Data sheet

6ES7513-1AL02-0AB0



SIMATIC S7-1500, CPU 1513-1 PN, central processing unit with working memory 300 KB for program and 1.5 MB for data, 1. interface: PROFINET IRT with 2 port switch, 40 NS bit-performance, SIMATIC memory card necessary

General information	
Product type designation	CPU 1513-1 PN
HW functional status	FS03
Firmware version	V2.9
Product function	
● I&M data	Yes; I&M0 to I&M3
• Isochronous mode	Yes; Distributed and central; with minimum OB $6x$ cycle of $500~\mu s$ (distributed) and 1 ms (central)
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 6ES7513-1AL01-0AB0
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
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Mains buffering	
 Mains/voltage failure stored energy time 	5 ms
Repeat rate, min.	1/s
Input current	
Current consumption (rated value)	0.7 A
Current consumption, max.	0.95 A
Inrush current, max.	1.9 A; Rated value
l²t	0.02 A ² ·s
Power	
Infeed power to the backplane bus	10 W
Power consumption from the backplane bus (balanced)	5.5 W
Power loss	
Power loss, typ.	5.7 W
Memory	
Number of slots for SIMATIC memory card	1
SIMATIC memory card required	Yes
Work memory	

a integrated (for program)	200 kbyta
• integrated (for program)	300 kbyte
• integrated (for data)	1.5 Mbyte
Load memory	00.01.4
Plug-in (SIMATIC Memory Card), max.	32 Gbyte
Backup	W
maintenance-free	Yes
CPU processing times	
for bit operations, typ.	40 ns
for word operations, typ.	48 ns
for fixed point arithmetic, typ.	64 ns
for floating point arithmetic, typ.	256 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
0:	59 999, and number range of DBs created via SFC 86: 60 000 60 999
• Size, max.	1.5 Mbyte; For DBs with absolute addressing, the max. size is 64 KB
FB Number and a	0. 05 505
Number range Class reserved.	0 65 535
• Size, max.	300 kbyte
FC	0.05.505
Number range	0 65 535
• Size, max.	300 kbyte
OB	
• Size, max.	300 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 	2
 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	100
Number	Any (only limited by the main memory)
	Any (only limited by the main memory)
Retentivity	Yes
— adjustable	1 00
S7 times • Number	2.049
	2 048
Retentivity	Von
— adjustable	Yes
IEC timer	
• Number	
	Any (only limited by the main memory)
Retentivity	
— adjustable	Any (only limited by the main memory) Yes
·	
— adjustable	
— adjustable Data areas and their retentivity	Yes 128 kbyte; In total; available retentive memory for bit memories, timers,

• Size, max.	16 kbyte
Number of clock memories	8; 8 clock memory bit, grouped into one clock memory byte
Data blocks	
 Retentivity adjustable 	Yes
Retentivity preset	No
Local data	
 per priority class, max. 	64 kbyte; max. 16 KB per block
Address area	
Number of IO modules	2 048; max. number of modules / submodules
I/O address area	2 0 10, 111411111111111111111111111111111
• Inputs	32 kbyte; All inputs are in the process image
•	32 kbyte; All outputs are in the process image
Outputs Outputs	32 kbyte, All outputs are in the process image
per integrated IO subsystem	0.144-
— 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	6; A maximum of 6 CMs (PROFINET + PROFIBUS) can be inserted in total
Number of IO Controllers	
• integrated	1
• Via CM	6; A maximum of 6 CMs (PROFINET + PROFIBUS) can be inserted in total
Rack	
Modules per rack, max.	32; CPU + 31 modules
Number of lines, max.	1
PtP CM	
Number of PtP CMs	the number of connectable PtP CMs is only limited by the number of available slots
Time of day	
Clock	
• Type	Hardware clock
Backup time	6 wk; At 40 °C ambient temperature, typically
Deviation per day, max.	10 s; Typ.: 2 s
Operating hours counter	10 0, 136 2 0
Number	16
Clock synchronization	Voc
• supported	Yes
• in AS, master	Yes
• in AS, slave	Yes
on Ethernet via NTP	Yes
Interfaces	
Number of PROFINET interfaces	1
1. Interface	
Interface types	
RJ 45 (Ethernet)	Yes; X1
Number of ports	2
• integrated switch	Yes
Protocols	
	Yes; IPv4
	1 GO, II V T
IP protocol PROFINET IO Controller	Voc
PROFINET IO Controller	Yes
PROFINET IO ControllerPROFINET IO Device	Yes
PROFINET IO ControllerPROFINET IO DeviceSIMATIC communication	Yes Yes
PROFINET IO ControllerPROFINET IO Device	Yes

Services	Media redundancy	Yes
Services		
		Yes
	— Direct data exchange	Yes; Requirement: IRT and isochronous mode (MRPD optional)
- Prioritized startup Vest, Max. 32 PPOFINET devices Number of connectable IO Devices, max. 282, british and \$10 devices can be connected via AS-I. PROFIBUS or PROFINET 128 Number of Connectable IO Devices for RT, max. 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 1	-	
