## SIEMENS

## 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	
<ul> <li>I&amp;M data</li> </ul>	Yes; I&M0 to I&M3
Isochronous mode	Yes; With minimum OB 6x cycle of 625 µs (distributed)
Engineering with	
<ul> <li>STEP 7 TIA Portal configurable/integrated from version</li> </ul>	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	
<ul> <li>Mains/voltage failure stored energy time</li> </ul>	5 ms; Refers to the power supply on the CPU section
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 <sup>2</sup> ·s
Digital inputs	
<ul> <li>from load voltage L+ (without load), max.</li> </ul>	20 mA; per group
Digital outputs	
<ul> <li>from load voltage L+, max.</li> </ul>	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	

Free rowards on wards on the backglane bus (balance)         8.5 W           Prever loss         II.8 W           Mannet of skip for SMATIC memory card         1           SMATIC memory card required         Yes           Image and skip for SMATIC memory card         1           Mannet of skip for data)         15% hype           Image and for for data)         15% hype           Image and for data)         16% hype           Least memory         -           Image and for data)         26 bype           Image and for forms, fyp.         60 ns           Image and for memory, form         27 ns           Image and forms         27 ns           Image and forms         27 ns           Image and forms         384 ns           CPU backs         384 ns           Image and forms         59 bype, and number range forms forms           Image and forms         15% bype           Image and forms         0	Infeed power to the backplane bus	10 W
Power Loss         11.8 W           Mance of a loss for SIMATIC memory card         1           Number of a loss for SIMATIC memory card         1           SiMATIC minory card requined         Yes           Write memory         175 Hayle           • inlegrated for rongom         20 for cashing point attimetic, hyn.           for hot rongom point attimetic, hyn.         20 for satisfied point attimetic, hyn.           for hot rongom point attimetic, hyn.         384 no           CPU brockating for rongom         1 00 696 sadd(08, FE, FC, DB) and UDTs           for         1 00 696 sadd(08, FE, FC, DB) and UDTs           for         1 00 696 sadd(08, FE, FC, DB) and UDTs           for         1 00 696 sadd(08, FE, FC, DB) and UDTs           for lattim point, atta         17 Hayle		
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Number of slots for SIMATIC memory card required         Yes           SIMATIC memory card required         Yes           • integrated for program)         175 keyte           • integrated for data)         1Mbyte           Laad memory         32 keyte           • Rady RNATIC Memory Card), max.         32 keyte           Backson         • maintenanzo-flyp           CPU processing Lines         60 ns           for ket openations, typ.         60 ns           for ket openations, typ.         72 ns           for file openation stimules, typ.         60 ns           for file openation stimules, typ.         60 ns           for file openation stimules, typ.         60 ns           for file openation attrimetic, typ.         60 ns           for file openation attrimetic, typ.         60 ns           of trade point attrimetic, typ.         96 ns.           of file floating point attrimetic, typ.         34 ns.           eValues         1 do 535           eValues         1 do 535           eValues         1 do 535           eValue         1 do 535           eValue         1 do 535           eValue         1 do 535           eValue         1 do 535		11.6 VV
SIMA TC. memory card required         Yes           Work memory         115 kbyte           • Integrated for program         1Mbyte           • Regrated for data)         1Mbyte           • Regrated for data)         32 Gbyte           Backup         1Mbyte           • Regrated for data)         32 Gbyte           Backup         1Mbyte           • Nambre for data         Yes           • Part December for data         90 ns           for koord operations, hyp.         60 ns           for koord operations, hyp.         72 ns           for koord operations, hyp.         98 ns           for koord         98 ns		
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Lead memory         Solution                • Place Jun (SIMATIC Memory Card), max.         Solution                • maintenance-free             • Yes          Solution                 • maintenance-free          Yes                 • More Solution          Solution                 • More Frange             • Solution          Solution                 • More Frange             • Solution          Solution                 • Number range             • Solution          Solution                 • Solution          Solution                 • Solution          Solution                 • Solution          Solution                 • Number range          Solution                 • Solutio		
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maintenance-free         Yes           CPU processing times         60 ns           for word operations, bp.         60 ns           for word operations, bp.         96 ns           for freed point atthmetic, typ.         98 ns           CPU2stocks         984 ns           Number of elements (total)         4 000, Blocks (OB, FB, FC, DB) and UDTs           OB		32 Gbyte
CPU processing times     60 ns       for bit operations, typ.     72 ns       for factor point arithmetic, typ.     96 ns       for factor point arithmetic, typ.     96 ns       for factor point arithmetic, typ.     96 ns       CPU-blocks     844 ns       CPU-blocks     999, and number range       Number of elements (total)     4 000; Blocks (OB, FB, FC, DB) and UDTs       DB     10 0999; subdivided into: number range that can be used by the user 1       Number range     10 0999; subdivided into: number range that can be used by the user 1       Number range     0 65 535       size, max.     175 kbyte       FD     175 kbyte       FO     100       Number range     0 65 535       Size, max.     175 kbyte       OB     100       Number range     0 65 535       Size, max.     175 kbyte       OB     20       Number of free cycle OBs     100       Number of free cycle OBs     20       Number of free cycle OBs     100       Number of optic salarm OBs     20       Number of technology synchronous earon OBs     3       Number of salarh. OBs     20       Number of salarh. OBs     100       Number of salarh. OBs     24       Number	•	Vac
