SIEMENS

Data sheet

6ES7511-1AK02-0AB0



SIMATIC S7-1500, CPU 1511-1 PN, CENTRAL PROCESSING UNIT WITH WORKING MEMORY 150 KB FOR PROGRAM AND 1 MB FOR DATA, 1. INTERFACE: PROFINET IRT WITH 2 PORT SWITCH, 60 NS BIT-PERFORMANCE, SIMATIC MEMORY CARD NECESSARY

General information	
Product type designation	CPU 1511-1 PN
HW functional status	FS01
Firmware version	V2.5
Engineering with	
 STEP 7 TIA Portal configurable/integrated as of version 	V15
Configuration control	
via dataset	Yes
Display	
Screen diagonal [cm]	3.45 cm
Control elements	
Number of keys	8
Mode buttons	2
Supply voltage	
Type of supply voltage	24 V DC
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
l ² t	0.02 A²·s
Power	
Infeed power to the backplane bus	10 W
Power consumption from the backplane bus	5.5 W
(balanced)	
Power loss	
Power loss, typ.	5.7 W
Memory	
Number of slots for SIMATIC memory card	1
SIMATIC memory card required	Yes
Work memory	
integrated (for program)	150 kbyte
• integrated (for data)	1 Mbyte
Load memory	
Plug-in (SIMATIC Memory Card), max.	32 Gbyte
Backup	
• maintenance-free	Yes
CPU processing times	
for bit operations, typ.	60 ns
for word operations, typ.	72 ns
for fixed point arithmetic, typ.	96 ns
for floating point arithmetic, typ.	384 ns
CPU-blocks	
Number of elements (total)	2 000; Blocks (OB, FB, FC, DB) and UDTs
DB	
Number range	1 60 999; subdivided into: number range that can be used by the user: 1 59 999, and number range of DBs created via SFC 86: 60 000 60 999
● Size, max.	1 Mbyte; For non-optimized block accesses, the max. size of the DB is 64 KB
FB	
Number range	0 65 535

• Size, max.	150 kbyte
FC	
Number range	0 65 535
• Size, max.	150 kbyte
ОВ	
• Size, max.	150 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	
— adjustable	Yes
Data areas and their retentivity	
Retentive data area (incl. timers, counters, flags),	128 kbyte; In total; available retentive memory for bit memories,
	timers, counters, DBs, and technology data (axes): 88 KB

Extended retentive data area (incl. timers, counters,	1 Mbyte; When using PS 60W 24/48/60V DC HF
flags), max.	
Flag	16 kbyte
• Number, max.	
Number of clock memories	8; 8 clock memory bits, grouped into one clock memory byte
Data blocks	
Retentivity adjustable	Yes
Retentivity preset	No
Local data	
• per priority class, max.	64 kbyte; max. 16 KB per block
Address area	
Number of IO modules	1 024; max. number of modules / submodules
I/O address area	
• Inputs	32 kbyte; All inputs are in the process image
Outputs	32 kbyte; All outputs are in the process image
per integrated IO subsystem	
— Inputs (volume)	8 kbyte
— Outputs (volume)	8 kbyte
per CM/CP	
— Inputs (volume)	8 kbyte
— Outputs (volume)	8 kbyte
Subprocess images	
 Number of subprocess images, max. 	32
Hardware configuration	
Number of distributed IO systems	32; A distributed I/O system is characterized not only by the integration of distributed I/O via PROFINET or PROFIBUS communication modules, but also by the connection of I/O via AS-i master modules or links (e.g. IE/PB-Link)
Number of DP masters	
● Via CM	4; A maximum of 4 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total
Number of IO Controllers	
● integrated	1
● Via CM	4; A maximum of 4 CMs/CPs (PROFIBUS, PROFINET, Ethernet) 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	
Number	16
Clock synchronization	
• 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	
Number of ports	2
• integrated switch	Yes
• RJ 45 (Ethernet)	Yes; X1
Functionality	
IP protocol	Yes; IPv4
PROFINET IO Controller	Yes
PROFINET IO Device	Yes
 SIMATIC communication 	Yes
 Open IE communication 	Yes
Web server	Yes
Media redundancy	Yes; MRP Automanager according to IEC 62439-2 Edition 2.0
PROFINET IO Controller	
Services	
— PG/OP communication	Yes
— S7 routing	Yes
— Isochronous mode	Yes
 Open IE communication 	Yes
— IRT	Yes
— MRP	Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50
— MRPD	Yes; Requirement: IRT
— PROFlenergy	Yes
— Prioritized startup	Yes; Max. 32 PROFINET devices
— Number of connectable IO Devices, max.	128; In total, up to 256 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
— Of which IO devices with IRT, max.	64

 Number of connectable IO Devices for RT, max. 	128
— of which in line, max.	128
 Number of IO Devices that can be simultaneously activated/deactivated, max. 	8; in total across all interfaces
 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 IO devices, and on the quantity of configured user data
Update time for IRT	
— for send cycle of 250 μs	$250~\mu s$ to 4 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 625 μs of the isochronous OB is decisive
— for send cycle of 500 μs	500 μs to 8 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 625 μs of the isochronous OB is decisive
— for send cycle of 1 ms	1 ms to 16 ms
— for send cycle of 2 ms	2 ms to 32 ms
— for send cycle of 4 ms	4 ms to 64 ms
 With IRT and parameterization of "odd" 	Update time = set "odd" send clock (any multiple of 125 µs: 375
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 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	V.
