

**SIEMENS**



# CNC control SINUMERIK 828D

Equipment for Machine Tools

Motion Control

Sales  
ordering  
brochure  
NC 828D

Edition  
November  
2012

Answers for industry.

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### Motion Control

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# Motion Control

## CNC control SINUMERIK 828D

Sales ordering brochure  
NC 828D · November 2012



The products and systems described in this catalog are distributed under application of a certified quality and environmental management system in accordance with DIN EN ISO 9001 (Certified Registration No. 001258 QM) and DIN EN ISO 14001 (Certified Registration No. 001258 UM). The certificates are recognized by all IQNet countries.

Supersedes:  
Sales ordering brochure NC 828D · May 2011

**Important note!**  
SINUMERIK 828D will be marketed in equipment packages with drives and motors only.  
With the exception of system CompactFlash cards, individual components can be ordered separately for spare part purposes.

**Overview of functions**  
CNC controls SINUMERIK 828D  
Overview of CNC options

1

**CNC controls**  
SINUMERIK 828D BASIC T/BASIC M  
SINUMERIK 828D  
Operator components  
SINUMERIK I/O  
Supplementary components

2

**Services and training**  
Services  
Documentation  
Training  
Engineering software  
Dimension drawing and  
2D/3D CAD generator

3

**Quick Packages**  
Introduction  
Turning machines  
Milling machines

4

## Notes

# Overview of functions



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

At certain points in the list, reference is also made to functions provided on the SINUMERIK 840D sl which are not available on the SINUMERIK 828D.

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

Control	Software version
SINUMERIK 828D	4.4

# Overview of functions

## Control structure and configuration

1

✓ Basic version ○ Option – Not available	Order No.	SINUMERIK 828D BASIC T/BASIC M und SINUMERIK 828D					
		PPU 240/ PPU 241		PPU 260/ PPU 261		PPU 280/ PPU 281	
		BASIC T	BASIC M	T	M	T	M
<b>Control structure and configuration</b>							
Panel-based control system comprising:		✓	✓	✓	✓	✓	✓
• Compact Operator Panel		✓	✓	✓	✓	✓	✓
• CNC/PLC Control Unit		✓	✓	✓	✓	✓	✓
• Closed-loop control for drives, up to ...		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	<b>6FC5835-1GY40-1YA0</b>	○	–	–	–	–	–
• SINUMERIK 828D, PPU 240/241 System software Milling, Export version, on CF card, with license	<b>6FC5835-2GY40-1YA0</b>	–	○	–	–	–	–
• SINUMERIK 828D, PPU 260/261 System software Turning, Export version, on CF card, with license	<b>6FC5834-1GY40-1YA0</b>	–	–	○	–	–	–
• SINUMERIK 828D, PPU 260/261 System software Milling, Export version, on CF card, with license	<b>6FC5834-2GY40-1YA0</b>	–	–	–	○	–	–
• SINUMERIK 828D, PPU 280/281 System software Turning, Export version, on CF card, with license	<b>6FC5833-1GY40-1YA0</b>	–	–	–	–	○	–
• SINUMERIK 828D, PPU 280/281 System software Milling, Export version, on CF card, with license	<b>6FC5833-2GY40-1YA0</b>	–	–	–	–	–	○
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	<b>6SL3040-1NC00-0AA0</b>	–	–	–	✓	✓	✓
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 not included in the scope of delivery)		✓	✓	✓	✓	✓	✓
HMI user memory, additional 256 MB on CompactFlash card of the PPU		–	–	–	–	–	–
Axes/spindles or positioning axes/auxiliary spindle							
• Basic scope of axes/spindles		3	4	3	4	3	4
• Maximum configuration axes/spindles		5	5	6	6	8	6
Axis/spindle, each additional	<b>6FC5800-0AC20-0YB0</b>	○	○	○	○	○	○
Positioning axis/auxiliary spindle, each additional	<b>6FC5800-0AC30-0YB0</b>	○	○	○	○	○	○
PLC-controlled axis		✓	✓	✓	✓	✓	✓
PLC positioning axis via PROFIBUS		–	–	–	–	–	–

## Drives/Connectable measuring systems

1

✓ Basic version ○ Option – Not available	Order No. Notes	SINUMERIK 828D BASIC T/BASIC M und SINUMERIK 828D					
		PPU 240/ PPU 241		PPU 260/ PPU 261		PPU 280/ PPU 281	
		BASIC T	BASIC M	T	M	T	M
<b>Drives</b>							
SINAMICS S120 Motor Modules via DRIVE-CLiQ	See NC 61	✓	✓	✓	✓	✓	✓
SINAMICS S120 DRIVE-CLiQ on motor		○	○	○	○	○	○
SINAMICS S120 Sensor Module Cabinet-Mounted	See NC 61	○	○	○	○	○	○
• SINAMICS S120 SMC10		○	○	○	○	○	○
• SINAMICS S120 SMC20		○	○	○	○	○	○
• SINAMICS S120 SMC30		○	○	○	○	○	○
SINAMICS S120 SME Sensor Module External	See NC 61	○	○	○	○	○	○
• SINAMICS S120 SME20		○	○	○	○	○	○
• SINAMICS S120 SME25		○	○	○	○	○	○
• SINAMICS S120 SME120		○	○	○	○	○	○
• SINAMICS S120 SME125		○	○	○	○	○	○
SINAMICS S120 expansion module	See NC 61	○	○	○	○	○	○
• SINAMICS S120 DMC20		○	○	○	○	○	○
SINAMICS S120 Motor Modules in booksize format	See NC 61	○	○	○	○	○	○
• Internal air cooling		○	○	○	○	○	○
• External air cooling		○	○	○	○	○	○
• Cold plate cooling		○	○	○	○	○	○
SINAMICS S120 Active Line Modules in booksize format	See NC 61	○	○	○	○	○	○
• Internal air cooling		○	○	○	○	○	○
• External air cooling		○	○	○	○	○	○
• Cold plate cooling		○	○	○	○	○	○
SINAMICS S120 Smart Line Modules in booksize format	See NC 61	○	○	○	○	○	○
• Internal air cooling		○	○	○	○	○	○
• External air cooling		○	○	○	○	○	○
• Cold plate cooling		○	○	○	○	○	○
SINAMICS S120 Motor Modules in chassis format, internal air cooling (rated pulse frequency 2 kHz)		On request	On request	On request	On request	On request	On request
Analog Drive Interface for 4 axes ADI 4		–	–	–	–	–	–
<b>Connectable measuring systems</b>							
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		✓	✓	✓	✓	✓	✓
Absolute encoder installed in motors SIMOTICS S-1FT7/S-1FK7/M-1PH8		✓	✓	✓	✓	✓	✓
Absolute encoder with SSI interface		–	–	–	–	–	–
Rotary measuring systems with							
• RS422 (TTL)		✓	✓	✓	✓	✓	✓
• sin/cos 1 V <sub>pp</sub>		✓	✓	✓	✓	✓	✓
• Distance-coded reference marks		✓	✓	✓	✓	✓	✓
• EnDat 2.1		✓	✓	✓	✓	✓	✓
Linear scale LMS with							
• sin/cos 1 V <sub>pp</sub>		✓	✓	✓	✓	✓	✓
• Distance-coded reference marks		✓	✓	✓	✓	✓	✓
• EnDat 2.1		✓	✓	✓	✓	✓	✓

# Overview of functions

## Motors that can be connected/Axis functions/ Spindle functions

1

✓ Basic version ○ Option – Not available	Order No.	SINUMERIK 828D BASIC T/BASIC M und SINUMERIK 828D						
		Notes	PPU 240/ PPU 241		PPU 260/ PPU 261		PPU 280/ PPU 281	
			BASIC T	BASIC M	T	M	T	M
<b>Motors that can be connected (preferred versions/mainstream)</b>								
✓ Servomotor SIMOTICS S-1FK7		✓	✓	✓	✓	✓	✓	
✓ Servomotor SIMOTICS S-1FT7		✓	✓	✓	✓	✓	✓	
✓ Spindle motor SIMOTICS M-1PH8		✓	✓	✓	✓	✓	✓	
✓ Built-in motor SIMOTICS S-1FE1 (not with SINAMICS S120 Combi)		✓	✓	✓	✓	✓	✓	
– Linear motors SIMOTICS L-1FN3, 1FN6 (not with SINAMICS S120 Combi)		–	–	–	–	–	–	
✓ Built-in torque motor SIMOTICS T-1FW6 (not with SINAMICS S120 Combi)		✓	✓	✓	✓	✓	✓	
✓ Hybrid spindle/motor spindle 2SP <sup>1)</sup>	<sup>1)</sup> www.siemens.com/spindle	✓	✓	✓	✓	✓	✓	
– Third-party motor		On request	On request	On request	On request	On request	On request	
<b>Axis functions</b>								
✓ Feedrate override of 0 % ... 200 %		✓	✓	✓	✓	✓	✓	
✓ Feedrate override, axis-specific of 0 % ... 200 %		✓	✓	✓	✓	✓	✓	
✓ Traversing range ± 9 decades		✓	✓	✓	✓	✓	✓	
✓ Rotary axis, turning endlessly		✓	✓	✓	✓	✓	✓	
✓ Velocity, max. 300 m/s		✓	✓	✓	✓	✓	✓	
✓ Acceleration with jerk limitation		✓	✓	✓	✓	✓	✓	
✓ Programmable acceleration		✓	✓	✓	✓	✓	✓	
✓ Follow-up mode		✓	✓	✓	✓	✓	✓	
✓ Measuring systems 1 and 2, selectable		✓	✓	✓	✓	✓	✓	
✓ Feedrate interpolation		✓	✓	✓	✓	✓	✓	
✓ Separate path feed for corners and chamfers		✓	✓	✓	✓	✓	✓	
✓ Travel to fixed stop		✓	✓	✓	✓	✓	✓	
○ Travel to fixed stop with Force Control	<b>6FC5800-0AM01-0YB0</b>	○	○	○	○	○	○	
– Analog axis		–	–	–	–	–	–	
– Setpoint exchange		–	–	–	–	–	–	
– Tangential control		–	–	–	–	–	–	
– Position switching signals/cam controller		–	–	–	–	–	–	
– Advanced Position Control APC		–	–	–	–	–	–	
<b>Spindle functions</b>								
✓ Spindle speed, analog		✓	✓	✓	✓	✓	✓	
✓ Spindle speed, digital		✓	✓	✓	✓	✓	✓	
✓ Spindle speed, max. programmable value range: 10 <sup>6</sup> ... 0.0001 (display: ± 999999999.9999)		✓	✓	✓	✓	✓	✓	
✓ Spindle override from 0 % ... 200 %		✓	✓	✓	✓	✓	✓	
5 Gear stages		5	5	5	5	5	5	
✓ Intermediate gear		✓	✓	✓	✓	✓	✓	
✓ Automatic gear stage selection		✓	✓	✓	✓	✓	✓	
✓ 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		✓	✓	✓	✓	✓	✓	
✓ Programmable thread run-in and run-out distance		✓	✓	✓	✓	✓	✓	
✓ Thread cutting with constant or variable pitch		✓	✓	✓	✓	✓	✓	
✓ Tapping with/without compensating chuck		✓	✓	✓	✓	✓	✓	

Interpolations/Couplings/Transformations/  
Measuring functions/cycles/Technologies

1

✓ Basic version ○ Option – Not available	Order No.	SINUMERIK 828D BASIC T/BASIC M und SINUMERIK 828D						
		Notes	PPU 240/ PPU 241		PPU 260/ PPU 261		PPU 280/ PPU 281	
			BASIC T	BASIC M	T	M	T	M
<b>Interpolations</b>								
Linear interpolation 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)	<b>6FC5800-0AS16-0YB0</b>	○	○	○	○	○	○	
Compressor for 3-axis machining		–	✓	–	✓	–	✓	
Polynomial interpolation		–	–	–	–	–	–	
Involute interpolation		–	–	–	–	–	–	
Crank interpolation CRIP		–	–	–	–	–	–	
<b>Couplings</b>								
Pair of synchronized axes (gantry axes), basic	<b>6FC5800-0AS51-0YB0</b>	○	○	○	○	○	○	
Master-Slave for drives, basic	<b>6FC5800-0AS52-0YB0</b>	○	○	○	○	○	○	
Generic couplings CP								
Generic coupling static (e.g. counter-spindle)	<b>6FC5800-0AM75-0YB0</b>	–	○	–	○	○	○	
Generic coupling basic, CP-Basic (e.g. multi-edge turning)	<b>6FC5800-0AM72-0YB0</b>							
• 4 axis pairs in simultaneous coupled motion, max.		○	–	○	–	○	–	
• 1 × synchronous spindle/multi-edge turning		○	–	○	–	○	–	
• Master value coupling/curve table interpolation		–	–	–	–	–	–	
<b>Transformations</b>								
Cartesian point-to-point travel PTP		✓	✓	✓	✓	✓	✓	
TRANSMIT/peripheral surface transformation	<b>6FC5800-0AM27-0YB0</b>	○	○	○	○	○	○	
TRANSMIT/TRACYL without Y axis	<b>6FC5800-0AS50-0YB0</b>	–	–	–	–	–	–	
Inclined axis	<b>6FC5800-0AM28-0YB0</b>	–	–	–	–	○	–	
Concatenated transformations (inclined axis TRAANG after TRAORI/jointed millhead/TRANSMIT/TRACYL)		–	–	–	–	✓	–	
<b>Measuring functions/measuring cycles</b>								
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)	<b>6FC5800-0AP28-0YB0</b>	○	○	○	○	○	○	
Measure kinematics (determine transformation data of rotary axes)	<b>6FC5800-0AP18-0YB0</b>	–	○	–	○	–	○	
<b>Technologies</b>								
Handwheel override		✓	✓	✓	✓	✓	✓	
Contour handwheel	<b>6FC5800-0AM08-0YB0</b>	○	○	○	○	○	○	
SINUMERIK MDynamics								
• Advanced Surface		–	✓	–	✓	–	✓	
• High Speed Settings		–	✓	–	✓	–	✓	
• Expanded user memory via the optional user CompactFlash card		–	✓	–	✓	–	✓	

# Overview of functions

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

1

✓ Basic version ○ Option – Not available	Order No.	SINUMERIK 828D BASIC T/BASIC M und SINUMERIK 828D						
		Notes	PPU 240/ PPU 241		PPU 260/ PPU 261		PPU 280/ PPU 281	
			BASIC T	BASIC M	T	M	T	M
<b>Motion-synchronous actions</b>								
High-speed CNC inputs/outputs								
• Digital inputs drives onboard		12	12	12	12	12	12	
• Digital inputs/outputs drives onboard		8	8	8	8	8	8	
• Digital inputs CNC onboard		8	8	8	8	8	8	
• Digital outputs CNC onboard		8	8	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 clock		–	–	–	–	–	–	
Evaluation of internal drive variables	<b>6FC5800-0AS53-0YB0</b>	○	○	○	○	○	○	
Asynchronous subroutines ASUB		✓	✓	✓	✓	✓	✓	
Interrupt routines with fast retraction from the contour		✓	✓	✓	✓	✓	✓	
Cross-mode actions (ASUBs and synchronized actions in all operating modes)		✓	✓	✓	✓	✓	✓	
Display of active synchronized actions in HMI (CNC option: Extended operator functions)	<b>6FC5800-0AP16-0YB0</b>	○	○	○	○	○	○	
<b>Open Architecture</b>								
OA Easy Screen (SINUMERIK Integrate Run MyScreens)								
• Free screens		5	5	5	5	5	5	
SINUMERIK Operate runtime license OA Easy Screen (SINUMERIK Integrate Run MyScreens)								
• > 5 screens, extended functions	<b>6FC5800-0AP64-0YB0</b>	○	○	○	○	○	○	
<b>CNC programming language</b>								
Programming language (DIN 66025 and high-level language extension)		✓	✓	✓	✓	✓	✓	
Main program call from main program and subroutine		✓	✓	✓	✓	✓	✓	
Subroutine levels/interrupt routines, maximum		11/4	11/4	11/4	11/4	11/4	11/4	
Number of subroutine 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 (CNC option: Extended operator functions)	<b>6FC5800-0AP16-0YB0</b>	○	○	○	○	○	○	
		10	10	10	10	10	10	
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 231 <sup>-1</sup>		✓	✓	✓	✓	✓	✓	
• Via H word, max. programmable value range REAL ± 3.4028 e <sup>x</sup> 38 (display ± 999999999.9999) INT -231 ... 231 <sup>-1</sup>		✓	✓	✓	✓	✓	✓	

## CNC programming language

1

✓ Basic version ○ Option – Not available	Order No.	SINUMERIK 828D BASIC T/BASIC M und SINUMERIK 828D					
		PPU 240/ PPU 241		PPU 260/ PPU 261		PPU 280/ PPU 281	
		BASIC T	BASIC M	T	M	T	M
<b>CNC programming language</b> (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 and logic operations		✓	✓	✓	✓	✓	✓
• Macro techniques		✓	✓	✓	✓	✓	✓
• Control structures IF-ELSE-ENDIF		✓	✓	✓	✓	✓	✓
• Control structures WHILE, FOR, REPEAT, LOOP		✓	✓	✓	✓	✓	✓
• Commands to HMI		✓	✓	✓	✓	✓	✓
• STRING functions		✓	✓	✓	✓	✓	✓
Program functions							
• Dynamic preprocessing memory FIFO		✓	✓	✓	✓	✓	✓
• Look Ahead (number of blocks)		1	50	1	100	1	150
• Frame concept		✓	✓	✓	✓	✓	✓
• Inclined-surface machining with swivel cycle		–	✓	–	✓	–	✓
• Axis/spindle replacement		✓	✓	✓	✓	✓	✓
• Geometry axes, switchable online in the CNC program		✓	✓	✓	✓	✓	✓
• Program preprocessing		✓	✓	✓	✓	✓	✓
Online ISO dialect interpreter		✓	✓	✓	✓	✓	✓
Program/workpiece management							
• Part programs on PPU, max. number	512 files per directory	750	750	750	750	750	750
• Workpieces on PPU, max. number	256 files per directory	250	250	250	250	250	250
• On additional pluggable CompactFlash card		✓	✓	✓	✓	✓	✓
• On USB storage medium, e.g. floppy disk drive, USB stick		✓	✓	✓	✓	✓	✓
• On network drive (Option: Network drive management)	<b>6FC5800-0AP01-0YB0</b>	○	○	○	○	○	○
• 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 (PLC)		✓	✓	✓	✓	✓	✓
Global and local user data		✓	✓	✓	✓	✓	✓
Global program user data		✓	✓	✓	✓	✓	✓
Display system variables (also via online configurable display) and log them		–	–	–	–	–	–

# Overview of functions

## Programming support/ Simulation/Operating modes

1

✓ Basic version ○ Option – Not available	Order No.	SINUMERIK 828D BASIC T/BASIC M und SINUMERIK 828D						
		Notes	PPU 240/ PPU 241		PPU 260/ PPU 261		PPU 280/ PPU 281	
			BASIC T	BASIC M	T	M	T	M
<b>Programming support</b>								
Program editor								
• Programming support for cycles programGUIDE		✓	✓	✓	✓	✓	✓	
• CNC editor with editing functions: Marking, 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	<b>6FC5800-0AP17-0YB0</b>	○	○	○	○	○	○	
• Backup workpiece setup data (Option: Extended operator functions)	<b>6FC5800-0AP16-0YB0</b>	○	○	○	○	○	○	
• Multiple clamping of various workpieces	<b>6FC5800-0AP14-0YB0</b>	–	○	–	○	–	○	
Technology cycles for drilling/milling (basic scope)		✓	✓	✓	✓	✓	✓	
Technology cycles for turning (basic scope)		✓	–	✓	–	✓	–	
Advanced Technology (expansion of technology cycles for turning and milling)	<b>6FC5800-0AP58-0YB0</b>	○	○	✓	✓	✓	✓	
Pocket milling with free contour definition and islands		○	○	✓	✓	✓	✓	
Stock removal cycles with free contour definition		○	–	✓	–	✓	–	
Residual material detection and machining for contour pockets and stock removal	<b>6FC5800-0AP13-0YB0</b>	○	○	○	○	○	○	
Access protection for cycles	<b>6FC5800-0AP54-0YB0</b>	–	–	–	–	–	–	
Programming support can be extended, e.g. customer cycles		✓	✓	✓	✓	✓	✓	
CAD reader for PC	See NC 61	○	○	○	○	○	○	
<b>Simulation</b>								
Simulation of program X, while program Y is being executed		–	–	–	–	–	–	
2D simulation		✓	✓	✓	✓	✓	✓	
3D simulation finished part	<b>6FC5800-0AP25-0YB0</b>	○	○	○	○	○	○	
3D simulation finished part and working area		–	–	–	–	–	–	
3D simulation finished part with collision check		–	–	–	–	–	–	
Simultaneous recording (real-time simulation of current machining)	<b>6FC5800-0AP22-0YB0</b>	○	○	○	○	○	○	
<b>Operating modes</b>								
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 (Option: Extended operator functions)	<b>6FC5800-0AP16-0YB0</b>	–	○	–	○	–	○	
• Manual measurement of tool offset		✓	✓	✓	✓	✓	✓	
• Automatic tool/workpiece measurement		✓	✓	✓	✓	✓	✓	
• Reference point approach, automatic/via CNC program		✓	✓	✓	✓	✓	✓	