for bit operations, typ.     60 ns       for word operations, typ.     72 ns       for fixed point attimutic, typ.     96 ns       for fixed point attimutic, typ.     96 ns       CPU-blocks     Number of elements (total)     4 000; Blocks (OB, FB, FC, DB) and UDTs       OB		1 es
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for fixed point arithmetic, typ.     96 ns       for fixed inp point arithmetic, typ.     384 ns       Ortheading point arithmetic, typ.     384 ns       Other of elements (total)     4 000; Blocks (OB, FB, FC, DB) and UDTs       DB     582e, max.     1, 60 999; subdivided into: number range that can be used by the user; 1, 69 999, and number range of DBs created via SFC 66: 60 000, 60 999       FB     1, 60 999; subdivided into: number range that can be used by the user; 1, 69 999, and number range of DBs created via SFC 66: 60 000, 60 999       FB     1, 60 999; subdivided into: number range that can be used by the user; 1, 69 999, and number range of DBs created via SFC 66: 60 000, 60 999       FB     1, 60 999; subdivided into: number range that can be used by the user; 1, 69 999, and number range of DBs created via SFC 66: 60 000, 60 999       FB     1, 60 999; subdivided into: number range that can be used by the user; 1, 69 999, and number range of DBs created via SFC 66: 60 000, 60 999       FB     1, 60 999; subdivided into: number range that can be used by the user; 1, 69 999, and number range of DBs created via SFC 66: 60 000, 65 535       FB     1, 65 395       FB     1, 65 395       FB     0, 65 355       Number of free cycle OBs     20       Number of opr		
for floating point arithmetic, typ.     384 ns       CPU blocks        Vumber of elements (tota)     4 000; Blocks (OB, FE, FC, DB) and UDTs       DB     60 999; subdivided into. number range that can be used by the user; 1 65 999; and number range of DBs created via SFC 68: 60 00 60 999; subdivided into. number range that can be used by the user; 1 65 999; and number range of DBs created via SFC 68: 60 00 60 999; subdivided into. number range that can be used by the user; 1 65 999; and number range of DBs created via SFC 68: 60 00 60 535       FD        • Number range     0 65 535       • Size, max.     175 kbyte       FD        • Number of free cycle OBs     100       • Number of free cycle OBs     100       • Number of free cycle OBs     20       • Number of free cycle OBs     33       • Number of free cycle OBs     30       • Number of free cycle OBs     30       • Number of free cycle OBs     10       • Number of free cycle OBs     10       • Number of free cycle OBs     10       • Number of free cycle OBs     100       • Number of sochronous more OBs		
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• Size, max.         1 Mbyte; For DBs with absolute addressing, the max. size is 64 KB           • Number range         0 65 535           • Size, max.         175 kbyte           • O         65 535           • Size, max.         175 kbyte           • O         65 535           • Size, max.         175 kbyte           • O         65 535           • Size, max.         175 kbyte           • OB         65 535           • Number of free cycle OBS         100           • Number of free cycle OBS         20           • Number of time alarn OBS         20           • Number of groces alarn OBS         20           • Number of process alarn OBS         50           • Number of process alarn OBS         50           • Number of process alarn OBS         50           • Number of face/ycle of sochronous mode OBS         1           • Number of face/ysphorhoous alarn OBS         2           • Number of tainup OBS         100           • Number of sochronous error OBS         2           • Number of disploatic alarn OBS         2           • Number of disploatic alarn OBS         24           • Number of disploatic alarn OBS         24           • Number of d		
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• Number range0 65 535• Size, max.175 köyteFC•• Number range0 65 535• Size, max.175 köyteOB•• Size, max.175 köyte• Number of free cycle OBs100• Number of free cycle OBs100• Number of free data and DBs20• Number of delay alarm OBs20• Number of cyclic interrupt OBs20• Number of process alarm OBs50• Number of port alarm OBs3• Number of sortchnology synchronous alarm OBs1• Number of startup OBs100• Number of startup OBs100• Number of startup OBs1• Number of startup OBs2• Number of startup OBs1• Number of startup OBs2• Number of startup OBs1• Number of startup OBs1• Number of startup OBs2• Number of startup OBs2• Number of startup OBs2• Number of startup OBs2• Number of startup OBs1• Number of startup OBs2• Number2 048Retentivity4• Autor2 048Retentivity4• Autor2 048Retentivity4 <td></td> <td></td>		
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OB       • Size, max.     175 kbyte       • Number of free cycle OBs     100       • Number of time alam OBs     20       • Number of delay alam OBs     20       • Number of cyclic interrupt OBs     20; With minimum OB 3x cycle of 500 µs       • Number of protess alam OBs     50       • Number of protess alam OBs     50       • Number of protess alam OBs     3       • Number of isochronous mode OBs     1       • Number of startup OBs     100       • Number of startup OBs     100       • Number of asynchronous entor OBs     2       • Number of startup OBs     100       • Number of synchronous entor OBs     2       • Number of using depth     2       • Per priority class     2 <b>57 counter</b> 2 <b>57 counter</b> 2       • Any (only limited by the main memory)     Retentivity <b>Ele counter</b> Yes       • Any (only limite	-	
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• Number of DPV1 alarm OBs3• Number of isochronous mode OBs1• Number of isochronous alarm OBs2• Number of startup OBs100• Number of asynchronous error OBs4• Number of synchronous error OBs2• Number of diagnostic alarm OBs1• Per priority class24Counters, timers and their retentivity24S7 counter2• Number of aljustable2• Number of aljustable2Outers, timers and their retentivity2S7 counter2- adjustableYesIEC counter adjustableYesS7 times adjustable20. Number2- adjustableYes- adjustableYes	Number of cyclic interrupt OBs	20; With minimum OB 3x cycle of 500 μs
