6ES7515-2FM02-0AB0

Data sheet



SIMATIC S7-1500F, CPU 1515F-2 PN, central processing unit with work memory 750 KB for program and 3 MB for data, 1st interface: PROFINET IRT with 2-port switch, 2nd interface: PROFINET RT, 30 ns bit performance, SIMATIC Memory Card required

Product type designation CPU 1515F-2 PN FS01 HW functional status FS01 Firmware version V2.8 Product function • I&M data Yes; I&M0 to I&M3 • Isochronous mode (distributed) and 1 ms (central) Engineering with • • STEP 7 TIA Portal configurable/integrated from version V16 (FW V2.8) / as of V13 SP1 (FW V1.8) configurable with 6ES7515-2FM01-0AB0 Configuration control via dataset Yes Display Screen diagonal [cm] Control elements Number of keys 8 Mode buttons 2 Supply voltage Type of supply voltage 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 • Repeat rate, min. 1/8 Input current Current consumption (rated value) 0.8 A Current consumption (rated value) 0.02 A²-s Power Infect power loss P	General information	
Firmware version Product function I &M data I sochronous mode Engineering with STEP 7 TIA Portal configurable/integrated from version Ves; Distributed and central; with minimum OB 6x cycle of 500 µs (distributed) and 1 ms (central) Engineering with STEP 7 TIA Portal configurable/integrated from version Configuration control via dataset Yes Display Screen diagonal [cm] Control elements Number of keys 8 Mode buttons 2 Supply voltage permissible range, lower limit (DC) permissible range, upper limit (DC) permissible range, upper limit (DC) Reverse polarity protection Ainsh voltage failure stored energy time Ainsh voltage failure stored energy time Ainsh voltage failure stored energy time Current consumption (rated value) Display Current consumption (rated value) Power consumption from the backplane bus Power consumption from the backplane bus (balanced) Power closs Power loss, typ. 6.3 W	Product type designation	CPU 1515F-2 PN
Product function • I&M data • Isochronous mode Engineering with • STEP 7 TIA Portal configurable/integrated from version Configuration control via dataset Screen diagonal [cm] Control elements Number of keys Mode buttons 2 Supply voltage Type of supply voltage permissible range, lower limit (DC) permissible range, lower limit (DC) permissible range, lower limit (DC) Alains buffering • Mains buffering • Mains/voltage failure stored energy time • Repeat rate, min. Input current Current consumption (rated value) Current consumption, max. In Insurb current, max. Power Infeed power to the backplane bus Power loss, typ. Power loss, typ. Power loss, typ. Power loss, typ. V16 (FW V2.8) / as of V13 SP1 (FW V1.8) configurable with 6ES7515- Ves; Distributed and central; with minimum OB 6x cycle of 500 μs (distributed) and 1 ms (central) Yes; Distributed and central; with minimum OB 6x cycle of 500 μs (distributed) and 1 ms (central) Ves; Distributed and central; with minimum OB 6x cycle of 500 μs (distributed) and 1 ms (central) Vas; Distributed and central; with minimum OB 6x cycle of 500 μs (distributed) and 1 ms (central) Vas; Distributed and central; with minimum OB 6x cycle of 500 μs (FW V2.8) / as of V13 SP1 (FW V1.8) configurable with 6ES7515- Vas; Distributed and central; with minimum OB 6x cycle of 500 μs (FW V2.8) / as of V13 SP1 (FW V1.8) configurable with 6ES7515- Vas; Distributed and central; with minimum OB 6x cycle of 500 μs (FW V2.8) / as of V13 SP1 (FW V1.8) configurable with 6ES7515- Vas; Distributed and central; with minimum OB 6x cycle of 500 μs (FW V2.8) / as of V13 SP1 (FW V1.8) configurable with 6ES7515- Vas; Distributed and central; with minimum OB 6x cycle of 500 μs (FW V2.8) / as of V13 SP1 (FW V1.8) configurable with 6ES7515- Vas; Distributed and central; with minimum OB 6x cycle of V13 SP1 (FW V1.8) configurable with 6ES7515- Vas; Distributed and central; with 6ES7515- Vas; Distributed and central; with 6ES7515- Vas; Distributed and central; with 6ES7	HW functional status	FS01
■ 18.M data ■ Isochronous mode ■ Isochronous mod	Firmware version	V2.8
• Isochronous mode Yes; Distributed and central; with minimum OB 6x cycle of 500 µs (distributed) and 1 ms (central) Engineering with • STEP 7 TIA Portal configurable/integrated from version Configuration control via dataset Yes Display Screen diagonal [cm] Control elements Number of keys Mode buttons 2 Supply voltage Type of supply voltage permissible range, lower limit (DC) permissible range, upper limit (DC) Reverse polarity protection Mains/voltage failure stored energy time • Repeat rate, min. Input current Current consumption (rated value) Current consumption, max. Inrush current, max. It A Inrush current, max. Infed power to the backplane bus Power consumption from the backplane bus (balanced) Power loss Power loss, typ. 6.3 W	Product function	
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STEP 7 TIA Portal configurable/integrated from version V16 (FW V2.8) / as of V13 SP1 (FW V1.8) configurable with 6ES7515-ZFM01-OAB0 Variable version	• Isochronous mode	
