MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Selected official pages for procurement and maintenance review

PRODUCT BRAND

Siemens

PRODUCT MODEL

6ES7288-3AQ04-0AA0

EM AQ04 Analog Output Module. Relevant section pages: 2, 816, 817, 818, 824. Adjacent model text on shared pages is outside this product reference.

OFFICIAL SOURCE

S7-200 SMART System Manual; S7-200 SMART V2.5, 01/2020, A5E03822230-AI

Siemens original documentation and product reference

Historical V2.5 (01/2020) reference, not installation instructions. Accuracy temperature scope differs from V2.8. Shared 4-20 mA and adjacent-model tables do not establish AQ04 ranges. Check the applicable edition.

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Amikon Limited prepared this independent reference package. Selected manufacturer pages follow with their original content and pagination visible.

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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℗ 12/2019 Subject to change

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Pin	X10 (gold)	X11 (gold)	X12 (gold)	X13 (gold)
6	AI 1+	AI 3+	AI 5+	AI 7+
7	AI 1-	AI 3-	AI 5-	AI 7-

A.4.2 EM AQ02 and EM AQ04 analog output module specifications

Table A- 101 General specifications

Technical data	EM Analog 2 x outputs (EM AQ02)	EM Analog 4 x outputs (EM AQ04)
Article number	6ES7288-3AQ02-0AA0	6ES7288-3AQ04-0AA0
Dimensions W x H x D (mm)	45 x 100 x 81	45 x 100 x 81
Weight	147.1 grams	170.5 grams
Power dissipation	1.5 W (no load)	2.1 W (no load)
Current consumption (SM Bus)	60 mA	60 mA
Current consumption (24 V DC)	50 mA (no load)	75 mA (no load)
	90 mA (20 mA load per channel)	155 mA (20 mA load per channel)

Table A- 102 Analog outputs

Technical data	EM Analog 2 x outputs (EM AQ02)	EM Analog 4 x outputs (EM AQ04)
Number of outputs	2	4
Type	Voltage or current	Voltage or current
Range	±10 V or 0 to 20 mA	±10 V or 0 to 20 mA
Resolution	Voltage mode: 11 bits + sign bit Current mode: 11 bits	Voltage mode: 11 bits + sign bit Current mode: 11 bits
Full scale range (data word)	Voltage: -27,648 to 27,648 Current: 0 to 27,648	Voltage: -27,648 to 27,648 Current: 0 to 27,648 (Refer to the output ranges for voltage and current (Page 824).)
Accuracy (25 °C / 0 to 55 °C)	±0.5% / ±1.0% of full scale	±0.5% / ±1.0% of full scale
Settling time (95% of new value)	Voltage: 300 µs (R), 750 µ (R), 750 µs (1 µF) Current: 600 µs (1 mH), 2 ms (10 mH)	Voltage: 300 µs (R), 750 µ (R), 750 µs (1 µF) Current: 600 µs (1 mH), 2 ms (10 mH)
Load impedance	Voltage: ≥ 1000 Ω Current: ≤ 500 Ω	Voltage: ≥ 1000 Ω Current: ≤ 600 Ω
Output behavior in STOP	Last value or substitute value (default value 0)	Last value or substitute value (default value 0)
Isolation (field side to logic)	None	None
Cable length (max.), in meters	100 m twisted and shielded	100 m twisted and shielded

Table A- 103 Diagnostics

Technical data	EM Analog 2 x outputs (EM AQ02)	EM Analog 4 x outputs (EM AQ04)
Overflow/underflow	Yes	Yes
Short to ground (voltage mode only)	Yes	Yes
Wire break (current mode only)	Yes	Yes
24 V DC low voltage	Yes	Yes

Table A- 104 Wiring diagram for the EM AQ02 Analog 2 x Outputs (6ES7288-3AQ02-0AA0) and EM AQ04 Analog 4 x Outputs (6ES7288-3AQ04-0AA0)

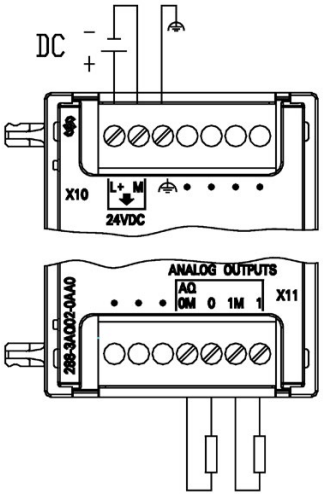
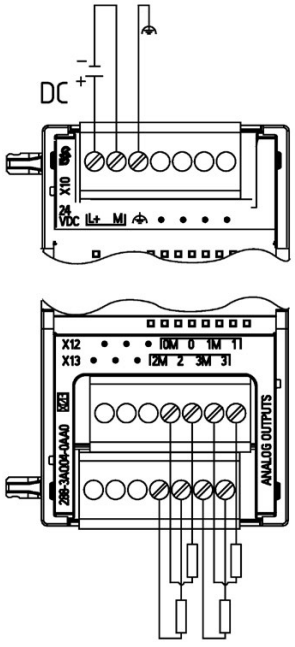
EM AQ02 Analog 2 x Outputs (6ES7288-3AQ02-0AA0)	EM AQ04 Analog 4 x Outputs (6ES7288-3AQ04-0AA0)
	
Note: Connectors must be gold. See Appendix F, Spare parts and other hardware, for article number.	

