Data sheet



SIMATIC S7-1500 Compact CPU CPU 1512C-1 PN, central processing unit with working memory 250 KB for program and 1 MB for data, 32 digital inputs, 32 digital outputs, 5 analog inputs, 2 analog outputs, 6 high speed counters, 4 high speed outputs for PTO/PWM/frequency output 1. interface: PROFINET IRT with 2 port switch, 48 NS bit-performance, incl. front connector push-in, SIMATIC memory card necessary

Compared information	
General information	
Product type designation	CPU 1512C-1 PN
HW functional status	FS03
Firmware version	V2.8
Product function	
● I&M data	Yes; I&M0 to I&M3
• Isochronous mode	Yes; With minimum OB 6x cycle of 625 µs (distributed)
Engineering with	
STEP 7 TIA Portal configurable/integrated from	V16 (FW V2.8) / V15 (FW V2.5) or higher; with older TIA Portal
version	versions configurable as 6ES7512-1CK00-0AB0
Configuration control	
via dataset	Yes
Display	
Screen diagonal [cm]	3.45 cm
Control elements	
Number of keys	8
Mode buttons	2

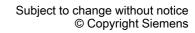


Supply voltage	
Type of supply voltage	24 V DC
permissible range, lower limit (DC)	19.2 V; 20.4 V DC, for supplying the digital inputs/outputs
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Mains buffering	
Mains/voltage failure stored energy time	5 ms; Refers to the power supply on the CPU section
Repeat rate, min.	1/s
Input current	0.0.4. Will. 11. 1.40.0.4. OPII1
Current consumption (rated value)	0.8 A; Without load; 18.8 A: CPU + load
Current consumption, max.	1 A; Without load; 19 A: CPU + load
Inrush current, max.	1.9 A; Rated value
² t	0.34 A²·s
Digital inputs	00 1
• from load voltage L+ (without load), max.	20 mA; per group
Digital outputs	
from load voltage L+, max.	30 mA; Per group, without load
Output voltage	
Rated value (DC)	24 V
Francisco estados	
Encoder supply Number of outputs	2; One common 24 V encoder supply per 16 digital inputs
24 V encoder supply	2, One common 21 v chooses supply per 10 digital inputs
• 24 V	Yes; L+ (-0.8 V)
Short-circuit protection	Yes
·	1 A
Output current, max.	IA
Power	
Infeed power to the backplane bus	10 W
Power consumption from the backplane bus	9 W
(balanced)	
Power loss	
Power loss Power loss, typ.	15.2 W
Power loss, typ.	15.2 W
Power loss, typ. Memory	
Power loss, typ. Memory Number of slots for SIMATIC memory card	1
Power loss, typ. Memory Number of slots for SIMATIC memory card SIMATIC memory card required	
Power loss, typ. Memory Number of slots for SIMATIC memory card SIMATIC memory card required Work memory	1 Yes
Power loss, typ. Memory Number of slots for SIMATIC memory card SIMATIC memory card required Work memory • integrated (for program)	1 Yes 250 kbyte
Power loss, typ. Memory Number of slots for SIMATIC memory card SIMATIC memory card required Work memory • integrated (for program) • integrated (for data)	1 Yes
Power loss, typ. Memory Number of slots for SIMATIC memory card SIMATIC memory card required Work memory • integrated (for program) • integrated (for data) Load memory	1 Yes 250 kbyte 1 Mbyte
Power loss, typ. Memory Number of slots for SIMATIC memory card SIMATIC memory card required Work memory • integrated (for program) • integrated (for data)	1 Yes 250 kbyte



