Data sheet

6ES7511-1CK00-0AB0



*** Spare part *** SIMATIC S7-1500 Compact CPU CPU 1511C-1 PN, central processing unit with work memory 175 KB for program and 1 MB for data, 16 digital inputs, 16 digital outputs, 5 analog inputs, 2 analog outputs, 6 high-speed counters, 4 high-speed counters for PTO/PWM/frequency output 1st interface: PROFINET IRT with 2-port switch, 60 ns bit performance, incl. push-in front connector, SIMATIC Memory Card required

General information	
Product type designation	CPU 1511C-1 PN
HW functional status	FS03
Firmware version	V2.9
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 version 	V17 (FW V2.9) / V13 SP1 Update 4 (FW V1.8) or higher
Configuration control	
via dataset	Yes
Display	
Screen diagonal [cm]	3.45 cm
Control elements	
Number of keys	6
Mode selector switch	1
Supply voltage	
Rated value (DC)	24 V
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	
Current consumption (rated value)	0.8 A; Digital onboard I/O modules are supplied separately
Inrush current, max.	1.9 A; Rated value
l²t	0.34 A ² ·s
Digital inputs	
 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 / header	
Rated value (DC)	24 V
Encoder supply	
Number of outputs	1; One common 24 V encoder supply
24 V encoder supply	
• 24 V	Yes; L+ (-0.8 V)

Short-circuit protection	Yes
Output current, max.	1 A
Power	17
Infeed power to the backplane bus	10 W
Power consumption from the backplane bus (balanced)	8.5 W
Power loss	0.5 W
Power loss, typ.	11.8 W
	11:0 VV
Number of clote for SIMATIC memory cord	1
Number of slots for SIMATIC memory card	Yes
SIMATIC memory card required Work memory	165
integrated (for program)	175 kbyte
• integrated (for data)	1 Mbyte
Load memory	· mayte
Plug-in (SIMATIC Memory Card), max.	32 Gbyte
Backup	
maintenance-free	Yes
CPU processing times	
for bit operations, typ.	60 ns
for word operations, typ.	72 ns
for fixed point arithmetic, typ.	96 ns
for floating point arithmetic, typ.	384 ns
CPU-blocks	
Number of elements (total)	4 000; 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.	175 kbyte
FC	
Number range	0 65 535
• Size, max.	175 kbyte
OB	
• Size, max.	175 kbyte
Number of free cycle OBs	100
Number of time alarm OBs	20
Number of delay alarm OBs	20
Number of cyclic interrupt OBs Number of process plans OBs	20; With minimum OB 3x cycle of 500 μs
Number of DRV4 clarm OBs	50
 Number of DPV1 alarm OBs Number of isochronous mode OBs 	3
 Number of isocnronous mode OBs Number of technology synchronous alarm OBs 	1 2
 Number of technology synchronous alarm OBS Number of startup OBs 	100
Number of startup OBs Number of asynchronous error OBs	4
Number of asynchronous error OBs	2
Number of synchronous end obs Number of diagnostic alarm OBs	1
Nesting depth	
per priority class	24
n - n - v - v - v - v - v - v - v - v -	<u></u>
Counters, timers and their retentivity	24
Counters, timers and their retentivity	24
S7 counter	
S7 counter • Number	2 048
S7 counter • Number Retentivity	
S7 counter • Number	2 048
S7 counter • Number Retentivity — adjustable	2 048 Yes
S7 counter • Number Retentivity — adjustable IEC counter	2 048
S7 counter • Number Retentivity — adjustable IEC counter • Number	2 048 Yes

S7 times	
● Number	2 048
Number Retentivity	2 U 1 U
— adjustable	Yes
IEC timer	
• Number	Any (only limited by the main memory)
Retentivity	, any (only minuted by the mean memory)
— 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	
• Size, 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	1 024; 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	
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	4; A maximum of 4 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total
Number of IO Controllers	
integratedVia CM	1 4; A maximum of 4 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can
	be inserted in total
Rack	00 0011 01
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

. 40	V
• in AS, master	Yes
• in AS, slave	Yes
on Ethernet via NTP	Yes
Digital inputs	40
integrated channels (DI)	16
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 "1" to "0", min.	4 µs; for parameterization "none"
— at "1" to "0", max.	20 ms
for interrupt inputs	
— 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	
Digital outputs Type of digital output	Transistor
	Transistor 16
Type of digital output	
Type of digital output integrated channels (DO)	16
Type of digital output integrated channels (DO) Current-sourcing	16 Yes; Push-pull output
Type of digital output integrated channels (DO) Current-sourcing Short-circuit protection	16 Yes; Push-pull output Yes; electronic/thermal 1.6 A with standard output, 0.5 A with high-speed output; see manual for
Type of digital output integrated channels (DO) Current-sourcing Short-circuit protection • Response threshold, typ.	16 Yes; Push-pull output Yes; electronic/thermal 1.6 A with standard output, 0.5 A with high-speed output; see manual for details
Type of digital output integrated channels (DO) Current-sourcing Short-circuit protection • Response threshold, typ. Limitation of inductive shutdown voltage to	16 Yes; Push-pull output Yes; electronic/thermal 1.6 A with standard output, 0.5 A with high-speed output; see manual for details -0.8 V Yes Up to ±100 ppm ±2 μs at high-speed output; see manual for details
Type of digital output integrated channels (DO) Current-sourcing Short-circuit protection • Response threshold, typ. Limitation of inductive shutdown voltage to Controlling a digital input	16 Yes; Push-pull output Yes; electronic/thermal 1.6 A with standard output, 0.5 A with high-speed output; see manual for details -0.8 V Yes
Type of digital output integrated channels (DO) Current-sourcing Short-circuit protection • Response threshold, typ. Limitation of inductive shutdown voltage to Controlling a digital input Accuracy of pulse duration	16 Yes; Push-pull output Yes; electronic/thermal 1.6 A with standard output, 0.5 A with high-speed output; see manual for details -0.8 V Yes Up to ±100 ppm ±2 μs at high-speed output; see manual for details
Type of digital output integrated channels (DO) Current-sourcing Short-circuit protection • Response threshold, typ. Limitation of inductive shutdown voltage to Controlling a digital input Accuracy of pulse duration minimum pulse duration Digital output functions, parameterizable • Switching tripped by comparison values	16 Yes; Push-pull output Yes; electronic/thermal 1.6 A with standard output, 0.5 A with high-speed output; see manual for details -0.8 V Yes Up to ±100 ppm ±2 μs at high-speed output; see manual for details
Type of digital output integrated channels (DO) Current-sourcing Short-circuit protection Response threshold, typ. Limitation of inductive shutdown voltage to Controlling a digital input Accuracy of pulse duration minimum pulse duration Digital output functions, parameterizable	Yes; Push-pull output Yes; electronic/thermal 1.6 A with standard output, 0.5 A with high-speed output; see manual for details -0.8 V Yes Up to ±100 ppm ±2 μs at high-speed output; see manual for details 2 μs; With High Speed output Yes; As output signal of a high-speed counter Yes
Type of digital output integrated channels (DO) Current-sourcing Short-circuit protection • Response threshold, typ. Limitation of inductive shutdown voltage to Controlling a digital input Accuracy of pulse duration minimum pulse duration Digital output functions, parameterizable • Switching tripped by comparison values	Yes; Push-pull output Yes; electronic/thermal 1.6 A with standard output, 0.5 A with high-speed output; see manual for details -0.8 V Yes Up to ±100 ppm ±2 μs at high-speed output; see manual for details 2 μs; With High Speed output Yes; As output signal of a high-speed counter
