Data sheet



SIPLUS ET 200SP CPU 1515SP PC2 F rail based on 6ES7677-2SB42-0GB0 with conformal coating, -40...+60 °C, OT2 with ST1/2 (+70 °C für 10 minutes), 8 GB RAM, 30 GB CFast with Windows 10 IoT Enterprise 64-bit and S7-1500 SoftwareController CPU 1505SP preinstalled, interfaces: 1x slot CFast, 1x slot SD/MMC, 1x connection for ET 200SP BusAdapter PROFINET, 1x 10/100/1000 Mbps Ethernet 2x USB 3.0; 2x USB 2.0, 1x DisplayPort,

General information	
Product type designation	CPU 1515SP PC2 F
Engineering with	
STEP 7 TIA Portal configurable/integrated from version	see entry ID: 109746275
Installed software	
 Visualization 	No
 Control 	S7-1500 Software Controller CPU 1505SP F
Configuration control	
via dataset	Yes
Control elements	
Mode selector switch	1
Supply voltage	
Rated value (DC)	24 V
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Mains buffering	
Mains/voltage failure stored energy time	5 ms
Input current	
Current consumption (rated value)	1.8 A; Full processor load, incl. ET 200SP modules and using USB
Current consumption (in no-load operation), typ.	0.5 A
Current consumption, max.	2.9 A
l²t	0.426 A ² ·s; with starting current inrush
Power	
Active power input, max.	43 W; incl. ET 200SP modules and using USB
Infeed power to the backplane bus	8.75 W
Power loss	
Power loss, typ.	16 W
Processor	
Processor type	Intel Atom E3940, 1.6 GHz, 4 cores
Memory	
Type of memory	DDR3L
Main memory	8 GB RAM
CFast memory card	Yes; 30 GB flash memory
SIMATIC memory card required	No
Work memory	
• integrated (for program)	1.5 Mbyte
• integrated (for data)	5 Mbyte
 integrated (for CPU function library of CPU Runtime) 	20 Mbyte

Load momony	
Load memory ● integrated (on PC mass storage)	320 Mbyte
Backup	320 Mibyte
·	Voc. all mamony areas declared retentive
• with UPS	Yes; all memory areas declared retentive
with non-volatile memory	Yes
CPU processing times	
for bit operations, typ.	10 ns
for word operations, typ.	12 ns
for fixed point arithmetic, typ.	16 ns
for floating point arithmetic, typ.	64 ns
CPU-blocks	
Number of elements (total)	6 000; In addition to blocks such as DBs, FBs and FCs, UDTs, global
DB	constants, etc. are also regarded as elements
Number, max.	5 999; Number range: 1 to 65535
• Size, max.	5 Mbyte
FB	· mayto
Number, max.	5 998; Number range: 1 to 65535
• Size, max.	1 024 kbyte
FC	1 024 kByto
Number, max.	5 999; Number range: 1 to 65535
Size, max.	1 024 kbyte
• Size, max.	1 024 RUYLE
• Size, max.	1 024 kbyte
	100
Number of free cycle OBs Number of time clarm OBs	
Number of time alarm OBs	20
Number of delay alarm OBs	20
Number of cyclic interrupt OBs	20
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; 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	
— 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), max.	410 kbyte; For storage in NVRAM; for storage in mass storage 5 242 020 bytes
Flag	410 kbyte, 1 of storage in 1991 will, for storage in mass storage 3 242 020 bytes
· ·	16 khyto
Size, max. Number of clock memories.	16 kbyte
Number of clock memories Data blocks	8; 8 clock memory bit, grouped into one clock memory byte
Data blocks	

Retentivity adjustable	Yes
Retentivity adjustable Retentivity preset	No
Local data	INO
	C4 khi tau may 46 KD may black
per priority class, max.	64 kbyte; max. 16 KB per block
Address area	0.400
Number of IO modules	8 192
I/O address area	
• Inputs	32 kbyte; All inputs are in the process image
Outputs	32 kbyte; All outputs are in the process image
Subprocess images	
Number of subprocess images, max.	32
Hardware configuration	
Integrated power supply	Yes
Number of distributed IO systems	20
Number of DP masters	
• Via CM	1