Table A- 105 Connector pin locations for EM AQ02 Analog 2 x Outputs (6ES7288-3AQ02-0AA0)

Pin	X10 (gold)	X11 (gold)
1	L+ / 24 V DC	No connection
2	M / 24 V DC	No connection
3	Functional Earth	No connection
4	No connection	AQ 0M
5	No connection	AQ 0

Pin	X10 (gold)	X11 (gold)
6	No connection	AQ 1M
7	No connection	AQ 1

Table A- 106 Connector pin locations for EM AQ04 Analog 4 x Outputs (6ES7288-3AQ04-0AA0)

Pin	X10 (gold)	X11 (gold)	X12 (gold)	X13 (gold)
1	L+ / 24 V DC	No connection	No connection	No connection
2	M / 24 V DC	No connection	No connection	No connection
3	Functional Earth	No connection	No connection	No connection
4	No connection	No connection	AQ 0M	AQ 2M
5	No connection	No connection	AQ 0	AQ 2
6	No connection	No connection	AQ 1M	AQ 3M
7	No connection	No connection	AQ 1	AQ 3

A.4.3 EM AM03 and EM AM06 analog input/output module specifications

Table A- 107 General specifications

Technical data	EM 2 x Analog Inputs / 1 x Analog Outputs (AM03)	EM 4 x Analog Inputs / 2 x Analog Outputs (AM06)
Article number	6ES7288-3AM03-0AA0	6ES7288-3AM06-0AA0
Dimensions W x H x D (mm)	45 x 100 x 81	45 x 100 x 81
Weight	172 grams	173.4 grams
Power dissipation	1.1 W (no load)	2.0 W (no load)
Current consumption (SM Bus)	60 mA	80 mA
Current consumption (24 V DC)	30 mA (no load)	60 mA (no load)
	50 mA (20 mA load per channel)	100 mA (20 mA load per channel)

Table A- 108 Analog inputs

Model	EM 2 x Analog Inputs / 1 x Analog Outputs (AM03)	EM 4 x Analog Inputs / 2 x Analog Outputs (AM06)
Number of inputs	2	4
Type	Voltage or current (differential): Selectable in groups of 2	Voltage or current (differential): Selectable in groups of 2
Range	±10 V, ±5 V, ±2.5 V, or 0 to 20 mA	±10 V, ±5 V, ±2.5 V, or 0 to 20 mA
Full scale range (data word)	-27,648 to 27,648	-27,648 to 27,648
Overshoot/undershoot range (data word)	Voltage: 27,649 to 32,511 / -27,649 to -32,512 Current: 27,649 to 32,511 / -4,864 to 0	Voltage: 27,649 to 32,511 / -27,649 to -32,512 Current: 27,649 to 32,511 / -4,864 to 0

A.4.7 Measurement ranges of the analog outputs for voltage and current (SB and EM)

Table A- 118 Analog output representation for voltage (SB and EM)

System		Voltage Output Range	
Decimal	**Hexadecimal**	**± 10 V**	
32767	7FFF	See note 1	Overflow
32512	7F00	See note 1	
32511	7EFF	11.76 V	Overshoot range
27649	6C01		
27648	6C00	10 V	Rated range
20736	5100	7.5 V	
1	1	361.7 µ V	
0	0	0 V	
-1	FFFF	-361.7 µ V	
-20736	AF00	-7.5 V	
-27648	9400	-10 V	
-27649	93FF		Undershoot range
-32512	8100	-11.76 V	
-32513	80FF	See note 1	Underflow
-32768	8000	See note 1	

1 In an overflow or underflow condition, analog outputs will take on the substitute value of the STOP mode.

Table A- 119 Analog output representation for current (SB and EM)

System		Current output range		
Decimal	**Hexadecimal**	**0 mA to 20 mA**	**4 mA to 20 mA**	
32767	7FFF	See note 1	See note 1	Overflow
32512	7F00	See note 1	See note 1	
32511	7EFF	23.52 mA	22.81 mA	Overshoot range
27649	6C01			
27648	6C00	20 mA	20 mA	Rated range
20736	5100	15 mA	16 mA	
1	1	723.4 nA	4 mA + 578.7 nA	
0	0	0 mA	4mA	
-1	FFFF		4 mA to 578.7 nA	Undershoot range
-6912	E500		0 mA	
-6913	E4FF			Not possible. Output value limited to 0 mA.
-32512	8100			
-32513	80FF	See note 1	See note 1	Underflow
-32768	8000	See note 1	See note 1	

1 In an overflow or underflow condition, analog outputs will take on the substitute value of the STOP mode.