



SIMATIC S7-1500 COMPACT CPU CPU 1511C-1PN, CENTRAL PROCESSING UNIT WITH WORKING MEMORY 175 KB FOR PROGRAM AND 1 MB FOR DATA, 16 DIGITAL INPUTS, 16 DIGITAL OUTPUTS, 5 ANALOG INPUTS, 2 ANALOG OUTPUTS, 6 HIGH SPEED COUNTERS, 1. INTERFACE: PROFINET IRT WITH 2 PORT SWITCH, 60 NS BIT-PERFORMANCE, INCL. FRONT CONNECTOR PUSH-IN, SIMATIC MEMORY CARD NECESSARY

General information	
Product type designation	CPU 1511C-1 PN
HW functional status	FS01
Firmware version	V1.8
Engineering with	
<ul style="list-style-type: none"> STEP 7 TIA Portal configurable/integrated as of version 	V13 SP1 Update 4
Configuration control	
via dataset	Yes
Display	
Screen diagonal (cm)	3.45 cm
Control elements	
Number of keys	6
Mode selector switch	1
Supply voltage	
Type of supply voltage	24 V DC
permissible range, lower limit (DC)	19.2 V; 20.4 V DC, for supplying the digital inputs/outputs

permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Mains buffering	
• Mains/voltage failure stored energy time	5 ms; Refers to the power supply on the CPU section
Input current	
Current consumption (rated value)	0.8 A; Digital onboard I/O modules are supplied separately
Inrush current, max.	1.9 A; Rated value
I^2t	0.34 A ² ·s
Digital inputs	
• from load voltage L+ (without load), max.	20 mA; per group
Digital outputs	
• from load voltage L+, max.	30 mA; Per group, without load
Output voltage	
Rated value (DC)	24 V
Encoder supply	
Number of outputs	1; One common 24 V encoder supply
24 V encoder supply	
• 24 V	Yes; L+ (-0.8 V)
• Short-circuit protection	Yes
• Output current, max.	1 A
Power	
Power consumption from the backplane bus (balanced)	8.5 W
Infeed power to the backplane bus	10 W
Power loss	
Power loss, typ.	11.8 W
Memory	
SIMATIC Memory Card required	Yes
Work memory	
• integrated (for program)	175 kbyte
• integrated (for data)	1 Mbyte
Load memory	
• Plug-in (SIMATIC Memory Card), max.	32 Gbyte
Backup	
• maintenance-free	Yes
CPU processing times	
for bit operations, typ.	60 ns
for word operations, typ.	72 ns
for fixed point arithmetic, typ.	96 ns
for floating point arithmetic, typ.	384 ns

CPU-blocks

Number of elements (total)	2 000; In addition to blocks such as DBs, FBs and FCs, UDTs, global constants, etc. are also regarded as elements
DB	
• Number range	1 ... 60 999; subdivided into: number range that can be used by the user: 1 ... 59 999, and number range of DBs created via SFC 86: 60 000 ... 60 999
• Size, max.	1 Mbyte; For non-optimized block accesses, the max. size of the DB is 64 KB
FB	
• Number range	0 ... 65 535
• Size, max.	175 kbyte
FC	
• Number range	0 ... 65 535
• Size, max.	175 kbyte
OB	
• Size, max.	175 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
• Number of process alarm OBs	50
• Number of DPV1 alarm OBs	3
• Number of isochronous mode OBs	1
• Number of technology synchronous alarm OBs	2
• Number of startup OBs	100
• Number of asynchronous error OBs	4
• Number of synchronous error OBs	2
• Number of diagnostic alarm OBs	1
Nesting depth	
• per priority class	24
Counters, timers and their retentivity	
S7 counter	
• Number	2 048
Retentivity	
— adjustable	Yes
IEC counter	
• Number	Any (only limited by the main memory)
Retentivity	
— adjustable	Yes
S7 times	
• Number	2 048

Retentivity	
— adjustable	Yes
IEC timer	
• Number	Any (only limited by the main memory)
Retentivity	
— adjustable	Yes
Data areas and their retentivity	
retentive data area in total (incl. times, counters, flags), max.	128 kbyte; In total; available retentive memory for bit memories, timers, counters, DBs, and technology data (axes): 88 KB
Flag	
• Number, max.	16 kbyte
• Number of clock memories	8; 8 clock memory bits, grouped into one clock memory byte
Data blocks	
• Retentivity adjustable	Yes
• Retentivity preset	No
Local data	
• per priority class, max.	64 kbyte; max. 16 KB per block
Address area	
Number of IO modules	1 024; max. number of modules / submodules
I/O address area	
• Inputs	32 kbyte; All inputs are in the process image
• Outputs	32 kbyte; All outputs are in the process image
per integrated IO subsystem	
— Inputs (volume)	8 kbyte
— Outputs (volume)	8 kbyte
per CM/CP	
— Inputs (volume)	8 kbyte
— Outputs (volume)	8 kbyte
Subprocess images	
• Number of subprocess images, max.	32
Hardware configuration	
Number of distributed IO systems	20
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

