## **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	V2.6
Product function	
● I&M data	Yes; I&M0 to I&M3
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	100
Mains/voltage failure stored energy time	5 ms
	1/s
Repeat rate, min.	1/5
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 <sup>2</sup> ·s
Power	
Infeed power to the backplane bus	10 W
Power consumption from the backplane bus	5.5 W
(balanced)	0.0 1.1
Power loss	5.7.W
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	
<ul> <li>Plug-in (SIMATIC Memory Card), max.</li> </ul>	32 Gbyte
Backup	
maintenance-free	Yes
CDI I nyaasaa in a kinaas	
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
for nothing point annihilatio, typ.	00+ III
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
a Cina may	86: 60 000 60 999
● Size, max.	1 Mbyte; For DBs with absolute addressing, the max. size is 64 KB
FB	
Number range	0 65 535
	150 kbyte
● Size, max.	100 hbyto

FC	
Number range	0 65 535
• Size, max.	150 kbyte
ОВ	
• Size, max.	150 kbyte
Number of free cycle OBs	100
<ul> <li>Number of time alarm OBs</li> </ul>	20
Number of delay alarm OBs	20
<ul> <li>Number of cyclic interrupt OBs</li> </ul>	20; With minimum OB 3x cycle of 500 μs
<ul> <li>Number of process alarm OBs</li> </ul>	50
<ul><li>Number of DPV1 alarm OBs</li></ul>	3
<ul> <li>Number of isochronous mode OBs</li> </ul>	2
<ul> <li>Number of technology synchronous alarm OBs</li> </ul>	2
<ul><li>Number of startup OBs</li></ul>	100
<ul> <li>Number of asynchronous error OBs</li> </ul>	4
<ul> <li>Number of synchronous error OBs</li> </ul>	2
<ul> <li>Number of diagnostic alarm OBs</li> </ul>	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,
max.	timers, counters, DBs, and technology data (axes): 88 KB
Extended retentive data area (incl. timers, counters, flags), max.	1 Mbyte; When using PS 6 0W 24/48/60 V DC HF
DENIST THEA	

Flag	
Number, max.	16 kbyte
<ul> <li>Number of clock memories</li> </ul>	8; 8 clock memory bit, grouped into one clock memory byte
Data blocks	
Retentivity adjustable	Yes
Retentivity preset	No
Local data	
• per priority class, max.	64 kbyte; max. 16 KB per block
Address area  Number of IO modules	1.024: may number of modules / submodules
I/O address area	1 024; max. number of modules / submodules
	22 khyto: All inpute are in the process image
• Inputs	32 kbyte; All inputs are in the process image
Outputs	32 kbyte; All outputs are in the process image
per integrated IO subsystem	
— Inputs (volume)	8 kbyte
— Outputs (volume)	8 kbyte
per CM/CP	
— Inputs (volume)	8 kbyte
— Outputs (volume)	8 kbyte
Subprocess images	
<ul> <li>Number of subprocess images, max.</li> </ul>	32
Hardware configuration	
Number of distributed IO systems	32; A distributed I/O system is characterized not only by the integration of distributed I/O via PROFINET or PROFIBUS communication modules, but also by the connection of I/O via AS-i master modules or links (e.g. IE/PB-Link)
Number of DP masters	
● Via CM	4; A maximum of 4 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total
Number of IO Controllers	
• integrated	1
● Via CM	4; A maximum of 4 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total
Rack	
Modules per rack, max.	32; CPU + 31 modules
<ul> <li>Number of lines, max.</li> </ul>	1
PtP CM	
. N. I. CED OU	the number of connectable PtP CMs is only limited by the number
Number of PtP CMs	of available slots
Number of PtP CMs  Time of day	

• Number of controller     • Number of ports     • Number of protocol     • PROFINET IO Controller     • PROFINET IO Controller     • Services     • PROFINET IO Controller     • Services     • POID Communication     • Yes     • In Ag. Raber     • Number of PROFINET interfaces     • Number of prots     • Interface Uses     • Number of prots     • Ru 45 (Ethernet)     • PROFINET IO Controller     • PROFINET IO Device     • Silvation Communication     • Yes     • Number of ports     • Open IE communication     • Yes     • Nedia redundancy     • Yes     • Nedia redundancy     • Yes; Anx Predundancy manager and/or MRP client; max.     number of devices in the ring; 50     • MRP     • Number of connectable IO Devices, max.     • Number of connectable IO Devices, for RT, max.     • Number of connectable IO Devices for RT, max.	Backup time	6 wk; At 40 °C ambient temperature, typically