• Number of DPV1 alarm OBs3• Number of isochronous mode OBs1• Number of isochronous alarm OBs2• Number of startup OBs100• Number of asynchronous error OBs4• Number of synchronous error OBs2• Number of diagnostic alarm OBs1• Per priority class24Counters, timers and their retentivity24S7 counter2• Number of aljustable2• Number of aljustable2Outers, timers and their retentivity2S7 counter2- adjustableYesIEC counter adjustableYesS7 times adjustable20. Number2- adjustableYes- adjustableYes	Number of process alarm OBs	50
• Number of technology synchronous alarm OBs2• Number of startup OBs100• Number of asynchronous error OBs4• Number of synchronous error OBs2• Number of diagnostic alarm OBs1Number of diagnostic alarm OBs24Counters, timers and their retentivity24S7 counter2 048• Number2 048Retentivity adjustableYesIEC counter-• NumberAny (only limited by the main memory)Retentivity adjustableYess7 times adjustableYes- adjustableYes- adjustable2 048Retentivity adjustableYes- adjustableYes- adjustableYes- adjustableYes- adjustableYes- adjustableYes- adjustableYes- adjustableYes- adjustableYes- adjustableYes		3
• 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     24       Counters, timers and their retentivity     24       S7 counter     2 048       Retentivity     - adjustable       • Number     2 048       Retentivity     - adjustable       • Number     Any (only limited by the main memory)       Retentivity     - adjustable       • Number     2 048	<ul> <li>Number of isochronous mode OBs</li> </ul>	1
Number of startup OBs100Number of startup OBs4Number of asynchronous error OBs2Number of diagnostic alarm OBs1Nesting depth24Counters, timers and their retentivityS7 counter2 048Retentivity- adjustable- adjustableYesIEC counter- adjustable- adjustableYesS7 times- adjustable- adjustableYes- adjustableYes	<ul> <li>Number of technology synchronous alarm OBs</li> </ul>	2
• Number of asynchronous error OBs4• Number of synchronous error OBs2• Number of diagnostic alarm OBs1Nesting depth24• per priority class24Counters, timers and their retentivity2S7 counter2• Number2• Number20 Number20 Number20 Number20 Number20 Number20 Number20 Number40 Number20 Number40 Number20 Number2		100
Number of synchronous error OBs2Number of diagnostic alarm OBs1Nesting depth24• per priority class24Counters, timers and their retentivity2 048S7 counter2 048• Number2 048Retentivity- adjustable- adjustableYesIEC counter- adjustable• NumberAny (only limited by the main memory)Retentivity- adjustable- adjustableYesS7 times- adjustable- adjustableYes- adjustableYes- adjustableYes- adjustableYes- adjustableYes- adjustableYes- adjustableYes- adjustableYesS7 times- Yes- Number2 048Retentivity- adjustable- adjustableYes	-	4
• Number of diagnostic alarm OBs1Nesting depth• per priority class24Counters, timers and their retentivityS7 counter• Number2 048Retentivity- adjustableYesIEC counter• NumberAny (only limited by the main memory)Retentivity- adjustableYesS7 times• Number2 048Retentivity- adjustableYesS7 times• Number2 048Retentivity- adjustableYesS7 times• Number2 048Retentivity- adjustableYes		2
Nesting depth       24         counters, timers and their retentivity       57 counter         S7 counter       2 048         Number       2 048         Retentivity       - adjustable         - adjustable       Yes         IEC counter       Any (only limited by the main memory)         Retentivity       - adjustable         - adjustable       Yes         S7 times       Yes         S7 times       2 048         - adjustable       Yes		1
Counters, timers and their retentivity         S7 counter       2 048         Number       2 048         Retentivity       — adjustable         Yes       IEC counter         • Number       Any (only limited by the main memory)         Retentivity       — adjustable         Yes       S7 times         • Number       Yes         S7 times       2 048         Retentivity		
S7 counter       2 048         Retentivity		24
S7 counter       2 048         Retentivity	Counters, timers and their retentivity	
Retentivity       Yes         IEC counter       Any (only limited by the main memory)         • Number       Any (only limited by the main memory)         Retentivity       Yes         - adjustable       Yes         \$7 times       2 048         Retentivity       Yes	S7 counter	
adjustableYesIEC counter• NumberAny (only limited by the main memory)Retentivity adjustableYesS7 times• Number2 048Retentivity adjustableYes	Number	2 048
adjustableYesIEC counter• NumberAny (only limited by the main memory)Retentivity adjustableYesS7 times• Number2 048Retentivity adjustableYes	Retentivity	
IEC counter       Any (only limited by the main memory)         • Number       Any (only limited by the main memory)         Retentivity       Yes         • Number       Yes         • Number       2 048         Retentivity       Yes         - adjustable       Yes		Yes
Retentivity         - adjustable       Yes         S7 times         • Number       2 048         Retentivity         - adjustable       Yes		
Retentivity         - adjustable       Yes         S7 times         • Number       2 048         Retentivity         - adjustable       Yes	Number	Any (only limited by the main memory)
	Retentivity	
S7 times       • Number     2 048       Retentivity       - adjustable     Yes		Yes
Number 2 048 Retentivity		
Retentivity     Yes		2 048
- adjustable Yes		
		Yes
	IEC timer	

Number	Any (only limited by the main memory)
Retentivity	Any (only inflited by the main 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	
<ul> <li>per priority class, max.</li> </ul>	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	
<ul> <li>Number of subprocess images, max.</li> </ul>	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	
integrated	1
● Via CM	4; A maximum of 4 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total
Rack	
<ul> <li>Modules per rack, max.</li> </ul>	32; CPU + 31 modules
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	
•Туре	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	N .