Number of IO Controllers	
• via PC interfaces	1
Rack	
 Modules per rack, max. 	64; CPU 1515SP PC + 64 modules + server module
 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
 Hardware clock (real-time) 	Yes; Resolution: 1 s
 Backup time 	6 wk; At 40 °C ambient temperature, typically
Deviation per day, max.	10 s; Typ.: 2 s
Clock synchronization	
supported	Yes
• to DP, master	Yes
on Ethernet via NTP	Yes
 on Windows clock, slave 	Yes
Interfaces	
Number of industrial Ethernet interfaces	2
Number of PROFINET interfaces	1
Number of PROFIBUS interfaces	1; Via CM DP module
Number of RS 485 interfaces	1; Via CM DP module
Number of USB interfaces	4; 2x USB 2.0, 2x USB 3.0 on front side
Number of SD card slots	1
Video interfaces	
Graphics interface	1x DisplayPort
Graphics interface 1. Interface	ix Diopidy) of
	DDOEINET
Interface type	PROFINET
automatic detection of transmission rate	Yes
Autonegotiation	Yes
Autocrossing	Yes
Number of connections	88
Interface types	V W B A L L S S S S S S
• RJ 45 (Ethernet)	Yes; Via BusAdapter BA 2x RJ45
— Transmission rate, max.	100 Mbit/s
 Industrial Ethernet status LED 	Yes
 Number of ports 	2
integrated switch	Yes
BusAdapter (PROFINET)	Yes; Compatible BusAdapter: BA 2x RJ45, BA 2x FC, BA 2x SCRJ (from FS03, V2.2), BA SCRJ / RJ45 (from FS03, V3.1), BA SCRJ / FC (from FS03, V3.1), BA 2x LC (from FS03, V3.3), BA LC / RJ45 (from FS03, V3.3), BA LC / FC (from FS03, V3.3)
Protocols	
PROFINET IO Controller	Yes

SIMATIC communication Open IE communication Wes PROFINET IO Controllet Services	Yes
Open IE communication * Web Server * PROFINET ID Controller Services	
■ Ves PROFINET IO Controller Services — Isochronous mode — shorets dock pulse — shorets dock pulse — shorets dock pulse — PROFilemeny — PROFilemeny — PROFilemeny — PROFilemeny — PROFilemeny — Prioritized startup — Number of connectable IO Devices, max. — Number of connectable IO Devices, max. — Number of connectable IO Devices, max. — Of which In line, max. — of which In line, max. — of which In line, max. — Number of Connectable IO Devices for RT, max. — of which in line, max. — Number of IO Devices that can be simultaneously activated/deactivated, max. — IO Devices changing during operation (partner potts), supported — Number of IO Devices for RT, max. — IO Devices of the sping during operation (partner potts), supported — Number of IO Devices per tool, max. — Updating times — To send cycle of \$600 µs — for send cycle of \$600 µs — for send cycle of \$600 µs — for send cycle of 4 ms — with IRT and parameterization of "odd" send cycles — For send cycle of 4 ms — with IRT and parameterization of "odd" send cycles — for send cycle of 4 ms — for send cycle of 4 ms — for send cycle of 4 ms — for send cycle of 500 µs — for send cycle of 4 ms — for send cycle of 4 ms — for send cycle of 4 ms — for send cycle of 500 µs — for send cycle of 4 ms — for send cycle of 500 µs — for send cycle of 4 ms — for send cycle of 4 ms — for send cycle of 500 µs — for send cycle of 4 ms — for send cycle of 4 ms — for send cycle of 500 µs — interface to cycle of 500 µs — Number of IO Controllers with shared device, max. — Autonoosing Interface bypes • IA 16 (Elbernet) — Transmission rate • Ves: Integrated • V	
PROPINET IO Controller Services	
Services	165
Isochronous mode	