Operating hours counter  Number Clock synchronization  Supported In AS, master AS, slave Interfaces  Interface Interfaces  Number of PROFINET interfaces  Number of PROFINET interfaces  PROFINET IO Controller  Nes Similar Communication  PROFINET IO Controller  Services  PG/OP communication PROFINET IO Controller  Services  PG/OP communication PROFINET IO Controller  Services  PROFINET IO Controller  Yes  Services  PROFINET IO Controller  Yes  Services  PROFINET IO Controller  PROFINET IO Controller  Services  PROFINET IO Controller  PROFINET IO Controller  PROFINET IO Controller  PROFINET IO Controller  Services  PROFINET IO Controller  PROFINET		
Number   16  Clock synchronization  supported   Yes	· · ·	
* supported     * in AS, master     * in AS, slave     * on Ethernet via NTP     * Ves     * Interfaces  Number of PROFINET interfaces  1 1. Interface  Interface types      * Number of ports     * Ves     * Number of ports     * Pes     * Number of ports     * Pes     * Number of ports     * Pes     * Number of ports     * PROFINET interfaces      * IP protocol     * PROFINET in Controller     * PROFINET IO Controller     * PROFINET IO Device     * PROFINET IO Device     * SIMATIC communication     * Yes     * SIMATIC communication     * Yes     * Web server     * Media redundancy     * Yes MRP Automanager according to IEC 62439-2 Edition 2.0  PROFINET IO Controller  Services  - PG/OP communication     * Yes     - Open IE communication     * PROFINET IO Controller  Services  - PG/OP communication     * Yes     - Open IE communication     * Yes     - Number of connectable IO Devices, max.     * Number of connectable IO Devices, max.     * Ves; Max. 32 PROFINET devices     - Of which IO devices with IRT, max.     - Number of connectable IO Devices for RT,     * 128		16
* supported     * in AS, master     * in AS, slave     * on Ethernet via NTP     * Ves     * Interfaces  Number of PROFINET interfaces  1 1. Interface  Interface types      * Number of ports     * Ves     * Number of ports     * Pes     * Number of ports     * Pes     * Number of ports     * Pes     * Number of ports     * PROFINET interfaces      * IP protocol     * PROFINET in Controller     * PROFINET IO Controller     * PROFINET IO Device     * PROFINET IO Device     * SIMATIC communication     * Yes     * SIMATIC communication     * Yes     * Web server     * Media redundancy     * Yes MRP Automanager according to IEC 62439-2 Edition 2.0  PROFINET IO Controller  Services  - PG/OP communication     * Yes     - Open IE communication     * PROFINET IO Controller  Services  - PG/OP communication     * Yes     - Open IE communication     * Yes     - Number of connectable IO Devices, max.     * Number of connectable IO Devices, max.     * Ves; Max. 32 PROFINET devices     - Of which IO devices with IRT, max.     - Number of connectable IO Devices for RT,     * 128	Clock synchronization	
in AS, slave in AS, slave ves von Ethernet via NTP  Yes  Number of PROFINET interfaces  1  1. Interface  Interface types  Number of ports integrated switch RJ 45 (Ethernet)  Protocols  PROFINET IO Controller PROFINET IO Device SIMATIC communication PROFINET IO Controller PROFINET IO Controller Yes SIMATIC communication Yes Web server Media redundancy Yes; MRP Automanager according to IEC 62439-2 Edition 2.0  PROFINET IO Controller  PROFINET IO Controller  Yes Media redundancy Yes; MRP Automanager according to IEC 62439-2 Edition 2.0  PROFINET IO Controller  Services  PG/OP communication Yes — PG/OP communic		Yes
interfaces  Number of PROFINET interfaces  1  Interface  Interface types  Number of ports Integrated switch RI 45 (Ethernet) PROFINET IO Controller PROFINET IO Controller PROFINET IO Communication Web server Media redundancy PROFINET IO Controller PROFINET IO Controller PROFINET IO Communication PROFINET IO Communication PROFINET IO Controller PROFINET IO Controller  Services PROFINET IO Controller  Yes: As MRP redundancy manager and/or MRP client: max. number of devices in the ring: 50  Yes: Requirement: IRT PROFILE IN Intell, up to 256 distributed I/O devices can be connected via AS-I, PROFIBUS or PROFINET  Of which IO devices with IRT, max. Pumber of connectable IO Devices for RT, 128		Yes
• on Ethernet via NTP  Interfaces  Number of PROFINET interfaces  1  1. Interface  Interface types  • Number of ports • integrated switch • RJ 45 (Ethernet)  Protocols  • IP protocol • PROFINET IO Controller • PROFINET IO Device • PROFINET IO Device • SIMATIC communication • Web server • Media redundancy • Media redundancy  PROFINET IO Controller  Services  - PG/OP communication - S7 routing - Isochronous mode - Open IE communication - RT - MRP - MRP - MRP - Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50 - MRPD - PROFINET Wes - Prioritized startup - Number of connectable IO Devices, max Of which IO devices with IRT, max Number of connectable IO Devices for RT.  128	● in AS, slave	Yes
Number of PROFINET interfaces   1		Yes
Number of PROFINET interfaces   1	Interfaces	
Interface types  Number of ports Integrated switch RJ 45 (Ethernet) Protocols  Protocols  Profine Ti O Controller PROFINET IO Device SilMATIC communication Open IE communication Wes Media redundancy PROFINET IO Controller  Services  PROFOP communication Yes PROFONE Ti O Controller  Services  PROFINE Ti O Controller  Services  PROFOR communication Yes  Nes Copen IE communication Yes  PROFOR is communication Yes  Nery  PROFOR in the ring: 50  Yes; Requirement: IRT  PROFILE ring: 50  Yes; Requirement: IRT  PROFILE distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET  Of which IO devices with IRT, max. Number of connectable IO Devices for RT, 128		1
Number of ports  integrated switch  RJ 45 (Ethernet)  Protoccols  IP protoccol  PROFINET IO Controller  Services  PROFINET IO Controller  Yes  Nes  Nes  Nes  Nes  Nes  Nes  Nes	1. Interface	
<ul> <li>integrated switch</li> <li>RJ 45 (Ethernet)</li> <li>Yes; X1</li> </ul> Protocols <ul> <li>IP protocol</li> <li>Yes; IPv4</li> <li>PROFINET IO Controller</li> <li>PROFINET IO Device</li> <li>SIMATIC communication</li> <li>Yes</li> <li>Open IE communication</li> <li>Yes</li> <li>Web server</li> <li>Media redundancy</li> <li>Yes; MRP Automanager according to IEC 62439-2 Edition 2.0</li> </ul> PROFINET IO Controller Services <ul> <li>PG/OP communication</li> <li>Yes</li> <li>Services</li> </ul> PGFOP in E communication <ul> <li>Yes</li> <li>Sorrouting</li> <li>Yes</li> <li>Isochronous mode</li> <li>Yes</li> <li>Open IE communication</li> <li>Yes</li> <li>IRT</li> <li>MRP</li> <li>Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50</li> <li>Yes; Requirement: IRT</li> <li>PROFIenergy</li> <li>PROFIenergy</li> <li>Prioritized startup</li> <li>Number of connectable IO Devices, max.</li> <li>128, In total, up to 256 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET</li> </ul>	Interface types	
RJ 45 (Ethernet) Protocols  IP protocol PROFINET IO Controller PROFINET IO Device SIMATIC communication Open IE communication Web server Media redundancy PROFINET IO Controller Services  PG/OP communication Yes PS routing Pes PG/OP communication Yes Popen IE communication Yes Popen IE communication Yes Popen IE communication Yes Popen IE communication Yes Profile communication Yes Pes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50 Yes; Requirement: IRT PROFIlenergy 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. Plumber of connectable IO Devices for RT,	Number of ports	2
Protocols  IP protocol PROFINET IO Controller PROFINET IO Device SIMATIC communication Open IE communication Web server Media redundancy PROFINET IO Controller Services  PG/OP communication Yes PST routing Pes PG/OP communication Yes Popen IE communication Yes Profile Formunication Yes Pes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50 Yes; Requirement: IRT PROFlenergy Profilized startup Profilized startup Number of connectable IO Devices, max. Popen IE of which IO devices with IRT, max. Popen IE of Number of connectable IO Devices for RT, PROFIBUS or PROFINET	• integrated switch	Yes
