

I/O systems

SIMATIC ET 200 systems without control cabinet

SIMATIC ET 200eco PN

Overview



SIMATIC ET 200eco PN video

https://players.brightcove.net/1813624294001/70fecf0f-fbad-4fad-a077-d0e26af4d84c_default/index.html?videoId=6187715895001



- Compact block I/O for processing digital, fail-safe digital, analog and IO-Link signals for connecting to bus systems with Ethernet-based protocols PROFINET, EtherNet/IP and Modbus TCP
- Cabinet-free installation in degree of protection IP65/67/69K with M12 connection system
- Extremely rugged and resistant metal enclosure
- Housing type of the I/O devices with 2x M12 L-coded power connectors
 - 45 mm x 200 mm x 48 mm (W x H x D) with 8 x M12 for digital signals and IO-Link
- Housing type of the I/O devices with 2x M12 A-coded power connectors
 - 30 mm x 200 mm x 37 mm (W x H x D) with 4 x M12 for digital signals and IO-Link
 - 60 mm x 175 mm x 37 mm (W x H x D) with 8 x M12 for digital and fail-safe digital signals as well as IO-Link
 - 60 mm x 175 mm x 37 mm (W x H x D) with 4 x M12 or 8 x M12 for analog signals
- Fieldbus connection: 2 x M12 D-coded and automatic PROFINET addressing
- Data transfer rate 100 Mbps
- LLDP neighborhood discovery for topological configuration
- Fast startup (run-up within approx. 0.5 seconds)
- Channel-specific diagnostics, identification and maintenance data IM0 ... IM3
- Firmware update
- Ambient temperature range -40 °C to 60 °C
- Can be used in hazardous areas in zones 2 and 22
- Can be used outdoors
- Increase in communication availability due to Media Redundancy Protocol (MRP) on PROFINET as well as operation on S7-1500 R/H or S7-400H by means of S2 redundancy
- Variants of the I/O devices with M12 L-coded power connectors:
 - DI 8
 - DI 16
 - DQ 8 (0.5 A)
 - DQ 8 (2 A)
 - DIQ 16 (0.5A/2A)
 - 8 IO-Link + DI 4
 - 8 IO-Link + DIQ 8
 - 4 IO-Link + DIQ 12
 - AI 8 (TC, RTD)
 - AIQ 8 (U, I)
 - TM PosInput 2
- Variants of the I/O devices with M12 A-coded power connectors:
 - 8 DI
 - 16 DI
 - 8 DQ (2 A)
 - 8 DQ (1.3 A)
 - 8 DQ (0.5 A)
 - 16 DQ (1.3 A)
 - 8 DI/DQ (1.3 A)
 - 8 F-DI/3 F-DO (2 A)
 - 8 AI (U, I, TC, RTD)
 - 8 AI (TC, RTD)
 - 4 AO (U, I)
 - 4 IO-Link
 - 4 IO-Link + 8 DI + 4 DQ (1.3 A)

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- Digital I/O devices with 2x M12 L-coded power connectors and 45 mm width
 - 8 digital input signals with 8xM12 connection
 - 16 digital input signals with 8xM12 connection
 - 8 digital output signals 8-channel digital output module 0.5A with 8xM12 connection
 - 8 digital output signals 2A with 8xM12 connection
 - 16 digital input/output signals 0.5A/2A with 8xM12 connection



- Digital I/O devices with 2x M12 A-coded power connectors and 60 mm width
 - 8 digital input signals with 8xM12 connection
 - 16 digital input signals with 8xM12 connection
 - 8 digital output signals 1.3 A with 8xM12 connection
 - 8 digital output signals 2 A with 8xM12 connection
 - 16 digital output signals 1.3 A with 8xM12 connection
 - 8 digital input/output signals 1.3 A with 8xM12 connection



- Digital I/O devices with 2x M12 A-coded power connectors and 30 mm width
 - 8 digital input signals with 4xM12 connection
 - 8 digital output signals 0.5 A with 4xM12 connection
 - 8 digital output signals 1.3 A with 4xM12 connection

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Ordering data	Article No.		Article No.
ET 200eco PN digital input modules with M12 L-coded power connector • DI 8 x 24 V DC; 8 x M12, single and dual assignment, degree of protection IP67 • DI 16 x 24 V DC, 8 x M12, dual assignment, degree of protection IP67 with M12 A-coded power connector • 8 DI 24 V DC; 4 x M12, dual assignment, degree of protection IP67 • 8 DI 24 V DC; 8 x M12, degree of protection IP67 • 16 DI 24 V DC; 8 x M12, dual assignment, degree of protection IP67	6ES7141-6BG00-0BB0 6ES7141-6BH00-0BB0 6ES7141-6BF00-0AB0 6ES7141-6BG00-0AB0 6ES7141-6BH00-0AB0	PROFINET M12 connection plug, for user assembly Connector for PROFINET, 4-core, shielded IE M12 plug PRO connector • 1 unit • 8 units IE FC M12 plug PRO connector, for user assembly • 1 unit • 8 units	3RK1902-2DA00 6GK1901-0DB10-6AA0 6GK1901-0DB10-6AA8 6GK1901-0DB20-6AA0 6GK1901-0DB20-6AA8
ET 200eco PN digital output modules with M12 L-coded power connector • DQ 8 x 24 V DC/0.5 A; 8 x M12, single and dual assignment, degree of protection IP67 • DQ 8 x 24 V DC/2 A; 8 x M12, single and dual assignment, degree of protection IP67 with M12 A-coded power connector • 8 DQ 24 V DC/0.5 A; 4 x M12, dual assignment, 1 load voltage supply DQ; degree of protection IP67 • 8 DQ 24 V DC/1.3 A; 4 x M12, dual assignment, degree of protection IP67 • 8 DQ 24 V DC/1.3 A; 8 x M12, degree of protection IP67 • 8 DQ 24 V DC/2 A; 8 x M12, degree of protection IP67 • 16 DQ 24 V DC/1.3 A; 8 x M12, dual assignment, degree of protection IP67	6ES7142-6BG00-0BB0 6ES7142-6BR00-0BB0 6ES7142-6BF50-0AB0 6ES7142-6BF00-0AB0 6ES7142-6BG00-0AB0 6ES7142-6BR00-0AB0 6ES7142-6BH00-0AB0	M12 connection plug for 24 V DC load power supply Connection socket for 24 V DC infeed; 4-pin, A-coded, 3 units Connector for loop-through of 24 V DC; 4-pin, A-coded, 3 units Power M12 plug PRO Connector for 24 V DC supply voltage, with installation instructions, 4-pin, L-coded, 1 unit Power M12 cable connector PRO Connection socket for 24 V DC supply voltage, 4-pin, L-coded, with installation instructions, 1 unit M12 circular connector Can be assembled, for connecting actuators or sensors, 5-pin, screw terminal, max. 0.75 mm ² , A-coded, max. 4 A • Straight • Angled	6GK1907-0DC10-6AA3 6GK1907-0DB10-6AA3 6GK1906-0EA00 6GK1906-0EB00
ET 200eco PN digital input/output modules with M12 L-coded power connector • DIQ 16 x 24 V DC/0.5 A/2 A; dual assignment, degree of protection IP67 with M12 A-coded power connector • 8 DI/DQ 24 V DC/1.3 A; 8 x M12, degree of protection IP67	6ES7143-6BH00-0BB0 6ES7147-6BG00-0AB0	PROFINET bus cable Preassembled on one side with 1 x M12, D-coded, 4-wire, shielded • 3 m • 5 m • 10 m IE connecting cable M12-90/M12-90 Preassembled IE FC TP trailing cable GP 2 x 2 (PROFINET type C) with two 4-pin M12 plugs (D-coded) up to 85 m, degree of protection IP65/IP67, 90° cable outlet Length: • 0.3 m • 0.5 m • 1.0 m • 1, 5 m • 2.0 m • 3.0 m • 5.0 m • 10 m • 15 m	3RK1902-4BA00-5AA0 3RK1902-4DA00-5AA0 3RK1902-4CA00-4AA0 3RK1902-2HB30 3RK1902-2HB50 3RK1902-2HC10
Accessories • PD voltage distributor, 24 V DC; 1 X 7/8", 4 X M12 • Terminal block for ET 200eco PN, 10 A insulation displacement terminals • Spare fuses for terminal block, 10 units • Mounting rail 0.5 m • Profile screw for mounting rail, 50 units • Sealing cap M12 for IP67 modules, 12 mm outer diameter, without O-ring, 10 units • Sealing cap M12 for IP67 modules, 15 mm outer diameter, with O-ring, 10 units • Labels 10 mm x 5 mm RAL9016, for I/O devices with 2x M12 L-coded power connectors; 5 frames with 40 labels each • Labels 10 mm x 7 mm Ti-grey, for I/O devices with 2x M12 A-coded power connectors; 5 frames with 40 labels each	6ES7148-6CB00-0AA0 6ES7194-6CA00-0AA0 6ES7194-6HB00-0AA0 6ES7194-6GA00-0AA0 6ES7194-6MA00-0AA0 3RX9802-0AA00 3RK1901-1KA00 6ES7194-2BA00-0AA0 3RT2900-1SB10		6XV1870-8GE30 6XV1870-8GE50 6XV1870-8GH10 6XV1870-8GH15 6XV1870-8GH20 6XV1870-8GH30 6XV1870-8GH50 6XV1870-8GN10 6XV1870-8GN15

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Ordering data	Article No.	Article No.	
IE connecting cable M12-180/IE FC RJ45 plug-145 Preassembled IE FC TP trailing cable GP 2 x 2 (PROFINET type C) with M12 plug (D-coded) and IE FC RJ45 plug, degree of protection IP65/IP67 Length: • 2.0 m • 3.0 m • 5.0 m • 10 m • 15 m	6XV1871-5TH20 6XV1871-5TH30 6XV1871-5TH50 6XV1871-5TN10 6XV1871-5TN15		
M12-180/M12-180 IE robust connecting cable Preassembled IE FC TP robust food cable 2 x 2 (PROFINET type C) with two 4-pin M12 plugs (D-coded), degree of protection IP69 Length: • 1.0 m • 2.0 m • 3.0 m • 5.0 m	6XV1881-5AH10 6XV1881-5AH20 6XV1881-5AH30 6XV1881-5AH50	6XV1801-5GE30 6XV1801-5GE50 6XV1801-5GH10 6XV1801-5GH15 6XV1801-5GH20 6XV1801-5GH30 6XV1801-5GH50 6XV1801-5GN10 6XV1801-5GN15	
M12 Y-cable For double connection of I/O by means of a single cable to ET 200, 5-pin	6ES7194-6KA00-0XA0		
Control line Preassembled on one side with 1 x M12 plug angled, 5-pin, 5 x 0.34 mm², A-coded, max. 4 A, PUR casing, black • 1.5 m • 5 m • 10 m Preassembled, 1 x M12 cable box straight, 1 x M12 plug, 3 x 0.34 mm², A-coded, max. 4 A, PUR casing, black	3RK1902-4HB15-5AA0 3RK1902-4HB50-5AA0 3RK1902-4HC01-5AA0 3RK1902-4PB15-3AA0		
IO-Link connecting cables Between IO-Link master and reader, on both sides with M12 plug, 4-pin • 5 m • 10 m	6GT2891-4MH50 6GT2891-4MN10		
Energy cable 4 x 1.5 Traillable power cable, with 4 copper cores (1.5 mm2) for connecting to M12 plug-in connector; sold by the meter; max. delivery unit 1000 m, minimum order quantity 20 m	6XV1801-2B		
		M12-90/M12-90 M12 power connecting cable Flexible 4-core power connecting cable, preassembled with A-coded, 5-pin M12 plug and A-coded, 5-pin M12 socket to supply the ET 200 with 24 V DC; 90° cable outlet Length: • 0.3 m • 0.5 m • 1.0 m • 1.5 m • 2.0 m • 3.0 m • 5.0 m • 10 m • 15 m	
		M12-90/M12-90 M12 power connecting cable Flexible 4-core power connecting cable, preassembled with L-coded, 4-pin M12 plug and L-coded, 4-pin M12 socket, both sides angled 90°, to supply terminal devices with 24 V DC Length: • 0.5 m • 1.0 m • 1.5 m • 2.0 m • 3.0 m • 5.0 m • 10 m • 15 m	6XV1801-6GE50 6XV1801-6GH10 6XV1801-6GH15 6XV1801-6GH20 6XV1801-6GH30 6XV1801-6GH50 6XV1801-6GN10 6XV1801-6GN15
		M12-180/M12-180 M12 power connecting cable Flexible 4-core power connecting cable, preassembled with L-coded, 4-pin M12 plug and L-coded, 4-pin M12 socket to supply terminal devices with 24 V DC Length: • 0.5 m • 1.0 m • 1.5 m • 2.0 m • 3.0 m • 5.0 m • 10 m • 15 m	6XV1801-6DE50 6XV1801-6DH10 6XV1801-6DH15 6XV1801-6DH20 6XV1801-6DH30 6XV1801-6DH50 6XV1801-6DN10 6XV1801-6DN15
		M12-180/M12-180 M12 robust power connecting cable Flexible 4-core power connecting cable, preassembled with A-coded, 5-pin M12 plug and A-coded, 5-pin M12 socket to supply IP69 components with 24 V DC; Length: • 1.0 m • 2.0 m • 3.0 m • 5.0 m	6XV1801-5AH10 6XV1801-5AH20 6XV1801-5AH30 6XV1801-5AH50

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Technical specifications

Article number	6ES7141-6BG00-0BB0 ET 200eco PN, DI 8x24VDC, M12-L	6ES7141-6BH00-0BB0 ET 200eco PN, DI 16x24VDC, M12-L
General information		
Product function		
• Isochronous mode	Yes	Yes
• IRT	Yes	Yes
• Prioritized startup	Yes	Yes
Engineering with		
• STEP 7 TIA Portal configurable/ integrated from version	STEP 7 V17 or higher with HSP 0363	STEP 7 V17 or higher with HSP 0363
• PROFINET from GSD version/ GSD revision	GSDML V2.3.x	GSDML V2.3.x
• Multi Fieldbus Configuration Tool (MFCT)	from V1.3 SP1	from V1.3 SP1
Operating mode		
• DI	Yes	Yes
• Counter	No	No
• MSI	Yes	Yes
Supply voltage		
Load voltage 1L+		
• Rated value (DC)	24 V	24 V
• Reverse polarity protection	Yes; Against destruction; encoder power supply outputs applied with reversed polarity	Yes; Against destruction; encoder power supply outputs applied with reversed polarity
Input current		
Current consumption (rated value)	85 mA; without load	90 mA; without load
from load voltage 1L+ (unswitched voltage)	12 A; Maximum value	12 A; Maximum value
from load voltage 2L+, max.	12 A; Maximum value	12 A; Maximum value
Encoder supply		
Number of outputs	8	8
Hardware configuration		
Submodules		
• Number of configurable submodules, max.	2	2
Digital inputs		
Number of digital inputs	8	16
Digital inputs, parameterizable	Yes	Yes
Source/sink input	P-reading	P-reading
Input characteristic curve in accordance with IEC 61131, type 3	Yes	Yes
Number of simultaneously controllable inputs		
all mounting positions		
- up to 60 °C, max.	8	16
Input voltage		
• Rated value (DC)	24 V	24 V
• for signal "0"	-30 to +5 V	-30 to +5 V
• for signal "1"	+11 to +30V	+11 to +30V
Input current		
• for signal "1", typ.	2.4 mA	2.4 mA
Input delay (for rated value of input voltage) for standard inputs		
- parameterizable	Yes; 0.05 / 0.1 / 0.4 / 0.8 / 1.6 / 3.2 / 12.8 / 20 ms	Yes; 0.05 / 0.1 / 0.4 / 0.8 / 1.6 / 3.2 / 12.8 / 20 ms
Cable length		
• unshielded, max.	30 m	30 m
Encoder		
Connectable encoders		
• 2-wire sensor	Yes	Yes
- permissible quiescent current (2-wire sensor), max.	1.5 mA	1.5 mA
Interfaces		
Number of PROFINET interfaces	1	1

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Article number	6ES7141-6BG00-0BB0 ET 200eco PN, DI 8x24VDC, M12-L	6ES7141-6BH00-0BB0 ET 200eco PN, DI 16x24VDC, M12-L
1. Interface		
Interface type	PROFINET with 100 Mbit/s full duplex (100BASE-TX)	PROFINET with 100 Mbit/s full duplex (100BASE-TX)
Interface types		
• M12 port	Yes; 2x M12, 4-pin, D-coded	Yes; 2x M12, 4-pin, D-coded
• Number of ports	2	2
• integrated switch	Yes	Yes
Protocols		
• PROFINET IO Device	Yes	Yes
• Open IE communication	Yes	Yes
Interface types		
M12 port		
• Autonegotiation	Yes	Yes
• Autocrossing	Yes	Yes
• Transmission rate, max.	100 Mbit/s	100 Mbit/s
Protocols		
Supports protocol for PROFINET IO	Yes	Yes
PROFIsafe	No	No
EtherNet/IP	Yes	Yes
Modbus TCP	Yes	Yes
PROFINET IO Device		
Services		
- IRT	Yes; 250 µs to 4 ms in 125 µs frame	Yes; 250 µs to 4 ms in 125 µs frame
- Prioritized startup	Yes	Yes
Redundancy mode		
• PROFINET system redundancy (S2)	Yes	Yes
• PROFINET system redundancy (R1)	No	No
• H-Sync forwarding	Yes	Yes
Media redundancy		
- MRP	Yes	Yes
EtherNet/IP		
Services		
- CIP Implicit Messaging	Yes	Yes
- CIP Explicit Messaging	Yes	Yes
- CIP Safety	No	No
- Shared device	Yes; 2x EtherNet/IP Scanner	Yes; 2x EtherNet/IP Scanner
- Number of scanners with shared device, max.	2	2
Updating times		
- Requested Packet Interval (RPI)	2 ms	2 ms
Redundancy mode		
- DLR (Device Level Ring)	No	No
Address area		
- Address space per module, max.	20 byte	20 byte
- LargeForwardOpen (Class3)	No	No
Modbus TCP		
Services		
- read coils (code=1)	Yes	Yes
- read discrete inputs (code=2)	Yes	Yes
- Read Holding Registers (Code=3)	Yes	Yes
- write single coil (code=5)	Yes	Yes
- write multiple coils (code=15)	Yes	Yes
- Write Multiple Registers (Code=16)	Yes	Yes
- Parameter change by master	No	No
- Modbus TCP Security Protocol	No	No
Address space per station		
- Address space per station, max.	20 byte	20 byte
- Access-consistent address space	2 byte	2 byte

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Updating time		
- I/O request interval	2 ms	2 ms
Connections		
- number of connections per device	12	12
Open IE communication		
• TCP/IP	Yes; (only EtherNet/IP or Modbus TCP)	Yes; (only EtherNet/IP or Modbus TCP)
• SNMP	Yes	Yes
• LLDP	Yes	Yes
• ARP	Yes	Yes
Isochronous mode		
Equidistance	Yes	Yes
shortest clock pulse	250 µs	250 µs
max. cycle	4 ms	4 ms
Interrupts/diagnostics/ status information		
Alarms		
• Diagnostic alarm	Yes; Parameterizable	Yes; Parameterizable
• Maintenance interrupt	Yes; Parameterizable	Yes; Parameterizable
• Hardware interrupt	Yes; Parameterizable	Yes; Parameterizable
Diagnostics		
• Diagnostic information readable	Yes	Yes
• Monitoring the supply voltage	Yes	Yes
- parameterizable	Yes	Yes
• Wire-break	Yes; DI, input current < 0.3 mA, per channel	Yes; DI, input current < 0.3 mA, per channel
• Short-circuit encoder supply	Yes; Per channel group	Yes; Per channel group
Diagnostics indication LED		
• RUN LED	Yes; green LED	Yes; green LED
• ERROR LED	Yes; red LED	Yes; red LED
• MAINT LED	Yes; Yellow LED	Yes; Yellow LED
• NS LED	Yes; green/red LED	Yes; green/red LED
• MS LED	Yes; green/red LED	Yes; green/red LED
• IO LED	Yes; red/green/yellow LEDs	Yes; red/green/yellow LEDs
• Channel status display	Yes; green LED	Yes; green LED
• for channel diagnostics	Yes; red LED	Yes; red LED
• Connection display LINK TX/RX	Yes; green LED, only link	Yes; green LED, only link
Potential separation		
between the load voltages	Yes	Yes
between Ethernet and electronics	Yes	Yes
Potential separation channels		
• between the channels	No	No
• between the channels and the power supply of the electronics	No	No
Degree and class of protection		
IP degree of protection	IP65/67/69K	IP65/67/69K
Standards, approvals, certificates		
Suitable for safety-related tripping of standard modules	Yes; from FS01	Yes; from FS01
Highest safety class achievable for safety-related tripping of standard modules		
• Performance level according to ISO 13849-1	PL d	PL d
• Category according to ISO 13849-1	Cat. 3	Cat. 3
• SIL acc. to IEC 62061	SIL 2	SIL 2
Use in hazardous areas		
• Explosion protection category for gas	ATEX, UKEX, IECEx, CCCEx for Zone 2	ATEX, UKEX, IECEx, CCCEx for Zone 2
• Explosion protection category for dust	ATEX, UKEX, IECEx, CCCEx for Zone 22	ATEX, UKEX, IECEx, CCCEx for Zone 22

