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	V2.8
Product function	
● I&M data	Yes; I&M0 to I&M3
• Isochronous mode	Yes; With minimum OB 6x cycle of 625 µs (distributed)
Engineering with	
STEP 7 TIA Portal configurable/integrated as of	V16 (FW V2.8) / V13 SP1 Update 4 (FW V1.8) or higher
version	
Configuration control	
via dataset	Yes
Display	
Screen diagonal [cm]	3.45 cm
Control along the	
Control elements	
Number of keys	6
Mode selector switch	1

Supply voltage	
Type of supply voltage	24 V DC
permissible range, lower limit (DC)	19.2 V; 20.4 V DC, for supplying the digital inputs/outputs
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Mains buffering	
Mains/voltage failure stored energy time	5 ms; Refers to the power supply on the CPU section
Repeat rate, min.	1/s
Input current Current consumption (rated value)	0.9. A: Digital appeard I/O modules are supplied congretally
	0.8 A; Digital onboard I/O modules are supplied separately
Inrush current, max.	1.9 A; Rated value
² t	0.34 A²·s
Digital inputs	
• from load voltage L+ (without load), max.	20 mA; per group
Digital outputs	
from load voltage L+, max.	30 mA; Per group, without load
Output voltage	
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	
Infeed power to the backplane bus	10 W
Power consumption from the backplane bus	8.5 W
(balanced)	0.0 **
Davida	
Power loss	11.8 W
Power loss, typ.	TI.O VV
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
mantenance noo	

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)	2 000; Blocks (OB, FB, FC, DB) and UDTs
DB	2 000, 2.00.10 (02,12,10, 22,10,10, 22.10
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
ОВ	
• Size, max.	175 kbyte
 Number of free cycle OBs 	100
 Number of time alarm OBs 	20
 Number of delay alarm OBs 	20
 Number of cyclic interrupt OBs 	20; With minimum OB 3x cycle of 500 μs
 Number of process alarm OBs 	50
 Number of DPV1 alarm OBs 	3
 Number of isochronous mode OBs 	1
 Number of technology synchronous alarm OBs 	2
 Number of startup OBs 	100
 Number of asynchronous error OBs 	4
 Number of synchronous error OBs 	2
 Number of diagnostic alarm OBs 	1
Nesting depth	
• per priority class	24
Counters, timers and their retentivity	
S7 counter	
• Number	2 048
Retentivity	
— adjustable	Yes
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	The state of the s
·	Yes
— adjustable	163
Data areas and their retentivity	
Retentive data area (incl. timers, counters, flags),	128 kbyte; In total; available retentive memory for bit memories,
max.	timers, counters, DBs, and technology data (axes): 88 KB
Extended retentive data area (incl. timers, counters, flags), max.	1 Mbyte; When using PS 6 0W 24/48/60 V DC HF
Flag	
Number, max.	16 kbyte
Number of clock memories	8; 8 clock memory bit, grouped into one clock memory byte
Data blocks	
Retentivity adjustable	Yes
Retentivity preset	No
Local data	
• per priority class, max.	64 kbyte; max. 16 KB per block
Address area	
Number of IO modules	1 024; max. number of modules / submodules
I/O address area	
• Inputs	32 kbyte; All inputs are in the process image
Outputs	32 kbyte; All outputs are in the process image
per integrated IO subsystem	
— Inputs (volume)	8 kbyte
— Outputs (volume)	8 kbyte
per CM/CP	
— Inputs (volume)	8 kbyte
— Outputs (volume)	8 kbyte
Subprocess images	,,,
Number of subprocess images, max.	32
- Mulliper of Supprocess illiages, Illax.	<u></u>
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	

Number of IO Controllers • integrated • Via CM **Nodules per rack, max. • Number of lines, max. • Number of PtP CM **Number of PtP CMs **Type • Backup time • Deviation per day, max. • Deviation per day, max. • Number **Operating hours counter • Number • Number • Supported • Supported • Supported • Supported • in AS, master • in AS, slave • on Ethernet via NTP **Tyia CMs		A A
integrated integ	● Via CM	4; A maximum of 4 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total
• Via CM 4; A maximum of 4 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total Rack • Modules per rack, max. • Number of lines, max. • Number of PIP CMs • Number of PIP CMs • Number of PIP CMs • Backup time • Deviation per day, max. Operating hours counter • Number • I6 Clock synchronization • supported • in AS, master • in AS, slave • on Ethernet via NTP Digital inputs. parameterizable Source/sink input Input characteristic curve in accordance with IEC 61131, type 3 Digital input functions, parameterizable • Gate start/stop • Synchronization Input voltage • Type of input voltage • Type of input voltage • Rated value (DC) • for signal "1" • for signal "1" • for signal "1" • for signal "1", typ. • Succession to tale. • At A maximum of 4 CMs/CPs (PROFIBUS) 182 (CPU + 31 modules 192 (CPU + 31 modules 192 (CPU + 31 modules 193 (CPU + 31 modules 194 (CMS) 194 (CMS) 194 (CMS) 194 (CMS) 194 (CMS) 194 (CMS) 195 (CMS) 195 (CMS) 195 (CMS) 195 (CMS) 195 (CMS) 195 (CMS) 196 (CMS) 196 (CMS) 197 (CMS) 196 (CMS) 197 (CMS) 197 (CMS) 198 (CMS) 198 (CMS) 198 (CMS) 198 (CMS) 198 (CMS) 199 (CM	Number of IO Controllers	
Rack • Modules per rack, max. • Number of lines, max. • Number of PtP CMs • Number of PtP CMs • Number of PtP CMs • Type • Backup time • Deviation per day, max. • Number • Number • Number • Deviation per day, max. Operating hours counter • Number • Supported • Yes • In AS, slave • on Ethernet via NTP • Ves • On Ethernet via NTP • Perading Input characteristic curve in accordance with IEC 61131, type 3 Digital input functions, parameterizable • Cate start/stop • Cate start/stop • Synchronization • Yes • Synchronization • Yes • Synchronization • Yes • Synchronization • Yes • Type of input voltage • Type of resignal "1", type. • Synchronization	• integrated	1
Modules per rack, max. Number of lines, max. Number of lines, max. Number of PtP CMs Number of PtP CMs the number of connectable PtP CMs is only limited by the number of available slots Number of expectable PtP CMs is only limited by the number of available slots Number of day Clock Number Hardware clock Sackup time 6 kwt; At 40 °C ambient temperature, typically Deviation per day, max. Operating hours counter Number 16 Clock synchronization Supported Yes Naster Yes Naster Yes Naster Yes Naster Yes National Save On Ethernet via NTP Digital inputs Integrated channels (DI) 16 Digital inputs, parameterizable Yes Source/sink input P-reading Input characteristic curve in accordance with IEC Yes Cate start/stop Yes Capture Yes Synchronization Yes Input voltage Type of rignal "1" +11 to +30V Input current For signal "1", typ. 2.5 mA	● Via CM	
Number of lines, max. PIP CM Number of PtP CMs the number of connectable PtP CMs is only limited by the number of available slots Number of PtP CMs the number of connectable PtP CMs is only limited by the number of available slots Number	Rack	
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 Backup time Deviation per day, max. Operating hours counter Number Number Stock synchronization Supported In AS, master In AS, slave In Ethernet via NTP Digital inputs Preading Input characteristic curve in accordance with IEC 61131, type 3 Digital input functions, parameterizable Synchronization Yes Synchronization Yes Suprel's ink input Preading Input characteristic curve in accordance with IEC 61131, type 3 Digital input functions, parameterizable Synchronization Yes Synchronization Yes Input voltage Acabete Synchronization Yes Synchronization Poc Sate start/stop Yes Synchronization Nes Synchronization Poc Signal "1" Synchronization Poc Signal "1" Synchronization Poc Signal "1" Synchronization Poc Signal "1" Synchronization Sync	 Modules per rack, max. 	32; CPU + 31 modules
the number of connectable PtP CMs is only limited by the number of available slots Time of day Clock • Type • Backup time • Deviation per day, max. Operating hours counter • Number • Number • Number • Number • Number • Number • Number • Supported • in AS, master • on Ethernet via NTP Digital inputs Source/sink input P-reading Input characteristic curve in accordance with IEC 61131, type 3 Digital input functions, parameterizable • Sayschronization Pes • Synchronization Yes Ocapture • Synchronization Yes Preading Yes Capture • Synchronization Yes Input voltage • Type of input voltage • Rated value (DC) • For signal "1" • for signal "1" • for signal "1", typ. Input current • for signal "1", typ. Input current • for signal "1", typ. Input current • for signal "1", typ. Input current • for signal "1", typ. Input current • for signal "1", typ. Input current • for signal "1", typ. Input current • for signal "1", typ. Input current • for signal "1", typ. Input current • for signal "1", typ. Input current • for signal "1", typ. Input current	 Number of lines, max. 	1
Time of day Clock Type Backup time Deviation per day, max. Operating hours counter Number Supported In AS, master Integrated channels (DI) Digital inputs, parameterizable Source/sink input P-reading Input characteristic curve in accordance with IEC 61131, type 3 Digital input functions, parameterizable Synchronization Yes Counter Yes One Stee start/stop Capture Synchronization Yes Digital input functions, parameterizable Course synchronization Yes Orea start/stop Capture Synchronization Yes OD Capture Synchronization Possible input voltage Rated value (DC) For signal "1" For signal "1" For signal "1" For signal "1", typ. Input current For signal "1", typ. One wish a Hardware clock At 40 "C ambient temperature, typically For signal "1" For signal "1", typ. Hardware clock At 40 "C ambient temperature, typically For signal "1", typ. Hardware clock At 40 "C ambient temperature, typically For signal "1", typ. Hardware clock At 40 "C ambient temperature, typically For signal "1", typ. At a to "S. Typical "1" For signal "1", typ. Later where clock At 40 "C ambient temperature, typically For signal "1", typ. At a to "S. Typical "2" For signal "1", typ. Later where clock At 40 "C ambient temperature, typically At 40 "Cambient temperature, typical "A "Cambient temperature, typically At 40 "Cambient temperature, typically At	PtP CM	
Clock Type Backup time Deviation per day, max. Operating hours counter Number Clock synchronization supported in AS, master in AS, slave on Ethernet via NTP Digital inputs Integrated channels (DI) Digital inputs, parameterizable Source/sink input Input characteristic curve in accordance with IEC 61131, type 3 Digital input functions, parameterizable Gate start/stop Synchronization Pes Type of input voltage Rated value (DC) of or signal "0" of or signal "1" over the ware and in the signal "1", typ. Input current Input current For signal "1", typ. At the Cambient temperature, typically Se wk, at 40 "C ambient temperature, typically Se supported Se supported Se supported Yes Source/sink input Pesading Yes Pesading Yes OC Se sated value (DC) Se supported Se very supported Se ver	Number of PtP CMs	
Type Backup time Deviation per day, max. Operating hours counter Number Number Supported An As, slave On Ethernet via NTP Digital inputs Integrated channels (DI) Digital inputs, parameterizable Nource/sink input Input characteristic curve in accordance with IEC 61131, type 3 Digital input functions, parameterizable Gate start/stop Synchronization Yes Synchronization Yes Yes A Backup time A S, slave A Clock synchronization Yes Yes A Clock synchronization Yes Digital inputs P-reading Yes Source/sink input P-reading Yes Synchronization Yes Digital input functions, parameterizable A Gate start/stop A Synchronization Yes Pres A Synchronization Yes Pres A Synchronization A Clock sy		
• Backup time • Deviation per day, max. Operating hours counter • Number • Number • Number 16 Clock synchronization • supported • in AS, master • in AS, slave • on Ethernet via NTP Digital inputs integrated channels (DI) Digital inputs, parameterizable Source/sink input Input characteristic curve in accordance with IEC 61131, type 3 Digital input functions, parameterizable • Gate start/stop • Synchronization Input voltage • Type of input voltage • Rated value (DC) • for signal "1" Input current • for signal "1", typ. 16 6 Wk; At 40 °C ambient temperature, typically 10 s; Typ.: 2 s 10 s; Typ.: 2		
● Deviation per day, max. Operating hours counter ● Number 16 Clock synchronization ● supported ● in AS, master ● in AS, slave ● on Ethernet via NTP Pes Digital inputs integrated channels (DI) Digital inputs, parameterizable Source/sink input Input characteristic curve in accordance with IEC 61131, type 3 Digital input functions, parameterizable ● Gate start/stop ● Capture ● Synchronization Input voltage ● Type of input voltage ● Type of input voltage ● Rated value (DC) ● for signal "1", typ. Input current ● for signal "1", typ. 2.5 mA	••	
Operating hours counter Number Number 16 Clock synchronization supported in AS, master in AS, slave on Ethernet via NTP Pes Integrated channels (DI) Input characteristic curve in accordance with IEC 61131, type 3 Digital input functions, parameterizable Gate start/stop Capture Synchronization Pes Input voltage Type of input voltage Rated value (DC) for signal "1" Input current for signal "1", typ. 2.5 mA	Backup time	
● Number 16 Clock synchronization ● 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 Digital input functions, parameterizable • Gate start/stop Yes • Capture Yes • Synchronization Yes Input voltage • Type of input voltage • Rated value (DC) • for signal "1" Input current • for signal "1", typ. 2.5 mA	<u> </u>	10 s; Typ.: 2 s
Clock synchronization • supported • in AS, master • in AS, slave • on Ethernet via NTP Pes Digital inputs integrated channels (DI) Digital inputs, parameterizable Source/sink input Input characteristic curve in accordance with IEC 61131, type 3 Digital input functions, parameterizable • Gate start/stop • Capture • Synchronization Input voltage • Type of input voltage • Rated value (DC) • for signal "1" Input current • for signal "1", typ. 2.5 mA	Operating hours counter	
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in AS, master in AS, slave on Ethernet via NTP Pres Digital inputs integrated channels (DI) Digital inputs, parameterizable Source/sink input Input characteristic curve in accordance with IEC 61131, type 3 Digital input functions, parameterizable Gate start/stop Capture Synchronization Yes Pres Synchronization Pres Preading Pres Preading Pres Preading Pres Preading Pres Preading Pres Preading Pres Preading Pres Pre	Clock synchronization	
in AS, slave on Ethernet via NTP Pes On Ethernet via NTP Pyes Digital inputs integrated channels (DI) Digital inputs, parameterizable Yes Source/sink input Input characteristic curve in accordance with IEC 61131, type 3 Digital input functions, parameterizable Gate start/stop Gate start/stop Yes Synchronization Yes Input voltage Type of input voltage Rated value (DC) For signal "0" Type of or signal "1" Input current for signal "1", typ. 2.5 mA	• supported	Yes
on Ethernet via NTP Pyes Digital inputs integrated channels (DI) Digital inputs, parameterizable Source/sink input Input characteristic curve in accordance with IEC 61131, type 3 Digital input functions, parameterizable Gate start/stop Capture Synchronization Input voltage Type of input voltage Rated value (DC) Rated value (DC) for signal "0" for signal "1" For signal "1", typ. Preading Yes Yes Yes Yes Preading Yes Yes Otherwise Preading Preading Yes Otherwise Preading Preading Preading Preading Preading Preading Preading Preading Preading Yes Otherwise Yes Otherwise Input voltage For signal "0" Strip of signal "1" Hand of signal "1" Typ. Strip of male "1", typ.	● in AS, master	Yes
Digital inputs integrated channels (DI) Digital inputs, parameterizable Source/sink input Input characteristic curve in accordance with IEC 61131, type 3 Digital input functions, parameterizable • Gate start/stop • Capture • Synchronization Input voltage • Type of input voltage • Rated value (DC) • for signal "0" • for signal "1", typ. 16 P-reading Yes Yes Yes Yes Yes 9 OC 4 Ves DC 4 Ves DC 4 Ves 1 1 1 1 1 1 1 1 1 1 1 1 1	• in AS, slave	Yes
integrated channels (DI) Digital inputs, parameterizable Source/sink input Input characteristic curve in accordance with IEC 61131, type 3 Digital input functions, parameterizable Gate start/stop Capture Synchronization Input voltage Type of input voltage Rated value (DC) for signal "0" for signal "1", typ. 16 Yes Yes Yes P-reading Yes Yes Yes Yes Yes Yes Yes Ye	• on Ethernet via NTP	Yes
Digital inputs, parameterizable Source/sink input Input characteristic curve in accordance with IEC 61131, type 3 Digital input functions, parameterizable • Gate start/stop • Capture • Synchronization Input voltage • Type of input voltage • Rated value (DC) • for signal "0" • for signal "1" • for signal "1", typ. P-reading Yes Yes Yes Yes Yes Yes Yes PoC Yes Yes Yes Yes Yes 1 DC 24 V 1-3 to +5V 1-11 to +30V Input current • for signal "1", typ. 2.5 mA	Digital inputs	
Source/sink input Input characteristic curve in accordance with IEC 61131, type 3 Digital input functions, parameterizable • Gate start/stop • Capture • Synchronization Input voltage • Type of input voltage • Rated value (DC) • for signal "0" • for signal "1" Input current • for signal "1", typ.	integrated channels (DI)	16
Input characteristic curve in accordance with IEC 61131, type 3 Digital input functions, parameterizable • Gate start/stop Yes • Capture Yes • Synchronization Yes Input voltage • Type of input voltage DC • Rated value (DC) • for signal "0" • for signal "1" • for signal "1", typ. 2.5 mA	Digital inputs, parameterizable	Yes
Digital input functions, parameterizable • Gate start/stop Yes • Capture Yes • Synchronization Yes Input voltage • Type of input voltage DC • Rated value (DC) 24 V • for signal "0" -3 to +5V • for signal "1" +11 to +30V Input current • for signal "1", typ. 2.5 mA	Source/sink input	P-reading
 Gate start/stop Capture Synchronization Yes Input voltage Type of input voltage Rated value (DC) for signal "0" for signal "1" +11 to +30V Input current for signal "1", typ. 2.5 mA 	·	Yes
 Capture Synchronization Yes Input voltage Type of input voltage Rated value (DC) for signal "0" for signal "1" +11 to +30V Input current for signal "1", typ. 2.5 mA 	Digital input functions, parameterizable	
 Synchronization Yes Input voltage Type of input voltage Rated value (DC) for signal "0" for signal "1" to +30V Input current for signal "1", typ. 2.5 mA 	Gate start/stop	Yes
Input voltage Type of input voltage Rated value (DC) for signal "0" for signal "1" Type of input voltage 24 V -3 to +5V +11 to +30V Input current for signal "1", typ. 2.5 mA	Capture	Yes
 Type of input voltage Rated value (DC) for signal "0" for signal "1" to +30V Input current for signal "1", typ. 2.5 mA	 Synchronization 	Yes
 Rated value (DC) for signal "0" for signal "1" for signal "1" for signal "1", typ. 24 V -3 to +5V +11 to +30V Input current for signal "1", typ. 2.5 mA 	Input voltage	
● for signal "0" -3 to +5V ● for signal "1" +11 to +30V Input current ● for signal "1", typ. 2.5 mA	Type of input voltage	DC
● for signal "1" +11 to +30V Input current ● for signal "1", typ. 2.5 mA	Rated value (DC)	24 V
● for signal "1" +11 to +30V Input current ● for signal "1", typ. 2.5 mA	● for signal "0"	-3 to +5V
Input current ● for signal "1", typ. 2.5 mA		+11 to +30V
● for signal "1", typ. 2.5 mA		
		2.5 mA

for standard inputs	
— parameterizable	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
	4 µs; for parameterization "none"
— at "1" to "0", min.	20 ms
— at "1" to "0", max.	20 IIIS
for interrupt inputs	V 0 1 1 1 1
— parameterizable	Yes; Same as for standard inputs
for technological functions	
— parameterizable	Yes; Same as for standard inputs
Cable length	
• shielded, max.	1 000 m; 600 m for technological functions; depending on input frequency, encoder and cable quality; max. 50 m at 100 kHz
• unabialded many	600 m; for technological functions: No
• unshielded, max.	600 III, for technological functions. No
Digital outputs	
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
Accuracy of pulse duration	Up to ±100 ppm ±2 μs at high-speed output; see manual for details
minimum pulse duration	2 µs; With High Speed output
Digital output functions, parameterizable	
 Switching tripped by comparison values 	Yes; As output signal of a high-speed counter
 PWM output 	Yes
— Number, max.	4
 Cycle duration, parameterizable 	Yes
— ON period, min.	0 %
— ON period, max.	100 %
 Resolution of the duty cycle 	0.0036 %; For S7 analog format, min. 40 ns
Frequency output	Yes
Pulse train	Yes; also for pulse/direction interface
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 Ω ; 240 ohms with high-speed output, i.e. when using a high-
	speed output; see manual for details
• upper limit	12 kΩ
Output voltage	
Type of output voltage	DC
● for signal "0", max.	1 V; With high-speed output, i.e. when using a high-speed output; see manual for details
● for signal "1", min.	23.2 V; L+ (-0.8 V)
Output current	
● for signal "1" rated value	0.5 A; 0.1 A with high-speed output, i.e. when using a high-speed output, observe derating; see manual for details
for signal "1" permissible range, min.	2 mA
• for signal "1" permissible range, max.	0.6 A; 0.12 A with high-speed output, i.e. when using a high-speed output, observe derating; see manual for details
for signal "0" residual current, max.	0.5 mA
Output delay with resistive load	
• "0" to "1", max.	200 μs
• "1" to "0", max.	500 μs; Load-dependent
for technological functions	
— "0" to "1", max.	5 μs ; Depending on the output used, see additional description in manual
— "1" to "0", max.	$5~\mu s;$ Depending on the output used, see additional description in manual
Parallel switching of two outputs	
• for logic links	Yes; for technological functions: No
• for uprating	No
 for redundant control of a load 	Yes; for technological functions: No
Switching frequency	
with resistive load, max.	100 kHz; For high-speed output, 100 Hz for standard output
• with inductive load, max.	0.5 Hz; Acc. to IEC 60947-5-1, DC-13; observe derating curve
• on lamp load, max.	10 Hz
Total current of the outputs	
Current per channel, max.	0.5 A; see additional description in the manual
• Current per group, max.	8 A; see additional description in the manual
 Current per power supply, max. 	4 A; 2 power supplies for each group, current per power supply max. 4 A, see additional description in manual
for technological functions	
— Current per channel, max.	0.5 A; see additional description in the manual
Relay outputs	
Number of relay outputs	0
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

	600 m; for technological functions: No
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For current measurement	Analog inputs	
For voltage measurement For resistance/resistance thermometer measurement permissible input voltage for voltage input (destruction limit), max. permissible input current for current input (destruction limit), max. permissible input current for current input (destruction limit), max. Cycle time (all channels), min. 40 mA Technical unit for temperature measurement adjustable Input ranges (rated values), voltages • 0 to +10 V Input resistance (0 to 10 V) • 100 kΩ • 1 V to 5 V Input resistance (1 V to 5 V) • Input resistance (1 V to 5 V) • Input resistance (-10 V to +10 V) • Input resistance (-10 V to +10 V) • Input resistance (-5 V to +5 V) Input resistance (-5 V to +5 V) Input resistance (0 to 20 mA) • Input resistance (0 to 20 mA) • Input resistance (-20 mA to +20 mA) • Input resistance (-20 mA to +20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (Ni 100) • Input resistance (Pt 100) Input ranges (rated values), resistors	Number of analog inputs	5; 4x for U/I, 1x for R/RTD
 For resistance/resistance thermometer measurement permissible input voltage for voltage input (destruction limit), max. permissible input current for current input (destruction limit), max. Cycle time (all channels), min. 1 ms; Dependent on the parameterized interference frequency suppression; for details, see conversion procedure in manual Yes; °C/°F/K Technical unit for temperature measurement adjustable Input ranges (rated values), voltages 0 to +10 V 1 put resistance (0 to 10 V) 1 100 kΩ 1 yes; Physical measuring range: ± 10 V 1 nput resistance (1 V to 5 V) 1 nput resistance (1 V to 5 V) 1 nput resistance (-10 V to +10 V) 2 sy Physical measuring range: ± 10 V 1 nput resistance (-10 V to +10 V) 2 sy Physical measuring range: ± 10 V 1 nput resistance (-5 V to +5 V) 1 nput ranges (rated values), currents 0 to 20 mA 1 put resistance (0 to 20 mA) 20 mA 1 put resistance (-20 mA to +20 mA) 1 put resistance (-20 mA to +20 mA) 1 put resistance (4 mA to 20 mA) 1 put resistance (4 mA to 20 mA) 1 put resistance (4 mA to 20 mA) 1 put resistance (Ni 100) 1 put resistance (Ni 100) 1 put resistance (Pt 100) 1 put resistance (Pt 100) 1 put ranges (rated values), resistance 	 For current measurement 	4; max.
measurement permissible input voltage for voltage input (destruction limit), max. Permissible input current for current input (destruction limit), max. Cycle time (all channels), min. 1 ms; Dependent on the parameterized interference frequency suppression; for details, see conversion procedure in manual Yes; °C°FIK Technical unit for temperature measurement adjustable Input ranges (rated values), voltages • 0 to +10 V • Input resistance (0 to 10 V) • Input resistance (1 V to 5 V) • Input resistance (1 V to 5 V) • Input resistance (1 V to 5 V) • Input resistance (-10 V to +10 V) • Input resistance (-10 V to +10 V) • Input resistance (-5 V to +5 V) • Input resistance (-5 V to +5 V) Input resistance (0 to 20 mA) • Input resistance (0 to 20 mA) • Input resistance (0 to 20 mA) • Input resistance (-20 mA to +20 mA) • Input resistance (-20 mA to +20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (Ni 100) • Pt 100 • Input resistance (Ni 100) • Pt 100 • Input resistance (Pt 100) Input resistance (Pt 100) Input resistance (Pt 100) Input reanges (rated values), resistonce	For voltage measurement	4; max.
Permissible input voltage for voltage input (destruction limit), max.	• For resistance/resistance thermometer	1
	measurement	
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		28.8 V
Imit), max. Cycle time (all channels), min. 1 ms; Dependent on the parameterized interference frequency suppression; for details, see conversion procedure in manual Technical unit for temperature measurement adjustable Yes; °C/°F/K Input ranges (rated values), voltages • 0 to +10 V • 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 (-10 V to +10 V) 100 kΩ • 10 V to +10 V Yes; Physical measuring range: ± 10 V • Input resistance (-10 V to +10 V) 100 kΩ • 1nput resistance (-5 V to +5 V) 100 kΩ • 1nput resistance (-5 V to +5 V) 100 kΩ Input ranges (rated values), currents • 0 to 20 mA • 0 to 20 mA Yes; Physical measuring range: ± 20 mA • 1 nput resistance (0 to 20 mA) 50 Ω; Plus approx. 55 ohm for overvoltage protection by PTC • -20 mA to +20 mA Yes; Physical measuring range: ± 20 mA • Input resistance (-20 mA to +20 mA) 50 Ω; Plus approx. 55 ohm for overvoltage protection by PTC • 4 mA to 20 mA Yes; Physical measuring range: ± 20 mA • Input ranges (rated values), resistance thermometer • Ni 100 Y		40 4
Cycle time (all channels), min. 1 ms; Dependent on the parameterized interference frequency suppression; for details, see conversion procedure in manual Technical unit for temperature measurement adjustable Yes; °C/°F/K Input ranges (rated values), voltages • 0 to +10 V • 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 (10 V to +10 V) 100 kΩ • -10 V to +10 V Yes • Input resistance (-10 V to +10 V) 100 kΩ • Input resistance (-5 V to +5 V) 100 kΩ Input ranges (rated values), currents • 0 to 20 mA Yes; Physical measuring range: ± 20 mA • 1 to 20 mA Yes; Physical measuring range: ± 20 mA • 1 to 20 mA Yes; Physical measuring range: ± 20 mA • 1 to 20 mA Yes; Physical measuring range: ± 20 mA • 1 to 20 mA to +20 mA Yes; Physical measuring range: ± 20 mA • 1 nput resistance (-20 mA to +20 mA) Yes; Physical measuring range: ± 20 mA • 1 mput resistance (-20 mA to +20 mA) Yes; Physical measuring range: ± 20 mA • 1 mput resistance (4 mA to 20 mA) Yes; Physical measuring range: ± 20 mA • 1 mput resistance		40 mA
suppression; for details, see conversion procedure in manual Technical unit for temperature measurement adjustable Yes; °C/*F/K Input ranges (rated values), voltages Yes; Physical measuring range: \pm 10 V Input resistance (0 to 10 V) 100 kΩ Input resistance (1 V to 5 V) 100 kΩ Input resistance (-10 V to +10 V) Yes Input resistance (-10 V to +10 V) 100 kΩ Input resistance (-5 V to +5 V) 100 kΩ Input ranges (rated values), currents Yes; Physical measuring range: \pm 20 mA Input ranges (rated values), currents Yes O to 20 mA Yes; Physical measuring range: \pm 20 mA Input resistance (0 to 20 mA) Yes Pus approx. 55 ohm for overvoltage protection by PTC Yes Physical measuring range: \pm 20 mA Input resistance (4 mA to 20 mA) Yes Pus approx. 55 ohm for overvoltage protection by PTC Input ranges (rated values), resistance thermometer Ni 100 Yes; Standard/climate Input resistance (Pt 100) 10 MΩ Input ranges (rated values), resistors	·	1 ms: Dependent on the parameterized interference frequency
adjustable Input ranges (rated values), voltages • $0 \text{ to} +10 \text{ V}$	o, o.o (2 o.i.ao.,,	
Input ranges (rated values), voltages • 0 to +10 V • Input resistance (0 to 10 V) • Input resistance (0 to 10 V) • Input resistance (1 V to 5 V) • Input resistance (1 V to 5 V) • Input resistance (1 V to 5 V) • Input resistance (-10 V to +10 V) • Input resistance (-10 V to +10 V) • Input resistance (-5 V to +5 V) • Input resistance (-5 V to +5 V) • Input resistance (rated values), currents • 0 to 20 mA • Input resistance (0 to 20 mA) • Input resistance (-20 mA to +20 mA) • Input resistance (-20 mA to +20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (7 mB to +20 mA) • Input resistance (1 mB to 20 mA) • Input resistance (1 mB to 20 mA) • Input resistance (1 mB to 20 mB) • Input resistance (1 mB to 5 WB to 5 W	Technical unit for temperature measurement	Yes; °C/°F/K
• 0 to +10 V Yes; Physical measuring range: \pm 10 V • Input resistance (0 to 10 V) 100 k Ω • 1 V to 5 V Yes; Physical measuring range: \pm 10 V • Input resistance (1 V to 5 V) 100 k Ω • -10 V to +10 V Yes • Input resistance (-10 V to +10 V) 100 k Ω • -5 V to +5 V Yes; Physical measuring range: \pm 10 V • Input resistance (-5 V to +5 V) 100 k Ω Input ranges (rated values), currents • 0 to 20 mA Yes; Physical measuring range: \pm 20 mA • Input resistance (0 to 20 mA) 50 Ω ; Plus approx. 55 ohm for overvoltage protection by PTC • -20 mA to +20 mA Yes; Physical measuring range: \pm 20 mA • Input resistance (-20 mA to +20 mA) 50 Ω ; Plus approx. 55 ohm for overvoltage protection by PTC • 4 mA to 20 mA Yes; Physical measuring range: \pm 20 mA • Input resistance (4 mA to 20 mA) 50 Ω ; Plus approx. 55 ohm for overvoltage protection by PTC Input ranges (rated values), resistance thermometer • Ni 100 Yes; Standard/climate • Input resistance (Ni 100) Yes; Standard/climate • Input resistance (Pt 100) 10 M Ω Input ranges (rated values), resistors	adjustable	
• Input resistance (0 to 10 V) • 1 V to 5 V • Input resistance (1 V to 5 V) • Input resistance (1 V to 5 V) • Input resistance (-10 V to +10 V) • Input resistance (-10 V to +10 V) • Input resistance (-5 V to +5 V) • Input resistance (-5 V to +5 V) • Input resistance (-5 V to +5 V) • Input resistance (0 to 20 mA) • 100 k Ω Input resistance (0 to 20 mA) • Input resistance (-20 mA to +20 mA) • Input resistance (-20 mA to +20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (7 mA to 20 mA) • Input resistance (100) • Input resistance (Ni 100) • Input resistance (Ni 100) • Input resistance (Ni 100) • Input resistance (Pt 100) Input resistance (rated values), resistors	Input ranges (rated values), voltages	
• 1 V to 5 V • Input resistance (1 V to 5 V) • Input resistance (1 V to 5 V) • Input resistance (-10 V to +10 V) • Input resistance (-10 V to +10 V) • Input resistance (-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) • Input resistance (0 to 20 mA) • Input resistance (-20 mA to +20 mA) • Input resistance (-20 mA to +20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (10 mA) • Input resistance	• 0 to +10 V	Yes; Physical measuring range: ± 10 V
• Input resistance (1 V to 5 V) • -10 V to +10 V • Input resistance (-10 V to +10 V) • Input resistance (-10 V to +5 V) • Input resistance (-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) • Input resistance (0 to 20 mA) • Input resistance (-20 mA to +20 mA) • Input resistance (-20 mA to +20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (10 V to +5 V) Input resistance (4 mA to 20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (Ni 100) • Input resistance (Ni 100) • Input resistance (Pt 100) Input resistance (Pt 100) Input ranges (rated values), resistors	Input resistance (0 to 10 V)	100 kΩ
• -10 V to +10 V • Input resistance (-10 V to +10 V) • Input resistance (-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) • Input resistance (0 to 20 mA) • Input resistance (0 to 20 mA) • Input resistance (-20 mA to +20 mA) • Input resistance (-20 mA to +20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (10 mA) •	● 1 V to 5 V	Yes; Physical measuring range: ± 10 V
• Input resistance (-10 V to +10 V) • Input resistance (-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 • Input resistance (-20 mA to +20 mA) • Input resistance (-20 mA to 20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (10 mA) • Input resistance (4 mA to 20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (Ni 100) • Input resistance (Ni 100) • Pt 100 • Input resistance (Pt 100) Input ranges (rated values), resistors	Input resistance (1 V to 5 V)	100 kΩ
• -5 V to +5 V Yes; Physical measuring range: \pm 10 V 100 k Ω Input ranges (rated values), currents • 0 to 20 mA Yes; Physical measuring range: \pm 20 mA • Input resistance (0 to 20 mA) 50 Ω ; Plus approx. 55 ohm for overvoltage protection by PTC • -20 mA to +20 mA Yes • Input resistance (-20 mA to +20 mA) 50 Ω ; Plus approx. 55 ohm for overvoltage protection by PTC • 4 mA to 20 mA Yes; Physical measuring range: \pm 20 mA • Input resistance (4 mA to 20 mA) 50 Ω ; Plus approx. 55 ohm for overvoltage protection by PTC Input ranges (rated values), resistance thermometer • Ni 100 Yes; Standard/climate • Input resistance (Ni 100) Yes; Standard/climate • Input resistance (Pt 100) 10 M Ω Input ranges (rated values), resistors	• -10 V to +10 V	Yes
• Input resistance (-5 V to +5 V) Input ranges (rated values), currents • 0 to 20 mA	Input resistance (-10 V to +10 V)	100 kΩ
Input ranges (rated values), currents • 0 to 20 mA • Input resistance (0 to 20 mA) • Input resistance (0 to 20 mA) • Input resistance (-20 mA to +20 mA) • Input resistance (-20 mA to +20 mA) • Input resistance (-20 mA to +20 mA) • Input resistance (4 mA to 20 mA) • Input ranges (rated values), resistance thermometer • Ni 100 • Input resistance (Ni 100) • Pt 100 • Input ranges (rated values), resistors	• -5 V to +5 V	Yes; Physical measuring range: ± 10 V
• 0 to 20 mA • Input resistance (0 to 20 mA) • Input resistance (0 to 20 mA) • Input resistance (-20 mA to +20 mA) • Input resistance (-20 mA to +20 mA) • Input resistance (-20 mA to +20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (4 mA to 20 mA) • Input ranges (rated values), resistance thermometer • Ni 100 • Input resistance (Ni 100) • Pt 100 • Input resistance (Pt 100) Input ranges (rated values), resistors	Input resistance (-5 V to +5 V)	100 kΩ
• Input resistance (0 to 20 mA) 50 Ω ; Plus approx. 55 ohm for overvoltage protection by PTC • -20 mA to +20 mA Yes • Input resistance (-20 mA to +20 mA) 50 Ω ; Plus approx. 55 ohm for overvoltage protection by PTC • 4 mA to 20 mA Yes; Physical measuring range: \pm 20 mA • Input resistance (4 mA to 20 mA) 50 Ω ; Plus approx. 55 ohm for overvoltage protection by PTC Input ranges (rated values), resistance thermometer • Ni 100 Yes; Standard/climate • Input resistance (Ni 100) 10 M Ω • Pt 100 Yes; Standard/climate • Input resistance (Pt 100) 10 M Ω Input ranges (rated values), resistors	Input ranges (rated values), currents	
• -20 mA to +20 mA Yes • Input resistance (-20 mA to +20 mA) • 4 mA to 20 mA • Input resistance (4 mA to 20 mA) • Input resistance (4 mA to 20 mA) • Input resistance (4 mA to 20 mA) Input ranges (rated values), resistance thermometer • Ni 100 • Input resistance (Ni 100) • Pt 100 • Input resistance (Pt 100) Input ranges (rated values), resistors	• 0 to 20 mA	Yes; Physical measuring range: ± 20 mA
• Input resistance (-20 mA to +20 mA) • Input resistance (-20 mA to +20 mA) • 4 mA to 20 mA • Input resistance (4 mA to 20 mA) • Input ranges (rated values), resistance thermometer • Ni 100 • Input resistance (Ni 100) • Pt 100 • Input ranges (rated values), resistors • Ni Ω • Input resistance (Pt 100) Input ranges (rated values), resistors	Input resistance (0 to 20 mA)	50 Ω ; Plus approx. 55 ohm for overvoltage protection by PTC
• 4 mA to 20 mA • Input resistance (4 mA to 20 mA) Input ranges (rated values), resistance thermometer • Ni 100 • Input resistance (Ni 100) • Pt 100 • Input resistance (Pt 100) Input ranges (rated values), resistors Yes; Physical measuring range: \pm 20 mA 50 Ω ; Plus approx. 55 ohm for overvoltage protection by PTC Yes; Standard/climate 10 M Ω Input resistance (Pt 100) Input ranges (rated values), resistors	• -20 mA to +20 mA	Yes
• Input resistance (4 mA to 20 mA) 50 Ω ; Plus approx. 55 ohm for overvoltage protection by PTC Input ranges (rated values), resistance thermometer • Ni 100 Yes; Standard/climate • Input resistance (Ni 100) 10 M Ω • Pt 100 Yes; Standard/climate • Input resistance (Pt 100) 10 M Ω Input ranges (rated values), resistors	 Input resistance (-20 mA to +20 mA) 	50 Ω ; Plus approx. 55 ohm for overvoltage protection by PTC
Input ranges (rated values), resistance thermometer • Ni 100 • Input resistance (Ni 100) • Pt 100 • Input resistance (Pt 100) Input ranges (rated values), resistors Yes; Standard/climate 10 M Ω	• 4 mA to 20 mA	Yes; Physical measuring range: ± 20 mA
	 Input resistance (4 mA to 20 mA) 	50 Ω ; Plus approx. 55 ohm for overvoltage protection by PTC
	Input ranges (rated values), resistance thermometer	
 Pt 100 Yes; Standard/climate Input resistance (Pt 100) 10 MΩ Input ranges (rated values), resistors 	• Ni 100	Yes; Standard/climate
• Input resistance (Pt 100) 10 MΩ Input ranges (rated values), resistors	Input resistance (Ni 100)	10 ΜΩ
Input ranges (rated values), resistors	• Pt 100	Yes; Standard/climate
	• Input resistance (Pt 100)	10 ΜΩ
Vac Physical magnification 2 C00 characteristics	Input ranges (rated values), resistors	
■ U to 150 onms Yes; Physical measuring range: U 600 onms	• 0 to 150 ohms	Yes; Physical measuring range: 0 600 ohms
• Input resistance (0 to 150 ohms) 10 MΩ	Input resistance (0 to 150 ohms)	10 ΜΩ
• 0 to 300 ohms Yes; Physical measuring range: 0 600 ohms	• 0 to 300 ohms	Yes; Physical measuring range: 0 600 ohms
• Input resistance (0 to 300 ohms) 10 MΩ	 Input resistance (0 to 300 ohms) 	10 ΜΩ
• 0 to 600 ohms	• 0 to 600 ohms	Yes

• unshielded, max.

• 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)	
with voltage outputs, min.	1 kΩ
 with voltage outputs, capacitive load, max. 	100 nF
with current outputs, max.	500 Ω
with current outputs, inductive load, max.	1 mH
Cable length	
• shielded, max.	200 m
Analog value generation for the inputs	
Integration and conversion time/resolution per channel	
 Resolution with overrange (bit including sign), max. 	16 bit
• Integration time, parameterizable	Yes; 2.5 / 16.67 / 20 / 100 ms, acts on all channels
 Interference voltage suppression for 	400 / 60 / 50 / 10
interference frequency f1 in Hz	
Smoothing of measured values	
parameterizable	Yes
• Step: None	Yes
• Step: low	Yes
• Step: Medium	Yes
• Step: High	Yes
Analog value generation for the outputs	
Integration and conversion time/resolution per channel	46 hit
 Resolution with overrange (bit including sign), max. 	16 bit
Settling time	

• for resistive load	1.5 ms
• for capacitive load	2.5 ms
• for inductive load	2.5 ms

quadruple evaluation

Errors/accuracies	
Linearity error (relative to input range), (+/-)	0.1 %
Temperature error (relative to input range), (+/-)	0.005 %/K
Crosstalk between the inputs, max.	-60 dB
Repeat accuracy in steady state at 25 °C (relative to input range), (+/-)	0.05 %
Output ripple (relative to output range, bandwidth 0 to 50 kHz), (+/-)	0.02 %
Linearity error (relative to output range), (+/-)	0.15 %
Temperature error (relative to output range), (+/-)	0.005 %/K
Crosstalk between the outputs, max.	-80 dB
Repeat accuracy in steady state at 25 °C (relative to output range), (+/-)	0.05 %

Operational error limit in overall temperature range	
Voltage, relative to input range, (+/-)	0.3 %
 Current, relative to input range, (+/-) 	0.3 %
• Resistance, relative to input range, (+/-)	0.3 %
Resistance thermometer, relative to input	Pt100 Standard: ±2 K, Pt100 Climate: ±1 K, Ni100 Standard: ±1.2
range, (+/-)	K, Ni100 Climate: ±1 K
 Voltage, relative to output range, (+/-) 	0.3 %
 Current, relative to output range, (+/-) 	0.3 %
Basic error limit (operational limit at 25 °C)	
 Voltage, relative to input range, (+/-) 	0.2 %
 Current, relative to input range, (+/-) 	0.2 %
 Resistance, relative to input range, (+/-) 	0.2 %
 Resistance thermometer, relative to input range, (+/-) 	Pt100 Standard: ±1 K, Pt100 Climate: ±0.5 K, Ni100 Standard: ±0.6 K, Ni100 Climate: ±0.5 K
 Voltage, relative to output range, (+/-) 	0.2 %
 Current, relative to output range, (+/-) 	0.2 %
Interference voltage suppression for f = n x (f1 +/- 1 %),	f1 = interference frequency
 Series mode interference (peak value of interference < rated value of input range), min. 	30 dB
 Common mode voltage, max. 	10 V
 Common mode interference, min. 	60 dB; at 400 Hz: 50 dB
Interfaces	
Number of PROFINET interfaces	1
1. Interface	
Interface types	
Number of ports	2
• integrated switch	Yes
• RJ 45 (Ethernet)	Yes; X1
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
DDOEINET IO O	
PROFINET IO Controller	
PROFINET IO Controller Services	
	Yes
Services	Yes Yes
Services — PG/OP communication	

Ves; Requirement: IRT and isochronous mode (MRPD option Yes — IRT — MRP — MRP — Yes (MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRI Manager; MRP Client; max. number of devices in the ring: 50 Yes; Requirement: IRT — PROFlenergy — Prioritized startup — Number of connectable IO Devices, max. — Of which IO devices with IRT, max. — Number of connectable IO Devices for RT, max. — Number of connectable IO Devices for RT, max. — Number of IO Devices that can be simultaneously activated/deactivated, max. — Number of IO Devices per tool, max. — Updating times — It is in total across all interfaces The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of devices, and on the quantity of configured user data Update time for IRT — for send cycle of 250 μs — for send cycle of 1 ms — for send cycle of 2 ms — for send cycle of 4 ms — With IRT and parameterization of "odd" send cycles — for send cycle of 250 μs — for send cycle of 250 μs Update time for RT — with IRT and parameterization of "odd" send cycles — for send cycle of 250 μs — for send cycle of 250 μs Update time for RT — for send cycle of 250 μs Update time for RT — for send cycle of 250 μs Update time for RT — for send cycle of 250 μs Update time for RT — for send cycle of 250 μs Update time for RT — for send cycle of 250 μs Update time for RT — for send cycle of 250 μs Update time for RT — for send cycle of 250 μs 250 μs to 128 ms	nal)
MRP MRP MRPD MRPD MRPD PROFlenergy Prioritized startup Number of connectable IO Devices, max. Of which IO devices with IRT, max. Number of connectable IO Devices for RT, max. Number of IO Devices that can be simultaneously activated/deactivated, max. Number of IO Devices per tool, max. Number of IO Devices per tool, max. Updating times The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of devices, and on the quantity of configured user data Update time for IRT for send cycle of 250 μs For send cycle of 2 ms for send cycle of 4 ms With IRT and parameterization of "odd" send cycle of 250 μs Update time for RT Wies, Requirement: IRT Yes; Per user porgram Yes Max 32 PROFINET devices 128 In total, up to 256 distributed I/O devices can be connect via AS-i, pROFIBUS of PROFINET 128 128 In total, up to 256 distributed I/O devices can be connect via AS-i, pROFIBUS of PROFINET 128 128 In total, up to 256 distributed I/O devices can be connect via AS-i, pROFIBUS of PROFINET 128 128 In total, up to 256 distributed I/O devices can be connect via AS-i, pROFIBUS of PROFINET 128 128 128 In total, up to 256 distributed I/O devices can be connect via AS-i, pROFIBUS of PROFINET 128 128 128 128 128 In total, up to 256 distributed I/O devices can be connect via AS-i, pROFIBUS of PROFINET 128 128 128 128 128 128 128 12	,
PROFlenergy Prioritized startup Press Max. 32 PROFINET devices PROFIBUS or PROFINET 64 PROFIBUS or PROFINET PROFIBUS or PROFIBUS or PROFINET PROFIBUS or PROFIBUS or PROFIBUS or PROFIBUS or PROFIBE PROFIBUS or PROFIBUS or PROFIBUS or PROFIBE	
Prioritized startup — Number of connectable IO Devices, max. 128; In total, up to 256 distributed I/O devices can be connect via AS-i, PROFIBUS or PROFINET — Of which IO devices with IRT, max. — Number of connectable IO Devices for RT, max. — of which in line, max. — of which in line, max. — of which in line, max. — Number of IO Devices that can be simultaneously activated/deactivated, max. — Number of IO Devices per tool, max. — Number of IO Devices per tool, max. — Updating times The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of devices, and on the quantity of configured user data Update time for IRT — for send cycle of 250 μs — for send cycle of 500 μs — for send cycle of 1 ms — for send cycle of 2 ms — for send cycle of 4 ms — With IRT and parameterization of "odd" send cycles Update time for RT — for send cycle of 250 μs Update time = set "odd" send clock (any multiple of 125 μs: 37 μs, 625 μs 3 875 μs) Update time for RT — for send cycle of 250 μs 250 μs to 128 ms	
- Number of connectable IO Devices, max. - Of which IO devices with IRT, max Number of connectable IO Devices for RT, max Of which in line, max of which in line, max of which in line, max Number of IO Devices that can be simultaneously activated/deactivated, max Number of IO Devices per tool, max Number of IO Devices per tool, max Updating times - The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of devices, and on the quantity of configured user data Update time for IRT - for send cycle of 250 μs - for send cycle of 500 μs - for send cycle of 1 ms - for send cycle of 2 ms - for send cycle of 2 ms - for send cycle of 4 ms - With IRT and parameterization of "odd" send cycles Update time for RT - for send cycle of 250 μs - for send cycle of 2 ms - for send cycle of 2 ms - for send cycle of 2 ms - for send cycle of 4 ms - With IRT and parameterization of "odd" send cycles Update time for RT - for send cycle of 250 μs	
via AS-i, PROFIBUS or PROFINET - Of which IO devices with IRT, max Number of connectable IO Devices for RT, max of which in line, max of which in line, max Number of IO Devices that can be simultaneously activated/deactivated, max Number of IO Devices per tool, max Number of IO Devices per tool, max Updating times - The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of devices, and on the quantity of configured user data Update time for IRT - for send cycle of 250 μs - for send cycle of 500 μs - for send cycle of 500 μs - for send cycle of 1 ms - for send cycle of 1 ms - for send cycle of 2 ms - for send cycle of 4 ms - With IRT and parameterization of "odd" send cycles Update time for RT - for send cycle of 250 μs - for send cycle of 2 ms - fo	
 Number of connectable IO Devices for RT, max. — of which in line, max. — Number of IO Devices that can be simultaneously activated/deactivated, max. — Number of IO Devices per tool, max. — Updating times Update time for IRT — for send cycle of 250 μs — for send cycle of 500 μs — for send cycle of 2 ms — for send cycle of 4 ms — for send cycle of 500 μs — for send cycle of 5 ms — for send cycle of 250 μs Update time = set "odd" send clock (any multiple of 125 μs: 35 μs, 625 μs 3 875 μs) Update time for RT — for send cycle of 250 μs 	cted
max. — of which in line, max. — Number of IO Devices that can be simultaneously activated/deactivated, max. — Number of IO Devices per tool, max. 8 — Updating times The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of 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 more the minimum update time of 625 μs of the isochronous OB is decisive — for send cycle of 500 μs — for send cycle of 1 ms — for send cycle of 2 ms — for send cycle of 4 ms — with IRT and parameterization of "odd" send cycles Update time for RT — for send cycle of 250 μs 250 μs to 128 ms 128 8; in total across all interfaces 8 The minimum value of the update time also depends on communication as a light packed on communication as all interfaces 8 The minimum value of the update time also depends on communication as a light packed on communication a	
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— for send cycle of 2 ms — for send cycle of 4 ms — With IRT and parameterization of "odd" — send cycles Update time = set "odd" send clock (any multiple of 125 μs: 37 μs, 625 μs 3 875 μs) Update time for RT — for send cycle of 250 μs 2 ms to 32 ms 4 ms to 64 ms Update time = set "odd" send clock (any multiple of 125 μs: 37 μs)	
— for send cycle of 4 ms — With IRT and parameterization of "odd" send cycles Update time = set "odd" send clock (any multiple of 125 μs: 37 μs, 625 μs 3 875 μs) Update time for RT — for send cycle of 250 μs 250 μs to 128 ms	
 — With IRT and parameterization of "odd" update time = set "odd" send clock (any multiple of 125 μs: 37 μs, 625 μs 3 875 μs) Update time for RT — for send cycle of 250 μs 250 μs to 128 ms 	
send cycles μs, 625 μs 3 875 μs) Update time for RT — for send cycle of 250 μs 250 μs to 128 ms	
— for send cycle of 250 μs 250 μs to 128 ms	375
— 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	
— S7 routing Yes	
— Isochronous mode No	
— IRT Yes	