Type of digital output integrated channels (DO) Current-sourcing Short-circuit protection • Response threshold, typ. Limitation of inductive shutdown voltage to Controlling a digital input Accuracy of pulse duration minimum pulse duration Digital output functions, parameterizable • Switching tripped by comparison values • PWM output — Number, max. — Cycle duration, parameterizable	Yes; Push-pull output Yes; electronic/thermal 1.6 A with standard output, 0.5 A with high-speed output; see manual for details -0.8 V Yes Up to ±100 ppm ±2 μs at high-speed output; see manual for details 2 μs; With High Speed output Yes; As output signal of a high-speed counter Yes 4 Yes
Type of digital output integrated channels (DO) Current-sourcing Short-circuit protection Response threshold, typ. Limitation of inductive shutdown voltage to Controlling a digital input Accuracy of pulse duration minimum pulse duration Digital output functions, parameterizable Switching tripped by comparison values PWM output Number, max. Cycle duration, parameterizable ON period, min.	Yes; Push-pull output Yes; electronic/thermal 1.6 A with standard output, 0.5 A with high-speed output; see manual for details -0.8 V Yes Up to ±100 ppm ±2 μs at high-speed output; see manual for details 2 μs; With High Speed output Yes; As output signal of a high-speed counter Yes 4
Type of digital output integrated channels (DO) Current-sourcing Short-circuit protection Response threshold, typ. Limitation of inductive shutdown voltage to Controlling a digital input Accuracy of pulse duration minimum pulse duration Digital output functions, parameterizable Switching tripped by comparison values PWM output Number, max. Cycle duration, parameterizable ON period, min. ON period, max.	Yes; Push-pull output Yes; electronic/thermal 1.6 A with standard output, 0.5 A with high-speed output; see manual for details -0.8 V Yes Up to ±100 ppm ±2 μs at high-speed output; see manual for details 2 μs; With High Speed output Yes; As output signal of a high-speed counter Yes 4 Yes 0 % 100 %
Type of digital output integrated channels (DO) Current-sourcing Short-circuit protection Response threshold, typ. Limitation of inductive shutdown voltage to Controlling a digital input Accuracy of pulse duration minimum pulse duration Digital output functions, parameterizable Switching tripped by comparison values PWM output Number, max. Cycle duration, parameterizable ON period, min.	Yes; Push-pull output Yes; electronic/thermal 1.6 A with standard output, 0.5 A with high-speed output; see manual for details -0.8 V Yes Up to ±100 ppm ±2 μs at high-speed output; see manual for details 2 μs; With High Speed output Yes; As output signal of a high-speed counter Yes 4 Yes 0 %
Type of digital output integrated channels (DO) Current-sourcing Short-circuit protection Response threshold, typ. Limitation of inductive shutdown voltage to Controlling a digital input Accuracy of pulse duration minimum pulse duration Digital output functions, parameterizable Switching tripped by comparison values PWM output Number, max. Cycle duration, parameterizable ON period, min. ON period, max. Resolution of the duty cycle Frequency output	Yes; Push-pull output Yes; electronic/thermal 1.6 A with standard output, 0.5 A with high-speed output; see manual for details -0.8 V Yes Up to ±100 ppm ±2 μs at high-speed output; see manual for details 2 μs; With High Speed output Yes; As output signal of a high-speed counter Yes 4 Yes 0 % 100 %
Type of digital output integrated channels (DO) Current-sourcing Short-circuit protection Response threshold, typ. Limitation of inductive shutdown voltage to Controlling a digital input Accuracy of pulse duration minimum pulse duration Digital output functions, parameterizable Switching tripped by comparison values PWM output Number, max. Cycle duration, parameterizable ON period, min. ON period, max. Resolution of the duty cycle	Yes; Push-pull output Yes; electronic/thermal 1.6 A with standard output, 0.5 A with high-speed output; see manual for details -0.8 V Yes Up to ±100 ppm ±2 μs at high-speed output; see manual for details 2 μs; With High Speed output Yes; As output signal of a high-speed counter Yes 4 Yes 0 % 100 % 0.0036 %; For S7 analog format, min. 40 ns
Type of digital output integrated channels (DO) Current-sourcing Short-circuit protection Response threshold, typ. Limitation of inductive shutdown voltage to Controlling a digital input Accuracy of pulse duration minimum pulse duration Digital output functions, parameterizable Switching tripped by comparison values PWM output Number, max. Cycle duration, parameterizable ON period, min. ON period, max. Resolution of the duty cycle Frequency output	Yes; Push-pull output Yes; electronic/thermal 1.6 A with standard output, 0.5 A with high-speed output; see manual for details -0.8 V Yes Up to ±100 ppm ±2 μs at high-speed output; see manual for details 2 μs; With High Speed output Yes; As output signal of a high-speed counter Yes 4 Yes 0 % 100 % 0.0036 %; For S7 analog format, min. 40 ns Yes 0.5 A; 0.1 A with high-speed output, i.e. when using a high-speed output; see manual for details
Type of digital output integrated channels (DO) Current-sourcing Short-circuit protection Response threshold, typ. Limitation of inductive shutdown voltage to Controlling a digital input Accuracy of pulse duration minimum pulse duration Digital output functions, parameterizable Switching tripped by comparison values PWM output Number, max. Cycle duration, parameterizable ON period, min. ON period, max. Resolution of the duty cycle Frequency output Switching capacity of the outputs	Yes; Push-pull output Yes; electronic/thermal 1.6 A with standard output, 0.5 A with high-speed output; see manual for details -0.8 V Yes Up to ±100 ppm ±2 μs at high-speed output; see manual for details 2 μs; With High Speed output Yes; As output signal of a high-speed counter Yes 4 Yes 0 % 100 % 0.0036 %; For S7 analog format, min. 40 ns Yes

• lower limit	48 Ω ; 240 ohms with high-speed output, i.e. when using a high-speed output; see manual for details
• upper limit	12 kΩ
Output voltage	
Type of output voltage	DC
• for signal "0", max.	1 V; With high-speed output, i.e. when using a high-speed output; see
,	manual for details 23.2 V; L+ (-0.8 V)
• for signal "1", min.	23.2 V, L+ (-0.0 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 µs; 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
	1 60; for teermological functions. No
Switching frequency	400 lile. Fee kink annual 11 400 lile (11 11 11 11 11 11 11 11 11 11 11 11 11
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 group, max. 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	,
	0.5. At any additional department in the manual
— Current per channel, max.	0.5 A; see additional description in the manual
Relay outputs	
Number of relay outputs	0
Cable length	
• 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 For resistance/resistance thermometer 	4; max. 1
permissible input voltage for voltage input (destruction	28.8 V
limit), max. permissible input current for current input (destruction	40 mA
limit), max.	