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Product functions / securitr				
signed firmware update	Yes		Yes	
safely removing data	Yes		Yes	
Ambient conditions				
Ambient temperature during operation				
• min.	-40 °C		-40 °C	
• max.	60 °C		60 °C	
Altitude during operation relating to sea level				
• Ambient air temperature-barometric pressure-altitude	Up to max. 5 000 m, at installation height > 2 000 m additional restrictions		Up to max. 5 000 m, at installation height > 2 000 m additional restrictions	
connection method				
Design of electrical connection	4/5-pin M12 circular connectors		4/5-pin M12 circular connectors	
Design of electrical connection for the inputs and outputs	M12, 5-pin, A-coded		M12, 5-pin, A-coded	
Design of electrical connection for supply voltage	M12, 4-pin, L-coded		M12, 4-pin, L-coded	
Dimensions				
Width	45 mm		45 mm	
Height	200 mm		200 mm	
Depth	48 mm		48 mm	
Weights				
Weight, approx.	780 g		780 g	

Article number	6ES7141-6BF00-0AB0 ET200eco PN, 8DI, DC24V, 4xM12	6ES7141-6BG00-0AB0 ET200eco PN, 8DI, DC24V, 8xM12	6ES7141-6BH00-0AB0 ET200eco PN, 16DI, DC24V, 8xM12
Supply voltage			
Rated value (DC)	24 V	24 V	24 V
Reverse polarity protection	Yes	Yes	Yes
Input current			
Current consumption, typ.	100 mA	100 mA	100 mA
from supply voltage 1L+, max.	4 A	4 A	4 A
Encoder supply			
Number of outputs	4	8	8
Digital inputs			
Number of digital inputs	8	8	16
• in groups of	2	1	2
Input characteristic curve in accordance with IEC 61131, type 3	Yes	Yes	Yes
Number of simultaneously controllable inputs			
all mounting positions			
- up to 60 °C, max.	8	8	16
Input voltage			
• Rated value (DC)	24 V	24 V	24 V
• for signal "0"	-3 to +5V	-3 to +5V	-3 to +5V
• for signal "1"	+11 to +30V	+11 to +30V	+11 to +30V
Input current			
• for signal "1", typ.	7 mA	7 mA	7 mA
Cable length			
• unshielded, max.	30 m	30 m	30 m
Encoder			
Connectable encoders			
• 2-wire sensor	Yes	Yes	Yes
- permissible quiescent current (2-wire sensor), max.	1.5 mA	1.5 mA	1.5 mA
Interfaces			
Transmission procedure	100BASE-TX	100BASE-TX	100BASE-TX
Number of PROFINET interfaces	1	1	1

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1. Interface			
Interface types			
• M12 port	Yes	Yes	Yes
• integrated switch	Yes	Yes	Yes
Interface types			
M12 port			
• Autonegotiation	Yes	Yes	Yes
• Autocrossing	Yes	Yes	Yes
• Transmission rate, max.	100 Mbit/s	100 Mbit/s	100 Mbit/s
Protocols			
Supports protocol for PROFINET IO	Yes	Yes	Yes
PROFINET CBA	No	No	No
PROFIsafe	No	No	No
PROFINET IO Device			
Services			
- IRT with the option "high flexibility"	Yes	Yes	Yes
- Prioritized startup	Yes	Yes	Yes
Redundancy mode			
Media redundancy			
- MRP	Yes	Yes	Yes
Open IE communication			
• TCP/IP	No	No	No
• SNMP	Yes	Yes	Yes
• DCP	Yes	Yes	Yes
• LLDP	Yes	Yes	Yes
• ping	Yes	Yes	Yes
• ARP	Yes	Yes	Yes
Interrupts/diagnostics/ status information			
Diagnostics function	Yes	Yes	Yes
Alarms			
• Diagnostic alarm	Yes	Yes	Yes
Diagnoses			
• Diagnostic information readable	Yes	Yes	Yes
• Monitoring the supply voltage	Yes; green "ON" LED	Yes; green "ON" LED	Yes; green "ON" LED
• Wire-break in signal transmitter cable	Yes	Yes	Yes
• Short-circuit encoder supply	Yes; Per channel group	Yes; Per channel group	Yes; Per channel group
• Group error	Yes; Red/yellow "SF/MT" LED	Yes; Red/yellow "SF/MT" LED	Yes; Red/yellow "SF/MT" LED
Potential separation			
between the load voltages	Yes	Yes	Yes
between load voltage and all other switching components	No	No	No
between Ethernet and electronics	Yes	Yes	Yes
Potential separation channels			
• between the channels	No	No	No
Degree and class of protection			
IP degree of protection	IP65/67	IP65/67	IP65/67
Standards, approvals, certificates			
Use in hazardous areas			
• Explosion protection category for gas	ATEX II 3G Ex nA II T4	ATEX II 3G Ex nA II T4	ATEX II 3G Ex nA II T4
• Explosion protection category for dust	ATEX II 3D Ex tc IIIC T90°C Dc	ATEX II 3D Ex tc IIIC T90°C Dc	ATEX II 3D Ex tc IIIC T90°C Dc
connection method			
Design of electrical connection	4/5-pin M12 circular connectors	4/5-pin M12 circular connectors	4/5-pin M12 circular connectors
Dimensions			
Width	30 mm	60 mm	60 mm
Height	200 mm	175 mm	175 mm
Depth	49 mm	49 mm	49 mm
Weights			
Weight, approx.	550 g	910 g	910 g

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SIMATIC ET 200eco PN

I/O devices > Digital I/O devices

Technical specifications

Article number	6ES7142-6BG00-0BB0 ET 200eco PN, DQ 8x24VDC/0,5A, M12-L	6ES7142-6BR00-0BB0 ET 200eco PN, DQ 8x24VDC/2A, M12-L
General information		
Product function		
• Isochronous mode	Yes	Yes
• IRT	Yes	Yes
• Prioritized startup	Yes	Yes
Engineering with		
• STEP 7 TIA Portal configurable/ integrated from version	STEP 7 V17 or higher with HSP 0363	STEP 7 V17 or higher with HSP 0363
• PROFINET from GSD version/ GSD revision	GSDML V2.3.x	GSDML V2.3.x
• Multi Fieldbus Configuration Tool (MFCT)	from V1.3 SP1	from V1.3 SP1
Operating mode		
• DQ	Yes	Yes
• MSO	Yes	Yes
Supply voltage		
Load voltage 1L+		
• Rated value (DC)	24 V	24 V
• Reverse polarity protection	Yes	Yes
Load voltage 2L+		
• Rated value (DC)	24 V	24 V
• Reverse polarity protection	Yes; against destruction; load increasing	Yes; against destruction
Input current		
Current consumption (rated value)	65 mA; without load	65 mA; without load
from load voltage 1L+ (unswitched voltage)	12 A; Maximum value	12 A; Maximum value
from load voltage 2L+, max.	12 A; Maximum value	12 A; Maximum value
Hardware configuration		
Submodules		
• Number of configurable submodules, max.	2	2
Digital outputs		
Number of digital outputs	8	8
Current-sourcing	Yes	Yes
output type acc. to IEC 61131, type 0.5	Yes	
output type acc. to IEC 61131, type 2		Yes
Short-circuit protection	Yes; per channel, electronic	Yes; per channel, electronic
Limitation of inductive shutdown voltage to	Type: 2L+ (-52 V)	Type -14 V
Controlling a digital input	Yes	Yes
Switching capacity of the outputs		
• with resistive load, max.	0.5 A	2 A
• with inductive load, max.	0.5 A	2 A
• on lamp load, max.	5 W	10 W
Load resistance range		
• lower limit	48 Ω	12 Ω
• upper limit	4 kΩ	4 kΩ
Output voltage		
• for signal "1", min.	2L+ (-0,8 V)	2L+ (-0,8 V)
Output current		
• for signal "1" rated value	0.5 A	2 A
• for signal "0" residual current, max.	0.1 mA	0.2 mA
Parallel switching of two outputs		
• for uprating	No	No
• for redundant control of a load	Yes	Yes
Switching frequency		
• with resistive load, max.	100 Hz	100 Hz
• with inductive load, max.	0.5 Hz	0.5 Hz
• on lamp load, max.	1 Hz	1 Hz
Total current of the outputs		
• Current per module, max.	4 A	8 A
Cable length		
• unshielded, max.	30 m	30 m

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Interfaces		
Number of PROFINET interfaces	1	1
1. Interface		
Interface type	PROFINET with 100 Mbit/s full duplex (100BASE-TX)	PROFINET with 100 Mbit/s full duplex (100BASE-TX)
Interface types		
• M12 port	Yes; 2x M12, 4-pin, D-coded	Yes; 2x M12, 4-pin, D-coded
• Number of ports	2	2
• integrated switch	Yes	Yes
Protocols		
• PROFINET IO Device	Yes	Yes
• Open IE communication	Yes	Yes
Interface types		
M12 port		
• Autonegotiation	Yes	Yes
• Autocrossing	Yes	Yes
• Transmission rate, max.	100 Mbit/s	100 Mbit/s
Protocols		
Supports protocol for PROFINET IO	Yes	Yes
PROFIsafe	No	No
EtherNet/IP	Yes	Yes
Modbus TCP	Yes	Yes
PROFINET IO Device		
Services		
- IRT	Yes; 250 µs to 4 ms in 125 µs frame	Yes; 250 µs to 4 ms in 125 µs frame
- Prioritized startup	Yes	Yes
- Shared device	Yes	Yes
- Number of IO Controllers with shared device, max.	2	2
Redundancy mode		
• PROFINET system redundancy (S2)	Yes	Yes
• PROFINET system redundancy (R1)	No	No
• H-Sync forwarding	Yes	Yes
Media redundancy		
- MRP	Yes	Yes
EtherNet/IP		
Services		
- CIP Implicit Messaging	Yes	Yes
- CIP Explicit Messaging	Yes	Yes
- CIP Safety	No	No
- Shared device	Yes; 2x EtherNet/IP Scanner	Yes; 2x EtherNet/IP Scanner
- Number of scanners with shared device, max.	2	2
Updating times		
- Requested Packet Interval (RPI)	2 ms	2 ms
Redundancy mode		
- DLR (Device Level Ring)	No	No
Address area		
- Address space per module, max.	20 byte	20 byte
- LargeForwardOpen (Class3)	No	No
Modbus TCP		
Services		
- read coils (code=1)	Yes	Yes
- read discrete inputs (code=2)	Yes	Yes
- Read Holding Registers (Code=3)	Yes	Yes
- write single coil (code=5)	Yes	Yes
- write multiple coils (code=15)	Yes	Yes
- Write Multiple Registers (Code=16)	Yes	Yes
- Parameter change by master	No	No
- Modbus TCP Security Protocol	No	No

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Address space per station		
- Address space per station, max.	20 byte	20 byte
- Access-consistent address space	2 byte	2 byte
Updating time		
- I/O request interval	2 ms	2 ms
Connections		
- number of connections per device	12	12
Open IE communication		
• TCP/IP	Yes; (only EtherNet/IP or Modbus TCP)	Yes; (only EtherNet/IP or Modbus TCP)
• SNMP	Yes	Yes
• LLDP	Yes	Yes
• ARP	Yes	Yes
Isochronous mode		
Equidistance	Yes	Yes
shortest clock pulse	250 µs	250 µs
max. cycle	4 ms	4 ms
Interrupts/diagnostics/ status information		
Substitute values connectable	Yes	Yes
Alarms		
• Diagnostic alarm	Yes; Parameterizable	Yes; Parameterizable
• Maintenance interrupt	Yes; Parameterizable	Yes; Parameterizable
Diagnoses		
• Diagnostic information readable	Yes	Yes
• Monitoring the supply voltage	Yes	Yes
- parameterizable	Yes	Yes
• Wire-break	Yes	Yes
• Short-circuit	Yes; Outputs to M; channel by channel	Yes; Outputs to M; channel by channel
Diagnostics indication LED		
• RUN LED	Yes; green LED	Yes; green LED
• ERROR LED	Yes; red LED	Yes; red LED
• MAINT LED	Yes; Yellow LED	Yes; Yellow LED
• NS LED	Yes; green/red LED	Yes; green/red LED
• MS LED	Yes; green/red LED	Yes; green/red LED
• IO LED	Yes; red/green/yellow LEDs	Yes; red/green/yellow LEDs
• Channel status display	Yes; green LED	Yes; green LED
• for channel diagnostics	Yes; red LED	Yes; red LED
• For load voltage monitoring	Yes; green LED	Yes; green LED
• Connection display LINK TX/RX	Yes; green LED, only link	Yes; green LED, only link
Potential separation		
between the load voltages	Yes	Yes
between Ethernet and electronics	Yes	Yes
Potential separation channels		
• between the channels	No	No
• between the channels and the power supply of the electronics	Yes	Yes
Degree and class of protection		
IP degree of protection	IP65/67/69K	IP65/67/69K
Standards, approvals, certificates		
Suitable for safety-related tripping of standard modules	Yes; From FS02	Yes; From FS02

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Highest safety class achievable for safety-related tripping of standard modules		
• Performance level according to ISO 13849-1	PL d	PL d
• Category according to ISO 13849-1	Cat. 3	Cat. 3
• SIL acc. to IEC 62061	SIL 2	SIL 2
Use in hazardous areas		
• Explosion protection category for gas	ATEX, UKEX, IECEx, CCCEX for Zone 2	ATEX, UKEX, IECEx, CCCEX for Zone 2
• Explosion protection category for dust	ATEX, UKEX, IECEx, CCCEX for Zone 22	ATEX, UKEX, IECEx, CCCEX for Zone 22
Product functions / security		
signed firmware update	Yes	Yes
safely removing data	Yes	Yes
Ambient conditions		
Ambient temperature during operation		
• min.	-40 °C	-40 °C
• max.	60 °C	60 °C
Altitude during operation relating to sea level		
• Ambient air temperature-barometric pressure-altitude	Up to max. 5 000 m, at installation height > 2 000 m additional restrictions	Up to max. 5 000 m, at installation height > 2 000 m additional restrictions
connection method		
Design of electrical connection	4/5-pin M12 circular connectors	4/5-pin M12 circular connectors
Design of electrical connection for the inputs and outputs	M12, 5-pin, A-coded	M12, 5-pin, A-coded
Design of electrical connection for supply voltage	M12, 4-pin, L-coded	M12, 4-pin, L-coded
Dimensions		
Width	45 mm	45 mm
Height	200 mm	200 mm
Depth	48 mm	48 mm
Weights		
Weight, approx.	780 g	780 g

Article number	6ES7142-6BF50-0AB0 ET200eco PN, 8DO, DC24V/0,5A, 4xM12	6ES7142-6BF00-0AB0 ET200eco PN, 8DO, DC24V/1,3A, 4xM12	6ES7142-6BG00-0AB0 ET200eco PN, 8DO, DC24V/1,3A, 8xM12	6ES7142-6BR00-0AB0 ET200eco PN, 8 DO, DC24V/2A, 8xM12	6ES7142-6BH00-0AB0 ET200eco PN, 16DO DC24V/1,3A, 8xM12
Supply voltage					
Rated value (DC)	24 V	24 V	24 V	24 V	24 V
Reverse polarity protection	Yes	Yes	Yes	Yes	Yes
Load voltage 1L+					
• Rated value (DC)	24 V	24 V	24 V	24 V	24 V
• Reverse polarity protection	Yes	Yes	Yes	Yes	Yes
Load voltage 2L+					
• Rated value (DC)	24 V	24 V	24 V	24 V	24 V
• Reverse polarity protection	Yes	Yes	Yes	Yes	Yes
Input current					
Current consumption, typ.	100 mA	100 mA	100 mA	100 mA	100 mA
from supply voltage 1L+, max.	4 A	4 A	4 A	4 A	4 A
from load voltage 1L+ (unswitched voltage)	100 mA	4 A	4 A	4 A	4 A
from load voltage 2L+, max.	4 A	4 A	4 A	4 A	4 A
Digital outputs					
Number of digital outputs	8	8	8	8	16
• in groups of	8	4	4	4	8
Short-circuit protection	Yes	Yes	Yes	Yes	Yes
Limitation of inductive shutdown voltage to	Typ. (L1+, L2+) -47 V	Typ. (L1+, L2+) -47 V	Typ. (L1+, L2+) -47 V	Typ. (L1+, L2+) -47 V	Typ. (L1+, L2+) -47 V
Controlling a digital input	Yes	Yes	Yes	Yes	Yes
Switching capacity of the outputs					
• on lamp load, max.	5 W	5 W	5 W	10 W	5 W

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Article number	6ES7142-6BF50-0AB0 ET200eco PN, 8DO, DC24V/0,5A, 4xM12	6ES7142-6BF00-0AB0 ET200eco PN, 8DO, DC24V/1,3A, 4xM12	6ES7142-6BG00-0AB0 ET200eco PN, 8DO, DC24V/1,3A, 8xM12	6ES7142-6BR00-0AB0 ET200eco PN, 8 DO, DC24V/2A, 8xM12	6ES7142-6BH00-0AB0 ET200eco PN, 16DO DC24V/1,3A, 8xM12
Output current					
• for signal "1" rated value	0.5 A	1.3 A; Maximum	1.3 A; Maximum	2 A	1.3 A; Maximum
• for signal "0" residual current, max.	1.5 mA	1.5 mA	1.5 mA	1.5 mA	1.5 mA
Parallel switching of two outputs					
• for uprating	No	No	No	No	No
• for redundant control of a load	Yes	Yes	Yes	Yes	Yes
Switching frequency					
• with resistive load, max.	100 Hz	100 Hz	100 Hz	100 Hz	100 Hz
• with inductive load, max.	0.5 Hz	0.5 Hz	0.5 Hz	0.5 Hz	0.5 Hz
• on lamp load, max.	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz
Total current of the outputs (per group)					
all mounting positions					
- up to 55 °C, max.		3.9 A			
- up to 60 °C, max.	4 A	2.6 A	3.9 A	3.9 A	3.9 A
Cable length					
• unshielded, max.	30 m	30 m	30 m	30 m	30 m
Interfaces					
Transmission procedure	100BASE-TX	100BASE-TX	100BASE-TX	100BASE-TX	100BASE-TX
Number of PROFINET interfaces	1	1	1	1	1
1. Interface					
Interface types					
• M12 port		Yes			
• integrated switch	Yes	Yes	Yes	Yes	Yes
Interface types					
M12 port					
• Autonegotiation	Yes	Yes	Yes	Yes	Yes
• Autocrossing	Yes	Yes	Yes	Yes	Yes
• Transmission rate, max.	100 Mbit/s	100 Mbit/s	100 Mbit/s	100 Mbit/s	100 Mbit/s
Protocols					
Supports protocol for PROFINET IO	Yes	Yes	Yes	Yes	Yes
PROFINET CBA	No	No	No	No	No
PROFIsafe	No	No	No	No	No
PROFINET IO Device					
Services					
- IRT with the option "high flexibility"	Yes	Yes	Yes	Yes	Yes
- Prioritized startup	Yes	Yes	Yes	Yes	Yes
Redundancy mode					
Media redundancy					
- MRP	Yes	Yes	Yes	Yes	Yes
Open IE communication					
• TCP/IP	No	No	No	No	No
• SNMP	Yes	Yes	Yes	Yes	Yes
• DCP	Yes	Yes	Yes	Yes	Yes
• LLDP	Yes	Yes	Yes	Yes	Yes
• ping	Yes	Yes	Yes	Yes	Yes
• ARP	Yes	Yes	Yes	Yes	Yes
Interrupts/diagnostics/status information					
Diagnostics function	Yes	Yes	Yes	Yes	Yes
Alarms					
• Diagnostic alarm	Yes	Yes	Yes	Yes	Yes

