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CPUs STEP7 programmable, class C

CPUs	CPUs STEP7 programmable, class C						
312-5BE13 313-5BF13 313-6CF13 314-6CF02	314-6CG13						

Order number	312-5BE13	313-5BF13	313-6CF13	314-6CF02
Figure				
Type	CPU 312SC	CPU 313SC	CPU 313SC/DPM	CPU 314ST/DPM
General information				
Note	-	-	-	-
Features	‣ SPEED7 technology ‣ 16 x DI, 8 x DO ‣ 64 kB work memory ‣ Memory extension (max. 512 kB) ‣ PtP interface	‣ SPEED7 technology ‣ 24 x DI, 16 x DO, 4 x AI, 2 x AO, 1xAI Pt100 ‣ 128 kB work memory ‣ Memory extension (max. 512 kB) ‣ PtP interface	‣ SPEED7 technology ‣ 16 x DI, 16 x DO ‣ 128 kB work memory ‣ Memory extension (max 512 kB) ‣ PROFIBUS-DP master / PtP (switchable)	‣ SPEED7 technology, SPEED-Bus ‣ 8 x DI, 8 x DO, 4 x AI, 2 x AO, 1xAI Pt100 ‣ 512 kB work memory ‣ Memory extension (max. 2 MB) ‣ PROFIBUS-DP master / PtP (switchable)
SPEED-Bus	-	-	-	✓
Technical data power supply				
Power supply (rated value)	DC 24 V	DC 24 V	DC 24 V	DC 24 V
Power supply (permitted range)	DC 20.4...28.8 V	DC 20.4...28.8 V	DC 20.4...28.8 V	DC 20.4...28.8 V
Reverse polarity protection	✓	✓	✓	✓
Current consumption (no-load operation)	135 mA	240 mA	200 mA	-
Current consumption (rated value)	500 mA	700 mA	900 mA	1 A
Inrush current	11 A	11 A	11 A	5 A
Technical data digital inputs				
Number of inputs	16	24	16	8
Cable length, shielded	1000 m	1000 m	1000 m	1000 m
Cable length, unshielded	600 m	600 m	600 m	600 m
Rated load voltage	DC 24 V	DC 24 V	DC 24 V	DC 24 V
Reverse polarity protection of rated load voltage	✓	✓	✓	✓
Current consumption from load voltage L+ (without load)	70 mA	70 mA	70 mA	70 mA
Rated value	DC 24 V	DC 24 V	DC 24 V	DC 24 V
Input voltage for signal "0"	DC 0...5 V	DC 0...5 V	DC 0...5 V	DC 0...5 V
Input voltage for signal "1"	DC 15...28.8 V	DC 15...28.8 V	DC 15...28.8 V	DC 15...28.8 V
Input voltage hysterese	-	-	-	-
Frequency range	-	-	-	-
Input resistance	-	-	-	-
Input current for signal "1"	6 mA	6 mA	6 mA	6 mA
Connection of Two-Wire-BEROs possible	✓	✓	✓	✓
Max. permissible BERO quiescent current	1.5 mA	1.5 mA	1.5 mA	1.5 mA

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312-5BE13 313-5BF13 313-6CF13 314-6CF02	314-6CG13				

