

MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

SIEMENS

SMC20

CABINET SENSOR INTERFACE MODULE

Used with the applicable PLC System configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: Siemens official manufacturer documentation

Overview of functions

CNC controls SINUMERIK 828

Control structure and configuration

2

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

Overview of functions

CNC controls SINUMERIK 828

Connectable drives

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

Overview of functions

CNC controls SINUMERIK 828

Connectable measuring systems/Connectable motors

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

CNC controls

Supplementary components

SENTRON PAC**Technical specifications**

Article No.		7KM2112-0BA00-3AA0	7KM4212-0BA00-3AA0
Product brand name		SENTRON	SENTRON
Product type designation		PAC3200	PAC4200
Product designation		Multimeter	Multimeter
Type of measured value detection		complete	complete
Measuring inputs for voltage for 3 AC, max.	V	690/400	690/400
Wide-range power supply			
• For AC	V	95 ... 240	95 ... 240
• For DC	V	110 ... 340	110 ... 340
Measurable line frequency	Hz	45 ... 65	45 ... 65
Protection class when installed		II	II
Degree of pollution		2	2
Degree of protection			
- front		IP65	IP65
- rear		IP20	IP20
Relative humidity at 25 °C, during operation	%	5 ... 95	5 ... 95
Ambient temperature, during			
• storage	°C	-25 ... +70	-25 ... +70
• transport	°C	-25 ... +70	-25 ... +70
• operation	°C	-10 ... +55	-10 ... +55
Width	mm	96	96
Height	mm	96	96
Depth	mm	56	82
Installation depth	mm	51	77
Net weight	kg	0.54	0.46
Certificate of suitability		CB, CE, C-TICK, EAC, UL	CB, CE, C-TICK, EAC, UL

SINAMICS S120 drive system



4/2	SINAMICS S120 Combi
4/2	Power Modules
4/8	External fan module, Reinforcement plates
4/9	Line reactors
4/10	Line filters
4/11	SINAMICS S120
4/11	<u>Booksize compact format</u>
	<u>Motor Modules</u>
4/12	Single Motor Modules
4/13	Double Motor Modules
4/14	<u>Booksize format</u>
	<u>Line Modules</u>
4/14	Smart Line Modules
4/17	Line reactors
4/18	Line filters
4/19	Recommended line-side components
4/20	Active Line Modules
4/25	Active Interface Modules
4/27	Basic Line Filters
4/28	Recommended line-side components
4/29	Basic Line Modules
4/33	Line reactors
4/34	Line filters
4/35	Recommended line-side components
4/36	<u>Booksize format</u>
	<u>Motor Modules</u>
4/36	Single Motor Modules
4/41	Double Motor Modules
4/44	Series motor reactors
4/45	<u>Booksize format</u>
	<u>DC link components</u>
4/45	Braking Module
4/46	Braking resistors
4/47	Capacitor Module
4/48	Control Supply Module
4/49	DC link rectifier adapter
4/49	DC link adapter
4/50	<u>Supplementary system components</u>
4/50	DMC20 DRIVE-CLiQ Hub Module
4/51	DME20 DRIVE-CLiQ Hub Module
4/52	TM54F Terminal Module
4/54	Encoder system connection
4/54	SMC20 Sensor Module Cabinet-Mounted
4/55	SMC30 Sensor Module Cabinet-Mounted
4/56	SMC40 Sensor Module Cabinet-Mounted
4/57	SME125 Sensor Module External
4/58	Drive Based Safety Integrated

CAD CREATOR

Dimensional drawing and
2D/3D CAD generator

www.siemens.com/cadcreator

Drive Technology Configurator selection tool

Guided product selection
through to precise article number

www.siemens.com/dt-configurator

SINAMICS S120 drive system

SINAMICS S120 Combi

Power Modules

4

Overview



SINAMICS S120 Combi Power Module

SINAMICS S120 Combi is a very compact and rugged drive concept tailored for compact turning and milling machines. SINAMICS S120 Combi integrates a line infeed with regenerative feedback capability, power units for spindle and feed motors as well as a TTL encoder interface into a single Power Module. The SINAMICS S120 Combi Power Modules are optimized as a drive for machine tools with 3 to 6 axes. The Power Modules are available with external air cooling. SINAMICS Motor Modules in the booksize compact format are used as expansion axes.