supported	Yes
• in AS, master	Yes
• in AS, slave	Yes
• on Ethernet via NTP	Yes
Digital inputs	
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
C C C C C C C C C C C C C C C C C C C	TTT 10 T30V
Input current • for signal "1", typ.	2.5 mA
Input delay (for rated value of input voltage)	2.5 11/2
for standard inputs	
	Yes; none / 0.05 / 0.1 / 0.4 / 1.6 / 3.2 / 12.8 / 20 ms
— parameterizable	
— 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	
<ul> <li>shielded, max.</li> </ul>	1 000 m; 600 m for technological functions; depending on input frequency, encoder and cable quality; max. 50 m at 100 kHz
e unshielded may	
unshielded, max. Digital outputs	600 m; for technological functions: No
	Tanasidas
Type of digital output	Transistor
integrated channels (DO)	16
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	-0.8 V
Controlling a digital input	Yes
Digital output functions, parameterizable	
<ul> <li>Switching tripped by comparison values</li> </ul>	Yes; As output signal of a high-speed counter
PWM output	Yes
— Number, max.	4
<ul> <li>Cycle duration, parameterizable</li> </ul>	Yes
— ON period, min.	0 %
— ON period, max.	100 %
- Resolution of the duty cycle	0.0036 %; For S7 analog format, min. 40 ns
<ul> <li>Frequency output</li> </ul>	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 output; see manual for details
Load resistance range	
lower limit	48 $\Omega;$ 240 ohms with high-speed output, i.e. when using a high-speed output; see manual for details
upper limit	12 kΩ
Output voltage	
<ul> <li>Type of output voltage</li> </ul>	DC
• for signal "0", max.	1 V; With high-speed output, i.e. when using a high-speed output; see manual for details
● for signal "1", min.	23.2 V; L+ (-0.8 V)
Output current	
<ul> <li>for signal "1" rated value</li> </ul>	0.5 A; 0.1 A with high-speed output, i.e. when using a high-speed output, observe derating; see manual for details
<ul> <li>for signal "1" permissible range, min.</li> </ul>	2 mA
<ul> <li>for signal "1" permissible range, max.</li> </ul>	0.6 A; 0.12 A with high-speed output, i.e. when using a high-speed output, observe derating; see manual for details
<ul> <li>for signal "0" residual current, max.</li> </ul>	0.5 mA

Output delay with resistive load	
Output delay with resistive load	200 με
• "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	
<ul> <li>for logic links</li> </ul>	Yes; for technological functions: No
<ul> <li>for uprating</li> </ul>	No
<ul> <li>for redundant control of a load</li> </ul>	Yes; for technological functions: No
Switching frequency	
<ul> <li>with resistive load, max.</li> </ul>	100 kHz; For high-speed output, 100 Hz for standard output
<ul> <li>with inductive load, max.</li> </ul>	0.5 Hz; Acc. to IEC 60947-5-1, DC-13; observe derating curve
<ul> <li>on lamp load, max.</li> </ul>	10 Hz
Total current of the outputs	
Current per channel, max.	0.5 A; see additional description in the manual
<ul> <li>Current per group, max.</li> </ul>	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
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
<ul> <li>unshielded, max.</li> </ul>	600 m; for technological functions: No
Analog inputs	
Number of analog inputs	5; 4x for U/I, 1x for R/RTD
<ul> <li>For current measurement</li> </ul>	4; max.
<ul> <li>For voltage measurement</li> </ul>	4; max.
<ul> <li>For resistance/resistance thermometer measurement</li> </ul>	1
permissible input voltage for voltage input (destruction limit),	28.8 V
max.	
permissible input current for current input (destruction limit),	40 mA
max.	
Cycle time (all channels), min.	1 ms; Dependent on the parameterized interference frequency suppression; for
Tachnical unit for temporature management adjustable	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 $\Omega$ ; Plus approx. 55 ohm for overvoltage protection by PTC
• -20 mA to +20 mA	Yes
- Input resistance (-20 mA to +20 mA)	50 $\Omega$ ; 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 $\Omega$ ; Plus approx. 55 ohm for overvoltage protection by PTC
Input ranges (rated values), resistance thermometer	
Ni 100	Yes; Standard/climate
- Input resistance (Ni 100)	
Pt 100     Input registered (Pt 100)	Yes; Standard/climate
— Input resistance (Pt 100)	10 MΩ
Input ranges (rated values), resistors	
• 0 to 150 ohms	Yes; Physical measuring range: 0 600 ohms

Innut registeres (0 to 150 chrss)	10.100
— 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 MΩ
• 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	
• 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)	
	1 40
with voltage outputs, min.	1 kΩ 100 nF
with voltage outputs, capacitive load, max.	