Version Configuration control via dataset Yes Display Screen diagonal [cm] 6.1 cm Control elements Number of keys Mode buttons Supply voltage Type of supply voltage Type of supply voltage 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) 0.8 A Current consumption, max. 1.1 A Inrush current, max. 2.4 A; Rated value Power Infeed power to the backplane bus 12 W Power loss Power loss, typ. 6.3 W	Engineering with	
via dataset Yes Display Screen diagonal [cm] 6.1 cm Control elements Number of keys 8 Mode buttons Supply voltage Type of supply voltage 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) 0.8 A Current consumption, max. 1.1 A Inrush current, max. 2.4 A; Rated value It 0.02 A²-s Power Infeed power to the backplane bus 12 W Power consumption from the backplane bus (balanced) Power loss Power loss, typ. 6.3 W		
Screen diagonal [cm] 6.1 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) 0.8 A Current consumption, max. 1.1 A Inrush current, max. 2.4 A; Rated value I** Power Infeed power to the backplane bus (balanced) 6.2 W Power loss Power loss, typ. 6.3 W	Configuration control	
Screen diagonal [cm] 6.1 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) 0.8 A Current consumption, max. 1.1 A Inrush current, max. 2.4 A; Rated value It 0.02 A²-s Power Infeed power to the backplane bus (balanced) 6.2 W Power loss Power loss, typ. 6.3 W	via dataset	Yes
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Type of supply voltage Type of supply voltage permissible range, lower limit (DC) permissible range, upper limit (DC) Reverse polarity protection Mains buffering • Mains/voltage failure stored energy time • Repeat rate, min. Input current Current consumption (rated value) Current consumption, max. Inrush current, max. Inrush current, max. Integrated power to the backplane bus Power loss Power loss, typ. 24 V DC 19.2 V 19.2 V 19.2 V 19.2 V 28.8 V Revese polarity protection Yes 5 ms 5 ms 6 ms	Number of keys	8
Type of supply voltage permissible range, lower limit (DC) permissible range, upper limit (DC) Reverse polarity protection Mains buffering Mains/voltage failure stored energy time Repeat rate, min. Input current Current consumption (rated value) Current consumption, max. Inrush current, max. Inush current, max. Power Infeed power to the backplane bus Power loss Power loss, typ. 24 V DC 19.2 V 19.2 V 19.2 V 19.2 V 19.2 V 28.8 V 29.8 V 20.8 A 5 ms 5 ms 6 ms	Mode buttons	2
permissible range, lower limit (DC) permissible range, upper limit (DC) Reverse polarity protection Mains buffering Mains/voltage failure stored energy time Repeat rate, min. Input current Current consumption (rated value) Current consumption, max. Inrush current, max. Infeed power to the backplane bus Power loss Power loss, typ. 19.2 V 28.8 V 28.8 V 28.8 V 28.8 V 29.8 A 5 ms 5 ms 6 ms	Supply voltage	
permissible range, upper limit (DC) Reverse polarity protection Mains buffering Mains/voltage failure stored energy time Repeat rate, min. Input current Current consumption (rated value) Current consumption, max. Inrush current, max. Inush current, max. Inush current, max. Infeed power to the backplane bus Power consumption from the backplane bus (balanced) Power loss Power loss, typ. 6.3 W	Type of supply voltage	24 V DC
Reverse polarity protection Mains buffering Mains/voltage failure stored energy time Repeat rate, min. Input current Current consumption (rated value) Current consumption, max. Inrush current, max. Irush current, max. Infeed power to the backplane bus Power consumption from the backplane bus (balanced) Power loss Power loss, typ. Mains/voltage failure stored energy time 5 ms 1/s 1/s Insub Current consumption (rated value) 0.8 A 1.1 A 1.1 A 2.4 A; Rated value 1²t 0.02 A²-s Power 6.2 W Power loss Power loss, typ.	permissible range, lower limit (DC)	19.2 V
Mains buffering ● Mains/voltage failure stored energy time ● Repeat rate, min. Input current Current consumption (rated value) Current consumption, max. Inrush current, max. Irrush current, max. Inhered power to the backplane bus Power consumption from the backplane bus (balanced) Power loss Power loss, typ. 6.3 W	permissible range, upper limit (DC)	28.8 V
 Mains/voltage failure stored energy time Repeat rate, min. Input current Current consumption (rated value) Current consumption, max. Inrush current, max. Irrush current, max. I²t 0.02 A²·s Power Infeed power to the backplane bus Power consumption from the backplane bus (balanced) Power loss Power loss, typ. 6.3 W 	Reverse polarity protection	Yes
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Input current Current consumption (rated value) Current consumption, max. Inrush current, max. Irrush current, max. Infeed power to the backplane bus Power consumption from the backplane bus (balanced) Power loss Power loss, typ. 0.8 A 2.4 A; Rated value 0.02 A²-s Power 12 W Power consumption from the backplane bus (balanced) 6.3 W	 Mains/voltage failure stored energy time 	5 ms
Current consumption (rated value) Current consumption, max. Inrush current, max. It was a consumption from the backplane bus (balanced) Power loss Power loss, typ. 0.8 A 1.1 A 2.4 A; Rated value 0.02 A²·s 12 W 6.2 W Power loss Power loss, typ. 6.3 W	 Repeat rate, min. 	1/s