- shortest clock pulse - IRT - PROFlenergy - PROFlenergy - PROFlenergy - Proritized startup - Proritized startup - Proritized startup - Proritized startup - Number of connectable IO Devices, max Of which IO devices with IRT, max of which IO devices with IRT, max of which in line, max Of which in Ine, max IO Devices that can be simultaneously activated/descrivated, max IO Devices that can be simultaneously activated/descrivated, max IO Devices that can be simultaneously activated/descrivated, max IO Devices sharping during operation (partner ports), supported - Number of IO Devices per tool, max Updating times - Number of IOD evices per tool, max Updating times - For send cycle of 500 µs - For send cycle of 500 µs - For send cycle of 1 ms - For send cycle of 1 ms - For send cycle of 2 ms - With IRT and parameterization of "odd" send cycles - For send cycle of 500 µs - For send cycle of 4 ms - With IRT and parameterization of "odd" send cycles - For send cycle of 500 µs - For s	Yes
- IRT	
PROFlenergy Prioritized startup Number of connectable IO Devices, max. 128 Of which IO devices with IRT, max. 64 Number of connectable IO Devices for RT, max. Of which in line, max. 128 Number of connectable IO Devices for RT, max. Of which in line, max. 128 Number of IO Devices that can be simultaneously activated/deactivated, max. IO Devices changing during operation (partner ports), supported Number of IO Devices per tool, max. Updating times Prior send cycle of 500 µs For send cycle of 500 µs For send cycle of 1 ms With IRT and parameterization of "odd" send cycles Pwith IRT and parameterization of "odd" send cycles Pwith IRT and parameterization of "odd" send cycles Prior send cycle of 1 ms With IRT and parameterization of "odd" send cycles Prior send cycle of 1 ms For send cycle of 1 ms With IRT and parameterization of "odd" send cycles Prior send cycle of 1 ms For send cy	
- Prioritized startup - Ves. max. 32 PROFINET for diveces, if you want to use the "Prioritized startup" - Number of connectable IO Devices, max. - Of which IO devices with IRT, max. - Of which IO devices with IRT, max. - Of which II line, max. - Of bevices that can be simultaneously activated/deadvaried, max. - IO Devices changing during operation (partner ports), supported - Number of IO Devices per tool, max. - Updating times - Update time for IRT - Or send cycle of 500 µs - For send cycle of 500 µs - For send cycle of 4 ms - With IRT and parameterization of "odd" send cycles - Vital IRT and parameterization of "odd" send cycles - Update time for RT - Or send cycle of 500 µs - For send cycle of 500 µs - For send cycle of 100 µs - For send cycle of 500 µs - For send cycle of 100 µs - For send cycle o	
unctionality in STEP 7 for the PROFINET interface of the CPU, the CPU the device must be separated by means of a switch (e.g. SCALANCE X Of which I/O devices with IRT, max. Of which I/O levices with IRT, max. Number of connectable I/O Devices for RT, max. Of which in line, max. Number of I/O Devices that can be simultaneously activated/deactivated, max. I/O Devices changing during operation (partner ports), supported Number of I/O Devices per tool, max. Update time for IRT Or send cycle of 500 µs For send cycle of 500 µs For send cycle of 4 ms With IRT and parameterization of "odd" send cycles Update time for RT Update time for RT Or send cycle of 500 µs For send cycle of 500 µs With IRT and parameterization of "odd" send cycles Update time for RT For send cycle of 1 ms For send cycle of 1 m	
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Number of IO Devices that can be simultaneously activated/deactivated, max.	vices for RT, max. 128