PROFINET IO Controller PROFINET IO Device PROFINET IO Device SIMATIC communication Pes Media redundancy Pes; MRP Automanager according to IEC 62439-2 Edition 2.0  PROFINET IO Controller  Services  PG/OP communication Yes PSOPINET IO Controller  Services  PG/OP communication Yes POPEN IE communication Yes PROFINET IO Controller  Services  PG/OP communication Yes PSOPINET IO Controller  Services  PG/OP communication Yes PSOPINET IO Controller  Services  PG/OP communication Yes PISCATION Yes PSOPINET IO Controller  Services  PG/OP communication Yes PSOPINET IO Controller  Services  PG/OP communication Yes PSOPINET IO Controller  Services  PG/OP communication Yes PSOPINET IO Controller  Yes PSOPINET IO Controller  Yes PSOPINET IO Controller  Yes PSOPINET IO Cottanto IV PSOPINET IO Controller PSOPINET IO Controller PSOPINET PSOPINET IO CONTROLLER PSOPINET PSO	• RJ 45 (Ethernet)	Yes; X1
PROFINET IO Controller PROFINET IO Device SIMATIC communication Open IE communication Web server Media redundancy PROFINET IO Controller  Services  PG/OP communication Yes PGS/OP communication Yes PGS/OP communication Yes Services  PG/OP commu	Protocols	
PROFINET IO Device SIMATIC communication Yes Open IE communication Yes Web server Media redundancy Yes; MRP Automanager according to IEC 62439-2 Edition 2.0  PROFINET IO Controller  Services  PRO/OP communication Yes Services  PRO/OP communication Yes Isochronous mode Yes Open IE communication Yes NRP Ves; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50  MRPD PROFIenergy Prioritized startup 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. Number of connectable IO Devices for RT, 128	IP protocol	Yes; IPv4
SIMATIC communication Open IE communication Yes Web server Media redundancy Yes; MRP Automanager according to IEC 62439-2 Edition 2.0  PROFINET IO Controller  Services  — PG/OP communication — S7 routing — Isochronous mode — Open IE communication — IRT — MRP — MRP — Wes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50 — Yes; Requirement: IRT — PROFIenergy — Prioritized startup — Number of connectable IO Devices, max. — Number of connectable IO Devices for RT, — MRP IVES  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. — Number of connectable IO Devices for RT,  128	<ul> <li>PROFINET IO Controller</li> </ul>	Yes
Open IE communication  Web server  Media redundancy  PROFINET IO Controller  Services  PG/OP communication  Yes  Stroiting  Isochronous mode  Open IE communication  Yes  Open IE communication  Yes  IRT  MRP  MRP  Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50  Yes; Requirement: IRT  PROFIenergy  Prioritized startup  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  A Number of connectable IO Devices for RT, 128	<ul> <li>PROFINET IO Device</li> </ul>	Yes
Web server  Media redundancy  PROFINET IO Controller  Services  — PG/OP communication — S7 routing — Isochronous mode — Open IE communication — IRT — MRP — MRP — MRP — Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50 — MRPD — PROFlenergy — Prioritized startup — Number of connectable IO Devices, max. — Number of connectable IO Devices for RT,  128  Yes; MRP Automanager according to IEC 62439-2 Edition 2.0  Yes; MRP Automanager according to IEC 62439-2 Edition 2.0  Yes  Yes  Yes  Yes  Yes  Yes  Yes  Ye	<ul> <li>SIMATIC communication</li> </ul>	Yes
● Media redundancy  PROFINET IO Controller  Services  - PG/OP communication - S7 routing - Isochronous mode - Open IE communication - IRT - MRP - MRP - MRP - MRP - MRPD - PROFIenergy - Prioritized startup - Number of connectable IO Devices for RT, - MRP - Number of connectable IO Devices for RT, - Number of connectable IO Devices for RT, - MRP - Number of connectable IO Devices for RT, - MRP - Number of connectable IO Devices for RT, - MRP - Number of connectable IO Devices for RT, - MRP - Number of connectable IO Devices for RT, - MRPO - PROFINET - Of which IO devices with IRT, max Number of connectable IO Devices for RT, - 128	<ul> <li>Open IE communication</li> </ul>	Yes
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 Number of connectable IO Devices for RT, 128	• Web server	Yes
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 Number of connectable IO Devices for RT, - 128	Media redundancy	Yes; MRP Automanager according to IEC 62439-2 Edition 2.0