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	ET200eco PN, 8DO, DC24V/0,5A, 4xM12	ET200eco PN, 8DO, DC24V/1,3A, 4xM12	ET200eco PN, 8DO, DC24V/1,3A, 8xM12	ET200eco PN, 8 DO, DC24V/2A, 8xM12	ET200eco PN, 16DO DC24V/1,3A, 8xM12
Diagnoses					
• Diagnostic information readable	Yes	Yes	Yes	Yes	Yes
• Monitoring the supply voltage	Yes; green "ON" LED	Yes; green "ON" LED	Yes; green "ON" LED	Yes; green "ON" LED	Yes; green "ON" LED
• Wire-break in actuator cable	Yes	Yes	Yes	Yes	Yes
• Short-circuit	Yes	Yes	Yes	Yes	Yes
• Group error	Yes; Red/yellow "SF/MT" LED	Yes; Red/yellow "SF/MT" LED	Yes; Red/yellow "SF/MT" LED	Yes; Red/yellow "SF/MT" LED	Yes; Red/yellow "SF/MT" LED
Potential separation					
between the load voltages	Yes	Yes	Yes	Yes	Yes
between load voltage and all other switching components	No	No	No	No	No
between Ethernet and electronics	Yes	Yes	Yes	Yes	Yes
Potential separation channels					
• between the channels	No	No	No	No	No
Degree and class of protection					
IP degree of protection	IP65/67	IP65/67	IP65/67	IP65/67	IP65/67
Standards, approvals, certificates					
Suitable for safety-related tripping of standard modules	Yes	Yes	Yes	Yes	Yes
Highest safety class achievable for safety-related tripping of standard modules					
• Performance level according to ISO 13849-1	PL d	PL d	PL d	PL d	PL d
• Category according to ISO 13849-1	Cat. 3	Cat. 3	Cat. 3	Cat. 3	Cat. 3
• SIL acc. to IEC 62061	SIL 2	SIL 2	SIL 2	SIL 2	SIL 2
Use in hazardous areas					
• Explosion protection category for gas	ATEX II 3G Ex nA II T4	ATEX II 3G Ex nA II T4	ATEX II 3G Ex nA II T4	ATEX II 3G Ex nA II T4	ATEX II 3G Ex nA II T4
• Explosion protection category for dust	ATEX II 3D Ex tc IIIC T90°C Dc	ATEX II 3D Ex tc IIIC T90°C Dc	ATEX II 3D Ex tc IIIC T90°C Dc	ATEX II 3D Ex tc IIIC T90°C Dc	ATEX II 3D Ex tc IIIC T90°C Dc
connection method					
Design of electrical connection	4/5-pin M12 circular connectors	4/5-pin M12 circular connectors	4/5-pin M12 circular connectors	4/5-pin M12 circular connectors	4/5-pin M12 circular connectors
Dimensions					
Width	30 mm	30 mm	60 mm	60 mm	60 mm
Height	200 mm	200 mm	175 mm	175 mm	175 mm
Depth	49 mm	49 mm	49 mm	49 mm	49 mm
Weights					
Weight, approx.	550 g	550 g	910 g	910 g	910 g

Article number	6ES7143-6BH00-0BB0
	ET 200eco PN, DIQ 16x24VDC/2A, M12-L
General information	
Product function	
• Isochronous mode	No
• IRT	Yes
• Prioritized startup	Yes
Engineering with	
• STEP 7 TIA Portal configurable/ integrated from version	STEP 7 V17 or higher with HSP 0363
• PROFINET from GSD version/ GSD revision	GSDML V2.3.x
• Multi Fieldbus Configuration Tool (MFCT)	from V1.3 SP1
Operating mode	
• DI	Yes
• Counter	No
• DQ	Yes
• MSI	Yes
• MSO	Yes

Article number	6ES7143-6BH00-0BB0
	ET 200eco PN, DIQ 16x24VDC/2A, M12-L
Supply voltage	
Load voltage 1L+	
• Rated value (DC)	24 V
• Reverse polarity protection	Yes; Against destruction; encoder power supply outputs applied with reversed polarity, loads pick up
Load voltage 2L+	
• Rated value (DC)	24 V
• Reverse polarity protection	Yes; against destruction
Input current	
Current consumption (rated value)	90 mA; without load
from load voltage 1L+ (unswitched voltage)	12 A; Maximum value
from load voltage 2L+, max.	12 A; Maximum value

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Encoder supply	
Number of outputs	8
Hardware configuration	
Submodules	
• Number of configurable submodules, max.	2
Digital inputs	
Number of digital inputs	16; Parameterizable as DIQ
• in groups of	8
Digital inputs, parameterizable	Yes
Source/sink input	P-reading
Input characteristic curve in accordance with IEC 61131, type 3	Yes
Number of simultaneously controllable inputs	
all mounting positions	
- up to 60 °C, max.	16
Input voltage	
• Rated value (DC)	24 V
• for signal "0"	-3 to +5V
• for signal "1"	+11 to +30V
Input current	
• for signal "1", typ.	2.4 mA
Input delay (for rated value of input voltage) for standard inputs	
- parameterizable	Yes; 0.05 / 0.1 / 0.4 / 0.8 / 1.6 / 3.2 / 12.8 / 20 ms
Cable length	
• unshielded, max.	30 m
Digital outputs	
Number of digital outputs	16; Parameterizable as DIQ
• in groups of	8; 2 load groups for 8 outputs each
Current-sourcing	Yes
output type acc. to IEC 61131, type 0.5	Yes
output type acc. to IEC 61131, type 2	Yes
Short-circuit protection	Yes; per channel, electronic
Limitation of inductive shutdown voltage to	0.5 A: Type 1L+ (-70 V) / 2 A: Type (-18 V)
Controlling a digital input	Yes
Switching capacity of the outputs	
• with resistive load, max.	0.5 A / 2 A
• with inductive load, max.	0.5 A / 2 A
• on lamp load, max.	0.5 A: 5 W / 2 A 10 W
Load resistance range	
• lower limit	0.5 A: 48 ohms / 2 A: 12 ohms
• upper limit	4 kΩ
Output voltage	
• for signal "1", min.	1L+ (-0.8 V) / 2L+ (-0.8 V)
Output current	
• for signal "1" rated value	0.5 A / 2 A
• for signal "0" residual current, max.	0.1 mA
Parallel switching of two outputs	
• for uprating	No
• for redundant control of a load	Yes

Article number	6ES7143-6BH00-0BB0 ET 200eco PN, DIQ 16x24VDC/2A, M12-L
Switching frequency	
• with resistive load, max.	0.5 A: 100 Hz / 2 A: 40 Hz
• with inductive load, max.	0.5 Hz
• on lamp load, max.	1 Hz
Total current of the outputs	
• Current per group, max.	1L+: 2 A / 2L+: 6 A
• Current per module, max.	8 A
Cable length	
• unshielded, max.	30 m
Encoder	
Connectable encoders	
• 2-wire sensor	Yes
- permissible quiescent current (2-wire sensor), max.	1.5 mA
Interfaces	
Number of PROFINET interfaces	1
1. Interface	
Interface type	PROFINET with 100 Mbit/s full duplex (100BASE-TX)
Interface types	
• M12 port	Yes; 2x M12, 4-pin, D-coded
• Number of ports	2
• integrated switch	Yes
Protocols	
• PROFINET IO Device	Yes
• Open IE communication	Yes
Interface types	
M12 port	
• Autonegotiation	Yes
• Autocrossing	Yes
• Transmission rate, max.	100 Mbit/s
Protocols	
Supports protocol for PROFINET IO	Yes
PROFIsafe	No
EtherNet/IP	Yes
Modbus TCP	Yes
PROFINET IO Device	
Services	
- IRT	Yes; 250 µs to 4 ms in 125 µs frame
- Prioritized startup	Yes
- Shared device	Yes
- Number of IO Controllers with shared device, max.	2
Redundancy mode	
• PROFINET system redundancy (S2)	Yes
• PROFINET system redundancy (R1)	No
• H-Sync forwarding	Yes
Media redundancy	
- MRP	Yes

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EtherNet/IP	
Services	
- CIP Implicit Messaging	Yes
- CIP Explicit Messaging	Yes
- CIP Safety	No
- Shared device	Yes; 2x EtherNet/IP Scanner
- Number of scanners with shared device, max.	2
Updating times	
- Requested Packet Interval (RPI)	2 ms
Redundancy mode	
- DLR (Device Level Ring)	No
Address area	
- Address space per module, max.	20 byte
- LargeForwardOpen (Class3)	No
Modbus TCP	
Services	
- read coils (code=1)	Yes
- read discrete inputs (code=2)	Yes
- Read Holding Registers (Code=3)	Yes
- write single coil (code=5)	Yes
- write multiple coils (code=15)	Yes
- Write Multiple Registers (Code=16)	Yes
- Parameter change by master	No
- Modbus TCP Security Protocol	No
Address space per station	
- Address space per station, max.	20 byte
- Access-consistent address space	2 byte
Updating time	
- I/O request interval	2 ms
Connections	
- number of connections per device	12
Open IE communication	
• TCP/IP	Yes; (only EtherNet/IP or Modbus TCP)
• SNMP	Yes
• LLDP	Yes
• ARP	Yes
Interrupts/diagnostics/ status information	
Substitute values connectable	Yes
Alarms	
• Diagnostic alarm	Yes; Parameterizable
• Maintenance interrupt	Yes; Parameterizable
• Hardware interrupt	Yes; Parameterizable
Diagnoses	
• Diagnostic information readable	Yes
• Monitoring the supply voltage	Yes
- parameterizable	Yes
• Wire-break	Yes; DI, input current < 0.3 mA, per channel
• Short-circuit	Yes; Outputs to M and P; channel by channel
• Short-circuit encoder supply	Yes; Per channel group

Article number	6ES7143-6BH00-0BB0 ET 200eco PN, DIQ 16x24VDC/2A, M12-L
Diagnostics indication LED	
• RUN LED	Yes; green LED
• ERROR LED	Yes; red LED
• MAINT LED	Yes; Yellow LED
• NS LED	Yes; green/red LED
• MS LED	Yes; green/red LED
• IO LED	Yes; red/green/yellow LEDs
• Channel status display	Yes; green LED
• for channel diagnostics	Yes; red LED
• For load voltage monitoring	Yes; green LED
• Connection display LINK TX/RX	Yes; green LED, only link
Potential separation	
between the load voltages	Yes
between Ethernet and electronics	Yes
Potential separation channels	
• between the channels	Yes
• between the channels, in groups of	8
• between the channels and the power supply of the electronics	8 channels are non-isolated and 8 channels are isolated from supply voltage 1L+
Degree and class of protection	
IP degree of protection	IP65/67/69K
Standards, approvals, certificates	
Suitable for safety-related tripping of standard modules	Yes; from FS01
Highest safety class achievable for safety-related tripping of standard modules	
• Performance level according to ISO 13849-1	PL d
• Category according to ISO 13849-1	Cat. 3
• SIL acc. to IEC 62061	SIL 2
Use in hazardous areas	
• Explosion protection category for gas	ATEX, UKEX, IECEx, CCCEX for Zone 2
• Explosion protection category for dust	ATEX, UKEX, IECEx, CCCEX for Zone 22
Product functions / security	
signed firmware update	Yes
safely removing data	Yes
Ambient conditions	
Ambient temperature during operation	
• min.	-40 °C
• max.	60 °C
Altitude during operation relating to sea level	
• Ambient air temperature-barometric pressure-altitude	Up to max. 5 000 m, at installation height > 2 000 m additional restrictions
connection method	
Design of electrical connection	4/5-pin M12 circular connectors
Design of electrical connection for the inputs and outputs	M12, 5-pin, A-coded
Design of electrical connection for supply voltage	M12, 4-pin, L-coded
Dimensions	
Width	45 mm
Height	200 mm
Depth	48 mm
Weights	
Weight, approx.	780 g

I/O systems

SIMATIC ET 200 systems without control cabinet

SIMATIC ET 200eco PN

I/O devices > Digital I/O devices

Technical specifications

Article number	6ES7147-6BG00-0AB0 ET200eco PN, 8 DIO, DC24V/1,3A, 8xM12
Supply voltage	
Rated value (DC)	24 V
Reverse polarity protection	Yes
Load voltage 2L+	
• Rated value (DC)	24 V
• Reverse polarity protection	Yes
Input current	
Current consumption, typ.	100 mA
from supply voltage 1L+, max.	4 A
from load voltage 1L+ (unswitched voltage)	4 A
from load voltage 2L+, max.	4 A
Digital inputs	
Number of digital inputs	8
• in groups of	4
Input characteristic curve in accordance with IEC 61131, type 3	Yes
Number of simultaneously controllable inputs	
all mounting positions - up to 60 °C, max.	8
Input voltage	
• Rated value (DC)	24 V
• for signal "0"	-3 to +5V
• for signal "1"	+11 to +30V
Input current	
• for signal "1", typ.	7 mA
Cable length	
• unshielded, max.	30 m
Digital outputs	
Number of digital outputs	8
• in groups of	4
Short-circuit protection	Yes; Electronic
Limitation of inductive shutdown voltage to	Typ. (L1+, L2+) -47 V
Controlling a digital input	Yes
Switching capacity of the outputs	
• on lamp load, max.	5 W
Output current	
• for signal "1" rated value	1.3 A; Maximum
• for signal "0" residual current, max.	1.5 mA
Parallel switching of two outputs	
• for uprating	No
• for redundant control of a load	Yes
Switching frequency	
• with resistive load, max.	100 Hz
• with inductive load, max.	0.5 Hz
• on lamp load, max.	1 Hz

Article number	6ES7147-6BG00-0AB0 ET200eco PN, 8 DIO, DC24V/1,3A, 8xM12
Total current of the outputs (per group)	
all mounting positions - up to 60 °C, max.	3.9 A
Cable length	
• unshielded, max.	30 m
Encoder	
Connectable encoders	
• 2-wire sensor	Yes
- permissible quiescent current (2-wire sensor), max.	1.5 mA
Interfaces	
Transmission procedure	100BASE-TX
Number of PROFINET interfaces	1
1. Interface	
Interface types	
• M12 port	Yes
• integrated switch	Yes
Interface types	
M12 port	
• Autonegotiation	Yes
• Autocrossing	Yes
• Transmission rate, max.	100 Mbit/s
Protocols	
Supports protocol for PROFINET IO	Yes
PROFINET CBA	No
PROFIsafe	No
PROFINET IO Device	
Services	
- IRT with the option "high flexibility"	Yes
- Prioritized startup	Yes
Redundancy mode	
Media redundancy	
- MRP	Yes
Open IE communication	
• TCP/IP	No
• SNMP	Yes
• DCP	Yes
• LLDP	Yes
• ping	Yes
• ARP	Yes
Interrupts/diagnostics/ status information	
Diagnostics function	Yes
Alarms	
• Diagnostic alarm	Yes

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SIMATIC ET 200 systems without control cabinet

SIMATIC ET 200eco PN

I/O devices > Digital I/O devices

Technical specifications

Article number	6ES7147-6BG00-0AB0 ET200eco PN, 8 DIO, DC24V/1,3A, 8xM12
Diagnoses	
• Diagnostic information readable	Yes
• Monitoring the supply voltage	Yes; green "ON" LED
• Wire-break in actuator cable	Yes
• Wire-break in signal transmitter cable	Yes
• Short-circuit	Yes
• Short-circuit encoder supply	Yes
• Group error	Yes; Red/yellow "SF/MT" LED
Potential separation	
between the load voltages	Yes
between load voltage and all other switching components	No
between Ethernet and electronics	Yes
Potential separation channels	
• between the channels	No

Article number	6ES7147-6BG00-0AB0 ET200eco PN, 8 DIO, DC24V/1,3A, 8xM12
Degree and class of protection	
IP degree of protection	IP65/67
Standards, approvals, certificates	
Suitable for safety-related tripping of standard modules	No
Use in hazardous areas	
• Explosion protection category for gas	ATEX II 3G Ex nA II T4
• Explosion protection category for dust	ATEX II 3D Ex tc IIIC T90°C Dc
connection method	
Design of electrical connection	4/5-pin M12 circular connectors
Dimensions	
Width	60 mm
Height	175 mm
Depth	49 mm
Weights	
Weight, approx.	910 g

I/O systems

SIMATIC ET 200 systems without control cabinet
SIMATIC ET 200eco PN

I/O devices > Analog I/O devices

Overview



Analog distributed I/O devices with 2x M12 L-coded power connectors and 45 mm width

- 8 analog input signals RTD/TC with 8xM12 connection
- 6 analog input signals U/I and 2 analog input or output signals U/I with 8xM12 connection

Analog I/O devices with 2x M12 A-coded power connectors and 60 mm width

- 8 analog input signals U/I/RTD/TC with 8xM12 connection
- 8 analog input signals RTD/TC with 8xM12 connection
- 4 analog output signals U/I with 4xM12 connection

Ordering data

Article No.

Article No.

ET 200eco PN analog input modules

- 8 AI 4 U/I + 4 RTD/TC; 8 x M12, degree of protection IP67
- 8 AI RTD/TC; 8 x M12, degree of protection IP67
- 8 AI RTD/TC; 8 x M12-L, degree of protection IP67

6ES7144-6KD00-0AB0

6ES7144-6KD50-0AB0

6ES7144-6JF00-0BB0

ET 200eco PN analog output modules

- 4 AQ U/I; 4 x M12, degree of protection IP67

6ES7145-6HD00-0AB0

ET 200eco PN analog input/output modules

- 6 AI U/I, 2 AI/AQ U/I, 8 x M12, degree of protection IP67

6ES7146-6HF00-0BB0

Accessories

- PD voltage distributor, 24 V DC; 1 X 7/8", 4 X M12
- Terminal block for ET 200eco PN, 10 A insulation displacement terminals
- Spare fuses for terminal block, 10 units
- Mounting rail 0.5 m
- Profile screw for mounting rail, 50 units
- Sealing cap M12 for IP67 modules, 12 mm outer diameter, without O-ring, 10 units
- Sealing cap M12 for IP67 modules, 15 mm outer diameter, with O-ring, 10 units
- Labels 10 mm x 7 mm Ti-grey, for I/O devices with 2x M12 A-coded power connectors; 5 frames with 40 labels each

6ES7148-6CB00-0AA0

6ES7194-6CA00-0AA0

6ES7194-6HB00-0AA0

6ES7194-6GA00-0AA0

6ES7194-6MA00-0AA0

3RX9802-0AA00

3RK1901-1KA00

3RT2900-1SB10

PROFINET M12 connection plug, for user assembly

Connector for PROFINET, 4-core, shielded

IE M12 plug PRO connector

- 1 unit
- 8 units

IE FC M12 plug PRO connector, for user assembly

- 1 unit
- 8 units

3RK1902-2DA00

6GK1901-0DB10-6AA0

6GK1901-0DB10-6AA8

6GK1901-0DB20-6AA0

6GK1901-0DB20-6AA8

M12 connection plug for 24 V DC load power supply

Connection socket for 24 V DC infeed; 4-pin, A-coded, 3 units

Connector for loop-through of 24 V DC; 4-pin, A-coded, 3 units

6GK1907-0DC10-6AA3

6GK1907-0DB10-6AA3

M12 circular connector

Can be assembled, for connecting actuators or sensors, 5-pin, screw terminal, max. 0.75 mm², A-coded, max. 4 A

- Straight
- Angled

3RK1902-4BA00-5AA0

3RK1902-4DA00-5AA0

M12 coupling socket

4-pin, screw terminal, max. 0.75 mm², A-coded, max. 4 A, angled

3RK1902-4CA00-4AA0

PROFINET bus cable

Preassembled on one side with 1 x M12, D-coded, 4-wire, shielded

- 3 m
- 5 m
- 10 m

3RK1902-2HB30

3RK1902-2HB50

3RK1902-2HC10

IE connecting cable M12-90/M12-90

Preassembled IE FC TP trailing cable GP 2 x 2 (PROFINET type C) with two 4-pin M12 plugs (D-coded) up to 85 m, degree of protection IP65/IP67, 90° cable outlet
Length:

- 0.3 m
- 0.5 m
- 1.0 m
- 1.5 m
- 2.0 m
- 3.0 m
- 5.0 m
- 10 m
- 15 m

6XV1870-8GE30

6XV1870-8GE50

6XV1870-8GH10

6XV1870-8GH15

6XV1870-8GH20

6XV1870-8GH30

6XV1870-8GH50

6XV1870-8GN10

6XV1870-8GN15

I/O systems

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I/O devices > Analog I/O devices

Ordering data	Article No.		Article No.
IE connecting cable M12-180/IE FC RJ45 plug-145 Preassembled IE FC TP trailing cable GP 2 x 2 (PROFINET type C) with M12 plug (D-coded) and IE FC RJ45 plug, degree of protection IP65/IP67 Length: • 2.0 m • 3.0 m • 5.0 m • 10 m • 15 m	6XV1871-5TH20 6XV1871-5TH30 6XV1871-5TH50 6XV1871-5TN10 6XV1871-5TN15		
M12-180/M12-180 IE robust connecting cable Preassembled IE FC TP robust food cable 2 x 2 (PROFINET type C) with two 4-pin M12 plugs (D-coded), degree of protection IP69 Length: • 1.0 m • 2.0 m • 3.0 m • 5.0 m	6XV1881-5AH10 6XV1881-5AH20 6XV1881-5AH30 6XV1881-5AH50		
		M12-90/M12-90 M12 power connecting cable Flexible 4-core power connecting cable, preassembled with A-coded, 5-pin M12 plug and A-coded, 5-pin M12 socket to supply the ET 200 with 24 V DC; 90° cable outlet Length: • 0.3 m • 0.5 m • 1.0 m • 1.5 m • 2.0 m • 3.0 m • 5.0 m • 10 m • 15 m	6XV1801-5GE30 6XV1801-5GE50 6XV1801-5GH10 6XV1801-5GH15 6XV1801-5GH20 6XV1801-5GH30 6XV1801-5GH50 6XV1801-5GN10 6XV1801-5GN15
		M12-180/M12-180 M12 robust power connecting cable Flexible 4-core power connecting cable, preassembled with A-coded, 5-pin M12 plug and A-coded, 5-pin M12 socket to supply IP69 components with 24 V DC; Length: • 1.0 m • 2.0 m • 3.0 m • 5.0 m	6XV1801-5AH10 6XV1801-5AH20 6XV1801-5AH30 6XV1801-5AH50

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Technical specifications

Article number	6ES7144-6KD00-0AB0	6ES7144-6KD50-0AB0	6ES7144-6JF00-0BB0
	ET200eco PN, 8AI; 4 U/I; 4 RTD/TC 8xM12	ET200eco PN, 8AI RTD/TC 8xM12	ET 200eco PN, AI 8xRTD/TC, M12-L
General information			
Product function			
• Isochronous mode			No
• IRT			Yes
• Prioritized startup			Yes
• Measuring range scalable			Yes
Engineering with			
• STEP 7 TIA Portal configurable/ integrated from version			STEP 7 V17 or higher with HSP 0369
• PROFINET from GSD version/ GSD revision			GSDML V2.4.x
• Multi Fieldbus Configuration Tool (MFCT)			from V1.3 SP1
Operating mode			
• MSI			Yes
CiR - Configuration in RUN			
Calibration possible in RUN			Yes
Supply voltage			
Rated value (DC)	24 V	24 V	
Reverse polarity protection	Yes	Yes; against destruction	
Load voltage 1L+			
• Rated value (DC)			24 V
• Reverse polarity protection			Yes; against destruction
Input current			
Current consumption (rated value)			85 mA; without load
Current consumption, typ. from load voltage 1L+ (unswitched voltage)	110 mA	110 mA	12 A; Maximum value
from load voltage 2L+, max.			12 A; Maximum value

I/O systems

SIMATIC ET 200 systems without control cabinet

SIMATIC ET 200eco PN

I/O devices > Analog I/O devices

Technical specifications

Article number	6ES7144-6KD00-0AB0 ET200eco PN, 8AI; 4 U/I; 4 RTD/TC 8xM12	6ES7144-6KD50-0AB0 ET200eco PN, 8AI RTD/TC 8xM12	6ES7144-6JF00-0BB0 ET 200eco PN, AI 8xRTD/TC, M12-L
Encoder supply			
Number of outputs	4		
Hardware configuration			
Submodules			
• Number of configurable submodules, max.			2
Analog inputs			
Number of analog inputs	8	8	8
Constant measurement current for resistance-type transmitter, typ.			0.7 mA
Cycle time (all channels), min.			Sum of the basic conversion times and additional processing times (depending on the parameterization of the active channels); for line compensation in case of a three-wire connection, an additional cycle is necessary
Technical unit for temperature measurement adjustable			Yes; Degrees Celsius / degrees Fahrenheit / Kelvin
Input ranges (rated values), voltages			
• 0 to +10 V	Yes		
• 1 V to 5 V	Yes		
• -10 V to +10 V	Yes		
• -80 mV to +80 mV	Yes	Yes	Yes; 16 bit incl. sign
Input ranges (rated values), currents			
• 0 to 20 mA	Yes		
• -20 mA to +20 mA	Yes		
• 4 mA to 20 mA	Yes		
Input ranges (rated values), thermocouples			
• Type B			Yes; 16 bit incl. sign
• Type C			Yes; 16 bit incl. sign
• Type E	Yes	Yes	Yes; 16 bit incl. sign
• Type J	Yes	Yes	Yes; 16 bit incl. sign
• Type K	Yes	Yes	Yes; 16 bit incl. sign
• Type L			Yes; 16 bit incl. sign
• Type N	Yes	Yes	Yes; 16 bit incl. sign
• Type R			Yes; 16 bit incl. sign
• Type S			Yes; 16 bit incl. sign
• Type T			Yes; 16 bit incl. sign
• Type U			Yes; 16 bit incl. sign
Input ranges (rated values), resistance thermometer			
• Ni 100	Yes	Yes	Yes; Standard/climate
• Ni 1000	Yes	Yes	Yes; Standard/climate
• Ni 120	Yes	Yes	Yes; Standard/climate
• Ni 200	Yes	Yes	Yes; Standard/climate
• Ni 500	Yes	Yes	Yes; Standard/climate
• Pt 100	Yes	Yes	Yes; Standard/climate
• Pt 1000	Yes	Yes	Yes; Standard/climate
• Pt 200	Yes	Yes	Yes; Standard/climate
• Pt 500	Yes	Yes	Yes; Standard/climate
Input ranges (rated values), resistors			
• 0 to 150 ohms	Yes	Yes	Yes
• 0 to 300 ohms	Yes	Yes	Yes
• 0 to 600 ohms	Yes	Yes	Yes
• 0 to 3000 ohms	Yes	Yes	Yes
• 0 to 6000 ohms			Yes

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Article number	6ES7144-6KD00-0AB0 ET200eco PN, 8AI; 4 U/I; 4 RTD/TC 8xM12	6ES7144-6KD50-0AB0 ET200eco PN, 8AI RTD/TC 8xM12	6ES7144-6JF00-0BB0 ET 200eco PN, AI 8xRTD/TC, M12-L
Thermocouple (TC)			
Temperature compensation			
- parameterizable	Yes	Yes	Yes
- internal temperature compensation	Yes	Yes	Yes
- external temperature compensation with Pt100		Yes	
- external temperature compensation with compensations socket	Yes	Yes	Yes
- dynamic reference temperature value		Yes	Yes
- for definable comparison point temperature		Yes	
- fixed reference temperature			Yes
Cable length			
• shielded, max.	30 m	30 m	30 m
Analog value generation for the inputs			
Analog value display	SIMATIC S7 format	SIMATIC S7 format	SIMATIC S7 format
Measurement principle	integrating	integrating	integrating
Integration and conversion time/resolution per channel			
• Resolution with overrange (bit including sign), max.	16 bit	16 bit	16 bit
• Integration time, parameterizable	Yes	Yes	Yes; channel by channel
• Integration time (ms)	2/16.67/20/100 ms	2/16.67/20/100 ms	0.84 / 16.7 (50) / 20 (60) / 60 (180)
• Basic conversion time, including integration time (ms)			4.50 / 21.5 (54) / 24 (64) / 64 (184)
• Interference voltage suppression for interference frequency f1 in Hz	500 / 60 / 50 / 10 Hz	500 / 60 / 50 / 10 Hz	none / 60 / 50 / 16.7
• Conversion time (per channel)	4 / 19 / 22 / 102 ms	4 / 19 / 22 / 102 ms	
Smoothering of measured values			
• parameterizable	Yes	Yes	Yes
Encoder			
Number of connectable encoders, max.	8	8	
Connection of signal encoders			
• for voltage measurement	Yes		
• for current measurement as 2-wire transducer	Yes		
• for current measurement as 4-wire transducer	Yes		
• for resistance measurement with two-wire connection	Yes	Yes	Yes
• for resistance measurement with three-wire connection	Yes	Yes	Yes
• for resistance measurement with four-wire connection	Yes	Yes	Yes
Errors/accuracies			
Linearity error (relative to input range), (+/-)	0.01 %	0.01 %	0.01 %; ±0.1 % for resistance thermometers and resistance
Temperature error (relative to input range), (+/-)	U: 0.0035%/°C; I: 0.006%/°C; RTD: 0.0005%/°C; TC: 0.0035%/°C	RTD: 0.0005%/°C; TC: 0.0035%/°C	0.0009 %/K; ±0.005 % / K at thermocouple
Crosstalk between the inputs, min.	85 dB	-85 dB	
Crosstalk between the inputs, max.			-70 dB
Repeat accuracy in steady state at 25 °C (relative to input range), (+/-)	0.008 %	0.008 %	0.008 %
Temperature error of internal compensation			±1.5 °C

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Technical specifications

Article number	6ES7144-6KD00-0AB0 ET200eco PN, 8AI; 4 U/I; 4 RTD/TC 8xM12	6ES7144-6KD50-0AB0 ET200eco PN, 8AI RTD/TC 8xM12	6ES7144-6JF00-0BB0 ET 200eco PN, AI 8xRTD/TC, M12-L
Interference voltage suppression for $f = n \times (f1 \pm 1 \%)$, f1 = interference frequency			
• Series mode interference (peak value of interference < rated value of input range), min.	46 dB	46 dB	
• Common mode interference, min.	70 dB	70 dB	
Interference voltage suppression for $f = n \times (f1 \pm 0.5 \%)$, f1 = interference frequency			
• Series mode interference (peak value of interference < rated value of input range), min.			40 dB
Interfaces			
Transmission procedure	100BASE-TX	100BASE-TX	
Number of PROFINET interfaces	1	1	1
1. Interface			
Interface type			PROFINET with 100 Mbit/s full duplex (100BASE-TX)
Interface types			
• M12 port	Yes		Yes; 2x M12, 4-pin, D-coded
• Number of ports			2
• integrated switch	Yes	Yes	Yes
Protocols			
• PROFINET IO Device			Yes
• Open IE communication			Yes
Interface types			
M12 port			
• Autonegotiation	Yes	Yes	Yes
• Autocrossing	Yes	Yes	Yes
• Transmission rate, max.	100 Mbit/s	100 Mbit/s	100 Mbit/s
Protocols			
Supports protocol for PROFINET IO	Yes	Yes	Yes
PROFINET CBA	No	No	
PROFIsafe	No	No	No
EtherNet/IP			Yes
Modbus TCP			Yes
PROFINET IO Device			
Services			
- IRT			Yes; 250 µs to 4 ms in 125 µs frame
- IRT with the option "high flexibility"	Yes		
- Prioritized startup	Yes	Yes	Yes
- Shared device			Yes
- Number of IO Controllers with shared device, max.			2
Redundancy mode			
• PROFINET system redundancy (S2)			Yes
• PROFINET system redundancy (R1)			No
• H-Sync forwarding			Yes
Media redundancy			
- MRP	Yes	Yes	Yes
EtherNet/IP			
Services			
- CIP Implicit Messaging			Yes
- CIP Explicit Messaging			Yes
- CIP Safety			No
- Shared device			Yes; 2x EtherNet/IP Scanner
- Number of scanners with shared device, max.			2

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Technical specifications

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Updating times - Requested Packet Interval (RPI)			2 ms
Redundancy mode - DLR (Device Level Ring)			No
Address area - Address space per module, max. - LargeForwardOpen (Class3)			38 byte No
Modbus TCP Services - read coils (code=1) - read discrete inputs (code=2) - Read Holding Registers (Code=3) - write single coil (code=5) - write multiple coils (code=15) - Write Multiple Registers (Code=16) - Parameter change by master - Modbus TCP Security Protocol			Yes Yes Yes Yes Yes Yes No No
Address space per station - Address space per station, max. - Access-consistent address space			38 byte 2 byte
Updating time - I/O request interval			2 ms
Connections - number of connections per device			12
Open IE communication • TCP/IP • SNMP • DCP • LLDP • ping • ARP	No Yes Yes Yes Yes Yes	No Yes Yes Yes Yes Yes	Yes; (only EtherNet/IP or Modbus TCP) Yes Yes Yes
Interrupts/diagnostics/ status information			
Diagnostics function	Yes	Yes	
Alarms • Diagnostic alarm • Maintenance interrupt • Limit value alarm	Yes	Yes	Yes; Parameterizable Yes; Parameterizable Yes; two upper and two lower limit values in each case
Diagnoses • Diagnostic information readable • Monitoring the supply voltage - parameterizable • Wire-break • Short-circuit encoder supply • Group error • Overflow/underflow	Yes Yes; green "ON" LED Yes; per module Yes; Red/yellow "SF/MT" LED Yes	Yes Yes; green "ON" LED Yes; Red/yellow "SF/MT" LED Yes	Yes Yes Yes Yes; Not for ±80 mV Yes
Diagnostics indication LED • RUN LED • ERROR LED • MAINT LED • NS LED • MS LED • IO LED • Channel status display • for channel diagnostics • Connection display LINK TX/RX			Yes; green LED Yes; red LED Yes; Yellow LED Yes; green/red LED Yes; green/red LED Yes; red/green/yellow LEDs Yes; green LED Yes; red LED Yes; green LED, only link

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Article number	6ES7144-6KD00-0AB0 ET200eco PN, 8AI; 4 U/I; 4 RTD/TC 8xM12	6ES7144-6KD50-0AB0 ET200eco PN, 8AI RTD/TC 8xM12	6ES7144-6JF00-0BB0 ET 200eco PN, AI 8xRTD/TC, M12-L
Potential separation			
between the load voltages	Yes	Yes	Yes
between load voltage and all other switching components	No	No	
between Ethernet and electronics	Yes	Yes	Yes
Potential separation channels			
• between the channels	No	No	No
• between the channels and the power supply of the electronics			Yes
Degree and class of protection			
IP degree of protection	IP65/67	IP65/67	IP65/67/69K
Standards, approvals, certificates			
Suitable for safety-related tripping of standard modules			Yes; from FS01
Suitable for applications according to AMS 2750	Yes; Declaration of Conformity, see online support entry 109757262	Yes; Declaration of Conformity, see online support entry 109757262	Yes; Declaration of Conformity, see online support entry 109757262
Suitable for applications according to CQI-9	Yes; Based on AMS 2750 E	Yes; Based on AMS 2750 E	Yes; based on AMS 2750 F
Highest safety class achievable for safety-related tripping of standard modules			
• Performance level according to ISO 13849-1			PL d
• Category according to ISO 13849-1			Cat. 3
• SIL acc. to IEC 62061			SIL 2
Use in hazardous areas			
• Explosion protection category for gas	ATEX gas explosion protection, Zone 2	ATEX gas explosion protection, Zone 2	ATEX, UKEX, IECEx, CCCEX for Zone 2
• Explosion protection category for dust	ATEX dust explosion protection, Zone 22	ATEX dust explosion protection, Zone 22	ATEX, UKEX, IECEx, CCCEX for Zone 22
Product functions / security			
signed firmware update			Yes
safely removing data			Yes
Ambient conditions			
Ambient temperature during operation			
• min.			-40 °C
• max.			60 °C
Altitude during operation relating to sea level			
• Ambient air temperature-barometric pressure-altitude			Up to max. 5 000 m, at installation height > 2 000 m additional restrictions
connection method			
Design of electrical connection	4/5-pin M12 circular connectors	4/5-pin M12 circular connectors	4/5-pin M12 circular connectors
Design of electrical connection for the inputs and outputs			M12, 5-pin, A-coded
Design of electrical connection for supply voltage			M12, 4-pin, L-coded
Dimensions			
Width	60 mm	60 mm	45 mm
Height	175 mm	175 mm	200 mm
Depth	49 mm	49 mm	48 mm
Weights			
Weight, approx.	930 g	930 g	780 g
Article number	6ES7145-6HD00-0AB0 ET200eco PN, 4AO U/I 4xM12	Article number	6ES7145-6HD00-0AB0 ET200eco PN, 4AO U/I 4xM12
Supply voltage		Analog outputs	
Rated value (DC)	24 V	Number of analog outputs	4
Reverse polarity protection	Yes	Voltage output, short-circuit protection	Yes
Input current		Voltage output, short-circuit current, max.	30 mA
Current consumption, typ.	280 mA	Current output, no-load voltage, max.	20 V
Actuator supply			
Number of outputs	4		

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SIMATIC ET 200eco PN

I/O devices > Analog I/O devices

Technical specifications

Article number	6ES7145-6HD00-0AB0 ET200eco PN, 4AO U/I 4xM12
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
Connection of actuators	
• for voltage output two-wire connection	Yes
• for current output two-wire connection	Yes
Load impedance (in rated range of output)	
• with voltage outputs, min.	1 kΩ
• with voltage outputs, capacitive load, max.	1 μF
• with current outputs, max.	600 Ω
• with current outputs, inductive load, max.	1 mH
Cable length	
• shielded, max.	30 m
Analog value generation for the outputs	
Analog value display	SIMATIC S7 format
Conversion principle	Resistor network
Integration and conversion time/resolution per channel	
• Resolution with overrange (bit including sign), max.	16 bit
• Conversion time (per channel)	1 ms
Settling time	
• for resistive load	2 ms
• for capacitive load	1.8 ms
• for inductive load	2 ms
Errors/accuracies	
Output ripple (relative to output range, bandwidth 0 to 50 kHz), (+/-)	U: ±0.6 mVrms; I: ±0.4 nArms
Linearity error (relative to output range), (+/-)	0.02 %
Temperature error (relative to output range), (+/-)	U: 0.001%/°C; I: 0.0025%/°C
Crosstalk between the outputs, min.	70 dB
Repeat accuracy in steady state at 25 °C (relative to output range), (+/-)	0.008 %
Interfaces	
Transmission procedure	100BASE-TX
Number of PROFINET interfaces	1
1. Interface	
Interface types	
• M12 port	Yes
• integrated switch	Yes

Article number	6ES7145-6HD00-0AB0 ET200eco PN, 4AO U/I 4xM12
Interface types	
M12 port	
• Autonegotiation	Yes
• Autocrossing	Yes
• Transmission rate, max.	100 Mbit/s
Protocols	
Supports protocol for PROFINET IO	Yes
PROFINET CBA	No
PROFIsafe	No
PROFINET IO Device	
Services	
- IRT with the option "high flexibility"	Yes
- Prioritized startup	Yes
Redundancy mode	
Media redundancy	
- MRP	Yes
Open IE communication	
• TCP/IP	No
• SNMP	Yes
• DCP	Yes
• LLDP	Yes
• ping	Yes
• ARP	Yes
Interrupts/diagnostics/status information	
Diagnostics function	Yes
Substitute values connectable	Yes
Alarms	
• Diagnostic alarm	Yes
Diagnoses	
• Diagnostic information readable	Yes
• Monitoring the supply voltage	Yes; green "ON" LED
• Wire-break	Yes; Channel-by-channel with current output
• Short-circuit	Yes; Channel-by-channel with voltage output
• Group error	Yes; Red/yellow "SF/MT" LED
Potential separation	
between the load voltages	Yes
between load voltage and all other switching components	No
between Ethernet and electronics	Yes
Potential separation channels	
• between the channels	No
Degree and class of protection	
IP degree of protection	IP65/67
Standards, approvals, certificates	
Use in hazardous areas	
• Explosion protection category for gas	ATEX gas explosion protection, Zone 2
• Explosion protection category for dust	ATEX dust explosion protection, Zone 22
connection method	
Design of electrical connection	4/5-pin M12 circular connectors
Dimensions	
Width	60 mm
Height	175 mm
Depth	49 mm
Weights	
Weight, approx.	930 g