maintenance-free	Yes
CPU processing times	
for bit operations, typ.	48 ns
for word operations, typ.	58 ns
for fixed point arithmetic, typ.	77 ns
for floating point arithmetic, typ.	307 ns
CPU-blocks	
Number of elements (total)	2 000; Blocks (OB, FB, FC, DB) and UDTs
DB	
Number range	1 60 999; subdivided into: number range that can be used by the user: 1 59 999, and number range of DBs created via SFC 86: 60 000 60 999
• Size, max.	1 Mbyte; For DBs with absolute addressing, the max. size is 64 KB
FB	
Number range	0 65 535
• Size, max.	250 kbyte
FC	
Number range	0 65 535
• Size, max.	250 kbyte
ОВ	
• Size, max.	250 kbyte
 Number of free cycle OBs 	100
Number of time alarm OBs	20
 Number of delay alarm OBs 	20
 Number of cyclic interrupt OBs 	20; With minimum OB 3x cycle of 500 μs
 Number of process alarm OBs 	50
 Number of DPV1 alarm OBs 	3
 Number of isochronous mode OBs 	1
 Number of technology synchronous alarm OBs 	2
 Number of startup OBs 	100
 Number of asynchronous error OBs 	4
 Number of synchronous error OBs 	2
 Number of diagnostic alarm OBs 	1
Nesting depth	
• per priority class	24
Counters, timers and their retentivity	
S7 counter	
• Number	2 048
Retentivity	
— adjustable	Yes





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6ES7512-1CK01-0AB0

IEC counter	
• Number	Any (only limited by the main memory)
Retentivity	
— adjustable	Yes
S7 times	
Number	2 048
Retentivity	
— adjustable	Yes
IEC timer	
Number	Any (only limited by the main memory)
Retentivity	
— adjustable	Yes
Data areas and their retentivity	
Retentive data area (incl. timers, counters, flags), max.	128 kbyte; In total; available retentive memory for bit memories, timers, counters, DBs, and technology data (axes): 88 KB
Extended retentive data area (incl. timers, counters, flags), max.	1 Mbyte; When using PS 6 0W 24/48/60 V DC HF
Flag	
Number, max.	16 kbyte
 Number of clock memories 	8; 8 clock memory bit, grouped into one clock memory byte
Data blocks	
Retentivity adjustable	Yes
Retentivity preset	No
Local data	
• per priority class, max.	64 kbyte; max. 16 KB per block
Address area	
Number of IO modules	2 048; max. number of modules / submodules
I/O address area	
Inputs	32 kbyte; All inputs are in the process image
Outputs	32 kbyte; All outputs are in the process image
per integrated IO subsystem	
— Inputs (volume)	8 kbyte
— Outputs (volume)	8 kbyte
per CM/CP	
— Inputs (volume)	8 kbyte
— Outputs (volume)	8 kbyte
Subprocess images	
 Number of subprocess images, max. 	32
Hardware configuration	



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Number of distributed IO systems	32; A distributed I/O system is characterized not only by the integration of distributed I/O via PROFINET or PROFIBUS communication modules, but also by the connection of I/O via AS-i master modules or links (e.g. IE/PB-Link)
Number of DP masters	
● Via CM	6; A maximum of 6 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total
Number of IO Controllers	
• integrated	1
● Via CM	6; A maximum of 6 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total
Rack	
Modules per rack, max.	32; CPU + 31 modules
 Number of lines, max. 	1
PtP CM	
Number of PtP CMs	the number of connectable PtP CMs is only limited by the number of available slots
Time of day	
Clock	
• Type	Hardware clock
Backup time	6 wk; At 40 °C ambient temperature, typically
Deviation per day, max.	10 s; Typ.: 2 s
Operating hours counter	
Number	16
Clock synchronization	
• supported	Yes
● in AS, master	Yes
• in AS, slave	Yes
• on Ethernet via NTP	Yes
Digital inputs	
integrated channels (DI)	32
Digital inputs, parameterizable	Yes
Source/sink input	P-reading
Input characteristic curve in accordance with IEC 61131, type 3	Yes
Digital input functions, parameterizable	
Gate start/stop	Yes
Capture	Yes
Synchronization	Yes
Input voltage	
Type of input voltage	DC
• Rated value (DC)	24 V
● for signal "0"	-3 to +5V