— PG/OP communication	Yes
— S7 routing	Yes
— Isochronous mode	No
— Open IE communication	Yes
— IRT	Yes
— MRP	Yes
— MRPD	Yes; Requirement: IRT
— PROFlenergy	Yes
— Shared device	Yes
 Number of IO Controllers with shared device, max. 	4
 Asset management record 	Yes; Per user program
Interface types RJ 45 (Ethernet)	

• 100 Mbps	Yes
Autonegotiation	Yes
Autocrossing	Yes
Industrial Ethernet status LED	Yes

Industrial Ethernet status LED	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		
PROFINET IO Controller			
Services			
— PG/OP communication	Yes		
— S7 routing	Yes		
 Isochronous mode 	Yes		
 Open IE communication 	Yes		
— IRT	Yes		
— PROFlenergy	Yes		
 Prioritized startup 	Yes; Max. 32 PROFINET devices		
— Number of connectable IO Devices, max.	128; In total, up to 256 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET		
 Of which IO devices with IRT, max. 	64		
 Number of connectable IO Devices for RT, 	128		
max.			
— of which in line, max.	128		
 Number of IO Devices that can be simultaneously activated/deactivated, max. 	8; in total across all interfaces		
 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 IO devices, and on the quantity of configured user data		
Redundancy mode	Redundancy mode		
— MRP	Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50		
— MRPD	Yes; Requirement: IRT		
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		

several passive connections per port, supported ISO-on-TCP (RFC1006) Data length, max. IUDP Data length, max. IUDP Data length, max. IUDP multicast IDHCP SNMP SNMP SNMP SNMP DCP LILDP Ves ILIDP Ves Ves ILIDP Ves Ves Ves Ves Ves Ves Ves Ves	— Data length, max.	64 kbyte
In ISO-on-TCP (RFC1006) Data length, max. UDP Data length, max. UDP Data length, max. UDP multicast DHCP SMMP BCP BCP CLIDP Wes Wes server HTTP Yes; Standard and user pages HTTPS PCP UA Server Application authentication Security policies Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 User authentication Number of secssible variables, max. Number of registerable nodes, max. Sampling time, min. Send time, min. Number of monitored items, max. Number of rever interfaces, max. Number of rever interfaces, max. Number of rever interfaces, max. Number of server interfaces, max. Number of monitored items, max. Nu	 several passive connections per port, 	Yes
- Data length, max. • UDP - Data length, max. - UDP multicast - DHCP • SMMP • DCP • SMMP • DCP • LLDP Web server • HTTP • HTTPS • Runtime license required • OPC UA Server - Application authentication - Security policies - Application authentication - Security policies - Was authentication - Number of secssible variables, max. - Number of registerable nodes, max. - Subscriptions per session, max. - Sampling time, min. - Send time, min. - Send time, min. - Sumber of server methods, max. - Number of molitored items, max. - Number of server methods, max. - Number of server interfaces, max. - Number of server interfaces, max. - Number of server interfaces, max. - Number of modes for user-defined server interfaces, max. - Number of modes for user-defined server interfaces, max. Further protocols • MODBUS Yes; MODBUS TCP Media redundancy • Switchover time on line break, typ. • Number of stations in the ring, max. 500 ms 500 ms Yes; MODBUS TCP	supported	
UDP Data length, max. UDP multicast PHCP SNMMP DCP LLDP LLDP Web server HTTP HTTPS Yes: Standard and user pages Yes: Standard and user pages Ves: Standard and user pages PHTTP HTTPS Yes: Standard and user pages Per Standard and user pages OPC UA Runtime license required Per Suman authentication Security policies Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 User authentication Number of sessions, max. Number of sessions, max. Number of registerable nodes, max. Number of registerable nodes, max. Subscriptions per session, max. Sampling time, min. Send time, min. Number of server methods, max. Number of inputsioutputs per server method, max. Number of monitored items, max. Number of monitored items, max. Number of server interfaces, max. Number of nodes for user-defined server interfaces, max. Number of server interfaces, max. Number of nodes for user-defined server interfaces, max. Number of nodes for user-defined server interfaces, max. Number of server interfaces, max. Number of nodes for user-defined server interfaces, max. Number of server interfaces, max. Number of nodes for user-defined server interfaces, max. Number of nodes for us	• ISO-on-TCP (RFC1006)	Yes
— Data length, max. — UDP multicast DHCP SNMP SNMP DCP LLDP Wes LLDP Web server HTTP HTTPS Pes; Standard and user pages HTTPS Pes; Standard and user pages Per ULDP Web server Per Standard and user pages Per ULDP Pes; Standard and user pages Pes; Mac Standard and user pages Pes; Mac Standard and user pages Pes; Model user pages Pes; Mac Standard and use	— Data length, max.	64 kbyte