<ul> <li>— PG/OP communication</li> <li>— S7 routing</li> <li>— Isochronous mode</li> <li>— Open IE communication</li> <li>— IRT</li> <li>— MRP</li> <li>— MRP</li> <li>— Wes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50</li> <li>— MRPD</li> <li>— PROFlenergy</li> <li>— Prioritized startup</li> <li>— Number of connectable IO Devices, max.</li> <li>— 128; In total, up to 256 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET</li> <li>— Of which IO devices with IRT, max.</li> <li>— Number of connectable IO Devices for RT,</li> <li>— 128</li> </ul>	PROFINET IO Controller	
<ul> <li>S7 routing</li> <li>Isochronous mode</li> <li>Open IE communication</li> <li>IRT</li> <li>MRP</li> <li>MRP</li> <li>MRPD</li> <li>Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50</li> <li>MRPD</li> <li>Yes; Requirement: IRT</li> <li>PROFlenergy</li> <li>Prioritized startup</li> <li>Number of connectable IO Devices, max.</li> <li>— Of which IO devices with IRT, max.</li> <li>Number of connectable IO Devices for RT,</li> <li>128</li> </ul>	Services	
- Isochronous mode - Open IE communication - IRT - MRP - MRP - MRP - MRP - Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50 - MRPD - Yes; Requirement: IRT - PROFlenergy - Prioritized startup - Number of connectable IO Devices, max Number of connectable IO Devices for RT, - Number of connectable IO Devices for RT, - 128	— PG/OP communication	Yes
<ul> <li>Open IE communication</li> <li>IRT</li> <li>MRP</li> <li>MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50</li> <li>MRPD</li> <li>Yes; Requirement: IRT</li> <li>PROFlenergy</li> <li>Prioritized startup</li> <li>Number of connectable IO Devices, max.</li> <li>128; In total, up to 256 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET</li> <li>Of which IO devices with IRT, max.</li> <li>Number of connectable IO Devices for RT,</li> <li>128</li> </ul>	— S7 routing	Yes
— IRT  — MRP  — MRP  — Wes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50  — MRPD  — PROFlenergy  — Prioritized startup  — Number of connectable IO Devices, max.  — Number of connectable IO Devices for RT,  Yes  Yes; Requirement: IRT  Yes; Max. 32 PROFINET devices  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,	<ul><li>— Isochronous mode</li></ul>	Yes
<ul> <li>MRP</li> <li>Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50</li> <li>MRPD</li> <li>Yes; Requirement: IRT</li> <li>PROFlenergy</li> <li>Prioritized startup</li> <li>Number of connectable IO Devices, max.</li> <li>128; In total, up to 256 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET</li> <li>Of which IO devices with IRT, max.</li> <li>Number of connectable IO Devices for RT,</li> <li>128</li> </ul>	<ul> <li>Open IE communication</li> </ul>	Yes
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, 128	— IRT	Yes
<ul> <li>PROFlenergy</li> <li>Prioritized startup</li> <li>Number of connectable IO Devices, max.</li> <li>Of which IO devices with IRT, max.</li> <li>Number of connectable IO Devices for RT,</li> <li>Yes</li> <li>Yes; Max. 32 PROFINET devices</li> <li>128; In total, up to 256 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET</li> <li>Of which IO devices with IRT, max.</li> <li>128</li> </ul>	— MRP	
<ul> <li>Prioritized startup</li> <li>Number of connectable IO Devices, max.</li> <li>128; In total, up to 256 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET</li> <li>Of which IO devices with IRT, max.</li> <li>Number of connectable IO Devices for RT,</li> <li>128</li> </ul>	— MRPD	Yes; Requirement: IRT
<ul> <li>Number of connectable IO Devices, max.</li> <li>128; In total, up to 256 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET</li> <li>Of which IO devices with IRT, max.</li> <li>Number of connectable IO Devices for RT,</li> <li>128</li> </ul>	— PROFlenergy	Yes
via AS-i, PROFIBUS or PROFINET  — Of which IO devices with IRT, max.  — Number of connectable IO Devices for RT,  128	— Prioritized startup	Yes; Max. 32 PROFINET devices
— Number of connectable IO Devices for RT, 128	— Number of connectable IO Devices, max.	
,	— Of which IO devices with IRT, max.	64
max.	<ul> <li>Number of connectable IO Devices for RT,</li> </ul>	128
	max.	

— of which in line, max.	128
<ul> <li>Number of IO Devices that can be</li> </ul>	8; in total across all interfaces
simultaneously activated/deactivated, max.	
<ul> <li>Number of IO Devices per tool, max.</li> </ul>	8
— Updating times	The minimum value of the update time also depends on
	communication share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data
Update time for IRT	as notes, and on the quantity of somigation costs and
— for send cycle of 250 μs	250 μs to 4 ms; Note: In the case of IRT with isochronous mode,
ion some system in 200 ps	the minimum update time of 625 $\mu s$ of the isochronous OB is decisive
— for send cycle of 500 μs	500 $\mu s$ to 8 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 625 $\mu s$ of the isochronous OB is decisive
— for send cycle of 1 ms	1 ms to 16 ms
— for send cycle of 2 ms	2 ms to 32 ms
— for send cycle of 4 ms	4 ms to 64 ms
<ul> <li>With IRT and parameterization of "odd" send cycles</li> </ul>	Update time = set "odd" send clock (any multiple of 125 $\mu$ s: 375 $\mu$ s, 625 $\mu$ s 3 875 $\mu$ s)
Update time for RT	
— for send cycle of 250 μs	250 μs to 128 ms
— for send cycle of 500 μs	500 μs to 256 ms
— for send cycle of 1 ms	1 ms to 512 ms
— for send cycle of 2 ms	2 ms to 512 ms
— for send cycle of 4 ms	4 ms to 512 ms
PROFINET IO Device	
Services	
<ul><li>— PG/OP communication</li></ul>	Yes
— S7 routing	Yes
— Isochronous mode	No
<ul> <li>Open IE communication</li> </ul>	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
— Shared device	Yes
<ul> <li>Number of IO Controllers with shared device, max.</li> </ul>	4
— Asset management record	Yes; Per user program
Interface types	
RJ 45 (Ethernet)	
• 100 Mbps	Yes

Autonegotiation	Yes
<ul> <li>Autocrossing</li> </ul>	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
<ul> <li>Number of connections reserved for ES/HMI/web</li> </ul>	10
<ul> <li>Number of connections via integrated interfaces</li> </ul>	64
<ul> <li>Number of S7 routing paths</li> </ul>	16
Redundancy mode	
H-Sync forwarding	Yes
SIMATIC communication	
S7 communication, as server	Yes
<ul> <li>S7 communication, as client</li> </ul>	Yes
<ul> <li>User data per job, max.</li> </ul>	See online help (S7 communication, user data size)
Open IE communication	
• TCP/IP	Yes
— Data length, max.	64 kbyte
<ul> <li>several passive connections per port, supported</li> </ul>	Yes
• ISO-on-TCP (RFC1006)	Yes
— Data length, max.	64 kbyte
• UDP	Yes
— Data length, max.	2 kbyte; 1 472 bytes for UDP broadcast
— UDP multicast	Yes; Max. 5 multicast circuits
• DHCP	No
• SNMP	Yes
• DCP	Yes
• LLDP	Yes
Web server	
• HTTP	Yes; Standard and user pages
• HTTPS	Yes; Standard and user pages
OPC UA	
Runtime license required	Yes
OPC UA client	Yes
<ul> <li>Application authentication</li> </ul>	Yes
— Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
<ul> <li>User authentication</li> </ul>	"anonymous" or by user name & password
<ul> <li>Number of connections, max.</li> </ul>	4

<ul> <li>Number of nodes of the client interfaces, max.</li> </ul>	1 000
<ul><li>— Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_Rea dList/OPC_UA_WriteList, max.</li></ul>	300
<ul> <li>Number of elements for one call of OPC_UA_NameSpaceGetIndexList, max.</li> </ul>	20
<ul> <li>Number of elements for one call of OPC_UA_MethodGetHandleList, max.</li> </ul>	100
<ul> <li>Number of simultaneous calls of the client instructions per connection (except OPC_UA_ReadList,OPC_UA_WriteList,OPC_ UA_MethodCall), max.</li> </ul>	1
<ul> <li>Number of simultaneous calls of the client instructions</li> <li>OPC_UA_ReadList,OPC_UA_WriteList and OPC_UA_MethodCall, max.</li> </ul>	5
<ul> <li>Number of registerable nodes, max.</li> </ul>	5 000
<ul> <li>Number of registerable method calls of OPC_UA_MethodCall, max.</li> </ul>	100
<ul><li>— Number of inputs/outputs when calling OPC_UA_MethodCall, max.</li></ul>	20
OPC UA server	Yes; Data access (read, write, subscribe), method call, custom address space
<ul> <li>Application authentication</li> </ul>	Yes
— Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
— User authentication	"anonymous" or by user name & password
<ul><li>Number of sessions, max.</li></ul>	32
<ul> <li>Number of accessible variables, max.</li> </ul>	50 000
<ul> <li>Number of registerable nodes, max.</li> </ul>	10 000
— Number of subscriptions per session, max.	20
— Sampling time, min.	100 ms
— Send time, min.	500 ms
<ul> <li>Number of server methods, max.</li> </ul>	20
<ul> <li>Number of inputs/outputs per server method, max.</li> </ul>	20
— Number of monitored items, max.	1 000; For 1 s sampling interval and 1 s send interval
<ul> <li>Number of server interfaces, max.</li> </ul>	10
<ul> <li>Number of nodes for user-defined server interfaces, max.</li> </ul>	1 000
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
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Isochronous mode  Isochronous operation (application synchronized up	Yes; Distributed and central; with minimum OB 6x cycle of 625 μs
to terminal)	(distributed) and 1 ms (central)
Equidistance	Yes
S7 message functions	
Number of login stations for message functions, max.	32
Program alarms	Yes
Number of configurable program messages, max.	5 000; Program messages are generated by the "Program_Alarm" block, ProDiag or GRAPH
Number of loadable program messages in RUN, max.	2 500
Number of simultaneously active program alarms	
Number of program alarms	300
<ul> <li>Number of alarms for system diagnostics</li> </ul>	100
<ul> <li>Number of alarms for motion technology objects</li> </ul>	80
Test commissioning functions	
Joint commission (Team Engineering)	Yes; Parallel online access possible for up to 5 engineering systems
Status block	Yes; Up to 8 simultaneously (in total across all ES clients)
Single step	No
Number of breakpoints	8
Status/control	
Status/control variable	Yes
• Variables	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters
<ul><li>Number of variables, max.</li></ul>	
<ul><li>of which status variables, max.</li></ul>	200; per job
— of which control variables, max.	200; per job
Forcing	
Forcing, variables	Peripheral inputs/outputs
<ul> <li>Number of variables, max.</li> </ul>	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
<ul> <li>Connection display LINK TX/RX</li> </ul>	Yes

Supported technology objects	
Motion Control	Yes; Note: The number of axes affects the cycle time of the PLC
	program; selection guide via the TIA Selection Tool or SIZER
<ul> <li>Number of available Motion Control resources</li> </ul>	800
for technology objects (except cam disks)	
<ul> <li>Required Motion Control resources</li> </ul>	
<ul><li>per speed-controlled axis</li></ul>	40
— per positioning axis	80
— per synchronous axis	160
— per external encoder	80
— per output cam	20
— per cam track	160
— per probe	40
<ul> <li>Positioning axis</li> </ul>	
<ul> <li>Number of positioning axes at motion</li> </ul>	5
control cycle of 4 ms (typical value)	
<ul> <li>Number of positioning axes at motion</li> </ul>	10
control cycle of 8 ms (typical value)	
Controller	
<ul><li>PID_Compact</li></ul>	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 temperature during operation		
<ul><li>horizontal installation, min.</li></ul>	0 °C	
<ul> <li>horizontal installation, max.</li> </ul>	60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off	
<ul> <li>vertical installation, min.</li> </ul>	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	Yes	
— FBD	Yes	
— STL	Yes	
— SCL	Yes	
— GRAPH	Yes	
Know-how protection		
User program protection/password protection	Yes	
<ul> <li>Copy protection</li> </ul>	Yes	
Block protection	Yes	
Access protection		
Password for display	Yes	
<ul><li>Protection level: Write protection</li></ul>	Yes	
<ul> <li>Protection level: Read/write protection</li> </ul>	Yes	
<ul> <li>Protection level: Complete protection</li> </ul>	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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