● for signal "1"	+11 to +30V
Input current	
• for signal "1", typ.	2.5 mA
Input delay (for rated value of input voltage)	
for standard inputs	
— parameterizable	Yes: none / 0.05 / 0.1 / 0.4 / 1.6 / 3.2 / 12.8 / 20 ms
— at "0" to "1", min.	4 µs; for parameterization "none"
— at "0" to "1", max.	20 ms
— at 0 to 1, max. — at "1" to "0", min.	4 μs; for parameterization "none"
	20 ms
— at "1" to "0", max.	20 IIIS
for interrupt inputs	Very Orange of for standard investo
— parameterizable	Yes; Same as for standard inputs
for technological functions	
— parameterizable	Yes; Same as for standard inputs
Cable length	
• shielded, max.	1 000 m; 600 m for technological functions; depending on input
	frequency, encoder and cable quality; max. 50 m at 100 kHz
• unshielded, max.	600 m; for technological functions: No
Digital outputs	
Type of digital output	Transistor
integrated channels (DO)	32
Current-sourcing	Yes; Push-pull output
Short-circuit protection	Yes; electronic/thermal
 Response threshold, typ. 	1.6 A with standard output, 0.5 A with high-speed output; see manual for details
Limitation of inductive shutdown voltage to	Connector X11: -0.8 V; connector X12: L+ (-53 V)
Controlling a digital input	Yes
Accuracy of pulse duration	Up to ±100 ppm ±2 µs at high-speed output; see manual for details
minimum pulse duration	2 μs; With High Speed output
Digital output functions, parameterizable	
 Switching tripped by comparison values 	Yes; As output signal of a high-speed counter
 PWM output 	Yes
— Number, max.	4
 Cycle duration, parameterizable 	Yes
— ON period, min.	0 %
— ON period, max.	100 %
Resolution of the duty cycle	0.0036 %; For S7 analog format, min. 40 ns
Frequency output	Yes
Switching capacity of the outputs	
• with resistive load, max.	0.5 A; 0.1 A with high-speed output, i.e. when using a high-speed output; see manual for details



● on lamp load, max.	5 W; 1 W with high-speed output, i.e. when using a high-speed
o of famp load, max.	output; see manual for details
Load resistance range	
lower limitupper limit	48 Ω ; 240 ohms with high-speed output, i.e. when using a high-speed output; see manual for details 12 k Ω
Output voltage	12 102
Type of output voltage	DC
	1 V; With high-speed output, i.e. when using a high-speed output;
● for signal "0", max.	see manual for details
● for signal "1", min.	23.2 V; L+ (-0.8 V)
Output current	
• for signal "1" rated value	0.5 A; 0.1 A with high-speed output, i.e. when using a high-speed output, observe derating; see manual for details
for signal "1" permissible range, min.	2 mA
for signal "1" permissible range, max.	0.6 A; 0.12 A with high-speed output, i.e. when using a high-speed output, observe derating; see manual for details
for signal "0" residual current, max.	0.5 mA
Output delay with resistive load	
• "0" to "1", max.	200 μs
• "1" to "0", max.	500 μs; Load-dependent
for technological functions	
— "0" to "1", max.	5 μs; Depending on the output used, see additional description in manual
— "1" to "0", max.	$5\mu s;$ Depending on the output used, see additional description in manual
Parallel switching of two outputs	
• for logic links	Yes; for technological functions: No
• for uprating	No
 for redundant control of a load 	Yes; for technological functions: No
Switching frequency	
• with resistive load, max.	100 kHz; For high-speed output, 100 Hz for standard output
with inductive load, max.	0.5 Hz; Acc. to IEC 60947-5-1, DC-13; observe derating curve
● on lamp load, max.	10 Hz
Total current of the outputs	
Current per channel, max.	0.5 A; see additional description in the manual
• Current per group, max.	8 A; see additional description in the manual
Current per power supply, max.	4 A; 2 power supplies for each group, current per power supply max. 4 A, see additional description in manual
for technological functions	
— Current per channel, max.	0.5 A; see additional description in the manual
Relay outputs	
Number of relay outputs	0



shielded, max.	1 000 m; 600 m for technological functions; depending on output
	frequency, load, and cable quality; max. 50 m at 100 kHz