Benefits

- Compact multi-axis module with line infeed with regenerative feedback capability and power units for 3 or 4 axes
- Customized drive system for compact standard turning and milling machines
- Requires very little mounting space in control cabinet (incl. fan module, shield terminals and ventilation clearances)
- Optimized for weak supply networks with frequent undervoltage, network imbalances and large frequency fluctuations
- Optimized for harsh operating conditions with increased cabinet temperature and increased humidity
- Rugged Power Modules resistant to short circuits, overvoltage and ground faults
- Rugged and easy-to-fit screw-type terminals with integrated shield connection for the power cables
- Perfect expandability using additional Motor Modules in booksize compact format
- Low energy consumption thanks to state-of-the-art 400-V technology
- Excellent dynamic response and machining precision thanks to Dynamic Servo Control (DSC)
- Simple cabling due to intelligent DRIVE-CLiQ interface
- Very simple commissioning thanks to predefined topologies

Function

- Power Module with 3 or 4 integrated power units
- Integrated line infeed with regenerative feedback capability
- Integrated TTL encoder interface
- Integrated motor brake control for one axis
- Integrated fan power supply
- Line supply voltage 380 to 480 V 3 AC
- Supply types TT, TN and IT
- Integrated shield terminals
- Heat dissipation concept with an external heatsink for extremely low power loss in the control cabinet
- Easy-to-mount fan module optimized for harsh environments
- Increased availability thanks to fan monitoring
- Derating only from 45 °C cabinet temperature
- Power cables are connected by means of screw-type terminals

Integration

The following components can be connected to the SINAMICS S120 Combi drive system:

- SINUMERIK 828D BASIC
- SINUMERIK 828D
- 3 or 4 spindles/feed motors
- 3 or 4 motor encoders
- 3 or 4 direct encoders via DMC20
- Direct spindle encoder with TTL directly or sin/cos via SMC20
- External fan module
- Up to two additional SINAMICS S120 Motor Modules in booksize compact format via DC link connection and 24 V DC busbars
- Braking Module with braking resistor via DC link connection
- Control Supply Module via DC link connection and 24 V DC busbars
- One safe motor brake control
- 5 or 6 DRIVE-CLiQ sockets
- 24 V electronics power supply via connector
- 1 safe standstill input for the infeed (Enable Pulses)
- 1 safe standstill input for the spindle and feeds (Enable Pulses)
- 1 temperature sensor input for the spindle (KTY84-130 or PTC)
- PE/protective conductor connections

The scope of supply of the SINAMICS S120 Combi Power Modules includes:

- SINAMICS S120 Combi Power Module
- Accessories pack consisting of:
 - 4 DRIVE-CLiQ dust-proof blanking plugs
 - Connector X224 for the electronics power supply
 - Connector X11 for motor brake control
 - Connector X21 Enable Pulses infeed
 - Connector X22 Enable Pulses drives/temp.
 - 5 shield terminals for power cables
 - Shield terminal for signal cable

Selection and ordering data

SINAMICS S120 Combi Power Module with external air cooling					
Rated power Infeed	Rated output current Spindle	Rated output current Feedrate 1	Rated output current Feedrate 2	Rated output current Feedrate 3	Article No.
kW	A	A	A	A	
3-axis Power Module					
16	18	5	5	–	6SL3111-3VE21-6FA0
16	24	9	9	–	6SL3111-3VE21-6EA0
20	30	9	9	–	6SL3111-3VE22-0HA0
4-axis Power Module					
10	24 ¹⁾	12	12	12	6SL3111-4VE21-0EA0
16	18	9	5	5	6SL3111-4VE21-6FA0
16	24	9	9	9	6SL3111-4VE21-6EA0
20	30	12	9	9	6SL3111-4VE22-0HA0