## Operating modes/Tools

1

✓ Basic version ○ Option – Not available	Order No.	SINUMERIK 828D BASIC T/BASIC M und SINUMERIK 828D						
		Notes	PPU 240/ PPU 241		PPU 260/ PPU 261		PPU 280/ PPU 281	
			BASIC T	BASIC M	T	M	T	M
<b>Operating modes (continued)</b>								
<b>MDI</b>								
• Input in text editor		✓	✓	✓	✓	✓	✓	
• Load/save MDI program (Option: Extended operator functions)	<b>6FC5800-0AP16-0YB0</b>	○	○	○	○	○	○	
• Input screen forms for technology and positioning, cycle support		✓	✓	✓	✓	✓	✓	
Teach-in (Option: Extended operator functions)	<b>6FC5800-0AP16-0YB0</b>	○	○	○	○	○	○	
<b>Automatic</b>								
• 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 (Option: Network drive management)	<b>6FC5800-0AP01-0YB0</b>	○	○	○	○	○	○	
• Program control		✓	✓	✓	✓	✓	✓	
• Program editing		✓	✓	✓	✓	✓	✓	
• Overstoring (Option: Extended operator functions)	<b>6FC5800-0AP16-0YB0</b>	○	○	○	○	○	○	
• DRF offset (Option: Extended operator functions)	<b>6FC5800-0AP16-0YB0</b>	○	○	○	○	○	○	
• Block search with/without calculation		✓	✓	✓	✓	✓	✓	
• Extended block search (program, search point, step up and down, interrupt function) (Option: Extended operator functions)	<b>6FC5800-0AP16-0YB0</b>	○	○	○	○	○	○	
<b>Repos (repositioning on the contour)</b>								
• With operator command/semi-automatically		✓	✓	✓	✓	✓	✓	
• Program-controlled		✓	✓	✓	✓	✓	✓	
<b>Preset</b>								
• Set actual value		✓	✓	✓	✓	✓	✓	
<b>Tools</b>								
<b>Tool types</b>								
• Turning		✓	–	✓	–	✓	–	
• Drilling/milling		✓	✓	✓	✓	✓	✓	
• Groove sawing		✓	✓	✓	✓	✓	✓	
<b>Tool radius compensations in plane</b>								
• With approach and retract strategies		✓	✓	✓	✓	✓	✓	
• With transition circle/ellipse at 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		✓	✓	✓	✓	✓	✓	

# Overview of functions

## Tool management/ Communication/data management

1

<ul style="list-style-type: none"> <li>✓ Basic version</li> <li>○ Option</li> <li>– Not available</li> </ul>	Order No.	SINUMERIK 828D BASIC T/BASIC M und SINUMERIK 828D					
	Notes	PPU 240/ PPU 241		PPU 260/ PPU 261		PPU 280/ PPU 281	
		BASIC T	BASIC M	T	M	T	M
<b>Tool management</b>							
• 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 vacant position search using softkey		✓	✓	✓	✓	✓	✓
• Loading and unloading of tools		✓	✓	✓	✓	✓	✓
• Tool cabinet and tool catalog		–	–	–	–	–	–
• Loading and unloading via code carrier system		–	–	–	–	–	–
• Adapter data		✓	–	✓	–	✓	–
• Location-dependent offsets		–	–	–	–	–	–
• Monitoring of tool life and workpiece count		✓	✓	✓	✓	✓	✓
• Replacement tools for tool management	<b>6FC5800-0AM78-0YB0</b>	○	○	○	○	○	○
TDI tool management functions for individual machines and networked machines		–	–	–	–	–	–
<b>Communication/data management</b>							
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 RS232		✓	✓	✓	✓	✓	✓
Manage additional drives							
• Via Ethernet, max. (Option: Network drive management)	<b>6FC5800-0AP01-0YB0</b>	○ 4	○ 4	○ 4	○ 4	○ 4	○ 4
• Via USB		✓	✓	✓	✓	✓	✓
• Via CF card of the operator panel front		✓	✓	✓	✓	✓	✓
RS232C serial interface		✓	✓	✓	✓	✓	✓
Data backup of system software and user data (backup/restore) on user CF card		✓	✓	✓	✓	✓	✓
I/O interface via PROFINET (via I/O modules PP 72/48D PN and PP 72/48D 2/2A PN only)		✓	✓	✓	✓	✓	✓
Connection to an external PROFINET network with SIMATIC DP PN/PN coupler	<b>6ES7158-3AD00-0XA0</b>	○	○	○	○	○	○
RPC SINUMERIK		–	–	–	–	–	–
ADDM Automation Data Management		–	–	–	–	–	–
Production data evaluation							
• MDA Machine Data Acquisition Machine and operating data acquisition		–	–	–	–	–	–

<ul style="list-style-type: none"> <li>✓ Basic version</li> <li>○ Option</li> <li>– Not available</li> </ul>	Order No.	SINUMERIK 828D BASIC T/BASIC M und SINUMERIK 828D					
	Notes	PPU 240/ PPU 241		PPU 260/ PPU 261		PPU 280/ PPU 281	
		BASIC T	BASIC M	T	M	T	M
<b>Operation</b>							
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)		✓	✓	✓	✓	✓	✓
SINUMERIK operator panel CNC with TCU		–	–	–	–	–	–
SINUMERIK operator panel CNC with PCU		–	–	–	–	–	–
SINUMERIK PCU 50.3/PCU 50.5		–	–	–	–	–	–
Connection for:							
• Standard monitor (DVI), VGA via ext. adapter, as for PCU 50.3/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 3.5 m spiral connecting cable	<b>6FX2007-1AD03</b>	○	○	○	○	○	○
• Mini handheld unit with 5 m straight connecting cable	<b>6FX2007-1AD13</b>	○	○	○	○	○	○
• Connection kit for mini handheld unit, non-assembled without Industrial Ethernet	<b>6FX2006-1BG03</b>	○	○	○	○	○	○
• Connection kit for mini handheld unit, assembled with PROFINET	<b>6FX2006-1BC20</b>	○	○	○	○	○	○
• Holder for mini handheld unit	<b>6FX2006-1BG70</b>	○	○	○	○	○	○
• Handwheel connection module PROFIBUS/PROFINET		–	–	–	–	–	–
Machine control panels							
• SINUMERIK MCP 802D sl		–	–	–	–	–	–
• SINUMERIK MCPA module		–	–	–	–	–	–
• SINUMERIK MCP 310C PN	<b>6FC5303-0AF23-0AA1</b>	○	○	○	○	○	○
• SINUMERIK MCP 483C PN	<b>6FC5303-0AF22-0AA1</b>	○	○	○	○	○	○
• SINUMERIK MPP Machine Push Button Panel		–	–	–	–	–	–
Electronic handwheels							
• With 120 mm x 120 mm front panel, 5 V DC	<b>6FC9320-5DB01</b>	○	○	○	○	○	○
• With 76.2 mm x 76.2 mm front panel, 5 V DC	<b>6FC9320-5DC01</b>	○	○	○	○	○	○
• With 76.2 mm x 76.2 mm front panel, 24 V DC, HTL	<b>6FC9320-5DH01</b>	–	–	–	–	–	–
• Without front panel, without setting wheel, 5 V DC	<b>6FC9320-5DF01</b>	○	○	○	○	○	○
• Without front panel, with setting wheel, 5 V DC	<b>6FC9320-5DM00</b>	○	○	○	○	○	○
• Portable in housing, spiral cable 2.5 m	<b>6FC9320-5DE02</b>	○	○	○	○	○	○
• Flange socket for portable handwheel	<b>6FC9341-1AQ</b>	○	○	○	○	○	○
• Cable distributor		–	–	–	–	–	–
Connection for electronic handwheels		2	2	2	2	2	2
Keyboards							
• Integrated QWERTY keyboard		✓	✓	✓	✓	✓	✓
• External SINUMERIK keyboards		–	–	–	–	–	–
• KBPC CG US standard PC keyboard		–	–	–	–	–	–

# Overview of functions

## Operation/Functions/ Monitoring functions

1

✓ Basic version ○ Option – Not available	Order No.	SINUMERIK 828D BASIC T/BASIC M und SINUMERIK 828D					
		PPU 240/ PPU 241		PPU 260/ PPU 261		PPU 280/ PPU 281	
		BASIC T	BASIC M	T	M	T	M
<b>Operation (continued)</b>							
Connection for memory/storage devices							
• Floppy disk drive 3.5"/1.44 MB with USB connection		✓	✓	✓	✓	✓	✓
• Card reader for CF/SD storage media, with USB connection		✓	✓	✓	✓	✓	✓
• Hard disk with USB connection		✓	✓	✓	✓	✓	✓
<b>Functions</b>							
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, 8 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, Polish, Romanian, Russian, Slovakian, Swedish, Turkish	<b>6FC5860-0YC40-0YA8</b>	○	○	○	○	○	○
<b>Monitoring functions</b>							
Working area limitation		✓	✓	✓	✓	✓	✓
Limit switch monitoring Software and hardware limit switches		✓	✓	✓	✓	✓	✓
Position monitoring		✓	✓	✓	✓	✓	✓
Standstill (zero-speed) monitoring		✓	✓	✓	✓	✓	✓
Clamping monitoring		✓	✓	✓	✓	✓	✓
2D/3D protection zones		✓	✓	✓	✓	✓	✓
Contour monitoring		✓	✓	✓	✓	✓	✓
Contour monitoring using 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 ○ Option – Not available	Order No. Notes	SINUMERIK 828D BASIC T/BASIC M und SINUMERIK 828D					
		PPU 240/ PPU 241		PPU 260/ PPU 261		PPU 280/ PPU 281	
		BASIC T	BASIC M	T	M	T	M
<b>Compensations</b>							
Backlash compensation		✓	✓	✓	✓	✓	✓
Leadscrew error compensation		✓	✓	✓	✓	✓	✓
Bidirectional threaded spindle error compensation	<b>6FC5800-0AM54-0YB0</b>	○	○	○	○	○	○
Measuring system error compensation		✓	✓	✓	✓	✓	✓
Sag compensation, multi-dimensional The correctable tolerance band is limited to 1 mm.	<b>6FC5800-0AM55-0YB0</b>	○	○	○	○	○	○
Quadrant error compensation per operator input		✓	✓	✓	✓	✓	✓
Graphic monitoring of the quadrant error compensation by means of circularity test		✓	✓	✓	✓	✓	✓
Temperature compensation		✓	✓	✓	✓	✓	✓
Feedforward control, velocity-dependent		✓	✓	✓	✓	✓	✓
Feedforward control, acceleration-dependent		✓	✓	✓	✓	✓	✓
<b>PLC</b>							
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							
• LAD ladder diagram		✓	✓	✓	✓	✓	✓
• FBD function block diagram		–	–	–	–	–	–
• STL statement list		–	–	–	–	–	–
PLC programming tool for integrated PLC	On toolbox DVD-ROM	✓	✓	✓	✓	✓	✓
PLC ladder add-on editor on PPU		✓	✓	✓	✓	✓	✓
I/O modules							
• PP 72/48D PN I/O module (digital), max. number		○ 3	○ 3	○ 4	○ 4	○ 5	○ 5
• PP 72/48D 2/2A PN I/O module (digital/analog), max. number		○ 3	○ 3	○ 4	○ 4	○ 5	○ 5
• PP 72/48D PN or PP 72/48D 2/2A PN I/O modules		○ 3	○ 3	○ 4	○ 4	○ 5	○ 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		✓	✓	✓	✓	✓	✓

# Overview of functions

## Safety functions/Commissioning/ Diagnostic functions

1

✓ Basic version ○ Option – Not available	Order No.	SINUMERIK 828D BASIC T/BASIC M und SINUMERIK 828D						
		Notes	PPU 240/ PPU 241		PPU 260/ PPU 261		PPU 280/ PPU 281	
			BASIC T	BASIC M	T	M	T	M
<b>Safety functions</b>								
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)	<b>6FC5800-0AC50-0YB0</b>	○	○	○	○	○	○	
• SINAMICS S120 Terminal Module Cabinet TM54F to control SOS, SS2, SLS, SSM and SAM	<b>6SL3055-0AA00-3BA0</b>	○	○	○	○	○	○	
<b>Commissioning</b>								
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								
• Serial interface		–	–	–	–	–	–	
• USB interface with storage medium, e.g. memory stick	Import/export INI file	✓	✓	✓	✓	✓	✓	
• Network drive		✓	✓	✓	✓	✓	✓	
• User CF card		✓	✓	✓	✓	✓	✓	
• RCS Commander	<b>6FC5860-7YC00-0YA0</b>	✓	✓	✓	✓	✓	✓	
STARTER drive/commissioning tool on PC/PG for SINAMICS S120	On STARTER DVD-ROM	✓	✓	✓	✓	✓	✓	
SinuCom commissioning/service tools for SINUMERIK 840Di sl/840D sl		–	–	–	–	–	–	
<b>Diagnostic functions</b>								
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)	<b>6NH9720-3AA00</b> <b>6NH9860-1AA00</b> <b>6NH7701-5AN</b>	○	○	○	○	○	○	
Remote diagnostics and file transfer								
• RCS Host remote diagnostics function for connection of a modem router to the X127 (SINUMERIK Integrate Access MyMachine P2P)	<b>6FC5800-0AP30-0YB0</b>	○	○	○	○	○	○	
• RCS Commander for PC/PG (SINUMERIK Integrate Access MyMachine P2P) Principally permits file transfer between PC/PG and CNCs	<b>6FC5860-7YC00-0YA0</b> RCS Commander for PC/PG on CD-ROM	✓	✓	✓	✓	✓	✓	

Service and maintenance/  
SINUMERIK Ctrl-Energy

✓ Basic version ○ Option – Not available	Order No. Notes	SINUMERIK 828D BASIC T/BASIC M und SINUMERIK 828D					
		PPU 240/ PPU 241		PPU 260/ PPU 261		PPU 280/ PPU 281	
		BASIC T	BASIC M	T	M	T	M
<b>Service and maintenance</b>							
ePS Network Services		–	–	–	–	–	–
TPM Total Productive Maintenance Servicing and maintenance support		–	–	–	–	–	–
Integrated service planner for monitoring service intervals		✓	✓	✓	✓	✓	✓
Easy Extend Simply extend optional machine components		✓	✓	✓	✓	✓	✓
<b>SINUMERIK Ctrl-Energy</b>							
Intelligent standby control of the machine		✓	✓	✓	✓	✓	✓
Measurement and evaluation of the energy usage of the drive system		✓	✓	✓	✓	✓	✓
Measurement and evaluation of the total usage of the machine		○	○	○	○	○	○
• SENTRON PAC3200 power monitoring device	<b>7KM2112-0BA00-3AA0</b>	○	○	○	○	○	○
• SENTRON PAC4200 power monitoring device	<b>7KM4212-0BA00-3AA0</b>	○	○	○	○	○	○

## System overview

	SINUMERIK 828D BASIC T / BASIC M und 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	3	4	3	4	3	4
Number of axes/spindles, max.	5	5	6	6	6 / 8 <sup>1)</sup>	6
Number of axes with Drive Based Extended Safety, max.	5	5	6	6	6 / 8 <sup>1)</sup>	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
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
• For user data	1 MB	1 MB	1 MB	1 MB	1 MB	1 MB
Numeric Control Extension NX10.3	–	–	–	1	1	1
PP 72/48D I/O Module	3	3	4	4	5	5

<sup>1)</sup> The following can be achieved with a NX10.3:

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

# Overview of functions

## Overview of CNC options

1

✓ Basic version ○ Option – Not available	Order 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
<b>Manufacturer options</b>							
Axis/spindle, each additional	<b>6FC5800-0AC20-0YB0</b>	○	○	○	○	○	○
Positioning axis/auxiliary spindle, each additional	<b>6FC5800-0AC30-0YB0</b>	○	○	○	○	○	○
TRANSMIT/peripheral surface transformation	<b>6FC5800-0AM27-0YB0</b>	○	○	○	○	○	○
TRANSMIT/TRACYL without Y axis	<b>6FC5800-0AS50-0YB0</b>	○	○	○	○	○	○
Inclined axis <sup>1)</sup>	<b>6FC5800-0AM28-0YB0</b>	–	–	–	–	○	–
Pair of synchronized axes (gantry axes), basic	<b>6FC5800-0AS51-0YB0</b>	○	○	○	○	○	○
Travel to fixed stop with Force Control	<b>6FC5800-0AM01-0YB0</b>	○	○	○	○	○	○
Generic coupling static CP-Static <sup>2)</sup>	<b>6FC5800-0AM75-0YB0</b>	–	○	–	○	○	○
Generic coupling basic CP-Basic <sup>3)</sup>	<b>6FC5800-0AM72-0YB0</b>	○	–	○	–	○	–
Bidirectional threaded spindle error compensation	<b>6FC5800-0AM54-0YB0</b>	○	○	○	○	○	○
Sag compensation, multi-dimensional	<b>6FC5800-0AM55-0YB0</b>	○	○	○	○	○	○
Master-Slave for drives, basic	<b>6FC5800-0AS52-0YB0</b>	○	○	○	○	○	○
Evaluation of internal drive variables, basic	<b>6FC5800-0AS53-0YB0</b>	○	○	○	○	○	○
SINUMERIK Operate runtime license OA Easy Screen	<b>6FC5800-0AP64-0YB0</b>	○	○	○	○	○	○
Safety Integrated extended functions	<b>6FC5800-0AC50-0YB0</b>	○	○	○	○	○	○
<b>User options</b>							
Advanced Technology (expansion of the technology cycles for turning and milling) <sup>4)</sup>	<b>6FC5800-0AP58-0YB0</b>	○	○	✓	✓	✓	✓
Extended operator functions <sup>5)</sup>	<b>6FC5800-0AP16-0YB0</b>	○	○	○	○	○	○
Machining step programming ShopTurn/ShopMill	<b>6FC5800-0AP17-0YB0</b>	○	○	○	○	○	○
Multiple clamping of various workpieces	<b>6FC5800-0AP14-0YB0</b>	–	○	–	○	–	○
Residual material detection and machining for contour pockets and stock removal	<b>6FC5800-0AP13-0YB0</b>	○	○	○	○	○	○
3D simulation finished part	<b>6FC5800-0AP25-0YB0</b>	○	○	○	○	○	○
Simultaneous recording (real-time simulation of current machining)	<b>6FC5800-0AP22-0YB0</b>	○	○	○	○	○	○
Measuring cycles for drilling/milling and turning	<b>6FC5800-0AP28-0YB0</b>	○	○	○	○	○	○
Network drive management	<b>6FC5800-0AP01-0YB0</b>	○	○	○	○	○	○
Replacement tools for tool management	<b>6FC5800-0AM78-0YB0</b>	○	○	○	○	○	○
RCS Host remote diagnostics software for connection of a modern router to the X127 (SINUMERIK Integrate Access MyMachine /P2P)	<b>6FC5800-0AP30-0YB0</b>	○	○	○	○	○	○
Contour handwheel	<b>6FC5800-0AM08-0YB0</b>	○	○	○	○	○	○
Advanced Surface	Basic scope	–	✓	–	✓	–	✓
Spline interpolation (A, B and C splines)	<b>6FC5800-0AS16-0YB0</b>	○	○	○	○	○	○
Measure kinematics (determine transformation data of rotary axes)	<b>6FC5800-0AP18-0YB0</b>	–	○	–	○	–	○

<sup>1)</sup> For non-orthogonal Y-axis in turning machines.

<sup>2)</sup> For turning machines with counterspindle.

<sup>3)</sup> For multi-edge turning in turning machines.

<sup>4)</sup> The CNC option extended 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

<sup>5)</sup> 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

## CNC controls



<b>2/2</b>	<b>SINUMERIK 828D BASIC</b>
2/2	SINUMERIK 828D BASIC T
2/5	SINUMERIK 828D BASIC M
<b>2/8</b>	<b>SINUMERIK 828D</b>
2/8	SINUMERIK 828D
<b>2/14</b>	<b>Operator components</b>
2/14	SINUMERIK MCP 310C PN
2/15	SINUMERIK MCP 483C PN
2/17	Mini handheld unit
2/18	Electronic handwheel
<b>2/19</b>	<b>SINUMERIK I/O</b>
2/19	SINUMERIK PP 72/48D PN I/O module
<b>2/21</b>	<b>Supplementary components</b>
2/21	SINAUT MD 720-3 GSM/GPRS modem
2/22	SITOP power supply
	<b>CAD CREATOR</b>
	Dimension drawing and 2D/3D CAD generator <a href="http://www.siemens.com/cadcreator">www.siemens.com/cadcreator</a>

# CNC controls

## SINUMERIK 828D BASIC

### SINUMERIK 828D BASIC T

#### Overview



SINUMERIK 828D BASIC T PPU 241.2, horizontal



SINUMERIK 828D BASIC T PPU 240.2, vertical

The SINUMERIK 828D BASIC T is a operator-panel-based CNC, tailored for use in modern standard turning machines.

The operator panel CNC is mounted from the rear using special clamps included in the scope of supply.

