

I/O systems

SIMATIC ET 200 systems without control cabinet
SIMATIC ET 200AL

I/O modules > Analog I/O modules

Overview



- 30-mm-wide module with parameters and diagnostic functions
- For connecting analog actuators and sensors without additional amplifiers
- 4-channel analog input module with M12 connection
- 4-channel analog output module with M12 connection

Technical specifications

Article number	6ES7144-5KD00-0BA0 ET 200AL, AI 4XU/I/RTD, 4XM12
General information	
Product type designation	AI 4xU/I/RTD, 4xM12
HW functional status	E02
Firmware version	V1.0.x
Product function	
• I&M data	Yes; I&M0 to I&M3
Engineering with	
• STEP 7 TIA Portal configurable/ integrated as of version	STEP 7 V13 SP1 or higher
• STEP 7 configurable/integrated as of version	From V5.5 SP4 Hotfix 3
• PROFIBUS as of GSD version/ GSD revision	GSD as of Revision 5
• PROFINET as of GSD version/ GSD revision	GSDML V2.3.1
Supply voltage	
Load voltage 1L+	
• Rated value (DC)	24 V
• Reverse polarity protection	Yes; against destruction
Input current	
Current consumption (rated value)	35 mA; without load
from load voltage 1L+ (unswitched voltage)	4 A; Maximum value
from load voltage 2L+, max.	4 A; Maximum value
Encoder supply	
Number of outputs	4
24 V encoder supply	
• Short-circuit protection	Yes; per channel, electronic
• Output current, max.	0.5 A; per channel, total current of all channels max. 1 A
Power loss	
Power loss, typ.	1.5 W

Article number	6ES7144-5KD00-0BA0 ET 200AL, AI 4XU/I/RTD, 4XM12
Analog inputs	
Number of analog inputs	4
• For current measurement	4
• For voltage measurement	4
• For resistance/resistance thermometer measurement	4
permissible input voltage for voltage input (destruction limit), max.	30 V
permissible input current for current input (destruction limit), max.	50 mA
Cycle time (all channels), min.	8 ms
Technical unit for temperature measurement adjustable	Yes; Degrees Celsius / degrees Fahrenheit / Kelvin
Input ranges (rated values), voltages	
• 0 to +10 V	Yes
• Input resistance (0 to 10 V)	10 MΩ
• 1 V to 5 V	Yes
• Input resistance (1 V to 5 V)	10 MΩ
Input ranges (rated values), currents	
• 0 to 20 mA	Yes
• Input resistance (0 to 20 mA)	50 Ω
• 4 mA to 20 mA	Yes
• Input resistance (4 mA to 20 mA)	50 Ω
Input ranges (rated values), resistance thermometer	
• Ni 100	Yes; Standard/climate
• Input resistance (Ni 100)	10 MΩ
• Pt 100	Yes; Standard/climate
• Input resistance (Pt 100)	10 MΩ
Input ranges (rated values), resistors	
• 0 to 150 ohms	Yes
• Input resistance (0 to 150 ohms)	10 MΩ
• 0 to 300 ohms	Yes
• Input resistance (0 to 300 ohms)	10 MΩ

I/O systems

SIMATIC ET 200 systems without control cabinet
SIMATIC ET 200AL

I/O modules > Analog I/O modules

Technical specifications (continued)

Article number	6ES7145-5ND00-0BA0 ET 200AL, AQ 4xU/I, 4xM12
General information	
Product type designation	AQ 4XU/I, 4XM12
HW functional status	E01
Firmware version	V1.0.x
Product function	
• I&M data	Yes; I&M0 to I&M3
Engineering with	
• STEP 7 TIA Portal configurable/ integrated as of version	STEP 7 V14 or higher
• STEP 7 configurable/integrated as of version	V5.5 SP4 Hotfix 7 or higher
• PROFIBUS as of GSD version/ GSD revision	GSD as of Revision 5
• PROFINET as of GSD version/ GSD revision	GSDML V2.3.1
Supply voltage	
Load voltage 1L+	
• Rated value (DC)	24 V
• Reverse polarity protection	Yes; Against destruction; actuator power supply outputs applied with reversed polarity
Input current	
Current consumption (rated value)	110 mA; without load
from load voltage 1L+ (unswitched voltage)	4 A; Maximum value
from load voltage 2L+, max.	4 A; Maximum value
Actuator supply	
Number of outputs	4
Short-circuit protection	Yes; per module, electronic
Output current	
• Rated value	Total current 1 A up to 45 °C; 0.5 A up to 55 °C
Power loss	
Power loss, typ.	2.6 W
Analog outputs	
Number of analog outputs	4
Voltage output, short-circuit protection	Yes
Voltage output, short-circuit current, max.	24 mA
Current output, no-load voltage, max.	15 V
Cycle time (all channels) max.	1 ms
Output ranges, voltage	
• 0 to 10 V	Yes; 15 bit
• 1 V to 5 V	Yes; 14 bit
• -10 V to +10 V	Yes; 16 bit incl. sign
Output ranges, current	
• 0 to 20 mA	Yes; 15 bit
• -20 mA to +20 mA	Yes; 16 bit incl. sign
• 4 mA to 20 mA	Yes; 14 bit
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