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- for send cycle of 4 ms - With IRT and parameterization of "odd" send cycles With IRT and parameterization of "odd" send cycles ### Update time = set "odd" send clock (any multiple of 125 μs: 375 μs, 625 ### 875 μs) Update time for RT - for send cycle of 500 μs - for send cycle of 1 ms - for send cycle of 1 ms - for send cycle of 2 ms - for send cycle of 4 ms - Cutputs, max Outputs, max Outputs, max Outputs, max Sk byte #### PROFINET IO Device Services - Isochronous mode - shortest clock pulse - IRT - PROFIenergy - Prioritized startup - Shared device - Number of IO Controllers with shared device, max Asset management record - Asset management record - Yes #### Integrated Ethernet interface #### automatic detection of transmission rate - Autocrossing - FRI Yes - FRI Yes - FRI Yes - Autocrossing - Yes - FRI Yes - Started Ethernet interface - Autocrossing - FRI Yes - FRI	1 ms to 16 ms
Update time = set "odd" send clock (any multiple of 125 μs: 375 μs, 625 875 μs) Update time for RT — for send cycle of 500 μs — for send cycle of 1 ms — for send cycle of 2 ms — for send cycle of 4 ms — lnputs, max. — Outputs, max. — Outputs, max. — 8 kbyte PROFINET IO Device Services — Isochronous mode — shortest clock pulse — IRT — PROFlenergy — Prioritized startup — Shared device — Number of IO Controllers with shared device, max. — Asset management record 2. Interface Interface type Autonegotiation — Yes Autonegotiation — RJ 45 (Ethernet) — Transmission rate, max. 1 000 Mbit/s	2 ms to 32 ms
Update time for RT — for send cycle of 500 µs — for send cycle of 1 ms — for send cycle of 2 ms — for send cycle of 2 ms — for send cycle of 4 ms — for send cycle of 502 ms — law for send cycle of 4 ms — for send cycle of 512 ms	4 ms to 64 ms
- for send cycle of 500 μs - for send cycle of 1 ms - for send cycle of 2 ms - for send cycle of 2 ms - for send cycle of 4 ms - for send cycle of 500 μs - Inputs, max Outputs, max 8 kbyte PROFINET IO Device Services - Isochronous mode - shortest clock pulse - shortest clock pulse - shortest clock pulse - PROFlenergy - Prioritized startup - Prioritized startup - Shared device - Number of IO Controllers with shared device, max Asset management record 2. Interface Interface type - Integrated Ethernet interface - automatic detection of transmission rate - Yes - Autocrossing - Yes - FIJ 45 (Ethernet) - Transmission rate, max Transmission rate, max Transmission rate, max Transmission rate, max Transmission rate, max.	
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- for send cycle of 2 ms - for send cycle of 4 ms 4 ms to 512 ms Address area - Inputs, max Outputs, max. 8 kbyte PROFINET IO Device Services - Isochronous mode - shortest clock pulse - IRT - PROFlenergy - Prioritized startup - Prioritized startup - Shared device - Number of IO Controllers with shared device, max Asset management record 2. Interface Interface type Autocrossing Interface types • RJ 45 (Ethernet) - Transmission rate, max. 4 ms to 512 ms 4 ms to 512 m	500 µs to 256 ms
— for send cycle of 4 ms Address area — Inputs, max. — Outputs, max. 8 kbyte PROFINET IO Device Services — Isochronous mode — shortest clock pulse — IRT — PROFlenergy — Prioritized startup — Prioritized startup — Shared device — Number of IO Controllers with shared device, max. — Asset management record 2. Interface Interface type automatic detection of transmission rate Autocrossing Interface types • RJ 45 (Ethernet) — Transmission rate, max. 4 whyte 4 kbyte 8 kbyte No 8 kbyte 9 keys 1 Interface types • RJ 45 (Ethernet) — Transmission rate, max. 1 000 Mbit/s	1 ms to 512 ms
Address area	2 ms to 512 ms
- Inputs, max Outputs, max Outputs, max Outputs, max Outputs, max. PROFINET IO Device Services - Isochronous mode - shortest clock pulse - IRT - PROFlenergy - Prioritized startup - Prioritized startup - Shared device - Number of IO Controllers with shared device, max Asset management record 2. Interface Interface type automatic detection of transmission rate Autonegotiation - Yes Autocrossing - RJ 45 (Ethernet) - Transmission rate, max. 8 kbyte 8 kbyte 8 kbyte 9 kbyte 1 Interface types 9 Yes Interface types 9 RJ 45 (Ethernet) - Transmission rate, max. 1 000 Mbit/s	4 ms to 512 ms