- UDP multicast • DHCP • SNMP • SNMP • DCP • LLDP Web server • HTTP • HTTPS • Runtime license required • OPC UA • Runtime license required • OPC UA Server — Application authentication — Security policies — Application authentication — Security policies — Wish server — Wish server — Application authentication — Security policies — Wish server — Wish server — Wes (read, write, subscribe), method call, custom address space — Application authentication — Security policies — Ves (Pes (read, write, subscribe), method call, custom address space — Application authentication — Security policies — Wish server — Available security policies: None, Basic 128Rsa15, Basic 256Rsa15, Ba	• UDP	Yes
DHCP SNMP SNMP CCP SNMP DCP SNMP Pes LLDP Yes LLDP Yes Web server HTTP HTTP Syes; Standard and user pages Per Standard and user pages Per Standard and user pages OPC UA Runtime license required Pes OPC UA Server Pes: Data access (read, write, subscribe), method call, custom address space Application authentication Security policies Pes Security policies Pasic 256Rs at 5, Basic 256Sha 256 Puser authentication Number of sessions, max. Number of accessible variables, max. Number of registerable nodes, max. Subscriptions per session, max. Subscriptions per session, max. Sampling time, min. Send time, min. Send time, min. Send time, min. Send time, min. Number of renore rethods, max. Number of repriserable was accessed and the server method, max. Number of nontored items, max. Number of nontored items, max. Number of nodes for user-defined server interfaces, max. Number of nodes for user-defined server interfaces, max. Number of monitored items, max. Services of the properties of the proper	— Data length, max.	2 kbyte; 1 472 bytes for UDP broadcast
SNMP DCP LLDP Yes Ves LLDP Yes Web server HTTP Yes; Standard and user pages HTTPS Yes; Standard and user pages PHTTPS Yes; Standard and user pages OPC UA Runtime license required Papication authentication Security policies Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Rs	— UDP multicast	Yes; Max. 5 multicast circuits
DCP LLDP Yes Web server HTTP HTTPS Yes; Standard and user pages PCP UA Runtime license required OPC UA Server Application authentication Security policies Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Rsa15, Basic256Rsa256 User authentication Number of sessions, max. Number of accessible variables, max. Number of server methods, max. Subscriptions per session, max. Send time, min. Send time, min. Number of server methods, max. Number of foserver methods, max. Number of foreinterfaces, max. Number of fonces for user-defined server interfaces, max. Number of monitored items, max. Number of server interfaces, m	• DHCP	No
LLDP Web server HTTP HTTPS Yes; Standard and user pages Yes; Standard and user pages OPC UA Runtime license required OPC UA Server Application authentication Security policies Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Rsa15, Basic256Rsa15, Basic256Sha256 User authentication Number of sessions, max. Number of accessible variables, max. Number of registerable nodes, max. Subscriptions per session, max. Sampling time, min. Send time, min. Number of server methods, max. Number of inputs/outputs per server method, max. Number of monitored Items, max. Number of monitored Items, max. Number of nodes for user-defined server interfaces, max. Further protocols ModBus Media redundancy Subscriptions per session, max. Subscriptions per session, max. 20 1000; For 1 s sampling interval and 1 s send interval 1000 Yes; MODBUS TCP Media redundancy Switchover time on line break, typ. Switchover time on line break, typ. Number of stations in the ring, max.	• SNMP	Yes
Web server HTTP HTTP Yes; Standard and user pages OPC UA Runtime license required OPC UA Server Yes; Data access (read, write, subscribe), method call, custom address space Application authentication Security policies Available security policies: None, Basic128Rsa15, Basic256Sha15, Basic256Sha256 User authentication Number of sessions, max. Number of accessible variables, max. Number of accessible variables, max. Subscriptions per session, max. Sampling time, min. Send time, min. Send time, min. Number of server methods, max. Number of server interfaces, max. Server interfaces, max. Number of server interfaces, max. Number of server interfaces, max. Server interfaces, max. Number of server interfaces, max. Number of server interfaces, max. Server interfaces, max. Number of server interfaces, max. Server interfaces, max. Number of server interfaces, max. Server int	• DCP	Yes
HTTP HTTPS Yes; Standard and user pages Yes; Standard and user pages POPC UA Runtime license required OPC UA Server Yes; Data access (read, write, subscribe), method call, custom address space Application authentication Security policies Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Rsa15, Basic256Rsa256 User authentication Number of sessions, max. Number of sessions, max. Number of ergisterable nodes, max. Number of registerable nodes, max. Subscriptions per session, max. Sampling time, min. Soo ms Number of server methods, max. Number of server methods, max. Number of inputs/outputs per server method, max. Number of monitored items, max. Number of modes for user-defined server interfaces, max. Number of nodes for user-defined server interfaces, max. Further protocols Modbus Modbus Number of stations in the ring, max. Number of stations in the ring, max.	• LLDP	Yes
