passes ≤ 9999		●	●	●	●	●
Number of levels for skip blocks (/0 to /...)		1	1	1	1	1
Polar coordinates		●	●	●	●	●
1/2/3-point contours		●	−	−	−	−
Dimensions metric/inch, changeover manually or via program		●	●	●	●	●
Auxiliary function output						
• Via M word, max. programmable value range: INT 2^{31} -1		●	●	●	●	●
• Via H word, max. programmable value range: REAL ±3.4028 ex 38 (display: ±999999999.9999) INT -2^{31} to 2^{31} -1		−	●	●	●	●
High-level language CNC with						
• Predefined user variables (arithmetic parameters)		●	●	●	●	●
• Indirect programming		●	●	●	●	●
• Program jumps and branches		●	●	●	●	●
• Arithmetic and trigonometric functions		●	●	●	●	●
• Compare operations and logic combinations		●	●	●	●	●
• Control structures IF-ELSE-ENDIF		●	●	●	●	●
Online ISO dialect interpreter		●	●	●	−	−
Program/workpiece management						
• On supplementary CF card		●	●	●	●	●
• On network drive		−	−	●	−	●
• Number of part programs on NC, max.		99	99	99	99	99
CNC programming: Cycles						
Process-oriented cycles for drilling/milling and turning		●	●	●	−	−
Process-oriented cycles for grinding (external cylindrical, surface)		−	−	−	●	●
Access protection for cycles		●	●	●	●	●

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● Standard (basic functionality) ○ Option − Not available		T/M value	T/M plus	T/M pro	G/N plus	G/N pro

CNC programming: Programming support

		T/M value	T/M plus	T/M pro	G/N plus	G/N pro
Program editor						
• Text editor with editing functions: Marking, copying, deleting		●	●	●	●	●
Programming support for geometry entries						
• Geometry processor with programming graphics/ Free contour input (contour calculator)		−	●	●	●	●
• Screens for 1/2/3-point contours		●	−	−	−	−
Programming support for cycles						
• Screens and stationary auxiliary displays (e. g. customer cycles)		○ 1)	○ 1)	○ 1)	○ 1)	○ 1)
• Programming support expandable (e.g. custom displays)		○ 1)	○ 1)	○ 1)	○ 1)	○ 1)

Parameters

		T/M value	T/M plus	T/M pro	G/N plus	G/N pro
Number of basic frames, max.		1	1	1	1	1
Number of settable offsets, max.		6	6	6	6	6
Scratching, determining zero offset		●	●	●	●	●

Simulation

		T/M value	T/M plus	T/M pro	G/N plus	G/N pro
Drilling/milling (tool carrier vertical to the workpiece)						
• Single-sided 2D view, dynamic		●	●	●	−	−
Turning (tool carrier vertical to the workpiece)						
• Traverse path simulation without model (broken-line graphics)		●	●	●	−	−
Grinding						
• Traverse path simulation (broken-line graphics)		−	−	−	●	●
Nibbling						
• Traverse path simulation with tool form (broken-line graphics)		−	−	−	●	●

Operating modes

		T/M value	T/M plus	T/M pro	G/N plus	G/N pro
JOG		●	●	●	●	●
• Handwheel selection		●	●	●	●	●
• Switchover inch/metric		●	●	●	●	●
• Manual measurement of zero offset		●	●	●	−	−
• Manual measurement of tool offset		●	●	●	−	−
• Automatic tool measurement		−	●	●	−	−
• Dressing of grinding wheels		−	−	−	●	●
• Reference point approach, automatic/via CNC program		●	●	●	●	●
MDA		●	●	●	●	●
• Input in text editor		●	●	●	●	●
• Save MDA program		●	●	●	●	●
Automatic		●	●	●	●	●
• Execute from internal memory and/or CF card		●	●	●	●	●
• Execute from RS 232 C interface		−	−	−	−	−
• Execute from network drive		−	−	●	−	●
• Program control		●	●	●	●	●
• Program editing		●	●	●	●	●
• Block search with/without calculation		●	●	●	●	●

1) On request.

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● Standard (basic functionality) ○ Option – Not available		T/M value	T/M plus	T/M pro	G/N plus	G/N pro
Operating modes (continued)						
Teach In		●	●	●	–	–
• Teach positions in MDA buffer, loadable		●	●	●	–	–
REPOS (repositioning on the contour)		●	●	●	●	●
• With operator command/semi-automatically		–	–	–	–	–
• Program-controlled		●	●	●	●	●
Tools						
Tool types						
• Turning		●	●	●	–	–
• Drilling/milling		●	●	●	–	–
• Grinding		–	–	–	●	●
• Nibbling		–	–	–	●	●
Tool radius compensations in plane						
• With transition circle/ellipse on outer edges		●	●	●	–	–
Tool change via T number		●	●	●	●	●
Operation without tool management						
• Editing of tool data		●	●	●	●	●
• Tool offset selection via T and D numbers		●	●	●	●	●
• Number of tools		32	64	128	64	128
• Cutting edges in tool list		32	64	128	64	128
Monitoring of tool life and workpiece count		–	●	●	–	–
Communication and data management						
Serial interfaces RS 232 C		●	●	●	●	●
Ethernet connection		–	–	●	–	●
Peer-to-peer connection		●	●	●	●	●
I/O interfacing via PROFIBUS DP		●	●	●	●	●
Data backup to internal memory and/or CF card		●	●	●	●	●
Data backup via RS 232 C interface		●	●	●	●	●
Data backup to network drive (Ethernet)		–	–	●	–	●
Operation						
SINUMERIK 802D sl operator panel, 10.4", color	See CNC control	●	●	●	●	●
Handheld units						
• Mini handheld unit with coiled connecting cable	6FX2007-1AD02	○	○	○	○	○
• Mini handheld unit with straight connecting cable	6FX2007-1AD12	○	○	○	○	○
Machine control panels						
• MCP machine control panel	6FC5603-0AD00-0AA2	○	○	○	○	○
• MCP 802D sl machine control panel[1]	6FC5303-0AF30-1AA0	○	○	○	○	○
• Machine Control Panel analog, MCPA module for MCP 802D sl	6FC5312-0DA01-0AA0	○	○	○	○	○