• with current outputs, max.	500 Ω
with current outputs, inductive load, max.	1 mH
Cable length	200 -
<ul> <li>shielded, max.</li> </ul>	200 m
Analog value generation for the inputs	
Integration and conversion time/resolution per channel	
<ul> <li>Resolution with overrange (bit including sign), max.</li> </ul>	16 bit
<ul> <li>Integration time, parameterizable</li> </ul>	Yes; 2.5 / 16.67 / 20 / 100 ms, acts on all channels
<ul> <li>Interference voltage suppression for interference frequency f1 in Hz</li> </ul>	400 / 60 / 50 / 10
Smoothing of measured values	
	Yes
parameterizable	
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), max.	16 bit
Settling time	
<ul> <li>for resistive load</li> </ul>	1.5 ms
<ul> <li>for capacitive load</li> </ul>	2.5 ms
<ul> <li>for inductive load</li> </ul>	2.5 ms
Encoder	
Connection of signal encoders	
<ul> <li>for voltage measurement</li> </ul>	Yes
• for current measurement as 4-wire transducer	Yes
• for resistance measurement with two-wire connection	Yes
<ul> <li>for resistance measurement with three-wire connection</li> </ul>	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
<ul> <li>Input frequency, max.</li> </ul>	100 kHz
Counting frequency, max.	400 kHz; with quadruple evaluation
Signal filter, parameterizable	Yes
- Oignar men, parametenzable	100

<ul> <li>Incremental encoder with A/B tracks, 90° phase offset</li> </ul>	Yes
<ul> <li>Incremental encoder with A/B tracks, 90° phase offset and zero track</li> </ul>	Yes
	Yes
<ul> <li>pulse encoder</li> <li>pulse encoder with direction</li> </ul>	Yes
<ul> <li>pulse encoder with one impulse signal per count direction</li> </ul>	Yes
Errors/accuracies	
	0.1 %
Linearity error (relative to input range), (+/-)	0.005 %/K
Temperature error (relative to input range), (+/-) Crosstalk between the inputs, max.	-60 dB
Repeat accuracy in steady state at 25 °C (relative to input	0.05 %
range), (+/-)	0.03 %
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 $^\circ\text{C}$ (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
<ul> <li>Voltage, relative to output range, (+/-)</li> </ul>	0.3 %
• Current, relative to output range, (+/-)	0.3 %
Basic error limit (operational limit at 25 °C)	
<ul> <li>Voltage, relative to input range, (+/-)</li> </ul>	0.2 %
• Current, relative to input range, (+/-)	0.2 %
<ul> <li>Resistance, relative to input range, (+/-)</li> </ul>	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
<ul> <li>Voltage, relative to output range, (+/-)</li> </ul>	0.2 %
<ul> <li>Current, relative to output range, (+/-)</li> </ul>	0.2 %
Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interfe	erence frequency
<ul> <li>Series mode interference (peak value of interference &lt; rated value of input range), min.</li> </ul>	30 dB
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
<ul> <li>integrated switch</li> </ul>	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
— Isochronous mode	Yes
— Direct data exchange	Yes; Requirement: IRT and isochronous mode (MRPD optional)
— IRT	Yes
— PROFlenergy	Yes; per user program
Drightized stortup	
<ul> <li>— Prioritized startup</li> <li>— Number of connectable IO Devices, max.</li> </ul>	Yes; Max. 32 PROFINET devices 128; In total, up to 256 distributed I/O devices can be connected via AS-i,

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	PROFIBUS or PROFINET
- Of which IO devices with IRT, max.	64
— Number of connectable IO Devices for RT, max.	128
— of which in line, max.	128
— Number of IO Devices that can be simultaneously	8: in total across all interfaces
activated/deactivated, max.	
<ul> <li>— Number of IO Devices per tool, max.</li> </ul>	8
— Updating times	The minimum value of the update time also depends on 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
— for send cycle of 500 µs	500 $\mu s$ to 8 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 625 $\mu s$ 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
<ul> <li>— With IRT and parameterization of "odd" send cycles</li> </ul>	Update time = set "odd" send clock (any multiple of 125 $\mu$ s: 375 $\mu$ s, 625 $\mu$ s 3
	875 µs)
Update time for RT	050
— 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
— for send cycle of 4 ms	4 ms to 512 ms
PROFINET IO Device	
Services	X
— PG/OP communication	Yes
— Isochronous mode	No
— IRT	Yes
— PROFlenergy	Yes; per user program
— Shared device	Yes
Number of IO Controllors with shared device may	4
<ul> <li>Number of IO Controllers with shared device, max.</li> </ul>	
- activation/deactivation of I-devices	Yes; per user program
<ul> <li>activation/deactivation of I-devices</li> <li>Asset management record</li> </ul>	Yes; per user program Yes; per user program
<ul> <li>activation/deactivation of I-devices</li> <li>Asset management record</li> <li>Interface types</li> <li>RJ 45 (Ethernet)</li> </ul>	Yes; per user program
	Yes; per user program Yes