#### Benefits

- Compact, rugged, and maintenance-free operator-panel CNC with dedicated system software for turning technologies
- Highest machining precision with 80 bit NANO<sup>FP</sup> accuracy
- The new user interface SINUMERIK Operate: same look and feel as with SINUMERIK 840D sl
- Intelligent kinematic transformations for milling and drilling processes on the front and peripheral surfaces of the workpiece
- ShopTurn: Very fast programming time in the production of individual parts and small batches
- programGUIDE: Very fast machining times and maximum flexibility in the manufacture of workpieces in large batch sizes
- Unique spectrum of technology cycles – ranging from the machining of any turning and milling contours with residual material detection to in-process measurements
- Animated Elements: Unique operating and programming support with moving picture sequences
- State-of-the-art data transmission via USB stick, CompactFlash card and plant network (Ethernet)
- Easy Message: Maximum machine availability thanks to process monitoring based on text messaging (SMS)

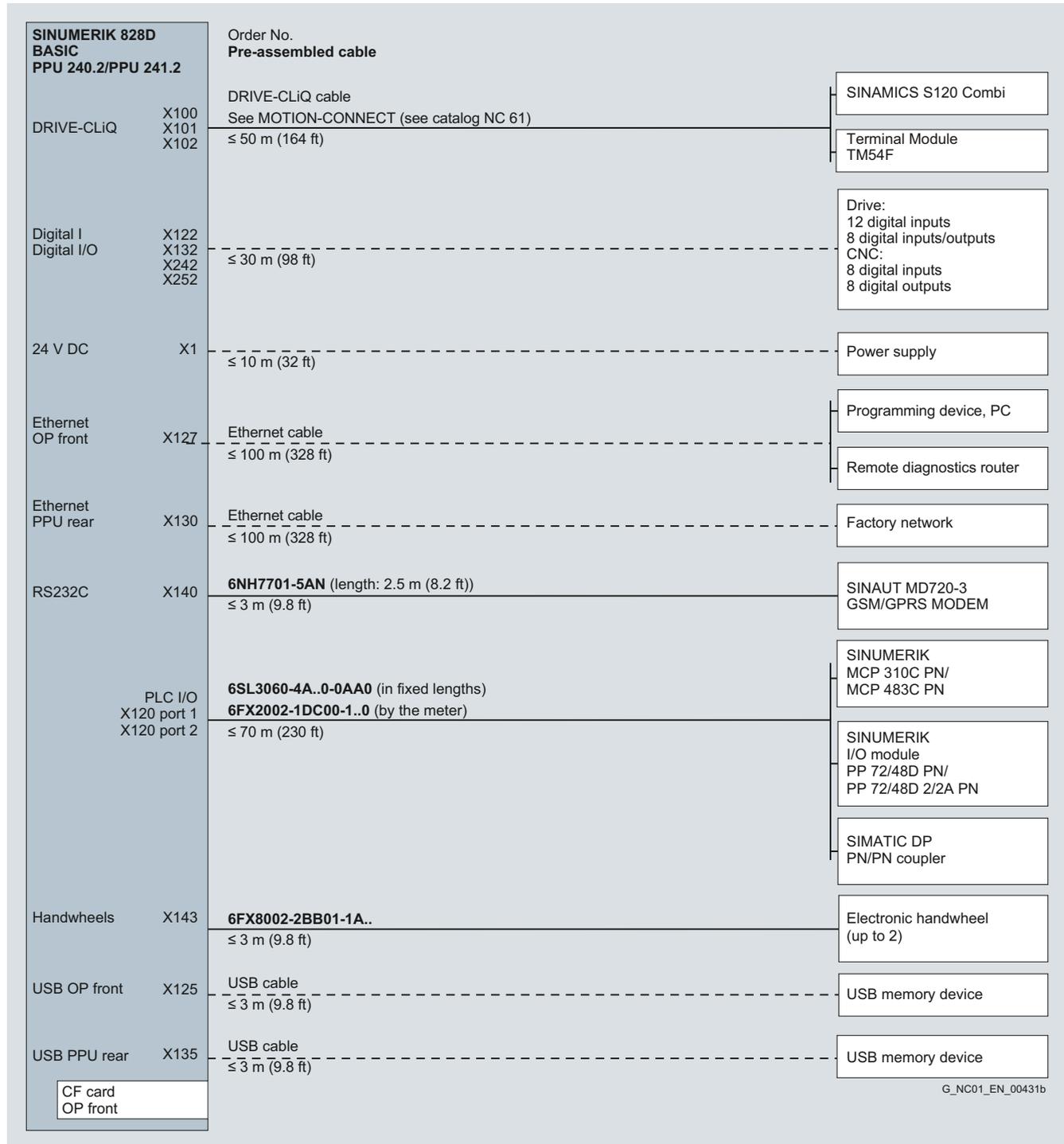
#### Function

- 2 operator panel variants for horizontal and vertical operator panel housings
- Integrated QWERTY full CNC keyboard with short-stroke keys
- CompactFlash card, USB and Ethernet interfaces on the operator panel front
- Additional Ethernet interface on rear of CNC for connection to factory network
- GSM/GPRS modem connection: Easy Message (option)
- Integrated PLC based on the SIMATIC S7-200 command set with ladder logic programming
- I/O interface based on PROFINET for the connection of PLC I/O devices and a machine control panel
- CNC options subject to license
- Up to 5 axes/spindles
- 1 machining channel/mode group
- Integrated tool management with tool life monitoring
- Management of replacement tools (option)
- Graphical machining step programming ShopTurn (option)
- Configurable user screens Easy Screen
- Integrated data archiving procedure for simple data updates
- Faults will be remedied for a period of 24 months following 2nd commissioning on all system components in accordance with the repair service contract performance description.

## Integration

The following components can be connected to the SINUMERIK 828D BASIC T:

- Up to 2 electronic handwheels
- Mini handheld unit with handwheel
- Up to 3 I/O modules PP 72/48D PN or PP 72/48D 2/2A PN
- MCP 310C PN or MCP 483C PN machine control panel
- GSM/GPRS modem
- SINAMICS S120 Combi drive system via DRIVE-CLiQ



Connection overview for SINUMERIK 828D BASIC T/BASIC M

More information about cables can be found under [MOTION-CONNECT connection systems](#).

# CNC controls

## SINUMERIK 828D BASIC

### SINUMERIK 828D BASIC T

#### Technical specifications

	<b>SINUMERIK 828D BASIC T PPU 240.2 vertical 6FC5370-4AT20-0AA0</b>	<b>SINUMERIK 828D BASIC T PPU 241.2 horizontal 6FC5370-3AT20-0AA0</b>
<b>Input voltage</b>	24 V DC, + 20 %/- 15 %	24 V DC, + 20 %/- 15 %
<b>Power consumption, max.</b>	60 W	60 W
<b>Main power outage buffering time</b>	3 ms (20 ms with SITOP smart)	3 ms (20 ms with SITOP smart)
<b>Degree of protection to EN 60529 (IEC 60529)</b>		
• Operator panel front	IP65 (with closed front cover)	IP65 (with closed front cover)
• PPU	IP20 (rear)	IP20 (rear)
<b>Relative humidity</b>		
• Storage	5 ... 95 % at 25 °C	5 ... 95 % at 25 °C
• Transport	5 ... 95 % at 25 °C	5 ... 95 % at 25 °C
• Operation	5 ... 90 % at 25 °C (no condensation)	5 ... 90 % at 25 °C (no condensation)
<b>Ambient temperature</b>		
• Storage	-20 ... +55 °C	-20 ... +55 °C
• Transport	-20 ... +70 °C	-20 ... +70 °C
• Operation	0 ... 45 °C (rear 0 ... 55 °C)	0 ... 45 °C (rear 0 ... 55 °C)
<b>Dimensions</b>		
• Width	310 mm	483 mm
• Height	380 mm	220 mm
• Depth	105 mm	105 mm
<b>Weight, approx.</b>	4.5 kg	4.5 kg

#### Selection and ordering data

Description	Order No.
<b>Hardware components</b>	
<b>SINUMERIK 828D BASIC T PPU 240.2 vertical</b> Without system software	<b>6FC5370-4AT20-0AA0</b>
<b>SINUMERIK 828D BASIC T PPU 241.2 horizontal</b> Without system software	<b>6FC5370-3AT20-0AA0</b>
<b>Software components</b>	
<b>System software Turning for SINUMERIK 828D BASIC T PPU 240.2/PPU 241.2</b> On CompactFlash card with license up to software version 4.4 SP2, Export	<b>6FC5835-1GY40-1YA0</b>
<b>SINUMERIK 828D toolbox</b> On DVD-ROM	<b>6FC5830-0CY40-0YA8</b>
<b>SINUMERIK HMI RCS Commander</b> For PC/PG on CD-ROM current software version	<b>6FC5860-7YC00-0YA0</b>
<b>Language extensions for operating software SINUMERIK Operate</b> On DVD-ROM up to software version 4.4	<b>6FC5860-0YC40-1YA8</b>

Description	Order No.
<b>Software components (continued)</b>	
<b>SIZER for Siemens Drives engineering tool</b> For SINAMICS and MICROMASTER on DVD-ROM Languages: English, French, German, Italian	<b>6SL3070-0AA00-0AG0</b>
<b>STARTER commissioning tool</b> For SINAMICS and MICROMASTER on DVD-ROM Languages: English, French, German, Italian, Spanish	<b>6SL3072-0AA00-0AG0</b>
<b>Accessories</b>	
<b>CompactFlash card, 1 GB, empty</b> To expand the user memory and as spare part if system CF card is damaged	<b>6FC5313-5AG00-0AA1</b>
<b>Set of clamps (9 units)</b> For operator components with 2.5 mm profile, length 20 mm	<b>6FC5248-0AF14-0AA0</b>

### Overview



SINUMERIK 828D BASIC M PPU 241.2, horizontal



SINUMERIK 828D BASIC M PPU 240.2, vertical

The SINUMERIK 828D BASIC M is an operator-panel-based CNC, tailored for use in modern standard milling machines.

The operator panel CNC is mounted from the rear using special clamps included in the scope of supply.

### Benefits

- Compact, rugged, and maintenance-free operator-panel CNC with dedicated system software for milling technologies
- Highest machining precision with 80 bit NANO<sup>FP</sup> accuracy
- The new user interface SINUMERIK Operate: same look and feel as SINUMERIK 840D sl
- Intelligent kinematic transformations for the machining of cylindrical workpieces
- Technology package SINUMERIK MDynamics with the new function Advanced Surface: Perfect workpiece surfaces and very fast machining times in the production of moldmaking workpieces
- ShopMill: Very fast programming time in the production of individual parts and small batches
- programGUIDE: Very fast machining times and maximum flexibility in the manufacture of workpieces in large batch sizes
- Unique spectrum of technology cycles – ranging from the machining of any milling contours with residual material detection to in-process measurements
- Animated Elements: Unique operating and programming support with moving picture sequences
- State-of-the-art data transmission via USB stick, CompactFlash card and plant network (Ethernet)
- Easy Message: Maximum machine availability thanks to process monitoring based on text messaging (SMS)

### Function

- 2 operator panel variants for horizontal and vertical operator panel housings
- Integrated QWERTY full CNC keyboard with short-stroke keys
- CompactFlash card, USB and Ethernet interface on the operator panel front
- Additional Ethernet interface on rear of CNC for connection to factory network
- GSM/GPRS modem connection: Easy Message (option)
- Integrated PLC based on the SIMATIC S7-200 command set with ladder logic programming
- I/O interface based on PROFINET for the connection of PLC I/O devices and a machine control panel
- CNC options subject to license
- Up to 5 axes/spindles
- 1 machining channel/mode group
- Integrated tool management with tool life monitoring
- Management of replacement tools (option)
- Graphical machining step programming ShopMill (option)
- Configurable user screens Easy Screen
- Integrated data archiving procedure for simple data updates
- Faults will be remedied for a period of 24 months following 2nd commissioning on all system components in accordance with the repair service contract performance description.

# CNC controls

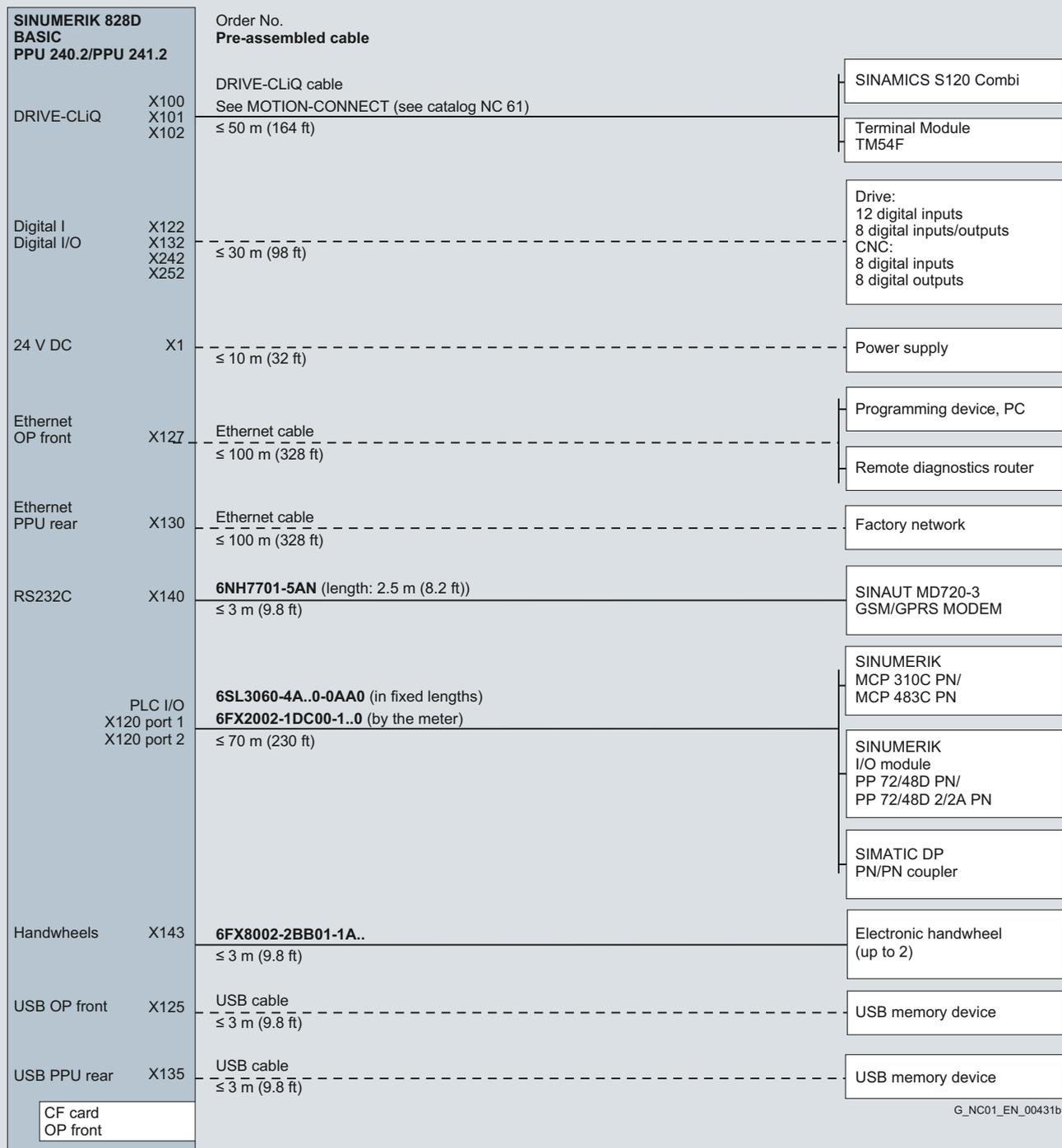
## SINUMERIK 828D BASIC

### SINUMERIK 828D BASIC M

#### Integration

The following components can be connected to the SINUMERIK 828D BASIC M:

- Up to 2 electronic handwheels
- Mini handheld unit with handwheel
- Up to 3 I/O modules PP 72/48D PN or PP 72/48D 2/2A PN
- MCP 310C PN or MCP 483C PN machine control panel
- GSM/GPRS modem
- SINAMICS S120 Combi drive system via DRIVE-CLiQ



Connection overview for SINUMERIK 828D BASIC T/BASIC M

[More information about cables can be found under MOTION-CONNECT connection systems.](#)

### Technical specifications

	<b>SINUMERIK 828D BASIC M PPU 240.2 vertical</b> 6FC5370-4AM20-0AA0	<b>SINUMERIK 828D BASIC M PPU 241.2 horizontal</b> 6FC5370-3AM20-0AA0
<b>Input voltage</b>	24 V DC, + 20 %/- 15 %	24 V DC, + 20 %/- 15 %
<b>Power consumption, max.</b>	60 W	60 W
<b>Main power outage buffering time</b>	3 ms (20 ms with SITOP smart)	3 ms (20 ms with SITOP smart)
<b>Degree of protection to EN 60529 (IEC 60529)</b>		
• Operator panel front	IP65 (with closed front cover)	IP65 (with closed front cover)
• PPU	IP20 (rear)	IP20 (rear)
<b>Relative humidity</b>		
• Storage	5 ... 95 % at 25 °C	5 ... 95 % at 25 °C
• Transport	5 ... 95 % at 25 °C	5 ... 95 % at 25 °C
• Operation	5 ... 90 % at 25 °C (no condensation)	5 ... 90 % at 25 °C (no condensation)
<b>Ambient temperature</b>		
• Storage	-20 ... +55 °C	-20 ... +55 °C
• Transport	-20 ... +70 °C	-20 ... +70 °C
• Operation	0 ... 45 °C (rear 0 ... 55 °C)	0 ... 45 °C (rear 0 ... 55 °C)
<b>Dimensions</b>		
• Width	310 mm	483 mm
• Height	380 mm	220 mm
• Depth	105 mm	105 mm
<b>Weight, approx.</b>	4.5 kg	4.5 kg

### Selection and ordering data

Description	Order No.
<b>Hardware components</b>	
<b>SINUMERIK 828D BASIC M PPU 240.2 vertical</b> Without system software	<b>6FC5370-4AM20-0AA0</b>
<b>SINUMERIK 828D BASIC M PPU 241.2 horizontal</b> Without system software	<b>6FC5370-3AM20-0AA0</b>
<b>Software components</b>	
<b>System software Milling for SINUMERIK 828D BASIC M PPU 240.2/PPU 241.2</b> On CompactFlash card with license up to software version 4.4 SP2, Export	<b>6FC5835-2GY40-1YA0</b>
<b>SINUMERIK 828D toolbox</b> On DVD-ROM	<b>6FC5830-0CY40-0YA8</b>
<b>SINUMERIK HMI RCS Commander</b> For PC/PG on CD-ROM current software version	<b>6FC5860-7YC00-0YA0</b>
<b>Language extensions for operating software SINUMERIK Operate</b> On DVD-ROM up to software version 4.4	<b>6FC5860-0YC40-1YA8</b>

Description	Order No.
<b>Software components (continued)</b>	
<b>SIZER for Siemens Drives engineering tool</b> For SINAMICS and MICROMASTER on DVD-ROM Languages: English, French, German, Italian	<b>6SL3070-0AA00-0AG0</b>
<b>STARTER commissioning tool</b> For SINAMICS and MICROMASTER on DVD-ROM Languages: English, French, German, Italian, Spanish	<b>6SL3072-0AA00-0AG0</b>
<b>Accessories</b>	
<b>CompactFlash card, 1 GB, empty</b> To expand the user memory and as spare part if system CF card is damaged	<b>6FC5313-5AG00-0AA1</b>
<b>Set of clamps (9 units)</b> For operator components with 2.5 mm profile, length 20 mm	<b>6FC5248-0AF14-0AA0</b>

# CNC controls

## SINUMERIK 828D

### Overview



SINUMERIK 828D PPU 261.2/PPU 281.2, horizontal



SINUMERIK 828D PPU 260.2/PPU 280.2, vertical

The SINUMERIK 828D is an operator-panel-based CNC combining all the components of a CNC in a single unit:

- CNC, PLC, HMI
- Full CNC keyboard
- Closed-loop control for 6 drives

The motors can be easily connected to the digital drive system via DRIVE-CLiQ. In combination with the modular structure of the SINAMICS S120 drive system, this design is conceived to ensure very simple and rugged installation with minimum wiring overhead.

The performance range of the CNC has been precisely selected to meet the requirements of standard turning and milling machines – from one-off production runs to industrial scale manufacture. Thanks to the technology-specific versions for turning and milling, the system parameters are optimized for the machine, making the commissioning process much quicker and easier.

The operator panel CNC is mounted from the rear using special clamping elements included in the scope of supply.

### Benefits

#### *Benefits for the machine operator*

- High-quality, rugged, magnesium die-cast operator panels
- Extremely user-friendly operation through integrated QWERTY keyboard with short-stroke keys
- Easy data exchange thanks to USB and Ethernet interfaces on the panel front
- Simple operation using ShopMill and ShopTurn software
- Advanced Surface: Innovative, high-performance CNC functions provide top quality of workpiece surface with minimum machining times
- Animated Elements: Optimized operator guidance thanks to CNC input screens with animated elements
- Easy input of pictographic languages directly via the CNC keyboard
- Easy Message: Integrated mobile radio modem for optimum process monitoring via mobile telephone

#### *Benefits for the machine manufacturer*

- High system quality through reduction in hardware interfaces
- Drive based Safety Integrated to comply with machinery directive
- Less complex system thanks to technology-specific system software
- Faster, easier commissioning thanks to preset system parameters
- Automatic system configuration by means of single PLC I/Os
- Service Planner: Integrated planner for machine maintenance intervals
- Easy Archive: Integrated archiving procedure for optimum handling of commissioning updates
- Easy Extend: Integrated wizard for optional machine units
- Simple PLC programming with symbols and comments on the CNC control
- No investment required by dealers and machine manufacturers thanks to free PLC programming tool
- Faults will be remedied for a period of 24 months following 2nd commissioning on all system components in accordance with the repair service contract performance description.

