## **Data sheet**

6ES7511-1CK01-0AB0



SIMATIC S7-1500 Compact CPU CPU 1511C-1PN, central processing unit with working 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 outputs for PTO/PWM/frequency output 1. interface: PROFINET IRT with 2 port switch, 60 NS bit-performance, incl. front connector push-in, SIMATIC memory card necessary

Figure similar

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) / V15 (FW V2.5) or higher; with older TIA Portal versions configurable as 6ES7511-1CK00-0AB0
Configuration control	
via dataset	Yes
Display	
Screen diagonal [cm]	3.45 cm
Control elements	
Number of keys	8
Mode buttons	2
Supply voltage	
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; Without load; 9.8 A: CPU + load
Current consumption, max.	1 A; Without load; 10 A: CPU + load
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	
• from load voltage L+, max.	30 mA; Per group, without load
output voltage / header	
Rated value (DC)	24 V
Encoder supply	
	1.0
Number of outputs	1; One common 24 V encoder supply

• 24 V	Yes; L+ (-0.8 V)
Short-circuit protection	Yes
Output current, max.	1 A
Power	
Infeed power to the backplane bus	10 W
Power consumption from the backplane bus (balanced)	8.5 W
Power loss	
Power loss, typ.	11.8 W
Memory	
Number of slots for SIMATIC memory card	1
SIMATIC memory card required	Yes
Work memory	
integrated (for program)	175 kbyte
• integrated (for data)	1 Mbyte
Load memory	
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
<ul> <li>Number of free cycle OBs</li> </ul>	100
<ul> <li>Number of time alarm OBs</li> </ul>	20
Number of delay alarm OBs	20
<ul> <li>Number of cyclic interrupt OBs</li> </ul>	20; With minimum OB 3x cycle of 500 μs
<ul> <li>Number of process alarm OBs</li> </ul>	50
<ul> <li>Number of DPV1 alarm OBs</li> </ul>	3
<ul> <li>Number of isochronous mode OBs</li> </ul>	1
<ul> <li>Number of technology synchronous alarm OBs</li> </ul>	2
<ul> <li>Number of startup OBs</li> </ul>	100
<ul> <li>Number of asynchronous error OBs</li> </ul>	4
<ul> <li>Number of synchronous error OBs</li> </ul>	2
Number of diagnostic alarm OBs	1
Nesting depth	
per priority class	24
Counters, timers and their retentivity	
S7 counter	
Number	2 048
Retentivity	
— adjustable	Yes
IEC counter	
Number	Any (only limited by the main memory)
Retentivity	
— adjustable	Yes
S7 times	

Number	2 048
Retentivity	
— adjustable	Yes
IEC timer	
Number	Any (only limited by the main memory)
Retentivity	
— adjustable	Yes
Data areas and their retentivity	
Retentive data area (incl. timers, counters, flags), max.	128 kbyte; In total; available retentive memory for bit memories, timers, counters, DBs, and technology data (axes): 88 KB
Extended retentive data area (incl. timers, counters, flags), max.	1 Mbyte; When using PS 6 0W 24/48/60 V DC HF
Flag	
• Size, max.	16 kbyte
Number of clock memories	8; 8 clock memory bit, grouped into one clock memory byte
Data blocks	
<ul> <li>Retentivity adjustable</li> </ul>	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	
<ul><li>Inputs</li></ul>	32 kbyte; All inputs are in the process image
<ul><li>Outputs</li></ul>	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	
<ul><li>integrated</li></ul>	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
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	
	Yes
Clock synchronization	
Clock synchronization • supported	Yes
Clock synchronization  • supported  • in AS, master	Yes Yes
Clock synchronization  • supported  • in AS, master  • in AS, device	Yes Yes Yes