<ul> <li>activation/deactivation of I-devices</li> <li>Asset management record</li> <li>Interface types</li> <li>RJ 45 (Ethernet)</li> </ul>	Yes; per user program Yes Yes
<ul> <li>activation/deactivation of I-devices         <ul> <li>Asset management record</li> </ul> </li> <li>Interface types</li> <li>RJ 45 (Ethernet)         <ul> <li>100 Mbps</li> <li>Autonegotiation</li> <li>Autocrossing</li> </ul> </li> </ul>	Yes; per user program Yes Yes Yes
<ul> <li>activation/deactivation of I-devices         <ul> <li>Asset management record</li> </ul> </li> <li>Interface types</li> <li>RJ 45 (Ethernet)         <ul> <li>100 Mbps</li> <li>Autonegotiation</li> <li>Autocrossing</li> <li>Industrial Ethernet status LED</li> </ul> </li> </ul>	Yes; per user program Yes Yes
<ul> <li>activation/deactivation of I-devices         <ul> <li>Asset management record</li> </ul> </li> <li>Interface types         <ul> <li>RJ 45 (Ethernet)</li> <li>100 Mbps</li> <li>Autonegotiation</li> <li>Autocrossing</li> <li>Industrial Ethernet status LED</li> </ul> </li> <li>Protocols</li> </ul>	Yes; per user program Yes Yes Yes
<ul> <li>activation/deactivation of I-devices         <ul> <li>Asset management record</li> </ul> </li> <li>Interface types</li> <li>RJ 45 (Ethernet)         <ul> <li>100 Mbps</li> <li>Autonegotiation</li> <li>Autocrossing</li> <li>Industrial Ethernet status LED</li> </ul> </li> <li>Protocols         <ul> <li>Number of connections</li> </ul> </li> </ul>	Yes; per user program Yes Yes Yes Yes
<ul> <li>activation/deactivation of I-devices <ul> <li>Asset management record</li> </ul> </li> <li>Interface types <ul> <li>RJ 45 (Ethernet)</li> <li>100 Mbps</li> <li>Autonegotiation</li> <li>Autocrossing</li> <li>Industrial Ethernet status LED</li> </ul> </li> <li>Protocols <ul> <li>Number of connections</li> <li>Number of connections, max.</li> </ul> </li> </ul>	Yes; per user program Yes Yes Yes Yes Yes 96; via integrated interfaces of the CPU and connected CPs / CMs
<ul> <li>activation/deactivation of I-devices <ul> <li>Asset management record</li> </ul> </li> <li>Interface types <ul> <li>RJ 45 (Ethernet)</li> <li>100 Mbps</li> <li>Autonegotiation</li> <li>Autocrossing</li> <li>Industrial Ethernet status LED</li> </ul> </li> <li>Protocols <ul> <li>Number of connections, max.</li> <li>Number of connections reserved for ES/HMI/web</li> </ul> </li> </ul>	Yes; per user program Yes Yes Yes Yes 96; via integrated interfaces of the CPU and connected CPs / CMs 10
<ul> <li>activation/deactivation of I-devices</li> <li>Asset management record</li> </ul> Interface types RJ 45 (Ethernet) <ul> <li>100 Mbps</li> <li>Autonegotiation</li> <li>Autocrossing</li> <li>Industrial Ethernet status LED</li> </ul> Protocols Number of connections, max. <ul> <li>Number of connections reserved for ES/HMI/web</li> <li>Number of connections via integrated interfaces</li> </ul>	Yes; per user program Yes Yes Yes Yes 96; via integrated interfaces of the CPU and connected CPs / CMs 10 64
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<ul> <li>activation/deactivation of I-devices <ul> <li>Asset management record</li> </ul> </li> <li>Interface types <ul> <li>RJ 45 (Ethernet)</li> <li>100 Mbps</li> <li>Autonegotiation</li> <li>Autocrossing</li> <li>Industrial Ethernet status LED</li> </ul> </li> <li>Protocols <ul> <li>Number of connections, max.</li> <li>Number of connections reserved for ES/HMI/web</li> <li>Number of connections via integrated interfaces</li> <li>Number of S7 routing paths</li> </ul> </li> <li>Redundancy mode <ul> <li>H-Sync forwarding</li> </ul> </li> </ul>	Yes; per user program Yes Yes Yes Yes 96; via integrated interfaces of the CPU and connected CPs / CMs 10 64
<ul> <li>activation/deactivation of I-devices         <ul> <li>Asset management record</li> </ul> </li> <li>Interface types</li> <li>RJ 45 (Ethernet)         <ul> <li>100 Mbps</li> <li>Autonegotiation</li> <li>Autocrossing</li> <li>Industrial Ethernet status LED</li> </ul> </li> <li>Protocols         <ul> <li>Number of connections, max.</li> <li>Number of connections reserved for ES/HMI/web</li> <li>Number of S7 routing paths</li> </ul> </li> <li>Redundancy mode         <ul> <li>H-Sync forwarding</li> <li>Media redundancy</li> </ul> </li> </ul>	Yes; per user program Yes Yes Yes 96; via integrated interfaces of the CPU and connected CPs / CMs 10 64 16 Yes
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<ul> <li>activation/deactivation of I-devices         <ul> <li>Asset management record</li> </ul> </li> <li>Interface types</li> <li>RJ 45 (Ethernet)         <ul> <li>100 Mbps</li> <li>Autonegotiation</li> <li>Autocrossing</li> <li>Industrial Ethernet status LED</li> </ul> </li> <li>Protocols         <ul> <li>Number of connections, max.</li> <li>Number of connections reserved for ES/HMI/web</li> <li>Number of S7 routing paths</li> </ul> </li> <li>Redundancy mode         <ul> <li>H-Sync forwarding</li> <li>Media redundancy</li> </ul> </li> </ul>	Yes; per user program Yes Yes Yes Yes 96; via integrated interfaces of the CPU and connected CPs / CMs 10 64 16 Yes only via 1st interface (X1) Yes; MRP Automanager according to IEC 62439-2 Edition 2.0, MRP Manager;