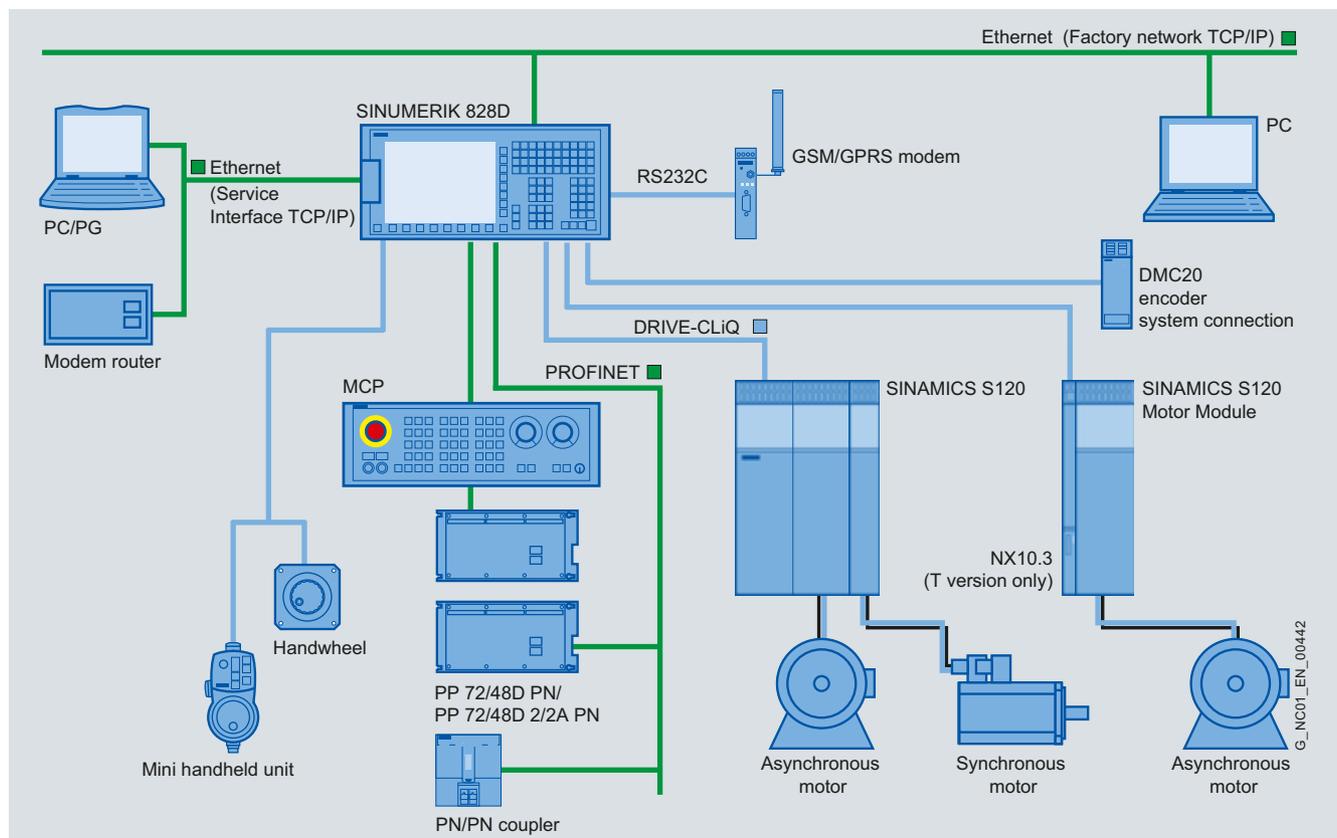
### Function

- Operator-panel CNC with dedicated system software versions for turning and milling technologies
- Operator panel variants for horizontal and vertical operator panel housings
- Integrated QWERTY full CNC keyboard with short-stroke keys
- CompactFlash card, USB and Ethernet interfaces on the operator panel front
- Additional Ethernet interface on rear of CNC for connection to factory network
- Integrated PLC based on the SIMATIC S7-200 command set with ladder logic programming
- I/O interface based on PROFINET for the connection of PLC I/O devices and machine control panel
- GSM/GPRS modem connection: Easy Message (option)
- CNC options subject to license
- Up to 5 axes/spindles for milling and turning applications
- 1 machining channel/mode group
- Integrated tool management with tool life monitoring
- Graphical machining step programming ShopMill/ShopTurn (option)
- Operator interface SINUMERIK Operate: same look and feel as SINUMERIK 840D sl
- Configurable user displays Easy Screen
- Integrated data archiving procedure for simple data updates

### Integration

The following components can be connected to the SINUMERIK 828D:

- Up to 2 electronic handwheels
- Mini handheld unit with handwheel
- Up to 3 I/O modules PP 72/48D PN or PP 72/48D 2/2A PN
- MCP 310C PN or MCP 483C PN machine control panel
- GSM/GPRS modem
- Numeric Control Extension NX10.3 (only with PPU 280.2/PPU 281.2 for Turning)
- SINAMICS S120 drive system via DRIVE-CLiQ



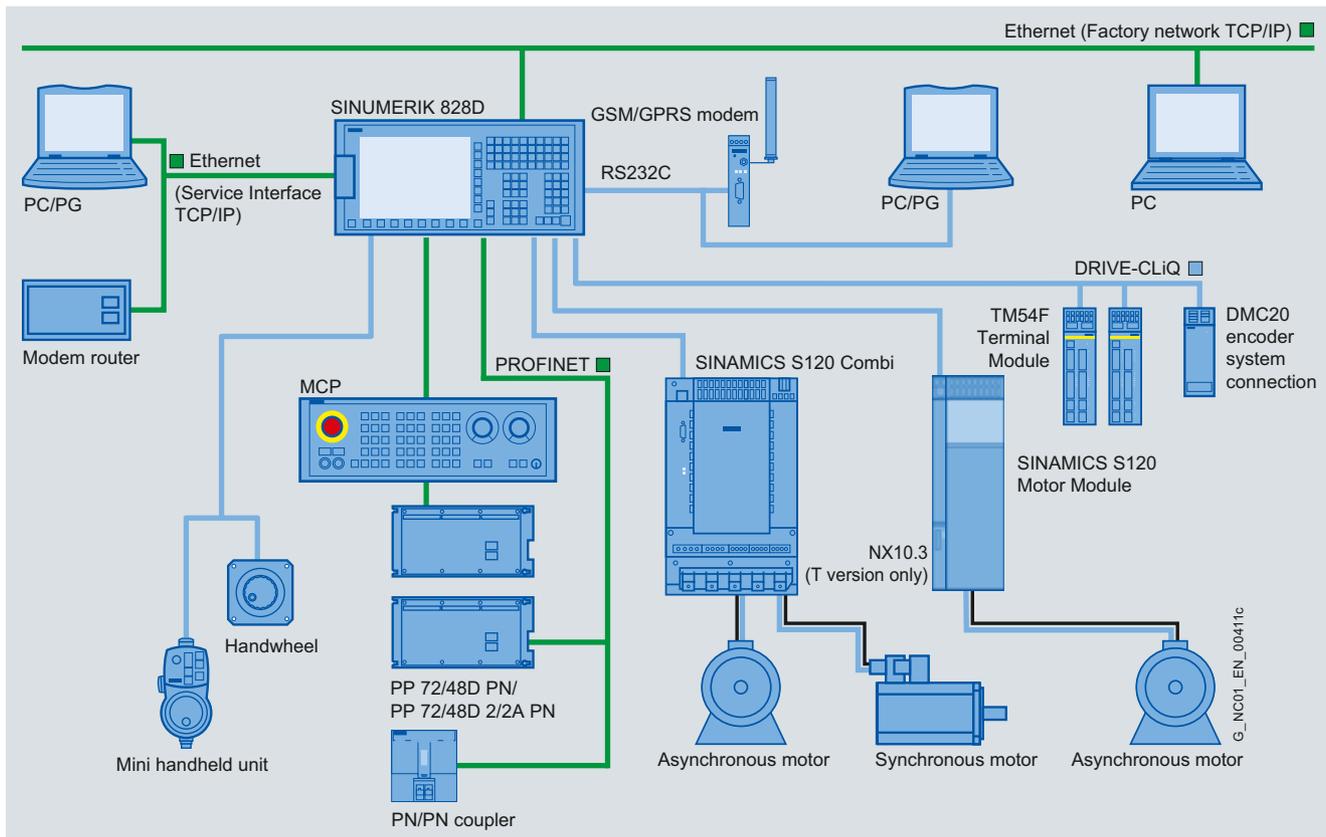
Connection overview for SINUMERIK 828D with SINAMICS S120

# CNC controls

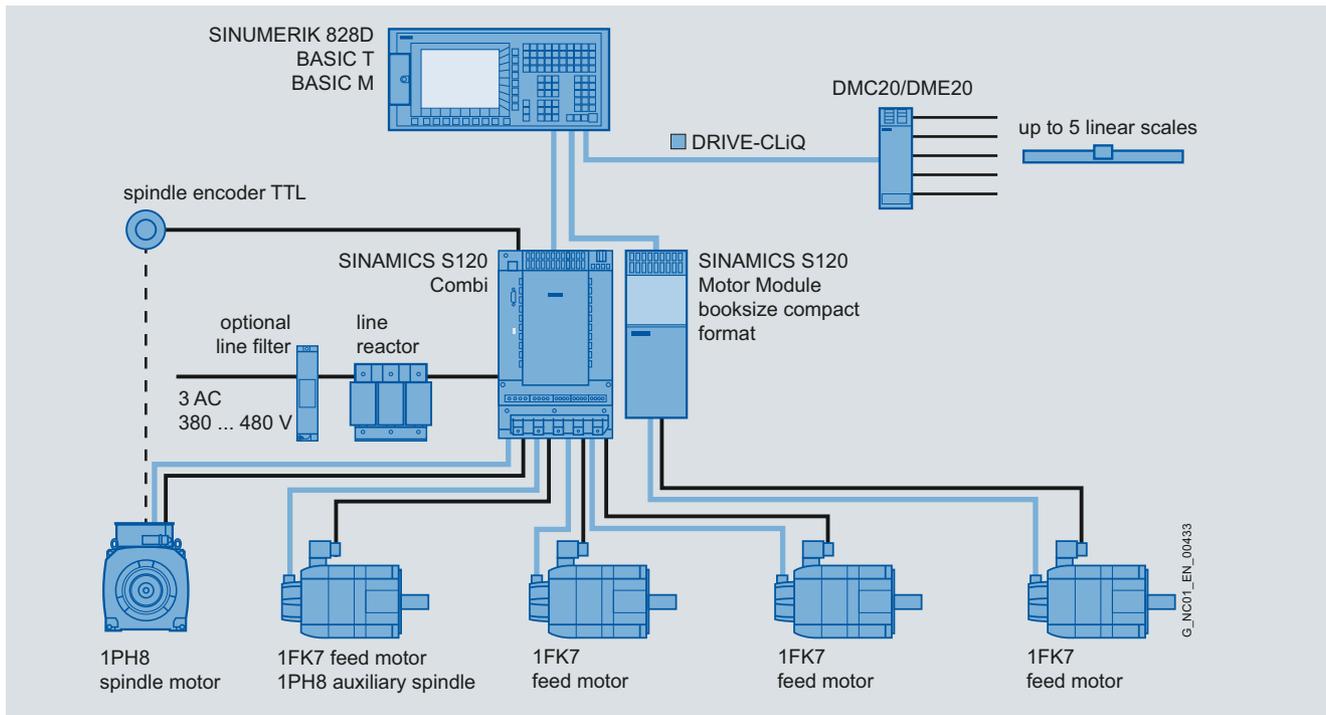
## SINUMERIK 828D

### Integration (continued)

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Connection overview for SINUMERIK 828D with SINAMICS S120 Combi



Connection overview for SINUMERIK 828D BASIC with SINAMICS S120 Combi

### Integration (continued)

SINUMERIK 828D PPU 260.2/PPU 261.2 PPU 280.2/PPU 281.2		Order No. Pre-assembled cable	
DRIVE-CLiQ	X100 X101 X102	DRIVE-CLiQ cable See MOTION-CONNECT (see catalog NC 61) ≤ 50 m (164 ft)	Terminal Module TM54F  SINAMICS S120  NX10.3 <sup>1)</sup>
Digital I Digital I/O	X122 X132 X142	≤ 30 m (98 ft)	Drive: 12 digital inputs 8 digital inputs/outputs CNC: 8 digital inputs 8 digital outputs
24 V DC	X1	≤ 10 m (32 ft)	Power supply
Ethernet OP front	X127	Ethernet cable ≤ 100 m (328 ft)	Programming device, PC  Remote diagnostics router
Ethernet PPU rear	X130	Ethernet cable ≤ 100 m (328 ft)	Factory network
RS232C	X140	<b>6NH7701-5AN</b> (length: 2.5 m (8.2 ft)) ≤ 3 m (9.8 ft)	SINAUT MD720-3 GSM/GPRS modem
PLC I/O port 1 X120 port 2 <sup>1)</sup> X120		<b>6SL3060-4A..0-0AA0</b> (in fixed lengths) <b>6FX2002-1DC00-1..0</b> (by the meter) ≤ 70 m (230 ft)	SINUMERIK MCP 310C PN/ MCP 483C PN  SINUMERIK I/O module PP 72/48D PN/ PP 72/48D 2/2A PN  SIMATIC DP PN/PN coupler
	Handwheels	X143	<b>6FX8002-2BB01-1A..</b> ≤ 3 m (9.8 ft)
USB OP front	X125	USB cable ≤ 3 m (9.8 ft)	USB memory device
USB PPU rear	X135	USB cable ≤ 3 m (9.8 ft)	USB memory device
CF card OP front			

G\_NC01\_EN\_00410a

<sup>1)</sup> With PPU 280.2/PPU 281.2 only.

Connection overview for SINUMERIK 828D

More information about cables can be found under  
MOTION-CONNECT connection systems.

# CNC controls

## SINUMERIK 828D

### Technical specifications

	SINUMERIK 828D PPU 261.2 horizontal 6FC5370-5AA20-0AA0	SINUMERIK 828D PPU 260.2 vertical 6FC5370-6AA20-0AA0	SINUMERIK 828D PPU 281.2 horizontal 6FC5370-7AA20-0AA0	SINUMERIK 828D PPU 280.2 vertical 6FC5370-8AA20-0AA0
<b>Input voltage</b>	24 V DC + 20 %/- 15 %			
<b>Power consumption, max.</b>	60 W			
<b>Main power outage buffering time</b>	3 ms (20 ms with SITOP smart)			
<b>Degree of protection to EN 60529 (IEC 60529)</b>				
• Operator panel front	IP65 (with closed front cover)			
• PPU	IP20 (rear)			
<b>Relative humidity</b>				
• Storage	5 ... 95 % at 25 °C			
• Transport	5 ... 95 % at 25 °C			
• Operation	5 ... 90 % at 25 °C (no condensation)			
<b>Ambient temperature</b>				
• Storage	-20 ... +55 °C			
• Transport	-20 ... +70 °C			
• Operation	0 ... 45 °C (rear 0 ... 55 °C)			
<b>Dimensions</b>				
• Width	483 mm	310 mm	483 mm	310 mm
• Height	220 mm	380 mm	220 mm	380 mm
• Depth	105 mm	105 mm	105 mm	105 mm
<b>Weight, approx.</b>	4.5 kg	4.5 kg	4.5 kg	4.5 kg

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### Selection and ordering data

Description	Order No.
<b>Hardware components</b>	
<b>SINUMERIK 828D PPU 260.2 vertical</b> Without system software	<b>6FC5370-6AA20-0AA0</b>
<b>SINUMERIK 828D PPU 261.2 horizontal</b> Without system software	<b>6FC5370-5AA20-0AA0</b>
<b>SINUMERIK 828D PPU 280.2 vertical</b> Without system software	<b>6FC5370-8AA20-0AA0</b>
<b>SINUMERIK 828D PPU 281.2 horizontal</b> Without system software	<b>6FC5370-7AA20-0AA0</b>
<b>Software components</b>	
<b>System software Turning for SINUMERIK 828D PPU 260.2/PPU 261.2</b> On CompactFlash card with license software version 4.4 SP2, Export	<b>6FC5834-1GY40-1YA0</b>
<b>System software Milling for SINUMERIK 828D PPU 260.2/PPU 261.2</b> On CompactFlash card with license software version 4.4 SP2, Export	<b>6FC5834-2GY40-1YA0</b>
<b>System software Turning for SINUMERIK 828D PPU 280.2/PPU 281.2</b> On CompactFlash card with license software version 4.4 SP2, Export	<b>6FC5833-1GY40-1YA0</b>
<b>System software Milling for SINUMERIK 828D PPU 280.2/PPU 281.2</b> On CompactFlash card with license software version 4.4 SP2, Export	<b>6FC5833-2GY40-1YA0</b>
<b>SINUMERIK 828D toolbox</b> On CD-ROM	<b>6FC5830-0YC00-0YA8</b>
<b>SINUMERIK HMI RCS Commander</b> For PC/PG on CD-ROM current software version	<b>6FC5860-7YC00-0YA0</b>
<b>Language extensions for operating software SINUMERIK Operate</b> On DVD-ROM up to software version 4.4	<b>6FC5860-0YC40-0YA8</b>
<b>SIZER for Siemens Drives engineering tool</b> For SINAMICS and MICROMASTER on DVD-ROM Languages: English, French, German, Italian	<b>6SL3070-0AA00-0AG0</b>
<b>STARTER commissioning tool</b> For SINAMICS and MICROMASTER on DVD-ROM Languages: English, French, German, Italian, Spanish	<b>6SL3072-0AA00-0AG0</b>

Description	Order No.
<b>Other hardware components</b>	
<b>Numeric Control Extension NX10.3</b>	<b>6SL3040-1NC00-0AA0</b>
<b>TM54F Terminal Module</b>	<b>6SL3055-0AA00-3BA0</b>
<b>SIMATIC DP PN/PN coupler</b> Coupling module for connecting two PROFINET networks	<b>6ES7158-3AD00-0XA0</b>
<b>DRIVE-CLiQ signal cable</b> For PROFINET connection Pre-assembled cable Connector degree of protection IP20	
• By the meter <sup>1)</sup>	<b>6FX2002-1DC00-1..0</b>
• In fixed lengths <sup>1)</sup>	<b>6SL3060-4A..0-0AA0</b>
<b>Accessories</b>	
<b>CompactFlash card, 1 GB, empty</b> To expand the user memory and as spare part if system CF card is damaged	<b>6FC5313-5AG00-0AA1</b>
<b>Set of clamps (9 units)</b> For operator components with 2.5 mm profile, length 20 mm	<b>6FC5248-0AF14-0AA0</b>

<sup>1)</sup> More information about cables can be found under [MOTION-CONNECT](#) connection systems.

# CNC controls

## Operator components

### SINUMERIK MCP 310C PN

#### Overview



SINUMERIK MCP 310C PN machine control panel

The SINUMERIK MCP 310C PN machine control panel with mechanical keys is designed to permit user-friendly, well-structured operation of the machine functions. It is suitable for machine-level operation of milling, turning, grinding and special machines.

In addition to PROFINET functionality, SINUMERIK MCP 310C PN has also retained its complete Industrial Ethernet functionality. The network technology can be changed over using DIP switches.

All keys are designed with replaceable key covers for machine-specific adaptations. The key covers can be freely inscribed using laser. Transparent key covers can be used as an alternative.

The machine control panel is mounted from the rear using special clamps.

Included in the scope of delivery are the clamps, key caps (30 × ergo gray, 30 × transparent, 9 × labeled) and a backing plate for the emergency stop.

#### Design

##### Control elements:

- Mode and function keys
  - 49 keys with LEDs
  - Direction keys for milling machines with rapid traverse override (key covers for the direction keys for turning machines are supplied in the included accessories pack)
  - Default key assignment includes 16 freely assignable customer keys
- Feed control with feed/rapid traverse override (rotary switch with 23 positions)
- Key switch (4 positions and 3 different keys)

##### Key type:

- Mechanical keys

##### Interfaces:

- PROFINET/Industrial Ethernet
- 9 inputs/6 outputs for 9 control devices (additional cable set required for control devices)
- For 2 handwheels in combination with SINUMERIK 840D sl

##### Expansion facilities:

- 6 slots for control devices ( $d = 16$  mm)
- 1 slot for emergency stop button or rotary override switch (up to  $d = 22$  mm)

#### Integration

The SINUMERIK MCP 310C PN machine control panel can be used for:

- SINUMERIK 828D BASIC T
- SINUMERIK 828D BASIC M
- SINUMERIK 828D
- SINUMERIK 840D sl

#### Technical specifications

<b>SINUMERIK MCP 310C PN machine control panel</b> 6FC5303-0AF23-0AA1	
<b>Input voltage</b>	24 V DC
<b>Power consumption, max.</b>	5 W
<b>Degree of protection to DIN EN 60529 (IEC 60529)</b>	<ul style="list-style-type: none"> <li>• Front IP54</li> <li>• Rear IP00</li> </ul>
<b>Humidity class based on DIN EN 60721-3-3</b>	Class 3K5 condensation and icing excluded. Low air temperature 0 °C.
<b>Relative humidity</b>	<ul style="list-style-type: none"> <li>• Storage 5 ... 95 % at 25 °C</li> <li>• Transport 5 ... 95 % at 25 °C</li> <li>• Operation 5 ... 80 % at 25 °C</li> </ul>
<b>Ambient temperature</b>	<ul style="list-style-type: none"> <li>• Storage -25 ... +55 °C</li> <li>• Transport -40 ... +70 °C</li> <li>• Operation               <ul style="list-style-type: none"> <li>- Front 0 ... 45 °C</li> <li>- Rear 0 ... 55 °C</li> </ul> </li> </ul>
<b>Distance</b>	100 m
<b>Dimensions</b>	<ul style="list-style-type: none"> <li>• Width 310 mm</li> <li>• Height 175 mm</li> <li>• Depth 54 mm</li> </ul>
<b>Panel cutout</b>	<ul style="list-style-type: none"> <li>• Width 285 mm</li> <li>• Height 155 mm</li> <li>• Tolerance + 1 mm</li> </ul>
<b>Weight, approx.</b>	1.2 kg
<b>Approvals, according to</b>	CE, cULus

### SINUMERIK MCP 310C PN

#### Selection and ordering data

Description	Order No.
<b>SINUMERIK MCP 310C PN machine control panel</b> PROFINET/Industrial Ethernet Width 310 mm, with mechanical keys	<b>6FC5303-0AF23-0AA1</b>
<b>Accessories</b>	
<b>Square key cover, for labeling</b> 1 set comprising: 90 × ergo gray, 20 × red, 20 × yellow, 20 × green, 20 × mid-gray	<b>6FC5248-0AF12-0AA0</b>
<b>Square key cover, for labeling</b> 90 × transparent	<b>6FC5248-0AF21-0AA0</b>
<b>Actuating element 22 mm</b> Latching mushroom pushbutton, red and non-illuminated with 40 mm protection against lifting and tilting, incl. holder	<b>3SB3000-1HA20</b>
<b>Contact block with 2 contacts</b> 1 NO + 1 NC, 2-pin, screw terminal	<b>3SB3400-0A</b>
<b>Key set (10 sets)</b> For machine control panel	<b>6FC5148-0AA03-0AA0</b>
<b>Spindle/rapid traverse override rotary switch</b> 1 × 16G, T=24, cap, button, pointer, and rapid traverse and spindle dials	<b>6FC5247-0AF12-1AA0</b>
<b>Feed/rapid traverse override rotary switch</b> 1 × 23G, T=32, cap, button, pointer, and rapid traverse and feed dials	<b>6FC5247-0AF13-1AA0</b>
<b>Cable set (60 units)</b> For additional machine control panel command devices Length 500 mm	<b>6FC5247-0AA35-0AA0</b>
<b>Signal cable, pre-assembled</b> For connecting an electronic handwheel Length, max. 25 m <sup>1)</sup>	<b>6FX8002-2CP00-....</b>
<b>Set of clamps (9 units)</b> For operator components with 2.5 mm profile Length 20 mm	<b>6FC5248-0AF14-0AA0</b>

Example:

16G: Latching at position 16  
T=24: 24 positions for 360°

<sup>1)</sup> More information about cables can be found under MOTION-CONNECT connection systems.