Cycle time (all channels), min.	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 k Ω
• 1 V to 5 V	Yes; Physical measuring range: ± 10 V
	100 k Ω
— Input resistance (1 V to 5 V)	
• -10 V to +10 V	Yes

Input resistance / 10 V to ±10 V/	100 kΩ
— Input resistance (-10 V to +10 V)• -5 V to +5 V	7.5.5.1.1.2
	Yes; Physical measuring range: ± 10 V 100 kΩ
— Input resistance (-5 V to +5 V)	100 ΚΩ
Input ranges (rated values), currents	V DI : 1
• 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	555 m, 151 5m, 255 m 151 FUTUE
	2
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 mandar
• 0 to 10 V	Yes
• 1 V to 5 V	Yes
• -10 V to +10 V	Yes
Output ranges, current	V
• 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), max.	16 bit
Integration time, parameterizable	Yes; 2.5 / 16.67 / 20 / 100 ms, acts on all channels
Interference voltage suppression for interference	400 / 60 / 50 / 10
frequency f1 in Hz	1007 007 10
Smoothing of measured values	
parameterizable	Yes
Step: None	Yes
• Step: low	Yes
Step: Nedium	Yes
• Step: High	Yes
	100
Analog value generation for the outputs	
Integration and conversion time/resolution per channel	4017
Resolution with overrange (bit including sign), max.	16 bit
Settling time	

for an elektrical and	45
• 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 	Yes
offset	
 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), (+/-)	0.15 %
Temperature error (relative to output range), (+/-)	0.005 %/K
Crosstalk between the outputs, max.	-80 dB
Repeat accuracy in steady state at 25 °C (relative to output range), (+/-)	0.05 %
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	V.
— PG/OP communication	Yes
— Isochronous mode	Yes
— Direct data exchange	Yes; Requirement: IRT and isochronous mode (MRPD optional)
— IRT — PROFlenergy	Yes
Prorienergy Prioritized startup	Yes; per user program Yes; Max. 32 PROFINET devices
— Number of connectable IO Devices, max.	128; In total, up to 256 distributed I/O devices can be connected via AS-
— Number of confidentable to Devices, max.	i, PROFIBUS or PROFINET
 Of which IO devices with IRT, max. 	64
 Number of connectable IO Devices for RT, 	128
max.	
— of which in line, max.	128
Number of IO Devices that can be simultaneously activated descriveted may.	8; in total across all interfaces
simultaneously activated/deactivated, max.	8
— Number of IO Devices per tool, max. — Updating times	The minimum value of the update time also depends on communication
— Opdating times	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
— for send cycle of 500 μs	500 μs to 8 ms; Note: In the case of IRT with isochronous mode, the
— for seria cycle of 500 μs	minimum update time of 625 µs of the isochronous OB is decisive
— for send cycle of 1 ms	1 ms to 16 ms
— for send cycle of 2 ms	2 ms to 32 ms
— for send cycle of 4 ms	4 ms to 64 ms
 With IRT and parameterization of "odd" send 	Update time = set "odd" send clock (any multiple of 125 µs: 375 µs, 625
cycles	μs 3 875 μs)
Update time for RT	250 up to 420 mg
— for send cycle of 250 μs	250 µs to 128 ms
— for send cycle of 500 μs	500 µs to 256 ms
— for send cycle of 1 ms	1 ms to 512 ms
— for send cycle of 2 ms	2 ms to 512 ms 4 ms to 512 ms
— for send cycle of 4 ms PROFINET IO Device	4 III5 to 012 III5
Services	
— PG/OP communication	Yes
— Isochronous mode	No
— IRT	Yes
— PROFlenergy	Yes; per user program
— Shared device	Yes
Number of IO Controllers with shared device,	4
max.	