Article number	6ES7145-5ND00-0BA0 ET 200AL, AQ 4xU/I, 4xM12
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.	500 Ω
• with current outputs, inductive load, max.	1 mH
Destruction limits against exter- nally applied voltages and currents	
• Voltages at the outputs towards MANA	16 V
Cable length	
• shielded, max.	30 m
Settling time	
• for resistive load	1 ms
• for capacitive load	1 ms
• for inductive load	1 ms
Errors/accuracies	
Output ripple (relative to output range, bandwidth 0 to 50 kHz), (+/-)	0.02 %
Linearity error (relative to output range), (+/-)	0.1 %
Temperature error (relative to output range), (+/-)	0.005 %/K
Crosstalk between the outputs, max.	-70 dB
Repeat accuracy in steady state at 25 °C (relative to output range), (+/-)	0.03 %
Operational error limit in overall temperature range	
• Voltage, relative to output range, (+/-)	0.25 %
• Current, relative to output range, (+/-)	0.25 %
Basic error limit (operational limit at 25 °C)	
• Voltage, relative to output range, (+/-)	0.15 %
• Current, relative to output range, (+/-)	0.15 %
Interrupts/diagnostics/ status information	
Substitute values connectable	Yes; channel by channel, parameterizable
Alarms	
• Diagnostic alarm	Yes; Parameterizable
Diagnostic messages	
• Wire-break	Yes; channel-by-channel, only for output type "current"
• Short-circuit	Yes; Actuator supply module by module; channel by channel for output type "voltage"
Diagnostics indication LED	
• Channel status display	Yes; Green LED
• for module diagnostics	Yes; Green/red LED
Potential separation	
between the load voltages	Yes
Potential separation channels	
• between the channels	No
• between the channels and backplane bus	Yes
• between the channels and the power supply of the electronics	No

Technical specifications (continued)

Article number	6ES7145-5ND00-0BA0 ET 200AL, AQ 4xU/I, 4xM12
Isolation	
Isolation tested with	707 V DC (type test)
Degree and class of protection	
Degree of protection acc. to EN 60529	
• IP65	Yes
• IP67	Yes
Ambient conditions	
Ambient temperature during operation	
• min.	-25 °C
• max.	55 °C

Article number	6ES7145-5ND00-0BA0 ET 200AL, AQ 4xU/I, 4xM12
Connection method	
Design of electrical connection for the inputs and outputs	M12, 5-pole
Power supply	M8, 4-pole
ET-Connection	
• ET-Connection	M8, 4-pin, shielded
Dimensions	
Width	30 mm
Height	159 mm
Depth	40 mm
Weights	
Weight, approx.	175 g

Ordering data

Analog input modules	
AI 4xU/I/RTD, 4xM12	6ES7144-5KD00-0BA0
AQ 4xU/I, 4xM12	6ES7145-5ND00-0BA0
Accessories	
Bus cable for backplane bus (ET connection)	
4-pin, shielded	
Pre-assembled at both ends, 2 M8 connectors	
0.19 m	6ES7194-2LH02-0AA0
0.3 m	6ES7194-2LH03-0AA0
1 m	6ES7194-2LH10-0AA0
2 m	6ES7194-2LH20-0AA0
5 m	6ES7194-2LH50-0AA0
10 m	6ES7194-2LN10-0AA0
15 m	6ES7194-2LN15-0AA0
Pre-assembled at both ends, 2 M8 connectors, angled	
0.3 m	6ES7194-2LH03-0AB0
1 m	6ES7194-2LH10-0AB0
2 m	6ES7194-2LH20-0AB0
5 m	6ES7194-2LH50-0AB0
10 m	6ES7194-2LN10-0AB0
15 m	6ES7194-2LN15-0AB0
Pre-assembled at one end, 1 M8 connector	
2 m	6ES7194-2LH20-0AC0
5 m	6ES7194-2LH50-0AC0
10 m	6ES7194-2LN10-0AC0
15 m	6ES7194-2LN15-0AC0

M8 power cable	
4-pin	
Pre-assembled at both ends, M8 connector and M8 socket	
0.19 m	6ES7194-2LH02-1AA0
0.3 m	6ES7194-2LH03-1AA0
1 m	6ES7194-2LH10-1AA0
2 m	6ES7194-2LH20-1AA0
5 m	6ES7194-2LH50-1AA0
10 m	6ES7194-2LN10-1AA0
15 m	6ES7194-2LN15-1AA0
Pre-assembled at both ends, angled M8 connector and angled M8 socket	
0.3 m	6ES7194-2LH03-1AB0
1 m	6ES7194-2LH10-1AB0
2 m	6ES7194-2LH20-1AB0
5 m	6ES7194-2LH50-1AB0
10 m	6ES7194-2LN10-1AB0
15 m	6ES7194-2LN15-1AB0
Pre-assembled at one end, M8 socket	
2 m	6ES7194-2LH20-1AC0
5 m	6ES7194-2LH50-1AC0
10 m	6ES7194-2LN10-1AC0
15 m	6ES7194-2LN15-1AC0
M8 connector for ET connection	6ES7194-2AB00-0AA0
4-pin, shielded	
M8 power connector	
Male contact insert, 4-pin	6ES7194-2AA00-0AA0
Female contact insert, 4-pin	6ES7194-2AC00-0AA0
ET connection FastConnect stripping tool	6ES7194-2KA00-0AA0
Stripping tool for stripping the ET connection bus cable	
Labels	6ES7194-2BA00-0AA0
10 x 5 mm, RAL 9016; 5 frames with 40 labels each	