

Overview of functions

SINUMERIK 802D sl CNC control

- Standard (basic functionality)
- Option
- Not available

Order No.

SINUMERIK 802D sl

T/M value	T/M plus	T/M pro	G/N plus	G/N pro
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Control structure/application

Panel-based design		●	●	●	●	●
Drives	See Drive System					
• SINAMICS S120 Motor Module linked via DRIVE-CLiQ		●	●	●	●	●
Channels/mode groups (MGs)		1	1	1	1	1
• Maximum configuration		1	1	1	1	1
CNC <u>main</u> memory (buffered) for programs and data in MB		0.5	1	3	1	3
CNC <u>main</u> memory, maximum configuration in MB		0.5	1	3	1	3
CNC memory, expansion with CF card		●	●	●	●	●
Axes/spindles		● 5)	● 1)	● 1)	● 6)	● 6)
• 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

Max. number		2 ²⁾	2 ²⁾	2 ²⁾	2 ²⁾	2 ²⁾
Incremental rotary measuring systems with RS 422 (TTL)		● 3)	● 3)	● 3)	● 3)	● 3)
Linear scale LMS with sin/cos 1 V _{pp}		● 4)	● 4)	● 4)	● 4)	● 4)
• via SINAMICS Sensor Module SMC/SME		4)	4)	4)	4)	4)
Linear scale LMS with distance-coded reference marks		–	–	–	–	–
• via SINAMICS Sensor Module SMC/SME						
Linear scale LMS with EnDat		● 4)	● 4)	● 4)	● 4)	● 4)
• via SINAMICS Sensor Module SMC/SME		4)	4)	4)	4)	4)
Rotary measuring systems with distance-coded reference marks		–	–	–	–	–
• via SINAMICS Sensor Module SMC/SME						
Absolute encoder connection with EnDat linear/rotary		● 4)	● 4)	● 4)	● 4)	● 4)
• via SINAMICS Sensor Module SMC/SME		4)	4)	4)	4)	4)
Absolute/incremental encoder installed in 1FT6/1FK						
• integrated in motor via SINAMICS S120 + Sensor Module		●	●	●	●	●
Incremental encoder with sin/cos 1 V _{pp}		●	●	●	●	●
• via SINAMICS Sensor Module SMC/SME						
Resolver integrated in 1FT6/1FK		–	–	–	–	–
• via SINAMICS S120 with Sensor Module SMC/SME/motor-integrated						

1) 4 axes + 1 spindle or 3 axes + 1 spindle + 2nd spindle for rotating tool.

2) One measuring system per axis up to software release 1.2. Two measuring systems per axis for software release 1.4 and higher.

3) SINAMICS Sensor Module SMC required for max. one measuring system (spindle).

4) Two direct measuring systems; three direct measuring systems can be connected with Active Line Module.

5) 3 axes + 1 spindle.

6) N = 4 axes, no spindle; G = 4 (3) axes, 1 (2) spindle(s).

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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 to 200%	●	●	●	●	●
Traversing range ± 9 decades	●	●	●	●	●
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	●	●	●	●	●
Traversing to fixed stop	–	●	●	●	●

CNC functionality: Spindle functions

Digital spindle speed	●	●	●	●	●
Spindle speed, max. programmable value range: REAL ±3.4028 ex 38 (display: ± 999 999 999.9999)	●	●	●	●	●
Spindle override of 0% to 200%	●	●	●	●	●
5 gear stages	●	●	●	●	●
Automatic gear stage selection	●	●	●	●	●
Oriented spindle stop	●	●	●	●	●
Spindle speed limitation (min. and max.)	●	●	●	●	●
Constant cutting rate	●	●	●	●	●
Spindle control via PLC (positioning, reciprocation)	●	●	●	–	–
Changeover to axis mode	–	●	●	–	–
Thread cutting with constant or variable pitch	●	●	●	–	–
Tapping with compensating chuck/rigid tapping	●	●	●	–	–

CNC functionality: Interpolations

Linear interpolation axes	●	●	●	●	●
• 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	–	–

¹⁾ Cannot be changed.

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CNC functionality: Transformations

TRANSMIT/peripheral surface transformation
Inclined axis

–	●	●	–	–
–	–	–	●	●

CNC functionality: Measuring

Measuring stage 1
Probe (touch trigger)

–	●	●	●	●
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CNC functionality: Motion-synchronous actions

High-speed CNC inputs/outputs

- Digital inputs (on-board)

–	8 1)	8 1)	8	8
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- Digital inputs or outputs (on-board)

–	8 1)	8 1)	8	8
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CNC programming: Language

Programming language (DIN 66025 and high-level language expansion)

Subroutine levels and interrupt routines, max.

Number of subroutine repetitions ≤9999

Number of levels for skippable blocks (/0 to /...)

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 $\pm 3.4028 \times 10^{38}$ (display: $\pm 999\,999\,999.9999$) 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

- Comparing 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.