HTTPS Pes; Standard and user pages Per UA Runtime license required OPC UA Server Pes; Data access (read, write, subscribe), method call, custom address space Application authentication — Security policies — Security policies — User authentication — Number of sessions, max. — Number of accessible variables, max. — Number of registerable nodes, max. — Subscriptions per session, max. — Sampling time, min. — Send time, min. — Send time, min. — Number of server methods, max. — Number of inputs/outputs per server method, max. — Number of monitored items, max. — Number of monitored items, max. — Number of server interfaces, max. — Number of server interfaces, max. — Number of nodes for user-defined server interfaces, max. Further protocols • MODBUS Media redundancy • Switchover time on line break, typ. • Number of stations in the ring, max. 500 ms; For MRP, bumpless for MRPD \$000 ms; For MRP, bumpless for MRPD	Web server	
Runtime license required Runtime license required Pes; Data access (read, write, subscribe), method call, custom address space Application authentication Security policies Rundiable security policies: None, Basic128Rsa15, Basic256Rsa15, Bas	• HTTP	Yes; Standard and user pages
Runtime license required OPC UA Server OPC UA Server Yes; Data access (read, write, subscribe), method call, custom address space Application authentication Security policies Available security policies: None, Basic128Rsa15, Basic256Rsa15, Bas	• HTTPS	Yes; Standard and user pages
Yes; Data access (read, write, subscribe), method call, custom address space Application authentication Security policies Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 User authentication Number of sessions, max. Number of accessible variables, max. Number of registerable nodes, max. Subscriptions per session, max. Sampling time, min. Send time, min. Number of server methods, max. Number of inputs/outputs per server method, max. Number of monitored items, max. Number of nodes for user-defined server interfaces, max. Number of nodes for user-defined server interfaces, max. Further protocols Modia redundancy Security policies: None, Basic128Rsa15, Basic256Sha256 available security policies: None, Basic128Rsa15, Basic256Sha256 anonymous" or by user name & password available security policies: None, Basic128Rsa15, Basic256Rsa15, BasicaFase	OPC UA	
address space	Runtime license required	Yes
Available security policies: None, Basic128Rsa15, Basic256Rsa15, B	OPC UA Server	
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 — Subscriptions per session, max. 20 — Sampling time, min. 100 ms — Send time, min. 500 ms — Number of server methods, max. 20 — Number of inputs/outputs per server method, max. 20 — Number of monitored items, max. 1 000; For 1 s sampling interval and 1 s send interval — Number of server interfaces, max. 100 — Number of nodes for user-defined server interfaces, max. 1000 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	 Application authentication 	Yes
 Number of sessions, max. Number of accessible variables, max. Number of registerable nodes, max. Number of registerable nodes, max. Number of registerable nodes, max. Subscriptions per session, max. Sampling time, min. Send time, min. Number of server methods, max. Number of inputs/outputs per server method, max. Number of monitored items, max. Number of server interfaces, max. Number of server interfaces, max. Number of nodes for user-defined server interfaces, max. Further protocols MODBUS Yes; MODBUS TCP Media redundancy Switchover time on line break, typ. Number of stations in the ring, max. 	— Security policies	
 Number of accessible variables, max. Number of registerable nodes, max. Subscriptions per session, max. Sampling time, min. Send time, min. Number of server methods, max. Number of inputs/outputs per server method, max. Number of monitored items, max. Number of server interfaces, max. Number of nodes for user-defined server interfaces, max. Further protocols MODBUS Switchover time on line break, typ. Number of stations in the ring, max. 10 000 1000 <l< td=""><td> User authentication </td><td>"anonymous" or by user name & password</td></l<>	 User authentication 	"anonymous" or by user name & password
 Number of registerable nodes, max. Subscriptions per session, max. Sampling time, min. Send time, min. Number of server methods, max. Number of inputs/outputs per server method, max. Number of monitored items, max. Number of server interfaces, max. Number of server interfaces, max. Number of nodes for user-defined server interfaces, max. Further protocols MODBUS Yes; MODBUS TCP Media redundancy Switchover time on line break, typ. Number of stations in the ring, max. 10 000 modes for MRPD Number of stations in the ring, max. 	Number of sessions, max.	32