— Outputs, max. 8 kbyte PROFINET IO Device Services — Isochronous mode No — shortest clock pulse 500 μs — IRT Yes — PROFlenergy Yes — Prioritized startup Yes — Shared device Yes — Number of IO Controllers with shared device, max. — Asset management record Yes 2. Interface Interface type Integrated Ethernet interface automatic detection of transmission rate Yes Autorossing Yes Interface types ● RJ 45 (Ethernet) — Transmission rate, max. 1 000 Mbit/s	
PROFINET IO Device Services — Isochronous mode — shortest clock pulse — IRT — Yes — PROFlenergy — Prioritized startup — Shared device — Number of IO Controllers with shared device, max. — Asset management record 2. Interface Interface type automatic detection of transmission rate Autorossing Interface types • RJ 45 (Ethernet) — Transmission rate, max. 1000 Mbit/s	8 kbyte
Services - Isochronous mode - shortest clock pulse - IRT - PROFlenergy - Prioritized startup - Prioritized startup - Shared device - Number of IO Controllers with shared device, max Asset management record 2. Interface Interface type automatic detection of transmission rate Autonegotiation Autocrossing Interface types • RJ 45 (Ethernet) - Transmission rate, max. No No Yes 500 µs Yes Yes Yes Interface type Integrated Ethernet interface Yes • RJ 45 (Ethernet) - Transmission rate, max. 1 000 Mbit/s	8 kbyte
- Isochronous mode - shortest clock pulse - IRT - Yes - PROFlenergy - Prioritized startup - Shared device - Number of IO Controllers with shared device, max Asset management record 2. Interface Interface type automatic detection of transmission rate Autonegotiation Autocrossing Interface types • RJ 45 (Ethernet) - Transmission rate, max. No 500 μs Yes Yes Yes Integrated Ethernet interface Yes Automatic detection of transmission rate Yes Interface types • RJ 45 (Ethernet) - Transmission rate, max. 1 000 Mbit/s	
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- IRT - PROFlenergy - Prioritized startup - Shared device - Shared device - Number of IO Controllers with shared device, max Asset management record 2. Interface Interface type Interface type automatic detection of transmission rate Autonegotiation Autocrossing Interface types Interface types • RJ 45 (Ethernet) - Transmission rate, max. Yes Yes Yes Yes; Integrated 1 000 Mbit/s	No
— IRT — PROFlenergy — Prioritized startup — Shared device — Number of IO Controllers with shared device, max. — Asset management record 2. Interface Interface type Interface type automatic detection of transmission rate Autorogotiation Autocrossing Interface types • RJ 45 (Ethernet) — Transmission rate, max. Yes Yes Yes Integrated Ethernet interface Yes Yes Interface types • RJ 45 (Ethernet) — Transmission rate, max. 1 000 Mbit/s	500 μs
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2. Interface Interface type Integrated Ethernet interface automatic detection of transmission rate Yes Autonegotiation Yes Autocrossing Yes Interface types • RJ 45 (Ethernet) Yes; Integrated — Transmission rate, max. 1 000 Mbit/s	
Interface type automatic detection of transmission rate Autonegotiation Autocrossing Interface types • RJ 45 (Ethernet) — Transmission rate, max. Integrated Ethernet interface Yes Yes Yes Yes Integrated Yes Yes Integrated Yes; Integrated 1 000 Mbit/s	
automatic detection of transmission rate Autonegotiation Autocrossing Yes Interface types • RJ 45 (Ethernet) — Transmission rate, max. Yes Yes Yes Yes 1 000 Mbit/s	Integrated Ethernet interface