### SINUMERIK MCP 483C PN

#### Overview



SINUMERIK MCP 483C PN machine control panel

The SINUMERIK MCP 483C PN machine control panel permits user-friendly operation of the machine functions. It is suitable for machine-level operation of milling, turning, grinding and special machines.

In addition to PROFINET, SINUMERIK MCP 483C PN has also retained its complete Industrial Ethernet functionality. The network technology can be changed over using DIP switches.

All keys are designed with replaceable key covers for machine-specific adaptations. The key covers can be freely inscribed using laser. Transparent key covers can be used as an alternative.

The machine control panel is mounted from the rear using special clamps supplied with the panel.

#### Design

##### Control elements:

- Mode and function keys
  - 50 keys with LEDs
  - Direction keys for milling machines with rapid traverse override (key covers for the direction keys for turning machines are supplied in the included accessories pack)
- Spindle control with spindle override (rotary switch with 16 positions)
- Feed control with feed/rapid traverse override (rotary switch with 23 positions)
- Key switch (4 positions and 3 different keys)
- Emergency stop button (2 × (1 NO + 1 NC))

##### Key type:

- Mechanical keys

##### Interfaces:

- PROFINET/Industrial Ethernet
- 9 inputs/6 outputs for 9 control devices (additional cable set required for control devices)
- For 2 handwheels in combination with SINUMERIK 840D sl

##### Expansion facility:

- 2 slots for control devices ( $d = 16$  mm)

# CNC controls

## Operator components

### SINUMERIK MCP 483C PN

#### Integration

The SINUMERIK MCP 483C PN machine control panel can be used for:

- SINUMERIK 828D BASIC T
- SINUMERIK 828D BASIC M
- SINUMERIK 828D
- SINUMERIK 840D sl

#### Technical specifications

<b>SINUMERIK MCP 483C PN machine control panel</b> 6FC5303-0AF22-0AA1	
<b>Input voltage</b>	24 V DC
<b>Power consumption, max.</b>	5 W
<b>Degree of protection to DIN EN 60529 (IEC 60529)</b>	
• Front	IP54
• Rear	IP00
<b>Humidity class based on DIN EN 60721-3-3</b>	Class 3K5 condensation and icing excluded. Low air temperature 0 °C.
<b>Relative humidity</b>	
• Storage	5 ... 95 % at 25 °C
• Transport	5 ... 95 % at 25 °C
• Operation	5 ... 85 % at 25 °C
<b>Ambient temperature</b>	
• Storage	-25 ... +55 °C
• Transport	-25 ... +55 °C
• Operation	
- Front	0 ... 45 °C
- Rear	0 ... 55 °C
<b>Distance</b>	100 m
<b>Dimensions</b>	
• Width	483 mm
• Height	155 mm
• Depth	55 mm
Panel cutout	
• Width	450 mm
• Height	135 mm
• Tolerance	+ 1 mm
<b>Weight, approx.</b>	2 kg
<b>Approvals, according to</b>	CE, cULus

#### Selection and ordering data

Description	Order No.
<b>SINUMERIK MCP 483C PN machine control panel</b> PROFINET/Industrial Ethernet Width 19", with mechanical keys, emergency stop 22 mm	<b>6FC5303-0AF22-0AA1</b>
<b>Accessories</b>	
<b>Square key cover, for labeling</b> 1 set comprising: 90 × ergo gray, 20 × red, 20 × yellow, 20 × green, 20 × mid-gray	<b>6FC5248-0AF12-0AA0</b>
<b>Square key cover, for labeling</b> 90 × transparent	<b>6FC5248-0AF21-0AA0</b>
<b>Actuating element 22 mm</b> Latching mushroom pushbutton, red and non-illuminated with 40 mm protection against lifting and tilting, incl. holder	<b>3SB3000-1HA20</b>
<b>Contact block with 2 contacts</b> 1 NO + 1 NC, 2-pin, screw terminal	<b>3SB3400-0A</b>
<b>Key set (10 sets)</b> For machine control panel	<b>6FC5148-0AA03-0AA0</b>
<b>Rapid traverse dial</b> (1 set = 20 units) for MCP 483C 16-position rotary switch	<b>6FC5248-0AF30-0AA0</b>
<b>Spindle/rapid traverse override rotary switch</b> 1 × 16G, T=24, cap, button, pointer, and rapid traverse and spindle dials	<b>6FC5247-0AF12-1AA0</b>
<b>Feed/rapid traverse override rotary switch</b> 1 × 23G, T=32, cap, button, pointer, and rapid traverse and feed dials	<b>6FC5247-0AF13-1AA0</b>
<b>Cable set (60 units)</b> For additional machine control panel command devices Length 500 mm	<b>6FC5247-0AA35-0AA0</b>
<b>Set of clamps (9 units)</b> For operator components with 2.5 mm profile Length 20 mm	<b>6FC5248-0AF14-0AA0</b>

Example:

16G: Latching at position 16  
T=24: 24 positions for 360°

### Overview



Mini handheld unit

The convenient, ergonomically designed mini handheld unit with rugged metal connector is suitable for setting up and operating standard machines in the Jobshop area.

### Benefits

- Mobile positioning of axes
- Since coarse, medium and fine infeed can easily be graduated, the operator control concept offers fast, increment-precise positioning
- Rugged and compact

### Design

- Emergency stop implemented in 2 channels with 4-wire connection
- The 2-channel, 3-step enabling button has a 3-wire connection.
- Rapid traverse key and two  $\pm$  keys
- A handwheel to traverse the axes in jog mode
- Facility to connect rotary switches for the selection of up to 5 axes
- Customer-specific applications can be implemented via 3 user-assignable function keys. If necessary, the customer can use slide-in labels to mark the keys specifically. Connection by means of a connection kit.
- Optional angle socket for a 90° rotated cable outlet direction (non-assembled use only in conjunction with the connection kit).
- Secured by means of integrated magnetic clamps or optional holder

### Integration

The mini handheld unit can be used for:

- SINUMERIK 802D sl
- SINUMERIK 828D BASIC T
- SINUMERIK 828D BASIC M
- SINUMERIK 828D
- SINUMERIK 840D sl

### Technical specifications

#### Mini handheld unit with coiled cable

6FX2007-1AD03

#### Mini handheld unit with straight cable

6FX2007-1AD13

<b>Input voltage</b> (emergency stop and enabling)	24 V DC
<b>Handwheel operating voltage</b>	5 V DC
<b>Handwheel</b>	100 S/R, RS422
<b>Degree of protection to DIN EN 60529 (IEC 60529)</b>	IP65
<b>Humidity class based on DIN EN 60721-3-3</b>	Class 3K5 condensation and icing excluded. Low air temperature 0 °C.
<b>Ambient temperature</b>	
• Storage/Transport	-20 ... +60 °C
• Operation	0 ... 55 °C
<b>Distance between handwheel and NCU</b> (when using the handwheel), max.	25 m
<b>Dimensions</b>	
• Length (incl. emergency stop button)	175 mm
• Width	85 mm
• Height	70 mm
<b>Weight, approx.</b> (without connecting cable)	0.5 kg
<b>Approvals, according to</b>	CE, UL

### Selection and ordering data

Description	Order No.
<b>Mini handheld unit</b> 3-step enabling button incl. magnetic clamps and connecting cable with metal connector	
• Coiled connecting cable, length 1.5 m, stretches to 3.5 m	<b>6FX2007-1AD03</b>
• Straight cable length 5 m	<b>6FX2007-1AD13</b>

#### Accessories

<b>Connection kit for mini handheld unit, assembled</b> Version with metal connector, for connection to machine control panel with PROFINET, with terminator for SINUMERIK 828D	<b>6FX2006-1BG20</b>
<b>Connection kit for mini handheld unit, non-assembled</b> Version with metal connector, for connection to machine control panel without Industrial Ethernet, with terminator	<b>6FX2006-1BG03</b>
<b>90° angle socket</b> For connection kit, non-assembled 6FX2006-1BG03 Metal version	<b>6FX2006-1BG56</b>
<b>Holder</b> For mini handheld units 6FX2007-1AD.3 and electronic handwheel in housing 6FC9320-5DE02	<b>6FX2006-1BG70</b>

# CNC controls

## Operator components

### Electronic handwheel

#### Overview



Electronic handwheel

This encoder generates signals which correspond to the movements of the handwheel as it is turned. The axis selected via the control can be positioned paraxially. The handwheels are equipped with a magnetic latching mechanism that supports traversing with incremental accuracy. The front panel can be removed.

The portable handheld handwheel is connected via a flange socket using the coiled connecting cable. The enclosure is fitted with a magnetic clamp. A holder is available to provide a place to store the handwheel on non-metallic surfaces.

#### Selection and ordering data

Description	Order No.
<b>Electronic handwheel</b>	
• With front panel 120 mm × 120 mm, with setting wheel 5 V DC, RS422	<b>6FC9320-5DB01</b>
• With front panel 76.2 mm × 76.2 mm, with setting wheel 5 V DC, RS422	<b>6FC9320-5DC01</b>
• With front panel, with small setting wheel 5 V DC, RS422	<b>6FC9320-5DM00</b>
• With front panel, without setting wheel, for installation 5 V DC, RS422	<b>6FC9320-5DF01</b>
• Portable in housing, with setting wheel, 5 V DC, RS422 coiled cable 2.5 m	<b>6FC9320-5DE02</b>
<b>Adapter set</b>	<b>6FC9320-5DN00</b>
For installation in front panel with 3-hole fixing	
<b>Flange socket</b>	<b>6FC9341-1AQ</b>
For portable handwheel	
<b>Holder</b>	<b>6FX2006-1BG70</b>
For mini handheld units 6FX2007-1AD.3 and electronic handwheel in housing 6FC9320-5DE02	

#### Technical specifications

	Electronic handwheel 6FC9320-5DB01	6FC9320-5DC01/ 6FC9320-5DF01/ 6FC9320-5DM00	6FC9320-5DE02
<b>Rated voltage</b>	5 V DC ± 5 %	5 V DC ± 5 %	5 V DC ± 5 %
<b>Rated current, max.</b>	60 mA	60 mA	60 mA
<b>Interface</b>	RS422 (TTL)	RS422 (TTL)	RS422 (TTL)
<b>Phase angle of pulse sequence A to B</b>	90° electrical	90° electrical	90° electrical
<b>Pulses</b>	2 × 100 S/R	2 × 100 S/R	2 × 100 S/R
<b>Actuating force</b>	8 Ncm	4 Ncm	4 Ncm
<b>Output frequency, max.</b>	2 kHz	2 kHz	2 kHz
<b>Distance to NCU</b>	25 m	25 m	20 m
<b>Degree of protection to DIN EN 60529 (IEC 60529)</b>			
• Front	IP65	IP65	IP65
• Rear	IP50	IP50	IP50
<b>Relative humidity</b>			
• Storage/Transport	10 ... 95 % at 25 °C	10 ... 95 % at 25 °C	10 ... 95 % at 25 °C
• Operation	5 ... 80 % at 25 °C	5 ... 80 % at 25 °C	5 ... 80 % at 25 °C
<b>Ambient temperature</b>			
• Storage/Transport	-40 ... +85 °C	-40 ... +85 °C	-40 ... +85 °C
• Operation	0 ... 70 °C	0 ... 70 °C	0 ... 70 °C
<b>Weight, approx.</b>	0.6 kg	0.4 kg	1.3 kg
<b>Approvals, according to</b>	cULus	cULus	cULus

### SINUMERIK PP 72/48D PN I/O module

#### Overview



SINUMERIK PP 72/48D PN I/O module

The PP 72/48D PN I/O module is available in a digital variant with 72 inputs and 48 outputs, and in a digital/analog variant PP 72/48D 2/2A PN with 2 additional analog inputs and 2 additional analog outputs.

The I/O modules are connected to the CNC via an I/O interface based on PROFINET. The digital inputs and outputs are connected by means of three 50-pole ribbon cables. Terminal strip converters can be used or the direct connection of Distribution Boards, for example, is possible.

#### Benefits

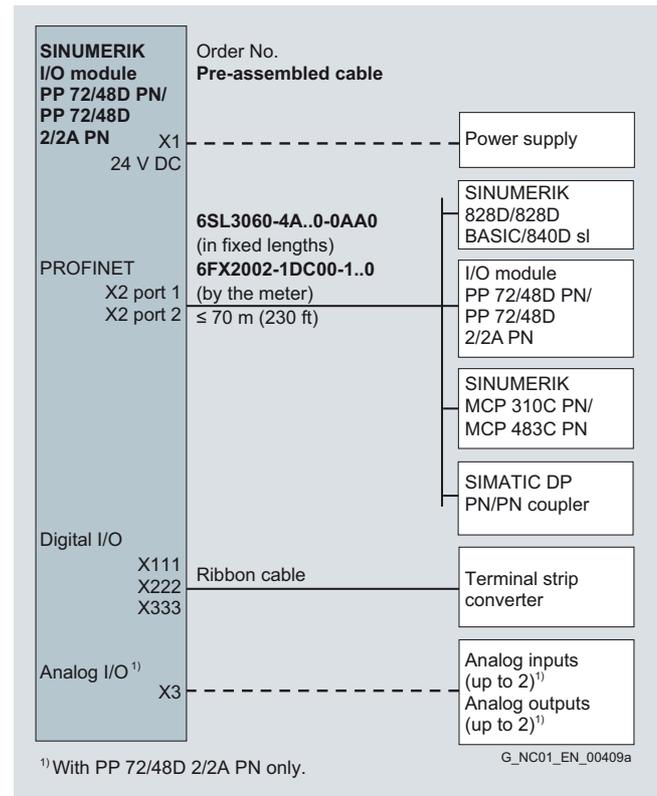
- Easy connection via I/O interface based on PROFINET
- Mounting plate for easy module installation in the control cabinet
- Automatic module detection by the CNC, no complex configuring required
- Easy connection of terminal strip converters to plug connectors
- Integrated 24 V DC power supply with electrical isolation between the inputs and outputs and PROFINET

#### Integration

The PP 72/48D PN and PP 72/48D 2/2A PN I/O modules can be used for the following CNCs:

- SINUMERIK 828D BASIC T
- SINUMERIK 828D BASIC M
- SINUMERIK 828D
- SINUMERIK 840D sl

#### Integration (continued)



Overview of connections for SINUMERIK PP 72/48D PN and PP 72/48D 2/2A PN I/O modules

#### Selection and ordering data

Description	Order No.
<b>SINUMERIK PP 72/48D PN I/O module</b> 72 digital inputs and 48 digital outputs	<b>6FC5311-0AA00-0AA0</b>
<b>SINUMERIK PP 72/48D 2/2A PN I/O module</b> 72 digital inputs and 48 digital outputs 2 analog inputs and 2 analog outputs	<b>6FC5311-0AA00-1AA0</b>

#### Accessories

<b>Terminal strip converter</b> 50-pin	<b>6EP5406-5AA00</b>
<b>Cable set</b> Ribbon cable, 50-pin, length 6 m 8 insulation displacement connectors, 50-pin	<b>6EP5306-5BG00</b>
<b>DRIVE-CLiQ signal cable, pre-assembled</b> For PROFINET connection Connection with degree of protection IP20	
• In exact meter lengths <sup>1)</sup>	<b>6FX2002-1DC00-1..0</b>
• In fixed lengths <sup>1)</sup>	<b>6SL3060-4A..0-0AA0</b>

<sup>1)</sup> More information about cables can be found under MOTION-CONNECT connection systems.

# CNC controls

## SINUMERIK I/O

### SINUMERIK PP 72/48D PN I/O module

#### Technical specifications

	<b>SINUMERIK PP 72/48D PN I/O module</b> 6FC5311-0AA00-0AA0	<b>SINUMERIK 72/48D 2/2A PN I/O module</b> 6FC5311-0AA00-1AA0
<b>Input voltage</b>	24 V DC + 20 %/- 15 %	24 V DC + 20 %/- 15 %
<b>Power consumption, max.</b>	17 W	19 W
<b>Digital inputs/outputs</b>	72/48	72/48
• Connection method	Connector acc. to MIL-C-83-503/DIN 41-651	Connector acc. to MIL-C-83-503/DIN 41-651
• Demand factor of outputs	100 % at $I_{out} = 250$ mA per output	100 % at $I_{out} = 250$ mA per output
<b>Analog inputs</b>	–	2
• Connection method	–	PHOENIX MINI COMBICON, spring cage connector, core cross-section $0.5 \text{ mm}^2$
• Type of analog inputs	–	$\pm 10$ V, 0 ... 10 V, $\pm 20$ mA, 4 ... 20 mA, PT100
• Resolution	–	16 bit incl. sign
<b>Analog outputs</b>	–	2
• Connection method	–	PHOENIX MINI COMBICON, spring cage connector, core cross-section $0.5 \text{ mm}^2$
• Type of analog outputs	–	$\pm 10$ V, $\pm 20$ mA (max. $600 \Omega$ )
• Resolution	–	16 bit incl. sign
<b>Degree of protection to DIN EN 60529 (IEC 60529)</b>	IP00	IP00
<b>Relative humidity</b>		
• Storage	5 ... 95 % at 25 °C	5 ... 95 % at 25 °C
• Transport	5 ... 95 % at 25 °C	5 ... 95 % at 25 °C
• Operation	10 ... 80 % at 25 °C	10 ... 80 % at 25 °C
<b>Ambient temperature</b>		
• Storage	-40 ... +70 °C	-40 ... +70 °C
• Transport	-40 ... +70 °C	-40 ... +70 °C
• Operation	0 ... 55 °C	0 ... 55 °C
<b>Dimensions</b>		
• Width	300 mm	300 mm
• Height	150 mm	150 mm
• Depth	35 mm	35 mm
<b>Weight, approx.</b>	0.9 kg	0.9 kg

#### Overview



SINAUT MD720-3 GSM/GPRS modem

The SINAUT MD720-3 GSM/GPRS modem transmits the text messages into the GSM network of the mobile radio operator. By inserting the appropriate SIM card into the SINAUT MD720-3 GSM/GPRS modem, it is possible to freely select the required mobile radio operator.

With Easy Message the SINUMERIK 828D BASIC T/ BASIC M CNCs provide a means of transmitting process data using text messages (SMS). This makes it possible to send messages to various mobile phones of the operating and maintenance personnel to notify them, for example, of the workpiece counter reading or the fact that a tool has reached its wear limit.

#### Benefits

- Rugged GSM modem for industrial use
- High-quality signal transmission thanks to powerful external antenna
- Simple mounting on standard mounting rails in the control cabinet or operator panel housing

#### Design

The SINAUT MD720-3 GSM/GPRS modem features the following interfaces as standard:

- 9-pin Sub-D socket for connection to the CNC (RS232C interface)
- 4-pin screw terminal for connection to a 24 V DC supply voltage
- SMA antenna connection socket for GSM/GPRS antenna
- Slot for inserting a GSM SIM card

The SINAUT MD720-3 has diagnostic LEDs for modem status, field strength and connection control.