- Subscriptions per session, max Sampling time, min Send time, min Send time, min Number of server methods, max Number of inputs/outputs per server method, max Number of monitored items, max Number of monitored items, max Number of server interfaces, max Number of nodes for user-defined server interfaces, max Number of nodes for user-defined server interfaces, max. Further protocols • MODBUS Media redundancy • Switchover time on line break, typ. • Number of stations in the ring, max. 20 20 20 80 80 80 80 80 80 80	 Number of accessible variables, max. 	50 000
- Sampling time, min Send time, min Send time, min Number of server methods, max Number of inputs/outputs per server method, max Number of monitored items, max Number of server interfaces, max Number of nodes for user-defined server interfaces, max Number of nodes for user-defined server interfaces, max. Further protocols • MODBUS Media redundancy • Switchover time on line break, typ Number of stations in the ring, max. 1000 1000 1000 1000 1000 1000 1000 1	 Number of registerable nodes, max. 	10 000
 — Send time, min. — Number of server methods, max. — Number of inputs/outputs per server method, max. — Number of monitored items, max. — Number of server interfaces, max. — Number of nodes for user-defined server interfaces, max. — Number of nodes for user-defined server interfaces, max. Further protocols • MODBUS • MODBUS Yes; MODBUS TCP Media redundancy • Switchover time on line break, typ. • Number of stations in the ring, max. 50 	 Subscriptions per session, max. 	20
 Number of server methods, max. Number of inputs/outputs per server method, max. Number of monitored items, max. Number of server interfaces, max. Number of nodes for user-defined server interfaces, max. Number of nodes for user-defined server interfaces, max. Further protocols MODBUS Yes; MODBUS TCP Media redundancy Switchover time on line break, typ. Number of stations in the ring, max. 	— Sampling time, min.	100 ms
 Number of inputs/outputs per server method, max. Number of monitored items, max. Number of server interfaces, max. Number of nodes for user-defined server interfaces, max. Further protocols MODBUS Yes; MODBUS TCP Media redundancy Switchover time on line break, typ. Number of stations in the ring, max. 	— Send time, min.	500 ms
method, max. — Number of monitored items, max. — Number of server interfaces, max. — Number of nodes for user-defined server interfaces, max. — Number of nodes for user-defined server interfaces, max. Further protocols • MODBUS Yes; MODBUS TCP Media redundancy • Switchover time on line break, typ. • Number of stations in the ring, max. 50	 Number of server methods, max. 	20
 Number of server interfaces, max. Number of nodes for user-defined server interfaces, max. Further protocols MODBUS Yes; MODBUS TCP Media redundancy Switchover time on line break, typ. Number of stations in the ring, max. 		20
 — Number of nodes for user-defined server interfaces, max. Further protocols MODBUS Media redundancy Switchover time on line break, typ. Number of stations in the ring, max. 1 000 Yes; MODBUS TCP 200 ms; For MRP, bumpless for MRPD 50 	 Number of monitored items, max. 	1 000; For 1 s sampling interval and 1 s send interval
interfaces, max. Further protocols • MODBUS Yes; MODBUS TCP Media redundancy • Switchover time on line break, typ. • Number of stations in the ring, max. 50	 Number of server interfaces, max. 	10
Further protocols		1 000
 MODBUS		
 Media redundancy Switchover time on line break, typ. Number of stations in the ring, max. 		Yes; MODBUS TCP
 Switchover time on line break, typ. Number of stations in the ring, max. Switchover time on line break, typ. 100 ms; For MRP, bumpless for MRPD 50 		
• Number of stations in the ring, max. 50		200 ms; For MRP, bumpless for MRPD
Isochronous mode		
	Isochronous mode	

Isochronous operation (application synchronized up to terminal)	Yes; With minimum OB 6x cycle of 625 µs
Equidistance	Yes
S7 message functions	
Number of login stations for message functions, max.	32
Program alarms	Yes
Number of configurable program alarms	5 000
Number of simultaneously active program alarms	
 Number of program alarms 	300
 Number of alarms for system diagnostics 	100
 Number of alarms for motion technology objects 	80
Test commissioning functions	
Joint commission (Team Engineering)	Yes; Parallel online access possible for up to 5 engineering systems
Status block	Yes; Up to 8 simultaneously (in total across all ES clients)
Single step	No
Number of breakpoints	8
Status/control	
Status/control variable	Yes
 Variables 	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters
Number of variables, max.	