• unshielded, max. 600 m; for technological functions: No

Analog inputs	
Number of analog inputs	5; 4x for U/I, 1x for R/RTD
 For current measurement 	4; max.
 For voltage measurement 	4; max.
 For resistance/resistance thermometer 	1
measurement	
permissible input voltage for voltage input	28.8 V
(destruction limit), max.	40 4
permissible input current for current input (destruction limit), max.	40 mA
Cycle time (all channels), min.	1 ms; Dependent on the parameterized interference frequency
	suppression; for details, see conversion procedure in manual
Technical unit for temperature measurement adjustable	Yes; °C/°F/K
Input ranges (rated values), voltages	
• 0 to +10 V	Yes; Physical measuring range: ± 10 V
— Input resistance (0 to 10 V)	100 kΩ
• 1 V to 5 V	Yes; Physical measuring range: ± 10 V
— Input resistance (1 V to 5 V)	100 kΩ
• -10 V to +10 V	Yes
— Input resistance (-10 V to +10 V)	100 kΩ
• -5 V to +5 V	Yes; Physical measuring range: ± 10 V
— Input resistance (-5 V to +5 V)	100 kΩ
Input ranges (rated values), currents	
• 0 to 20 mA	Yes; Physical measuring range: ± 20 mA
— Input resistance (0 to 20 mA)	50 Ω ; Plus approx. 55 ohm for overvoltage protection by PTC
• -20 mA to +20 mA	Yes
— Input resistance (-20 mA to +20 mA)	50 Ω ; Plus approx. 55 ohm for overvoltage protection by PTC
• 4 mA to 20 mA	Yes; Physical measuring range: ± 20 mA
— Input resistance (4 mA to 20 mA)	50 Ω ; Plus approx. 55 ohm for overvoltage protection by PTC
Input ranges (rated values), resistance thermometer	
● Ni 100	Yes; Standard/climate
— Input resistance (Ni 100)	10 ΜΩ
• Pt 100	Yes; Standard/climate
— Input resistance (Pt 100)	10 ΜΩ
Input ranges (rated values), resistors	
• 0 to 150 ohms	Yes; Physical measuring range: 0 600 ohms
— Input resistance (0 to 150 ohms)	10 ΜΩ
• 0 to 300 ohms	Yes; Physical measuring range: 0 600 ohms



— Input resistance (0 to 300 ohms)	10 ΜΩ
• 0 to 600 ohms	Yes
— Input resistance (0 to 600 ohms)	10 ΜΩ
Cable length	
• shielded, max.	800 m; for U/I, 200 m for R/RTD

Analog outputs		
integrated channels (AO)	2	
Voltage output, short-circuit protection	Yes	
Cycle time (all channels), min.	1 ms; Dependent on the parameterized interference frequency suppression; for details, see conversion procedure in manual	
Output ranges, voltage	suppression, for details, see conversion procedure in manual	
• 0 to 10 V	Yes	
• 1 V to 5 V	Yes	
• -10 V to +10 V	Yes	
Output ranges, current		
• 0 to 20 mA	Yes	
• -20 mA to +20 mA	Yes	
• 4 mA to 20 mA	Yes	
Load impedance (in rated range of output)		
with voltage outputs, min.	1 kΩ	
• with voltage outputs, capacitive load, max.	100 nF	
• with current outputs, max.	500 Ω	
• with current outputs, inductive load, max.	1 mH	
Cable length		
• shielded, max.	200 m	

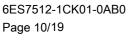
Analog value generation for the inputs	
Integration and conversion time/resolution per channel	
 Resolution with overrange (bit including sign), 	16 bit
max.	
 Integration time, parameterizable 	Yes; 2.5 / 16.67 / 20 / 100 ms, acts on all channels
 Interference voltage suppression for 	400 / 60 / 50 / 10
interference frequency f1 in Hz	
Smoothing of measured values	
parameterizable	Yes
• Step: None	Yes
• Step: low	Yes
Step: Medium	Yes
• Step: High	Yes