Easy Message provides the following functions:

- Input of PIN number
- Configuration of user profiles
- Display of modem status and field strength
- Generation of outgoing text messages (SMS)
- Processing of incoming text messages (SMS)
- Visualization of transmission protocol

#### Integration

- SINUMERIK 828D BASIC T
- SINUMERIK 828D BASIC M
- SINUMERIK 828D
- Modem cable for RS232C interface
- SINAUT ANT 794-4MR antenna

#### Technical specifications

SINAUT MD720-3 GSM/GPRS modem 6NH9720-3AA00	
<b>Input voltage</b>	12 ... 30 V DC
<b>Power loss</b>	
• Typical	5 W
• Maximum	6.2 W
<b>Frequency range (Quad-Band)</b>	850/900/1800/1900 MHz
<b>Transmit output power</b>	
• At 850/900 MHz	2 W
• At 1800/1900 MHz	1 W
<b>Interfaces</b>	
• RS232C	9-pin SUB-D socket
• Antenna	SMA antenna socket (50 Ω)
<b>Degree of protection to DIN EN 60529 (IEC 60529)</b>	IP40
<b>Relative humidity, max.</b>	95 % at 25 °C
<b>Ambient temperature</b>	
• Storage	-25 ... +85 °C
• Transport	-25 ... +85 °C
• Operation	-20 ... +60 °C
<b>Dimensions</b>	
• Width	22.5 mm
• Height	99 mm
• Depth	114 mm
<b>Weight, approx.</b>	150 g
<b>Approvals, according to</b>	Current approvals can be found on the Internet at <a href="http://www.siemens.com/simatic-net/ik-info">www.siemens.com/simatic-net/ik-info</a>

#### Selection and ordering data

Description	Order No.
<b>SINAUT MD720-3 GSM/GPRS modem</b>	<b>6NH9720-3AA00</b>
<b>SINAUT ANT 794-4MR antenna</b>	<b>6NH9860-1AA00</b>
<b>Modem cable</b> For RS232C interface Length 2.5 m	<b>6NH7701-5AN</b>

#### More information

You can find additional information on the Internet at:

[www.siemens.com/industrymall](http://www.siemens.com/industrymall)

# CNC controls

## Supplementary components

### SITOP power supply

#### Overview

##### Stabilized power supply units



SITOP power supply

The 24 V power supply units from the SITOP range are optimized for industrial use and operate on the switched-mode principle. Due to the precisely regulated output voltage, the devices are even suitable for the connection of sensitive sensors. Different versions are available depending on the output current and field of application.

##### SITOP lite/smart

SITOP lite/smart requires little space on the mounting rail and offers high performance. With its tolerant overload response, even loads with a high inrush current can be smoothly switched on. If required, SITOP smart makes available 50 % extra power for 5 seconds.

#### Benefits

- High efficiency
- Low space requirements and easy installation
- Exact output voltage and low residual ripple
- Integrated short-circuit protection and safe electrical separation
- National and international approvals
- No release of silicone

#### Selection and ordering data

Description	Order No.
<b>Stabilized power supply</b> <b>SITOP lite 10 A</b> <b>24 V DC, 1-phase</b> Input voltage: 20 V/230 V AC (93 ... 132 V/187 ... 264 V AC) Output voltage: 4 V DC $\pm$ 3 % Approvals: cULus	<b>6EP1334-1LB00</b>
<b>Stabilized power supply</b> <b>SITOP smart 10 A</b> <b>24 V DC, 1-phase</b> Input voltage: 20 V/230 V AC (85 ... 132 V/170 ... 264 V AC) Output voltage: 4 V DC $\pm$ 3 % Approvals: cULus, CSA	<b>6EP1334-2BA01</b>
<b>Stabilized power supply</b> <b>PSU100S 20 A</b> <b>24 V DC, 1-phase</b> Input voltage: 20 V/230 V AC (85 ... 132 V/176 ... 264 V AC) Output voltage: 4 V DC $\pm$ 3 % Approvals: cULus	<b>6EP1336-2BA10</b>
<b>Stabilized power supply</b> <b>PSU300S</b> <b>24 V DC, 3-phase</b> Input voltage: 400 ... 500 V 3 AC (340 ... 550 V 3 AC) Output voltage: 4 V DC $\pm$ 3 % Approvals: cULus	
<ul style="list-style-type: none"> <li>• 10 A</li> <li>• 20 A</li> </ul>	<b>6EP1434-2BA10</b>  <b>6EP1436-2BA10</b>

#### More information

You can find additional information in Catalog KT 10.1 or on the Internet at:

[www.siemens.com/sitop](http://www.siemens.com/sitop)

[www.siemens.com/industrymall](http://www.siemens.com/industrymall)

### Overview



The 7KM PAC measuring devices ensure precise, reproducible and reliable measurement of energy values for infeed, outgoing feeders or individual loads. They not only supply comprehensive information about your electrical installation and power distribution system, but also provide important measured values to help you assess the status of your system and the power quality. For further processing of the measurement data, the devices are equipped with a wide range of communication options for easy integration into higher-level automation and power management systems.

They can be used for both single-phase and multi-phase measurements in 3- and 4-conductor power supply systems (TN, TT, IT).

### Benefits

- Simple mounting and commissioning
- High IP65 degree of protection (front side, when installed) permits usage in extremely dusty and wet environments
- Intuitive operation using 4 function buttons and multilingual plain text displays
- Easy to adapt to different systems using integrated and optional
  - Digital inputs and outputs
  - Communication interfaces
- Global application
  - At least 8 languages
  - International approvals
  - Developed and tested in accordance with European and international standards
- Low mounting depth

### More information

More information is available in the Siemens Industry Mall or on the Internet at:

[www.siemens.com/industrymall](http://www.siemens.com/industrymall)

[www.siemens.com/powermanagementsystem](http://www.siemens.com/powermanagementsystem)

### Technical specifications

	SENTRON PAC3200 7KM2112-0BA00-3AA0	SENTRON PAC4200 7KM4212-0BA00-3AA0
<b>Suitable for TN, TT, IT systems</b>	✓	✓
<b>Continuous signal acquisition</b>	✓	✓
<b>Measuring supply voltages</b>		
<b>Measuring inputs for voltage</b> 3 AC; UL-L/UL-N; CAT III	max. 690 V/400 V	
• Wide-range power supply	95 to 240 V AC 50/60 Hz ±10 % 110 to 340 V DC ±10 %	
<b>Measuring inputs for voltage</b> 3 AC; UL-L/UL-N; CAT III	max. 500 V/289 V	–
• Low-voltage power supply	22 to 65 V DC; ±10 %	–
<b>Measurement at voltage transformers</b> for voltages of > 500 V or 690 V	✓	✓
<b>Measuring inputs for current</b> 3 AC; CAT III	x/1 A or x/5 A	
<b>Current direction</b> programmable	✓	✓ per phase
<b>Measurement using current transformers</b>	✓	✓
<b>Mechanical system</b>		
<b>Dimensions (W × H × D)</b>	96 × 96 × 56 mm	96 × 96 × 82 mm
<b>Overall depth</b>		
• Without module	51 mm	77 mm
• With module	73 mm	99 mm
<b>Safety class</b>	II	II
<b>Degree of protection</b> at front	IP65	IP65
<b>Slots for expansion modules</b>	1	2
<b>Operating temperature</b>	–10 ... +55 °C	–10 ... +55 °C
<b>Relative humidity in operation</b> at 25 °C without condensation	95 %	95 %
<b>Degree of pollution</b>	2	2
<b>Approvals</b>		
<b>CE (Europe)</b>	✓	✓
<b>cULus (USA/Canada)</b>	✓	✓
<b>C-Tick (Australia)</b>	✓	–
<b>GOST (Russia)</b>	✓	✓

### Selection and ordering data

Description	Order No.
<b>Power monitoring device</b> <b>SENTRON PAC3200</b> <b>U<sub>c</sub></b> 95 to 240 V AC 50/60 Hz ±10 % 110 to 340 V DC ±10 % with AC/DC wide-range power supply and screw terminals	<b>7KM2112-0BA00-3AA0</b>
<b>Power monitoring device</b> <b>SENTRON PAC4200</b> <b>U<sub>c</sub></b> 95 to 240 V AC ±10 % 110 to 340 V DC ±10 % with AC/DC wide-range power supply and screw terminals	<b>7KM4212-0BA00-3AA0</b>

# CNC controls

Notes

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## Services and training



<b>3/2</b>	<b>Services</b>
3/2	Material warranty and on-site service
<b>3/3</b>	<b>Documentation</b>
3/3	Specific documentation for SINUMERIK 828D/SINAMICS S120
3/4	General documentation for SINUMERIK 828D
<b>3/5</b>	<b>Training</b>
3/5	SITRAIN
3/6	SinuTrain for SINUMERIK Operate
3/8	SINUMERIK 828D BASIC T/BASIC M training cases
3/8	SINAMICS S120 Combi training rack
3/9	SINUMERIK 828D training case
<b>3/10</b>	<b>Engineering software</b>
3/10	SIZER for Siemens Drives engineering tool
<b>3/11</b>	<b>Dimension drawing and 2D/3D CAD generator</b>
3/11	CAD CREATOR

# Services and training

## Services

### Material warranty and on-site service

#### Overview



Equipment package SINUMERIK 828D, SIMOTICS M-1PH8 and SIMOTICS S-1FK7 motors

#### Material warranty and on-site service

For the SINUMERIK 828D and the associated components<sup>1)</sup> by Siemens Industry Sector IA & DT, you will receive a material warranty and free on-site service of 24 months<sup>2)</sup> after end user notification.

#### Benefits

You benefit because the warranty period does not commence until the machine has received the final acceptance from your customer. So none of the warranty period expires while your machine is being shipped or stored.

If required, the warranty and on-site service can be extended by 6 or 12 months.

#### Selection and ordering data

Description	Order No.
<b>Warranty and on-site service extension by 6 or 12 months</b>	<b>6FC8506-0RX0 - AA2</b>
For SINUMERIK 828D and the associated components by Siemens I IA&DT on machine tools for countries in country groups 1 to 3 (country list)	
• Number of measuring circuits <sup>3)</sup>	
- 0 to 4	1
- 5	2
• Contract extension by 6 months	6
• Contract extension by 12 months	1

#### More information

Further information about the country list, the conditions and the scope of the repair service contract can be found at:

[www.siemens.com/automation/rsc](http://www.siemens.com/automation/rsc)

The end user registration has to be made online via identSNAPSHOT.

[www.siemens.com/identsnapshot/register](http://www.siemens.com/identsnapshot/register)

<sup>1)</sup> Not applicable to complete motor spindles.

<sup>2)</sup> A maximum of 36 months from delivery ex works.

<sup>3)</sup> Physical axes and spindles count as measuring circuits.

### Overview

Comprehensive documentation is available for the SINUMERIK 828D BASIC T/BASIC M controls and the SINAMICS S120 Combi drive system, ranging from Operating Manual, Programming Manual up to the Commissioning Manual.

Information is available in the following formats:

- Paper version, printed copy
- PDF file available for download on the Internet at:

[www.siemens.com/automation/support](http://www.siemens.com/automation/support)

More information is available on the Internet at:

[www.siemens.com/motioncontrol/docu](http://www.siemens.com/motioncontrol/docu)

Please send any queries or suggestions to:

[docu.motioncontrol@siemens.com](mailto:docu.motioncontrol@siemens.com)

### Selection and ordering data

Description	Order No.
<i>Specific documentation for SINUMERIK 828D</i>	
<b>PPU Manual SINUMERIK 828D</b>	
• German	<b>6FC5397-2DP10-1AA0</b>
• English	<b>6FC5397-2DP10-1BA0</b>
• Korean	<b>6FC5397-2DP10-1LA0</b>
• Chinese Traditional	<b>6FC5397-2DP10-1MA0</b>
• Chinese Simplified	<b>6FC5397-2DP10-1RA0</b>
<b>Commissioning Manual SINUMERIK 828D Turning and Milling</b>	
• German	<b>6FC5397-3DP40-2AA0</b>
• English	<b>6FC5397-3DP40-2BA0</b>
• Korean	<b>6FC5397-3DP40-2LA0</b>
• Chinese Traditional	<b>6FC5397-3DP40-2MA0</b>
• Chinese Simplified	<b>6FC5397-3DP40-2RA0</b>
<b>Service Manual SINUMERIK 828D</b>	
• German	<b>6FC5397-5DP40-0AA0</b>
• English	<b>6FC5397-5DP40-0BA0</b>
• Italian	<b>6FC5397-5DP40-0CA0</b>
• French	<b>6FC5397-5DP40-0DA0</b>
• Spanish	<b>6FC5397-5DP40-0EA0</b>
• Portuguese	<b>6FC5397-5DP40-0KA0</b>
• Korean	<b>6FC5397-5DP40-0LA0</b>
• Chinese Traditional	<b>6FC5397-5DP40-0MA0</b>
• Chinese Simplified	<b>6FC5397-5DP40-0RA0</b>
<b>Parameter Manual SINUMERIK 828D</b>	
• German	<b>6FC5397-8DP40-2AA0</b>
• English	<b>6FC5397-8DP40-2BA0</b>
• Chinese Simplified	<b>6FC5397-8DP40-2RA0</b>

### Selection and ordering data (continued)

Description	Order No.
<i>Specific documentation for SINUMERIK 828D/SINAMICS S120</i>	
<b>Diagnostics Manual SINUMERIK 828D/SINAMICS S120</b>	
• German	<b>6FC5398-8BP40-2AA0</b>
• English	<b>6FC5398-8BP40-2BA0</b>
• Italian	<b>6FC5398-8BP40-2CA0</b>
• French	<b>6FC5398-8BP40-2DA0</b>
• Spanish	<b>6FC5398-8BP40-2EA0</b>
• Portuguese	<b>6FC5398-8BP40-2KA0</b>
• Chinese Simplified	<b>6FC5398-8BP40-2RA0</b>
<b>Parameter Manual Machine Data and Interface Signals SINUMERIK 828D/SINAMICS S120</b>	
• German	<b>6FC5397-4DP40-2AA0</b>
• English	<b>6FC5397-4DP40-2BA0</b>
<i>Specific documentation for SINAMICS S120 Combi</i>	
<b>Manual SINAMICS S120 Combi</b>	
• German	<b>6SL3097-4AV00-0AP1</b>
• English	<b>6SL3097-4AV00-0BP1</b>
• Chinese Simplified	<b>6SL3097-4AV00-0RP1</b>

# Services and training

## Documentation

### General documentation for SINUMERIK 828D

#### Selection and ordering data (continued)

Description	Order No.
<i>General documentation for SINUMERIK 828D</i>	
<b>Operating Manual SINUMERIK 840D sI/828D Turning</b>	
• German	6FC5398-8CP40-2AA0
• English	6FC5398-8CP40-2BA0
• Italian	6FC5398-8CP40-2CA0
• French	6FC5398-8CP40-2DA0
• Spanish	6FC5398-8CP40-2EA0
• Portuguese	6FC5398-8CP40-2KA0
• Korean	6FC5398-8CP40-2LA0
• Chinese Traditional	6FC5398-8CP40-2MA0
• Chinese Simplified	6FC5398-8CP40-2RA0
<b>Operating Manual SINUMERIK 840D sI/828D Milling</b>	
• German	6FC5398-7CP40-2AA0
• English	6FC5398-7CP40-2BA0
• Italian	6FC5398-7CP40-2CA0
• French	6FC5398-7CP40-2DA0
• Spanish	6FC5398-7CP40-2EA0
• Portuguese	6FC5398-7CP40-2KA0
• Korean	6FC5398-7CP40-2LA0
• Chinese Traditional	6FC5398-7CP40-2MA0
• Chinese Simplified	6FC5398-7CP40-2RA0
<b>Programming Manual Fundamentals SINUMERIK 840D sI/828D</b>	
• German	6FC5398-1BP40-2AA0
• English	6FC5398-1BP40-2BA0
• Italian	6FC5398-1BP40-2CA0
• French	6FC5398-1BP40-2DA0
• Spanish	6FC5398-1BP40-2EA0
• Portuguese	6FC5398-1BP40-2KA0
• Korean	6FC5398-1BP40-2LA0
• Chinese Traditional	6FC5398-1BP40-2MA0
• Chinese Simplified	6FC5398-1BP40-2RA0
<b>Programming Manual Job Planning SINUMERIK 840D sI/828D</b>	
• German	6FC5398-2BP40-2AA0
• English	6FC5398-2BP40-2BA0
• Italian	6FC5398-2BP40-2CA0
• French	6FC5398-2BP40-2DA0
• Spanish	6FC5398-2BP40-2EA0
• Portuguese	6FC5398-2BP40-2KA0
• Korean	6FC5398-2BP40-2LA0
• Chinese Traditional	6FC5398-2BP40-2MA0
• Chinese Simplified	6FC5398-2BP40-2RA0

Description	Order No.
<i>General documentation for SINUMERIK 828D (continued)</i>	
<b>Programming Manual ISO Turning SINUMERIK 840D sI/840Di sI/ 828D/802D sI</b>	
• German	6FC5398-5BP10-1AA0
• English	6FC5398-5BP10-1BA0
• Italian	6FC5398-5BP10-1CA0
• French	6FC5398-5BP10-1DA0
• Spanish	6FC5398-5BP10-1EA0
• Portuguese	6FC5398-5BP10-1KA0
• Korean	6FC5398-5BP10-1LA0
• Chinese Traditional	6FC5398-5BP10-1MA0
• Chinese Simplified	6FC5398-5BP10-1RA0
<b>Programming Manual ISO Milling SINUMERIK 840D sI/840Di sI/ 828D/802D sI</b>	
• German	6FC5398-7BP10-1AA0
• English	6FC5398-7BP10-1BA0
• Italian	6FC5398-7BP10-1CA0
• French	6FC5398-7BP10-1DA0
• Spanish	6FC5398-7BP10-1EA0
• Portuguese	6FC5398-7BP10-1KA0
• Korean	6FC5398-7BP10-1LA0
• Chinese Traditional	6FC5398-7BP10-1MA0
• Chinese Simplified	6FC5398-7BP10-1RA0
<b>Programming Manual Measuring cycles SINUMERIK 840D sI</b>	
• German	6FC5398-4BP40-2AA0
• English	6FC5398-4BP40-2BA0
• Italian	6FC5398-4BP40-2CA0
• French	6FC5398-4BP40-2DA0
• Spanish	6FC5398-4BP40-2EA0
• Korean	6FC5398-4BP40-2LA0
• Chinese Traditional	6FC5398-4BP40-2MA0
• Chinese Simplified	6FC5398-4BP40-2RA0
<b>Function Manual Basic Functions</b>	
• German	6FC5397-0BP40-2AA0
• English	6FC5397-0BP40-2BA0
<b>Function Manual Extended Functions</b>	
• German	6FC5397-1BP40-2AA0
• English	6FC5397-1BP40-2BA0
<b>Function Manual ISO Dialects</b>	
• German	6FC5397-7BP10-1AA0
• English	6FC5397-7BP10-1BA0
<b>SIMATIC NET GPRS/GSM Modem SINAUT MD720-3 System Manual</b>	On product CD in scope of supply of modem
• English/German	
<b>SIMATIC NET Quad-Band GSM- Antenna/SINAUT 794-4MR Operating Instructions</b>	On product CD in scope of supply of modem
• English/German	

### Faster and more applicable know-how: Hands-on training from the manufacturer

SITRAIN – Training for Industry – provides you with comprehensive support in solving your tasks.

Training by the market leader in the industry enables you to make independent decisions with confidence. Especially where the optimum and efficient use of products and plants are concerned. You can eliminate deficiencies in existing plants, and exclude expensive faulty planning right from the beginning.



First-class know-how directly pays for itself: In shorter startup times, high-quality end products, faster troubleshooting and reduced downtimes. In other words, increased profits and lower costs.

#### Achieve more with SITRAIN

- Shorter times for startup, maintenance and servicing
- Optimized production operations
- Reliable configuration and startup
- Minimization of plant downtimes
- Flexible plant adaptation to market requirements
- Compliance with quality standards in production
- Increased employee satisfaction and motivation
- Shorter familiarization times following changes in technology and staff

#### Contact

Visit our site on the Internet at:

[www.siemens.com/sitrain](http://www.siemens.com/sitrain)

or let us advise you personally.

#### SITRAIN Customer Support Germany:

Phone: +49 (911) 895-7575

Fax: +49 (911) 895-7576

E-mail: [info@sitrain.com](mailto:info@sitrain.com)

### SITRAIN highlights

#### Top trainers

Our trainers are skilled teachers with direct practical experience. Course developers have close contact with product development, and directly pass on their knowledge to the trainers.

#### Practical experience

The practical experience of our trainers enables them to teach theory effectively. But since theory can be pretty drab, we attach great importance to practical exercises which can comprise up to half of the course time. You can therefore immediately implement your new knowledge in practice. We train you on state-of-the-art methodically/didactically designed training equipment. This training approach will give you all the confidence you need.

#### Wide variety

With a total of about 300 local attendance courses, we train the complete range of Siemens Industry products as well as interaction of the products in systems.

#### Tailor-made training

We are only a short distance away. You can find us at more than 50 locations in Germany, and in 62 countries worldwide. You wish to have individual training instead of one of our 300 courses? Our solution: We will provide a program tailored exactly to your personal requirements. Training can be carried out in our Training Centers or at your company.

#### The right mixture: Blended learning

"Blended learning" is a combination of various training media and sequences. For example, a local attendance course in a Training Center can be optimally supplemented by a teach-yourself program as preparation or follow-up. Additional effect: Reduced traveling costs and periods of absence.



# Services and training

## Training

### SinuTrain for SINUMERIK Operate

#### Overview



SinuTrain for SINUMERIK Operate is a PC-based CNC training/ CNC programming software package. SinuTrain for SINUMERIK Operate enables completely identical operator control and CNC programming as on SINUMERIK CNC systems that are equipped with graphical user interface SINUMERIK Operate.

SinuTrain for SINUMERIK Operate taps into the following applications:

- Self-study or professional training of SINUMERIK operation and CNC programming
- Offline CNC program creation and simulation
- Professional presentation of SINUMERIK operation and CNC programming

To allow you to experience the advantages of using SinuTrain for SINUMERIK Operate, we can provide a trial version for 60 days. The trial version can be ordered on DVD-ROM for a nominal charge, or downloaded free of charge from the Internet.