I/O systems

SIMATIC ET 200 systems without control cabinet

SIMATIC ET 200eco PN

I/O devices > Analog I/O devices

Technical specifications

Article number	6ES7146-6HF00-0BB0 ET 200eco PN, AI 6xU/I + AIQ 2xU/I, M12-L
General information	
Product function	
• Isochronous mode	No
• IRT	Yes
• Prioritized startup	Yes
Engineering with	
• STEP 7 TIA Portal configurable/ integrated from version	STEP 7 V18 or higher with HSP 0391
• PROFINET from GSD version/ GSD revision	GSDML V2.4.x
• Multi Fieldbus Configuration Tool (MFCT)	V1.5 or higher
Operating mode	
• MSI	Yes
• MSO	Yes
CiR - Configuration in RUN	
Calibration possible in RUN	Yes
Supply voltage	
Load voltage 1L+	
• Rated value (DC)	24 V
• Reverse polarity protection	Yes; against destruction
Input current	
Current consumption (rated value)	110 mA; without load
from load voltage 1L+ (unswitched voltage)	12 A; Maximum value
from load voltage 2L+, max.	12 A; Maximum value
Encoder supply	
Number of outputs	8
Actuator supply	
Number of outputs	2
Hardware configuration	
Submodules	
• Number of configurable submodules, max.	2
Analog inputs	
Number of analog inputs	8; 6 AI fixed, 2 AIQ can be parameterized
Cycle time (all channels), min.	sum of the basic conversion times
Input ranges (rated values), voltages	
• 0 to +10 V	Yes
• 1 V to 5 V	Yes
• -10 V to +10 V	Yes
Input ranges (rated values), currents	
• 0 to 20 mA	Yes; 17 V for 2-wire transformers
• -20 mA to +20 mA	Yes; 17 V for 2-wire transformers
• 4 mA to 20 mA	Yes; 17 V for 2-wire transformers
Cable length	
• shielded, max.	30 m
Analog outputs	
Number of analog outputs	2; AIQ can be parameterized
Voltage output, short-circuit protection	Yes
Voltage output, short-circuit current, max.	40 mA
Current output, no-load voltage, max.	19 V
Cycle time (all channels) max.	1 ms
Output ranges, voltage	
• 0 to 10 V	Yes
• 1 V to 5 V	Yes
• -10 V to +10 V	Yes

Article number	6ES7146-6HF00-0BB0 ET 200eco PN, AI 6xU/I + AIQ 2xU/I, M12-L
Output ranges, current	
• 0 to 20 mA	Yes
• -20 mA to +20 mA	Yes
• 4 mA to 20 mA	Yes
Connection of actuators	
• for voltage output two-wire connection	Yes
• for voltage output four-wire connection	Yes
• for current output two-wire connection	Yes
• for current output four-wire connection	Yes
Load impedance (in rated range of output)	
• with voltage outputs, min.	1 kΩ
• with voltage outputs, capacitive load, max.	1 μF
• with current outputs, max.	600 Ω
• with current outputs, inductive load, max.	1 mH
Cable length	
• shielded, max.	30 m
Analog value generation for the inputs	
Analog value display	SIMATIC S7 format
Measurement principle	integrating
Integration and conversion time/resolution per channel	
• Resolution with overrange (bit including sign), max.	16 bit
• Integration time, parameterizable	Yes; channel by channel
• Integration time (ms)	0.84 / 16.7 (50) / 20 (60) / 60 (180)
• Basic conversion time, including integration time (ms)	4.50 / 21.5 (54) / 24 (64) / 64 (184)
• Interference voltage suppression for interference frequency f1 in Hz	none / 60 / 50 / 16.7
Smoothing of measured values	
• parameterizable	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 ms
• for capacitive load	1 ms
• for inductive load	1 ms
Encoder	
Connection of signal encoders	
• for voltage measurement	Yes
• for current measurement as 2-wire transducer	Yes
• for current measurement as 4-wire transducer	Yes

I/O systems

SIMATIC ET 200 systems without control cabinet
SIMATIC ET 200eco PN

I/O devices > Analog I/O devices

Technical specifications

Article number	6ES7146-6HF00-0BB0 ET 200eco PN, AI 6xU/I +AIQ 2xU/I, M12-L
Errors/accuracies	
Linearity error (relative to input range), (+/-)	0.01 %
Temperature error (relative to input range), (+/-)	0.006 %/K
Crosstalk between the inputs, max.	-70 dB
Repeat accuracy in steady state at 25 °C (relative to input range), (+/-)	0.008 %
Output ripple (relative to output range, bandwidth 0 to 50 kHz), (+/-)	0.02 %
Linearity error (relative to output range), (+/-)	0.02 %
Temperature error (relative to output range), (+/-)	0.002 %/K
Crosstalk between the outputs, max.	-70 dB
Repeat accuracy in steady state at 25 °C (relative to output range), (+/-)	0.008 %
Interference voltage suppression for $f = n \times (f_1 \pm 0.5 \%)$, $f_1 = \text{interference frequency}$	
• Series mode interference (peak value of interference < rated value of input range), min.	46 dB
Interfaces	
Number of PROFINET interfaces	1
1. Interface	
Interface type	PROFINET with 100 Mbit/s full duplex (100BASE-TX)
Interface types	
• M12 port	Yes; 2x M12, 4-pin, D-coded
• Number of ports	2
• integrated switch	Yes
Protocols	
• PROFINET IO Device	Yes
• Open IE communication	Yes
Interface types	
M12 port	
• Autonegotiation	Yes
• Autocrossing	Yes
• Transmission rate, max.	100 Mbit/s
Protocols	
Supports protocol for PROFINET IO	Yes
PROFIsafe	No
EtherNet/IP	Yes
Modbus TCP	Yes
PROFINET IO Device	
Services	
- IRT	Yes; 250 µs to 4 ms in 125 µs frame
- Prioritized startup	Yes
- Shared device	Yes
- Number of IO Controllers with shared device, max.	2

Article number	6ES7146-6HF00-0BB0 ET 200eco PN, AI 6xU/I +AIQ 2xU/I, M12-L
Redundancy mode	
• PROFINET system redundancy (S2)	Yes
• PROFINET system redundancy (R1)	No
• H-Sync forwarding	Yes
Media redundancy	
- MRP	Yes
EtherNet/IP	
Services	
- CIP Implicit Messaging	Yes
- CIP Explicit Messaging	Yes
- CIP Safety	No
- Shared device	Yes; 2x EtherNet/IP Scanner
- Number of scanners with shared device, max.	2
Updating times	
- Requested Packet Interval (RPI)	2 ms
Redundancy mode	
- DLR (Device Level Ring)	No
Address area	
- Address space per module, max.	48 byte; of which 44 bytes for inputs and 4 bytes for outputs
- LargeForwardOpen (Class3)	No
Modbus TCP	
Services	
- read coils (code=1)	Yes
- read discrete inputs (code=2)	Yes
- Read Holding Registers (Code=3)	Yes
- write single coil (code=5)	Yes
- write multiple coils (code=15)	Yes
- Write Multiple Registers (Code=16)	Yes
- Parameter change by master	No
- Modbus TCP Security Protocol	No
Address space per station	
- Address space per station, max.	48 byte; of which 44 bytes for inputs and 4 bytes for outputs
- Access-consistent address space	2 byte
Updating time	
- I/O request interval	2 ms
Connections	
- number of connections per device	12
Open IE communication	
• TCP/IP	Yes; (only EtherNet/IP or Modbus TCP)
• SNMP	Yes
• LLDP	Yes
• ARP	Yes

I/O systems

SIMATIC ET 200 systems without control cabinet

SIMATIC ET 200eco PN

I/O devices > Analog I/O devices

Technical specifications

Article number	6ES7146-6HF00-0BB0 ET 200eco PN, AI 6xU/I +AIQ 2xU/I, M12-L
Interrupts/diagnostics/ status information	
Substitute values connectable	Yes; channel by channel, parameterizable
Alarms	
• Diagnostic alarm	Yes; Parameterizable
• Maintenance interrupt	Yes; Parameterizable
• Limit value alarm	Yes; two upper and two lower limit values in each case
Diagnoses	
• Diagnostic information readable	Yes
• Monitoring the supply voltage	Yes
- parameterizable	Yes
• Wire-break	Yes; at 4 mA to 20 mA and 1 V to 5 V
• Short-circuit	Yes; encoder and actuator supply module to ground, for output type voltage; channel by channel
• Overflow/underflow	Yes
Diagnostics indication LED	
• RUN LED	Yes; green LED
• ERROR LED	Yes; red LED
• MAINT LED	Yes; Yellow LED
• NS LED	Yes; green/red LED
• MS LED	Yes; green/red LED
• IO LED	Yes; red/green/yellow LEDs
• Channel status display	Yes; green LED
• for channel diagnostics	Yes; red LED
• Connection display LINK TX/RX	Yes; green LED, only link
Potential separation	
between the load voltages	Yes
between Ethernet and electronics	Yes
Potential separation channels	
• between the channels	No
• between the channels and the power supply of the electronics	No

Article number	6ES7146-6HF00-0BB0 ET 200eco PN, AI 6xU/I +AIQ 2xU/I, M12-L
Degree and class of protection	
IP degree of protection	IP65/67/69K
Standards, approvals, certificates	
Suitable for safety-related tripping of standard modules	Yes; from FS01
Highest safety class achievable for safety-related tripping of standard modules	
• Performance level according to ISO 13849-1	PL d
• Category according to ISO 13849-1	Cat. 3
• SIL acc. to IEC 62061	SIL 2
Use in hazardous areas	
• Explosion protection category for gas	ATEX, UKEX, IECEx, CCCEX for Zone 2
• Explosion protection category for dust	ATEX, UKEX, IECEx, CCCEX for Zone 22
Product functions / security	
signed firmware update	Yes
safely removing data	Yes
Ambient conditions	
Ambient temperature during operation	
• min.	-40 °C
• max.	60 °C
Altitude during operation relating to sea level	
• Ambient air temperature-barometric pressure-altitude	Up to max. 5 000 m, at installation height > 2 000 m additional restrictions
connection method	
Design of electrical connection	4/5-pin M12 circular connectors
Design of electrical connection for the inputs and outputs	M12, 5-pin, A-coded
Design of electrical connection for supply voltage	M12, 4-pin, L-coded
Dimensions	
Width	45 mm
Height	200 mm
Depth	48 mm
Weights	
Weight, approx.	795 g

I/O systems

SIMATIC ET 200 systems without control cabinet
SIMATIC ET 200eco PN

Technology I/O modules > TM PosInput 2 counter and position detection module

Overview



Technical properties

- Counter and position detection module for ET 200eco PN
- Interfaces:
 - Encoder signals A, B and N for RS-422 differential signals or 24 V signals
 - SSI interface with clock and data for RS-422 differential signals
 - 24 V encoder supply, short-circuit-proof
 - 2 digital inputs for controlling the counting process, for saving or setting the counter or position value
 - 2 digital outputs for fast reactions depending on the counter reading, position value or measured value

- Counting frequency 1 MHz (4 MHz with fourfold evaluation)
- Counting range: +/- 31 bits
- Measurement function
- Parameterizable input filters for suppressing interferences at encoder and digital inputs

Supported types of encoders/signals

- Incremental encoders with and without N signal
- Pulse encoders with directional signal
- Pulse encoders without directional signal
- Pulse encoders for forward or reverse pulses
- SSI encoders with a frame length of 10 to 40 bits, of which up to 32 bits position value

Supported system functions

- Isochronous mode
- Firmware update
- Identification data I&M

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Ordering data

Article No.

Article No.

TM PosInput 2 counter and position detection module

2 channels, max. 1 MHz for RS-422 differential signals or SSI absolute encoders
200 kHz for 24 V count signals

6ES7147-6AB00-0BB0

Accessories

- Mounting rail 0.5 m
- Profile screw for mounting rail, 50 units
- Sealing cap M12 for IP67 modules, 12 mm outer diameter, without O-ring, 10 units
- Sealing cap M12 for IP67 modules, 15 mm outer diameter, with O-ring, 10 units
- Labels 10 mm x 5 mm RAL9016, for I/O devices with 2x M12 L-coded power connectors; 5 frames with 40 labels each

6ES7194-6GA00-0AA0

6ES7194-6MA00-0AA0

3RX9802-0AA00

3RK1901-1KA00

6ES7194-2BA00-0AA0

PROFINET M12 connection plug, for user assembly

Connector for PROFINET, 4-core, shielded

IE M12 plug PRO connector

- 1 unit
- 8 units

IE FC M12 plug PRO connector, for user assembly

- 1 unit
- 8 units

3RK1902-2DA00

6GK1901-0DB10-6AA0

6GK1901-0DB10-6AA8

6GK1901-0DB20-6AA0

6GK1901-0DB20-6AA8

Power M12 plug PRO

Connector for 24 V DC supply voltage, with installation instructions, 4-pin, L-coded, 1 unit

6GK1906-0EA00

Power M12 cable connector PRO

Connection socket for 24 V DC supply voltage, 4-pin, L-coded, with installation instructions, 1 unit

6GK1906-0EB00

M12 circular connector

Can be assembled, for connecting actuators or sensors, 5-pin, screw terminal, max. 0.75 mm², A-coded, max. 4 A

- Straight
- Angled

3RK1902-4BA00-5AA0

3RK1902-4DA00-5AA0

M12 coupling socket

4-pin, screw terminal, max. 0.75 mm², A-coded, max. 4 A, angled

3RK1902-4CA00-4AA0

PROFINET bus cable

Preassembled on one side with 1 x M12, D-coded, 4-wire, shielded

- 3 m
- 5 m
- 10 m

3RK1902-2HB30

3RK1902-2HB50

3RK1902-2HC10

I/O systems

SIMATIC ET 200 systems without control cabinet
SIMATIC ET 200eco PN

Technology I/O modules > TM PosInput 2 counter and position detection module

Ordering data	Article No.		Article No.	
M12-90/M12-90 IE connecting cable Preassembled IE FC TP trailing cable GP 2 x 2 (PROFINET type C) with two 4-pin M12 plugs (D-coded) up to 85 m, degree of protection IP65/IP67, 90° cable outlet Length: • 0.3 m • 0.5 m • 1.0 m • 1.5 m • 2.0 m • 3.0 m • 5.0 m • 10 m • 15 m	6XV1870-8GE30 6XV1870-8GE50 6XV1870-8GH10 6XV1870-8GH15 6XV1870-8GH20 6XV1870-8GH30 6XV1870-8GH50 6XV1870-8GN10 6XV1870-8GN15		M12-90/M12-90 M12 power connecting cable Flexible 4-core power connecting cable, preassembled with A-coded, 5-pin M12 plug and A-coded, 5-pin M12 socket to supply the ET 200 with 24 V DC; 90° cable outlet Length: • 0.3 m • 0.5 m • 1.0 m • 1.5 m • 2.0 m • 3.0 m • 5.0 m • 10 m • 15 m	6XV1801-5GE30 6XV1801-5GE50 6XV1801-5GH10 6XV1801-5GH15 6XV1801-5GH20 6XV1801-5GH30 6XV1801-5GH50 6XV1801-5GN10 6XV1801-5GN15
M12-180/IE FC RJ45 plug-145 IE connecting cable Preassembled IE FC TP trailing cable GP 2 x 2 (PROFINET type C) with M12 plug (D-coded) and IE FC RJ45 plug, degree of protection IP65/IP67 Length: • 2.0 m • 3.0 m • 5.0 m • 10 m • 15 m	6XV1871-5TH20 6XV1871-5TH30 6XV1871-5TH50 6XV1871-5TN10 6XV1871-5TN15		M12-90/M12-90 M12 power connecting cable Flexible 4-core power connecting cable, preassembled with L-coded, 4-pin M12 plug and L-coded, 4-pin M12 socket, both sides angled 90°, to supply terminal devices with 24 V DC Length: • 0.5 m • 1.0 m • 1.5 m • 2.0 m • 3.0 m • 5.0 m • 10 m • 15 m	6XV1801-6GE50 6XV1801-6GH10 6XV1801-6GH15 6XV1801-6GH20 6XV1801-6GH30 6XV1801-6GH50 6XV1801-6GN10 6XV1801-6GN15
M12-180/M12-180 IE robust connecting cable Preassembled IE FC TP robust food cable 2 x 2 (PROFINET type C) with two 4-pin M12 plugs (D-coded), degree of protection IP69 Length: • 1.0 m • 2.0 m • 3.0 m • 5.0 m	6XV1881-5AH10 6XV1881-5AH20 6XV1881-5AH30 6XV1881-5AH50		M12-180/M12-180 M12 power connecting cable Flexible 4-core power connecting cable, preassembled with L-coded, 4-pin M12 plug and L-coded, 4-pin M12 socket to supply terminal devices with 24 V DC Length: • 0.5 m • 1.0 m • 1.5 m • 2.0 m • 3.0 m • 5.0 m • 10 m • 15 m	6XV1801-6DE50 6XV1801-6DH10 6XV1801-6DH15 6XV1801-6DH20 6XV1801-6DH30 6XV1801-6DH50 6XV1801-6DN10 6XV1801-6DN15
M12 Y-cable For double connection of I/O by means of a single cable to ET 200, 5-pin	6ES7194-6KA00-0XA0			
Control line Preassembled on one side with 1 x M12 plug angled, 5-pin, 5 x 0.34 mm ² , A-coded, max. 4 A, PUR casing, black • 1.5 m • 5 m • 10 m Preassembled, 1 x M12 cable box straight, 1 x M12 plug, 3 x 0.34 mm ² , A-coded, max. 4 A, PUR casing, black	3RK1902-4HB15-5AA0 3RK1902-4HB50-5AA0 3RK1902-4HC01-5AA0 3RK1902-4PB15-3AA0			
Energy cable 4 x 1.5 Trailable power cable, with 4 copper cores (1.5 mm ²) for connecting to M12 plug-in connector; sold by the meter; max. delivery unit 1000 m, minimum order quantity 20 m	6XV1801-2B		M12-180/M12-180 M12 robust power connecting cable Flexible 4-core power connecting cable, preassembled with A-coded, 5-pin M12 plug and A-coded, 5-pin M12 socket to supply IP69 components with 24 V DC; Length: • 1.0 m • 2.0 m • 3.0 m • 5.0 m	6XV1801-5AH10 6XV1801-5AH20 6XV1801-5AH30 6XV1801-5AH50

I/O systems

SIMATIC ET 200 systems without control cabinet

SIMATIC ET 200eco PN

Technology I/O modules > TM PosInput 2 counter and position detection module

Technical specifications

Article number	6ES7147-6AB00-0BB0 ET 200eco PN, TM PosInput 2, M12-L
General information	
Number of channels	2
Product function	
• Isochronous mode	Yes
• IRT	Yes
• Fast startup	Yes
• Prioritized startup	Yes
Engineering with	
• STEP 7 TIA Portal configurable/ integrated from version	STEP 7 V18 or higher with HSP
• PROFINET from GSD version/ GSD revision	GSDML V2.42
• Multi Fieldbus Configuration Tool (MFCT)	V1.5 or higher
Supply voltage	
Rated value (DC)	24 V
Load voltage 1L+	
• Rated value (DC)	24 V
• Reverse polarity protection	Yes; against destruction; encoder power supply outputs applied with reversed polarity, loads conduct
Load voltage 2L+	
• Rated value (DC)	24 V
• Reverse polarity protection	Yes; against destruction
Input current	
Current consumption (rated value)	100 mA; without load
from load voltage 1L+ (unswitched voltage)	12 A; Maximum value
from load voltage 2L+, max.	12 A; Maximum value
Encoder supply	
Number of outputs	4; 1 per encoder connection
Hardware configuration	
Submodules	
• Number of configurable submodules, max.	2
Digital inputs	
Number of digital inputs	4; 2 per channel
Digital inputs, parameterizable	Yes
Source/sink input	P-reading
Input characteristic curve in accordance with IEC 61131, type 3	Yes
Digital input functions, parameterizable	
• Gate start/stop	Yes; only for pulse and incremental encoders
• Capture	Yes
• Synchronization	Yes; only for pulse and incremental encoders
• Freely usable digital input	Yes
Input voltage	
• Type of input voltage	DC
• Rated value (DC)	24 V
• for signal "0"	-5 ... +5 V
• for signal "1"	+11 to +30V
• permissible voltage at input, min.	-30 V; -5 V continuous, -30 V brief reverse polarity protection
• permissible voltage at input, max.	30 V
Input current	
• for signal "1", typ.	2.5 mA