Autonegotiation Autocrossing Interface types RJ 45 (Ethernet) — Transmission rate, max. Yes Yes Yes 1 000 Mbit/s	
Autocrossing Interface types • RJ 45 (Ethernet) — Transmission rate, max. Yes Yes 1 000 Mbit/s	
Interface types • RJ 45 (Ethernet) — Transmission rate, max. Yes; Integrated 1 000 Mbit/s	
• RJ 45 (Ethernet) — Transmission rate, max. Yes; Integrated 1 000 Mbit/s	
— Transmission rate, max. 1 000 Mbit/s	Yes: Integrated
Industrial Ethernet status LED No	
Number of ports	
3. Interface	
Interface type PROFIBUS with CM DP	DDOEIDII C WALL OM DD

Number of connections	44
Interface types	
• RS 485	Yes
Protocols	
 PROFIBUS DP master 	Yes
PROFIBUS DP slave	Yes
SIMATIC communication	Yes
PROFIBUS DP master	
Number of DP slaves, max.	125
Services	
— Equidistance	No
— Isochronous mode	No
Address area	
— Inputs, max.	8 kbyte
— Outputs, max.	8 kbyte
Interface types	- ····, ·
RS 485	
	12 Mbit/s
Transmission rate, max. Protocols	12 IVINIU 3
	Voc
PROFIsafe	Yes
Number of connections	22
Number of connections, max.	88
 Number of connections reserved for ES/HMI/web 	10
Number of S7 routing paths	16
Redundancy mode	
Media redundancy	
— MRP	Yes
— MRPD	Yes
 Switchover time on line break, typ. 	200 ms
— Number of stations in the ring, max.	50
SIMATIC communication	
 PG/OP communication 	Yes
 S7 routing 	Yes
 S7 communication, as server 	Yes
 S7 communication, as client 	Yes
User data per job, max.	64 kbyte; BSEND/BRCV: 64 KB; PUT/GET: 960 bytes
Open IE communication	
• TCP/IP	Yes
— Data length, max.	64 kbyte
• ISO-on-TCP (RFC1006)	Yes
— Data length, max.	64 kbyte
• UDP	Yes
— Data length, max.	1 472 kbyte
• SNMP	Yes
• DCP	Yes
• LLDP	Yes
• LLDP Web server	100
	Voc. Via Windows and DDOFINET interface
• HTTP	Yes; Via Windows and PROFINET interface
• HTTPS	Yes; Via Windows and PROFINET interface
OPC UA	Vaca NO are NIII lise are a required
Runtime license required	Yes; "Small" license required
OPC UA Client	V E 0W 0DU 45050B \ (2.0
	Yes; From SW CPU 1505SP V2.6
OPC UA Server	Yes; Data access (read, write, subscribe), runtime license required
— Application authentication	Yes; Data access (read, write, subscribe), runtime license required Yes; Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
	Yes; Data access (read, write, subscribe), runtime license required Yes; Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 Yes; Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
— Application authentication— Security policies— User authentication	Yes; Data access (read, write, subscribe), runtime license required Yes; Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 Yes; Available security policies: None, Basic128Rsa15, Basic256Rsa15,
Application authentication Security policies	Yes; Data access (read, write, subscribe), runtime license required Yes; Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 Yes; Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
— Application authentication— Security policies— User authentication	Yes; Data access (read, write, subscribe), runtime license required Yes; Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 Yes; Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256

Number of login stations for message functions, max.	32
Program alarms	Yes
Number of configurable program messages, max.	10 000
Number of simultaneously active program alarms	1 000
Number of program alarms	1 000
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
Single step	No
Number of breakpoints	8
Status/control	
Status/control variable	Yes
Variables	Inputs, outputs, memory bits, DB, times, counters
 Number of variables, max. 	