#### Benefits

- User-friendly, accurate simulation of operation and CNC programming of SINUMERIK controls on the PC
- Maximum compatibility thanks to integrated original SINUMERIK CNC software
- Accurate simulation of machine operation with inexpensive virtual machine control panel
- State-of-the-art fully graphical CNC user interface with moving picture sequences for clarification of technological sequences (Animated Elements)
- Optimum training software with a wide CNC programming spectrum – from ISO and CNC high-level language to fully graphical machining step programming
- High process safety through realistic graphical CNC simulation – including multi-channel machining operations

#### Function

##### Technologies

SinuTrain for SINUMERIK Operate can be used for the following machining technologies:

- Milling (SinuTrain ShopMill and SinuTrain complete package)
- Turning (SinuTrain ShopTurn and SinuTrain complete package)
- Other technologies<sup>1)</sup> and multi-channel capability (SinuTrain complete package)

##### Adaptation to the machine

CNC programs created with SinuTrain for SINUMERIK Operate can be used on real machines. However, in this case, SinuTrain must be adapted to the actual SINUMERIK configuration of the machine. This adaptation can be made either by the user with the configuration tool or by a Siemens service specialist.

To allow operation of a larger array of machinery, several different configurations can be stored in SinuTrain for SINUMERIK Operate. In order to ensure maximum compatibility with different SINUMERIK software versions on the machine, multiple copies of SinuTrain for SINUMERIK Operate can be installed in the relevant software versions on one PC.

##### Accurate simulation of real operator control on the machine

With its fully-fledged, virtual machine control panel, SinuTrain for SINUMERIK Operate offers functions such as CNC Start, CNC Stop or feedrate and spindle override and can therefore be operated just like a real machine.

##### Online help

Like a SINUMERIK CNC, SinuTrain for SINUMERIK Operate also offers a comprehensive online help. In addition, the SinuTrain DVD-ROM includes training manuals for the self-study of SINUMERIK operating and programming procedures.

##### Programming, simulation and printing

- DIN/ISO programming with programGUIDE
- ShopMill/ShopTurn machining step programming
- Multi-channel programming with programSYNC (SinuTrain complete package only)
- Fully-fledged graphical CNC simulation
- TCP/IP Ethernet networking with machines
- Print function for DIN/ISO and ShopMill/ShopTurn machining step programs
- Integrated CAD reader for importing DXF files

<sup>1)</sup> For other technologies, consultation with the relevant machine manufacturer is recommended to ensure that the software can be optimally adapted to the CNC of the machine.

#### Integration

SinuTrain for SINUMERIK Operate can be used for:

- SINUMERIK 828D/828D BASIC (software version 2.7 SP1/4.4 SP1 and higher)
- SINUMERIK 840D sl software version 2.7 SP1/4.4 SP1 and higher

#### Requirements:

##### Hardware

- PC with 1.5 GHz processor (SingleCore)
- RAM: 1 GB
- Hard disk: 3 GB free memory space
- DVD drive for installation from DVD
- Graphics card: minimum resolution 640 × 480 pixels
- USB interface
- Mouse, keyboard

##### Software

- Operating system Windows XP SP3 32 bit Professional/Home Edition
- Operating system Windows 7 32/64 bit
- Adobe Acrobat Reader

#### Selection and ordering data

Description	Order No.
<b>SinuTrain for SINUMERIK Operate</b> For SINUMERIK 828D/828D BASIC/840D sl On DVD-ROM Languages: Chinese Simplified, English, French, German, Italian, Spanish up to software version 4.4 SP2	
• SinuTrain complete package Single-user license	<b>6FC5870-4YC40-1YA0</b>
• SinuTrain complete package Classroom license	<b>6FC5870-8YC40-1YA0</b>
• SinuTrain SW upgrade <sup>2)</sup> Single-user license	<b>6FC5870-4YC40-1YC0</b>
• SinuTrain SW upgrade <sup>2)</sup> Classroom license	<b>6FC5870-8YC40-1YC0</b>
• SinuTrain trial version for 60 days	<b>6FC5870-0YC40-1YC0</b>
<b>SinuTrain BASIC</b> Includes two machine templates (SinuTrain ShopMill and SinuTrain ShopTurn). The functions printing, machine import/export, and machine adaptation are disabled. On DVD-ROM Languages: Chinese Simplified, English, French, German, Italian, Spanish up to software version 4.4 SP2	
• Single-user license	<b>6FC5870-1BC40-1YA0</b>
<b>SinuTrain ShopTurn</b> On DVD-ROM Languages: Chinese Simplified, English, French, German, Italian, Spanish up to software version 4.4 SP2	
• Single-user license	<b>6FC5870-2YC40-1YA0</b>
• Classroom license	<b>6FC5870-6YC40-1YA0</b>
<b>SinuTrain ShopMill</b> On DVD-ROM Languages: Chinese Simplified, English, French, German, Italian, Spanish up to software version 4.4 SP2	
• Single-user license	<b>6FC5870-3YC40-1YA0</b>
• Classroom license	<b>6FC5870-7YC40-1YA0</b>
<b>Machine adaptation for SinuTrain</b> Machine adaptation service provided by Siemens <sup>1)</sup>	<b>6FC5088-4AA22-4AB0</b>

#### More information

The first steps in working with SINUMERIK Operate can be learned quickly and easily through a web-based training program.

You can download a free trial version of SinuTrain for SINUMERIK Operate from the Internet.

More information is available on the Internet at:

[www.cnc4you.siemens.com](http://www.cnc4you.siemens.com)

<sup>1)</sup> You have to provide an e-mail with a complete serial startup file and you get a file back via e-mail to be imported in SinuTrain. Not applicable for SinuTrain BASIC. For details please contact your Siemens sales representative.

<sup>2)</sup> Only available for complete package. A valid license key for SinuTrain versions 6.3, 7.3 or 7.5. is required for the upgrade license.

# Services and training

## Training

### Training cases SINUMERIK 828D BASIC T/BASIC M

#### Overview



SINUMERIK 828D BASIC T training case

The training cases for SINUMERIK 828D BASIC T and SINUMERIK 828D BASIC M are used to provide practical training in operation, programming, commissioning and servicing.

#### Design

The SINUMERIK 828D BASIC training cases include:

- SINUMERIK 828D BASIC T PPU 241.2 or SINUMERIK 828D BASIC M PPU 241.2 including system software and software options
- SINUMERIK MCP 483 PN machine control panel
- SINUMERIK PP 72/48D 2/2A PN I/O module
- SINAUT MD720-3 GSM/GPRS modem including antenna
- Industrial Ethernet Switch SCALANCE XB005 unmanaged

The SINUMERIK 828D BASIC T/BASIC M training cases are designed for table set-up and can be operated independently without a SINAMICS S120 Combi training rack.

The SINUMERIK 828D BASIC training cases are supplied in a Peli protector case with rigid foam inlay. The extendable handle and the wheels integrated in the bottom make the case easy to transport.

#### Technical specifications

SINUMERIK 828D BASIC T/BASIC M training cases 6AG1067-1AA24-0AA0/6AG1067-1AA20-0AA0	
Supply voltage	230 V AC
Degree of protection to DIN VDE 0470 Part 1/EN 60529 (IEC 60529)	IP00
Ambient temperature	
• Storage	-20 ... +60 °C
• Transport	-20 ... +60 °C
• Operation	5 ... 40 °C
Dimensions (W × H × D)	650 × 500 × 250 mm
Weight, approx.	30 kg

#### Selection and ordering data

Description	Order No.
SINUMERIK 828D BASIC T training case	6AG1067-1AA24-0AA0
SINUMERIK 828D BASIC M training case	6AG1067-1AA20-0AA0

### SINAMICS S120 Combi training rack

#### Overview



SINAMICS S120 Combi training rack

The SINAMICS S120 Combi training rack is used in conjunction with the training cases SINUMERIK 828D BASIC T or SINUMERIK 828D BASIC M to provide practical training in operation, programming and commissioning.

#### Design

The SINAMICS S120 Combi training rack includes:

- SINAMICS S120 Combi Power Module 16 kW, 18 A/9 A/5 A/5 A
- SINAMICS S120 Motor Module 9 A in booksize compact format
- Line filter and line reactor
- 1PH8 spindle motor with 2.8 kW
- 4 feed motors 1FK7 with 0.85 Nm

The SINAMICS S120 Combi training rack is designed as a standing device on rollers and can be operated only in conjunction with the SINUMERIK 828D BASIC T or SINUMERIK 828D BASIC M training cases.

#### Technical specifications

SINAMICS S120 Combi training rack 6AG1067-1AA21-0AA0	
Supply voltage	3 AC 380 ... 480 V
Degree of protection to DIN VDE 0470 Part 1/EN 60529 (IEC 60529)	IP00
Ambient temperature	
• Storage	-20 ... +60 °C
• Transport	-20 ... +60 °C
• Operation	5 ... 40 °C
Dimensions (W × H × D)	615 × 1150 × 615 mm
Weight, approx.	120 kg

#### Selection and ordering data

Description	Order No.
SINAMICS S120 Combi training rack	6AG1067-1AA21-0AA0

### SINUMERIK 828D training case

#### Overview



SINUMERIK 828D training case

The training case for SINUMERIK 828D is used to provide practical training in operation, programming, commissioning and servicing.

#### Design

The SINUMERIK 828D training case includes:

- SINUMERIK 828D BASIC PPU 281.2 including system software and software options
- SINUMERIK MCP 483 PN machine control panel
- SINUMERIK PP 72/48D PN I/O module
- SINAUT MD720-3 GSM/GPRS modem including antenna
- Industrial Ethernet Switch SCALANCE XB005 unmanaged

The SINUMERIK 828D training case is designed for table set-up and can be operated independently without a SINAMICS S120 Combi training rack.

The SINUMERIK 828D training case is supplied in a Peli protector case with rigid foam inlay. The extendable handle and the wheels integrated in the bottom make the case easy to transport.

#### Technical specifications

##### SINUMERIK 828D training case

6AG1067-1AA13-0AA0

**Supply voltage** 230 V AC

**Degree of protection to DIN VDE 0470 Part 1/ EN 60529 (IEC 60529)** IP00

##### Ambient temperature

- Storage -20 ... +60 °C
- Transport -20 ... +60 °C
- Operation 5 ... 40 °C

##### Dimensions

- Width 650 mm
- Height 500 mm
- Depth 250 mm

**Weight, approx.** 30 kg

#### Selection and ordering data

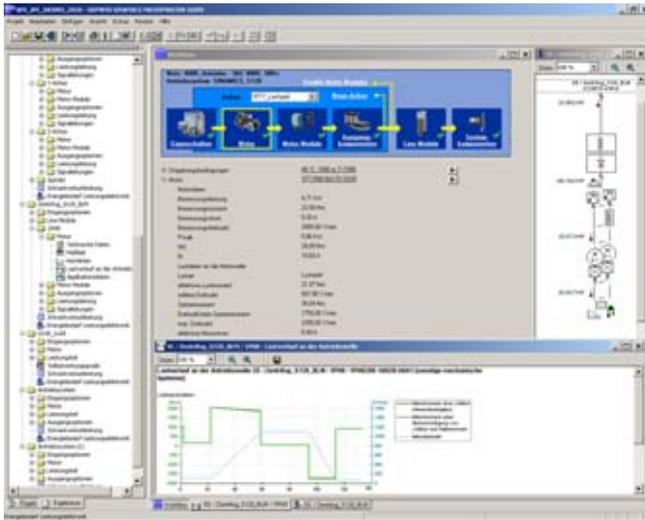
Description	Order No.
<b>SINUMERIK 828D training case</b>	<b>6AG1067-1AA13-0AA0</b>

# Services and training

## Engineering software

### SIZER for Siemens Drives engineering tool

#### Overview



The following drives and controls can be engineered in a user-friendly way using the SIZER for Siemens Drives engineering tool:

- SINAMICS Low Voltage, MICROMASTER 4 and DYNAMVERT T drive systems
- Motor starters
- SINUMERIK CNC control
- SIMOTION Motion Control System
- SIMATIC Technology

It provides support when selecting the technologies involved in the hardware and firmware components required for a drive task. SIZER for Siemens Drives supports the complete configuration of the drive system, from basic single drives to demanding multi-axis applications.

SIZER for Siemens Drives supports all of the configuring steps in a workflow:

- Configuring the power supply
- Designing the motor and gearbox, including calculation of mechanical transmission elements
- Configuring the drive components
- Compiling the required accessories
- Selecting the line-side and motor-side power options, e.g. cables, filters, and reactors

When SIZER for Siemens Drives was being designed, particular importance was placed on a high degree of usability and a universal, function-based approach to the drive application. The extensive user guidance makes using the tool easy. Status information keeps you continually informed about the progress of the configuration process.

The SIZER for Siemens Drives user interface is available in English, French, German, and Italian.

#### Overview (continued)

The drive configuration is saved in a project. In the project, the components and functions used are displayed in a hierarchical tree structure.

The project view permits the configuration of drive systems and the copying/inserting/modifying of drives already configured.

The configuration process produces the following results:

- A parts list of the required components (export to Excel, use of the Excel data sheet for import to SAP)
- Technical specifications of the system
- Characteristic curves
- Comments on system reactions
- Mounting arrangement of drive and control components and dimension drawings of motors
- Energy requirements of the configured application

These results are displayed in a results tree and can be reused for documentation purposes.

Technological online help is available:

- Detailed technical specifications
- Information about the drive systems and their components
- Decision-making criteria for the selection of components
- Online help in English, French, German, Italian, Chinese and Japanese

#### System requirements

- PG or PC with Pentium III min. 800 MHz (> 1 GHz recommended)
- 512 MB RAM (1 GB RAM recommended)
- At least 4.1 GB of free hard disk space
- An additional 100 MB of free hard disk space on Windows system drive
- Screen resolution 1024 × 768 pixels (1280 × 1024 pixels recommended)
- Operating system:
  - Windows XP Home Edition SP2
  - Windows XP Professional 32 bit SP2
  - Windows XP Professional 64 bit SP2
  - Windows Vista Business
  - Windows 7 Ultimate 32 bit
  - Windows 7 Professional 32 bit
- Microsoft Internet Explorer V5.5 SP2

#### Selection and ordering data

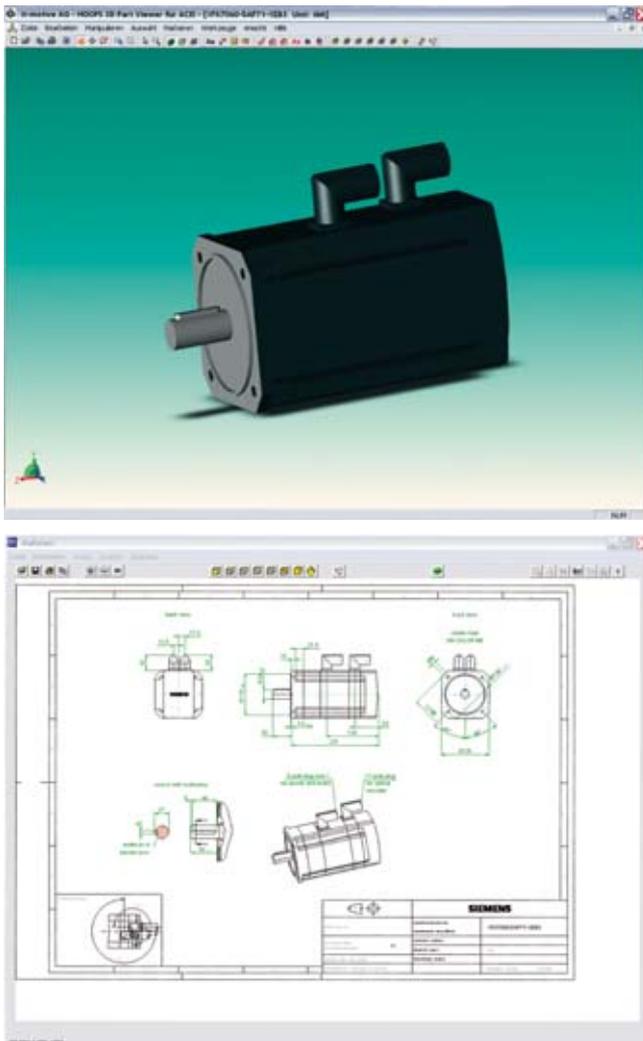
Description	Order No.
<b>SIZER for Siemens Drives engineering tool</b>	<b>6SL3070-0AA00-0AG0</b>
DVD-ROM	
English, French, German, Italian	

#### More information

The SIZER for Siemens Drives engineering tool is available free on the Internet at:

[www.siemens.com/sizer](http://www.siemens.com/sizer)

### Overview



#### CAD CREATOR – Dimension drawing and 2D/3D CAD generator

Thanks to the user-friendly operator interface of the CAD CREATOR, it is easy to configure controls, drives and motors. With the support of the CAD CREATOR, product-specific dimension drawings and 2D/3D CAD models can be created quickly. The CAD CREATOR assists the machine manufacturer's designers, in addition to drafting engineers and project engineers.

### Benefits

- Provision of dimension drawings as 2D/3D CAD models in mm and inches
- Display of 2D/3D CAD models and dimension drawings on integrated viewers
- With the online version, 3D models and dimension drawings can also be displayed in the form of a downloadable PDF
- Support for all general geometry interfaces STEP, IGES, Parasolid, SAT, VDA, and for special interfaces such as Ideas, NX, Solid Edge, Pro/Engineer, Autocad, Inventor, Mechanical Desktop, Catia and Solidworks
- Multi-language operator interface in English, French, German, Italian and Spanish, and direct Help (English, German)
- Dimension drawings and 2D/3D CAD models for:
  - Motors
    - 1FT6/1FT7/1FK7 synchronous motors
    - 1FE1 built-in synchronous motors
    - 1FW3 torque motors
    - 1FW6 built-in torque motors
    - 1FT6/1FT7/1FK7 geared motors
    - 1PH8 synchronous/asynchronous motors
    - 1PH7/1PH4/1PL6/1PM4/1PM6 asynchronous motors
    - 2SP1 motor spindles
    - 1FN3, 1FN6 linear motors
  - SINAMICS S110, SINAMICS S120
    - Control Units
    - Power Modules (Blocksize/Chassis/Combi)
    - Line Modules (Booksize/Chassis)
    - Line-side components
    - Motor Modules (Booksize/Chassis)
    - DC link components
    - Supplementary system components
    - Load-side power components
    - Encoder system connection
    - MOTION-CONNECT connection system
  - SINUMERIK
    - CNC controls
    - Operator components for CNC controls
  - SIMOTION
    - SIMOTION D
    - SIMOTION C

The CAD CREATOR offers a variety of options for configuring, but also different methods for searching for a product:

- According to order number
- According to technical description

After successful configuration of the product, the dimension drawings and models are displayed with the integrated viewers and made available for export.

### Selection and ordering data

Description	Order No.
<b>CAD CREATOR</b> Dimension drawing and 2D/3D CAD generator on DVD-ROM English, French, German, Italian, Spanish	<b>6SL3075-0AA00-0AG0</b>

### More information

The CAD CREATOR is available on DVD-ROM and as an Internet application.

You can find additional information on the Internet at:

[www.siemens.com/cadcreator](http://www.siemens.com/cadcreator)

# Services and training

Notes

3

## Quick Packages



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4/4	<b>Turning machines</b>
4/4	Package overview
4/6	<b>Milling machines</b>
4/6	Package overview

# Quick Packages

## Introduction



4

### Overview

Quick Packages are predefined packages for standard turning and milling machines which comprise drive and motors.

Quick Packages are optimally tailored to the mechanical properties of standard turning and milling machines, comprising the SINAMICS S120 Combi drive system, 1FK7 feed motors and 1PH8 spindle motors.

Depending upon the machine model, a SINUMERIK 828D BASIC T/BASIC M CNC as well as the accessories listed in this catalog are added to the Quick Package.

### Benefits

- Optimally matched components for turning and milling machines
- Drive packages suggested by Siemens mechatronics specialists
- Simple and fast dimensioning of the SINAMICS S120 Combi drive system
- Optimized logistics chain thanks to reduced variance

### Configuration

#### *Determining the package number using the subsequent package overview*

- Technology selection: Turning or milling
- Selection of the drive configuration based on the electrical characteristics of the feed and spindle motors on the basis of the package overview
- Based on the characteristics of the 1FK7 feed motors, the corresponding row is selected in the package overview: With or without holding brake
- Based on the characteristics of the 1PH8 spindle motor, the corresponding row is selected in the package overview: Type of construction IM B3 or IM B5
- The appropriate SINAMICS S120 Combi drive system as well as the number required to order the package can be found at the intersection between the row and column. The package number must be stated in the order.

#### *Selection of the CNC and additional components from this catalog*

- Selection of the CNC variant: Horizontal or vertical
- Addition of system software on CompactFlash card and any CNC options
- Addition of the MOTION-CONNECT connection system
- Addition of other accessories

For easier selection of the CNC system and additional components, use of the SIZER for Siemens Drives engineering tool is recommended.