• Rack, number of rows, max.	1
PtP CM	
• Number of PtP CMs	the number of connectable PtP CMs is only limited by the number of available slots
Time of day	
Clock	
• Type	Hardware clock
• Backup time	6 wk; At 40 °C ambient temperature, typically
• Deviation per day, max.	10 s; Typ.: 2 s
Operating hours counter	
• Number	16
Clock synchronization	
• supported	Yes
• in AS, master	Yes
• in AS, slave	Yes
• on Ethernet via NTP	Yes
Digital inputs	
integrated channels (DI)	16
Digital inputs, parameterizable	Yes
m/p-reading	p-reading
Input characteristic curve in accordance with IEC 61131, type 3	Yes
Digital input functions, parameterizable	
• Gate start/stop	Yes; With activated technology function
• Capture	Yes; With activated technology function
• Synchronization	Yes; With activated technology function
Input voltage	
• Type of input voltage	DC
• Rated value (DC)	24 V
• for signal "0"	-3 to +5V
• for signal "1"	+11 to +30V
Input current	
• for signal "1", typ.	2.5 mA
Input delay (for rated value of input voltage)	
for standard inputs	
— parameterizable	Yes; none / 0.05 / 0.1 / 0.4 / 1.6 / 3.2 / 12.8 / 20 ms
— at "0" to "1", min.	6 µs; for parameterization "none"
— at "0" to "1", max.	20 ms
— at "1" to "0", min.	6 µs; for parameterization "none"
— at "1" to "0", max.	20 ms
for interrupt inputs	

— parameterizable	Yes; Same as for standard inputs
for counter/technological functions	
— parameterizable	Yes; Same as for standard inputs
— at "0" to "1", min.	6 µs; for parameterization "none"
— at "0" to "1", max.	20 ms
— at "1" to "0", min.	6 µs; for parameterization "none"
— at "1" to "0", max.	20 ms
Cable length	
• shielded, max.	1 000 m; 600 m for technological functions; depending on input frequency, encoder and cable quality; max. 50 m at 100 kHz
• unshielded, max.	600 m; For technological functions: No
Digital outputs	
Type of digital output	Transistor
integrated channels (DO)	16
Current-sourcing	Yes; Push-pull output
Short-circuit protection	Yes; electronic/thermal
• Response threshold, typ.	1.6 A with standard output, 0.5 A with high-speed output; i.e. when using a high-speed output (DQ1, DQ3 ... DQ7) as HSC output
Limitation of inductive shutdown voltage to	-0.8 V
Controlling a digital input	Yes
Digital output functions, parameterizable	
• Switching tripped by comparison values	Yes; As output signal of a high-speed counter
Switching capacity of the outputs	
• with resistive load, max.	0.5 A; 0.1 A with high-speed output; i.e. when using a high-speed output (DQ1, DQ3 ... DQ7) as HSC output
• on lamp load, max.	5 W; 1 W with high-speed output; i.e. when using a high-speed output (DQ1, DQ3 ... DQ7) as HSC output
Load resistance range	
• lower limit	48 Ω; 240 ohms with high-speed output; i.e. when using a high-speed output (DQ1, DQ3 ... DQ7) as HSC output
• upper limit	12 kΩ
Output voltage	
• Type of output voltage	DC
• for signal "0", max.	1 V; With high-speed output; i.e. when using a high-speed output (DQ1, DQ3 ... DQ7) as HSC output
• for signal "1", min.	L+ (-0.8 V)
Output current	
• for signal "1" rated value	0.5 A; 0.1 A with high-speed output; i.e. when using a high-speed output (DQ1, DQ3 ... DQ7) as HSC output, observe derating
• for signal "1" permissible range, min.	2 mA
• for signal "1" permissible range, max.	0.6 A; 0.12 A with high-speed output; i.e. when using a high-speed output (DQ1, DQ3 ... DQ7) as HSC output, observe derating