Article number	6ES7147-6AB00-0BB0 ET 200eco PN, TM PosInput 2, M12-L
Input delay (for rated value of input voltage) for standard inputs	
- parameterizable	Yes; none / 0.05 / 0.1 / 0.4 / 0.8 / 1.6 / 3.2 / 12.8 / 20 ms
for technological functions	
- parameterizable	Yes
Cable length	
• shielded, max.	30 m
• unshielded, max.	30 m
Digital outputs	
Type of digital output	Transistor
Number of digital outputs	4; 2 per channel
Digital outputs, parameterizable	Yes
Short-circuit protection	Yes; electronic/thermal
Limitation of inductive shutdown voltage to	2L+ (-39 V)
Controlling a digital input	Yes
Digital output functions, parameterizable	
• Switching tripped by comparison values	Yes
• Freely usable digital output	Yes
Switching capacity of the outputs	
• with resistive load, max.	0.5 A; Per digital output
• with inductive load, max.	0.5 A
Load resistance range	
• lower limit	48 Ω
• upper limit	12 kΩ
Output voltage	
• Type of output voltage	DC
• for signal "1", min.	23.2 V; 2L+ (-0.8 V)
Output current	
• for signal "1" rated value	0.5 A
• for signal "0" residual current, max.	0.5 mA
Output delay with resistive load	
• "0" to "1", max.	50 μs
• "1" to "0", max.	50 μs
Parallel switching of two outputs	
• for uprating	No
Switching frequency	
• with resistive load, max.	10 kHz
• with inductive load, max.	0.5 Hz; According to IEC 60947-5-1, DC-13
Total current of the outputs	
• Current per module, max.	2 A; Supply from 2L+
Cable length	
• shielded, max.	30 m
• unshielded, max.	30 m

I/O systems

SIMATIC ET 200 systems without control cabinet

SIMATIC ET 200eco PN

Technology I/O modules > TM PosInput 2 counter and position detection module

Technical specifications

Article number	6ES7147-6AB00-0BB0 ET 200eco PN, TM PosInput 2, M12-L
Encoder	
Encoder signals, incremental encoder (symmetrical)	
• Input voltage	RS 422
• Input frequency, max.	1 MHz
• Counting frequency, max.	4 MHz; with quadruple evaluation
• Cable length, shielded, max.	30 m
• 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
Encoder signals, incremental encoder (asymmetrical)	
• Input voltage	24 V
• Input frequency, max.	200 kHz
• Counting frequency, max.	800 kHz; with quadruple evaluation
• Cable length, shielded, max.	30 m
• 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
Encoder signals, absolute encoder (SSI)	
• Input signal	to RS-422
• Telegram length, parameterizable	10 ... 40 bit
• Clock frequency, max.	2 MHz; 125 kHz, 250 kHz, 500 kHz, 1 MHz, 1.5 MHz or 2 MHz
• Binary code	Yes
• Gray code	Yes
• Cable length, shielded, max.	30 m; Up to 500 kHz
• Parity bit, parameterizable	Yes
• Monoflop time	16, 32, 48, 64 µs & automatic
• Multiturn	Yes
• Singleturn	Yes
Interfaces	
Number of PROFINET interfaces	1
1. Interface	
Interface type	PROFINET with 100 Mbit/s full duplex (100BASE-TX)
Interface types	
• M12 port	Yes; 2x M12, 4-pin, D-coded
• Number of ports	2
• integrated switch	Yes
Protocols	
• PROFINET IO Device	Yes
• Open IE communication	Yes
Interface types	
M12 port	
• Autonegotiation	Yes
• Autocrossing	Yes
• Transmission rate, max.	100 Mbit/s

Article number	6ES7147-6AB00-0BB0 ET 200eco PN, TM PosInput 2, M12-L
Protocols	
Supports protocol for PROFINET IO	Yes
PROFIsafe	No
EtherNet/IP	Yes
Modbus TCP	Yes
PROFINET IO Device	
Services	
- IRT	Yes; 500 µs to 4 ms at an interval of 125 µs
- Prioritized startup	Yes
- Shared device	Yes
- Number of IO Controllers with shared device, max.	2
Redundancy mode	
• PROFINET system redundancy (S2)	Yes
• PROFINET system redundancy (R1)	No
• H-Sync forwarding	Yes
Media redundancy	
- MRP	Yes
EtherNet/IP	
Services	
- CIP Implicit Messaging	Yes
- CIP Explicit Messaging	Yes
- CIP Safety	No
- Shared device	Yes; 2x EtherNet/IP Scanner
- Number of scanners with shared device, max.	2
Updating times	
- Requested Packet Interval (RPI)	2 ms
Address area	
- Address space per module, max.	32 byte
- LargeForwardOpen (Class3)	No
Modbus TCP	
Services	
- read coils (code=1)	Yes
- read discrete inputs (code=2)	Yes
- Read Holding Registers (Code=3)	Yes
- write single coil (code=5)	Yes
- write multiple coils (code=15)	Yes
- Write Multiple Registers (Code=16)	Yes
- Parameter change by master	No
- Modbus TCP Security Protocol	No
Address space per station	
- Address space per station, max.	32 byte
- Access-consistent address space	2 byte
Updating time	
- I/O request interval	2 ms
Connections	
- number of connections per device	12
Open IE communication	
• TCP/IP	Yes; (only EtherNet/IP or Modbus TCP)
• SNMP	Yes
• LLDP	Yes
• ARP	Yes
Isochronous mode	
Equidistance	Yes
shortest clock pulse	500 µs
max. cycle	4 ms

I/O systems

SIMATIC ET 200 systems without control cabinet

SIMATIC ET 200eco PN

Technology I/O modules > TM PosInput 2 counter and position detection module

Technical specifications

Article number	6ES7147-6AB00-0BB0 ET 200eco PN, TM PosInput 2, M12-L
Interrupts/diagnostics/ status information	
Substitute values connectable	Yes
Alarms	
• Diagnostic alarm	Yes; Parameterizable
• Maintenance interrupt	Yes; Parameterizable
• Hardware interrupt	No
Diagnoses	
• Diagnostic information readable	Yes
• Monitoring the supply voltage	Yes
- parameterizable	Yes
• Wire-break	Yes
• Short-circuit	Yes
• Short-circuit encoder supply	Yes
• A/B transition error at incremental encoder	Yes
• Telegram error at SSI encoder	Yes
Diagnostics indication LED	
• RUN LED	Yes; green LED
• ERROR LED	Yes; red LED
• MAINT LED	Yes; Yellow LED
• NS LED	Yes; green/red LED
• MS LED	Yes; green/red LED
• IO LED	Yes; red/green/yellow LEDs
• Channel status display	Yes; green LED
• for channel diagnostics	Yes; red LED
• For load voltage monitoring	Yes; green LED
• Connection display LINK TX/RX	Yes; green LED, only link
Integrated Functions	
Counter	Yes
• Number of counters	2
• Counting frequency, max.	4 MHz; with quadruple evaluation
Fast mode	No
Counting functions	
• Can be used with TO High_Speed_Counter	Yes; only for pulse and incremental encoders
• Continuous counting	Yes
• Counter response parameterizable	Yes
• Hardware gate via digital input	Yes
• Software gate	Yes
• Event-controlled stop	Yes
• Synchronization via digital input	Yes
• Counting range, parameterizable	Yes
Comparator	
- Number of comparators	2; Per channel
- Direction dependency	Yes
- Can be changed from user program	Yes
Position detection	
• Incremental acquisition	Yes
• Absolute acquisition	Yes
• Suitable for S7-1500 Motion Control	Yes
Measuring functions	
• Measuring time, parameterizable	Yes
• Dynamic measurement period adjustment	Yes
• Number of thresholds, parameterizable	2

Article number	6ES7147-6AB00-0BB0 ET 200eco PN, TM PosInput 2, M12-L
Measuring range	
- Frequency measurement, min.	0.04 Hz
- Frequency measurement, max.	4 MHz
- Cycle duration measurement, min.	0.25 µs
- 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	
between the load voltages	Yes
between Ethernet and electronics	Yes
Potential separation channels	
• between the channels	Yes; DI channels are isolated from the DQ channels
Degree and class of protection	
IP degree of protection	IP65/67/69K
Standards, approvals, certificates	
Suitable for safety-related tripping of standard modules	Yes
Highest safety class achievable for safety-related tripping of standard modules	
• Performance level according to ISO 13849-1	PL d
• Category according to ISO 13849-1	Cat. 3
• SIL acc. to IEC 62061	SIL 2
Use in hazardous areas	
• Explosion protection category for gas	ATEX, UKEX, IECEx, CCCEx for Zone 2
• Explosion protection category for dust	ATEX, UKEX, IECEx, CCCEx for Zone 22
Product functions / security	
signed firmware update	Yes; V5.1.2 or higher
safely removing data	Yes; V5.1.2 or higher
Ambient conditions	
Ambient temperature during operation	
• min.	-40 °C
• max.	60 °C
Altitude during operation relating to sea level	
• Ambient air temperature-barometric pressure-altitude	Up to max. 5 000 m, at installation height > 2 000 m additional restrictions
connection method	
Design of electrical connection	4/5/8-pin M12 circular connectors
Design of electrical connection for the inputs and outputs	M12, 5-pin, A-coded
Design of electrical connection for supply voltage	M12, 4-pin, L-coded
Decentralized operation	
to SIMATIC S7-300	Yes
to SIMATIC S7-400	Yes
to SIMATIC S7-1200	Yes
to SIMATIC S7-1500	Yes
to standard PROFIBUS master	No
to standard PROFINET controller	Yes
Dimensions	
Width	45 mm
Height	200 mm
Depth	48 mm
Weights	
Weight, approx.	820 g

I/O systems

SIMATIC ET 200 systems without control cabinet
SIMATIC ET 200eco PN

I/O devices > Fail-safe I/O device

Overview



The ET 200eco PN fail-safe I/O device expands the ET 200eco PN system family. It is incorporated seamlessly into the Safety Integrated concept like with ET 200MP / ET 200SP and ET200pro. It also supports safety-related communication via PROFINET. The functional safety is certified in accordance with IEC 61508. It is designed for safety-related use up to SIL 3 according to IEC 62061 and PL e according to ISO 13849.

The following fail-safe I/O device with 2x M12 A-coded power connectors and 60 mm width is available:

- F-DI 8x24V /F-DQ 3x24V 2A with 8xM12 connection

Ordering data

ET 200eco PN fail-safe digital input/output modules

- 8 F-DI 24 V DC/
3 F-DQ 24 V DC/2 A;
PROFINET, certified up to SIL 3
(IEC 61508), PL e (ISO 13849);
4 x M12/3 x M12, degree of
protection IP65/67

6ES7146-6FF00-0AB0

Accessories

- PD voltage distributor, 24 V DC;
1 X 7/8", 4 X M12
- Terminal block for ET 200eco PN,
10 A insulation displacement
terminals
- Spare fuses for terminal block,
10 units
- Mounting rail 0.5 m
- Profile screw for mounting rail,
50 units
- Sealing cap M12 for IP67
modules, 12 mm outer diameter,
without O-ring, 10 units
- Sealing cap M12 for IP67
modules, 15 mm outer diameter,
with O-ring, 10 units
- Labels 10 mm x 7 mm yellow, for
I/O devices with 2x M12 A-coded
power connectors; 17 frames with
48 labels each

6ES7148-6CB00-0AA0

6ES7194-6CA00-0AA0

6ES7194-6HB00-0AA0

6ES7194-6GA00-0AA0

6ES7194-6MA00-0AA0

3RX9802-0AA00

3RK1901-1KA00

6ES7194-6HA00-0AA0

PROFINET M12 connection plug, for user assembly

Connector for PROFINET, 4-core,
shielded

IE M12 plug PRO connector

- 1 unit
- 8 units

IE FC M12 plug PRO connector,
for user assembly

- 1 unit
- 8 units

3RK1902-2DA00

6GK1901-0DB10-6AA0

6GK1901-0DB10-6AA8

6GK1901-0DB20-6AA0

6GK1901-0DB20-6AA8

M12 connection plug for 24 V DC load power supply

Connection socket
for 24 V DC infeed;
4-pin, A-coded, 3 units

Connector for
loop-through of 24 V DC;
4-pin, A-coded, 3 units

6GK1907-0DC10-6AA3

6GK1907-0DB10-6AA3

M12 circular connector

Can be assembled, for connecting
actuators or sensors, 5-pin,
screw terminal, max. 0.75 mm²,
A-coded, max. 4 A

- Straight
- Angled

3RK1902-4BA00-5AA0

3RK1902-4DA00-5AA0

M12 coupling socket

4-pin, screw terminal,
max. 0.75 mm², A-coded,
max. 4 A, angled

3RK1902-4CA00-4AA0

PROFINET bus cable

Preassembled on one side with
1 x M12, D-coded, 4-wire, shielded

- 3 m
- 5 m
- 10 m

3RK1902-2HB30

3RK1902-2HB50

3RK1902-2HC10

M12-90/M12-90 IE connecting cable

Preassembled
IE FC TP trailing cable GP 2 x 2
(PROFINET type C) with two
4-pin M12 plugs
(D-coded) up to 85 m,
degree of protection IP65/IP67,
90° cable outlet
Length:

- 0.3 m
- 0.5 m
- 1.0 m
- 1.5 m
- 2.0 m
- 3.0 m
- 5.0 m
- 10 m
- 15 m

6XV1870-8GE30

6XV1870-8GE50

6XV1870-8GH10

6XV1870-8GH15

6XV1870-8GH20

6XV1870-8GH30

6XV1870-8GH50

6XV1870-8GN10

6XV1870-8GN15

M12-180/IE FC RJ45 IE connecting cable plug-145

Preassembled
IE FC TP trailing cable GP 2 x 2
(PROFINET type C)
with M12 plug (D-coded)
and IE FC RJ45 plug,
degree of protection IP65/IP67
Length:

- 2.0 m
- 3.0 m
- 5.0 m
- 10 m
- 15 m

6XV1871-5TH20

6XV1871-5TH30

6XV1871-5TH50

6XV1871-5TN10

6XV1871-5TN15

I/O systems

SIMATIC ET 200 systems without control cabinet
SIMATIC ET 200eco PN

I/O devices > Fail-safe I/O device

Ordering data	Article No.	Article No.
M12-180/M12-180 IE robust connecting cable Preassembled IE FC TP robust food cable 2 x 2 (PROFINET type C) with two 4-pin M12 plugs (D-coded), degree of protection IP69 Length: • 1.0 m • 2.0 m • 3.0 m • 5.0 m	6XV1881-5AH10 6XV1881-5AH20 6XV1881-5AH30 6XV1881-5AH50	IO-Link connecting cables Between IO-Link master and reader, on both sides with M12 plug, 4-pin • 5 m • 10 m 6GT2891-4MH50 6GT2891-4MN10
M12 Y-cable For connection of single-channel sensors (1001 evaluation), 5-pin For joint connection of an F-DQ and an F-DI channel by means of an 8-pin M12 socket	6ES7194-6KB00-0XA0 6ES7194-6KC00-0XA0	M12-90/M12-90 M12 power connecting cable Flexible 4-core power connecting cable, preassembled with A-coded, 5-pin M12 plug and A-coded, 5-pin M12 socket to supply the ET 200 with 24 V DC; 90° cable outlet Length: • 0.3 m • 0.5 m • 1.0 m • 1.5 m • 2.0 m • 3.0 m • 5.0 m • 10 m • 15 m 6XV1801-5GE30 6XV1801-5GE50 6XV1801-5GH10 6XV1801-5GH15 6XV1801-5GH20 6XV1801-5GH30 6XV1801-5GH50 6XV1801-5GN10 6XV1801-5GN15
E-coding plug (metal) for fail-safe ET 200 distributed I/O, IP65/IP67	6ES7194-6KB01-0AA0	
Control line Preassembled on one side with 1 x M12 plug angled, 5-pin, 5 x 0.34 mm ² , A-coded, max. 4 A, PUR casing, black • 1.5 m • 5 m • 10 m Preassembled, 1 x M12 cable box straight, 1 x M12 plug, 3 x 0.34 mm ² , A-coded, max. 4 A, PUR casing, black	3RK1902-4HB15-5AA0 3RK1902-4HB50-5AA0 3RK1902-4HC01-5AA0 3RK1902-4PB15-3AA0	M12-180/M12-180 M12 robust power connecting cable Flexible 4-core power connecting cable, preassembled with A-coded, 5-pin M12 plug and A-coded, 5-pin M12 socket to supply IP69 components with 24 V DC; Length: • 1.0 m • 2.0 m • 3.0 m • 5.0 m 6XV1801-5AH10 6XV1801-5AH20 6XV1801-5AH30 6XV1801-5AH50

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Technical specifications

Article number	6ES7146-6FF00-0AB0 ET 200eco PN, F-DI 8x24V /F-DQ 3x24V 2A	Article number	6ES7146-6FF00-0AB0 ET 200eco PN, F-DI 8x24V /F-DQ 3x24V 2A
General information		Encoder supply	
Engineering with		Number of outputs	2; Vs
• STEP 7 TIA Portal configurable/ integrated from version	V15 with HSP 204	Digital inputs	
Operating mode		Number of digital inputs	8; 8 (one-channel); 4 (two-channel)
• DI	Yes	Digital inputs, parameterizable	Yes
• DQ	Yes	Input characteristic curve in accordance with IEC 61131, type 1	Yes
Supply voltage		Number of simultaneously controllable inputs	
Rated value (DC)	24 V	all mounting positions	
Reverse polarity protection	Yes	- up to 60 °C, max.	8
Load voltage 1L+		Input voltage	
• Rated value (DC)	24 V	• Rated value (DC)	24 V
• Reverse polarity protection	Yes	• for signal "0"	-30 V DC to +5 V DC
Load voltage 2L+		• for signal "1"	15 V DC to 30 V DC
• Rated value (DC)	24 V	Input delay (for rated value of input voltage)	
• Reverse polarity protection	Yes	for standard inputs	
Input current		- parameterizable	Yes; 0.8 / 1.6 / 3.2 / 6.4 / 12.8 ms
Current consumption, typ.	200 mA	Cable length	
from supply voltage 1L+, max.	4 A	• unshielded, max.	30 m
from load voltage 2L+, max.	4 A		

I/O systems

SIMATIC ET 200 systems without control cabinet

SIMATIC ET 200eco PN

I/O devices > Fail-safe I/O device

Technical specifications

Article number	6ES7146-6FF00-0AB0 ET 200eco PN, F-DI 8x24V /F-DQ 3x24V 2A
Digital outputs	
Number of digital outputs	3
• in groups of	3
Short-circuit protection	Yes; Electronic
Limitation of inductive shutdown voltage to	PM-switching: Typ. -26 V to (-48 V)
Controlling a digital input	No
Switching capacity of the outputs	
• on lamp load, max.	10 W
Output current	
• for signal "1" rated value	2 A
• for signal "0" residual current, max.	0.5 mA
Parallel switching of two outputs	
• for uprating	No
• for redundant control of a load	No
Switching frequency	
• with resistive load, max.	30 Hz
• with inductive load, max.	0.1 Hz
• on lamp load, max.	10 Hz
Total current of the outputs (per group)	
all mounting positions	
- up to 60 °C, max.	3.9 A
Cable length	
• unshielded, max.	30 m
Encoder	
Connectable encoders	
• 2-wire sensor	No
- permissible quiescent current (2-wire sensor), max.	0.5 mA
Interfaces	
Transmission procedure	100BASE-TX
Number of PROFINET interfaces	1
1. Interface	
Interface types	
• M12 port	Yes
• integrated switch	Yes
Interface types	
M12 port	
• Autonegotiation	Yes
• Autocrossing	Yes
• Transmission rate, max.	100 Mbit/s
Protocols	
Supports protocol for PROFINET IO	Yes
PROFINET CBA	No
PROFIsafe	Yes
PROFINET IO Device	
Services	
- IRT with the option "high flexibility"	No; module will participate within an IRT topology
- Prioritized startup	No
Redundancy mode	
Media redundancy	
- MRP	Yes