Order number	312-5BE13	313-5BF13	313-6CF13	314-6CF02
Input delay of "0" to "1"	0.1 / 0.35 ms	0.1 / 0.35 ms	0.1 / 0.35 ms	parameterizable 2.56μs - 40ms
Input delay of "1" to "0"	0.1 / 0.35 ms	0.1 / 0.35 ms	0.1 / 0.35 ms	parameterizable 2.56μs - 40ms
Number of simultaneously utilizable inputs horizontal configuration	-	-	-	8
Number of simultaneously utilizable inputs vertical configuration	-	-	-	8
Input characteristic curve	IEC 61131, type 1	IEC 61131, type 1	IEC 61131, type 1	IEC 61131, type 1
Initial data size	2 Byte	3 Byte	2 Byte	34 Byte
Technical data digital outputs				
Number of outputs	8	16	16	8
Cable length, shielded	1000 m	1000 m	1000 m	1000 m
Cable length, unshielded	600 m	600 m	600 m	600 m
Rated load voltage	DC 24 V	DC 24 V	DC 24 V	DC 24 V
Reverse polarity protection of rated load voltage	-	-	-	-
Current consumption from load voltage L+ (without load)	100 mA	100 mA	100 mA	30 mA
Total current per group, horizontal configuration, 40°C	3 A	3 A	3 A	-
Total current per group, horizontal configuration, 60°C	2 A	2 A	2 A	-
Total current per group, vertical configuration	2 A	2 A	2 A	-
Output voltage signal "1" at min. current	L+ (-0.8 V)	L+ (-0.8 V)	L+ (-0.8 V)	L+ (-0.8 V)
Output voltage signal "1" at max. current	-	-	-	-
Output current at signal "1", rated value	0.5 A	0.5 A	0.5 A	0.5 A
Output current, permitted range to 40°C	5 mA to 0.6 A	5 mA to 0.6 A	5 mA to 0.6 A	5 mA to 0.6 A
Output current, permitted range to 60°C	5 mA to 0.6 A	5 mA to 0.6 A	5 mA to 0.6 A	5 mA to 0.6 A
Output current at signal "0" max. (residual current)	0.5 mA	0.5 mA	0.5 mA	100 μA
Output delay of "0" to "1"	-	-	-	-
Output delay of "1" to "0"	-	-	-	-
Minimum load current	-	-	-	-
Lamp load	5 W	5 W	5 W	5 W
Parallel switching of outputs for redundant control of a load	possible	possible	possible	possible
Parallel switching of outputs for increased power	not possible	not possible	not possible	not possible
Actuation of digital input	✓	✓	✓	✓
Switching frequency with resistive load	max. 2.5 kHz	max. 2.5 kHz	max. 2.5 kHz	max. 2.5 kHz
Switching frequency with inductive load	max. 0.5 Hz	max. 0.5 Hz	max. 0.5 Hz	max. 0.5 Hz
Switching frequency on lamp load	max. 2.5 kHz	max. 2.5 kHz	max. 2.5 kHz	max. 2.5 kHz

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Order number	312-5BE13	313-5BF13	313-6CF13	314-6CF02
Internal limitation of inductive shut-off voltage	L+ (-52 V)	L+ (-52 V)	L+ (-52 V)	L+ (-52 V)
Short-circuit protection of output	yes, electronic	yes, electronic	yes, electronic	yes, electronic
Trigger level	1 A	1 A	1 A	1 A
Number of operating cycle of relay outputs	-	-	-	-
Switching capacity of contacts	-	-	-	-
Output data size	1 Byte	2 Byte	2 Byte	18 Byte
Technical data analog inputs				
Number of inputs	-	5	-	5
Cable length, shielded	-	200 m	-	200 m
Rated load voltage	-	DC 24 V	-	DC 24 V
Reverse polarity protection of rated load voltage	-	✓	-	✓
Current consumption from load voltage L+ (without load)	-	-	-	85 mA
Voltage inputs	-	✓	-	✓
Min. input resistance (voltage range)	-	100 kΩ	-	120 kΩ
Input voltage ranges	-	0 V ... +10 V -10 V ... +10 V	-	-10 V ... +10 V 0 V ... +10 V
Operational limit of voltage ranges	-	+/-0.3%	-	+/-0.3%
Basic error limit voltage ranges with SFU	-	+/-0.2%	-	+/-0.3%
Current inputs	-	✓	-	✓
Min. input resistance (current range)	-	100 Ω	-	33 Ω
Input current ranges	-	0 mA ... +20 mA -20 mA ... +20 mA +4 mA ... +20 mA	-	-20 mA ... +20 mA 0 mA ... +20 mA +4 mA ... +20 mA
Operational limit of current ranges	-	+/-0.3%	-	+/-0.3%
Basic error limit current ranges with SFU	-	+/-0.2%	-	+/-0.2%
Resistance inputs	-	✓	-	✓
Resistance ranges	-	0 ... 600 Ohm	-	0 ... 600 Ohm
Operational limit of resistor ranges	-	+/-0.4%	-	+/-0.4%
Basic error limit	-	+/-0.2%	-	+/-0.2%
Resistance thermometer inputs	-	✓	-	✓
Resistance thermometer ranges	-	Pt100	-	Pt100 Pt1000 Ni100 Ni1000
Operational limit of resistance thermometer ranges	-	+/-0.6%	-	+/-0.6%
Basic error limit thermoresistor ranges	-	+/-0.4%	-	+/-0.4%
Thermocouple inputs	-	-	-	-
Thermocouple ranges	-	-	-	-
Operational limit of thermocouple ranges	-	-	-	-

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312-5BE13	314-6CG13					
313-5BF13						
313-6CF13						
314-6CF02						