<ul style="list-style-type: none"> • for signal "0" residual current, max. 	0.5 mA
Output delay with resistive load	
<ul style="list-style-type: none"> • "0" to "1", max. 	100 μ s
<ul style="list-style-type: none"> • "1" to "0", max. 	500 μ s; Load-dependent
for technological functions	
— "0" to "1", max.	5 μ s; Depending on the output used, see additional description in manual
— "1" to "0", max.	5 μ s; Depending on the output used, see additional description in manual
Parallel switching of two outputs	
<ul style="list-style-type: none"> • for logic links 	Yes; For technological functions: No
<ul style="list-style-type: none"> • for uprating 	No
<ul style="list-style-type: none"> • for redundant control of a load 	Yes; For technological functions: No
Switching frequency	
<ul style="list-style-type: none"> • with resistive load, max. 	100 Hz
<ul style="list-style-type: none"> • with inductive load, max. 	0.5 Hz; Acc. to IEC 60947-5-1, DC-13; observe derating curve
<ul style="list-style-type: none"> • on lamp load, max. 	10 Hz
Total current of the outputs	
<ul style="list-style-type: none"> • Current per channel, max. 	0.5 A; see additional description in the manual
<ul style="list-style-type: none"> • Current per group, max. 	8 A; see additional description in the manual
<ul style="list-style-type: none"> • Current per power supply, max. 	4 A; 2 power supplies for each group, current per power supply max. 4 A, see additional description in manual
for technological functions	
— Current per channel, max.	0.1 A; see additional description in the manual
Cable length	
<ul style="list-style-type: none"> • shielded, max. 	1 000 m; 600 m for technological functions; depending on output frequency, load, and cable quality
<ul style="list-style-type: none"> • unshielded, max. 	600 m; For technological functions: No
Analog inputs	
Number of analog inputs	5; 4x for U/I, 1x for R/RTD
<ul style="list-style-type: none"> • For current measurement 	4; max.
<ul style="list-style-type: none"> • For voltage measurement 	4; max.
<ul style="list-style-type: none"> • For resistance/resistance thermometer measurement 	1
permissible input voltage for voltage input (destruction limit), max.	28.8 V
permissible input current for current input (destruction limit), max.	40 mA
Cycle time (all channels), min.	1 ms; Dependent on the parameterized interference frequency suppression; for details, see conversion procedure in manual
Technical unit for temperature measurement adjustable	Yes; °C/°F/K
Input ranges (rated values), voltages	

• 0 to +10 V	Yes; Physical measuring range: ± 10 V
• Input resistance (0 to 10 V)	100 k Ω
• 1 V to 5 V	Yes; Physical measuring range: ± 10 V
• Input resistance (1 V to 5 V)	100 k Ω
• -10 V to +10 V	Yes
• Input resistance (-10 V to +10 V)	100 k Ω
• -5 V to +5 V	Yes; Physical measuring range: ± 10 V
• Input resistance (-5 V to +5 V)	100 k Ω
Input ranges (rated values), currents	
• 0 to 20 mA	Yes; Physical measuring range: ± 20 mA
• Input resistance (0 to 20 mA)	50 Ω ; Plus approx. 55 ohm for overvoltage protection by PTC
• -20 mA to +20 mA	Yes
• Input resistance (-20 mA to +20 mA)	50 Ω ; Plus approx. 55 ohm for overvoltage protection by PTC
• 4 mA to 20 mA	Yes; Physical measuring range: ± 20 mA
• Input resistance (4 mA to 20 mA)	50 Ω ; Plus approx. 55 ohm for overvoltage protection by PTC
Input ranges (rated values), resistance thermometer	
• Ni 100	Yes; Standard/climate
• Input resistance (Ni 100)	10 M Ω
• Pt 100	Yes; Standard/climate
• Input resistance (Pt 100)	10 M Ω
Input ranges (rated values), resistors	
• 0 to 150 ohms	Yes; Physical measuring range: 0 ... 600 ohms
• Input resistance (0 to 150 ohms)	10 M Ω
• 0 to 300 ohms	Yes; Physical measuring range: 0 ... 600 ohms
• Input resistance (0 to 300 ohms)	10 M Ω
• 0 to 600 ohms	Yes
• Input resistance (0 to 600 ohms)	10 M Ω
Cable length	
• shielded, max.	800 m; for U/I, 200 m for R/RTD
Analog outputs	
integrated channels (AO)	2
Voltage output, short-circuit protection	Yes
Cycle time (all channels), min.	1 ms; Dependent on the parameterized interference frequency suppression; for details, see conversion procedure in manual
Output ranges, voltage	
• 0 to 10 V	Yes
• 1 V to 5 V	Yes
• -10 V to +10 V	Yes
Output ranges, current	
• 0 to 20 mA	Yes
• -20 mA to +20 mA	Yes