— of which status variables, max.	200
— of which control variables, max.	200
Forcing	
• Forcing	Yes
 Forcing, variables 	Inputs, outputs
Number of variables, max.	200
Diagnostic buffer	
• present	Yes
 Number of entries, max. 	1 000
— of which powerfail-proof	300
Traces	
 Number of configurable Traces 	4
Memory size per trace, max.	512 kbyte
Interrupts/diagnostics/status information	
Diagnostics indication LED	
RUN/STOP LED	Yes
• ERROR LED	Yes
MAINT LED	Yes
Supported technology objects	
Motion Control	Yes
Number of available Motion Control resources for technology objects Described Matter Control resources	2 400
Required Motion Control resources	40:
— per speed-controlled axis	40; per axis
per positioning axis	SUI DOE GVIE
	80; per axis
— per synchronous axis	160; per axis
— per external encoder	160; per axis 80; per external encoder
— per external encoder — per output cam	160; per axis 80; per external encoder 20; per cam
— per external encoder — per output cam — per cam track	160; per axis 80; per external encoder 20; per cam 160; per cam track
per external encoderper output camper cam trackper probe	160; per axis 80; per external encoder 20; per cam
 per external encoder per output cam per cam track per probe Positioning axis 	160; per axis 80; per external encoder 20; per cam 160; per cam track 40; per probe
 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) 	160; per axis 80; per external encoder 20; per cam 160; per cam track 40; per probe
 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) 	160; per axis 80; per external encoder 20; per cam 160; per cam track 40; per probe
— 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) Controller	160; per axis 80; per external encoder 20; per cam 160; per cam track 40; per probe 15
— 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) Controller • PID_Compact	160; per axis 80; per external encoder 20; per cam 160; per cam track 40; per probe 15 30 Yes; Universal PID controller with integrated optimization
— 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) Controller • PID_Compact • PID_3Step	160; per axis 80; per external encoder 20; per cam 160; per cam track 40; per probe 15 30 Yes; Universal PID controller with integrated optimization Yes; PID controller with integrated optimization for valves
— 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) Controller • PID_Compact • PID_3Step • PID-Temp	160; per axis 80; per external encoder 20; per cam 160; per cam track 40; per probe 15 30 Yes; Universal PID controller with integrated optimization
— 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) Controller • PID_Compact • PID_3Step • PID-Temp Counting and measuring	160; per axis 80; per external encoder 20; per cam 160; per cam track 40; per probe 15 30 Yes; Universal PID controller with integrated optimization Yes; PID controller with integrated optimization for valves Yes; PID controller with integrated optimization for temperature
	160; per axis 80; per external encoder 20; per cam 160; per cam track 40; per probe 15 30 Yes; Universal PID controller with integrated optimization Yes; PID controller with integrated optimization for valves
— 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) Controller • PID_Compact • PID_3Step • PID-Temp Counting and measuring • High-speed counter	160; per external encoder 20; per cam 160; per cam track 40; per probe 15 30 Yes; Universal PID controller with integrated optimization Yes; PID controller with integrated optimization for valves Yes; PID controller with integrated optimization for temperature
	160; per external encoder 20; per cam 160; per cam track 40; per probe 15 30 Yes; Universal PID controller with integrated optimization Yes; PID controller with integrated optimization for valves Yes; PID controller with integrated optimization for temperature

 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 repair time	
 Low demand mode: PFDavg in accordance with SIL3 	< 2.00E-05
High demand/continuous mode: PFH in accordance with SIL3	< 1.00E-09 1/h
Railway application	
• EN 50121-3-2	Yes; EMC for rail vehicles
• EN 50121-4	Yes; EMC for signal and telecommunications systems
• EN 50124-1	Yes; Railway applications - overvoltage category OV2; pollution degree PD2; rated surge voltage UNi = 0.5 kV; UNm = 24 V DC
● EN 50125-1	Yes; Rail vehicles - see ambient conditions
• EN 50125-2	Yes; Stationary electrical equipment - see ambient conditions
• EN 50125-3	Yes; Signal and telecommunications systems - see ambient conditions; vibrations and shocks: Application point outside of tracks (1 m to 3 m away from track)
• EN 50155	Yes; Rail vehicles - temperature class OT2, ST1/ST2, horizontal mounting position