Order number	312-5BE13	313-5BF13	313-6CF13	314-6CF02
Basic error limit thermoelement ranges	-	-	-	-
Programmable temperature compensation	-	-	-	-
External temperature compensation	-	-	-	-
Internal temperature compensation	-	-	-	-
Resolution in bit	-	12	-	12
Measurement principle	-	successive approximation	-	Sigma-Delta
Basic conversion time	-	1 ms	-	1 ms
Noise suppression for frequency	-	80 dB	-	80 dB
Initial data size	-	10 Byte	-	10 Byte
Technical data analog outputs				
Number of outputs	-	2	-	2
Cable length, shielded	-	200 m	-	200 m
Rated load voltage	-	-	-	DC 24 V
Reverse polarity protection of rated load voltage	-	-	-	✓
Current consumption from load voltage L+ (without load)	-	-	-	-
Voltage output short-circuit protection	-	✓	-	-
Voltage outputs	-	✓	-	✓
Min. load resistance (voltage range)	-	1 kΩ	-	1 kΩ
Max. capacitive load (current range)	-	1 µF	-	1 µF
Output voltage ranges	-	-10 V ... +10 V 0 V ... +10 V	-	-10 V ... +10 V 0 V ... +10 V
Operational limit of voltage ranges	-	+/-0.2%	-	+/-0.4%
Basic error limit voltage ranges with SFU	-	+/-0.1%	-	+/-0.3%
Current outputs	-	✓	-	✓
Max. in load resistance (current range)	-	500 Ω	-	500 Ω
Max. inductive load (current range)	-	100 µH	-	10 mH
Output current ranges	-	-20 mA ... +20 mA 0 mA ... +20 mA +4 mA ... +20 mA	-	-20 mA ... +20 mA 0 mA ... +20 mA +4 mA ... +20 mA
Operational limit of current ranges	-	+/-0.3%	-	+/-0.4%
Basic error limit current ranges with SFU	-	+/-0.2%	-	+/-0.3%
Settling time for ohmic load	-	0.5 ms	-	0.2 ms
Settling time for capacitive load	-	0.5 ms	-	0.5 ms
Settling time for inductive load	-	0.5 ms	-	0.2 ms
Resolution in bit	-	12	-	12
Conversion time	-	1 ms	-	1
Substitute value can be applied	-	no	-	yes
Output data size	-	4 Byte	-	4 Byte

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Order number	312-5BE13	313-5BF13	313-6CF13	314-6CF02
Technical data counters				
Number of counters	2	3	3	4
Counterwidth	32 Bit	32 Bit	32 Bit	32 Bit
Maximum input frequency	10 kHz	30 kHz	30 kHz	100 kHz
Maximum count frequency	10 kHz	30 kHz	30 kHz	100 kHz
Mode incremental encoder	✔	✔	✔	✔
Mode pulse / direction	✔	✔	✔	✔
Mode pulse	✔	✔	✔	✔
Mode frequency counter	-	-	-	-
Mode period measurement	-	-	-	-
Gate input available	✔	✔	✔	✔
Latch input available	✔	✔	✔	✔
Reset input available	-	-	-	✔
Counter output available	✔	✔	✔	✔
Load and working memory				
Load memory, integrated	512 KB	512 KB	512 KB	2 MB
Load memory, maximum	512 KB	512 KB	512 KB	2 MB
Work memory, integrated	64 KB	128 KB	128 KB	512 KB
Work memory, maximal	512 KB	512 KB	512 KB	2 MB
Memory divided in 50% program / 50% data	✔	✔	✔	✔
Memory card slot	MMC-Card with max. 1 GB	MMC-Card with max. 1 GB	MMC-Card with max. 1 GB	MMC-Card with max. 1 GB
Hardware configuration				
Racks, max.	1	4	4	4
Modules per rack, max.	8	8	8	8 in multiple-, 32 in a single-rack configu-ration
Number of integrated DP master	0	0	1	1
Number of DP master via CP	4	4	4	4
Operable function modules	8	8	8	8
Operable communication modules PtP	8	8	8	8
Operable communication modules LAN	8	8	8	8
Status information, alarms, diagnostics				
Status display	yes	yes	yes	yes
Interrupts	yes	yes	yes	yes
Process alarm	yes	yes	yes	no
Diagnostic interrupt	yes	yes	yes	yes, parameterizable
Diagnostic functions	no	no	no	yes
Diagnostics information read-out	possible	possible	possible	possible

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312-5BE13 313-5BF13 313-6CF13 314-6CF02	314-6CG13					