• 4 mA to 20 mA	Yes
Load impedance (in rated range of output)	
• with voltage outputs, min.	1 k Ω
• with voltage outputs, capacitive load, max.	100 nF
• with current outputs, max.	500 Ω
• with current outputs, inductive load, max.	1 mH
Cable length	
• shielded, max.	200 m

Analog value generation for the inputs

Integration and conversion time/resolution per channel	
• Resolution with overrange (bit including sign), max.	16 bit
• Integration time, parameterizable	Yes; 2.5 / 16.67 / 20 / 100 ms, acts on all channels
• Interference voltage suppression for interference frequency f1 in Hz	400 / 60 / 50 / 10
Smoothing of measured values	
• parameterizable	Yes
• Step: None	Yes
• Step: low	Yes
• Step: Medium	Yes
• Step: High	Yes

Analog value generation for the outputs

Integration and conversion time/resolution per channel	
• Resolution with overrange (bit including sign), max.	16 bit
Settling time	
• for resistive load	1.5 ms
• for capacitive load	2.5 ms
• for inductive load	2.5 ms

Encoder

Connection of signal encoders	
• for voltage measurement	Yes
• for current measurement as 4-wire transducer	Yes
• for resistance measurement with two-wire connection	Yes
• for resistance measurement with three-wire connection	Yes
• for resistance measurement with four-wire connection	Yes
Connectable encoders	
• 2-wire sensor	Yes

— permissible quiescent current (2-wire sensor), max.	1.5 mA
Encoder signals, incremental encoder (asymmetrical)	
• Input voltage	24 V
• Input frequency, max.	100 kHz
• Counting frequency, max.	400 kHz; with quadruple evaluation
• Signal filter, parameterizable	Yes
• Incremental encoder with A/B tracks, 90° phase offset	Yes
• Incremental encoder with A/B tracks, 90° phase offset and zero track	Yes
• Pulse encoder	Yes
• Pulse encoder with direction	Yes
• Pulse encoder with one impulse signal per count direction	Yes
Errors/accuracies	
Linearity error (relative to input range), (+/-)	0.1 %
Temperature error (relative to input range), (+/-)	0.005 %/K
Crosstalk between the inputs, max.	-60 dB
Repeat accuracy in steady state at 25 °C (relative to input area), (+/-)	0.05 %
Output ripple (based on output area, bandwidth 0 to 50 kHz), (+/-)	0.02 %
Linearity error (relative to output range), (+/-)	0.15 %
Temperature error (relative to output range), (+/-)	0.005 %/K
Crosstalk between the outputs, max.	-80 dB
Repeat accuracy in steady state at 25 °C (relative to output area), (+/-)	0.05 %
Operational error limit in overall temperature range	
• Voltage, relative to input area, (+/-)	0.3 %
• Current, relative to input area, (+/-)	0.3 %
• Resistance, relative to input area, (+/-)	0.3 %
• Resistance thermometer, relative to input area, (+/-)	Pt100 Standard: ±2 K, Pt100 Climate: ±1 K, Ni100 Standard: ±1.2 K, Ni100 Climate: ±1 K
• Voltage, relative to output area, (+/-)	0.3 %
• Current, relative to output area, (+/-)	0.3 %
Basic error limit (operational limit at 25 °C)	
• Voltage, relative to input area, (+/-)	0.2 %
• Current, relative to input area, (+/-)	0.2 %
• Resistance, relative to input area, (+/-)	0.2 %
• Resistance thermometer, relative to input area, (+/-)	Pt100 Standard: ±1 K, Pt100 Climate: ±0.5 K, Ni100 Standard: ±0.6 K, Ni100 Climate: ±0.5 K
• Voltage, relative to output area, (+/-)	0.2 %

- Current, relative to output area, (+/-) 0.2 %

Interference voltage suppression for $f = n \times (f_1 \pm 1 \%)$, $f_1 =$ interference frequency

- Series mode interference (peak value of interference < rated value of input range), min. 30 dB
- Common mode voltage, max. 10 V
- Common mode interference, min. 60 dB; at 400 Hz: 50 dB