 activation/deactivation of I-devices 	Yes; per user program

Interface lypes # 145 (Etheret) • 100 Maps • Autocrossing • Autocrossing • Autocrossing • Autocrossing • Autocrossing • Number of connections • Number of connections reserved for ES/HMINveb • Number of connections reserved for FS/HMINveb • Number of connections integrated interfaces • Number of SY routing paths ## 16 Redundancy — Media redundancy — MRP — MRP — MRP — MRP — MRP — MRP interconnection, supported — MRP — Switchover time on line break, typ. — Switchover time on line break, typ. — Switchover time on line break, typ. — Number of datations in the ring, max. Signature Symmetric Sym	Asset management record	Yes; per user program
Not on Morpo Autocrospilation Autocrospilation Autocrospilation Autocrospilation Autocrospilation Autocrospilation Autocrospilation Autocrospilation Number of connections Number of connections Number of connections Number of connections reserved for ES/HMI/web Number of connections integrated interfaces Number of strouting paths Number of strouting paths Autocrospilation Autocrospilation Autocrospilation Autocrospilation Number of strouting paths Autocrospilation	Interface types	
Autocrossing Auto	RJ 45 (Ethernet)	
Autocrossing	• 100 Mbps	Yes
• Industrial Ethernet status LED Protocotors Number of connections, max. • Number of connections reserved for ESH-MI/web • Number of connections reserved for ESH-MI/web • Number of connections reserved for ESH-MI/web • Number of strouting paths Education ST routing paths - H-Sync forwarding - Media redundancy - MRP - MRP - MRP interconnection, supported - MRP interconnection, supported - MRP - Switchover time on line break, typ. - Switchover time on line break, typ. - Switchover time on line break, typ. - Number of stations in the ring, max. SIMATIC communication • PGIOP communication • PGIOP communication • PGIOP communication, as server • ST communication, as server • ST communication, as client • User data per job, max - See online help (S7 communication, user data size) Poen IE communication • TCPIP - Data length, max - several passive connections per port, supported • ISO-en-TCP (RFC1006) - Data length, max - UDP multicast • UDP - Data length, max - UDP multicast • DICP • INS • SNMP • DCP • LILDP • Recryption • Wes server • HTTP • HTTP • HTTP • HTTP • HTTP • Resident and user pages PCP UA Client - Application authernication - Number of connections, max. - Number of connections, max. - Number of lenneths for one call of OPC UA, Node-GetHandelList/OPC_UA_ReadListC max. - Number of lenneths for one call of OPC_UA, Node-GetHandelList/OPC_UA_ReadListC max. - Number of lenneths for one call of OPC_UA, Node-GetHandelList/OPC_UA_ReadListC max. - Number of connections, max.	 Autonegotiation 	Yes
Number of connections	 Autocrossing 	Yes
Number of connections Number of connections, max. Number of connections reserved for ES/HMI/web Number of connections reserved for ES/HMI/web Number of Strouting paths Number of Stations in the ring, max. Number of stations in the ring, max. Number of stations paths Number	Industrial Ethernet status LED	Yes
Number of connections, max. Number of connections via integrated interfaces of the CPU and connected CPs / CMs on Number of S7 routing paths Nedia redundancy - Media redundancy - Media redundancy - MRP NRP interconnection, supported - MRPP - Number of state in the ring, max. Number of state in the ring, ma	Protocols	
Number of connections reserved for ESHMINveb Number of connections via integrated interfaces Number of S7 routing paths Redundancy mode H-Bryon Convarding Media redundancy —MRIP —MRIP interconnection, supported —MRIP —Switchover time on line break, typ. —Switchover time on line break, typ. —Number of stations in the ring, max. SMATIC communication PROP —Svitchover time on line break, typ. —Number of stations in the ring, max. SEMATIC communication PROP —Svitchover time on line break, typ. —Number of stations in the ring, max. PROP —Switchover time on line break, typ. —Number of stations in the ring, max. PROP —Switchover time on line break, typ. —Number of stations in the ring, max. PROP —Switchover time on line break, typ. —Number of stations in the ring, max. PROP —Switchover time on line break, typ. —Number of stations in the ring, max. PROP —Switchover time on line break, typ. —Number of stations in the ring, max. PROP —Switchover time on line break, typ. —Number of stations in the ring, max. PROP —Switchover time on line break, typ. —Switchover time on line break, typ. —Number of stations in the ring, max. PROP —Switchover time on line break, typ. —Number of stations in the ring, max. PROP —Switchover time on line break, typ. —Number of stations in the ring, max. PROP —Switchover time on line break, typ. —Number of stations in the ring, max. PROP —Switchover time on line break, typ. —Number of stations in the ring, max. PROP —Switchover time on line break, typ. —Switchover time on line break, typ. —Number of stations in the ring, max. —Number of leanest stations on one all of the client interfaces, max. —Number of leanest station on one all of the ring, max. —Number of elements for one call of the client interfaces, max. —Number of leanest store one call of the ring, max. —Number of leanest station on one call of the ring, max. —Number of stations on one call of the ring, max. —Number of leanest station one call of the ring, max. —Number of leanest stations on one call of the ring, max. —	Number of connections	
Number of Connections via integrated interfaces Number of Strouting paths Redundancy	 Number of connections, max. 	96; via integrated interfaces of the CPU and connected CPs / CMs
Redundancy mode H-Sync forwarding H-Sync forwarding Media redundancy	 Number of connections reserved for ES/HMI/web 	10
Redudancy mode H-Sync forwarding Media redundancy — Media redundancy — MRP — MRP Herconnection, supported — MRP Herconnection, supported — MRPD — Switchover time on line break, typ. — Number of stations in the ring, max SIMATIC communication P FGCP communica	 Number of connections via integrated interfaces 	64
Media redundancy — Media redundancy — Media redundancy — MRP — MRP Many Manager, MRP Client — MRP Interconnection, supported — MRPD Yes: AMRP interconnection, supported — MRPD Yes: Requirement: IRT — Switchover time on line break, typ. — Number of stations in the ring, max. SIMIATIC communication	Number of S7 routing paths	16