Current consumption, max. Inrush current, max. I²t O.02 A²·s Power Infeed power to the backplane bus Power consumption from the backplane bus (balanced) Power loss Power loss, typ. 1.1 A 2.4 A; Rated value 0.02 A²·s 6.2 W Power loss Power loss, typ. 6.3 W	Input current	
Inrush current, max. I't O.02 A²-s Power Infeed power to the backplane bus Power consumption from the backplane bus (balanced) Power loss Power loss, typ. 2.4 A; Rated value 0.02 A²-s 12 W 6.2 W Power loss Power loss, typ. 6.3 W	Current consumption (rated value)	0.8 A
Power Ioss Power loss, typ. 0.02 A²·s 0.02 A²·s 0.02 A²·s 12 W 6.2 W 6.3 W	Current consumption, max.	1.1 A
Power Ioss Power loss, typ. Infeed power to the backplane bus 12 W 6.2 W 6.3 W	Inrush current, max.	2.4 A; Rated value
Infeed power to the backplane bus Power consumption from the backplane bus (balanced) Power loss Power loss, typ. 6.3 W	I²t	0.02 A ² ·s
Power consumption from the backplane bus (balanced) 6.2 W Power loss Power loss, typ. 6.3 W	Power	
Power loss Power loss, typ. 6.3 W	Infeed power to the backplane bus	12 W
Power loss, typ. 6.3 W	Power consumption from the backplane bus (balanced)	6.2 W
	Power loss	
Memory	Power loss, typ.	6.3 W
	Memory	

Number of slots for SIMATIC memory card	1
	Yes
SIMATIC memory card required	T es
Work memory	7E0 khyta
• integrated (for program)	750 kbyte
• integrated (for data)	3 Mbyte
Load memory	22 Chyto
Plug-in (SIMATIC Memory Card), max. Peakur	32 Gbyte
■ Backup ■ maintenance-free	Voc
	Yes
CPU processing times	22
for bit operations, typ.	30 ns
for word operations, typ.	36 ns
for fixed point arithmetic, typ.	48 ns
for floating point arithmetic, typ.	192 ns
CPU-blocks	
Number of elements (total)	6 000; 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.	3 Mbyte; For DBs with absolute addressing, the max. size is 64 KB
FB	
Number range	0 65 535
• Size, max.	500 kbyte
FC	
Number range	0 65 535
Size, max.	500 kbyte
ОВ	
• Size, max.	500 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; Up to 8 possible for F-blocks
Counters, timers and their retentivity	
S7 counter	
Number	2 048
Retentivity	
— adjustable	Yes
IEC counter	
Number	Any (only limited by the main memory)
Retentivity	7.1.17 (only inflicted by the main memory)
— adjustable	Yes
— adjustable S7 times	100
• Number	2 048
	2 UTU
Retentivity	Voc
— adjustable	Yes
IEC timer	
Number	Any (only limited by the main memory)

Retentivity	
— adjustable	Yes
Pata areas and their retentivity	
Retentive data area (incl. timers, counters, flags), max.	512 kbyte; In total; available retentive memory for bit memories, timers, counters, DBs, and technology data (axes): 472 KB
Extended retentive data area (incl. timers, counters, flags), max.	3 Mbyte; When using PS 6 0W 24/48/60 V DC HF
Flag	
• Size, max.	16 kbyte
 Number of clock memories 	8; 8 clock memory bit, grouped into one clock memory byte
Data blocks	
Retentivity adjustable	Yes
Retentivity preset	No
Local data	
 per priority class, max. 	64 kbyte; max. 16 KB per block
ddress area	
Number of IO modules	8 192; 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
lardware configuration	
Number of distributed IO systems	64; 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	(0.9)
• Via CM	8; A maximum of 8 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total
Number of IO Controllers	
• integrated	2
• Via CM	8; A maximum of 8 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
ime 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	
At a second seco	16
Number	
Number Clock synchronization	
	Yes
Clock synchronization	Yes Yes
Clock synchronization • supported	
Clock synchronization supported in AS, master	Yes

1. Interface	
Interface types	
RJ 45 (Ethernet)	Yes; X1
Number of ports	2
integrated switch	Yes
Protocols	
IP protocol	Yes; IPv4
PROFINET IO Controller	Yes
PROFINET IO Device	Yes
SIMATIC communication	Yes
Open IE communication	Yes; Optionally also encrypted
Web server	Yes
Media redundancy	Yes; MRP Automanager according to IEC 62439-2 Edition 2.0
PROFINET IO Controller	103, With Automanager according to 120 02400 2 Edition 2.0
Services	
— PG/OP communication	Yes
— Isochronous mode	Yes
— Direct data exchange — IRT	Yes; Requirement: IRT and isochronous mode (MRPD optional) Yes
	Yes
— PROFlenergy	
— Prioritized startup	Yes; Max. 32 PROFINET devices
— Number of connectable IO Devices, max.	256; In total, up to 1 000 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. 	256
— of which in line, max.	256
Number of IO Devices that can be	8; in total across all interfaces
simultaneously activated/deactivated, max.	o, 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 500 μs of the isochronous OB is decisive
— for send cycle of 500 μs	500 μs to 8 ms
— for send cycle of 1 ms	1 ms to 16 ms
— for send cycle of 2 ms	2 ms to 32 ms
— for send cycle of 4 ms	4 ms to 64 ms
 With IRT and parameterization of "odd" send cycles 	Update time = set "odd" send clock (any multiple of 125 μs : 375 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	
— PG/OP communication	Yes
 Isochronous mode 	No
— IRT	Yes
— PROFlenergy	Yes; per user program
 Shared device 	Yes
 Number of IO Controllers with shared device, 	4
max.	