Interfaces

Number of PROFINET interfaces 1

1. Interface

Interface types

- Number of ports 2
- integrated switch Yes
- RJ 45 (Ethernet) Yes; X1

Functionality

- PROFINET IO Controller Yes
- PROFINET IO Device Yes
- SIMATIC communication Yes
- Open IE communication Yes
- Web server Yes
- Media redundancy Yes

Interface types

RJ 45 (Ethernet)

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

Protocols

Number of connections

- Number of connections, max. 96; via integrated interfaces of the CPU and connected CPs / CMs
- Number of connections reserved for ES/HMI/web 10
- Number of connections via integrated interfaces 64
- Number of S7 routing paths 16

PROFINET IO Controller

Services

- PG/OP communication Yes
- S7 routing Yes
- Isochronous mode Yes
- Open IE communication Yes
- IRT Yes

— MRP	Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50
— PROFinergy	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 PROFIBUS or PROFINET
— Of which IO devices with IRT, max.	64
— Number of connectable IO Devices for RT, max.	128
— of which in line, max.	128
— Number of IO Devices that can be simultaneously activated/deactivated, max.	8
— 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 µs to 4 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 625 µs of the isochronous OB is decisive
— for send cycle of 500 µs	500 µs to 8 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 625 µs of the isochronous OB is decisive
— for send cycle of 1 ms	1 ms to 16 ms
— for send cycle of 2 ms	2 ms to 32 ms
— for send cycle of 4 ms	4 ms to 64 ms
— With IRT and parameterization of "odd" 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
— S7 routing	Yes
— Isochronous mode	No
— Open IE communication	Yes
— IRT	Yes
— MRP	Yes
— PROFinergy	Yes

— Shared device	Yes
— Number of IO Controllers with shared device, max.	4
SIMATIC communication	
• S7 communication, as server	Yes
• S7 communication, as client	Yes
• User data per job, max.	See online help (S7 communication, user data size)
Open IE communication	
• TCP/IP	Yes
— 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.	1 472 byte
• DHCP	No
• SNMP	Yes
• DCP	Yes
• LLDP	Yes
Web server	
• HTTP	Yes; Standard and user-defined pages
• HTTPS	Yes; Standard and user-defined pages
Further protocols	
• MODBUS	Yes; MODBUS TCP
Media redundancy	
• Switchover time on line break, typ.	200 ms
• Number of stations in the ring, max.	50
Isochronous mode	
Isochronous operation (application synchronized up to terminal)	Yes; With minimum OB 6x cycle of 625 µs
Equidistance	Yes
S7 message functions	
Number of login stations for message functions, max.	32
Block related messages	Yes
Number of configurable alarms, max.	5 000
Number of simultaneously active alarms in alarm pool	
• Number of reserved user alarms	300
• Number of reserved alarms for system diagnostics	100

<ul style="list-style-type: none"> • Number of reserved alarms for Motion Control technology objects 	80
Test commissioning functions	
Joint commission (Team Engineering)	Yes; Parallel online access possible for up to 5 engineering systems
Status block	Yes; Up to 8 simultaneously (in total across all ES clients)
Single step	No
Status/control	
<ul style="list-style-type: none"> • Status/control variable 	Yes
<ul style="list-style-type: none"> • Variables 	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters
<ul style="list-style-type: none"> • Number of variables, max. 	
— of which status variables, max.	200; per job
— of which control variables, max.	200; per job
Forcing	
<ul style="list-style-type: none"> • Forcing, variables 	Peripheral inputs/outputs
<ul style="list-style-type: none"> • Number of variables, max. 	200
Diagnostic buffer	
<ul style="list-style-type: none"> • present 	Yes
<ul style="list-style-type: none"> • Number of entries, max. 	1 000
— of which powerfail-proof	500
Traces	
<ul style="list-style-type: none"> • Number of configurable Traces 	4; Up to 512 KB of data per trace are possible
Interrupts/diagnostics/status information	
Alarms	
<ul style="list-style-type: none"> • Diagnostic alarm 	Yes
<ul style="list-style-type: none"> • Hardware interrupt 	Yes
Diagnostic messages	
<ul style="list-style-type: none"> • Monitoring the supply voltage 	Yes
<ul style="list-style-type: none"> • Wire-break 	Yes; for analog inputs/outputs, see description in manual
<ul style="list-style-type: none"> • Short-circuit 	Yes; for analog outputs, see description in manual
<ul style="list-style-type: none"> • A/B transition error at incremental encoder 	Yes
Diagnostics indication LED	
<ul style="list-style-type: none"> • RUN/STOP LED 	Yes
<ul style="list-style-type: none"> • ERROR LED 	Yes
<ul style="list-style-type: none"> • MAINT LED 	Yes
<ul style="list-style-type: none"> • Monitoring of the supply voltage (PWR-LED) 	Yes
<ul style="list-style-type: none"> • Channel status display 	Yes
<ul style="list-style-type: none"> • for channel diagnostics 	Yes; For analog inputs/outputs
<ul style="list-style-type: none"> • Connection display LINK TX/RX 	Yes
Supported technology objects	