	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	V
Gate start/stop	Yes
• Capture	Yes
Synchronization	Yes
Input voltage	DO.
Type of input voltage  Pated value (PO)	DC
Rated value (DC)  for ping t   C	24 V
• for signal "0"	-3 to +5V
• for signal "1"	+11 to +30V
Input current	0.5 \
• for signal "1", typ.	2.5 mA
Input delay (for rated value of input voltage)	
for standard inputs	V
— 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	Van Oana as for standard in other
— parameterizable	Yes; Same as for standard inputs
for technological functions	Van Oana as for standard in other
— parameterizable	Yes; Same as for standard inputs
Cable length	4 000 ms coo ms for to sharely rised fractioner demanding an input fractioner.
• shielded, max.	1 000 m; 600 m for technological functions; depending on input frequency, encoder and cable quality; max. 50 m at 100 kHz
• unshielded, max.	600 m; for technological functions: No
Digital outputs	
Type of digital output	Transistor
integrated channels (DO)	16
integrated channels (DO) Current-sourcing	16 Yes; Push-pull output
Current-sourcing	Yes; Push-pull output
Current-sourcing Short-circuit protection	Yes; Push-pull output Yes; electronic/thermal
Current-sourcing Short-circuit protection • Response threshold, typ.	Yes; Push-pull output Yes; electronic/thermal 1.6 A with standard output, 0.5 A with high-speed output; see manual for details
Current-sourcing Short-circuit protection • Response threshold, typ. Limitation of inductive shutdown voltage to	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
Current-sourcing Short-circuit protection • Response threshold, typ. Limitation of inductive shutdown voltage to Controlling a digital input	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
Current-sourcing Short-circuit protection • Response threshold, typ. Limitation of inductive shutdown voltage to Controlling a digital input Accuracy of pulse duration	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
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	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
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
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
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	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
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.	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
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
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 %
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 %
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
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
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
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  with resistive load, 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 % 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 5 W; 1 W with high-speed output, i.e. when using a high-speed output; see
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  with resistive load, max.  on lamp load, 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 % 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 5 W; 1 W with high-speed output, i.e. when using a high-speed output; see
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, min. — ON period, max. — Resolution of the duty cycle Frequency output Switching capacity of the outputs  with resistive load, max.  on lamp load, 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 % 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 5 W; 1 W with high-speed output, i.e. when using a high-speed output; see manual for details
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 with resistive load, max. on lamp load, max.  Load resistance range lower limit	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 5 W; 1 W with high-speed output, i.e. when using a high-speed output; see manual for details
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  with resistive load, max.  on lamp load, max.  Load resistance range  lower limit  upper limit	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 5 W; 1 W 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,	
for single HAII and socially and social	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	
Switching frequency		
with resistive load, max.	100 kHz; For high-speed output, 100 Hz for standard output	
with inductive load, max.	0.5 Hz; Acc. to IEC 60947-5-1, DC-13; observe derating curve	
with inductive load, max.     on lamp load, max.	10 Hz	
	10 112	
Total current of the outputs	0.5 At one additional description in the manual	
Current per channel, max.     Current per group, max.	0.5 A; see additional description in the manual	
Current per group, max.	8 A; see additional description in the manual	
Current per power supply, max.	4 A; 2 power supplies for each group, current per power supply max. 4 A, see additional description in manual	
for technological functions		
— Current per channel, max.	0.5 A; see additional description in the manual	
Relay outputs		
Number of relay outputs	0	
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	
<ul> <li>For current measurement</li> </ul>	4; max.	
<ul> <li>For voltage measurement</li> </ul>	·, · · · · · · ·	
<ul> <li>For resistance/resistance thermometer measurement</li> </ul>	4; max.	
■ 1 OF Tesistance/resistance thempothere measurement		
permissible input voltage for voltage input (destruction limit), max.	4; max.	
permissible input voltage for voltage input (destruction limit),	4; max.	
permissible input voltage for voltage input (destruction limit), max.  permissible input current for current input (destruction limit),	4; max. 1 28.8 V	
permissible input voltage for voltage input (destruction limit), max.  permissible input current for current input (destruction limit), max.	4; max.  1  28.8 V  40 mA  1 ms; Dependent on the parameterized interference frequency suppression; for	
permissible input voltage for voltage input (destruction limit), max.  permissible input current for current input (destruction limit), max.  Cycle time (all channels), min.	4; max.  1  28.8 V  40 mA  1 ms; Dependent on the parameterized interference frequency suppression; for details, see conversion procedure in manual	
permissible input voltage for voltage input (destruction limit), max.  permissible input current for current input (destruction limit), max.  Cycle time (all channels), min.  Technical unit for temperature measurement adjustable	4; max.  1  28.8 V  40 mA  1 ms; Dependent on the parameterized interference frequency suppression; for details, see conversion procedure in manual	
permissible input voltage for voltage input (destruction limit), max.  permissible input current for current input (destruction limit), max.  Cycle time (all channels), min.  Technical unit for temperature measurement adjustable Input ranges (rated values), voltages	4; max.  1  28.8 V  40 mA  1 ms; Dependent on the parameterized interference frequency suppression; for details, see conversion procedure in manual Yes; °C/°F/K	
permissible input voltage for voltage input (destruction limit), max.  permissible input current for current input (destruction limit), max.  Cycle time (all channels), min.  Technical unit for temperature measurement adjustable  Input ranges (rated values), voltages  • 0 to +10 V	4; max.  1  28.8 V  40 mA  1 ms; Dependent on the parameterized interference frequency suppression; for details, see conversion procedure in manual Yes; °C/°F/K  Yes; Physical measuring range: ± 10 V	
permissible input voltage for voltage input (destruction limit), max.  permissible input current for current input (destruction limit), max.  Cycle time (all channels), min.  Technical unit for temperature measurement adjustable  Input ranges (rated values), voltages  • 0 to +10 V  — Input resistance (0 to 10 V)	4; max.  1  28.8 V  40 mA  1 ms; Dependent on the parameterized interference frequency suppression; for details, see conversion procedure in manual Yes; °C/°F/K  Yes; Physical measuring range: ± 10 V 100 kΩ	
permissible input voltage for voltage input (destruction limit), max.  permissible input current for current input (destruction limit), max.  Cycle time (all channels), min.  Technical unit for temperature measurement adjustable  Input ranges (rated values), voltages  • 0 to +10 V  — Input resistance (0 to 10 V)  • 1 V to 5 V	4; max. 1 28.8 V 40 mA 1 ms; Dependent on the parameterized interference frequency suppression; for details, see conversion procedure in manual Yes; $^{\circ}\text{C}/^{\circ}\text{F}/\text{K}$ Yes; Physical measuring range: $\pm$ 10 V 100 k $\Omega$ Yes; Physical measuring range: $\pm$ 10 V	
permissible input voltage for voltage input (destruction limit), max.  permissible input current for current input (destruction limit), max.  Cycle time (all channels), min.  Technical unit for temperature measurement adjustable  Input ranges (rated values), voltages  • 0 to +10 V  — Input resistance (0 to 10 V)  • 1 V to 5 V  — Input resistance (1 V to 5 V)	4; max. 1 28.8 V 40 mA 1 ms; Dependent on the parameterized interference frequency suppression; for details, see conversion procedure in manual Yes; $^{\circ}\text{C}/^{\circ}\text{F}/\text{K}$ Yes; Physical measuring range: $\pm$ 10 V 100 k $\Omega$ Yes; Physical measuring range: $\pm$ 10 V 100 k $\Omega$	
permissible input voltage for voltage input (destruction limit), max.  permissible input current for current input (destruction limit), max.  Cycle time (all channels), min.  Technical unit for temperature measurement adjustable Input ranges (rated values), voltages  • 0 to +10 V  — Input resistance (0 to 10 V)  • 1 V to 5 V  — Input resistance (1 V to 5 V)  • -10 V to +10 V	4; max. 1   28.8 V   40 mA   1 ms; Dependent on the parameterized interference frequency suppression; for details, see conversion procedure in manual Yes; °C/°F/K   Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$ Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$ Yes	
permissible input voltage for voltage input (destruction limit), max.  permissible input current for current input (destruction limit), max.  Cycle time (all channels), min.  Technical unit for temperature measurement adjustable Input ranges (rated values), voltages  • 0 to +10 V  — Input resistance (0 to 10 V)  • 1 V to 5 V  — Input resistance (1 V to 5 V)  • -10 V to +10 V  — Input resistance (-10 V to +10 V)	4; max. 1   28.8 V   40 mA   1 ms; Dependent on the parameterized interference frequency suppression; for details, see conversion procedure in manual Yes; °C/°F/K   Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$ Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$ Yes   100 k $\Omega$	
permissible input voltage for voltage input (destruction limit), max.  permissible input current for current input (destruction limit), max.  Cycle time (all channels), min.  Technical unit for temperature measurement adjustable  Input ranges (rated values), voltages  • 0 to +10 V  — Input resistance (0 to 10 V)  • 1 V to 5 V  — Input resistance (1 V to 5 V)  • -10 V to +10 V  — Input resistance (-10 V to +10 V)  • -5 V to +5 V  — Input resistance (-5 V to +5 V)	4; max. 1   28.8 V   40 mA   1 ms; Dependent on the parameterized interference frequency suppression; for details, see conversion procedure in manual Yes; °C/°F/K   Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$ Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$ Yes   100 k $\Omega$ Yes   100 k $\Omega$ Yes   100 k $\Omega$ Yes; Physical measuring range: $\pm$ 10 V	
permissible input voltage for voltage input (destruction limit), max.  permissible input current for current input (destruction limit), max.  Cycle time (all channels), min.  Technical unit for temperature measurement adjustable  Input ranges (rated values), voltages  • 0 to +10 V  — Input resistance (0 to 10 V)  • 1 V to 5 V  — Input resistance (1 V to 5 V)  • -10 V to +10 V  — Input resistance (-10 V to +10 V)  • -5 V to +5 V	4; max. 1   28.8 V   40 mA   1 ms; Dependent on the parameterized interference frequency suppression; for details, see conversion procedure in manual Yes; $^{\circ}\text{C}/^{\circ}\text{F}/\text{K}$ Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$ Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$ Yes   100 k $\Omega$ Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$ Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$	
permissible input voltage for voltage input (destruction limit), max.  permissible input current for current input (destruction limit), max.  Cycle time (all channels), min.  Technical unit for temperature measurement adjustable Input ranges (rated values), voltages  • 0 to +10 V  — Input resistance (0 to 10 V)  • 1 V to 5 V  — Input resistance (1 V to 5 V)  • -10 V to +10 V  — Input resistance (-10 V to +10 V)  • -5 V to +5 V  — Input resistance (-5 V to +5 V)  Input ranges (rated values), currents  • 0 to 20 mA	4; max. 1   28.8 V   40 mA   1 ms; Dependent on the parameterized interference frequency suppression; for details, see conversion procedure in manual Yes; °C/°F/K   Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$ Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$ Yes   100 k $\Omega$ Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$ Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$	
permissible input voltage for voltage input (destruction limit), max.  permissible input current for current input (destruction limit), max.  Cycle time (all channels), min.  Technical unit for temperature measurement adjustable Input ranges (rated values), voltages  • 0 to +10 V  — Input resistance (0 to 10 V)  • 1 V to 5 V  — Input resistance (1 V to 5 V)  • -10 V to +10 V  — Input resistance (-10 V to +10 V)  • -5 V to +5 V  — Input resistance (-5 V to +5 V)  Input ranges (rated values), currents  • 0 to 20 mA  — Input resistance (0 to 20 mA)	4; max. 1   28.8 V   40 mA   1 ms; Dependent on the parameterized interference frequency suppression; for details, see conversion procedure in manual Yes; °C/°F/K   Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$ Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$ Yes   100 k $\Omega$ Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$ Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$ Yes; Physical measuring range: $\pm$ 20 mA   50 $\Omega$ ; Plus approx. 55 ohm for overvoltage protection by PTC	
permissible input voltage for voltage input (destruction limit), max.  permissible input current for current input (destruction limit), max.  Cycle time (all channels), min.  Technical unit for temperature measurement adjustable Input ranges (rated values), voltages  • 0 to +10 V  — Input resistance (0 to 10 V)  • 1 V to 5 V  — Input resistance (1 V to 5 V)  • -10 V to +10 V  — Input resistance (-10 V to +10 V)  • -5 V to +5 V  — Input resistance (-5 V to +5 V)  Input ranges (rated values), currents  • 0 to 20 mA  — Input resistance (0 to 20 mA)  • -20 mA to +20 mA	4; max. 1   28.8 V   40 mA   1 ms; Dependent on the parameterized interference frequency suppression; for details, see conversion procedure in manual Yes; °C/°F/K   Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$ Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$ Yes   100 k $\Omega$ Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$ Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$ Yes; Physical measuring range: $\pm$ 20 mA   50 $\Omega$ ; Plus approx. 55 ohm for overvoltage protection by PTC   Yes	
permissible input voltage for voltage input (destruction limit), max.  permissible input current for current input (destruction limit), max.  Cycle time (all channels), min.  Technical unit for temperature measurement adjustable Input ranges (rated values), voltages  • 0 to +10 V  — Input resistance (0 to 10 V)  • 1 V to 5 V  — Input resistance (1 V to 5 V)  • -10 V to +10 V  — Input resistance (-10 V to +10 V)  • -5 V to +5 V  — Input resistance (-5 V to +5 V)  Input ranges (rated values), currents  • 0 to 20 mA  — Input resistance (0 to 20 mA)	4; max. 1   28.8 V   40 mA   1 ms; Dependent on the parameterized interference frequency suppression; for details, see conversion procedure in manual Yes; °C/°F/K   Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$ Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$ Yes   100 k $\Omega$ Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$ Yes; Physical measuring range: $\pm$ 10 V   100 k $\Omega$ Yes; Physical measuring range: $\pm$ 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)	Tes, Standard/climate  10 $M\Omega$	
• Pt 100		
- Input resistance (Pt 100)	Yes; Standard/climate 10 $M\Omega$	
Input ranges (rated values), resistors	I O IVIZ	
• 0 to 150 ohms	Voc. Dhyolad macauring range: 0 600 ahma	
	Yes; Physical measuring range: 0 600 ohms 10 $M\Omega$	
— Input resistance (0 to 150 ohms)		
• 0 to 300 ohms	Yes; Physical measuring range: 0 600 ohms	
<ul><li>Input resistance (0 to 300 ohms)</li><li>0 to 600 ohms</li></ul>	10 ΜΩ	
	Yes	
— Input resistance (0 to 600 ohms)	10 ΜΩ	
Cable length	200 m. for IVI 200 m for D/DTD	
shielded, max.  Analog outputs	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)	165	
with voltage outputs, min.	1 kΩ	
with voltage outputs, min.      with voltage outputs, capacitive load, max.	100 nF	
	500 Ω	
with current outputs, max.      with current outputs, inductive lead, may.	1 mH	
with current outputs, inductive load, max.  Cable length	1 11113	
shielded, max.	200 m	
Analog value generation for the inputs	200 111	
Integration and conversion time/resolution per channel	16 hit	
Resolution with overrange (bit including sign), max.	16 bit	
Integration time, parameterizable  Interference veltege companying for interference.	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		
parameterizable	Yes	
Step: None	Yes	
• Step: low	Yes	
Step: Medium	Yes	
Step: Medium     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	10 bit	
• for resistive load	1.5 ms	
for resistive load     for capacitive load	2.5 ms	
for inductive load     for inductive load	2.5 ms	
	£.0 III0	
Encoder  Connection of signal angulars		
Connection of signal encoders	Vee	
• for voltage measurement	Yes	
<ul> <li>for current measurement as 4-wire transducer</li> </ul>	Yes	
and the second s	Yes	
for resistance measurement with two-wire connection		
• for resistance measurement with three-wire connection	Yes	

• 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		
<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		
• pulse encoder	Yes		
<ul> <li>pulse encoder with direction</li> </ul>	Yes		
<ul> <li>pulse encoder with one impulse signal per count direction</li> </ul>	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	0.05 %		
range), (+/-)  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			
<ul> <li>Voltage, relative to input range, (+/-)</li> </ul>	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 %		
<ul> <li>Current, relative to output range, (+/-)</li> </ul>	0.3 %		
Basic error limit (operational limit at 25 °C)			
<ul> <li>Voltage, relative to input range, (+/-)</li> </ul>	0.2 %		
<ul> <li>Current, relative to input range, (+/-)</li> </ul>	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 = interference	rence frequency		
<ul> <li>Series mode interference (peak value of interference &lt; rated value of input range), min.</li> </ul>	30 dB		
<ul> <li>Common mode voltage, max.</li> </ul>	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		
<ul> <li>Number of ports</li> </ul>	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			

Convince			
Services	Voc		
— 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		
— Prioritized startup	Yes; Max. 32 PROFINET devices		
<ul> <li>Number of connectable IO Devices, max.</li> </ul>	128; In total, up to 256 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET		
<ul> <li>Of which IO devices with IRT, max.</li> </ul>	64		
<ul> <li>Number of connectable IO Devices for RT, max.</li> </ul>	128		
— of which in line, max.	128		
<ul> <li>Number of IO Devices that can be simultaneously activated/deactivated, max.</li> </ul>	8; in total across all interfaces		
<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		
Update time for IRT	configured user data		
•	250 up to 4 mg. Note: In the case of IDT with inach and a the minimum		
— 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		
— With IRT and parameterization of "odd" send cycles	Update time = set "odd" send clock (any multiple of 125 $\mu s$ : 375 $\mu s$ , 625 $\mu s$ 3 875 $\mu s)$		
Update time for RT			
— 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			
— PG/OP communication	Yes		
— Isochronous mode	No		
— IRT	Yes		
— PROFlenergy	Yes; per user program		
— Shared device	Yes		
<ul> <li>Number of IO Controllers with shared device, max.</li> </ul>	4		
<ul> <li>activation/deactivation of I-devices</li> </ul>	Yes; per user program		
Asset management record	Yes; per user program		
Interface types			
RJ 45 (Ethernet)			
• 100 Mbps	Yes		
Autonegotiation	Yes		
Autorossing	Yes		
Industrial Ethernet status LED	Yes		
Protocols			
Number of connections			
	96: via integrated interfaces of the CDLL and connected CDs / CMs		
Number of connections, max.      Number of connections recoved for ES/HMI/web.	96; via integrated interfaces of the CPU and connected CPs / CMs		
Number of connections reserved for ES/HMI/web     Number of connections via integrated interfaces.	10		
Number of connections via integrated interfaces	64		
Number of S7 routing paths	16		
Redundancy mode			
H-Sync forwarding	Yes		
Media redundancy			
— Media redundancy	only via 1st interface (X1)		
— MRP	Yes; MRP Automanager according to IEC 62439-2 Edition 2.0, MRP Manager; MRP Client		
MPD interconnection aumorated			
MRP interconnection, supported	Yes; as MRP ring node according to IEC 62439-2 Edition 3.0		

— MRPD	Voc. Poquiroment: IDT		
···· -	Yes; Requirement: IRT		
<ul><li>— Switchover time on line break, typ.</li><li>— Number of stations in the ring, max.</li></ul>	200 ms; For MRP, bumpless for MRPD		
— Number of stations in the ring, max.  SIMATIC communication	50		
PG/OP communication	Vas: encryption with TLS V1.3 pre-selected		
• S7 routing	Yes; encryption with TLS V1.3 pre-selected Yes		
S7 communication, as server	Yes		
S7 communication, as client	Yes		
User data per job, max.	See online help (S7 communication, user data size)		
Open IE communication			
• TCP/IP	Yes		
— Data length, max.	64 kbyte		
— several passive connections per port, supported	Yes		
• ISO-on-TCP (RFC1006)	Yes		
— Data length, max.	64 kbyte		
• UDP	Yes		
— Data length, max.	2 kbyte; 1 472 bytes for UDP broadcast		
<ul><li>UDP multicast</li></ul>	Yes; Max. 5 multicast circuits		
• DHCP	Yes		
• DNS	Yes		
• SNMP	Yes		
• DCP	Yes		
• LLDP	Yes		
Encryption	Yes; Optional		
Web server			
• HTTP	Yes; Standard and user pages		
• HTTPS	Yes; Standard and user pages		
OPC UA	Ves IIO III lisease associated		
Runtime license required     ORC HA Client	Yes; "Small" license required		
OPC UA Client  Application outbonfication	Yes Yes		
<ul><li>— Application authentication</li><li>— Security policies</li></ul>			
— Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256		
<ul> <li>User authentication</li> </ul>	"anonymous" or by user name & password		
<ul> <li>Number of connections, max.</li> </ul>	4		
<ul> <li>Number of nodes of the client interfaces, recommended max.</li> </ul>	1 000		
<ul> <li>Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/OPC_I max.</li> </ul>	300		
Number of elements for one call of OPC_UA_NameSpaceGetIndexList, max.	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		
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		
<ul> <li>Number of subscriptions per session, max.</li> </ul>	20		

Sampling interval min	100 ms		
— Sampling interval, min.			
— Publishing interval, min.	500 ms		
Number of server methods, max.	20		
Number of inputs/outputs per server method, max.	20		
Number of monitored items, recommended max.	1 000; for 1 s sampling interval and 1 s send interval		
<ul> <li>Number of server interfaces, max.</li> </ul>	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		
<ul> <li>Alarms and Conditions</li> </ul>	Yes		
<ul> <li>Number of program alarms</li> </ul>	100		
<ul> <li>Number of alarms for system diagnostics</li> </ul>	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 massages in DLIM may	2 500		
Number of loadable program messages in RUN, max.	2 000		
Number of simultaneously active program alarms	600		
Number of program alarms     Number of alarma for pustom diagnostics	600		
Number of alarms for system diagnostics     Number of alarms for motion technology chicate	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		
<ul> <li>Variables</li> </ul>	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters		
<ul> <li>Number of variables, max.</li> </ul>			
<ul><li>of which status variables, max.</li></ul>	200; per job		
— of which control variables, max.	200; per job		
Forcing			
• Forcing	Yes		
<ul> <li>Forcing, variables</li> </ul>	Peripheral inputs/outputs		
Number of variables, max.	200		
Diagnostic buffer			
• present	Yes		
<ul> <li>Number of entries, max.</li> </ul>	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		
<ul><li>Diagnostic alarm</li><li>Hardware interrupt</li></ul>	Yes Yes		
-			
Hardware interrupt			
Hardware interrupt     Diagnoses	Yes		
<ul> <li>Hardware interrupt</li> <li>Diagnoses</li> <li>Monitoring the supply voltage</li> </ul>	Yes Yes; for analog inputs/outputs, see description in manual		
<ul> <li>Hardware interrupt</li> <li>Diagnoses</li> <li>Monitoring the supply voltage</li> <li>Wire-break</li> </ul>	Yes		
Hardware interrupt     Diagnoses	Yes Yes; for analog inputs/outputs, see description in manual Yes; for analog outputs, see description in manual		
Hardware interrupt     Diagnoses	Yes Yes; for analog inputs/outputs, see description in manual Yes; for analog outputs, see description in manual Yes		
Hardware interrupt  Diagnoses     Monitoring the supply voltage     Wire-break     Short-circuit     A/B transition error at incremental encoder  Diagnostics indication LED     RUN/STOP LED	Yes Yes; for analog inputs/outputs, see description in manual Yes; for analog outputs, see description in manual Yes Yes		
Hardware interrupt  Diagnoses     Monitoring the supply voltage     Wire-break     Short-circuit     A/B transition error at incremental encoder  Diagnostics indication LED     RUN/STOP LED     ERROR LED	Yes Yes Yes; for analog inputs/outputs, see description in manual Yes; for analog outputs, see description in manual Yes Yes		
Hardware interrupt  Diagnoses     Monitoring the supply voltage     Wire-break     Short-circuit     A/B transition error at incremental encoder  Diagnostics indication LED     RUN/STOP LED	Yes Yes; for analog inputs/outputs, see description in manual Yes; for analog outputs, see description in manual Yes Yes		