— of which status variables, max.	200; per 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	
Diagnostics indication LED	
RUN/STOP LED	Yes
• ERROR LED	Yes
• MAINT LED	Yes
• STOP ACTIVE LED	Yes
 Connection display LINK TX/RX 	Yes

Motion Control Ves; 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 for technology objects (except cam disks) Required Motion Control resources — per speed-controlled axis — per synchronous axis — per synchronous axis — per synchronous axis — per cam track — per probe Positioning axis — Number of positioning axes at motion control cycle of 4 ms (typical value) — Number of positioning axes at motion control cycle of 4 ms (typical value) PID_Compact PID_Compact PID_Compact PID_Compact PID_Compact PID_Compact PID_Step PID_Compact PID_Compact PID_Step PID_Compact PID_Step PID_Compact PID_Step PID_Controller with integrated optimization for valves Pes; PID controller with integrated optimization for temperature Counting and measuring PID_Step PID_Compact PiD_Step PID_Compact PID_Step PID_Controller with integrated optimization for valves Pes; PID controller with integrated optimization for temperature Counting and measuring Pid_speed counter Ambient temperature during operation Portical installation, min. Portical installation, min. Portical installation, min. Portical installation, max. Portical installation, min. Portical installation, max. Portical installation, min. Portical installation in min. Portical installation in min. Por	Supported technology objects	
Number of available Motion Control resources for technology objects (except cam disks) Required Motion Control resources — per speed-controlled axis — per synchronous axis — per synchronous axis — per synchronous axis — per output cam — per cam track — per probe Positioning axis — Number of positioning axes at motion control cycle of 4 ms (typical value) — Number of positioning axes at a motion control cycle of 8 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) PID_Compact PID_Compact PID_Step PID_Temp Counting and measuring High-speed counter Ambient conditions Ambient temperature during operation • horizontal installation, min. • horizontal installation, max. • vertical installation, max. • v	Motion Control	Yes; Note: The number of axes affects the cycle time of the PLC
for technology objects (except cam disks) Required Motion Control resources — per speed-controlled axis — per positioning axis — per synchronous axis — per output cam — per cam track — per output cam — per cam track — per positioning axes at motion control cycle of 4 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) Controller PID_Compact PID_Compact PID_Temp Yes; Universal PID controller with integrated optimization for valves Yes; PID controller with integrated optimization for temperature Counting and measuring PID_Temp Yes Ambient temperature during operation Norizontal installation, min. Nor		program; selection guide via the TIA Selection Tool or SIZER
Required Motion Control resources — per speed-controlled axis — per positioning axis — per synchronous axis — per external encoder — per output cam — per cam track — per probe Positioning axis — Number of positioning axes at motion control cycle of 4 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) PID_Compact PID_Compact PID_Sixep PID_Temp Yes; Universal PID controller with integrated optimization Yes; PID controller with integrated optimization for valves PID_Sixep PID_Temp Yes; PID controller with integrated optimization for temperature Yes PID_Temp Counting and measuring Pidis-speed counter Yes Ambient temperature during operation Norizontal installation, min. Norizontal installation, min. Norizontal installation, min. Norizontal installation, max. Norizontal installation, min. Norizontal installation,		800
- per speed-controlled axis		
— per positioning axis — per synchronous axis — per external encoder — per output cam — per cant track — per output cam — per cant track — per probe • Positioning axis — Number of positioning axes at motion control cycle of 4 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) Controller • PID_Compact • PID_Compact • PID_Tamp Counting and measuring • PID_Temp Counting and measuring • High-speed counter Ambient conditions Ambient temperature during operation • horizontal installation, min. • horizontal installation, min. • horizontal installation, min. • vertical installation, min. • vertical installation, max. Ambient temperature during storage/transportation • rin. • vertical installation, max. Ambient temperature during storage/transportation • min. • vertical installation, min. • vertical mistallation, min. •	 Required Motion Control resources 	
— per synchronous axis — per external encoder — per output cam — per cam track — per probe • Postitioning axis — Number of positioning axes at motion control cycle of 4 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) • PID_Compact • PID_Compact • PID_Step • PID_Temp Counting and measuring • High-speed counter Ambient conditions Ambient temperature during operation • horizontal installation, min. • horizontal installation, min. • horizontal installation, min. • vertical installation, max. • vertical installation, max. • vertical installation, max. Ambient temperature during storage/transportation • min. • vertical installation, max. Ambient temperature during storage/transportation • min. • vertical mistallation, max. Ambient temperature during storage/transportation • min. • vertical mistallation, max. Yes Configuration Programming Programming language — LAD — FBD — STL Yes	per speed-controlled axis	