Media redundancy — Mere aredundancy — MRP — MRP Mre Yes; MRP Automanager according to IEC 62439-2 Edition 2.0, MRP Manager, MRP Client — MRP Interconnection, supported — MRPI — MRP interconnection, supported — MRPI — Switchover time on line break, typ. — Switchover time on line break, typ. — Number of stations in the ring, max. 50 SIMATIC communication • PG/OP communication • PG/OP communication • PG/OP communication • PG/OP communication • ST routing • ST communication, as server • ST communication, as client • ST communication, as client • ST communication, as client • ST communication • TCP/IP — Data length, max. — several passive connections per port, supported • ISO-on-TCP (RFC1006) • Data length, max. — UDP — Data length, max. — UDP multicast • DHCP • DNS • SNMP • Yes • DNS • SNMP • Yes • DCP • LLDP • LDP • LENCYPION • HTTP • Yes; Standard and user pages • HTTP • Yes; Standard and user pages • HTTP • Pesculty policies • Ravitime license required • OPC UA Client — Number of connections, max. — Number of connections, max. — Number of olenemists for one call of OPC_UA_Node/GetHandleLst/OPC_UA_ReadList/omax. — Number of elements for one call of OPC_UA_Node/GetHandleLst/OPC_UA_ReadList/omax. — Number of elements for one call of OPC_UA_Node/GetHandleLst/OPC_UA_ReadList/omax. — Number of elements for one call of OPC_UA_Node/GetHandleLst/OPC_UA_ReadList/omax. — Number of elements for one call of OPC_UA_Node/GetHandleLst/OPC_UA_ReadList/omax. — Number of lements for one call of OPC_UA_ReadList/omax. — Number of lements for one call of OPC_UA_ReadList/omax. — Number of lements for one call of OPC_UA_ReadList/omax. — Number of lements for one call of OPC_UA_ReadList/omax. — Number of lements for one call of OPC_UA_ReadList/omax. — Number of lements for one call of OPC_UA_ReadList/omax. — Number of lements for one call of OPC_UA_ReadList/omax. — Number of lements for one call of OPC_UA_ReadList/omax. — Number of lements for one call of OPC_UA_ReadList/omax. — Number of lements for one call of OPC_UA	-	
Media redundancy only via 1st Interface (X1) MRP MRP interconnection, supported MRPD MRPD MRPD Switchover time on line break, bp Number of stations in the ring, max. SiMATIC communication - PG/OP communication - PG/OP communication - S7 communication, as client - S8 ro communication, as client - S9 ro communication - S7 communication, as client - S9 ro communication - CP/IP - Data length, max. - SiMIP - Data length, max	-	Yes
- MRP - MRP interconnection, supported - MRP interconnection interfield interfaces, in the single interface interfaces in the single interfaces	· · · · · · · · · · · · · · · · · · ·	
- MRPD - Switchover time on line break, typ Number of stations in the ring, max. SIMATIC communication • PG/OP communication • PG/OP communication • PG/OP communication • PG/OP communication • S7 routing • S7 communication, as server • S7 communication, as server • S7 communication, as server • S8 communication, as client • User data per job, max. See online help (S7 communication, user data size) Open IE communication • TCP/IP — Data length, max. — Several passive connections per port, supported • ISO-on-TCP (RFC1006) — Data length, max. — UDP — Data length, max. — UDP multicast • DHCP • DNS • SNMP — Data length, max. — UDP multicast • Pes • SNMP • DCP • DNS • SNMP • SNMP • DCP • LLDP • Encryption Web server • HTTP • Yes; Standard and user pages • HTTP • Yes; Standard and user pages • HTTP • Yes; Standard and user pages • HTTP • Yes; Standard and user pages • HTTP • Yes; Standard and user pages • HTTP • Yes; Standard and user pages • HTTP • Yes; Standard and user pages • User authentication — Security policies — User authentication — Security policies — User authentication — Number of connections, max. — Number of elements for one call of OPC_UA_NudeGetHandleList/OPC_UA_ReadList/C max. — Number of elements for one call of OPC_UA_NudeGetHandleList/OPC_UA_ReadList/C max.		Manager; MRP Client
- Switchover time on line break, typ Number of stations in the ring, max. SIMATIC communication • PG/OP communication, as server • S7 communication, as client • User data per job, max. • User data per job, max. — See online help (S7 communication, user data size) Open IE communication • TCP/IP — Data length, max. — several passive connections per port, supported • ISO-On-TCP (RFC1006) — Data length, max. — UDP — Data length, max. — UDP multicast • DHCP • DNS • SNMP • DNS • SNMP • DCP • Encryption Ves • LLDP • Encryption • First place and and user pages • HTTP • Yes; Standard and user pages OPC UA • Runtime license required • OPC UA Client — Application authentication — Security policies — User authentication — Number of connections, max. — Number of connections, max. — Number of connections, max. — Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. — Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. — Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. — Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. — Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. — Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max.	• •	
- Number of stations in the ring, max. SIMATIC communication ● PG/OP communication ● S7 routing ● S7 routing ● S7 communication, as server ● S7 communication, as client ● User data per job, max. Open IE communication ● TCPIP - Data length, max several passive connections per port, supported ● ISO-on-TCP (RFC1006) - Data length, max. ● UDP - Data length, max. - UDP multicast ● DHCP • SNMP • SNMP • SNMP • CPC • LLIDP - Encryption Web server ● HTTP - Yes; Standard and user pages OPC UA • Runtime license required • OPC UA Client - Application authentication - Security policies - Security policies - Number of connections, max. - Number of onese of the client interfaces, max. - Number of onese of the client interfaces, max. - Number of elements for one call of OPC UA_Node-SetHandlet.ist/OPC_UA_ReadList/C max. - Number of elements for one call of OPC UA_Node-SetHandlet.ist/OPC_UA_ReadList/C max. - Number of olese of the client interfaces, max. - Number of olese of the client interfaces, max. - Number of olese of the client interfaces, max. - Number of olese of the client interfaces, max. - Number of olese of the client interfaces, max. - Number of olese of the client interfaces, max. - Number of olese of the client interfaces, max. - Number of olese of the client interfaces, max. - Number of olese of the client interfaces, max. - Number of olese of the client interfaces, max. - Number of olese of the client interfaces, max. - Number of olese of the client interfaces, max. - Number of olese of the client interfaces, max. - Number of olese of the client interfaces, max. - Number of olese of the client interfaces, max.		·
SIMATIC communication PG/OP communication Sf routing Sf routing Sf communication, as server Sf communication, as client User data per job, max. Copen IE communication TCP/IP Data length, max. - several passive connections per port, supported ISO-on-TCP (RFC1008) Data length, max. UDP Data length, max. UDP Data length, max. Seven in wax. UDP Data length, max. Seven in wax.		