Analog value generation for the outputs

Integration and conversion time/resolution per channel



 Resolution with overrange (bit including sign), 	16 bit
max.	
Settling time	
• for resistive load	1.5 ms
• for capacitive load	2.5 ms
• for inductive load	2.5 ms
Encoder	
Connection of signal encoders	
for voltage measurement	Yes
 for current measurement as 4-wire transducer 	Yes
 for resistance measurement with two-wire connection 	Yes
 for resistance measurement with three-wire connection 	Yes
 for resistance measurement with four-wire connection 	Yes
Connectable encoders	
• 2-wire sensor	Yes
 permissible quiescent current (2-wire sensor), max. 	1.5 mA
Encoder signals, incremental encoder (asymmetrical)	
Input voltage	24 V
Input frequency, max.	100 kHz
 Counting frequency, max. 	400 kHz; with quadruple evaluation
Signal filter, parameterizable	Yes
 Incremental encoder with A/B tracks, 90° phase offset 	Yes
 Incremental encoder with A/B tracks, 90° phase offset and zero track 	Yes
Pulse encoder	Yes
Pulse encoder with direction	Yes
 Pulse encoder with one impulse signal per count direction 	Yes
Errors/accuracies	
Linearity error (relative to input range), (+/-)	0.1 %
Temperature error (relative to input range), (+/-)	0.005 %/K
Crosstalk between the inputs, max.	-60 dB
Repeat accuracy in steady state at 25 °C (relative to input range), (+/-)	0.05 %
Output ripple (relative to output range, bandwidth 0 to 50 kHz), (+/-)	0.02 %



Linearity error (relative to output range), (+/-)

Temperature error (relative to output range), (+/-)



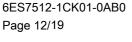
0.15 %

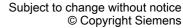
0.005 %/K

Crosstalk between the outputs, max.	-80 dB
Repeat accuracy in steady state at 25 °C (relative to	0.05 %
output range), (+/-)	
Operational error limit in overall temperature range	
 Voltage, relative to input range, (+/-) 	0.3 %
Current, relative to input range, (+/-)	0.3 %
 Resistance, relative to input range, (+/-) 	0.3 %
 Resistance thermometer, relative to input range, (+/-) 	Pt100 Standard: ±2 K, Pt100 Climate: ±1 K, Ni100 Standard: ±1.2 K, Ni100 Climate: ±1 K
 Voltage, relative to output range, (+/-) 	0.3 %
Current, relative to output range, (+/-)	0.3 %
Basic error limit (operational limit at 25 °C)	
● Voltage, relative to input range, (+/-)	0.2 %
 Current, relative to input range, (+/-) 	0.2 %
 Resistance, relative to input range, (+/-) 	0.2 %
 Resistance thermometer, relative to input range, (+/-) 	Pt100 Standard: ±1 K, Pt100 Climate: ±0.5 K, Ni100 Standard: ±0.6 K, Ni100 Climate: ±0.5 K
 Voltage, relative to output range, (+/-) 	0.2 %
Current, relative to output range, (+/-)	0.2 %
Interference voltage suppression for f = n x (f1 +/- 1 %)	, f1 = interference frequency
 Series mode interference (peak value of interference < rated value of input range), min. 	30 dB
 Common mode voltage, max. 	10 V
 Common mode interference, min. 	60 dB; at 400 Hz: 50 dB
Interfaces	
Number of PROFINET interfaces	1
1. Interface	
Interface types	
• RJ 45 (Ethernet)	Yes; X1
Number of ports	2
• integrated switch	Yes
Protocols	
• IP protocol	Yes; IPv4
PROFINET IO Controller	Yes
PROFINET IO Device	Yes
SIMATIC communication	Yes
Open IE communication	Yes; Optionally also encrypted
Web server	Yes
Media redundancy	Yes
PROFINET IO Controller	
Services	
— PG/OP communication	Yes