Asset management record	Yes; per user program
2. Interface	
Interface types	

D 1 45 454	V V9
• RJ 45 (Ethernet)	Yes; X2
Number of ports	1
integrated switch	No
Protocols	Very IDeal
IP protocol IP PROFINET IO Controller	Yes; IPv4
PROFINET IO Controller PROFINET IO Position	Yes
PROFINET IO Device SIMATIC communication	Yes Yes
SIMATIC communication	
Open IE communication Web conver	Yes
Web server Modia redundancy	Yes No
Media redundancy PROFINET IO Controller	INO
Services	
— PG/OP communication	Yes
Isochronous mode	No
Direct data exchange	No
— IRT	No
— PROFlenergy	Yes
Prioritized startup	No
Number of connectable IO Devices, max.	32; In total, up to 1 000 distributed I/O devices can be connected via
	AS-i, PROFIBUS or PROFINET
 Number of connectable IO Devices for RT, max. 	32
— of which in line, max.	32
 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
Undata tima far DT	
Update time for RT	
— for send cycle of 1 ms	1 ms to 512 ms
	1 ms to 512 ms
— for send cycle of 1 ms	1 ms to 512 ms
— for send cycle of 1 ms PROFINET IO Device	1 ms to 512 ms Yes
— for send cycle of 1 ms PROFINET IO Device Services	
— for send cycle of 1 ms PROFINET IO Device Services — PG/OP communication	Yes
— for send cycle of 1 ms PROFINET IO Device Services — PG/OP communication — Isochronous mode	Yes No
— for send cycle of 1 ms PROFINET IO Device Services — PG/OP communication — Isochronous mode — IRT	Yes No No
— for send cycle of 1 ms PROFINET IO Device Services — PG/OP communication — Isochronous mode — IRT — PROFIenergy	Yes No No Yes
— for send cycle of 1 ms PROFINET IO Device Services — PG/OP communication — Isochronous mode — IRT — PROFIenergy — Prioritized startup — Shared device — Number of IO Controllers with shared device,	Yes No No Yes No
— for send cycle of 1 ms PROFINET IO Device Services — PG/OP communication — Isochronous mode — IRT — PROFlenergy — Prioritized startup — Shared device — Number of IO Controllers with shared device, max.	Yes No No Yes No Yes A
— for send cycle of 1 ms PROFINET IO Device Services — PG/OP communication — Isochronous mode — IRT — PROFlenergy — Prioritized startup — Shared device — Number of IO Controllers with shared device, max. — Asset management record	Yes No No Yes No Yes
— for send cycle of 1 ms PROFINET IO Device Services — PG/OP communication — Isochronous mode — IRT — PROFlenergy — Prioritized startup — Shared device — Number of IO Controllers with shared device, max. — Asset management record Interface types	Yes No No Yes No Yes A
— for send cycle of 1 ms PROFINET IO Device Services — PG/OP communication — Isochronous mode — IRT — PROFIenergy — Prioritized startup — Shared device — Number of IO Controllers with shared device, max. — Asset management record Interface types RJ 45 (Ethernet)	Yes No No Yes No Yes 4 Yes; per user program
— for send cycle of 1 ms PROFINET IO Device Services — PG/OP communication — Isochronous mode — IRT — PROFIenergy — Prioritized startup — Shared device — Number of IO Controllers with shared device, max. — Asset management record Interface types RJ 45 (Ethernet) ● 100 Mbps	Yes No No Yes No Yes 4 Yes; per user program
— for send cycle of 1 ms PROFINET IO Device Services — PG/OP communication — Isochronous mode — IRT — PROFlenergy — Prioritized startup — Shared device — Number of IO Controllers with shared device, max. — Asset management record Interface types RJ 45 (Ethernet) • 100 Mbps • Autonegotiation	Yes No No Yes No Yes 4 Yes; per user program Yes
— for send cycle of 1 ms PROFINET IO Device Services — PG/OP communication — Isochronous mode — IRT — PROFlenergy — Prioritized startup — Shared device — Number of IO Controllers with shared device, max. — Asset management record Interface types RJ 45 (Ethernet) • 100 Mbps • Autonegotiation • Autocrossing	Yes No No Yes No Yes 4 Yes; per user program Yes Yes Yes
— for send cycle of 1 ms PROFINET IO Device Services — PG/OP communication — Isochronous mode — IRT — PROFlenergy — Prioritized startup — Shared device — Number of IO Controllers with shared device, max. — Asset management record Interface types RJ 45 (Ethernet) • 100 Mbps • Autonegotiation • Autocrossing • Industrial Ethernet status LED	Yes No No Yes No Yes 4 Yes; per user program Yes
— for send cycle of 1 ms PROFINET IO Device Services — PG/OP communication — Isochronous mode — IRT — PROFlenergy — Prioritized startup — Shared device — Number of IO Controllers with shared device, max. — Asset management record Interface types RJ 45 (Ethernet) • 100 Mbps • Autonegotiation • Autocrossing • Industrial Ethernet status LED Protocols	Yes No No Yes No Yes 4 Yes; per user program Yes Yes Yes
— for send cycle of 1 ms PROFINET IO Device Services — PG/OP communication — Isochronous mode — IRT — PROFlenergy — Prioritized startup — Shared device — Number of IO Controllers with shared device, max. — Asset management record Interface types RJ 45 (Ethernet) • 100 Mbps • Autonegotiation • Autocrossing • Industrial Ethernet status LED Protocols Number of connections	Yes No No Yes No Yes 4 Yes; per user program Yes Yes Yes Yes Yes