Motion Control	Yes
<ul style="list-style-type: none"> • Speed-controlled axis <ul style="list-style-type: none"> — Number of speed-controlled axes, max. • Positioning axis <ul style="list-style-type: none"> — Number of positioning axes, max. • Synchronized axes (relative gear synchronization) <ul style="list-style-type: none"> — Number of axes, max. • External encoders <ul style="list-style-type: none"> — Number of external encoders, max. 	<p>6; Requirement: There must be no other motion technology objects created; note: The number of axes affects the cycle time of the PLC program; selection guide via the TIA Selection Tool</p> <p>6; Requirement: There must be no other motion technology objects created; note: The number of axes affects the cycle time of the PLC program; selection guide via the TIA Selection Tool</p> <p>3; Requirement: There must be no other motion technology objects created; note: The number of axes affects the cycle time of the PLC program; selection guide via the TIA Selection Tool</p> <p>6; Requirement: There must be no other motion technology objects created; note: The number of axes affects the cycle time of the PLC program; selection guide via the TIA Selection Tool</p>
Controller	
<ul style="list-style-type: none"> • PID_Compact • PID_3Step • PID-Temp 	<p>Yes; Universal PID controller with integrated optimization</p> <p>Yes; PID controller with integrated optimization for valves</p> <p>Yes; PID controller with integrated optimization for temperature</p>
Counting and measuring	
<ul style="list-style-type: none"> • High-speed counter 	Yes

Integrated Functions

Number of counters	6; Of which max. 4x A/B/N
Counting frequency (counter) max.	400 kHz; with quadruple evaluation
Counting functions	
<ul style="list-style-type: none"> • Continuous counting • Counter response parameterizable • Hardware gate via digital input • Software gate • Event-controlled stop • Synchronization via digital input • Counting range, parameterizable 	<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>
Comparator	
<ul style="list-style-type: none"> — Number of comparators — Direction dependency — Can be changed from user program 	<p>2; per count channel; see manual for details</p> <p>Yes</p> <p>Yes</p>
Position detection	
<ul style="list-style-type: none"> • Incremental acquisition • Suitable for S7-1500 Motion Control 	<p>Yes</p> <p>Yes</p>
Measuring functions	

• Measuring time, parameterizable	Yes
• Dynamic measurement period adjustment	Yes
• Number of thresholds, parameterizable	2
Measuring range	
— Frequency measurement, min.	0.04 Hz
— Frequency measurement, max.	400 kHz; with quadruple evaluation
— Cycle duration measurement, min.	2.5 μ s
— Cycle duration measurement, max.	25 s
Accuracy	
— Frequency measurement	100 ppm; depending on measuring interval and signal evaluation
— Cycle duration measurement	100 ppm; depending on measuring interval and signal evaluation
— Velocity measurement	100 ppm; depending on measuring interval and signal evaluation
Potential separation	
Potential separation digital inputs	
• between the channels	No
• between the channels, in groups of	16
Potential separation digital outputs	
• between the channels	No
• between the channels, in groups of	16
Potential separation channels	
• between the channels and backplane bus	Yes
• Between the channels and load voltage L+	No
Isolation	
Isolation tested with	707 V DC (type test)
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	0 °C
• horizontal installation, max.	60 °C; Note derating data for onboard I/O in the manual. Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off
• vertical installation, min.	0 °C
• vertical installation, max.	40 °C; Note derating data for onboard I/O in the manual. Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off
Configuration	
Programming	
Programming language	
— LAD	Yes
— FBD	Yes
— STL	Yes
— SCL	Yes

— GRAPH	Yes
Know-how protection	
• User program protection	Yes
• Copy protection	Yes
• Block protection	Yes
Access protection	
• Password for display	Yes
• Protection level: Write protection	Yes
• Protection level: Read/write protection	Yes
• Protection level: Complete protection	Yes
Cycle time monitoring	
• lower limit	adjustable minimum cycle time
• upper limit	adjustable maximum cycle time
Dimensions	
Width	85 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	1 050 g
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