Article number	6ES7146-6FF00-0AB0 ET 200eco PN, F-DI 8x24V /F-DQ 3x24V 2A
Open IE communication	
• TCP/IP	No
• SNMP	Yes
• DCP	Yes
• LLDP	Yes
• ping	Yes
• ARP	Yes
Interrupts/diagnostics/status information	
Diagnostics function	Yes
Alarms	
• Diagnostic alarm	Yes
Diagnoses	
• Diagnostic information readable	Yes
• Monitoring the supply voltage	Yes; green "ON" LED
• Wire-break in actuator cable	Yes
• Wire-break in signal transmitter cable	Yes
• Short-circuit	Yes
• Short-circuit encoder supply	Yes
• Group error	Yes; Red/yellow "SF/MT" LED
Potential separation	
between the load voltages	Yes
between load voltage and all other switching components	No
between Ethernet and electronics	Yes
Potential separation channels	
• between the channels	No
Degree and class of protection	
IP degree of protection	IP65/67
Standards, approvals, certificates	
Suitable for safety-related tripping of standard modules	No
Highest safety class achievable in safety mode	
• Performance level according to ISO 13849-1	PLe
• SIL acc. to IEC 61508	SIL 2 (single-channel), SIL 3 (two-channel)
• SILCL according to IEC 62061	SIL 3
Ambient conditions	
Ambient temperature during operation	
• min.	-25 °C
• max.	60 °C
connection method	
Design of electrical connection	4/5-pin M12 circular connectors
Dimensions	
Width	60 mm
Height	175 mm
Depth	49 mm
Weights	
Weight, approx.	940 g

I/O systems

SIMATIC ET 200 systems without control cabinet

SIMATIC ET 200eco PN

I/O devices > IO-Link master

Overview



IO-Link master with 2x M12 L-coded power connectors and 45 mm width

- IO-Link communication modules for connecting up to 8 IO-Link devices
- Options: IO-Link master
 - with 4x Class A port and 4x Class B port as well as additional 4 digital inputs,
 - with 4x Port Class A and additional 12 digital inputs/outputs or
 - with 8x Port Class A and additional 8 digital inputs/outputs.
- The IO-Link specifications V1.0 and V1.1 are supported



IO-Link master with 2x M12 A-coded power connectors and 60 mm width

- IO-Link communication modules for connecting up to 4 IO-Link devices
- IO-Link master with 4x Class A port and additional 8 digital inputs and 4 digital outputs
- The IO-Link specification V1.0 is supported



IO-Link master with 2x M12 A-coded power connectors and 30 mm width

- IO-Link communication modules for connecting up to 4 IO-Link devices
- IO-Link master with 4x Class B port
- The IO-Link specifications V1.0 and V1.1 are supported

I/O devices > IO-Link master

Ordering data	Article No.	Article No.
ET 200eco PN IO-Link master 4 IO-L + 8 DI + 4 DQ, 24 V DC/1.3 A; 8 x M12, degree of protection IP67, enclosure width 60 mm; for connecting up to 4 IO-Link devices according to IO-Link specification V1.0 and Class A port as well as 8 digital inputs and 4 digital outputs 4 IO-L; 4 x M12, degree of protection IP67, enclosure width 30 mm; for connecting up to 4 IO-Link devices according to IO-Link specification V1.0 and V1.1 and Class B port 8 IO-L + 4 DI 24 V DC; 8 x M12, degree of protection IP67, enclosure width 45 mm; for connecting up to 8 IO-Link devices according to IO-Link specification V1.0 and V1.1, 4x Class A port and 4 x Class B port, as well as 4 additional digital inputs 8 IO-L + 8 DIQ 24 V DC; 8 x M12, degree of protection IP67, enclosure width 45 mm; for connecting up to 8 IO-Link devices according to IO-Link specification V1.0 and V1.1, 8x Class A ports, as well as 8 additional digital inputs/outputs 4 IO-L + 12 DIQ 24 V DC; 8 x M12, degree of protection IP67, enclosure width 45 mm; for connecting up to 4 IO-Link devices according to IO-Link specification V1.0 and V1.1, 4x Class A ports, as well as 12 additional digital inputs/outputs	6ES7148-6JA00-0AB0 6ES7148-6JD00-0AB0 6ES7148-6JG00-0BB0 6ES7148-6JJ00-0BB0 6ES7148-6JE00-0BB0	PROFINET M12 connection plug, for user assembly Connector for PROFINET, 4-core, shielded IE M12 plug PRO connector 1 unit 8 units IE FC M12 plug PRO connector, for user assembly 1 unit 8 units M12 connection plug for 24 V DC load power supply Connection socket for 24 V DC infeed; 4-pin, A-coded, 3 units Connector for loop-through of 24 V DC; 4-pin, A-coded, 3 units M12 circular connector Can be assembled, for connecting actuators or sensors, 5-pin, screw terminal, max. 0.75 mm ² , A-coded, max. 4 A - Straight - Angled M12 coupling socket 4-pin, screw terminal, max. 0.75 mm ² , A-coded, max. 4 A, angled PROFINET bus cable Preassembled on one side with 1 x M12, D-coded, 4-wire, shielded 3 m 5 m 10 m IE connecting cable M12-90/M12-90 Preassembled IE FC TP trailing cable GP 2 x 2 (PROFINET type C) with two 4-pin M12 plugs (D-coded) up to 85 m, degree of protection IP65/IP67, 90° cable outlet Length: 0.3 m 0.5 m 1.0 m 1.5 m 2.0 m 3.0 m 5.0 m 10 m 15 m IE connecting cable M12-180/IE FC RJ45 plug-145 Preassembled IE FC TP trailing cable GP 2 x 2 (PROFINET type C) with M12 plug (D-coded) and IE FC RJ45 plug, degree of protection IP65/IP67 Length: 2.0 m 3.0 m 5.0 m 10 m 15 m
Accessories - PD voltage distributor, 24 V DC; 1 X 7/8", 4 X M12 - Terminal block for ET 200eco PN, 10 A insulation displacement terminals - Spare fuses for terminal block, 10 units - Mounting rail 0.5 m - Profile screw for mounting rail, 50 units - Sealing cap M12 for IP67 modules, 12 mm outer diameter, without O-ring, 10 units - Sealing cap M12 for IP67 modules, 15 mm outer diameter, with O-ring, 10 units - Labels 10 mm x 5 mm RAL9016, for I/O devices with 2x M12 L-coded power connectors; 5 frames with 40 labels each - Labels 10 mm x 7 mm Ti-grey, for I/O devices with 2x M12 A-coded power connectors; 5 frames with 40 labels each	6ES7148-6CB00-0AA0 6ES7194-6CA00-0AA0 6ES7194-6HB00-0AA0 6ES7194-6GA00-0AA0 6ES7194-6MA00-0AA0 3RX9802-0AA00 3RK1901-1KA00 6ES7194-2BA00-0AA0 3RT2900-1SB10	3RK1902-2DA00 6GK1901-0DB10-6AA0 6GK1901-0DB10-6AA8 6GK1901-0DB20-6AA0 6GK1901-0DB20-6AA8 6GK1907-0DC10-6AA3 6GK1907-0DB10-6AA3 3RK1902-4BA00-5AA0 3RK1902-4DA00-5AA0 3RK1902-4CA00-4AA0 3RK1902-2HB30 3RK1902-2HB50 3RK1902-2HC10 6XV1870-8GE30 6XV1870-8GE50 6XV1870-8GH10 6XV1870-8GH15 6XV1870-8GH20 6XV1870-8GH30 6XV1870-8GH50 6XV1870-8GN10 6XV1870-8GN15 6XV1871-5TH20 6XV1871-5TH30 6XV1871-5TH50 6XV1871-5TN10 6XV1871-5TN15

I/O systems

SIMATIC ET 200 systems without control cabinet
SIMATIC ET 200eco PN

I/O devices > IO-Link master

Ordering data	Article No.	Article No.
M12-180/M12-180 IE robust connecting cable Preassembled IE FC TP robust food cable 2 x 2 (PROFINET type C) with two 4-pin M12 plugs (D-coded), degree of protection IP69 Length: • 1.0 m • 2.0 m • 3.0 m • 5.0 m	6XV1881-5AH10 6XV1881-5AH20 6XV1881-5AH30 6XV1881-5AH50	
M12 Y-cable For double connection of I/O by means of a single cable to ET 200, 5-pin	6ES7194-6KA00-0XA0	
Control line Preassembled on one side with 1 x M12 plug angled, 5-pin, 5 x 0.34 mm ² , A-coded, max. 4 A, PUR casing, black • 1.5 m • 5 m • 10 m Preassembled, 1 x M12 cable box straight, 1 x M12 plug, 3 x 0.34 mm ² , A-coded, max. 4 A, PUR casing, black	3RK1902-4HB15-5AA0 3RK1902-4HB50-5AA0 3RK1902-4HC01-5AA0 3RK1902-4PB15-3AA0	
IO-Link connecting cables Between IO-Link master and reader, on both sides with M12 plug, 4-pin • 5 m • 10 m	6GT2891-4MH50 6GT2891-4MN10	
Energy cable 4 x 1.5 Trailable power cable, with 4 copper cores (1.5 mm ²) for connecting to M12 plug-in connector; sold by the meter; max. delivery unit 1000 m, minimum order quantity 20 m	6XV1801-2B	
M12-90/M12-90 M12 power connecting cable Flexible 4-core power connecting cable, preassembled with A-coded, 5-pin M12 plug and A-coded, 5-pin M12 socket to supply the ET 200 with 24 V DC; 90° cable outlet Length: • 0.3 m • 0.5 m • 1.0 m • 1.5 m • 2.0 m • 3.0 m • 5.0 m • 10 m • 15 m	6XV1801-5GE30 6XV1801-5GE50 6XV1801-5GH10 6XV1801-5GH15 6XV1801-5GH20 6XV1801-5GH30 6XV1801-5GH50 6XV1801-5GN10 6XV1801-5GN15	
M12-180/M12-180 M12 power connecting cable Flexible 4-core power connecting cable, preassembled with L-coded, 4-pin M12 plug and L-coded, 4-pin M12 socket to supply terminal devices with 24 V DC Length: • 0.5 m • 1.0 m • 1.5 m • 2.0 m • 3.0 m • 5.0 m • 10 m • 15 m	6XV1801-6DE50 6XV1801-6DH10 6XV1801-6DH15 6XV1801-6DH20 6XV1801-6DH30 6XV1801-6DH50 6XV1801-6DN10 6XV1801-6DN15	
M12-90/M12-90 M12 power connecting cable Flexible 4-core power connecting cable, preassembled with L-coded, 4-pin M12 plug and L-coded, 4-pin M12 socket, both sides angled 90°, to supply terminal devices with 24 V DC Length: • 0.5 m • 1.0 m • 1.5 m • 2.0 m • 3.0 m • 5.0 m • 10 m • 15 m	6XV1801-6GE50 6XV1801-6GH10 6XV1801-6GH15 6XV1801-6GH20 6XV1801-6GH30 6XV1801-6GH50 6XV1801-6GN10 6XV1801-6GN10	
M12-180/M12-180 M12 robust power connecting cable Flexible 4-core power connecting cable, preassembled with A-coded, 5-pin M12 plug and A-coded, 5-pin M12 socket to supply IP69 components with 24 V DC; Length: • 1.0 m • 2.0 m • 3.0 m • 5.0 m	6XV1801-5AH10 6XV1801-5AH20 6XV1801-5AH30 6XV1801-5AH50	
Power M12 plug PRO Connector for 24 V DC supply voltage, with installation instructions, 4-pin, L-coded, 1 unit	6GK1906-0EA00	
Power M12 cable connector PRO Connection socket for 24 V DC supply voltage, 4-pin, L-coded, with installation instructions, 1 unit	6GK1906-0EB00	

I/O systems

SIMATIC ET 200 systems without control cabinet

SIMATIC ET 200eco PN

I/O devices > IO-Link master

Technical specifications

Article number	6ES7148-6JA00-0AB0	6ES7148-6JD00-0AB0	6ES7148-6JG00-0BB0
	ET 200eco PN, 4xIO-Link + 8DI/4DO, 8xM12	ET 200eco PN, 4xIO-Link 4xM12	ET 200eco PN, CM 8x IO-Link, M12-L
General information			
Product function			
• Isochronous mode			No
• Prioritized startup			Yes
Engineering with			
• STEP 7 TIA Portal configurable/ integrated from version			STEP 7 V17 or higher with HSP 0363
• PROFINET from GSD version/ GSD revision			GSDML V2.3.x
• Multi Fieldbus Configuration Tool (MFCT)			from V1.3 SP1
Operating mode			
• IO-Link	Yes	Yes	Yes
• DI	Yes	Yes	Yes
• Counter			No
• DQ	Yes	Yes; max. 100 mA	No
• MSI			No
• MSO			No
Supply voltage			
Rated value (DC)	24 V	24 V	
Reverse polarity protection	Yes	Yes	
Load voltage 1L+			
• Rated value (DC)			24 V
• Reverse polarity protection			Yes; against destruction
Load voltage 2L+			
• Rated value (DC)	24 V	24 V	24 V
• Reverse polarity protection	Yes	Yes; against destruction; load increasing	Yes; Against destruction; encoder power supply outputs applied with reversed polarity
Input current			
Current consumption (rated value)			70 mA; without load
Current consumption, typ. from supply voltage 1L+, max.	200 mA	100 mA	
from load voltage 1L+ (unswitched voltage)	4 A	4 A	12 A; Maximum value
from load voltage 2L+, max.	4 A	4 A	12 A; Maximum value
Encoder supply			
Number of outputs	6	4	8
Hardware configuration			
Submodules			
• Number of configurable submodules, max.			9
Digital inputs			
Number of digital inputs	8		4
Source/sink input			P-reading
Input characteristic curve in accordance with IEC 61131, type 3	Yes		Yes
Number of simultaneously controllable inputs all mounting positions			
- up to 60 °C, max.	8		4
Input voltage			
• Rated value (DC)	24 V		24 V
• for signal "0"	-3 to +5V		-3 to +5V
• for signal "1"	+11 to +30V		+11 to +30V
Input current			
• for signal "0", max. (permissible quiescent current)	1.5 mA		
• for signal "1", typ.	7 mA		2.5 mA
Cable length			
• unshielded, max.	30 m		30 m

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I/O devices > IO-Link master

Technical specifications

Article number	6ES7148-6JA00-0AB0 ET 200eco PN, 4xIO-Link + 8DI/4DO, 8xM12	6ES7148-6JD00-0AB0 ET 200eco PN, 4xIO-Link 4xM12	6ES7148-6JG00-0BB0 ET 200eco PN, CM 8x IO-Link, M12-L
Digital outputs			
Number of digital outputs	4		
Short-circuit protection	Yes; Electronic		
Limitation of inductive shutdown voltage to	Typ. (L1+, L2+) -47 V		
Controlling a digital input	Yes		
Switching capacity of the outputs			
• on lamp load, max.	5 W		
Output current			
• for signal "1" rated value	1.3 A; Maximum		
• for signal "0" residual current, max.	1.5 mA		
Parallel switching of two outputs			
• for uprating	No		
• for redundant control of a load	Yes		
Switching frequency			
• with resistive load, max.	100 Hz		
• with inductive load, max.	0.5 Hz		
• on lamp load, max.	1 Hz		
Total current of the outputs (per group)			
all mounting positions			
- up to 60 °C, max.	3.9 A		
Cable length			
• unshielded, max.	30 m		
IO-Link			
Number of ports	4	4	8
• of which simultaneously controllable	4	4	8
IO-Link protocol 1.0	Yes	Yes	Yes
IO-Link protocol 1.1	No	Yes	Yes
Transmission rate	4.8 kBd (COM1); 38.4 kBd (COM2)	4.8 kBaud (COM1); 38.4 kBaud (COM2), 230 kBaud (COM3)	4.8 kBaud (COM1); 38.4 kBaud (COM2), 230 kBaud (COM3)
Cycle time, min.			2 ms
Size of process data, input per port	32 byte	32 byte	33 byte
Size of process data, input per module	32 byte	128 bytes + 4 bytes PQI	264 byte
Size of process data, output per port	32 byte	32 byte	32 byte
Size of process data, output per module	32 byte	128 byte	256 byte
Memory size for device parameter		2 kbyte; for each port	2 kbyte; for each port
Master backup		Possible with function block IO_LINK_MASTER	possible with LIOLink_Master function block
Configuration without S7-PCT		Possible; autostart/manual function	Possible; autostart/manual function
Cable length unshielded, max.	20 m	20 m	20 m
Connection of IO-Link devices			
• Port type A	Yes	Yes; via 3-core cable	Yes; via 3-core cable
• Port type B		Yes; Additional device supply: max. 2 A per port, max. 4 A per module	Yes; additional device supply: max. 2 A per port, max. 6 A per module
• via three-wire connection	Yes		Yes
Interfaces			
Transmission procedure	100BASE-TX	100BASE-TX	
Number of PROFINET interfaces	1	1	1
1. Interface			
Interface type			PROFINET with 100 Mbit/s full duplex (100BASE-TX)

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SIMATIC ET 200eco PN

I/O devices > IO-Link master

Technical specifications

Article number	6ES7148-6JA00-0AB0 ET 200eco PN, 4xIO-Link + 8DI/4DO, 8xM12	6ES7148-6JD00-0AB0 ET 200eco PN, 4xIO-Link 4xM12	6ES7148-6JG00-0BB0 ET 200eco PN, CM 8x IO-Link, M12-L
Interface types			
• M12 port	Yes	Yes	Yes; 2x M12, 4-pin, D-coded
• Number of ports			2
• integrated switch	Yes	Yes	Yes
Protocols			
• PROFINET IO Device			Yes
• Open IE communication			Yes
Interface types			
M12 port			
• Autonegotiation	Yes	Yes	Yes
• Autocrossing	Yes	Yes	Yes
• Transmission rate, max.	100 Mbit/s	100 Mbit/s	100 Mbit/s
Protocols			
Supports protocol for PROFINET IO	Yes	Yes	Yes
PROFINET CBA	No	No	
PROFIsafe	No	No	No
EtherNet/IP	No	No	Yes
Modbus TCP			Yes
PROFINET IO Device			
Services			
- IRT			Yes; 250 µs to 4 ms in 125 µs frame
- IRT with the option "high flexibility"	Yes	Yes	
- Prioritized startup			Yes
- Shared device			Yes
- Number of IO Controllers with shared device, max.			2
Redundancy mode			
• PROFINET system redundancy (S2)			Yes
• PROFINET system redundancy (R1)			No
• H-Sync forwarding			Yes
Media redundancy			
- MRP	Yes	Yes	Yes
EtherNet/IP			
Services			
- CIP Implicit Messaging			Yes
- CIP Explicit Messaging			Yes
- CIP Safety			No
- Shared device			Yes; 2x EtherNet/IP Scanner
- Number of scanners with shared device, max.			2
Updating times			
- Requested Packet Interval (RPI)			2 ms
Redundancy mode			
- DLR (Device Level Ring)			No
Address area			
- Address space per module, max.			300 byte
- LargeForwardOpen (Class3)			No
Modbus TCP			
Services			
- read coils (code=1)			Yes
- read discrete inputs (code=2)			Yes
- Read Holding Registers (Code=3)			Yes
- write single coil (code=5)			Yes
- write multiple coils (code=15)			Yes
- Write Multiple Registers (Code=16)			Yes
- Parameter change by master			No
- Modbus TCP Security Protocol			No

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I/O devices > IO-Link master