Yes - S7 routing Yes - Isochronous mode Yes; Requirement: IRT and isochronous mode (MRPD optional) - Direct data exchange - IRT Yes; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP — MRP Manager; MRP Client; max. number of devices in the ring: 50 Yes; Requirement: IRT - MRPD - PROFlenergy Yes; per user program Yes; Max. 32 PROFINET devices - Prioritized startup - Number of connectable IO Devices, max. 128; In total, up to 512 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET — Of which IO devices with IRT, max. 64 128 - Number of connectable IO Devices for RT. max 128 - of which in line, max. 8; in total across all interfaces - Number of IO Devices that can be simultaneously activated/deactivated, max. 8 - Number of IO Devices per tool, max. The minimum value of the update time also depends on - Updating times communication share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data Update time for IRT — for send cycle of 250 µs 250 µs to 4 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 625 µs of the isochronous OB is decisive 500 µs to 8 ms; Note: In the case of IRT with isochronous mode, — for send cycle of 500 µs the minimum update time of 625 µs of the isochronous OB is decisive 1 ms to 16 ms - for send cycle of 1 ms 2 ms to 32 ms - for send cycle of 2 ms 4 ms to 64 ms - for send cycle of 4 ms Update time = set "odd" send clock (any multiple of 125 µs: 375 - With IRT and parameterization of "odd" send cycles μs, 625 μs ... 3 875 μs) Update time for RT — for send cycle of 250 µs 250 µs to 128 ms 500 µs to 256 ms — for send cycle of 500 µs 1 ms to 512 ms - for send cycle of 1 ms 2 ms to 512 ms - for send cycle of 2 ms 4 ms to 512 ms - for send cycle of 4 ms **PROFINET IO Device** Services - PG/OP communication Yes - S7 routing Yes





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— Isochronous mode— IRTNoYes

— MRP Yes; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP

Manager; MRP Client; max. number of devices in the ring: 50

— MRPD— PROFlenergyYes; Requirement: IRTYes; per user program

— Shared device— Number of IO Controllers with shared4

— Number of 10 Controllers with shared

device, max.

Autocrossing

— Asset management record Yes; per user program

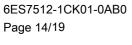
Interface types RJ 45 (Ethernet) • 100 Mbps • Autonegotiation Yes

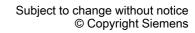
Yes

Protocols	
Number of connections	
Number of connections, max.	128; via integrated interfaces of the CPU and connected CPs / CMs
 Number of connections reserved for ES/HMI/web 	10
 Number of connections via integrated interfaces 	88
 Number of S7 routing paths 	16
Redundancy mode	
H-Sync forwarding	Yes
Media redundancy	
 Switchover time on line break, typ. 	200 ms; For MRP, bumpless for MRPD
 Number of stations in the ring, max. 	50
SIMATIC communication	
 S7 communication, as server 	Yes
 S7 communication, as client 	Yes
 User data per job, max. 	See online help (S7 communication, user data size)
Open IE communication	
• TCP/IP	Yes
— Data length, max.	64 kbyte
 several passive connections per port, supported 	Yes
• ISO-on-TCP (RFC1006)	Yes
— Data length, max.	64 kbyte
• UDP	Yes
— Data length, max.	2 kbyte; 1 472 bytes for UDP broadcast



— UDP multicast	Yes; Max. 5 multicast circuits
• DHCP	No
• SNMP	Yes
• DCP	Yes
• LLDP	Yes
Web server	
• HTTP	Yes; Standard and user pages
• HTTPS	Yes; Standard and user pages
OPC UA	
 Runtime license required 	Yes
OPC UA Client	Yes
 Application authentication 	Yes
— Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
User authentication	"anonymous" or by user name & password
 Number of connections, max. 	4
 Number of nodes of the client interfaces, max. 	1 000
 Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_Rea dList/OPC_UA_WriteList, max. 	300
 Number of elements for one call of OPC_UA_NameSpaceGetIndexList, max. 	20
 Number of elements for one call of OPC_UA_MethodGetHandleList, max. 	100
 Number of simultaneous calls of the client instructions per connection (except OPC_UA_ReadList,OPC_UA_WriteList,OPC_ UA_MethodCall), max. 	1
 Number of simultaneous calls of the client instructions OPC_UA_ReadList,OPC_UA_WriteList and OPC_UA_MethodCall, max. 	5
 Number of registerable nodes, max. 	5 000
 Number of registerable method calls of OPC_UA_MethodCall, max. 	100
— Number of inputs/outputs when calling OPC_UA_MethodCall, max.	20
OPC UA Server	Yes; Data access (read, write, subscribe), method call, custom address space
 Application authentication 	Yes
— Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
 User authentication 	"anonymous" or by user name & password