- Number of connectable IO Devices, max Of which In devices with IRT, max Number of connectable IO Devices for RT, 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 identificated Number of IO Devices that can be simultaneously activated identificated Number of IO Devices per tool, max Number of IO Devices per tool, max Updating times - Updating times - 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 IO devices, and on the quantity of configurate time rolation 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 1 ms - Will IET and parameter/zation of "odd" send cycles - Will IET and parameter/zation of "odd" send cycles - For send cycle of 250 µs - For send cycle of 250 µs - For send cycle of 1 ms - For send cycle of 2 ms - For send cycle of 2 ms - For send cycle of 3 ms - For send cycle of 3 ms - For send cycle of 5 ms - For send cycle of	— PROFlenergy	Yes; per user program
PROFIBUS of PROFINET Of which I/O devices with IRT, max. Number of connectable I/O Devices for RT, max. Number of I/O Devices that can be simultaneously activated deactivated, max. Number of I/O Devices per tool, max. Updating times From minimum value of the update time also depends on communication share set for PROFINET I/O, on the number of I/O devices, and on the quantity of configured user data. Update time for IRT For send cycle of 250 µs For send cycle of 250 µs For send cycle of 1 ms No for send cycle of 1 ms No for send cycle of 1 ms No for send cycle of 2 ms For send cycle of 250 µs For send cycle of 250 µs For send cycle of 250 µs No for send cycle of 250 µs No send cycle of 250 µs For send cy	— Prioritized startup	Yes; Max. 32 PROFINET devices
- 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/deachvator, max Number of IO Devices per tool, max Number of IO Devices per tool, max Updating times - Updating times - The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data. Update time for IRT - For send cycle of 250 µs - 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 1 ms - For send cycle of 2 ms - With IRT and parameterization of "odd" send cycles - Update time for RT - For send cycle of 500 µs - For send cycle of 2 ms - For send cycle of 1 ms - For send cycle of 500 µs - For send cycle of 500 µs - For send cycle of 1 ms - For send cycle of 1	·	128; In total, up to 512 distributed I/O devices can be connected via AS-i,
- Number of connectable IO Devices for RT, max of which in line, max Whore of ID Devices that can be simultaneously activisted/deach/shared, 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 IO devices, and on the quantity of configured user data - Update time for IRT - For send cycle of 250 µs - For send cycle of 250 µs - For send cycle of 100 µs - For send cycle of 250 µs - For send cycle of 100 µs - For send cyc	— Of which IO devices with IRT, max.	
- of which in line, max Number of IO Devices that can be simultaneously acreveted/seach/weet, max Number of IO Devices por tool, max Updating times - 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 4 ms - for send cycle of 500 µs - for send cycle of 4 ms - for send cycle of 500 µs - for send cy		
Number of IO Devices that can be simultaneously activated/described, max. Number of IO Devices per tool, max. Updating times Updati		
- Number of IO Devices per tool, max Updating times - Updating - Updatin	— Number of IO Devices that can be simultaneously	
Lydating times are for PPOFINET IO, on the number of IO devices, and on the quantity of configured user data. Update time for IRT - for send cycle of 250 µs - for send cycle of 500 µs - for send cycle of 100 µs - for send cycle of 1 ms - for send cycle of 4 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 520 µs - for send cycle of 1 ms - for send cycle of 2 ms - for send cycle of 4 ms - for send cycle of 4 ms - for send cycle of 4 ms - for send cycle of 520 µs - for send cycle of 1 ms - for send cycle		8
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 1 ms - for send cycle of 1 ms - for send cycle of 4 ms - for send cycle of 4 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: 375 µs, 625 µs 3 875 µs) Update time for RT - for send cycle of 250 µs - for send cycle of 250 µs - for send cycle of 500 µs - for send cycle of 250 µs - for send cycle of 4 ms - FPGFINET IO Device Services - PGIOP communication - Isochronous mode - IRT - PROFInergy - Shared device - Number of IO Controllers with shared device, max activation/deactivation of 1-devices - Asset management record Test program - Asset management record Test program - Asset management record Yes - Autonegotiation - Yes - Industrial Ethernet status LED - Yes - Number of connections with general paths - Numb	•	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
- 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 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 250 μs - for send cycle of 500 μs - for send cycle of 1 ms - with IRT and parameterization of "odd" send cycles Update time for RT - for send cycle of 500 μs - for send cycle of 1500 μs - for send cycle of 1 ms - for send cycle of 1 ms - for send cycle of 1 ms - for send cycle of 4 ms - for send cycle of 500 μs - for send cycle of 4 ms - for send cycle of 500 μs - for send cycle of 5	Update time for IRT	