#### *Example for ordering a Quick Package for milling machines*

1. Choose motors for feed, e.g. 11 Nm/16 Nm/16 Nm, with holding brake, in the package overview.	1FK7063-2AF71-1RH1 1FK7083-2AC71-1RH1 1FK7083-2AC71-1RH1
2. Choose motor for spindle, e.g. 7 kW, type of construction IM B3, in the package overview.	1PH8105-1DF00-0LA1
3. Find SINAMICS S120 Combi drive system in the package overview.	6SL3111-4VE21-6EAO
4. Use SIZER to determine the complete configuration including the motor selection from step 1 and step 2. During the configuration, verify whether the drive system corresponds to step 3.	
5. Find package number in the package overview and specify this together with the parts list in the order.	QMB3140407

#### *Motor versions for Quick Packages*

##### 1FK7 feed motors

- Compact or High Inertia
- 20 bit absolute encoder + 12 bit multi-turn (encoder AM20DQI)
- DE shaft extension: Plain shaft
- Shaft and flange accuracy: Tolerance N
- Holding brake: With or without
- Degree of protection IP65
- Paint finish: Anthracite RAL 7016

##### 1PH8 spindle motors for turning machines

- 22 bit incremental encoder + commutation position 11 bit (encoder IC22DQ)
- Cooling: Forced ventilation from DE to NDE
- Type of construction: IM B3 or IM B5
- DE shaft extension: Plain shaft
- Bearing version: Standard
- Vibration magnitude: Grade S/A
- Shaft and flange accuracy: Tolerance R
- Cable connection: Terminal box top/cable entry from right/signal connection DE

##### 1PH8 spindle motors for milling machines

- 1PH808: 20 bit incremental encoder without commutation position (encoder IN20DQ)
- 1PH810/1PH813: 22 bit incremental encoder + commutation position 11 bit (encoder IC22DQ)
- Cooling: Forced ventilation from DE to NDE
- Type of construction: IM B3 or IM B5
- DE shaft extension: Plain shaft
- Bearing version: Performance
- Vibration magnitude: Grade SPECIAL/B
- Shaft and flange accuracy: Tolerance SPECIAL
- Cable connection: Terminal box top/cable entry from right/signal connection DE

# Quick Packages

## Turning machines

### Package overview

Feed motors								CT Compact
Axis 1				Axis 2				HI High Inertia
Static torque	Rated speed			Static torque	Rated speed			
$M_0$	$n_{rated}$	Type	Order No.	$M_0$	$n_{rated}$	Type	Order No.	
Nm	rpm			Nm	rpm			
6	3000	HI	1FK7060-3BF71-1R.1	6	3000	CT	1FK7060-2AF71-1R.1	
6	3000	CT	1FK7060-2AF71-1R.1	6	3000	CT	1FK7060-2AF71-1R.1	
6	3000	HI	1FK7060-3BF71-1R.1	8	3000	CT	1FK7080-2AF71-1R.1	
6	3000	HI	1FK7060-3BF71-1R.1	11	2000	CT	1FK7063-2AC71-1R.1	
6	3000	HI	1FK7060-3BF71-1R.1	11	3000	CT	1FK7063-2AF71-1R.1	
6	3000	HI	1FK7060-3BF71-1R.1	16	2000	CT	1FK7083-2AC71-1R.1	
8	3000	HI	1FK7062-3BF71-1R.1	8	3000	CT	1FK7080-2AF71-1R.1	
8	3000	CT	1FK7080-2AF71-1R.1	8	3000	CT	1FK7080-2AF71-1R.1	
8	3000	HI	1FK7062-3BF71-1R.1	11	2000	CT	1FK7063-2AC71-1R.1	
8	3000	HI	1FK7062-3BF71-1R.1	12	3000	HI	1FK7081-3BF71-1R.1	
11	2000	CT	1FK7063-2AC71-1R.1	11	2000	CT	1FK7063-2AC71-1R.1	
11	3000	CT	1FK7063-2AF71-1R.1	11	3000	CT	1FK7063-2AF71-1R.1	
11	3000	CT	1FK7063-2AF71-1R.1	12	3000	HI	1FK7081-3BF71-1R.1	
11	3000	CT	1FK7063-2AF71-1R.1	16	2000	CT	1FK7083-2AC71-1R.1	
11	3000	CT	1FK7063-2AF71-1R.1	20	2000	HI	1FK7084-3BC71-1R.1	
16	2000	CT	1FK7083-2AC71-1R.1	16	2000	CT	1FK7083-2AC71-1R.1	

### Spindle motors

Rated power	Static torque	Rated current for S1 duty	Rated speed	
$P_{rated}$	$M_0$	$I_{rated}$	$n_{rated}$	Order No.
kW	Nm	A	rpm	
3.7	21	11.6	2000	1PH8083-1DG0.-OCA1
4.8	27	17.3	3000	1PH8087-1DM0.-OCA1
5.5	38	13.5	1500	1PH8103-1DF0.-OCA1
7	52	17.5	1500	1PH8105-1DF0.-OCA1
9	63	23.5	1500	1PH8107-1DF0.-OCA1
11	96	24	1500	1PH8131-1DF0.-OCA1
12	128	30	1000	1PH8133-1DD0.-OCA1

#### 1FK7...-...71-1R ■ 1

- G** Without holding brake
- H** With holding brake

#### 1PH8...-1.0 ■ -OCA1

- 0** Type of construction IM B3
- 2** Type of construction IM B5

## Package overview

Quick Packages for turning machines  
including SINAMICS S120 Combi Power Module for 3 axes

Package No.

QT ■ 2120004	QT ■ 2120005	QT ■ 2120006	QT ■ 2120007			
QT ■ 2020004	QT ■ 2020005	QT ■ 2020006	QT ■ 2020007			
QT ■ 2125004	QT ■ 2125005	QT ■ 2125006	QT ■ 2125007			
		QT ■ 2130006	QT ■ 2130007			
		QT ■ 2131006	QT ■ 2131007			
				QT ■ 2140009	QT ■ 2140001	QT ■ 2140002
QT ■ 2625004	QT ■ 2625005	QT ■ 2625006	QT ■ 2625007			
QT ■ 2525004	QT ■ 2525005	QT ■ 2525006	QT ■ 2525007			
		QT ■ 2630006	QT ■ 2630007			
			QT ■ 2635007	QT ■ 2635009	QT ■ 2635001	
		QT ■ 3030006	QT ■ 3030007			
		QT ■ 3131006	QT ■ 3131007	QT ■ 3131009	QT ■ 3131001	QT ■ 3131002
				QT ■ 3135009	QT ■ 3135001	QT ■ 3135002
				QT ■ 3140009	QT ■ 3140001	QT ■ 3140002
				QT ■ 3151009	QT ■ 3151001	QT ■ 3151002
				QT ■ 4040009	QT ■ 4040001	QT ■ 4040002

### SINAMICS S120 Combi Power Modules for 3 axes

	6SL3111-3VE21-6FA0
	6SL3111-3VE21-6EA0
	6SL3111-3VE22-0HA0

### Quick Package

QT ■ .....

- A SINUMERIK 828D (PPU 260.2, PPU 261.2, PPU 280.2 or PPU 281.2)
- B SINUMERIK 828D BASIC T (PPU 240.2 or PPU 241.2)

# Quick Packages

## Milling machines

### Package overview

Feed motors												CT Compact	HI High Inertia
Axis 1				Axis 2				Axis 3					
Static torque	Rated speed		Order No.	Static torque	Rated speed		Order No.	Static torque	Rated speed		Order No.		
$M_0$	$n_{rated}$	Type		$M_0$	$n_{rated}$	Type		$M_0$	$n_{rated}$	Type			
Nm	rpm			Nm	rpm			Nm	rpm				
6	3000	HI	1FK7060-3BF71-1R.1	6	3000	HI	1FK7060-3BF71-1R.1	8	3000	CT	1FK7080-2AF71-1R.1		
6	3000	HI	1FK7060-3BF71-1R.1	6	3000	HI	1FK7060-3BF71-1R.1	11	3000	CT	1FK7063-2AF71-1R.1		
6	3000	HI	1FK7060-3BF71-1R.1	6	3000	HI	1FK7060-3BF71-1R.1	16	2000	CT	1FK7083-2AC71-1R.1		
6	3000	HI	1FK7060-3BF71-1R.1	8	3000	HI	1FK7062-3BF71-1R.1	11	3000	CT	1FK7063-2AF71-1R.1		
8	3000	HI	1FK7062-3BF71-1R.1	8	3000	HI	1FK7062-3BF71-1R.1	8	3000	CT	1FK7080-2AF71-1R.1		
8	3000	HI	1FK7062-3BF71-1R.1	8	3000	HI	1FK7062-3BF71-1R.1	11	3000	CT	1FK7063-2AF71-1R.1		
8	3000	HI	1FK7062-3BF71-1R.1	8	3000	HI	1FK7062-3BF71-1R.1	12	3000	HI	1FK7081-3BF71-1R.1		
8	3000	HI	1FK7062-3BF71-1R.1	8	3000	HI	1FK7062-3BF71-1R.1	16	2000	CT	1FK7083-2AC71-1R.1		
8	3000	HI	1FK7062-3BF71-1R.1	8	3000	HI	1FK7062-3BF71-1R.1	16	3000	CT	1FK7083-2AF71-1R.1		
8	3000	HI	1FK7062-3BF71-1R.1	8	3000	HI	1FK7062-3BF71-1R.1	18	3000	CT	1FK7100-2AF71-1R.1		
8	3000	HI	1FK7062-3BF71-1R.1	8	3000	HI	1FK7062-3BF71-1R.1	27	2000	CT	1FK7101-2AC71-1R.1		
11	2000	CT	1FK7063-2AC71-1R.1	11	2000	CT	1FK7063-2AC71-1R.1	12	3000	HI	1FK7081-3BF71-1R.1		
11	2000	CT	1FK7063-2AC71-1R.1	11	2000	CT	1FK7063-2AC71-1R.1	11	2000	CT	1FK7063-2AC71-1R.1		
11	2000	CT	1FK7063-2AC71-1R.1	11	2000	CT	1FK7063-2AC71-1R.1	11	3000	CT	1FK7063-2AF71-1R.1		
11	2000	CT	1FK7063-2AC71-1R.1	11	2000	CT	1FK7063-2AC71-1R.1	12	3000	HI	1FK7081-3BF71-1R.1		
11	2000	CT	1FK7063-2AC71-1R.1	11	2000	CT	1FK7063-2AC71-1R.1	16	2000	CT	1FK7083-2AC71-1R.1		
11	3000	CT	1FK7063-2AF71-1R.1	11	3000	CT	1FK7063-2AF71-1R.1	11	3000	CT	1FK7063-2AF71-1R.1		
11	3000	CT	1FK7063-2AF71-1R.1	11	3000	CT	1FK7063-2AF71-1R.1	16	2000	CT	1FK7083-2AC71-1R.1		
11	3000	CT	1FK7063-2AF71-1R.1	11	3000	CT	1FK7063-2AF71-1R.1	16	3000	CT	1FK7083-2AF71-1R.1		
11	3000	CT	1FK7063-2AF71-1R.1	11	3000	CT	1FK7063-2AF71-1R.1	18	3000	CT	1FK7100-2AF71-1R.1		
11	3000	CT	1FK7063-2AF71-1R.1	11	3000	CT	1FK7063-2AF71-1R.1	20	2000	CT	1FK7084-2AC71-1R.1		
11	3000	CT	1FK7063-2AF71-1R.1	11	3000	CT	1FK7063-2AF71-1R.1	20	3000	CT	1FK7084-2AF71-1R.1		
11	3000	CT	1FK7063-2AF71-1R.1	11	3000	CT	1FK7063-2AF71-1R.1	27	2000	CT	1FK7101-2AC71-1R.1		
11	3000	CT	1FK7063-2AF71-1R.1	16	2000	CT	1FK7083-2AC71-1R.1	16	2000	CT	1FK7083-2AC71-1R.1		

### Spindle motors

Rated power	Static torque	Rated current for S1 duty	Rated speed	Order No.
$P_{rated}$	$M_0$	$I_{rated}$	$n_{rated}$	
kW	Nm	A	rpm	
3.7	21	11.6	2000	1PH8083-1UG0.-0LA1
4.8	27	17.3	3000	1PH8087-1UM0.-0LA1
5.5	38	13.5	1500	1PH8103-1DF0.-0LA1
7	52	17.5	1500	1PH8105-1DF0.-0LA1
9	63	23.5	1500	1PH8107-1DF0.-0LA1
11	96	24	1500	1PH8131-1DF0.-0LA1
12	128	30	1000	1PH8133-1DD0.-0LA1

#### 1FK7...-...71-1R ■ 1

- G** Without holding brake
- H** With holding brake

#### 1PH8...-1.0 ■ -0LA1

- 0** Type of construction IM B3
- 2** Type of construction IM B5

Quick Packages for milling machines  
including SINAMICS S120 Combi Power Module for 4 axes

Package No.

QM ■ 2121254	QM ■ 2121255	QM ■ 2121256	QM ■ 2121257	QM ■ 2121259		
QM ■ 2121314	QM ■ 2121315	QM ■ 2121316	QM ■ 2121317	QM ■ 2121319		
QM ■ 2121404	QM ■ 2121405	QM ■ 2121406	QM ■ 2121407	QM ■ 2121409		
QM ■ 2126314	QM ■ 2126315	QM ■ 2126316	QM ■ 2126317	QM ■ 2126319		
QM ■ 2626254	QM ■ 2626255	QM ■ 2626256	QM ■ 2626257	QM ■ 2626259		
QM ■ 2626314	QM ■ 2626315	QM ■ 2626316	QM ■ 2626317	QM ■ 2626319		
QM ■ 2626354	QM ■ 2626355	QM ■ 2626356	QM ■ 2626357	QM ■ 2626359		
QM ■ 2626404	QM ■ 2626405	QM ■ 2626406	QM ■ 2626407	QM ■ 2626409		
				QM ■ 2626419	QM ■ 2626411	QM ■ 2626412
				QM ■ 2626459	QM ■ 2626451	QM ■ 2626452
				QM ■ 2626559	QM ■ 2626551	QM ■ 2626552
QM ■ 2630354	QM ■ 2630355	QM ■ 2630356	QM ■ 2630357	QM ■ 2630359		
QM ■ 3030304	QM ■ 3030305	QM ■ 3030306	QM ■ 3030307	QM ■ 3030309		
QM ■ 3030314	QM ■ 3030315	QM ■ 3030316	QM ■ 3030317	QM ■ 3030319		
QM ■ 3030354	QM ■ 3030355	QM ■ 3030356	QM ■ 3030357	QM ■ 3030359		
QM ■ 3030404	QM ■ 3030405	QM ■ 3030406	QM ■ 3030407	QM ■ 3030409		
QM ■ 3131314	QM ■ 3131315	QM ■ 3131316	QM ■ 3131317	QM ■ 3131319	QM ■ 3131311	
		QM ■ 3131406	QM ■ 3131407	QM ■ 3131409	QM ■ 3131401	
		QM ■ 3131416	QM ■ 3131417	QM ■ 3131419	QM ■ 3131411	QM ■ 3131412
				QM ■ 3131459	QM ■ 3131451	QM ■ 3131452
			QM ■ 3131507	QM ■ 3131509	QM ■ 3131501	
				QM ■ 3131529	QM ■ 3131521	QM ■ 3131522
				QM ■ 3131559	QM ■ 3131551	QM ■ 3131552
			QM ■ 3140407	QM ■ 3140409	QM ■ 3140401	

### SINAMICS S120 Combi Power Modules for 4 axes

■	6SL3111-4VE21-6FA0
■	6SL3111-4VE21-6EA0
■	6SL3111-4VE22-0HA0

### Quick Package

QM ■ .....

- A SINUMERIK 828D (PPU 260.2, PPU 261.2, PPU 280.2 or PPU 281.2)
- B SINUMERIK 828D BASIC M (PPU 240.2 or PPU 241.2)

# Quick Packages

## Milling machines

### Package overview

Feed motors										CT Compact HI High Inertia	
Axis 1				Axis 2				Axis 3			
Static torque	Rated speed			Static torque	Rated speed			Static torque	Rated speed		
$M_0$	$n_{rated}$	Type	Order No.	$M_0$	$n_{rated}$	Type	Order No.	$M_0$	$n_{rated}$	Type	Order No.
Nm	rpm			Nm	rpm			Nm	rpm		
12	3000	HI	1FK7081-3BF71-1R.1	12	3000	HI	1FK7081-3BF71-1R.1	12	3000	HI	1FK7081-3BF71-1R.1
12	3000	HI	1FK7081-3BF71-1R.1	12	3000	HI	1FK7081-3BF71-1R.1	16	2000	CT	1FK7083-2AC71-1R.1
12	3000	HI	1FK7081-3BF71-1R.1	12	3000	HI	1FK7081-3BF71-1R.1	16	3000	CT	1FK7083-2AF71-1R.1
12	3000	HI	1FK7081-3BF71-1R.1	12	3000	HI	1FK7081-3BF71-1R.1	18	3000	CT	1FK7100-2AF71-1R.1
12	3000	HI	1FK7081-3BF71-1R.1	12	3000	HI	1FK7081-3BF71-1R.1	20	2000	CT	1FK7084-2AC71-1R.1
12	3000	HI	1FK7081-3BF71-1R.1	12	3000	HI	1FK7081-3BF71-1R.1	20	3000	CT	1FK7084-2AF71-1R.1
12	3000	HI	1FK7081-3BF71-1R.1	12	3000	HI	1FK7081-3BF71-1R.1	27	2000	CT	1FK7101-2AC71-1R.1
12	3000	HI	1FK7081-3BF71-1R.1	20	2000	HI	1FK7084-3BC71-1R.1	20	2000	CT	1FK7084-2AC71-1R.1
12	3000	HI	1FK7081-3BF71-1R.1	20	2000	HI	1FK7084-3BC71-1R.1	20	3000	CT	1FK7084-2AF71-1R.1
16	2000	CT	1FK7083-2AC71-1R.1	16	2000	CT	1FK7083-2AC71-1R.1	16	2000	CT	1FK7083-2AC71-1R.1
16	2000	CT	1FK7083-2AC71-1R.1	16	2000	CT	1FK7083-2AC71-1R.1	16	3000	CT	1FK7083-2AF71-1R.1
16	2000	CT	1FK7083-2AC71-1R.1	16	2000	CT	1FK7083-2AC71-1R.1	18	3000	CT	1FK7100-2AF71-1R.1
16	2000	CT	1FK7083-2AC71-1R.1	16	2000	CT	1FK7083-2AC71-1R.1	20	2000	CT	1FK7084-2AC71-1R.1
16	2000	CT	1FK7083-2AC71-1R.1	16	2000	CT	1FK7083-2AC71-1R.1	20	3000	CT	1FK7084-2AF71-1R.1
16	2000	CT	1FK7083-2AC71-1R.1	16	2000	CT	1FK7083-2AC71-1R.1	27	2000	CT	1FK7101-2AC71-1R.1
16	2000	CT	1FK7083-2AC71-1R.1	20	2000	HI	1FK7084-3BC71-1R.1	20	2000	HI	1FK7084-3BC71-1R.1
20	2000	HI	1FK7084-3BC71-1R.1	20	2000	HI	1FK7084-3BC71-1R.1	20	2000	CT	1FK7084-2AC71-1R.1
20	2000	HI	1FK7084-3BC71-1R.1	20	2000	HI	1FK7084-3BC71-1R.1	20	3000	CT	1FK7084-2AF71-1R.1
20	2000	HI	1FK7084-3BC71-1R.1	20	2000	HI	1FK7084-3BC71-1R.1	27	2000	CT	1FK7101-2AC71-1R.1

### Spindle motors

Rated power	Static torque	Rated current for S1 duty	Rated speed	
$P_{rated}$	$M_0$	$I_{rated}$	$n_{rated}$	Order No.
kW	Nm	A	rpm	
7	52	17.5	1500	1PH8105-1DF0.-0LA1
9	63	23.5	1500	1PH8107-1DF0.-0LA1
11	96	24	1500	1PH8131-1DF0.-0LA1
12	128	30	1000	1PH8133-1DD0.-0LA1

#### 1FK7...-...71-1R ■ 1

- G** Without holding brake
- H** With holding brake

#### 1PH8...-1.0 ■-0LA1

- 0** Type of construction IM B3
- 2** Type of construction IM B5

# Quick Packages

## Milling machines

### Package overview

Quick Packages for milling machines  
including SINAMICS S120 Combi Power Module for 4 axes

Package No.

QM ■ 3535357	QM ■ 3535359	QM ■ 3535351	
QM ■ 3535407	QM ■ 3535409	QM ■ 3535401	
	QM ■ 3535419	QM ■ 3535411	QM ■ 3535412
	QM ■ 3535459	QM ■ 3535451	QM ■ 3535452
QM ■ 3535507	QM ■ 3535509	QM ■ 3535501	
	QM ■ 3535529	QM ■ 3535521	QM ■ 3535522
	QM ■ 3535559	QM ■ 3535551	QM ■ 3535552
QM ■ 3551507	QM ■ 3551509	QM ■ 3551501	
	QM ■ 3551529	QM ■ 3551521	QM ■ 3551522
QM ■ 4040407	QM ■ 4040409	QM ■ 4040401	
	QM ■ 4040419	QM ■ 4040411	QM ■ 4040412
	QM ■ 4040459	QM ■ 4040451	QM ■ 4040452
QM ■ 4040507	QM ■ 4040509	QM ■ 4040501	
	QM ■ 4040529	QM ■ 4040521	QM ■ 4040522
	QM ■ 4040559	QM ■ 4040551	QM ■ 4040552
QM ■ 4051517	QM ■ 4051519	QM ■ 4051511	
QM ■ 5151507	QM ■ 5151509	QM ■ 5151501	
	QM ■ 5151529	QM ■ 4051521	QM ■ 5151522
	QM ■ 5151559	QM ■ 5151551	QM ■ 5151552

#### SINAMICS S120 Combi Power Modules for 4 axes

■	6SL3111-4VE21-6EA0
■	6SL3111-4VE22-0HA0

#### Quick Package

QM ■ .....

- A SINUMERIK 828D (PPU 260.2, PPU 261.2, PPU 280.2 or PPU 281.2)
- B SINUMERIK 828D BASIC M (PPU 240.2 or PPU 241.2)

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Subject to change without prior notice  
Only PDF: (6ZB5411-0CC02-0BA2)  
MP.R2.MT.NC82.8D.3.02  
BR 1212 Ho 63 En  
Produced in Germany  
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