<ul> <li>activation/deactivation of I-devices</li> <li>Asset management record</li> </ul> Interface types RJ 45 (Ethernet) <ul> <li>100 Mbps</li> <li>Autonegotiation</li> <li>Autocrossing</li> <li>Industrial Ethernet status LED</li> </ul> Protocols Number of connections, max. <ul> <li>Number of connections reserved for ES/HMI/web</li> <li>Number of connections via integrated interfaces</li> <li>Number of S7 routing paths</li> </ul> Redundancy mode <ul> <li>H-Sync forwarding</li> <li>Media redundancy</li> <li>MRP</li> </ul>	Yes; per user program Yes Yes Yes Yes 96; via integrated interfaces of the CPU and connected CPs / CMs 10 64 16 Yes Yes Only via 1st interface (X1) Yes; MRP Automanager according to IEC 62439-2 Edition 2.0, MRP Manager; MRP Client
<ul> <li>activation/deactivation of I-devices         <ul> <li>Asset management record</li> </ul> </li> <li>Interface types</li> <li>RJ 45 (Ethernet)         <ul> <li>100 Mbps</li> <li>Autonegotiation</li> <li>Autocrossing</li> <li>Industrial Ethernet status LED</li> </ul> </li> <li>Protocols         <ul> <li>Number of connections, max.</li> <li>Number of connections reserved for ES/HMI/web</li> <li>Number of s7 routing paths</li> </ul> </li> <li>Redundancy mode         <ul> <li>H-Sync forwarding</li> <li>Media redundancy             <ul> <li>MRP</li> <li>MRP interconnection, supported</li> </ul> </li> </ul></li></ul>	Yes; per user program Yes Yes Yes Yes 96; via integrated interfaces of the CPU and connected CPs / CMs 10 64 16 Yes Yes Yes
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<ul> <li>activation/deactivation of I-devices</li> <li>Asset management record</li> </ul> Interface types RJ 45 (Ethernet) <ul> <li>100 Mbps</li> <li>Autonegotiation</li> <li>Autocrossing</li> <li>Industrial Ethernet status LED</li> </ul> Protocols Number of connections, max. <ul> <li>Number of connections reserved for ES/HMI/web</li> <li>Number of connections via integrated interfaces</li> <li>Number of S7 routing paths</li> </ul> Redundancy mode <ul> <li>H-Sync forwarding</li> <li>Media redundancy</li> <li>MRP</li> <li>MRP interconnection, supported</li> <li>MRPD</li> <li>Switchover time on line break, typ.</li> </ul>	Yes; per user program Yes Yes Yes Yes 96; via integrated interfaces of the CPU and connected CPs / CMs 10 64 16 Yes only via 1st interface (X1) Yes; MRP Automanager according to IEC 62439-2 Edition 2.0, MRP Manager; MRP Client Yes; as MRP ring node according to IEC 62439-2 Edition 3.0 Yes; Requirement: IRT 200 ms; For MRP, bumpless for MRPD
<ul> <li>activation/deactivation of I-devices</li> <li>Asset management record</li> </ul> Interface types RJ 45 (Ethernet) <ul> <li>100 Mbps</li> <li>Autonegotiation</li> <li>Autocrossing</li> <li>Industrial Ethernet status LED</li> </ul> Protocols Number of connections, max. <ul> <li>Number of connections reserved for ES/HMI/web</li> <li>Number of connections via integrated interfaces</li> <li>Number of S7 routing paths</li> </ul> Redundancy mode <ul> <li>H-Sync forwarding</li> <li>Media redundancy</li> <li>MRP</li> <li>MRP interconnection, supported</li> <li>MRPD</li> <li>Switchover time on line break, typ.</li> <li>Number of stations in the ring, max.</li> </ul>	Yes; per user program Yes Yes Yes Yes 96; via integrated interfaces of the CPU and connected CPs / CMs 10 64 16 Yes only via 1st interface (X1) Yes; MRP Automanager according to IEC 62439-2 Edition 2.0, MRP Manager; MRP Client Yes; as MRP ring node according to IEC 62439-2 Edition 3.0 Yes; Requirement: IRT
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<ul> <li>activation/deactivation of I-devices</li> <li>Asset management record</li> </ul> Interface types RJ 45 (Ethernet) <ul> <li>100 Mbps</li> <li>Autonegotiation</li> <li>Autocrossing</li> <li>Industrial Ethernet status LED</li> </ul> Protocols Number of connections max. <ul> <li>Number of connections reserved for ES/HMI/web</li> <li>Number of connections via integrated interfaces</li> <li>Number of S7 routing paths</li> </ul> Redundancy mode <ul> <li>H-Sync forwarding</li> <li>Media redundancy</li> <li>MRP</li> <li>MRP interconnection, supported</li> <li>MRPD</li> <li>Switchover time on line break, typ.</li> <li>Number of stations in the ring, max.</li> </ul>	Yes; per user program 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	Yes
• DNS	Yes
• SNMP	Yes
• DCP	Yes
• LLDP	Yes
ELDT     Encryption	Yes; Optional
Web server	
• HTTP	Yes; Standard and user pages
• HTTPS	Yes; Standard and user pages
OPC UA	
Runtime license required	Yes; "Small" license required
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,	1 000
recommended max.	