- 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 - for send cycle of 4 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: 375 μs, 625 μs 3 875 μs) Update time for RT - for send cycle of 250 μs - for send cycle of 500 μs - for send cycle of 250 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 - for send cycle of 5 ms - for send cycle of 4 ms - for send cycle of 5 ms - for send cycle - for send cycle - for send cycle - for send cycle - for		
- for send cycle of 1 ms	— for send cycle of 500 μs	
for send cycle of 2 ms for send cycle of 4 ms for send cycle of 4 ms With IRT and parameterization of "odd" send cycles by With IRT and parameterization of "odd" send cycles by With IRT and parameterization of "odd" send cycles by For send cycle of 250 μs 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 512 ms For send cycle		·
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: 375 μs, 625 μs 3 875 μs) Update time for RT for send cycle of 250 μs for send cycle of 500 μs for send cycle of 1 ms for send cycle of 1 ms for send cycle of 4 ms For send cycle of 500 μs For send c	•	2 ms to 32 ms
Update time for RT - for send cycle of 250 µs - for send cycle of 500 µs - for send cycle of 1 ms - for send cycle of 1 ms - for send cycle of 1 ms - for send cycle of 4 ms - for send cycle of 5 ms - for send cycle of 5 ms - for send cycle of 2 ms - for send cycle of 5 ms - for send cycle of 5 ms - for send cycle of 2 ms - for send cycle of 5 ms - for send cycle of 2 ms - for send cycle of 5 ms - for send cycle of 2 ms - for send cycle of 3 ms - for send cycle of 4 ms - for send cycle -	— for send cycle of 4 ms	4 ms to 64 ms
Update time for RT - for send cycle of 250 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 2 ms - for send cycle of 2 ms - for send cycle of 4 ms - for send cycle of 2 ms - for send cycle of 4 ms - for send cycle of 2 ms - for send cycle of 4 ms - for send cycle of 2 ms - for send cycle of 512 ms - FOG/Por communication - No - IRT - PGC/Por communication - No - No - No - Number of 10 Controllers with shared device, max activation/deactivation of I-devices - Yes; per user program - set pro	•	
- for send cycle of 500 µs 500 µs to 256 ms 1 ms to 512 ms 2 ms to 512 ms 2 ms to 512 ms 4 ms to 512 ms 4 ms to 512 ms 51	Update time for RT	
for send cycle of 1 ms for send cycle of 2 ms for send cycle of 4 ms for send cycle of 2 ms for send cycle of 4 ms for send cycle of 2 ms for send cycle of 4 ms	·	250 µs to 128 ms
for send cycle of 2 ms	— for send cycle of 500 μs	500 μs to 256 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; per user program - Asset management record Yes; per user program - Asset management record Yes; per user program Interface typos RJ 45 (Ethernet) • 100 Mbps Yes • Autocrossing Yes • Industrial Ethernet status LED Yes Protocols PROFISafe No Number of connections, max. • Number of connections, max. • Number of connections reserved for ES/HMI/web • Number of St routing paths • Number of T routing paths 16 Redundancy mode • H-Sync forwarding Yes Media redundancy Media redundancy Yes 4 ms to 512 ms For user program Yes Yes; per user program 1 ves; per user program 1 v	— for send cycle of 1 ms	1 ms to 512 ms
PROFINET IO Device Services - PG/OP communication - Isochronous mode - IRT - PROFlenergy - Shared device - Number of IO Controllers with shared device, max activation/deactivation of I-devices - Asset management record - Asset management record - Asset management record - Asset management record - Yes; per user program - Asset management record - Yes; per user program - Asset management record - Yes; per user program - Yes; per user program - Asset management record - Yes; per user program - Yes - Autorosysing - Autocrossing - Autocrossing - Industrial Ethernet status LED - Yes - Ves - Industrial Ethernet status LED - Yes - Ves - Ves - Ves - Ves - Industrial Ethernet status LED - Yes - Ves - Ves - Ves - Ves - Ves - Autocrossing - Ves - Industrial Ethernet status LED - Yes - Ves - Autocrossing - Ves - Industrial Ethernet status LED - Ves - Ve	— for send cycle of 2 ms	2 ms to 512 ms
Services - PG/OP communication	— for send cycle of 4 ms	4 ms to 512 ms
- PG/OP communication Yes - Isochronous mode No - IRT Yes - PROFlenergy Yes; per user program - Shared device Yes - Number of IO Controllers with shared device, max activation/deactivation of I-devices Yes; per user program - Asset management record Yes; per user program Interface types RJ 45 (Ethernet) • 100 Mbps Yes • Autonegotiation Yes • Autocrossing Yes • Industrial Ethernet status LED Yes Protocols PROFIsafe No Number of connections, max. • Number of connections, max. • Number of connections reserved for ES/HMII/web • Number of S7 routing paths • Number of S7 routing paths Redundancy mode • H-Sync forwarding Media redundancy	PROFINET IO Device	