Technical specifications

Article number	6ES7148-6JA00-0AB0 ET 200eco PN, 4xIO-Link + 8DI/4DO, 8xM12	6ES7148-6JD00-0AB0 ET 200eco PN, 4xIO-Link 4xM12	6ES7148-6JG00-0BB0 ET 200eco PN, CM 8x IO-Link, M12-L
Address space per station			
- Address space per station, max.			300 byte
- Access-consistent address space			2 byte
Updating time			
- I/O request interval			2 ms
Connections			
- number of connections per device			12
Open IE communication			
• TCP/IP	No	No	Yes; (only EtherNet/IP or Modbus TCP)
• SNMP	Yes	Yes	Yes
• DCP	Yes	Yes	
• LLDP	Yes	Yes	Yes
• ping	Yes	Yes	
• ARP	Yes	Yes	Yes
Interrupts/diagnostics/ status information			
Diagnostics function	Yes	Yes	
Alarms			
• Diagnostic alarm	Yes	Yes	Yes; Parameterizable
• Maintenance interrupt			Yes; Parameterizable
Diagnoses			
• Diagnostic information readable	Yes	Yes	Yes
• Monitoring the supply voltage	Yes; green "ON" LED	Yes; green "ON" LED	Yes
- parameterizable			Yes
• Wire-break			Yes
• Wire-break in actuator cable	Yes		
• Wire-break in signal transmitter cable	Yes		
• Short-circuit	Yes	Yes; Device supply to M	
• Short-circuit encoder supply	Yes		Yes; Per channel
• Group error	Yes; Red/yellow "SF/MT" LED	Yes; Red/yellow "SF/MT" LED	
Diagnostics indication LED			
• RUN LED			Yes; green LED
• ERROR LED			Yes; red LED
• MAINT LED			Yes; Yellow LED
• Monitoring of the supply voltage (PWR-LED)			Yes; green LED
• NS LED			Yes; green/red LED
• MS LED			Yes; green/red LED
• IO LED			Yes; red/green/yellow LEDs
• Channel status display			Yes; green LED
• for channel diagnostics			Yes; red LED
• For load voltage monitoring			Yes; green LED
• Connection display LINK TX/RX			Yes; green LED, only link
Potential separation			
between the load voltages	Yes	Yes	Yes
between load voltage and all other switching components	No	No	
between Ethernet and electronics	Yes	Yes	Yes
Potential separation channels			
• between the channels	No		No
• between the channels and the power supply of the electronics			No
Degree and class of protection			
IP degree of protection	IP65/67	IP65/67	IP65/67/69K
Standards, approvals, certificates			
Suitable for safety-related tripping of standard modules		No	Yes; from FS01

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I/O devices > IO-Link master

Technical specifications

Article number	6ES7148-6JA00-0AB0 ET 200eco PN, 4xIO-Link + 8DI/4DO, 8xM12	6ES7148-6JD00-0AB0 ET 200eco PN, 4xIO-Link 4xM12	6ES7148-6JG00-0BB0 ET 200eco PN, CM 8x IO-Link, M12-L
Highest safety class achievable for safety-related tripping of standard modules • Performance level according to ISO 13849-1 • Category according to ISO 13849-1 • SIL acc. to IEC 62061			PL d Cat. 3 SIL 2
Use in hazardous areas • Explosion protection category for gas • Explosion protection category for dust	ATEX II 3G Ex nA II T4 ATEX II 3D Ex tc IIIC T90°C Dc	ATEX II 3G Ex nA II T4 ATEX II 3D Ex tc IIIC T90°C Dc	ATEX, UKEX, IECEx, CCCEx for Zone 2 ATEX, UKEX, IECEx, CCCEx for Zone 22
Product functions / security			
signed firmware update			Yes
safely removing data			Yes
Ambient conditions			
Ambient temperature during operation • min. • max.			-40 °C 60 °C
Altitude during operation relating to sea level • Ambient air temperature-barometric pressure-altitude			Up to max. 5 000 m, at installation height > 2 000 m additional restrictions, see manual for details
connection method			
Design of electrical connection		3/5-pin M12 round connectors	4/5-pin M12 circular connectors
Design of electrical connection for the inputs and outputs			M12, 5-pin, A-coded
Design of electrical connection for supply voltage			M12, 4-pin, L-coded
Dimensions			
Width	60 mm	30 mm	45 mm
Height	175 mm	200 mm	200 mm
Depth	49 mm	49 mm	48 mm
Weights			
Weight, approx.	910 g	550 g	780 g
Article number	6ES7148-6JJ00-0BB0 ET 200eco PN, CM 8x IO-Link, M12-L	6ES7148-6JE00-0BB0 ET 200eco PN, CM 4x IO-Link, M12-L	
General information			
Product function • Isochronous mode • Prioritized startup	No Yes	No Yes	
Engineering with • STEP 7 TIA Portal configurable/ integrated from version • PROFINET from GSD version/ GSD revision • Multi Fieldbus Configuration Tool (MFCT)	STEP 7 V17 or higher with HSP 0378 GSDML V2.3.x V1.4.1 or higher	STEP 7 V17 or higher with HSP 0378 GSDML V2.3.x V1.4.1 or higher	
Operating mode • IO-Link • DI • Counter • DQ • MSI • MSO	Yes Yes No Yes Yes Yes	Yes Yes No Yes Yes Yes	
Supply voltage			
Load voltage 1L+ • Rated value (DC) • Reverse polarity protection	24 V Yes; against destruction	24 V Yes; against destruction	

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SIMATIC ET 200eco PN

I/O devices > IO-Link master

Technical specifications

Article number	6ES7148-6JJ00-0BB0 ET 200eco PN, CM 8x IO-Link, M12-L	6ES7148-6JE00-0BB0 ET 200eco PN, CM 4x IO-Link, M12-L
Load voltage 2L+		
• Rated value (DC)	24 V	24 V
• Reverse polarity protection	Yes; against destruction	Yes; against destruction
Input current		
Current consumption (rated value)	70 mA; without load	70 mA; without load
from load voltage 1L+ (unswitched voltage)	12 A; Maximum value	12 A; Maximum value
from load voltage 2L+, max.	12 A; Maximum value	12 A; Maximum value
Encoder supply		
Number of outputs	8	4
Hardware configuration		
Submodules		
• Number of configurable submodules, max.	10	6
Digital inputs		
Number of digital inputs	8; Parameterizable as DIQ	12; Parameterizable as DIQ
• in groups of	8	4
Digital inputs, parameterizable	Yes	Yes
Source/sink input	P-reading	P-reading
Input characteristic curve in accordance with IEC 61131, type 3	Yes	Yes
Number of simultaneously controllable inputs		
all mounting positions		
- up to 60 °C, max.	8	12
Input voltage		
• Rated value (DC)	24 V	24 V
• for signal "0"	-3 to +5V	-3 to +5V
• for signal "1"	+11 to +30V	+11 to +30V
Input current		
• for signal "1", typ.	2.5 mA	2.5 mA
Input delay (for rated value of input voltage) for standard inputs		
- parameterizable	Yes; 0.05 / 0.1 / 0.4 / 0.8 / 1.6 / 3.2 / 12.8 / 20 ms	Yes; 0.05 / 0.1 / 0.4 / 0.8 / 1.6 / 3.2 / 12.8 / 20 ms
Cable length		
• unshielded, max.	30 m	30 m
Digital outputs		
Number of digital outputs	8; Parameterizable as DIQ	12; Parameterizable as DIQ
• in groups of	8	2 load groups for 4 or 8 outputs each
Current-sourcing	Yes	Yes
output type acc. to IEC 61131, type 0.5	Yes	Yes
Short-circuit protection	Yes; per channel, electronic	Yes; per channel, electronic
Limitation of inductive shutdown voltage to	0.5 A: typ. 1L+ (-70 V)	0.5 A: Type 1L+ (-70 V) / 2 A: Type (-18 V)
Controlling a digital input	Yes	Yes
Switching capacity of the outputs		
• with resistive load, max.	0.5 A	0.5 A / 2 A
• with inductive load, max.	0.5 A	0.5 A / 2 A
• on lamp load, max.	5 W	0.5 A: 5 W / 2 A 10 W
Load resistance range		
• lower limit	48 Ω	0.5 A: 48 ohms / 2 A: 12 ohms
• upper limit	4 kΩ	4 kΩ
Output voltage		
• for signal "1", min.	1L+ (-0.8V)	1L+ (-0.8 V) / 2L+ (-0.8 V)
Output current		
• for signal "1" rated value	0.5 A	0.5 A / 2 A
• for signal "0" residual current, max.	0.1 mA	0.1 mA
Parallel switching of two outputs		
• for uprating	No	No
• for redundant control of a load	Yes	Yes

I/O systems

SIMATIC ET 200 systems without control cabinet

SIMATIC ET 200eco PN

I/O devices > IO-Link master

Technical specifications

Article number	6ES7148-6JJ00-0BB0 ET 200eco PN, CM 8x IO-Link, M12-L	6ES7148-6JE00-0BB0 ET 200eco PN, CM 4x IO-Link, M12-L
Switching frequency		
• with resistive load, max.	100 Hz	0.5 A: 100 Hz / 2 A: 40 Hz
• with inductive load, max.	0.5 Hz	0.5 Hz
• on lamp load, max.	1 Hz	1 Hz
Total current of the outputs		
• Current per group, max.	1L+: 4 A	1L+: 2 A / 2L+: 5.5 A
• Current per module, max.	4 A	7.5 A
Cable length		
• unshielded, max.	30 m	30 m
Encoder		
Connectable encoders		
• 2-wire sensor	Yes	Yes
- permissible quiescent current (2-wire sensor), max.	1.5 mA	1.5 mA
IO-Link		
Number of ports	8	4
• of which simultaneously controllable	8	4
IO-Link protocol 1.0	Yes	Yes
IO-Link protocol 1.1	Yes	Yes
Transmission rate	4.8 kBaud (COM1); 38.4 kBaud (COM2), 230 kBaud (COM3)	4.8 kBaud (COM1); 38.4 kBaud (COM2), 230 kBaud (COM3)
Cycle time, min.	2 ms	2 ms
Size of process data, input per port	33 byte	33 byte
Size of process data, input per module	264 byte	132 byte
Size of process data, output per port	32 byte	32 byte
Size of process data, output per module	256 byte	128 byte
Memory size for device parameter	2 kbyte; for each port	2 kbyte; for each port
Master backup	possible with LIOLink_Master function block	possible with LIOLink_Master function block
Configuration without S7-PCT	Possible; autostart/manual function	Possible; autostart/manual function
Cable length unshielded, max.	20 m	20 m
Connection of IO-Link devices		
• Port type A	Yes; via 3-core cable	Yes; via 3-core cable
• Port type B	No	No
• via three-wire connection	Yes	Yes
Interfaces		
Number of PROFINET interfaces	1	1
1. Interface		
Interface type	PROFINET with 100 Mbit/s full duplex (100BASE-TX)	PROFINET with 100 Mbit/s full duplex (100BASE-TX)
Interface types		
• M12 port	Yes; 2x M12, 4-pin, D-coded	Yes; 2x M12, 4-pin, D-coded
• Number of ports	2	2
• integrated switch	Yes	Yes
Protocols		
• PROFINET IO Device	Yes	Yes
• Open IE communication	Yes	Yes
Interface types		
M12 port		
• Autonegotiation	Yes	Yes
• Autocrossing	Yes	Yes
• Transmission rate, max.	100 Mbit/s	100 Mbit/s
Protocols		
Supports protocol for PROFINET IO	Yes	Yes
PROFIsafe	No	No
EtherNet/IP	Yes	Yes
Modbus TCP	Yes	Yes

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I/O devices > IO-Link master

Technical specifications

Article number	6ES7148-6JJ00-0BB0 ET 200eco PN, CM 8x IO-Link, M12-L	6ES7148-6JE00-0BB0 ET 200eco PN, CM 4x IO-Link, M12-L
PROFINET IO Device		
Services		
- IRT	Yes; 250 µs to 4 ms in 125 µs frame	Yes; 250 µs to 4 ms in 125 µs frame
- Prioritized startup	Yes	Yes
- Shared device	Yes	Yes
- Number of IO Controllers with shared device, max.	2	2
Redundancy mode		
• PROFINET system redundancy (S2)	Yes	Yes
• PROFINET system redundancy (R1)	No	No
• H-Sync forwarding	Yes	Yes
Media redundancy		
- MRP	Yes	Yes
EtherNet/IP		
Services		
- CIP Implicit Messaging	Yes	Yes
- CIP Explicit Messaging	Yes	Yes
- CIP Safety	No	No
- Shared device	Yes; 2x EtherNet/IP Scanner	Yes; 2x EtherNet/IP Scanner
- Number of scanners with shared device, max.	2	2
Updating times		
- Requested Packet Interval (RPI)	2 ms	2 ms
Redundancy mode		
- DLR (Device Level Ring)	No	No
Address area		
- Address space per module, max.	300 byte	300 byte
- LargeForwardOpen (Class3)	No	No
Modbus TCP		
Services		
- read coils (code=1)	Yes	Yes
- read discrete inputs (code=2)	Yes	Yes
- Read Holding Registers (Code=3)	Yes	Yes
- write single coil (code=5)	Yes	Yes
- write multiple coils (code=15)	Yes	Yes
- Write Multiple Registers (Code=16)	Yes	Yes
- Parameter change by master	No	No
- Modbus TCP Security Protocol	No	No
Address space per station		
- Address space per station, max.	300 byte	300 byte
- Access-consistent address space	2 byte	2 byte
Updating time		
- I/O request interval	2 ms	2 ms
Connections		
- number of connections per device	12	12
Open IE communication		
• TCP/IP	Yes; (only EtherNet/IP or Modbus TCP)	Yes; (only EtherNet/IP or Modbus TCP)
• SNMP	Yes	Yes
• LLDP	Yes	Yes
• ARP	Yes	Yes
Interrupts/diagnostics/status information		
Substitute values connectable	Yes	Yes
Alarms		
• Diagnostic alarm	Yes; Parameterizable	Yes; Parameterizable
• Maintenance interrupt	Yes; Parameterizable	Yes; Parameterizable
• Hardware interrupt	Yes; Parameterizable	Yes; Parameterizable

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I/O devices > IO-Link master

Technical specifications

Article number	6ES7148-6JJ00-0BB0 ET 200eco PN, CM 8x IO-Link, M12-L	6ES7148-6JE00-0BB0 ET 200eco PN, CM 4x IO-Link, M12-L
Diagnoses		
• Diagnostic information readable	Yes	Yes
• Monitoring the supply voltage	Yes	Yes
- parameterizable	Yes	Yes
• Wire-break	Yes; DI, input current < 0.3 mA, per channel	Yes; DI, input current < 0.3 mA, per channel
• Short-circuit encoder supply	Yes; Per channel	Yes; Per channel
Diagnostics indication LED		
• RUN LED	Yes; green LED	Yes; green LED
• ERROR LED	Yes; red LED	Yes; red LED
• MAINT LED	Yes; Yellow LED	Yes; Yellow LED
• Monitoring of the supply voltage (PWR-LED)		Yes; green LED
• NS LED	Yes; green/red LED	Yes; green/red LED
• MS LED	Yes; green/red LED	Yes; green/red LED
• IO LED	Yes; red-green-yellow LED	Yes; red-green-yellow LED
• Channel status display	Yes; green LED	Yes; green LED
• for channel diagnostics	Yes; red LED	Yes; red LED
• For load voltage monitoring	Yes; green LED	Yes; green LED
• Connection display LINK TX/RX	Yes; green LED, only link	Yes; green LED, only link
Potential separation		
between the load voltages	Yes	Yes
between Ethernet and electronics	Yes	Yes
Potential separation channels		
• between the channels	No	Yes
• between the channels and the power supply of the electronics		8 channels are non-isolated and 8 channels are isolated from supply voltage 1L+
Degree and class of protection		
IP degree of protection	IP65/67/69K	IP65/67/69K
Standards, approvals, certificates		
Suitable for safety-related tripping of standard modules	Yes; from FS01	Yes; from FS01
Highest safety class achievable for safety-related tripping of standard modules		
• Performance level according to ISO 13849-1	PL d	PL d
• Category according to ISO 13849-1	Cat. 3	Cat. 3
• SIL acc. to IEC 62061	SIL 2	SIL 2
Use in hazardous areas		
• Explosion protection category for gas	ATEX, UKEX, IECEx, CCCEX for Zone 2	ATEX, UKEX, IECEx, CCCEX for Zone 2
• Explosion protection category for dust	ATEX, UKEX, IECEx, CCCEX for Zone 22	ATEX, UKEX, IECEx, CCCEX for Zone 22
Product functions / security		
signed firmware update	Yes	Yes
safely removing data	Yes	Yes
Ambient conditions		
Ambient temperature during operation		
• min.	-40 °C	-40 °C
• max.	60 °C	60 °C
Altitude during operation relating to sea level		
• Ambient air temperature-barometric pressure-altitude	Up to max. 5 000 m, at installation height > 2 000 m additional restrictions	Up to max. 5 000 m, at installation height > 2 000 m additional restrictions
connection method		
Design of electrical connection	4/5-pin M12 circular connectors	4/5-pin M12 circular connectors
Design of electrical connection for the inputs and outputs	M12, 5-pin, A-coded	M12, 5-pin, A-coded
Design of electrical connection for supply voltage	M12, 4-pin, L-coded	M12, 4-pin, L-coded

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SIMATIC ET 200 systems without control cabinet
SIMATIC ET 200eco PN

I/O devices > IO-Link master

Technical specifications

Article number	6ES7148-6JJ00-0BB0 ET 200eco PN, CM 8x IO-Link, M12-L	6ES7148-6JE00-0BB0 ET 200eco PN, CM 4x IO-Link, M12-L
Dimensions		
Width	45 mm	45 mm
Height	200 mm	200 mm
Depth	48 mm	48 mm
Weights		
Weight, approx.	780 g	780 g

I/O systems
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SIMATIC ET 200eco PN

Accessories > Mounting rail

Overview



- Aluminum mounting rail for installation of SIMATIC ET 200eco PN
- Securing the I/O devices via two profile screws
- Length of mounting rail 0.5 m

Ordering data

Article No.

Mounting rail for ET 200eco PN Length 0.5 m	6ES7194-6GA00-0AA0
Profile screw for mounting rail For fixing the I/O devices on the mounting rail; 50 units	6ES7194-6MA00-0AA0

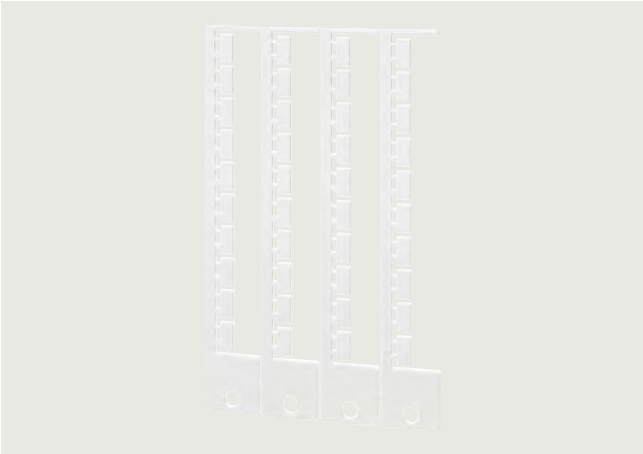
Technical specifications

Article number	6ES7194-6GA00-0AA0 Mounting BAR for ET200eco PN
Dimensions	
Width	500 mm
Height	203 mm
Depth	20 mm
Weights	
Weight, approx.	2.06 kg

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Accessories > Labels

Overview



- Labels for channel and device labeling of the ET 200eco PN components

Ordering data

Article No.

Labels 10 mm x 5 mm RAL9016 For I/O devices with 2x M12 L-coded power connectors; 5 frames with 40 labels each	6ES7194-2BA00-0AA0
Labels 10 x 7 mm Ti-grey For I/O devices with 2x M12 A-coded power connectors; 5 frames with 40 labels each	3RT2900-1SB10
Labels 10 mm x 7 mm yellow For I/O devices with 2x M12 A-coded power connectors; 17 frames with 48 labels each	6ES7194-6HA00-0AA0

I/O systems
SIMATIC ET 200 systems without control cabinet
SIMATIC ET 200eco PN

Accessories > Connector cover

Overview



- Stainless steel connector cover for ET 200ecoPN M12-L
- Optional use in hazardous area zone 2 / 22
- Can be used as protection against shocks and unintentional disconnection of cables

Ordering data

Stainless steel connector cover,
For using ET 200eco PN M12-L in
hazardous area zone 2 / 22

Article No.

6ES7194-6JA00-0BB0

Technical specifications

Article number	6ES7194-6JA00-0BB0 Connector cover for ET200ecoPN M12-L
General information	
Product description	connector cover for ET200ecoPN M12-L
Suitability for use	accessories for use of the ET200ecoPN M12-L in hazardous area Zone 2/22
Degree and class of protection	
IP degree of protection	IP20
Ambient conditions	
Ambient temperature during assembly, min.	-40 °C
Ambient temperature during assembly, max.	80 °C
Ambient temperature during operation	
• min.	-40 °C
• max.	60 °C
Ambient temperature during storage/transportation	
• min.	-40 °C
• max.	80 °C
Mechanics/material	
Material of housing	stainless steel with plastic edge protection
Material property	
• Silicone-free	Yes
Dimensions	
Width	50 mm
Height	200 mm
Depth	110 mm
Weights	
Weight, approx.	710 g