— for send cycle of 1 ms PROFINET IO Device Services — PG/OP communication — Isochronous mode — IRT — PROFlenergy — Prioritized startup — Shared device — Number of IO Controllers with shared device, max. — Asset management record Interface types RJ 45 (Ethernet) • 100 Mbps • Autonegotiation • Autocrossing • Industrial Ethernet status LED Protocols Number of connections, max.	Yes No No Yes No Yes 4 Yes; per user program Yes Yes Yes Yes Yes Yes Yes Yes Yes
— for send cycle of 1 ms PROFINET IO Device Services — PG/OP communication — Isochronous mode — IRT — PROFlenergy — Prioritized startup — Shared device — Number of IO Controllers with shared device, max. — Asset management record Interface types RJ 45 (Ethernet) • 100 Mbps • Autonegotiation • Autocrossing • Industrial Ethernet status LED Protocols Number of connections, max. • Number of connections reserved for ES/HMI/web	Yes No No Yes No Yes 4 Yes; per user program Yes Yes Yes Yes Yes You Yes Yes Yes Yes Yes Yes
— for send cycle of 1 ms PROFINET IO Device Services — PG/OP communication — Isochronous mode — IRT — PROFlenergy — Prioritized startup — Shared device — Number of IO Controllers with shared device, max. — Asset management record Interface types RJ 45 (Ethernet) • 100 Mbps • Autonegotiation • Autocrossing • Industrial Ethernet status LED Protocols Number of connections, max. • Number of connections reserved for ES/HMI/web • Number of connections via integrated interfaces	Yes No No Yes No Yes 4 Yes; per user program Yes Yes Yes Yes Yes 192; via integrated interfaces of the CPU and connected CPs / CMs 10 108
— for send cycle of 1 ms PROFINET IO Device Services — PG/OP communication — Isochronous mode — IRT — PROFlenergy — Prioritized startup — Shared device — Number of IO Controllers with shared device, max. — Asset management record Interface types RJ 45 (Ethernet) • 100 Mbps • Autonegotiation • Autocrossing • Industrial Ethernet status LED Protocols Number of connections • Number of connections reserved for ES/HMI/web • Number of s7 routing paths	Yes No No Yes No Yes 4 Yes; per user program Yes Yes Yes Yes Yes You Yes Yes Yes Yes Yes Yes
— for send cycle of 1 ms PROFINET IO Device Services — PG/OP communication — Isochronous mode — IRT — PROFlenergy — Prioritized startup — Shared device — Number of IO Controllers with shared device, max. — Asset management record Interface types RJ 45 (Ethernet) • 100 Mbps • Autonegotiation • Autocrossing • Industrial Ethernet status LED Protocols Number of connections • Number of connections reserved for ES/HMI/web • Number of s7 routing paths Redundancy mode	Yes No No Yes No Yes 4 Yes; per user program Yes Yes Yes Yes Yes 192; via integrated interfaces of the CPU and connected CPs / CMs 10 108 16
— for send cycle of 1 ms PROFINET IO Device Services — PG/OP communication — Isochronous mode — IRT — PROFlenergy — Prioritized startup — Shared device — Number of IO Controllers with shared device, max. — Asset management record Interface types RJ 45 (Ethernet) • 100 Mbps • Autonegotiation • Autocrossing • Industrial Ethernet status LED Protocols Number of connections • Number of connections reserved for ES/HMI/web • Number of connections via integrated interfaces • Number of S7 routing paths Redundancy mode • H-Sync forwarding	Yes No No Yes No Yes 4 Yes; per user program Yes Yes Yes Yes Yes 192; via integrated interfaces of the CPU and connected CPs / CMs 10 108
— for send cycle of 1 ms PROFINET IO Device Services — PG/OP communication — Isochronous mode — IRT — PROFlenergy — Prioritized startup — Shared device — Number of IO Controllers with shared device, max. — Asset management record Interface types RJ 45 (Ethernet) • 100 Mbps • Autonegotiation • Autocrossing • Industrial Ethernet status LED Protocols Number of connections, max. • Number of connections reserved for ES/HMI/web • Number of s7 routing paths Redundancy mode	Yes No No Yes No Yes 4 Yes; per user program Yes Yes Yes Yes Yes 192; via integrated interfaces of the CPU and connected CPs / CMs 10 108 16

— 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	
 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	No
• SNMP	Yes
SINIVIF DCP	Yes
• LLDP	Yes
	165
Web server ● HTTP	Yes; Standard and user pages
• HTTPS	Yes; Standard and user pages
OPC UA	res, Standard and user pages
	Yes
Runtime license required ODC LIA Client	Yes
OPC UA Client Application outboation	
Application authentication	Yes
— Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
— User authentication	"anonymous" or by user name & password
 Number of connections, max. 	10
 Number of nodes of the client interfaces, max. 	2 000
 Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/C max. 	300
 Number of elements for one call of OPC_UA_NameSpaceGetIndexList, max. 	20
 Number of elements for one call of OPC_UA_MethodGetHandleList, max. 	100
 Number of simultaneous calls of the client 	1
<pre>instructions per connection (except OPC_UA_ReadList,OPC_UA_WriteList,OPC_UA_M max.</pre>	
