

SIMATIC S7-400

Analog modules

SM 431 analog input module

Technical specifications (continued)

	6ES7 431-7QH00-0AB0	6ES7 431-7KF00-0AB0	6ES7 431-7KF10-0AB0
Voltages and currents			
Load voltage L+			
• Rated value (DC)	24 V; only required for supplying 2-wire transmitters		
• reverse polarity protection	Yes		
Current consumption			
from load voltage L+ (without load), max.	400 mA	400 mA	400 mA
from backplane bus DC 5 V, max.	700 mA	1,200 mA	650 mA
Power loss, typ.	4.5 W	4.6 W	3.3 W
Analog inputs			
Number of analog inputs	16	8	8
Number of analog inputs for voltage/current measurement	16	8	
Number of analog inputs for resistance measurement	8		8
Cable length, shielded, max.	200 m; 50 m with thermocouples and input ranges ≤ 80 mV	200 m	200 m; 50 m with thermocouples and input ranges ± 80 mV
permissible input frequency for voltage input (destruction limit), max.	18 V; 18 V continuous, 75 V for 1 ms (mark to space ratio 1:20)	35 V; 35 V continuous, 75 V for max. 1 s (mark to space ratio 1:20)	35 V; 35 V continuous, 75 V for max. 1 s (mark to space ratio 1:20)
permissible input current for current input (destruction limit), max.	40 mA	32 mA	
Input ranges (rated values), voltages			
• 1 to 5 V	Yes	Yes	
• -1 V to +1 V	Yes	Yes	
• -10 V to +10 V	Yes	Yes	
• -100 mV to +100 mV		Yes	
• -2.5 V to +2.5 V	Yes	Yes	
• -20 mV to +20 mV		Yes	
• -25 mV to +25 mV	Yes		
• -250 mV to +250 mV	Yes	Yes	
• -5 V to +5 V	Yes	Yes	
• -50 mV to +50 mV	Yes	Yes	
• -500 mV to +500 mV	Yes	Yes	
• -80 mV to +80 mV	Yes	Yes	
Input ranges (rated values), currents			
• 0 to 20 mA	Yes	Yes	
• -10 to +10 mA	Yes	Yes	
• -20 to +20 mA	Yes	Yes	
• -3.2 to +3.2 mA		Yes	
• 4 to 20 mA	Yes	Yes	
• -5 to +5 mA	Yes	Yes	

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Input ranges (rated values), thermoelements			
• Type B	Yes	Yes	
• Type E	Yes	Yes	
• Type J	Yes	Yes	
• Type K	Yes	Yes	
• Type L	Yes	Yes	
• Type N	Yes	Yes	
• Type R	Yes	Yes	
• Type S	Yes	Yes	
• Type T	Yes	Yes	
• Type U	Yes	Yes	
Input ranges (rated values), resistors			
• 0 to 150 Ohm	Yes		
• 0 to 300 Ohm	Yes		
• 0 to 48 Ohm	Yes		
• 0 to 600 Ohm	Yes		
• 0 to 6000 Ohm	Yes; usable up to 5000 ohms		
Input ranges (rated values), resistance thermometers			
• Ni 100	Yes		Yes
• Ni 1000	Yes		Yes; different characteristics selectable: Europe/US
• Pt 100	Yes		Yes
• Pt 1000	Yes		Yes
• Pt 200	Yes		Yes
• Pt 500	Yes		Yes
Characteristic linearization			
• programmable	Yes	Yes	Yes
• for thermoelements	Type B, R, S, T, E, J, K, N, U, L	Type B, N, E, R, S, J, L, T, K, U	
• for thermoresistor	Pt 100, Pt 200, Pt 500, Pt 1000, Ni 100, Ni 1000		Pt 100, Pt 200, Pt 500, Pt 1000, Ni 100, Ni 1000 various characteristics selectable (Europe/US)
Temperature compensation			
• external temperature compensation with compensations socket	Yes	Yes	
• external temperature compensation with Pt100	Yes		
• internal temperature compensation		Yes	
• dynamic reference temperature value	Yes	Yes	