[1] MCPA module is required.

		SINUMERIK 802D sl				
● Standard (basic functionality) ○ Option – Not available	Order No.	T/M value	T/M plus	T/M pro	G/N plus	G/N pro

Operation (continued)

Connection of electronic handwheels		2	2	2	2	2
• with front panel 120 mm x 120 mm, 5 V DC	**6FC9320-5DB01**	○	○	○	○	○
• with front panel 76 mm x 76 mm, 5 V DC	**6FC9320-5DC01**	○	○	○	○	○
Keyboards						
• Full CNC keyboard 802D sl, horizontal format	**6FC5303-0DM13-1AA0**	○	○	○	○	○
• Full CNC keyboard 802D sl, vertical format	**6FC5303-0DT12-1AA0**	○	○	○	○	○
CNC program messages		●	●	●	●	●
Online help for programming, alarms and machine data (expandable)		●	●	●	●	●
Access protection, 8 levels		●	●	●	●	●
Manual Machine plus for turning	**6FC5800-0AP07-0YB0**	–	○	○	–	–
Operating software languages						
• 18 languages switchable online		●	●	●	●	●
• Chinese Simplified, Chinese Traditional, English, German, Korean		●	●	●	●	●
• Czech, Dutch, Finnish, French, Hungarian, Italian, Polish, Portuguese (Braz.), Romanian, Russian, Spanish, Swedish, Turkish		●	●	●	●	●

Axis monitoring

Working area limitation		●	●	●	●	●
Limit switch monitoring software and hardware limit switches		●	●	●	●	●
Position monitoring		●	●	●	●	●
Standstill monitoring		●	●	●	●	●
Clamping monitoring		●	●	●	●	●
Contour monitoring		●	●	●	●	●
Clamp protection for nibbling		–	–	–	●	●

Compensations

Backlash compensation		●	●	●	●	●
Lead screw error compensation		●	●	●	●	●
Measuring system error compensation		●	●	●	●	●
Feedforward control, velocity-dependent		–	–	●	–	●
Friction compensation		●	●	●	●	●

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● Standard (basic functionality) ○ Option − Not available	Order No.	T/M value	T/M plus	T/M pro	G/N plus	G/N pro

PLC area

SIMATIC S7-200 integrated		●	●	●	●	●
Machining time, typically in ms/KI for bit operations[1]		0.1	0.1	0.1	0.1	0.1
Machining time, typically in ms/KI for word operations[1]		0.2	0.2	0.2	0.2	0.2
Ladder steps memory configuration		4000	6000	6000	6000	6000
• LAD ladder diagram		●	●	●	●	●
PLC programming tool, PLC program examples, standard machine data and alarm text editor on Toolbox		●	●	●	●	●
PP 72/48 I/O module, max. number	6FC5611-0CA01-0AA0	○ 3	○ 3	○ 3	○ 3	○ 3
ADI 4 (Analog Drive Interface for 4 Axes)	6FC5211-0BA01-0AA3	○	○	○	○	○
Digital inputs, max.		216	216	216	216	216
Digital outputs, max.		144	144	144	144	144
Bit memories, max. number		2048	3072	3072	3072	3072
Timers, max. number		40	40	64	40	64
Counters, max. number		32	32	64	32	64
Subroutines		64	64	64	64	64

Monitoring functions

Spindle speed limitation		●	●	●	●	●

Startup

Startup software integrated for SINAMICS S120 drive system		●	●	●	●	●
Series startup via a serial interface		●	●	●	●	●
Series startup via CF card		●	●	●	●	●
PLC library (PLC templates)		●	●	●	●	●
STARTER startup tool for SINAMICS	6SL3072-0AA00-0AG0	●	●	●	●	●

Diagnostic functions

Alarms and messages		●	●	●	●	●
Action log for diagnostic purposes, can be activated		● [2]	● [2]	● [2]	● [2]	● [2]
PLC status		●	●	●	●	●
LAD display		●	●	●	●	●
PLC remote diagnostics via Ethernet on the control		−	−	● [3]	−	● [3]
RCS 802 PC license for each accessing PC (Remote Control System, remote diagnostics for SINUMERIK 802D sl)	6FC6000-6DA51-0AA0	−	−	○	−	○

[1] 1 KI = 1024 instructions, corresponds to approx. 3 KB.
[2] Logbook for alarms/keys.
[3] RCS 802 required.