PG/OP communication ST routing ST routing ST communication, as server ST communication, as server ST communication, as client ST communication, as client ST communication, as client ST communication ST communication ST communication ST communication ST communication ST communication TCP/IP Data length, max. See online help (ST communication, user data size) Pata length, max. See online help (ST communication, user data size) Pata length, max. See online help (ST communication, user data size) Pata length, max. See online help (ST communication, user data size) Pata length, max. See online help (ST communication, user data size) Pata length, max. See online help (ST communication, user data size) Pata length, max. See online help (ST communication, user data size) Pata length, max. See online help (ST communication, user data size) Pata length, max. See online help (ST communication, user data size) Pata length, max. Pata length, max. See online help (ST communication, user data size) Pata length, max. See online help (ST communication, user data size) Pata length, max. See online help (ST communication, user data size) Pata length, max. Pata length, max. See online help (ST communication, user data size) Pata length, max. See online help (ST communication, user data size) Pata length, max. See online help (ST communication) Pata length, max. See online help (ST communicat		50
• \$7 routing • \$7 communication, as server • \$7 communication, as client • User data per job, max. • See online help (\$7 communication, user data size) Open IE communication • TCP/IP — Data length, max. — several passive connections per port, supported • (\$10-0n-TCP (RFC1006) — Data length, max. — UDP — Data length, max. — UDP — Data length, max. — UDP multicast • UDP — Yes • NMR • SNMP • SNMP • SNMP • CCP • LLLDP • Encryption Web server • HTTP • HTTPS • Yes; Standard and user pages OPC UA • Runtime license required • OPC UA Client — Application authentication — Security policies — Application authentication — Security policies — User authentication — Number of connections, max. — Number of elements for one call of OPC UA, Node-GetHandle List/OPC_UA_ReadList/C max. — Number of elements for one call of OPC UA, Node-GetHandle List/OPC_UA_ReadList/C max. — Number of elements for one call of OPC UA, Node-GetHandle List/OPC_UA_ReadList/C max.		Voca openintion with TLC V4.2 are releated
• \$7 communication, as server • \$7 communication, as client • User data per job, max. Open IE communication • TCP/IP — Data length, max. — several passive connections per port, supported • ISO-on-TCP (RFC1006) — Data length, max. — 54 kbyte • Data length, max. — 54 kbyte — Data length, max. — 64 kbyte • UDP — Data length, max. — 24 kbyte; 1 472 bytes for UDP broadcast — UDP multicast — UDP multicast — Yes; Max. 5 multicast circuits • DHCP • DNS • SNMP • Yes • DNS • SNMP • Pes • Encryption Web server • HTTP • HTTP • HTTP • HTTP • Yes; Standard and user pages OPC UA • Runtime license required • OPC UA Client — Application authentication — Security policies — User authentication — Number of connections, max. — Number of nodes of the client interfaces, max. — Number of nodes of the client interfaces, max. — Number of ondes of the client interfaces, max. — Number of lements for one call of OPC_UA_Node-GetHandleList/OPC_UA_ReadList/C max.		
Solution Service Serv	•	
User data per job, max. Open IE communication TCP/IP - Data length, max several passive connections per port, supported ISO-on-TCP (RFC1006) - Data length, max UDP - Data length, max UDP - Data length, max UDP multicast - UDP multicast - UDP yes; Max. 5 multicast circuits DHCP - Data length, max UDP multicast - UDP yes; Max. 5 multicast circuits DHCP - Yes - DNS - Yes - SNMP - Yes - ODP - Yes - LLDP - LLDP - Yes - LLDP - Encryption Web server - HTTP - Yes; Standard and user pages - HTTPS - Yes; Standard and user pages OPC UA Runtime license required - OPC UA Client - Application authentication - Security policies - Security policies - Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 - User authentication - Number of nodes of the client interfaces, max Number of nodes of the client interfaces, max Number of nodes of the client interfaces, max Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max.		
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• TCP/IP - Data length, max several passive connections per port, supported • ISC-on-TCP (RFC1006) - Data length, max UDP - Data length, max UDP - Data length, max UDP multicast - Ves; Max. 5 multicast circuits - Ves - UNB max Ves - Ves; Standard and user pages - Ves; Ves; Ves; Ves; Ves; Ves; Ves; Ves;		occ omine help (or communication, user data size)
- Data length, max several passive connections per port, supported ISO-on-TCP (RFC1006) - Data length, max. UDP - Data length, max UDP multicast - Ves; Max. 5 multicast circuits - DHCP - Ves - DNS - SNMP - Ves - DCP - Ves - ULDP - Ves - ULDP - Ves - ULDP - Ves - ULDP - Ves - ULTP - Ves; Optional Web server - HTTP - Ves; Standard and user pages - Ves; Ves; Ves; Ves; Ves; Ves; Ves; Ves;	·	Yes
several passive connections per port, supported ISO-on-TCP (RFC1006) Data length, max. IUDP Data length, max UDP multicast UDP multicast UDP multicast UDP multicast UDP multicast UDP multicast Ves DNS Security policies Security policies Number of connections, max Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. VUDP multicast Yes Aplication authentication Ves Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. VUDP multicast Aplication authentication Ves Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. Vunder of the call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. VUDP multicast Aplication authentication Ves Aplication authentication Ves Application authentication Ves Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. Ves -		
ISO-on-TCP (RFC1006) Data length, max. UDP Data length, max. UDP multicast EDHCP DNS SNMP DCP ELDP Encryption Web server HTTP Runtime license required OPC UA Client Application authentication Security policies Web assword Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 "anonymous" or by user name & password A number of nodes of the client interfaces, max. Number of lements for one call of OPC_UA_ReadList/C max. Page A kbyte Yes 4 kbyte Yes 64 kbyte Yes Abyle Called For UDP broadcast Yes Yes Yes Yes Yes Shaulticast circuits Yes Yes Yes Standard and user pages Yes; Standard and user pages Yes Auailable security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 "anonymous" or by user name & password 1 000 300	 several passive connections per port, 	
- Data length, max. • UDP - Data length, max. - UDP multicast DHCP DNS SNMP Encryption HTTP HTTPS PERUTE PERUTE POPC UA Client - Application authentication Security policies - User authentication Number of nondes of the client interfaces, max. Number of nodes of the client interfaces, max. Number of lements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. Eds Whyte; 1 472 bytes for UDP broadcast Yes; Max. 5 multicast circuits Yes Yes Yes Yes Yes Yes Yes Y	• •	Yes
UDP Data length, max. UDP multicast Yes; Max. 5 multicast circuits Pes NMP DCP Encryption Web server HTTP HTTP Res; Standard and user pages OPC UA Runtime license required OPC UA Client Application authentication Security policies Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 User authentication Number of connections, max. Number of ledments for one call of OPC UA_NodeGetHandleList/OPC_UA_ReadList/C max. Ves; Max. 5 multicast or UDP broadcast Yes; Max. 5 multicast circuits Yes Yes Yes Yes Yes Optional Yes Yes; Standard and user pages OPC UA OPC UA Client Yes Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 "anonymous" or by user name & password 4 1 000 300	,	
- Data length, max UDP multicast DHCP Syes; Max. 5 multicast circuits DHCP DNS SNMP DCP LLDP Encryption Web server HTTP HTTPS Pes; Standard and user pages Per Standard and user pages OPC UA Runtime license required OPC UA Client Application authentication Security policies Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Rsa15, Basic256Rsa15, Basic256Sha256 User authentication Number of connections, max. Number of nodes of the client interfaces, max. Number of elements for one call of OPC_UA_ReadList/C max.		