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Analog value creation			
Integrations and conversion time/resolution per channel			
• Resolution with overload area (bit including sign), max.	16 Bit; 16/16/16	16 Bit	16 Bit
• Integration time, parameterizable	Yes	Yes	Yes
• Integration time, ms	2.5 / 16.7 / 20 ms	2.5 / 16.7 / 20 / 100 ms	20 ms at 50 Hz (faulty module incl. wire break)
• Basic conversion time, ms	6 / 20.1 / 23.5 ms	10 / 16.7 / 20 / 100	8 / 23 / 25 ms
• additional conversion time for wire break monitoring	4.3 / 4.3 / 4.3 ms		110 ms / 4 ms
• additional conversion time for wire break monitoring and resistance measurement	5.5 ms	1 ms (module)	none
• additional conversion time for resistance measurement	12 / 40.2 / 47 ms		
• Interference voltage suppression for interference frequency f1 in Hz	400 / 60 / 50 Hz	400 / 60 / 50 / 10 Hz	none/ 60 / 50 Hz
Encoder			
Connection of signal encoders			
• for current measurement as 2-wire transducer	Yes		
• for current measurement as 4-wire transducer	Yes	Yes	
• for resistance measurement with 2-conductor connection	Yes; Line resistances are also measured		
• for resistance measurement with 3-conductor connection	Yes		Yes
• for resistance measurement with 4-conductor connection	Yes	Yes	Yes
Errors/accuracies			
Operational limit in overall temperature range			
• Voltage, relative to input area	+/- 0.3 %; +/- 0.3 % at +/- 250 mV, +/- 500 mV, +/- 1 V, +/- 2.5 V, +/- 5 V, 1 to 5 V, +/- 10 V; +/- 0.31 % at +/- 80 mV; +/- 0.32 % at +/- 50 mV; +/- 0.35 % at +/- 25 mV;	+/- 0.3 %	
• Current, relative to input area	+/- 0.3 %; at 0 to 20 mA, +/- 5 mA, +/-10 mA, +/-20 mA, 4 to 20 mA	+/- 0.5 %	
• Impedance, relative to input area	+/- 0.3 %; +/- 0.3 % at 0 to 48 Ohm (4-conductor measurement), 0 to 150 Ohm (4-conductor measurement), 0 to 300 Ohm (4-conductor measurement), 0 to 600 Ohm (4-conductor measurement), 0 to 5000 Ohm (4-conductor measurement, in range of 6000 Ohm); +/- 0.4 % at 0 to 300 Ohm (3-conductor measurement), 0 to 600 Ohm (3-conductor measurement), 0 to 5000 Ohm (3-conductor measurement, in range of 6000 Ohm);		
• Resistance-type thermometer, relative to input area	+/- 0.4 %		