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— Number of sessions, max.	32
— Number of accessible variables, max.	50 000
— Number of registerable nodes, max.	10 000
— Number of subscriptions per session, max.	20
— Sampling interval, min.	100 ms
— Publishing interval, min.	500 ms
— Number of server methods, max.	20
— Number of inputs/outputs per server	20
method, max.	
— Number of monitored items, max.	1 000; for 1 s sampling interval and 1 s send interval
— Number of server interfaces, max.	10; or 20, depending on type of server interface
— Number of nodes for user-defined server	1 000
interfaces, max.	
er protocols	

Further

Yes; MODBUS TCP • MODBUS

Isochronous mode		
Equidistance	Yes	
S7 message functions		
Number of login stations for message functions, max.	32	
Program alarms	Yes	
Number of configurable program messages, max.	5 000; Program messages are generated by the "Program_Alarm" block, ProDiag or GRAPH	
Number of loadable program messages in RUN, max.	2 500	
Number of simultaneously active program alarms		
 Number of program alarms 	600	
 Number of alarms for system diagnostics 	100	
 Number of alarms for motion technology objects 	80	
Test commissioning functions		
Joint commission (Team Engineering)	Yes; Parallel online access possible for up to 5 engineering systems	
Status block	Yes; Up to 8 simultaneously (in total across all ES clients)	
Single step	No	
Number of breakpoints	8	
Status/control		
Status/control variable	Yes	
Variables	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters	
 Number of variables, max. 		
— of which status variables, max.	200; per job	



— of which control variables, max.

200; per job

Forcing	
Forcing, variables	Peripheral inputs/outputs
 Number of variables, max. 	200
Diagnostic buffer	
• present	Yes
 Number of entries, max. 	1 000
of which powerfail-proof	500
Traces	
Number of configurable Traces	4; Up to 512 KB of data per trace are possible

Interrupts/diagnostics/status information		
Alarms		
Diagnostic alarm	Yes	
Hardware interrupt	Yes	
Diagnoses		
 Monitoring the supply voltage 	Yes	
Wire-break	Yes; for analog inputs/outputs, see description in manual	
Short-circuit	Yes; for analog outputs, see description in manual	
 A/B transition error at incremental encoder 	Yes	
Diagnostics indication LED		
RUN/STOP LED	Yes	
• ERROR LED	Yes	
MAINT LED	Yes	
STOP ACTIVE LED	Yes	
 Monitoring of the supply voltage (PWR-LED) 	Yes	
Channel status display	Yes	
• for channel diagnostics	Yes; For analog inputs/outputs	
 Connection display LINK TX/RX 	Yes	

Supported technology objects	
Motion Control	Yes; Note: The number of axes affects the cycle time of the PLC
	program; selection guide via the TIA Selection Tool or SIZER
 Number of available Motion Control resources 	800
for technology objects	
 Required Motion Control resources 	
 per speed-controlled axis 	40
per positioning axis	80
per synchronous axis	160
— per external encoder	80
— per output cam	20
— per cam track	160
— per probe	40
Positioning axis	



 Number of positioning axes at motion 	5
control cycle of 4 ms (typical value)	
 Number of positioning axes at motion 	10
control cycle of 8 ms (typical value)	
Controller	
PID_Compact	Yes; Universal PID controller with integrated optimization
PID_3Step	Yes; PID controller with integrated optimization for valves
PID-Temp	Yes; PID controller with integrated optimization for temperature
Counting and measuring	
High-speed counter	Yes
Integrated Functions	
Number of counters	6
Counting frequency (counter) max.	400 kHz; with quadruple evaluation
Counting functions	
 Continuous counting 	Yes
 Counter response parameterizable 	Yes
 Hardware gate via digital input 	Yes
Software gate	Yes
Event-controlled stop	Yes
 Synchronization via digital input 	Yes
 Counting range, parameterizable 	Yes
Comparator	
Number of comparators	2; per count channel; see manual for details
 Direction dependency 	Yes
 Can be changed from user program 	Yes
Position detection	
 Incremental acquisition 	Yes
 Suitable for S7-1500 Motion Control 	Yes
Measuring functions	
 Measuring time, parameterizable 	Yes
 Dynamic measurement period adjustment 	Yes
 Number of thresholds, parameterizable 	2
Measuring range	
 Frequency measurement, min. 	0.04 Hz
 Frequency measurement, max. 	400 kHz; with quadruple evaluation
 Cycle duration measurement, min. 	2.5 μs
 Cycle duration measurement, max. 	25 s
Accuracy	
— Frequency measurement	100 ppm; depending on measuring interval and signal evaluation
 Cycle duration measurement 	100 ppm; depending on measuring interval and signal evaluation
 Velocity measurement 	100 ppm; depending on measuring interval and signal evaluation