- UDP multicast • DHCP • DNS • DNS • SMMP • DCP • LLDP • Encryption Web server • HTTP • HTTPS • Runtime license required • OPC UA Client - Application authentication - Security policies - User authentication - Number of connections, max. - Number of nodes of the client interfaces, max. - Number of nodes of the client interfaces, max. - Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. Yes Yes; Max. 5 multicast circuits Yes Yes Yes Yes Yes Yes Yes Y		
SNMP SNMP POCP Yes LLDP Yes Encryption Web server HTTP Yes; Standard and user pages HTTPS Yes; Standard and user pages OPC UA Runtime license required OPC UA Client — Application authentication — Security policies — User authentication — Number of connections, max. — Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. **Topical Standard and user pages Yes; Standard and user pages Yes; "Small" license required Yes *Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 "anonymous" or by user name & password 4 1 000 300		
SNMP DCP LLDP Yes Encryption Yes; Optional Web server HTTP HTTPS Yes; Standard and user pages Yes; Standard and user pages OPC UA Runtime license required OPC UA Client Application authentication Security policies Wes authentication Number of connections, max. Number of nodes of the client interfaces, max. Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. Yes Yes; Standard and user pages Yes; "Small" license required Yes; "Small" license required Yes Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 "anonymous" or by user name & password 1 000 300	• DHCP	Yes
DCP LLDP Yes Encryption Yes; Optional Web server HTTP HTTP Yes; Standard and user pages Yes; Standard and user pages OPC UA Runtime license required OPC UA Client Application authentication Security policies User authentication Number of connections, max. Number of nodes of the client interfaces, max. Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. Yes Yes; "Small" license required Yes Yes Yes; "Small" license required Yes Yes Yes Tandard and user pages Yes; "Small" license required Yes	• DNS	Yes
● Encryption ● Encryption Web server ● HTTP ● HTTPS Pyes; Standard and user pages Yes; Standard and user pages Yes; Standard and user pages OPC UA ● Runtime license required ● OPC UA Client — Application authentication — Security policies Pyes Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 — User authentication — Number of connections, max. — Number of nodes of the client interfaces, max. — Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max.	• SNMP	Yes
Encryption Yes; Optional Web server HTTP Yes; Standard and user pages Yes; Standard and user pages OPC UA Runtime license required OPC UA Client — Application authentication — Security policies Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 — User authentication — Number of connections, max. — Number of nodes of the client interfaces, max. — Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. Yes; Standard and user pages	• DCP	Yes
● HTTP ● HTTPS ● HTTPS Pes; Standard and user pages OPC UA ● Runtime license required ● OPC UA Client — Application authentication — Security policies — User authentication — Number of connections, max. — Number of nodes of the client interfaces, max. — Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. Yes; "Small" license required Yes; "Small" license required Yes Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 "anonymous" or by user name & password 4 1 000 300	• LLDP	Yes
 HTTP HTTPS Yes; Standard and user pages Yes; Standard and user pages OPC UA Runtime license required OPC UA Client Application authentication Security policies Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 User authentication Number of connections, max. Number of nodes of the client interfaces, max. Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. 	Encryption	Yes; Optional
 HTTPS OPC UA Runtime license required OPC UA Client Application authentication Security policies — Security policies Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 — User authentication — Number of connections, max. — Number of nodes of the client interfaces, max. — Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. 	Web server	
OPC UA ■ Runtime license required ■ OPC UA Client — Application authentication — Security policies — User authentication — Number of connections, max. — Number of nodes of the client interfaces, max. — Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. PYes Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 "anonymous" or by user name & password 1 000 300	• HTTP	Yes; Standard and user pages
 Runtime license required OPC UA Client — Application authentication — Security policies — User authentication — Number of connections, max. — Number of nodes of the client interfaces, max. — Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. Yes Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Rsa15, Basic256Sha256 "anonymous" or by user name & password 1 000 300 	• HTTPS	Yes; Standard and user pages
 OPC UA Client Application authentication Security policies User authentication Number of connections, max. Number of nodes of the client interfaces, max. Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. Yes Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 "anonymous" or by user name & password 1 000 300 	OPC UA	
 Application authentication Security policies Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 User authentication Number of connections, max. Number of nodes of the client interfaces, max. Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. 	·	Yes; "Small" license required
- Security policies Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 - User authentication Number of connections, max. Number of nodes of the client interfaces, max. Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 "anonymous" or by user name & password 1 000 300	OPC UA Client	
— 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_ReadList/C max.		
 Number of connections, max. Number of nodes of the client interfaces, max. Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. 	— Security policies	Basic256Sha256
 — Number of nodes of the client interfaces, max. — Number of elements for one call of 300 OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. 	User authentication	"anonymous" or by user name & password
— Number of elements for one call of 300 OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max.	Number of connections, max.	4
OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max.	•	
— Number of elements for one call of 20	OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C	
	 Number of elements for one call of 	20

OPC_UA_NameSpaceGetIndexList, max.	
 Number of elements for one call of OPC_UA_MethodGetHandleList, max. 	100
Number of simultaneous calls of the client	1
<pre>instructions per connection (except OPC_UA_ReadList,OPC_UA_WriteList,OPC_UA_M max.</pre>	
Number of simultaneous calls of the client	5
instructions OPC_UA_ReadList,OPC_UA_WriteList and OPC_UA_MethodCall, max.	