●	●	●	●	●
8/0	8/0	8/0	8/0	8/0
●	●	●	●	●
1	1	1	1	1
●	●	●	–	–
●	●	●	●	●
●	●	●	●	●
●	●	●	●	●
–	●	●	●	●
●	●	●	●	●
●	●	●	●	●
●	●	●	●	●
●	●	●	–	–
●	●	●	●	●
–	–	●	–	●
99	99	99	99	99

CNC programming: Cycles

Process-oriented cycles for drilling/milling and turning

Technology cycles for grinding (external cylindrical)

Access protection for cycles

●	●	●	–	–
–	–	–	●	●
●	●	●	●	●

¹⁾ Software release 1.2 and higher

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CNC programming: Programming support

Program editor					
• Text editor with editing functions: Marking, copying, deleting, ...		●	●	●	●
Programming support for geometry entries					
• Screens for 1/2/3-point contours		●	●	●	–
Programming support for cycles					
• Screens and stationary auxiliary displays		●	●	●	●
• Programming support expandable (e.g. customer cycles)		● 1)	● 1)	● 1)	● 1)

Parameters

Number of basic frames, max.		1	1	1	1	1
Number of settable offsets, max.		6	6	6	6	6
Scratching, determining work offset		●	●	●	●	●

Simulation

Drilling/milling (toolholder vertical to the workpiece)					
• Single-sided 2D view, dynamic		●	●	●	–
Turning (toolholder vertical to the workpiece)					
• Traverse path simulation without model (broken-line graphics)		●	●	●	–
Nibbling					
• Traverse path simulation with tool form (broken-line graphics)		–	–	–	●

Operating modes

JOG		●	●	●	●	●
• Handwheel selection		●	●	●	●	●
• Inch/metric changeover		●	●	●	●	●
• Manual measurement of work offset		●	●	●	–	–
• Manual measurement of tool compensation		●	●	●	–	–
• Automatic tool measurement		●	●	●	–	–
• Reference point approach, automatic/via CNC program		●	●	●	●	●
MDA		●	●	●	●	●
• Input in text editor		●	●	●	●	●
• Save MDA program		●	●	●	●	●
Teach In		●	●	●	–	–
• Teach positions in MDA buffer, loadable		●	●	●	–	–
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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Operating modes (continued)

REPOS (repositioning)

- With operator command/semi-automatically
- Program-controlled

	T/M value	T/M plus	T/M pro	G/N plus	G/N pro
REPOS (repositioning)	●	●	●	●	●
• 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

Look-ahead detection of contour violations

Operation without tool management

- Editing of tool data
- Tool compensation selection via T and D numbers
- Number of tools
- Cutting edges in tool list

Monitoring of tool life and workpiece count

	T/M value	T/M plus	T/M pro	G/N plus	G/N pro
Turning	●	●	●	–	–
Drilling/milling	●	●	●	–	–
Grinding	–	–	–	●	●
Nibbling	–	–	–	●	●
Tool radius compensations in plane					
• With transition circle/ellipse on outer edges	●	●	●	–	–
Tool change via T number	●	●	●	●	●
Look-ahead detection of contour violations	●	●	●	●	●
Operation <u>without</u> tool management					
• Editing of tool data	●	●	●	●	●
• Tool compensation 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

I/O interfacing via PROFIBUS DP

Save data to internal memory and/or CF card

Save data via RS 232 C interface

Save data to network drive (Ethernet)

	T/M value	T/M plus	T/M pro	G/N plus	G/N pro
Serial interfaces RS 232 C	●	●	●	●	●
Ethernet connection	–	–	●	–	●
I/O interfacing via PROFIBUS DP	●	●	●	●	●
Save data to internal memory and/or CF card	●	●	●	●	●
Save data via RS 232 C interface	●	●	●	●	●
Save data to network drive (Ethernet)	–	–	●	–	●

Operation

SINUMERIK 802D sl operator panel, 10.4", color

Handheld units

- Mini handheld unit with coiled connecting cable
- Mini handheld unit with straight connecting cable

Machine control panels

- MCP Machine Control Panel
- MCP 802D sl Machine Control Panel¹⁾
- Machine Control Panel analog, MCPA module for MCP 802D sl

	T/M value	T/M plus	T/M pro	G/N plus	G/N pro
SINUMERIK 802D sl operator panel, 10.4", color	See CNC	●	●	●	●
Handheld units					
• Mini handheld unit with coiled connecting cable	6FX2007-1AD01	○	○	○	○
• Mini handheld unit with straight connecting cable	6FX2007-1AD11	○	○	○	○
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.

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Operation (continued)

Connection of electronic handwheels		2	2	2	2	2
• with 120 mm x 120 mm front panel, 5 V operating voltage	6FC9320-5DB00	○	○	○	○	○
• with 76 mm x 76 mm front panel, 5 V operating voltage	6FC9320-5DC00	○	○	○	○	○
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		●	●	●	●	●
Operating software languages						
• 2 languages switchable online		●	●	●	●	●
• Chinese (simplified), Chinese (traditional), English, German, Korean		●	●	●	●	●
• Czech, Dutch, Finnish, French, Hungarian, Italian, Polish, Portuguese (Braz.), Russian, Spanish		●	●	●	●	●

Axis monitoring

Working area limitation		●	●	●	●	●
Software and hardware limit switch monitoring		●	●	●	●	●
Position monitoring		●	●	●	●	●
Stoppage monitoring		●	●	●	●	●
Clamping monitoring		●	●	●	●	●
Contour monitoring		●	●	●	●	●
Clamp protection for nibbling		–	–	–	●	●

Compensations

Backlash compensation		●	●	●	●	●
Leadscrew error compensation		●	●	●	●	●
Measuring system error compensation		●	●	●	●	●
Feedforward control, speed-dependent		–	–	●	–	●
Friction compensation		●	●	●	●	●

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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
Digital inputs, maximum		216	216	216	216	216
Digital outputs, maximum		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		●	●	●	●	●
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Commissioning

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

Diagnostic functions

Alarms and messages		●	●	●	●	●
Action log can be activated for diagnostic purposes		● 2)	● 2)	● 2)	● 2)	● 2)
PLC status		●	●	●	●	●
LAD display		●	●	●	●	●
PLC remote diagnostics via Ethernet		–	–	● 3)	–	● 3)
RCS 802 PC license (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.