Potential separation	
Potential separation digital inputs	
between the channels	No
between the channels, in groups of	16
Potential separation digital outputs	
between the channels	No
• between the channels, in groups of	16
Potential separation channels	
 between the channels and backplane bus 	Yes
 Between the channels and load voltage L+ 	No
- Isolation	
Isolation tested with	707 V DC (type test)
Ambient conditions	
Ambient temperature during operation	
horizontal installation, min.	-25 °C; No condensation
horizontal installation, max.	60 °C; note derating data for onboard I/O in the manual. Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off
 vertical installation, min. 	-25 °C; No condensation
• vertical installation, max.	40 °C; note derating data for onboard I/O in the manual. Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off
Ambient temperature during storage/transportation	
• min.	-40 °C
• max.	70 °C
max. Altitude during operation relating to sea level	70 °C
	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
Altitude during operation relating to sea level	5 000 m; Restrictions for installation altitudes > 2 000 m, see
Altitude during operation relating to sea level ● Installation altitude above sea level, max.	5 000 m; Restrictions for installation altitudes > 2 000 m, see
Altitude during operation relating to sea level • Installation altitude above sea level, max. Configuration	5 000 m; Restrictions for installation altitudes > 2 000 m, see
Altitude during operation relating to sea level • Installation altitude above sea level, max. Configuration Programming	5 000 m; Restrictions for installation altitudes > 2 000 m, see
Altitude during operation relating to sea level • Installation altitude above sea level, max. Configuration Programming Programming language	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
Altitude during operation relating to sea level • Installation altitude above sea level, max. Configuration Programming Programming language — LAD	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual Yes
Altitude during operation relating to sea level • Installation altitude above sea level, max. Configuration Programming Programming language — LAD — FBD	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual Yes Yes
Altitude during operation relating to sea level • Installation altitude above sea level, max. Configuration Programming Programming language — LAD — FBD — STL	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual Yes Yes Yes Yes
Altitude during operation relating to sea level • Installation altitude above sea level, max. Configuration Programming Programming language — LAD — FBD — STL — SCL	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual Yes Yes Yes Yes Yes
Altitude during operation relating to sea level • Installation altitude above sea level, max. Configuration Programming Programming language — LAD — FBD — STL — SCL — GRAPH	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual Yes Yes Yes Yes Yes
Altitude during operation relating to sea level • Installation altitude above sea level, max. Configuration Programming Programming language — LAD — FBD — STL — SCL — GRAPH Know-how protection	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual Yes Yes Yes Yes Yes Yes Yes
Altitude during operation relating to sea level Installation altitude above sea level, max. Configuration Programming Programming language — LAD — FBD — STL — SCL — GRAPH Know-how protection • User program protection/password protection	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual Yes Yes Yes Yes Yes Yes Yes
Altitude during operation relating to sea level • Installation altitude above sea level, max. Configuration Programming Programming language — LAD — FBD — STL — SCL — GRAPH Know-how protection • User program protection/password protection • Copy protection	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual Yes Yes Yes Yes Yes Yes Yes Yes

 Protection level: Write protection 	Yes
 Protection level: Read/write protection 	Yes
 Protection level: Complete protection 	Yes
Cycle time monitoring	
lower limit	adjustable minimum cycle time
• upper limit	adjustable maximum cycle time
Dimensions	
Width	110 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	1 360 g
last modified:	10/13/2020