 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
 — GDS support (certificate management) 	Yes
— 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 method, max. 	20
 Number of monitored items, max. 	1 000; for 1 s sampling interval and 1 s send interval
— Number of server interfaces, max.	10 of each "Server interfaces" / "Companion specification" type and 20 of the type "Reference namespace"
 Number of nodes for user-defined server interfaces, max. 	1 000
 Alarms and Conditions 	Yes
 Number of program alarms 	100
Number of alarms for system diagnostics	50
Further protocols	
MODBUS	Yes; MODBUS TCP
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 joh
of which status variables, max. — of which control variables, max.	200; per job 200; per job
— of which control variables, max. Forcing	200, pei juu
• Forcing	Yes
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
 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 technology objects affects the cycle time of
 Number of available Motion Control resources for technology objects 	the PLC program; selection guide via the TIA Selection Tool 800
Required Motion Control resources	
— per speed-controlled axis	40
— per positioning axis	80
process and the second	
— per synchronous axis	160
— per synchronous axis — per external encoder	
— per external encoder	160
	160 80
— per external encoder — per output cam	160 80 20
per external encoderper output camper cam track	160 80 20 160
per external encoderper output camper cam trackper probe	160 80 20 160
 per external encoder per output cam per cam track per probe Positioning axis Number of positioning axes at motion control 	160 80 20 160 40
 per external encoder per output cam per cam track per probe Positioning axis Number of positioning axes at motion control cycle of 4 ms (typical value) Number of positioning axes at motion control 	160 80 20 160 40
 per external encoder per output cam per cam track per probe Positioning axis Number of positioning axes at motion control cycle of 4 ms (typical value) Number of positioning axes at motion control cycle of 8 ms (typical value) 	160 80 20 160 40
— per external encoder — per output cam — per cam track — per probe • Positioning axis — Number of positioning axes at motion control cycle of 4 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) Controller	160 80 20 160 40 5
— per external encoder — per output cam — per cam track — per probe • Positioning axis — Number of positioning axes at motion control cycle of 4 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) Controller • PID_Compact	160 80 20 160 40 5 10 Yes; Universal PID controller with integrated optimization
— per external encoder — per output cam — per cam track — per probe • Positioning axis — Number of positioning axes at motion control cycle of 4 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) Controller • PID_Compact • PID_3Step	160 80 20 160 40 5 10 Yes; Universal PID controller with integrated optimization Yes; PID controller with integrated optimization for valves
— per external encoder — per output cam — per cam track — per probe • Positioning axis — Number of positioning axes at motion control cycle of 4 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) Controller • PID_Compact • PID_3Step • PID-Temp	160 80 20 160 40 5 10 Yes; Universal PID controller with integrated optimization Yes; PID controller with integrated optimization for valves
— per external encoder — per output cam — per cam track — per probe • Positioning axis — Number of positioning axes at motion control cycle of 4 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) Controller • PID_Compact • PID_3Step • PID-Temp Counting and measuring	160 80 20 160 40 5 10 Yes; Universal PID controller with integrated optimization Yes; PID controller with integrated optimization for valves Yes; PID controller with integrated optimization for temperature
— per external encoder — per output cam — per cam track — per probe • Positioning axis — Number of positioning axes at motion control cycle of 4 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) Controller • PID_Compact • PID_3Step • PID-Temp Counting and measuring • High-speed counter	160 80 20 160 40 5 10 Yes; Universal PID controller with integrated optimization Yes; PID controller with integrated optimization for valves Yes; PID controller with integrated optimization for temperature
— per external encoder — per output cam — per cam track — per probe • Positioning axis — Number of positioning axes at motion control cycle of 4 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) Controller • PID_Compact • PID_3Step • PID-Temp Counting and measuring • High-speed counter Integrated Functions	160 80 20 160 40 5 10 Yes; Universal PID controller with integrated optimization Yes; PID controller with integrated optimization for valves Yes; PID controller with integrated optimization for temperature
— per external encoder — per output cam — per cam track — per probe • Positioning axis — Number of positioning axes at motion control cycle of 4 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) Controller • PID_Compact • PID_3Step • PID-Temp Counting and measuring • High-speed counter Integrated Functions Counting functions	160 80 20 160 40 5 10 Yes; Universal PID controller with integrated optimization Yes; PID controller with integrated optimization for valves Yes; PID controller with integrated optimization for temperature Yes
— per external encoder — per output cam — per cam track — per probe • Positioning axis — Number of positioning axes at motion control cycle of 4 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) Controller • PID_Compact • PID_AStep • PID-Temp Counting and measuring • High-speed counter Integrated Functions Counting functions • Continuous counting	160 80 20 160 40 5 10 Yes; Universal PID controller with integrated optimization Yes; PID controller with integrated optimization for valves Yes; PID controller with integrated optimization for temperature Yes
— per external encoder — per output cam — per cam track — per probe • Positioning axis — Number of positioning axes at motion control cycle of 4 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) Controller • PID_Compact • PID_3Step • PID-Temp Counting and measuring • High-speed counter Integrated Functions Counting functions • Continuous counting • Counter response parameterizable	160 80 20 160 40 5 10 Yes; Universal PID controller with integrated optimization Yes; PID controller with integrated optimization for valves Yes; PID controller with integrated optimization for temperature Yes Yes Yes
— per external encoder — per output cam — per cam track — per probe • Positioning axis — Number of positioning axes at motion control cycle of 4 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) Controller • PID_Compact • PID_3Step • PID-Temp Counting and measuring • High-speed counter Integrated Functions Counting functions • Continuous counting • Counter response parameterizable • Hardware gate via digital input	160 80 20 160 40 5 10 Yes; Universal PID controller with integrated optimization Yes; PID controller with integrated optimization for valves Yes; PID controller with integrated optimization for temperature Yes Yes Yes Yes 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 Petertial apparation phannels	16
Potential separation channels	Voc
 between the channels and backplane bus Between the channels and load voltage L+ 	Yes No
	INO
Isolation	707 \/ DC /tupo toot\
Isolation tested with	707 V DC (type test)
Ambient conditions	
Ambient temperature during operation	0.00
horizontal installation, min.	0 °C
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.	0 °C
 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	at an operating temperature of typically 40 °C, the display is switched off
min.	-40 °C
• max.	70 °C
Altitude during operation relating to sea level	
Installation altitude above sea level, max.	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
configuration / header	The state of the s
configuration / programming / header	
Programming language	
— LAD	Yes
— FBD	Yes
— STL	Yes
— SCL	Yes
— GRAPH	Yes
Know-how protection	
User program protection/password protection	Yes
Copy protection	Yes
Block protection	Yes
Access protection	
protection of confidential configuration data	Yes

 Password for display 	Yes
 Protection level: Write protection 	Yes
 Protection level: Read/write protection 	Yes
 Protection level: Complete protection 	Yes
Dimensions	
Width	85 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	1 050 g

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