Isochronous mode IRT PROFlenergy Shared device Number of IO Controllers with shared device, max activation/deactivation of I-devices Asset management record Yes; per user program	Services	
- IRT - PROFlenergy - Shared device - Number of IO Controllers with shared device, max activation/deactivation of I-devices - Asset management record Interface types RJ 45 (Ethernet) • 100 Mbps • Autorossing • Autorossing • Industrial Ethernet status LED Protocols PROFIsafe Number of connections • Number of connections reserved for ES/HMI/web • Number of connections via integrated interfaces • Number of 57 routing paths PROFlowarding • H-Sync forwarding • H-Sync forwarding Media redundancy	— PG/OP communication	Yes
- PROFlenergy - Shared device - Number of IO Controllers with shared device, max activation/deactivation of I-devices - Asset management record Interface types RJ 45 (Ethernet) • 100 Mbps • Autonegotiation • Autocrossing • Industrial Ethernet status LED Protocols PROFIsafe No Number of connections, max. • Number of connections, max. • Number of connections reserved for ES/HMI/web • Number of sonnections via integrated interfaces • Number of S7 routing paths • H-Sync forwarding • H-Sync forwarding Media redundancy	 Isochronous mode 	No
- Shared device Yes - Number of IO Controllers with shared device, max activation/deactivation of I-devices Yes; per user program - Asset management record Yes; per user program Interface types RJ 45 (Ethernet) • 100 Mbps • Autonegotiation • Autocrossing • Autocrossing • Industrial Ethernet status LED Protocols PROFIsafe No Number of connections, max. • Number of connections, max. • Number of connections reserved for ES/HMI/web • Number of s7 routing paths Redundancy mode • H-Sync forwarding Media redundancy Yes; per user program Yes Yes Yes Yes 10 128; via integrated interfaces of the CPU and connected CPs / CMs 10 Number of s7 routing paths 16	— IRT	Yes
- Number of IO Controllers with shared device, max activation/deactivation of I-devices 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 PROFIsafe No Number of connections, max. • Number of connections reserved for ES/HMI/web • Number of connections via integrated interfaces 88 • Number of S7 routing paths Redundancy mode • H-Sync forwarding Media redundancy 4 Yes; per user program Yes; per user program 4 Yes; per user program 4 Yes; per user program Yes Yes 4 Yes Yes 4 Yes Yes	— PROFlenergy	Yes; per user program
activation/deactivation of I-devices Asset management record Interface types RJ 45 (Ethernet) • 100 Mbps • Autonegotiation • Autocrossing • Industrial Ethernet status LED Protocols PROFIsafe No Number of connections, max. • Number of connections reserved for ES/HMI/web • Number of connections via integrated interfaces • Number of S7 routing paths Redundancy Media redundancy Yes; per user program Yes Yes Yes Yes Yes Yes Yes Ye	— Shared device	Yes
- Asset management record Interface types RJ 45 (Ethernet) • 100 Mbps • Autonegotiation • Autocrossing • Industrial Ethernet status LED Protocols PROFIsafe No Number of connections • Number of connections, max. • Number of connections reserved for ES/HMI/web • Number of son routions via integrated interfaces • Number of S7 routing paths Redundancy mode • H-Sync forwarding Yes Yes Yes Yes Yes Yes 128; via integrated interfaces of the CPU and connected CPs / CMs 16 Redundancy mode • H-Sync forwarding Yes Media redundancy	 Number of IO Controllers with shared device, max. 	4
Interface types RJ 45 (Ethernet) • 100 Mbps • Autonegotiation • Autocrossing • Industrial Ethernet status LED Protocols PROFIsafe No Number of connections • Number of connections, max. • Number of connections reserved for ES/HMI/web • Number of connections via integrated interfaces • Number of S7 routing paths Redundancy mode • H-Sync forwarding Media redundancy	 activation/deactivation of I-devices 	Yes; per user program
RJ 45 (Ethernet) • 100 Mbps • Autonegotiation • Autocrossing • Industrial Ethernet status LED Protocols PROFIsafe No Number of connections, max. • Number of connections reserved for ES/HMI/web • Number of connections via integrated interfaces • Number of S7 routing paths Redundancy mode • H-Sync forwarding Media redundancy	— Asset management record	Yes; per user program
• 100 Mbps • Autonegotiation • Autocrossing • Autocrossing • Industrial Ethernet status LED Protocols PROFIsafe No Number of connections • Number of connections, max. • Number of connections reserved for ES/HMI/web • Number of connections via integrated interfaces • Number of S7 routing paths Redundancy mode • H-Sync forwarding Media redundancy Yes Yes Yes No No No No 128; via integrated interfaces of the CPU and connected CPs / CMs 16 Redundancy mode Yes Media redundancy	Interface types	