• EN 61373	Yes; Rail vehicles - vibrations and shocks: Category 1 Class A/B
• Fire protection acc. to EN 45545-2	Yes; For proof of conformity, see Service & Support
Ambient conditions	
Ambient temperature during operation	
• min.	-40 °C; = Tmin
• max.	Up to 60 $^{\circ}\text{C}$ with max. 32 ET 200SP modules; up to 55 $^{\circ}\text{C}$ with max. 64 ET 200SP modules
 horizontal installation, min. 	-40 °C; = Tmin (incl. condensation/frost)
 horizontal installation, max. 	60 °C; = Tmax; +70 °C for 10 min (OT2, ST1/ST2 acc. to EN 50155)
 vertical installation, min. 	-40 °C; = Tmin
 vertical installation, max. 	50 °C; = Tmax; with max. 32 ET 200SP modules
Ambient temperature during storage/transportation	
• min.	-40 °C
• max.	70 °C
Altitude during operation relating to sea level	
 Installation altitude above sea level, max. 	2 000 m
 Ambient air temperature-barometric pressure-altitude 	Tmin Tmax at 1 140 hPa 795 hPa (-1 000 m +2 000 m)
Relative humidity	
With condensation, tested in accordance with IEC 60068- 2-38, max.	100 %; RH incl. condensation / frost (no commissioning in bedewed state), horizontal installation
Vibrations	
 Operation, tested according to IEC 60068-2-6 	Yes
Transport, tested acc. to IEC 60068-2-6	Yes
Shock testing	
 tested according to IEC 60068-2-6 	Yes
 tested according to IEC 60068-2-27 	Yes
 tested according to IEC 60068-2-29 	Yes
Storage/transport, tested acc. to IEC 60068-2-27	Yes
Resistance	
Coolants and lubricants — Resistant to commercially available coolants and	Vast Incl. diasal and oil droplets in the air
lubricants	Yes; Incl. diesel and oil droplets in the air
Use in stationary industrial systems	
 to biologically active substances according to EN 60721-3-3 	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna); Class 3B3 on request
 to chemically active substances according to EN 60721-3-3 	Yes; Class 3C4 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *
 to mechanically active substances according to EN 60721-3-3 	Yes; Class 3S4 incl. sand, dust, *
Use on land craft, rail vehicles and special-purpose vehicles	
 to biologically active substances according to EN 	
60721-3-5	Yes; Class 5B2 mold, fungus and dry rot spores (with the exception of fauna); Class 5B3 on request
60721-3-5 — to chemically active substances according to EN 60721-3-5 — to mechanically active substances according to EN	

Usage in industrial process technology	
 Against chemically active substances acc. to EN 60654-4 	Yes; Class 3 (excluding trichlorethylene)
 Environmental conditions for process, measuring and control systems acc. to ANSI/ISA-71.04 	Yes; Level GX group A/B (excluding trichlorethylene; harmful gas concentrations up to the limits of EN 60721-3-3 class 3C4 permissible); level LC3 (salt spray) and level LB3 (oil)
Remark	
 Note regarding classification of environmental conditions acc. to EN 60721, EN 60654-4 and ANSI/ISA-71.04 	* The supplied plug covers must remain in place over the unused interfaces during operation!
Conformal coating	
 Coatings for printed circuit board assemblies acc. to EN 61086 	Yes; Class 2 for high reliability
 Protection against fouling acc. to EN 60664-3 	Yes; Type 1 protection
 Electronic equipment on rolling stock acc. to EN 50155 	Yes; Class PC2 protective coating acc. to EN 50155:2017
 Military testing according to MIL-I-46058C, Amendment 7 	Yes; Discoloration of coating possible during service life
 Qualification and Performance of Electrical Insulating Compound for Printed Board Assemblies according to IPC- CC-830A 	Yes; Conformal coating, Class A
perating systems	
pre-installed operating system	Windows 10 IoT Enterprise 2016 LTSB, 64bit, MUI
onfiguration / header	
configuration / programming / header	
Programming language	
— LAD	Yes; incl. failsafe
— FBD	Yes; incl. failsafe
— STL	Yes
— SCL	Yes
— CFC	No
— GRAPH	Yes
Know-how protection	
 User program protection/password protection 	Yes
Copy protection	Yes
Block protection	Yes
Access protection	
Protection level: Write protection	Yes
Protection level: Read/write protection	Yes
Protection level: Complete protection	Yes
programming / cycle time monitoring / header	
• lower limit	adjustable minimum cycle time
• upper limit	adjustable maximum cycle time
Open Development interfaces	
Size of ODK SO file, max.	5.8 Mbyte
eripherals/Options	
SD card	Optionally for additional mass storage
imensions	
Width	160 mm
Height	117 mm
Depth	75 mm
/eights	
Weight, approx.	0.83 kg
ther	
Note:	for use in railway applications, also observe the product information "SIPLUS extreme RAIL" A5E37661960A, Online Support article 109736776
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