Order number	312-5BE13	313-5BF13	313-6CF13	314-6CF02
Supply voltage display	green LED	green LED	green LED	green LED
Group error display	red SF LED	red SF LED	red SF LED	red SF LED
Channel error display	red LED per group	red LED per group	red LED per group	red LED per group
Command processing times				
Bit instructions, min.	0.02 µs	0.02 µs	0.02 µs	0.01 µs
Word instruction, min.	0.02 µs	0.02 µs	0.02 µs	0.01 µs
Double integer arithmetic, min.	0.02 µs	0.02 µs	0.02 µs	0.01 µs
Floating-point arithmetic, min.	0.12 µs	0.12 µs	0.12 µs	0.06 µs
Timers/Counters and their retentive characteristics				
Number of S7 counters	512	512	512	512
Number of S7 times	512	512	512	512
Data range and retentive characteristic				
Number of flags	8192 Byte	8192 Byte	8192 Byte	8192 Byte
Number of data blocks	4095	4095	4095	4095
Max. data blocks size	64 KB	64 KB	64 KB	64 KB
Max. local data size per execution level	510 Byte	510 Byte	510 Byte	510 Byte
Blocks				
Number of OBs	15	15	15	24
Number of FBs	2048	2048	2048	2048
Number of FCs	2048	2048	2048	2048
Maximum nesting depth per priority class	8	8	8	8
Maximum nesting depth additional within an error OB	4	4	4	4
Time				
Real-time clock buffered	✓	✓	✓	✓
Clock buffered period (min.)	6 W	6 W	6 W	6 W
Accuracy (max. deviation per day)	10 s	10 s	10 s	10 s
Number of operating hours counter	8	8	8	8
Clock synchronization	✓	✓	✓	✓
Synchronization via MPI	Master/Slave	Master/Slave	Master/Slave	Master/Slave
Synchronization via Ethernet (NTP)	no	no	no	no
Address areas (I/O)				
Input I/O address area	1024 Byte	1024 Byte	1024 Byte	8192 Byte
Output I/O address area	1024 Byte	1024 Byte	1024 Byte	8192 Byte
Input process image maximal	128 Byte	128 Byte	128 Byte	2048 Byte
Output process image maximal	128 Byte	128 Byte	128 Byte	2048 Byte
Digital inputs	272	1016	8064	65536
Digital outputs	264	1008	8064	65536

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312-5BE13 313-5BF13 313-6CF13 314-6CF02	314-6CG13					

Order number	312-5BE13	313-5BF13	313-6CF13	314-6CF02
Digital inputs central	272	1016	1008	1032
Digital outputs central	264	1008	1008	1032
Integrated digital inputs	16	24	16	8
Integrated digital outputs	8	16	16	8
Analog inputs	64	253	503	1024
Analog outputs	64	250	503	1024
Analog inputs, central	64	253	248	261
Analog outputs, central	64	250	248	258
Integrated analog inputs	0	5	0	5
Integrated analog outputs	0	2	0	2
Communication functions				
PG/OP channel	✓	✓	✓	✓
Global data communication	✓	✓	✓	✓
Number of GD circuits, max.	4	4	4	4
Size of GD packets, max.	22 Byte	22 Byte	22 Byte	22 Byte
S7 basic communication	✓	✓	✓	✓
S7 basic communication, user data per job	76 Byte	76 Byte	76 Byte	76 Byte
S7 communication	✓	✓	✓	✓
S7 communication as server	✓	✓	✓	✓
S7 communication as client	-	-	-	-
S7 communication, user data per job	160 Byte	160 Byte	160 Byte	160 Byte
Number of connections, max.	32	32	32	32
Functionality Sub-D interfaces				
Type	X2	X2	X2	X2
Type of interface	RS485	RS485	RS485	RS485
Connector	Sub-D, 9-pin, female	Sub-D, 9-pin, female	Sub-D, 9-pin, female	Sub-D, 9-pin, female
Electrically isolated	-	-	-	✓
MPI	✓	✓	✓	✓
MP²I (MPI/RS232)	-	-	-	-
DP master	-	-	-	-
DP slave	-	-	-	-
Point-to-point interface	-	-	-	-
Type	X3	X3	X3	X3
Type of interface	RS485	RS485	RS485	RS485
Connector	Sub-D, 9-pin, female	Sub-D, 9-pin, female	Sub-D, 9-pin, female	Sub-D, 9-pin, female
Electrically isolated	✓	✓	✓	✓
MPI	-	-	-	-