Autorossing Autocrossing Industrial Ethernet status LED Yes Protocols PROFIsafe No Number of connections Number of connections, max. Number of connections reserved for ES/HMI/web Number of connections via integrated interfaces Number of S7 routing paths Redundancy mode H-Sync forwarding Media redundancy Yes Yes Yes No No No No 128; via integrated interfaces of the CPU and connected CPs / CMs 10 88 16 Redundancy mode H-Sync forwarding Yes Media redundancy	RJ 45 (Ethernet)	
Autocrossing Industrial Ethernet status LED Yes Protocols PROFIsafe No Number of connections Number of connections, max. Number of connections reserved for ES/HMI/web Number of connections via integrated interfaces Number of S7 routing paths Redundancy mode H-Sync forwarding Media redundancy Yes Yes No No 128; via integrated interfaces of the CPU and connected CPs / CMs 10 10 16 Redundancy mode Yes Media redundancy	• 100 Mbps	Yes
● Industrial Ethernet status LED Protocols PROFIsafe No Number of connections ● Number of connections, max. ● Number of connections reserved for ES/HMI/web ● Number of connections via integrated interfaces ● Number of S7 routing paths Redundancy mode ● H-Sync forwarding Media redundancy Yes No No 128; via integrated interfaces of the CPU and connected CPs / CMs 10 88 16 Redundancy mode ● H-Sync forwarding Yes	 Autonegotiation 	Yes
Protocols PROFIsafe No Number of connections Number of connections, max. Number of connections reserved for ES/HMI/web Number of connections via integrated interfaces Number of connections via integrated interfaces Number of S7 routing paths Redundancy mode H-Sync forwarding Yes Media redundancy	 Autocrossing 	Yes
PROFIsafe Number of connections Number of connections, max. Number of connections reserved for ES/HMI/web Number of connections via integrated interfaces Number of connections via integrated interfaces Number of S7 routing paths Redundancy mode H-Sync forwarding Yes Media redundancy		Yes
Number of connections Number of connections, max. Number of connections reserved for ES/HMI/web Number of connections via integrated interfaces Number of s7 routing paths Redundancy mode H-Sync forwarding Media redundancy	Protocols	
 Number of connections, max. Number of connections reserved for ES/HMI/web Number of connections via integrated interfaces Number of S7 routing paths Redundancy mode H-Sync forwarding Media redundancy 		No
 Number of connections reserved for ES/HMI/web Number of connections via integrated interfaces Number of S7 routing paths Redundancy mode H-Sync forwarding Media redundancy Yes		
 Number of connections via integrated interfaces Number of S7 routing paths Redundancy mode H-Sync forwarding Media redundancy Yes	 Number of connections, max. 	128; via integrated interfaces of the CPU and connected CPs / CMs
 Number of S7 routing paths Redundancy mode H-Sync forwarding Media redundancy 		
Redundancy mode • H-Sync forwarding Media redundancy Yes	 Number of connections via integrated interfaces 	
H-Sync forwarding Yes Media redundancy	·	16
Media redundancy	-	
·	H-Sync forwarding	Yes
— Media redundancy only via 1st interface (X1)	·	
	— Media redundancy	only via 1st interface (X1)

— MRP	Yes; MRP Automanager according to IEC 62439-2 Edition 2.0, MRP Manager; MRP Client
 MRP interconnection, supported 	Yes; as MRP ring node according to IEC 62439-2 Edition 3.0
— MRPD	Yes; Requirement: IRT
 Switchover time on line break, typ. 	200 ms; For MRP, bumpless for MRPD
 Number of stations in the ring, max. 	50
SIMATIC communication	
 PG/OP communication 	Yes; encryption with TLS V1.3 pre-selected
S7 routing	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
— UDP multicast	Yes; Max. 5 multicast circuits
• DHCP	Yes
• DNS	Yes
• SNMP	Yes
• DCP	Yes
• LLDP	Yes
• Encryption	Yes; Optional
Web server	166, Optional
• HTTP	Yes; Standard and user pages
• HTTPS	Yes; Standard and user pages
OPC UA	roc, otaliaala alla aosi pagoo
Runtime license required	Yes; "Small" license required
OPC UA Client	Yes
Application authentication	
	Yes
Security policies	Yes Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
— Security policies— User authentication	Available security policies: None, Basic128Rsa15, Basic256Rsa15,
— Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 "anonymous" or by user name & password
 — Security policies — User authentication — Number of connections, max. — Number of nodes of the client interfaces, 	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 "anonymous" or by user name & password 4 1 000
— Security policies — User authentication — Number of connections, max. — Number of nodes of the client interfaces, recommended max. — Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/OPC_I max. — Number of elements for one call of	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 "anonymous" or by user name & password 4 1 000
— Security policies — User authentication — Number of connections, max. — Number of nodes of the client interfaces, recommended max. — Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/OPC_U max. — Number of elements for one call of OPC_UA_NameSpaceGetIndexList, max. — Number of elements for one call of	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 "anonymous" or by user name & password 4 1 000 300
— Security policies — User authentication — Number of connections, max. — Number of nodes of the client interfaces, recommended max. — Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/OPC_U max. — Number of elements for one call of OPC_UA_NameSpaceGetIndexList, max. — Number of elements for one call of OPC_UA_MethodGetHandleList, max. — Number of simultaneous calls of the client	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 "anonymous" or by user name & password 4 1 000 300
— Security policies — User authentication — Number of connections, max. — Number of nodes of the client interfaces, recommended max. — Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/OPC_U max. — Number of elements for one call of OPC_UA_NameSpaceGetIndexList, max. — Number of elements for one call of OPC_UA_MethodGetHandleList, max. — Number of simultaneous calls of the client instructions for session management, per connection, max.	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 "anonymous" or by user name & password 4 1 000 300 20 100
— Security policies — User authentication — Number of connections, max. — Number of nodes of the client interfaces, recommended max. — Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/OPC_U max. — Number of elements for one call of OPC_UA_NameSpaceGetIndexList, max. — Number of elements for one call of OPC_UA_MethodGetHandleList, max. — Number of simultaneous calls of the client instructions for session management, per connection,	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 "anonymous" or by user name & password 4 1 000 300 20 100
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- Number of subscriptions per session, max Number of subscriptions per server method, max Number of imputisouplays between methods, max Number of modes for user defined server interfaceds, max Number of server interfaces max Number of server interfaces max Number of server interfaces max Number of server interfaces, max Number of program alarms Number of parts of subscriptions and server interfaces Number of parts of system degrostics - Number of ordinary system degrostics - Number of ordinary system degrostics - Number of configurable program messages, max Program alarms - Number of configurable program messages in RDN, max Program alarms - Number of standard system degrostics - Number of situations or messages in RDN, max Program alarms - Number of standard system degrostics - Number of situations or system degrostics - Number of situations and system degrostics - Number of situations or system degrostics - Number of situations for messages in RDN, max Of which status variables, max Of which control variables max Of which control varia	Number of registerable nodes, may	10 000
- Sampling interval, min Publishing interval, min Number of server methods, max Number of server methods, max Number of server interfaces, max Number of proach of user-defined server interfaces, max Number of proach of user-defined server interfaces, max Number of proach adams in the server interfaces, max Number of proach adams in the server interfaces, max Number of alarms for system diagnostics - Number of alarms for system diagnostics - Number of program alarms - Number of program alarms - Number of program alarms - Number of program messages, max Number of login stations for message functions, max Program alarms - Yes Number of program messages, max Soot; Program messages are generated by the "Program_Alarm" book, Program of ordinations by active program alarms - Number of configurable program messages, max Soot; Program and ordinations of program alarms - Number of ordinations where diagnostics and summary or program alarms - Number of ordinations where diagnostics and summary or program alarms - Number of ordinations where diagnostics and summary or program alarms - Number of ordinations where diagnostics and summary or program alarms - Number of ordinations or program alarms - Number of ordinations or program alarms - Number of ordinations from the ordinations or the summary or program alarms - Number of ordinations from the ordinations or the ordination ordinations or the ordinations or the ordinations or the or	Number of registerable nodes, max.	
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- Number of nodes for user-defined server interfaces, nax. • Alams and Conditions - Number of program alarms - Number of program alarms - Number of program alarms • MODBUS • Ves • Number of login stations for message functions, max. • Program alarms • Number of login stations for messages, max, • Number of loginative program messages in RUN, max. • Number of loginative program messages in RUN, max. • Number of loginative program alarms • Number of program alarms • Number of slams for system disgnostics • Number of alarms for system disgnostics • Number of alarms for system disgnostics • Number of alarms for mobin technology objects • Status block • Ves (1) to 8 simultaneously (in total across all ES clients) Single step • No • Number of alarms for mobin technology objects • Status block • Status block • Ves • Status control variables, max. — of which status variables, max. — of which control variables, max.		
max. *Alams and Conditions - Number of program alarms - Number of program alarms - Number of program alarms **OUGBUS** **MODBUS** **Pes; MODBUS** **None of Configurable program messages functions, max. **Program alarms **Number of loging stations for message functions, max. **Program alarms **Number of configurable program messages, max. **Soud.** **Number of configurable program messages, max. **Soud.** **Number of configurable program messages in RUN, max. **Soud.** **Number of configurable program messages in RUN, max. **Number of of simultaneously active program alarms **Number of program alarms **Number of program alarms **Number of program alarms **Number of program messages in RUN, max. **Number of program alarms **Number of program alarms **Number of alarms for notion technology objects **Test commissioning functions **Joint commissioning func		type "Reference namespace"
- Number of alarms for system diagnostics - Number of alarms for system diagnostics - Number of alarms for system diagnostics - Wes MODBUS TCP Equidistance	max.	
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Test commissioning functions Single step	· ·	100
Joint commission (Team Engineering) 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 Variables Number of variables, max. — of which status variables, max. — of which control variables, max. — of which process and the status variables, max. — of which control variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which process and the status variables, max. — of which	• •	80
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STOP ACTIVE LED Connection display LINK TX/RX Yes Supported technology objects Motion Control Yes; Note: The number of technology objects affects the cycle time of the PLC program; selection guide via the TIA Selection Tool Number of available Motion Control resources for technology objects 800	• ERROR LED	Yes
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Supported technology objects Motion Control Yes; Note: The number of technology objects affects the cycle time of the PLC program; selection guide via the TIA Selection Tool ◆ Number of available Motion Control resources for technology objects 800	STOP ACTIVE LED	Yes
Supported technology objects Motion Control Yes; Note: The number of technology objects affects the cycle time of the PLC program; selection guide via the TIA Selection Tool ◆ Number of available Motion Control resources for technology objects 800	 Connection display LINK TX/RX 	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 Number of available Motion Control resources for technology objects Yes; Note: The number of technology objects affects the cycle time of the PLC program; selection guide via the TIA Selection Tool 800		
 Number of available Motion Control resources for technology objects program; selection guide via the TIĂ Selection Tool 800 		Yes; Note: The number of technology objects affects the cycle time of the PLC
technology objects		
Required Motion Control resources		800
	 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 control cycle of 8 ms (typical value)	10
Controller	
PID_Compact	Yes; Universal PID controller with integrated optimization
PID_3Step	Yes; PID controller with integrated optimization for valves
PID-Temp	Yes; PID controller with integrated optimization for temperature
Counting and measuring	
High-speed counter	Yes
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-25 °C; No condensation
• horizontal installation, max.	60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off
 vertical installation, min. 	-25 °C; No condensation
 vertical installation, max. 	40 °C; 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 / header	
configuration / programming / header	
Programming language	
	Yes
— LAD	
— LAD — FBD	Yes
	Yes Yes
— FBD	
— FBD — STL	Yes
— FBD — STL — SCL	Yes Yes
— FBD — STL — SCL — GRAPH	Yes Yes
— FBD — STL — SCL — GRAPH Know-how protection	Yes Yes Yes
— FBD — STL — SCL — GRAPH Know-how protection ■ User program protection/password protection	Yes Yes Yes Yes
— FBD — STL — SCL — GRAPH Know-how protection • User program protection/password protection • Copy protection	Yes Yes Yes Yes Yes