Technical specifications

Article No.	6SL3111-3VE2-... 6SL3111-4VE2-...
Product brand name	SINAMICS
Product type designation	S120 Combi
Product designation	Power Module
DC link voltage²⁾	1.35 × line voltage
Output voltage	0 ... 0.7 × DC link voltage
Line power factor at rated power	
• Fundamental (cos φ_1)	> 0.96
• Total (λ)	0.65 ... 0.90
Radio interference suppression	
• Standard	No radio interference suppression
• With line filter	Category C2 according to EN 61800-3
Degree of protection	IP20
Installation altitude	Up to 1000 m above sea level without derating, > 1000 ... 4000 m with derating
Certificate of suitability	CE, cURus
Safety Integrated	Safety Integrity Level 2 (SIL 2) acc. to IEC 61508 Performance Level d (PLd) acc. to ISO 13849-1 Control Category 3 acc. to ISO 13849-1

¹⁾ Pulse frequency 4 kHz/8 kHz.

²⁾ The DC link voltage adjusts itself to the mean value of the rectified line voltage.

Technical specifications

Article No.	6SL3055-0AA00-3BA0
Product designation	TM54F Terminal Module
Power requirement at 24 V DC (X524) without DRIVE-CLiQ supply	0.2 A
• Conductor cross-section, max.	2.5 mm ²
• Fuse protection, max.	20 A
Power requirement ext. 24 V, max. For supplying the digital outputs and 24 V sensor supply (X514 at 24 V DC)	4 A
• Conductor cross-section, max.	2.5 mm ²
• Fuse protection, max.	20 A
I/O	
• Number of fail-safe digital inputs	10
• Number of fail-safe digital outputs	4
• 24 V sensor supply	3 of which 2 can be temporarily shut down using an internal test routine for dynamizing fail-safe digital inputs, current carrying capacity 0.5 A each
• Connection method	Plug-in screw-type terminals
• Conductor cross-section, max.	1.5 mm ²
Digital inputs	in accordance with IEC 61131-2 Type 1, with isolation
• Voltage	-3 ... +30 V
• Low level (an open digital input is interpreted as low)	-3 ... +5 V
• High level	15 ... 30 V
• Current consumption, typ.	
- At 24 V DC	> 2 mA
• Delay time of digital inputs, approx. ¹⁾	
- L → H, typ.	30 μs
- H → L, typ.	60 μs
• Safe state	Low level for inputs that can be inverted: without inversion

Article No.	6SL3055-0AA00-3BA0
Product designation	TM54F Terminal Module
Digital outputs	Sustained short-circuit proof
• Voltage DC	24 V
• Load current per fail-safe digital output, max. ²⁾	0.5 A
• Delay times (resistive load) ¹⁾	
- L → H, typ.	300 μs
- H → L, typ.	350 μs
• Safe state	Output switched off
Scanning cycle t_{SI} For fail-safe digital inputs or fail-safe digital outputs	4 ... 25 ms adjustable
Power loss at 24 V DC, max.	4.4 W
PE connection	M4 screw
Width	50 mm
Height	150 mm
Depth	111 mm
Net weight	0.9 kg
Certificate of suitability	cULus
Safety Integrated	Safety Integrity Level 2 (SIL2) according to IEC 61508 Performance Level d (PLd) according to ISO 13849-1 Control category 3 according to ISO 13849-1/EN 954-1

¹⁾ The specified delay times refer to the hardware. The actual reaction time depends on the time slot in which the digital input/output is processed.

²⁾ The total current of all fail-safe digital outputs must not exceed 5.33 A.