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312-5BE13	314-6CG13					
313-5BF13						
313-6CF13						
314-6CF02						

Order number	312-5BE13	313-5BF13	313-6CF13	314-6CF02
MP²I (MPI/RS232)	-	-	-	-
DP master	-	-	✓	✓
DP slave	-	-	✓	✓
Point-to-point interface	✓	✓	✓	✓
CAN	-	-	-	-
Functionality PROFIBUS master				
PG/OP channel	-	-	✓	✓
Routing	-	-	✓	✓
S7 basic communication	-	-	✓	✓
S7 communication	-	-	✓	✓
S7 communication as server	-	-	✓	✓
S7 communication as client	-	-	-	-
Equidistance support	-	-	-	-
Isochronous mode	-	-	-	-
SYNC/FREEZE	-	-	✓	✓
Activation/deactivation of DP slaves	-	-	✓	✓
Direct data exchange (slave-to-slave communication)	-	-	-	-
DPV1	-	-	-	-
Transmission speed, min.	-	-	9.6 kbit/s	9.6 kbit/s
Transmission speed, max.	-	-	12 Mbit/s	12 Mbit/s
Number of DP slaves, max.	-	-	32	124
Address range inputs, max.	-	-	1 KB	1 KB
Address range outputs, max.	-	-	1 KB	1 KB
User data inputs per slave, max.	-	-	244 Byte	244 Byte
User data outputs per slave, max.	-	-	244 Byte	244 Byte
Functionality PROFIBUS slave				
PG/OP channel	-	-	✓	✓
Routing	-	-	✓	✓
S7 communication	-	-	✓	✓
S7 communication as server	-	-	✓	✓
S7 communication as client	-	-	-	-
Direct data exchange (slave-to-slave communication)	-	-	-	-
DPV1	-	-	-	-
Transmission speed, min.	-	-	9.6 kbit/s	9.6 kbit/s
Transmission speed, max.	-	-	12 Mbit/s	12 Mbit/s
Automatic detection of transmission speed	-	-	-	-
Transfer memory inputs, max.	-	-	244 Byte	244 Byte
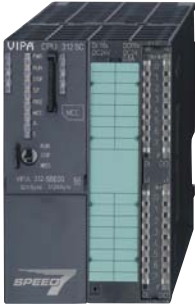
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Order number	312-5BE13	313-5BF13	313-6CF13	314-6CF02
Transfer memory outputs, max.	-	-	244 Byte	244 Byte
Address areas, max.	-	-	32	32
User data per address area, max.	-	-	32 Byte	32 Byte
Point-to-point communication				
PtP communication	✓	✓	✓	✓
Interface isolated	✓	✓	✓	✓
RS232 interface	-	-	-	-
RS422 interface	-	-	-	-
RS485 interface	✓	✓	✓	✓
Connector	Sub-D, 9-pin, female	Sub-D, 9-pin, female	Sub-D, 9-pin, female	Sub-D, 9-pin, female
Transmission speed, min.	150 bit/s	150 bit/s	150 bit/s	150 bit/s
Transmission speed, max.	115.5 kbit/s	115.5 kbit/s	115.5 kbit/s	115.5 kbit/s
Cable length, max.	500 m	500 m	500 m	500 m
Point-to-point protocol				
ASCII protocol	✓	✓	✓	✓
STX/ETX protocol	✓	✓	✓	✓
3964(R) protocol	✓	✓	✓	✓
RK512 protocol	-	-	-	-
USS master protocol	✓	✓	✓	✓
Modbus master protocol	✓	✓	✓	✓
Modbus slave protocol	-	-	-	-
Special protocols	-	-	-	-
Functionality RJ45 interfaces				
Type	X5	X5	X5	X5
Type of interface	Ethernet 10/100 MBit	Ethernet 10/100 MBit	Ethernet 10/100 MBit	Ethernet 10/100 MBit
Connector	RJ45	RJ45	RJ45	RJ45
Electrically isolated	✓	✓	✓	✓
PG/OP channel	✓	✓	✓	✓
Productive connections	-	-	-	-
Mechanical data				
Dimensions (WxHxD)	80 mm x 125 mm x 120 mm	120 mm x 125 mm x 120 mm	80 mm x 125 mm x 120 mm	80 mm x 125 mm x 120 mm
Weight	410 g	590 g	420 g	480 g
Environmental conditions				
Operating temperature	0 °C to 60 °C	0 °C to 60 °C	0 °C to 60 °C	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C	-25 °C to 70 °C	-25 °C to 70 °C	-25 °C to 70 °C
Certifications				
UL508 certification	in preparation	in preparation	in preparation	yes