— FBD — STL — SCL — GRAPH Know-how protection • User program protection/password protection • Copy protection • Block protection	Yes Yes Yes Yes Yes
— FBD — STL — SCL — GRAPH Know-how protection • User program protection/password protection • Copy protection • Block protection Access protection	Yes Yes Yes Yes Yes Yes Yes
FBD STL SCL GRAPH Know-how protection • User program protection/password protection • Copy protection • Block protection Access protection • protection of confidential configuration data	Yes Yes Yes Yes Yes Yes Yes Yes
FBD STL SCL GRAPH Know-how protection • User program protection/password protection • Copy protection • Block protection Access protection • protection of confidential configuration data • Password for display	Yes Yes Yes Yes Yes Yes Yes Yes Yes
FBD STL SCL GRAPH Know-how protection • User program protection/password protection • Copy protection • Block protection Access protection • protection of confidential configuration data • Password for display • Protection level: Write protection	Yes
FBD STL SCL GRAPH Know-how protection • User program protection/password protection • Copy protection • Block protection Access protection • protection of confidential configuration data • Password for display • Protection level: Write protection • Protection level: Read/write protection	Yes
FBD STL SCL GRAPH Know-how protection • User program protection/password protection • Copy protection • Block protection Access protection • protection of confidential configuration data • Password for display • Protection level: Write protection • Protection level: Read/write protection • Protection level: Complete protection	Yes
FBD STL SCL GRAPH Know-how protection • User program protection/password protection • Copy protection • Block protection Access protection • protection of confidential configuration data • Password for display • Protection level: Write protection • Protection level: Read/write protection • Protection level: Complete protection programming / cycle time monitoring / header	Yes
FBD STL SCL GRAPH Know-how protection • User program protection/password protection • Copy protection • Block protection Access protection • protection of confidential configuration data • Password for display • Protection level: Write protection • Protection level: Write protection • Protection level: Complete protection • Protection level: Complete protection programming / cycle time monitoring / header • lower limit	Yes
FBD STL SCL GRAPH Know-how protection • User program protection/password protection • Copy protection • Block protection Access protection • protection of confidential configuration data • Password for display • Protection level: Write protection • Protection level: Read/write protection • Protection level: Complete protection programming / cycle time monitoring / header • lower limit • upper limit Dimensions	Yes
FBD STL SCL GRAPH Know-how protection • User program protection/password protection • Copy protection • Block protection Access protection • protection of confidential configuration data • Password for display • Protection level: Write protection • Protection level: Read/write protection • Protection level: Complete protection programming / cycle time monitoring / header • lower limit • upper limit Dimensions Width	Yes
FBD STL SCL GRAPH Know-how protection • User program protection/password protection • Copy protection • Block protection Access protection • protection of confidential configuration data • Password for display • Protection level: Write protection • Protection level: Read/write protection • Protection level: Complete protection programming / cycle time monitoring / header • lower limit • upper limit Dimensions Width Height	Yes
FBD STL SCL GRAPH Know-how protection • User program protection/password protection • Copy protection • Block protection Access protection • protection of confidential configuration data • Password for display • Protection level: Write protection • Protection level: Read/write protection • Protection level: Complete protection programming / cycle time monitoring / header • lower limit • upper limit Dimensions Width Height Depth	Yes
FBD STL SCL GRAPH Know-how protection • User program protection/password protection • Copy protection • Block protection Access protection • protection of confidential configuration data • Password for display • Protection level: Write protection • Protection level: Read/write protection • Protection level: Complete protection • Protection level: Complete protection programming / cycle time monitoring / header • lower limit • upper limit Dimensions Width Height Depth Weights	Yes
FBD STL SCL GRAPH Know-how protection • User program protection/password protection • Copy protection • Block protection Access protection • protection of confidential configuration data • Password for display • Protection level: Write protection • Protection level: Read/write protection • Protection level: Complete protection programming / cycle time monitoring / header • lower limit • upper limit Dimensions Width Height Depth	Yes