— per external encoder — per output cam — per cam track — per probe 40 Positioning axis — Number of positioning axes at motion control cycle of 4 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) Controller PID_Compact PID_Compact PID_Temp Yes; Universal PID controller with integrated optimization for valves Yes; PID controller with integrated optimization for valves Yes; PID controller with integrated optimization for temperature Counting and measuring High-speed counter Ambient conditions Ambient temperature during operation Phorizontal installation, min. Phorizontal installation, min. Phorizontal installation, min. Porcious installation, min. Porcious installation, max. O °C V, the display is switched off Ambient temperature during storage/transportation min. Porcious installation, max. To °C Configuration Programming Programming language — LAD — FBD — STL Yes	— per positioning axis	80
- per output cam - per cam track - per probe - Positioning axis - Number of positioning axes at motion control cycle of 4 ms (typical value) - Number of positioning axes at motion control cycle of 8 ms (typical value) - Number of positioning axes at motion control cycle of 8 ms (typical value) - Number of positioning axes at motion control cycle of 8 ms (typical value) Controller - PID_Compact - PID_Compact - PID_Temp - Yes; PID controller with integrated optimization for valves - PID_Temp - Yes; PID controller with integrated optimization for temperature - PID_Temp - PiD-Temp - Yes - PID_Compact - Pigh-speed counter - Yes Ambient conditions Ambient temperature during operation - horizontal installation, min horizontal installation, max 0 °C - C, the display is switched off - vertical installation, max vertical installatio	— per synchronous axis	160
— per cam track — per probe • Positioning axis — Number of positioning axes at motion control cycle of 4 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) Controller • PID_Compact • PID_Sompact • PID_Temp Counting and measuring • High-speed counter Ambient conditions Ambient conditions Ambient temperature during operation • horizontal installation, min. • horizontal installation, min. • vertical installation, max. • vertical inst	— per external encoder	80
- per probe Positioning axis - Number of positioning axes at motion control cycle of 4 ms (typical value) - Number of positioning axes at motion control cycle of 8 ms (typical value) - Number of positioning axes at motion control cycle of 8 ms (typical value) Controller PID_Compact PID_Compact PID_Temp Yes; Universal PID controller with integrated optimization of valves PID_Temp Yes; PID controller with integrated optimization for valves Yes; PID controller with integrated optimization for temperature Counting and measuring High-speed counter Ambient conditions Ambient temperature during operation horizontal installation, min. horizontal installation, max. O °C C, the display is switched off vertical installation, max.	— per output cam	20
Positioning axis - Number of positioning axes at motion control cycle of 4 ms (typical value) - Number of positioning axes at motion control cycle of 8 ms (typical value) - Number of positioning axes at motion control cycle of 8 ms (typical value) Controller • PID_Compact • PID_Compact • PID_Temp Yes; Universal PID controller with integrated optimization for valves PID_Temp Counting and measuring • High-speed counter Ambient conditions Ambient temperature during operation • horizontal installation, min. • horizontal installation, min. • horizontal installation, min. • vertical installation, max. • vertical installation, max. 40 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off • 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. • max. 70 °C Configuration Programming Programming Programming language — LAD — FBD — STL Yes	— per cam track	160
- Number of positioning axes at motion control cycle of 4 ms (typical value) - Number of positioning axes at motion control cycle of 8 ms (typical value) Controller • PID_Compact • PID_SStep • PID_Temp Counting and measuring • High-speed counter Ambient temperature during operation • horizontal installation, min. • horizontal installation, min. • vertical installation, min. • vertical installation, max. • vertical installation, max. • vertical installation	— per probe	40
control cycle of 4 ms (typical value) Number of positioning axes at motion control cycle of 8 ms (typical value) Controller PID_Compact PID_Step PID_Temp Counting and measuring High-speed counter Phorizontal installation, min. Profrain installation, min. vertical installation, min. vertical installation, max. Pertical installation, max. Tablent temperature during storage/transportation min. min. min. configuration Programming Programming Programming Programming Programming Programming Programming Programming Programming Programming language — LAD — FBD — STL Pyes Ves; PID controller with integrated optimization for valves Yes; PID controller with integrated optimization for temperature Yes; PID controller with integrated optimization for valves Yes PlD_Controller with integrated optimization for valves Yes; PID controller with integrated optimization for valves Yes PlD_Controller with integrated optimization for valves Yes; PID controller with integrated op	Positioning axis	
- Number of positioning axes at motion control cycle of 8 ms (typical value) Controller PID_Compact PID_Sistep PID-Temp Yes; PID controller with integrated optimization for valves PID-Temp Yes; PID controller with integrated optimization for valves Yes; PID controller with integrated optimization for temperature Counting and measuring High-speed counter Ambient conditions Ambient temperature during operation No "C Horizontal installation, min. No "C Ho	 Number of positioning axes at motion 	5
control cycle of 8 ms (typical value) Controller PID_Compact PID_Dempact PID_Dempact PID_Temp PID_Temp PID_Temp PID_Temp Pigh-speed counter Ambient temperature during operation Portical installation, min. Programming Programming Programming Programming language LAD PFBD PSTL Yes Yes Yes Yes Yes Yes Yes Ye	control cycle of 4 ms (typical value)	