Connections, Interfaces

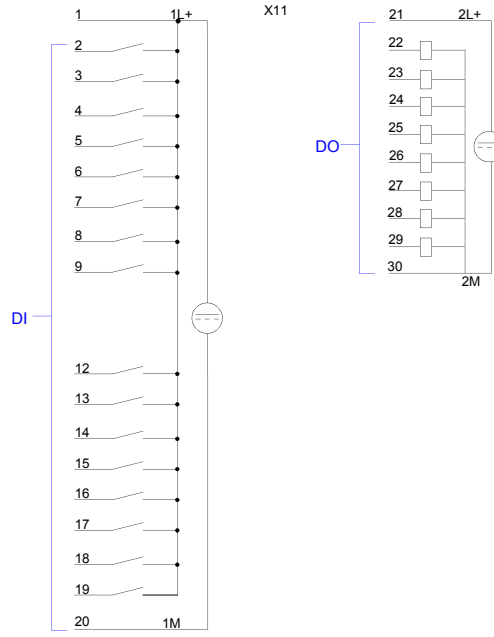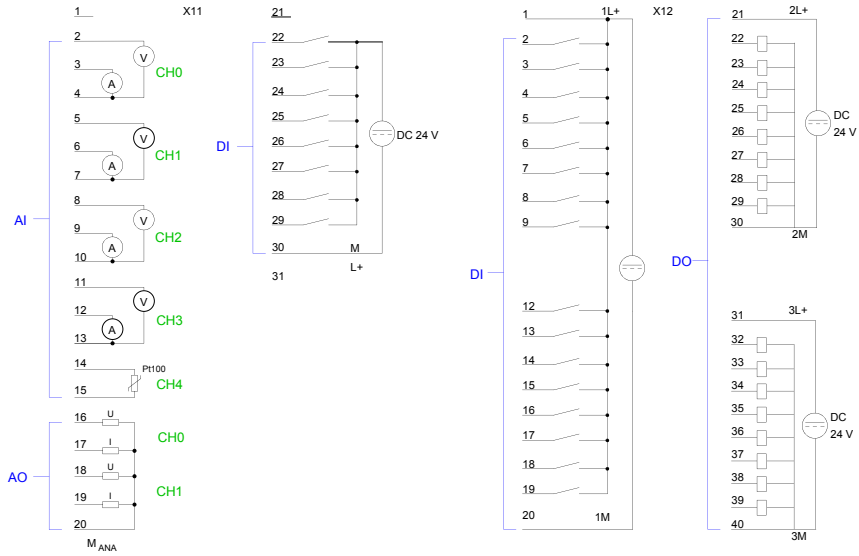| CPUs	CPUs STEP7 programmable, class C						
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312-5BE13

X1
+ ① + DC 24 V
- ② 0 V

X2 MPI
① n. c.
② M24V
③ RxD/TxD-P (line B)
④ RTS
⑤ M5V
⑥ P5V
⑦ P24V
⑧ RxD/TxD-N (line A)
⑨ n.c.

X3 PtP
① n. c.
② M24V
③ RxD/TxD-P (line B)
④ RTS
⑤ M5V
⑥ P5V
⑦ P24V
⑧ RxD/TxD-N (line A)
⑨ n.c.

X5
① Transmit +
② Transmit -
③ Receive +
④ n. c.
⑤ n. c.
⑥ Receive -
⑦ n. c.
⑧ n. c.
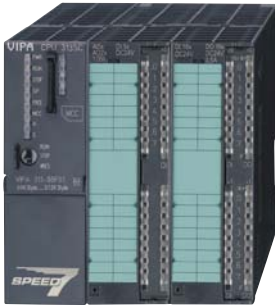
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X1
+ ① + DC 24 V
- ② 0 V

X2 MPI
① n. c.
② M24V
③ RxD/TxD-P (line B)
④ RTS
⑤ M5V
⑥ P5V
⑦ P24V
⑧ RxD/TxD-N (line A)
⑨ n.c.

X3 PtP
① shield
② M24V
③ RxD/TxD-P (line B)
④ RTS
⑤ M5V
⑥ P5V
⑦ P24V
⑧ RxD/TxD-N (line A)
⑨ n.c.

X5
① Transmit +
② Transmit -
③ Receive +
④ n. c.
⑤ n. c.
⑥ Receive -
⑦ n. c.
⑧ n. c.