<ul> <li>— Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/OPC_I max.</li> </ul>	300
<ul> <li>— Number of elements for one call of OPC_UA_NameSpaceGetIndexList, max.</li> </ul>	20
<ul> <li>— Number of elements for one call of OPC_UA_MethodGetHandleList, max.</li> </ul>	100
<ul> <li>— Number of simultaneous calls of the client instructions for session management, per connection, max.</li> </ul>	1
<ul> <li>— Number of simultaneous calls of the client instructions for data access, per connection, max.</li> </ul>	5
<ul> <li>— Number of registerable nodes, max.</li> </ul>	5 000
<ul> <li>— Number of registerable method calls of OPC_UA_MethodCall, max.</li> </ul>	100
<ul> <li>— Number of inputs/outputs when calling OPC_UA_MethodCall, max.</li> </ul>	20
• OPC UA Server	Yes; Data access (read, write, subscribe), method call, custom address space
<ul> <li>Application authentication</li> </ul>	Yes
— Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
— User authentication	"anonymous" or by user name & password
<ul> <li>— GDS support (certificate management)</li> </ul>	Yes
- Number of sessions, max.	32
<ul> <li>Number of accessible variables, max.</li> </ul>	50 000
<ul> <li>Number of registerable nodes, max.</li> </ul>	10 000
<ul> <li>Number of subscriptions per session, max.</li> </ul>	20
— Sampling interval, min.	100 ms
— Publishing interval, min.	500 ms
<ul> <li>Number of server methods, max.</li> </ul>	20
<ul> <li>Number of inputs/outputs per server method, max.</li> </ul>	20
<ul> <li>Number of monitored items, recommended max.</li> </ul>	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"
<ul> <li>— Number of nodes for user-defined server interfaces, max.</li> </ul>	1 000

	Vec
Alarms and Conditions	Yes
— Number of program alarms	100
<ul> <li>Number of alarms for system diagnostics</li> </ul>	50
Further protocols	
MODBUS	Yes; MODBUS TCP
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	
<ul> <li>Number of program alarms</li> </ul>	600
<ul> <li>Number of alarms for system diagnostics</li> </ul>	100
<ul> <li>Number of alarms for motion technology objects</li> </ul>	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
<ul> <li>Number of variables, max.</li> </ul>	
— of which status variables, max.	200; per job
- of which control variables, max.	200; per job
Forcing	
Forcing	Yes
Forcing, variables	Peripheral inputs/outputs
Number of variables, max.	200
Diagnostic buffer	200
-	Yes
present     Number of entries, max	1 000
Number of entries, max.	
— of which powerfail-proof	500
Traces	4. Up to 512 I/D of data partmass are possible
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	
<ul> <li>Monitoring the supply voltage</li> </ul>	Yes
Wire-break	Yes; for analog inputs/outputs, see description in manual
Short-circuit	Yes; for analog outputs, see description in manual
<ul> <li>A/B transition error at incremental encoder</li> </ul>	Yes
Diagnostics indication LED	
RUN/STOP LED	Yes
• ERROR LED	Yes
MAINT LED	Yes
<ul> <li>Monitoring of the supply voltage (PWR-LED)</li> </ul>	Yes
Channel status display	Yes
for channel diagnostics	Yes; For analog inputs/outputs
<ul> <li>Connection display LINK TX/RX</li> </ul>	Yes
Supported technology objects	
Motion Control	Yes; Note: The number of technology objects affects the cycle time of the PLC
	program; selection guide via the TIA Selection Tool
<ul> <li>Number of available Motion Control resources for</li> </ul>	
technology objects	800
<ul><li>technology objects</li><li>Required Motion Control resources</li></ul>	800
	800 40

— per synchronous axis	160
— per external encoder	80
— per output cam	20
— per cam track	160
— per probe	40
<ul> <li>Positioning axis</li> </ul>	
<ul> <li>— Number of positioning axes at motion control cycle of 4 ms (typical value)</li> </ul>	5
<ul> <li>— Number of positioning axes at motion control cycle of 8 ms (typical value)</li> </ul>	10
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	
Counting functions	
Continuous counting	Yes
Counter response parameterizable	Yes
Hardware gate via digital input	Yes
Software gate	Yes
	Yes
<ul> <li>Event-controlled stop</li> <li>Synchronization via digital input</li> </ul>	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	
<ul> <li>Incremental acquisition</li> </ul>	Yes
Suitable for S7-1500 Motion Control	Yes
Measuring functions	
<ul> <li>Measuring time, parameterizable</li> </ul>	Yes
<ul> <li>Dynamic measurement period adjustment</li> </ul>	Yes
<ul> <li>Number of thresholds, parameterizable</li> </ul>	2
Measuring range	
<ul> <li>Frequency measurement, min.</li> </ul>	0.04 Hz
<ul> <li>Frequency measurement, max.</li> </ul>	400 kHz; with quadruple evaluation
<ul> <li>— Cycle duration measurement, min.</li> </ul>	2.5 µs
<ul> <li>Cycle duration measurement, max.</li> </ul>	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
<ul> <li>between the channels, in groups of</li> </ul>	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
, in the second s	
Isolation	
Isolation tested with	707 V DC (type test)
Ambient conditions	
Ambient temperature during operation	
horizontal installation, min.	0 °C
<ul> <li>horizontal installation, max.</li> </ul>	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
<ul> <li>vertical installation, min.</li> </ul>	0° 0
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
Altitude during operation relating to sea level	
<ul> <li>Installation altitude above sea level, max.</li> </ul>	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
configuration / header	
configuration / programming / header	
Programming language	
— LAD	Yes
— FBD	Yes
— STL	Yes
— SCL	Yes
— GRAPH	Yes
Know-how protection	
<ul> <li>User program protection/password protection</li> </ul>	Yes
Copy protection	Yes
Block protection	Yes
Access protection	
<ul> <li>protection of confidential configuration data</li> </ul>	Yes
<ul> <li>Password for display</li> </ul>	Yes
<ul> <li>Protection level: Write protection</li> </ul>	Yes
<ul> <li>Protection level: Read/write protection</li> </ul>	Yes
Protection level: Complete protection	Yes
programming / cycle time monitoring / header	
lower limit	adjustable minimum cycle time
• upper limit	adjustable maximum cycle time
Dimensions	
Width	85 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	1 050 g

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