 Number of simultaneous calls of the client instructions 	5
OPC_UA_ReadList,OPC_UA_WriteList and OPC_UA_MethodCall, max.	5.000
Number of registerable nodes, max.	5 000
 Number of registerable method calls of OPC_UA_MethodCall, max. 	100
 Number of inputs/outputs when calling OPC_UA_MethodCall, max. 	20
OPC UA Server	Yes; Data access (read, write, subscribe), method call, custom address space
 Application authentication 	Yes
— Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
User authentication	"anonymous" or by user name & password
Number of sessions, max.	48
 Number of accessible variables, max. 	100 000

 Number of registerable nodes, max. 	20 000
 Number of subscriptions per session, max. 	20
— Sampling interval, min.	100 ms
— Publishing interval, min.	200 ms
 Number of server methods, max. 	50
 Number of inputs/outputs per server method, 	20
max.	
 Number of monitored items, max. 	2 000; for 1 s sampling interval and 1 s send interval
 Number of server interfaces, max. 	10
 Number of nodes for user-defined server 	5 000
interfaces, max.	
Further protocols	
MODBUS	Yes; MODBUS TCP
Isochronous mode	
Equidistance	Yes
S7 message functions	
Number of login stations for message functions, max.	32
Program alarms	Yes
Number of configurable program messages, max.	10 000; Program messages are generated by the "Program_Alarm"
	block, ProDiag or GRAPH
Number of loadable program messages in RUN, max.	5 000
Number of simultaneously active program alarms	
 Number of program alarms 	800
 Number of alarms for system diagnostics 	200
 Number of alarms for motion technology objects 	160
Test commissioning functions	
Joint commission (Team Engineering)	Yes; Parallel online access possible for up to 8 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 Status/control variable	Yes: without fail-safe
Status/control variable	Yes; without fail-safe Inputs/outputs memory bits DBs distributed I/Os timers counters
Status/control variableVariables	Yes; without fail-safe Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters
Status/control variableVariablesNumber of variables, max.	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters
 Status/control variable Variables Number of variables, max. — of which status variables, max. 	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job
 Status/control variable Variables Number of variables, max. of which status variables, max. of which control variables, max. 	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters
 Status/control variable Variables Number of variables, max. of which status variables, max. of which control variables, max. Forcing 	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job 200; per job
 Status/control variable Variables Number of variables, max. — of which status variables, max. — of which control variables, max. Forcing Forcing 	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job 200; per job Yes; without fail-safe
 Status/control variable Variables Number of variables, max. — of which status variables, max. — of which control variables, max. Forcing Forcing Forcing, variables 	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job 200; per job Yes; without fail-safe Peripheral inputs/outputs
 Status/control variable Variables Number of variables, max. — of which status variables, max. — of which control variables, max. Forcing Forcing Forcing, variables Number of variables, max. 	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job 200; per job Yes; without fail-safe
 Status/control variable Variables Number of variables, max. — of which status variables, max. — of which control variables, max. Forcing Forcing Forcing, variables Number of variables, max. Diagnostic buffer	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job 200; per job Yes; without fail-safe Peripheral inputs/outputs 200
 Status/control variable Variables Number of variables, max. — of which status variables, max. — of which control variables, max. Forcing Forcing Forcing, variables Number of variables, max. Diagnostic buffer present 	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job 200; per job Yes; without fail-safe Peripheral inputs/outputs 200 Yes
 Status/control variable Variables Number of variables, max. — of which status variables, max. — of which control variables, max. Forcing Forcing Forcing, variables Number of variables, max. Diagnostic buffer present Number of entries, max. 	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job 200; per job Yes; without fail-safe Peripheral inputs/outputs 200 Yes 3 200
Status/control variable Variables Number of variables, max. of which status variables, max. of which control variables, max. Forcing Forcing Forcing Forcing, variables Number of variables, max. Diagnostic buffer present Number of entries, max. of which powerfail-proof	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job 200; per job Yes; without fail-safe Peripheral inputs/outputs 200 Yes