Nontroloning of the supply voltage (PVR-LED)   Yes    - Connection display LINE TYREX   Yes    - Number of available Motion Control resources for technology objects    - Number of available Motion Control resources for technology objects    - Prepared Motion Control resources   Prepared Motion Control resources    - Prepared Motion Control resources   Prepared Motion Control resources    - Prepared Motion Control resources   Prepared Motion Control resources    - Prepared Motion Control resources   Prepared Motion Resource		
Controller Pipe State of Americal diagnostics Commontor of Indiana (American State	<ul> <li>Monitoring of the supply voltage (PWR-LED)</li> </ul>	Yes
**Commetion displays LINK TXPK**  **Motion Control**  **Number of swallable Notion Control resources for technology objects affects the cycle time of the PLC program; selection guide via the TIA Selection Tool Students of the PLC program; selection guide via the TIA Selection Tool Students of the PLC program; selection guide via the TIA Selection Tool Students of the PLC program; selection guide via the TIA Selection Tool Students of the PLC program; selection guide via the TIA Selection Tool Students of the PLC program; selection guide via the TIA Selection Tool Students of the PLC program; selection guide via the TIA Selection Tool Students of the PLC program; selection guide via the TIA Selection Tool Students of the PLC program; selection guide via the TIA Selection Tool Students of the PLC program; selection guide via the TIA Selection Tool Students of the PLC program; selection guide via the TIA Selection Tool Students of the PLC program selection guide via the TIA Selection Tool Students of the PLC program selection guide via the TIA Selection Tool Students of the PLC program selection guide via the TIA Selection Tool Students of the PLC program selection guide via the TIA Selection Tool Students of the PLC program selection guide via the TIA Selection Tool Students of the PLC program selection guide via the TIA Selection Tool Students of the PLC program selection guide via the TIA Selection Tool Students of the PLC program selection guide via the TIA Selection Tool Students of the PLC program selection guide via the TIA Selection Tool Students of the PLC program selection guide via the TIA Selection Tool Students of the PLC program selection guide via the TIA Selection Tool Students of the PLC program selection selection the program selection selection selection dependency selection measurement, min. Selection measure	· ·	Yes
Motion Control   Yes   Note: The number of technology objects affects the cycle time of the PLC program; selection guide via the TIA Selection Tool security of technology objects affects the cycle time of the PLC program; selection guide via the TIA Selection Tool security of technology objects affects the cycle time of the PLC program; selection guide via the TIA Selection Tool security of the T	-	Yes; For analog inputs/outputs
Motion Control  * Number of available Motion Control resources for technology objects  * Required Motion Control resources for technology objects  * Required Motion Control resources  - per speed-controlled axis  - per positioning axis  - per outport cain  - per probe  - Positioning axis  - Number of positioning axis at notion control cycle  of 4 ms (fycial value)  - Number of positioning axis at notion control cycle  of 4 ms (fycial value)  - Number of positioning axis at notion control cycle  of 8 ms (fycial value)  - Number of positioning axis at notion control cycle  of 9 ms (fycial value)  - Number of positioning axis at notion control cycle  of 9 ms (fycial value)  - PID Compact  * PID Compact  * PID, Step  * PID Temp  Yes, PID controller with integrated optimization  * Piper outport of Pineticons  Counting  * Number of counters  * Counting frequency, max.  * Outling frequency, max.  * Counting frequency max.  * Pipe count channel; see manual for details  * Yes  * Counting frequency max.  * Counting frequency max.  * Counting frequency max.  * Counting frequency max.		Yes
Number of available Motion Control resources for technology objects  - Required Motion Control resources - per speed-controlled axis - per synchronous axis - per synchronous axis - per synchronous axis - per option axis - per o	Supported technology objects	
technology objects  *Required Motion Control resources  - per speed-controlled axis  - per synchronous axis  - per synchronous axis  - per synchronous axis  - per option axis  - Number of positioning axes at motion control cycle of a first optional axis  - Number of positioning axes at motion control cycle of a first optional axis  - Number of positioning axes at motion control cycle of a first optional axis  - Number of positioning axes at motion control cycle of a first optional axis  - Number of positioning axes at motion control cycle of a first optional axis  - Number of positioning axes at motion control cycle of a first optional axis axis axis axis axis axis axis axis	Motion Control	
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- per synchronous axis - per external encoder - per orput cam - per cam track - per probe - Positioning axis - Per probe - Positioning axis - Number of positioning axis at motion control cycle of 4 ms (typical value) - Number of positioning axis at motion control cycle of 8 ms (typical value) - Number of positioning axis at motion control cycle of 8 ms (typical value) - Number of positioning axis at motion control cycle of 8 ms (typical value) - PID_Compact - PID_Compact - PID_Compact - PID_Compact - PID_Step - Yes; PID controller with integrated optimization for valves - PID-Temp - Yes; PID controller with integrated optimization for valves - PID-Temp - Yes; PID controller with integrated optimization for temperature - PID-Temp - Yes; PID controller with integrated optimization for temperature - PID-Temp - Yes; PID controller with integrated optimization for temperature - PID-Temp - Yes; PID controller with integrated optimization for temperature - Number of counters - PID-Temp - Yes; PID controller with integrated optimization for temperature - Number of counters - Outling and measuring - PID-Temp - Counting and measuring - PID-Temp - Counting and measuring - PID-Temp - PID-Temp - Yes - Counting and measuring - Yes - PID-Temp - PID-Temp - Yes - PID-Temp - PID-Temp - Yes - PID-Temp		40
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Controller  PID_Compact PID_Compact PID_Step PSStep	Number of positioning axes at motion control cycle	10
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PID-Temp  Counting and measuring		
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Direction dependency Can be changed from user program  Position detection  Incremental acquisition Suitable for S7-1500 Motion Control  Measuring functions  Measuring time, parameterizable Dynamic measurement period adjustment Number of thresholds, parameterizable Prequency measurement, min Frequency measurement, max Cycle duration measurement Cycle d	·	2: per count abannal, and manual for details
- Can be changed from user program  Position detection  Incremental acquisition Suitable for S7-1500 Motion Control  Measuring functions  Measuring time, parameterizable Dynamic measurement period adjustment Number of thresholds, parameterizable  Measuring range  Frequency measurement, min. Frequency measurement, max. Cycle duration measurement, min. Cycle duration measurement, max.  Frequency measurement (min. Cycle duration measurement) Frequency measurement (min. Cycle duration measurement) Frequency measurement Max.  Accuracy  Frequency measurement Do ppm; depending on measuring interval and signal evaluation Velocity measurement Do ppm; depending on measuring interval and signal evaluation Welocity measurement Do ppm; depending on measuring interval and signal evaluation Nelocity measurement Do ppm; depending on measuring interval and signal evaluation Nelocity measurement Do ppm; depending on measuring interval and signal evaluation Nelocity measurement Do ppm; depending on measuring interval and signal evaluation	·	
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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	·	
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<ul> <li>Dynamic measurement period adjustment</li> <li>Number of thresholds, parameterizable</li> <li>Measuring range</li> <li>— Frequency measurement, min.</li> <li>— Frequency measurement, max.</li> <li>— Cycle duration measurement, min.</li> <li>— Cycle duration measurement, min.</li> <li>— Cycle duration measurement, max.</li> <li>— Cycle duration measurement, max.</li> <li>■ Accuracy</li> <li>— Frequency measurement</li> <li>— Cycle duration measurement</li> <li>— Cycle duration measurement</li> <li>— Cycle duration measurement</li> <li>— Uo ppm; depending on measuring interval and signal evaluation</li> <li>— Velocity measurement</li> <li>— Velocity measurement</li> <li>— Uo ppm; depending on measuring interval and signal evaluation</li> <li>— Velocity measurement</li> <li>— Velocity measurement</li> <li>— Velocity measurement</li> </ul>	-	V
<ul> <li>Number of thresholds, parameterizable</li> <li>Measuring range</li> <li>— Frequency measurement, min.</li> <li>— Frequency measurement, max.</li> <li>— Cycle duration measurement, min.</li> <li>— Cycle duration measurement, min.</li> <li>— Cycle duration measurement, max.</li> <li>— Cycle duration measurement, max.</li> <li>■ Accuracy</li> <li>— Frequency measurement</li> <li>— Cycle duration measurement</li> <li>— Cycle duration measurement</li> <li>— Cycle duration measurement</li> <li>— Cycle duration measurement</li> <li>— Use ppm; depending on measuring interval and signal evaluation</li> <li>— Velocity measurement</li> <li< td=""><td></td><td></td></li<></ul>		
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<ul> <li>Frequency measurement, min.</li> <li>Frequency measurement, max.</li> <li>Cycle duration measurement, min.</li> <li>Fyeld duration measurement, max.</li> <li>Frequency measurement, max.</li> <li>System Accuracy</li> <li>Frequency measurement</li> <li>Frequency measurement</li> <li>Cycle duration measurement</li> <li>Do ppm; depending on measuring interval and signal evaluation</li> <li>Cycle duration measurement</li> <li>Do ppm; depending on measuring interval and signal evaluation</li> <li>Velocity measurement</li> <li>Do ppm; depending on measuring interval and signal evaluation</li> </ul>	·	2
<ul> <li>Frequency measurement, max.</li> <li>Cycle duration measurement, min.</li> <li>Dycle duration measurement, max.</li> <li>Eycle duration measurement, max.</li> <li>S</li> <li>Accuracy</li> <li>Frequency measurement</li> <li>Cycle duration measurement</li> <li>Do ppm; depending on measuring interval and signal evaluation</li> <li>Cycle duration measurement</li> <li>Do ppm; depending on measuring interval and signal evaluation</li> <li>Velocity measurement</li> <li>Do ppm; depending on measuring interval and signal evaluation</li> </ul>	· · ·	0.0411-
<ul> <li>Cycle duration measurement, min.</li> <li>Cycle duration measurement, max.</li> <li>Accuracy</li> <li>Frequency measurement</li> <li>Cycle duration measurement</li> <li>Do ppm; depending on measuring interval and signal evaluation</li> <li>Cycle duration measurement</li> <li>Velocity measurement</li> <li>Oppm; depending on measuring interval and signal evaluation</li> <li>Velocity measurement</li> <li>Oppm; depending on measuring interval and signal evaluation</li> </ul>		
<ul> <li>Cycle duration measurement, max.</li> <li>Accuracy</li> <li>Frequency measurement</li> <li>Cycle duration measurement</li> <li>100 ppm; depending on measuring interval and signal evaluation</li> <li>Cycle duration measurement</li> <li>Velocity measurement</li> <li>100 ppm; depending on measuring interval and signal evaluation</li> <li>Uppm; depending on measuring interval and signal evaluation</li> </ul>		
Accuracy  — Frequency measurement  — Cycle duration measurement  — Velocity measurement  100 ppm; depending on measuring interval and signal evaluation  100 ppm; depending on measuring interval and signal evaluation  100 ppm; depending on measuring interval and signal evaluation	•	
<ul> <li>Frequency measurement</li> <li>Cycle duration measurement</li> <li>Velocity measurement</li> <li>Too ppm; depending on measuring interval and signal evaluation</li> <li>Welocity measurement</li> <li>Too ppm; depending on measuring interval and signal evaluation</li> <li>Too ppm; depending on measuring interval and signal evaluation</li> </ul>		25 s
<ul> <li>Cycle duration measurement</li> <li>Velocity measurement</li> <li>100 ppm; depending on measuring interval and signal evaluation</li> <li>100 ppm; depending on measuring interval and signal evaluation</li> </ul>	•	
<ul> <li>Velocity measurement</li> <li>100 ppm; depending on measuring interval and signal evaluation</li> </ul>		
·	•	
Potential separation		100 ppm; depending on measuring interval and signal evaluation
	Potential separation	