MRP
Yes; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP Manager; MRP Client; max. number of devices in the ring: 50
MRPD
Yes; Requirement: IRT
PROFlenergy
Shared device
Number of IO Controllers with shared device, max.

Yes; per user program

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

— Asset management record

ratoriogottation	
Autocrossing	Yes
Protocols	
Number of connections	
Number of connections, max.	96; via integrated interfaces of the CPU and connected CPs / CMs
 Number of connections reserved for ES/HMI/web 	10
 Number of connections via integrated interfaces 	64
 Number of S7 routing paths 	16
Redundancy mode	
H-Sync forwarding	Yes
SIMATIC communication	
S7 communication, as server	Yes
 S7 communication, as client 	Yes
 User data per job, max. 	See online help (S7 communication, user data size)
Open IE communication	
• TCP/IP	Yes
Data length, max.	64 kbyte
 several passive connections per port, supported 	Yes
• ISO-on-TCP (RFC1006)	Yes
— Data length, max.	64 kbyte
• UDP	Yes
— Data length, max.	2 kbyte; 1 472 bytes for UDP broadcast
— UDP multicast	Yes; Max. 5 multicast circuits
• DHCP	No
• SNMP	Yes
• DCP	Yes
• LLDP	Yes
Web server	

• HTTP	Yes; Standard and user pages
• HTTPS	Yes; Standard and user pages
OPC UA	
Runtime license required	Yes
OPC UA client	Yes
 Application authentication 	Yes
— Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
 User authentication 	"anonymous" or by user name & password
— Number of connections, max.	4
 Number of nodes of the client interfaces, max. 	1 000
 Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_Rea dList/OPC_UA_WriteList, max. 	300
 Number of elements for one call of OPC_UA_NameSpaceGetIndexList, max. 	20
Number of elements for one call of OPC_UA_MethodGetHandleList, max.	100
 Number of simultaneous calls of the client instructions per connection (except OPC_UA_ReadList,OPC_UA_WriteList,OPC_ UA_MethodCall), max. 	1
 Number of simultaneous calls of the client instructions OPC_UA_ReadList,OPC_UA_WriteList and OPC_UA_MethodCall, max. 	5
 Number of registerable nodes, max. 	5 000
— Number of registerable method calls of OPC_UA_MethodCall, max.	100
— Number of inputs/outputs when calling OPC_UA_MethodCall, max.	20
OPC UA server	Yes; Data access (read, write, subscribe), method call, custom address space
 Application authentication 	Yes
— Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
User authentication	"anonymous" or by user name & password
— Number of sessions, max.	32
 Number of accessible variables, max. 	50 000
 Number of registerable nodes, max. 	10 000
 Number of subscriptions per session, max. 	20
— Sampling interval, min.	100 ms
— Publishing interval, min.	500 ms

 Number of server methods, max. 	20
 Number of inputs/outputs per server 	20
method, max.	
 Number of monitored items, max. 	1 000; for 1 s sampling interval and 1 s send interval
 Number of server interfaces, max. 	10; or 20, depending on type of server interface
 Number of nodes for user-defined server 	1 000
interfaces, max.	
Further protocols	
• MODBUS	Yes; MODBUS TCP
Media redundancy	
 Switchover time on line break, typ. 	200 ms; For MRP, bumpless for MRPD
 Number of stations in the ring, max. 	50
Isochronous mode	
Isochronous operation (application synchronized up	Yes; With minimum OB 6x cycle of 625 µs (distributed)
to terminal)	
Equidistance	Yes
S7 message functions	
Number of login stations for message functions, max.	32
Program alarms	Yes
Number of configurable program messages, max.	5 000; Program messages are generated by the "Program_Alarm"
	block, ProDiag or GRAPH
Number of loadable program messages in RUN, max.	2 500
Number of simultaneously active program alarms	
 Number of program alarms 	300
 Number of alarms for system diagnostics 	100
 Number of alarms for motion technology 	80
objects	
Test commissioning functions	
Joint commission (Team Engineering)	Yes; Parallel online access possible for up to 5 engineering
	systems
Status block	Yes; Up to 8 simultaneously (in total across all ES clients)
Single step	No
Number of breakpoints	8
Status/control	
Status/control variable	Yes
• Variables	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters
Number of variables, max.	
— of which status variables, max.	200; per job
— of which control variables, max.	200; per job
Forcing	

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

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

Supported technology objects	
Motion Control	Yes; Note: The number of axes affects the cycle time of the PLC
	program; selection guide via the TIA Selection Tool or SIZER
 Number of available Motion Control resources 	800
for technology objects (except cam disks)	
 Required Motion Control resources 	
— per speed-controlled axis	40
— per positioning axis	80
— per synchronous axis	160
— per external encoder	80
— per output cam	20
— per cam track	160
— per probe	40
Positioning axis	
 Number of positioning axes at motion control cycle of 4 ms (typical value) 	5

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

Potential separation

Potential separation digital inputs

between the channels	No
between the channels, in groups of	16
Potential separation digital outputs	
• between the channels	No
 between the channels, in groups of 	16
Potential separation channels	
between the channels and backplane bus	Yes
 Between the channels and load voltage L+ 	No
Isolation	
Isolation tested with	707 V DC (type test)
	, or . To (type toot)
Ambient conditions	
Ambient temperature during operation	
horizontal installation, min.	0 °C
 horizontal installation, max. 	60 °C; Note derating data for onboard I/O in the manual. Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off
 vertical installation, min. 	0 °C
• vertical installation, max.	40 °C; Note derating data for onboard I/O in the manual. Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off
Ambient temperature during storage/transportation	
• min.	-40 °C
• max.	70 °C
Altitude during operation relating to sea level	
Installation altitude above sea level, max.	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
Configuration	
Programming	
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	
Password for display	Yes
Protection level: Write protection	Yes
Protection level: Read/write protection	Yes

 Protection level: Complete protection 	Yes
Cycle time monitoring	
• lower limit	adjustable minimum cycle time
• upper limit	adjustable maximum cycle time
Dimensions	
Width	85 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	1 050 g
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