Controller PID_Compact PID_Step PID_Temp Yes; Universal PID controller with integrated optimization Yes; PID controller with integrated optimization for valves Yes; PID controller with integrated optimization for temperature Counting and measuring High-speed counter Yes Ambient conditions Ambient temperature during operation horizontal installation, min. horizontal installation, max. 60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off 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. min. 40 °C 70 °C Configuration Programming Programming language LAD FBD PSTL Yes	• • • •	10
PID_Compact PID_3Step PID_Temp Yes; PID controller with integrated optimization for valves PID_Temp Yes; PID controller with integrated optimization for valves Yes; PID controller with integrated optimization for valves Yes; PID controller with integrated optimization for temperature Counting and measuring High-speed counter Ambient conditions Ambient temperature during operation No "C Horizontal installation, min. Horizontal installation, max. O "C C, the display: 50 "C, at an operating temperature of typically 50 "C, the display is switched off Vertical installation, max. Vertical installation, max. Vertical installation, max. O "C To bisplay: 40 "C, at an operating temperature of typically 40 "C, the display is switched off Ambient temperature during storage/transportation min. min. max. 70 "C Configuration Programming Programming Programming language LAD FBD FBD Yes STL Yes		
PID_3Step PID-Temp PID-Temp Pigh-speed counter Ambient conditions Ambient temperature during operation horizontal installation, min. horizontal installation, min. vertical installation, max. vertical installation installation, max. vertical installation, max. vertical installation installation, max. vertical installation installation, max. vertical installation installation installation, max. vertical installation installati	Controller	
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. horizontal installation, max. 60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off vertical installation, min. 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. min. 40 °C 70 °C Configuration Programming Programming Programming language — LAD — FBD — STL Yes Yes	PID_Compact	
Counting and measuring • High-speed counter Ambient conditions Ambient temperature during operation • horizontal installation, min. • horizontal installation, max. • oo °C, Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off • vertical installation, min. • vertical installation, max. • vertical installation, max. • vertical installation, max. • vertical installation, max. • vertical installation, max. • o°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. • o°C Configuration Programming Programming Programming language — LAD — FBD — STL Yes	• PID_3Step	Yes; PID controller with integrated optimization for valves
High-speed counter Ambient conditions Ambient temperature during operation horizontal installation, min. horizontal installation, max. horizontal installation, max. horizontal installation, min. vertical installation, min. vertical installation, max. horizontal installation, min. vertical installation, max. vertical installation, min. vertical installation of conception of typically 50 °C, at an operating temperature of typically 50 °C, the display is switched off vertical installation, min. vertical installatio	PID-Temp	Yes; PID controller with integrated optimization for temperature
Ambient conditions Ambient temperature during operation • horizontal installation, min. • horizontal installation, max. • horizontal installation, max. • vertical installation, min. • vertical installation, max. • vertical installation, min. • vertical installation	Counting and measuring	
Ambient temperature during operation • horizontal installation, min. • horizontal installation, max. • horizontal installation, max. • horizontal installation, max. • oo °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off • vertical installation, min. • vertical installation, max. • vertical installation, max. • vertical installation, max. • oo °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off Ambient temperature during storage/transportation • min. • min. • 40 °C To °C Configuration Programming Programming language — LAD — FBD — STL Yes Yes	High-speed counter	Yes
 horizontal installation, min. horizontal installation, max. 60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off vertical installation, min. 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 Configuration Programming Programming language — LAD — FBD — FBD — STL Yes Yes Yes 	Ambient conditions	
 horizontal installation, max. 60 °C; 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; 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. To °C Configuration Programming Programming language LAD FBD FBD Yes STL Yes 	Ambient temperature during operation	
 °C, the display is switched off 0 °C vertical installation, min. 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 Configuration Programming Programming language LAD FBD FBD Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Y	horizontal installation, min.	0 °C
 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 Configuration Programming Programming language LAD FBD Yes STL Yes Yes Yes 	• horizontal installation, max.	
°C, the display is switched off Ambient temperature during storage/transportation • min. • max. 70 °C Configuration Programming Programming language — LAD — FBD — STL Yes Yes Yes	• vertical installation, min.	0 °C
	• vertical installation, max.	
 ● max. To °C Configuration Programming Programming language — LAD — FBD — STL Yes Yes Yes 	Ambient temperature during storage/transportation	
Configuration Programming Programming language — LAD Yes — FBD Yes — STL Yes	• min.	-40 °C
Programming Programming language — LAD Yes — FBD Yes — STL Yes	• max.	70 °C
Programming language — LAD Yes — FBD Yes — STL Yes	Configuration	
— LAD Yes — FBD Yes — STL Yes	Programming	
FBDSTLYesYes	Programming language	
— STL Yes	— LAD	Yes
	— FBD	Yes
— SCL 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	35 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	405 g
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