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Basic error limit (operational limit at 25 °C)			
• Voltage, relative to input area	+/- 0,15 %; +/- 0.15 % at +/- 250 mV, +/- 500 mV, +/- 1 V, +/- 2.5 V, +/- 5 V, 1 to 5 V, +/- 10 V; +/- 0.17 % at +/- 80 mV; +/- 0.19 % at +/- 50 mV; +/- 0.23 % at +/- 25 mV;	+/- 0,1 %	
• Current, relative to input area	+/- 0.15 %; at 0...20 mA, +/- 5 mA, +/-10 mA, +/-20 mA, 4...20 mA	+/- 0,17 %	
• Impedance, relative to input area	+/- 0,15 %; +/- 0.15 % at 0 to 48 Ohm (4-conductor measurement), 0 to 150 Ohm (4-conductor measurement), 0 to 300 Ohm (4-conductor measurement), 0 to 5000 Ohm (4-conductor measurement, in region of 6000 Ohm); +/- 0.3 % at 0 to 300 Ohm (3-conductor measurement), 0 to 600 Ohm (3-conductor measurement), 0 to 5000 Ohm (3-conductor measurement, in region of 6000 Ohm)		
• Resistance-type thermometer, relative to input area	+/- 0,3 %		
Status information/alarms/ diagnostics			
Alarms			
• Diagnostic alarm	Yes; parameterizable	Yes; parameterizable	Yes; parameterizable
• Limit value alarm	Yes; parameterizable	Yes	Yes
Diagnoses			
• Diagnostics	Yes; parameterizable	Yes	Yes
Isolation			
Isolation checked with	2120 V DC between bus and L+/M; 2120 V D between bus and analog part; 500 V DC between bus and local ground; 707 V DC between analog part and L+/M; 2120 V DC between analog part and local ground; 2120 V DC between L+/M and local ground	1500 V DC	1500 V DC
Isolation			
Isolation, analog inputs			
• Isolation, analog inputs	Yes	Yes	Yes
• between the channels	No	Yes	No
Permissible potential difference			
between the inputs (UCM)	120 V AC	120 V AC	none

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	6ES7 431-7QH00-0AB0	6ES7 431-7KF00-0AB0	6ES7 431-7KF10-0AB0
Dimensions and weight			
Width	25 mm	25 mm	25 mm
Height	290 mm	290 mm	290 mm
Depth	210 mm	210 mm	210 mm
Required slots	1	1	1
Weights			
Weight, approx.	500 g	650 g	650 g

Ordering data

Order No.	Order No.
SM 431 analog input modules 16 inputs, non-floating, 13 bit 8 inputs, floating, 13 bit 8 inputs, floating, 14 bit, with linearization 8 inputs, floating, 14 bit 16 inputs, floating, 16 bit, process interrupt capability 8 inputs, floating, 16 bit, process interrupt capability, for thermocouples (current, voltage) 8 inputs, floating, 16 bit, process interrupt capability, for thermal resistors	S7-SmartLabel Software for machine labeling of modules directly from the STEP 7 project Labeling sheets for machine labeling DIN A4, for printing using laser printer; 10 units Petrol Light beige Yellow Red SIMATIC Manual Collection ^{D)} Electronic manuals on DVD, in 5 languages: S7-200/300/400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, engineering software, runtime software, PCS 7, SIMATIC HMI, SIMATIC NET SIMATIC Manual Collection Maintenance service for 1 year ^{D)} Current Manual Collection DVD as well as the three following updates Manual "SIMATIC S7-400 programmable controller" incl. operation list German English French Spanish Italian
Front connectors 48-pin • With screw contacts, 1 unit • With screw contacts, 84 units • With spring-loaded clamps, 1 unit • With crimp contacts, 1 unit ^{A)} • With crimp contacts, 84 units • 1 unit; for 6ES7 431-7KF00-0AB0; spare part, included in scope of delivery of module	2XV9 450-1SL01-0YX0 6ES7 492-2AX00-0AA0 6ES7 492-2BX00-0AA0 6ES7 492-2CX00-0AA0 6ES7 492-2DX00-0AA0 6ES7 998-8XC01-8YE0 6ES7 998-8XC01-8YE2 6ES7 498-8AA04-8AA0 6ES7 498-8AA04-8BA0 6ES7 498-8AA04-8CA0 6ES7 498-8AA04-8DA0 6ES7 498-8AA04-8EA0
SIMATIC TOP connect See page 5/104; Information about which components can be used for the respective module, see A&D Mall or Catalog KT 10.2	
Range card for analog inputs 1 card for 2 inputs (spare part)	6ES7 974-0AA00-0AA0
Cover foil for labeling strip Spare part	6ES7 492-2XX00-0AA0

A) Subject to export regulations: AL: N and ECCN: EAR99H

D) Subject to export regulations: AL: N and ECCN: 5D992B1