- hatusan the channels	No				
between the channels	No 46				
between the channels, in groups of  Potential separation digital outputs	16				
between the channels	No				
between the channels, in groups of	16	No 40			
Potential separation channels	10	16			
between the channels and backplane bus  Yes					
Between the channels and backplane bus     Between the channels and load voltage L+					
Isolation	NO	No			
Isolation tested with	707 V DC (type test)	707 V DO (hura a karak)			
Ambient conditions	707 V DC (type test)				
Ambient temperature during operation					
horizontal installation, min.	-25 °C; No condensation				
<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>	-25 °C; No condensation				
vertical installation, max.	40 °C; note derating data for on	board I/O in the manual.	Display: 40 °C, at an		
	operating temperature of typica				
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 installa	ation 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					
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				
programming / cycle time monitoring / header	165				
• lower limit	adjustable minimum cycle time				
• upper limit	adjustable maximum cycle time				
Dimensions	adjustable maximum cycle time		_		
Width	85 mm				
Height	147 mm				
Depth	129 mm				
Weights	4.050				
Weight, approx.	1 050 g				
Classifications					
		Version	Classification		
	eClass	14	27-24-22-07		
	eClass	12	27-24-22-07		
	eClass	9.1	27-24-22-07		
	eClass	9	27-24-22-07		
	eClass	8	27-24-22-07		
	eClass	7.1	27-24-22-07		
	eClass				
	COIdoS	6	27-24-22-07		

ETIM	9	EC000236
ETIM	8	EC000236
ETIM	7	EC000236
IDEA	4	3565
UNSPSC	15	32-15-17-05

# Approvals / Certificates

### **General Product Approval**





Miscellaneous



Miscellaneous



#### For use in hazardous locations



<u>FM</u>

CCC-Ex



IECEx



**Miscellaneous** 

For use in hazardous locations

**Test Certificates** 

Marine / Shipping

Type Examination Certificate

Type Test Certific-ates/Test Report









Marine / Shipping

NK / Nippon Kaiji Ky-okai





CCS (China Classification Society)



**PROFINET** 

other

#### **Industrial Communication**

**PROFINET** 

last modified:

12/8/2024