Status/control variable Variables Number of variables, max. — of which status variables, max. — of which control variables, max. Forcing Forcing Forcing, variables Number of variables, max. Diagnostic buffer present Number of entries, max. — of which powerfail-proof Traces	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job 200; per job Yes; without fail-safe Peripheral inputs/outputs 200 Yes 3 200 500
Status/control variable Variables Number of variables, max. — of which status variables, max. — of which control variables, max. Forcing Forcing Forcing, variables Number of variables, max. Diagnostic buffer present Number of entries, max. — of which powerfail-proof Traces Number of configurable Traces	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job 200; per job Yes; without fail-safe Peripheral inputs/outputs 200 Yes 3 200
Status/control variable Variables Number of variables, max. — of which status variables, max. — of which control variables, max. Forcing Forcing Forcing, variables Number of variables, max. Diagnostic buffer present Number of entries, max. — of which powerfail-proof Traces Number of configurable Traces Interrupts/diagnostics/status information	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job 200; per job Yes; without fail-safe Peripheral inputs/outputs 200 Yes 3 200 500
Status/control variable Variables Number of variables, max. — of which status variables, max. — of which control variables, max. Forcing Forcing Forcing, variables Number of variables, max. Diagnostic buffer present Number of entries, max. — of which powerfail-proof Traces Number of configurable Traces Interrupts/diagnostics/status information Diagnostics indication LED	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job 200; per job Yes; without fail-safe Peripheral inputs/outputs 200 Yes 3 200 500 4; Up to 512 KB of data per trace are possible
Status/control variable Variables Number of variables, max. — of which status variables, max. — of which control variables, max. Forcing Forcing Forcing, variables Number of variables, max. Diagnostic buffer present Number of entries, max. — of which powerfail-proof Traces Number of configurable Traces Interrupts/diagnostics/status information Diagnostics indication LED RUN/STOP LED	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job 200; per job Yes; without fail-safe Peripheral inputs/outputs 200 Yes 3 200 500 4; Up to 512 KB of data per trace are possible
Status/control variable Variables Number of variables, max. — of which status variables, max. — of which control variables, max. Forcing Forcing Forcing, variables Number of variables, max. Diagnostic buffer present Number of entries, max. — of which powerfail-proof Traces Number of configurable Traces Interrupts/diagnostics/status information Diagnostics indication LED RUN/STOP LED ERROR LED	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job 200; per job Yes; without fail-safe Peripheral inputs/outputs 200 Yes 3 200 500 4; Up to 512 KB of data per trace are possible Yes Yes
Status/control variable Variables Number of variables, max. — of which status variables, max. — of which control variables, max. Forcing Forcing Forcing, variables Number of variables, max. Diagnostic buffer present Number of entries, max. — of which powerfail-proof Traces Number of configurable Traces Interrupts/diagnostics/status information Diagnostics indication LED RUN/STOP LED ERROR LED MAINT LED	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job 200; per job Yes; without fail-safe Peripheral inputs/outputs 200 Yes 3 200 500 4; Up to 512 KB of data per trace are possible Yes Yes Yes Yes
Status/control variable Variables Number of variables, max. — of which status variables, max. — of which control variables, max. Forcing Forcing Forcing, variables Number of variables, max. Diagnostic buffer present Number of entries, max. — of which powerfail-proof Traces Number of configurable Traces Interrupts/diagnostics/status information Diagnostics indication LED RUN/STOP LED ERROR LED MAINT LED STOP ACTIVE LED	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job 200; per job Yes; without fail-safe Peripheral inputs/outputs 200 Yes 3 200 500 4; Up to 512 KB of data per trace are possible Yes Yes Yes Yes Yes
Status/control variable Variables Number of variables, max. — of which status variables, max. — of which control variables, max. Forcing Forcing Forcing, variables Number of variables, max. Diagnostic buffer present Number of entries, max. — of which powerfail-proof Traces Number of configurable Traces Interrupts/diagnostics/status information Diagnostics indication LED RUN/STOP LED ERROR LED MAINT LED STOP ACTIVE LED Connection display LINK TX/RX	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job 200; per job Yes; without fail-safe Peripheral inputs/outputs 200 Yes 3 200 500 4; Up to 512 KB of data per trace are possible Yes Yes Yes Yes
Status/control variable Variables Number of variables, max. — of which status variables, max. — of which control variables, max. Forcing Forcing Forcing, variables Number of variables, max. Diagnostic buffer present Number of entries, max. — of which powerfail-proof Traces Number of configurable Traces Interrupts/diagnostics/status information Diagnostics indication LED RUN/STOP LED ERROR LED MAINT LED STOP ACTIVE LED	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job 200; per job Yes; without fail-safe Peripheral inputs/outputs 200 Yes 3 200 500 4; Up to 512 KB of data per trace are possible Yes Yes Yes Yes Yes
Status/control variable Variables Number of variables, max. — of which status variables, max. — of which control variables, max. Forcing Forcing Forcing, variables Number of variables, max. Diagnostic buffer present Number of entries, max. — of which powerfail-proof Traces Number of configurable Traces Interrupts/diagnostics/status information Diagnostics indication LED RUN/STOP LED ERROR LED MAINT LED STOP ACTIVE LED Connection display LINK TX/RX	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job Yes; without fail-safe Peripheral inputs/outputs 200 Yes 3 200 500 4; Up to 512 KB of data per trace are possible Yes Yes Yes Yes Yes Yes Yes Yes Yes Y
Status/control variable Variables Number of variables, max. — of which status variables, max. — of which control variables, max. Forcing Forcing Forcing, variables Number of variables, max. Diagnostic buffer present Number of entries, max. — of which powerfail-proof Traces Number of configurable Traces Interrupts/diagnostics/status information Diagnostics indication LED RUN/STOP LED REROR LED MAINT LED STOP ACTIVE LED Connection display LINK TX/RX Supported technology objects Motion Control	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job 200; per job Yes; without fail-safe Peripheral inputs/outputs 200 Yes 3 200 500 4; Up to 512 KB of data per trace are possible Yes Yes Yes Yes Yes Yes Yes Yes Yes Y
Status/control variable Variables Number of variables, max. — of which status variables, max. — of which control variables, max. Forcing Forcing Forcing, variables Number of variables, max. Diagnostic buffer present Number of entries, max. — of which powerfail-proof Traces Number of configurable Traces Interrupts/diagnostics/status information Diagnostics indication LED RUN/STOP LED RROR LED MAINT LED STOP ACTIVE LED Connection display LINK TX/RX Supported technology objects Motion Control Number of available Motion Control resources for	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job Yes; without fail-safe Peripheral inputs/outputs 200 Yes 3 200 500 4; Up to 512 KB of data per trace are possible Yes Yes Yes Yes Yes Yes Yes Yes Yes Y
Status/control variable Variables Number of variables, max. — of which status variables, max. — of which control variables, max. Forcing Forcing Forcing, variables Number of variables, max. Diagnostic buffer present Number of entries, max. — of which powerfail-proof Traces Number of configurable Traces Interrupts/diagnostics/status information Diagnostics indication LED RUN/STOP LED REROR LED MAINT LED STOP ACTIVE LED Connection display LINK TX/RX Supported technology objects Motion Control	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job 200; per job Yes; without fail-safe Peripheral inputs/outputs 200 Yes 3 200 500 4; Up to 512 KB of data per trace are possible Yes Yes Yes Yes Yes Yes Yes Yes Yes Y

	40
— 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
 Number of available Extended Motion Control resources for technology objects 	512
 Required Extended Motion Control resources 	
per cam (1 000 points and 50 segments)	2
per cam (10 000 points and 50 segments)	20
 for each set of kinematics 	30
 Per leading axis proxy 	3
 Positioning axis 	
 Number of positioning axes at motion control cycle of 4 ms (typical value) 	140
 Number of positioning axes at motion control cycle of 8 ms (typical value) 	192
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
Standards, approvals, certificates	
Highest safety class achievable in safety mode	DI a
Performance level according to ISO 13849-1	PLe
• SIL acc. to IEC 61508	SIL 3
Probability of failure (for service life of 20 years and repa	
 Low demand mode: PFDavg in accordance with SIL3 	< 2.00E-05
High demand/continuous mode: PFH in accordance with SIL3	< 1.00E-09
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	
Programming	
Programming language	
— LAD	Yes; incl. failsafe
— FBD	Yes; incl. failsafe
— STL	Yes
— SCL	Yes
— GRAPH	Yes
Know-how protection	
·	Yes
User program protection/password protection	Yes Yes
 User program protection/password protection Copy protection	Yes
User program protection/password protection	

 Password for display 	Yes
Protection level: Write protection	
·	Yes; Specific write protection both for Standard and for Failsafe
 Protection level: Read/write protection 	Yes
 Protection level: Write protection for Failsafe 	Yes
Protection level: Complete protection	Yes
Cycle time monitoring	
• lower limit	adjustable minimum cycle time
• upper limit	adjustable maximum cycle time
Dimensions	
Width	70 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	830 g

last modified: