

## S7-400 analog inputs

Module type	Analog inputs SM 431					
Special features of this module	Simple module for current and voltage measurement; high channel density	Universal module for current, voltage and resistance measurement	Universal module covering the most common measurement ranges and therefore greatly simplifying spare parts handling	Very fast analog value conversion with current value encryption; therefore suitable for acquisition of fast signals	Universal module, covering the most common measurement ranges; high resolution and precision; high channel density	High resolution and highly precise measurement of temperatures with thermocouples (TC); available as an option: Plug with integrated temperature compensation; single-channel, electrically isolated
Voltage measuring range Sensors	±1 V 1 ... 5 V	±1 V ±10 V 1 ... 5 V	±80 mV ±250 mV ±500 mV ±1 V ±2.5 V ±5 V ±10 V 1 ... 5 V	±1 V 1 ... 5 V ±10 V	±25 mV, ±50 mV, ±80 mV, ±250 mV, ±500 mV, ±1 V, ±2.5 V, ±5 V, ±10 V, 1 ... 5 V	
Diagnostics capability					●	
Interrupt capability					●	
Operating error	≤ ± 1%	< ± 1%	< ± 0.38%	< ± 0.9%	< ± 0.35%	< ± 0.3%
Number of channels	16	8			16	8
Galvanic isolation: Number of groups	1	1			1	8
Resolution	12 bits + sign		13 bits + sign		15 bits + sign	
Conversion time per channel (50 Hz)	65 ms	25 ms	23 ms	52 μs <sup>1)</sup>	23 ms	20 ms
Order No. group: 6ES7	431-0HH. <sup>2)</sup>	431-1KF0.	431-1KF1.	431-1KF2. <sup>2)</sup>	431-7QH.	431-7KF0.

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Current measuring range Sensors	4 ... 20 mA ±20 mA		4 ... 20 mA 0 ... 20 mA ±20 mA	4 ... 20 mA ±20 mA	4 ... 20 mA 0 ... 20 mA ±5 mA ±10 mA ±20 mA	4 ... 20 mA 0 ... 20 mA ±5 mA ±10 mA ±20 mA ± 3.2 mA
Diagnostics capability					●	
Interrupt capability					●	
Operating error	≤ ± 0.65%	≤ ± 1%	≤ ± 0.35%	≤ ± 0.8%	≤ ± 0.3%	≤ ± 0.5%
Number of channels	16	8			16	8
Galvanic isolation: Number of groups	1	1			1	8
Resolution	12 bits + sign		13 bits + sign		15 bits + sign	
Conversion time per channel (50 Hz)	65 ms	25 ms	23 ms	52 μs <sup>1)</sup>	23 ms	20 ms
Order No. group: 6ES7	431-0HH. <sup>2)</sup>	431-1KF0.	431-1KF1.	431-1KF2. <sup>2)</sup>	431-7QH.	431-7KF0.

<sup>1)</sup> Independent of the set interference frequency suppression

<sup>2)</sup> As SIPLUS extreme component also for corrosive atmosphere/condensation (for further details, see page 98 or [www.siemens.com/siplus-extreme](http://www.siemens.com/siplus-extreme))

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Module type	Analog inputs SM 431			
Special features of this module	Universal module for current, voltage and resistance measurement	Universal module covering the most common measurement ranges and therefore greatly simplifying spare parts handling	Very fast analog conversion with current value encryption; therefore suitable for acquisition of fast signals	Universal module, covering the most common measurement ranges; high resolution and precision; high channel density
Resistance measuring range Sensors	0 ... 600 Ω	0 ... 48 Ω, 0 ... 150 Ω, 0 ... 300 Ω, 0 ... 600 Ω, 0 ... 6 000 Ω	0 ... 600 Ω	0 ... 48 Ω, 0 ... 150 Ω, 0 ... 300 Ω, 0 ... 600 Ω, 0 ... 6 000 Ω
Diagnostics capability				●
Interrupt capability				●
Operating error	≤ ± 1,25%	≤ ± 0.5%	≤ ± 1%	≤ ± 0.4%
Number of channels	4			8
Galvanic isolation: Number of groups	1			1
Resolution	13 bit	14 bit		16 bit
Conversion time per channel (50 Hz)	25 ms	23 ms	52 μs <sup>1)</sup>	23 ms
Order No. group: 6ES7	431-1KF0.	431-1KF1.	431-1KF2. <sup>3)</sup>	431-7QH.

Module type	Analog inputs SM 431		
Special features of this module	Universal module covering the most common measurement ranges and therefore greatly simplifying spare parts handling	Universal module, covering the most common measurement ranges; high resolution and precision; high channel density	High resolution and highly precise measurement of temperatures with thermocouples (TC); available as an option: Plug with integrated temperature compensation; single-channel, electrically isolated
Thermocouple types	B, E, N, J, K, L, R, S, T, U		
Diagnostics capability		●	
Interrupt capability		●	
Operating error	≤ ± 14.8 K	≤ ± 11.5 K	≤ ± 3.5 K
Number of channels	8	16	8
Galvanic isolation: Number of groups	1		8
Resolution	14 bit	16 bit	
Conversion time per channel (50 Hz)	20/23 ms	6/21/23 ms	–
Order No. group: 6ES7	431-1KF1.	431-7QH.	431-7KF0.

Module type	Analog inputs SM 431		
Special features of this module	Universal module covering the most common measurement ranges and therefore greatly simplifying spare parts handling	Universal module, covering the most common measurement ranges; high resolution and precision; high channel density	High resolution and highly precise measurement of temperatures with the resistance temperature detector (RTD); single-channel, electrically isolated
Resistance thermometer types	Pt 100; 200; 500; 1 000 Ni 100; 1 000 <sup>2)</sup>	Pt 100; 200; 500; 1 000 Ni 100; 1 000 <sup>2)</sup>	
Diagnostics capability		●	
Interrupt capability		●	
Operating error	≤ ± 5.7 K	≤ ± 4.9 K	≤ ± 1 K
Number of channels	4	8	
Galvanic isolation: Number of groups	1		8
Resolution	14 bit	16 bit	
Conversion time per channel (50 Hz)	20/23 ms	6/21/23 ms	--
Order No. group: 6ES7	431-1KF1.	431-7QH.	431-7KF1.

<sup>1)</sup> Independent of the set interference frequency suppression

<sup>2)</sup> Both standard and climate

<sup>3)</sup> As SIPLUS extreme component also for corrosive atmosphere/condensation (for further details, see page 98 or [www.siemens.com/siplus-extreme](http://www.siemens.com/siplus-extreme))

## S7-400 analog output modules, standards and approvals

Module type	Analog outputs SM 432
Special features of this module	Universal analog output module
Power	$\pm 10$ V, 0 ... 10 V, 1 ... 5 V
Current	$\pm 20$ mA, 0 ... 20 mA, 4 ... 20 mA
Diagnostics capability	
Interrupt capability	
Operating error	A: $\pm 0.5\%$ I: $\pm 1\%$
Number of channels	8
Galvanic isolation: Number of groups	1
Resolution	12 bits + sign
Conversion time per channel	< 420 $\mu$ s
Order No. group: 6ES7	432-1HF. <sup>1)</sup>
The SIMATIC S7-400 complies with the following national and international standards	The failsafe CPUs comply <i>additionally</i> with the following standards
DIN, EN, IEC	IEC G1508 (SIL3)
CE	EN 954 (Category 4)
UL certificate	NFPA 79-2002, NFPA 85
CSA certificate	UL 1998, UL 508 and UL 991
FM class 1 div. 2; group A, B, C and D, temperature group T4 ( $\leq 135$ °C)	
GOST	
C-Tick	
EU Directive 94/9/EC (ATEX 100a)	
ISA-S71.04 severity level G1, G2, G3	
Marine certification from	
<ul style="list-style-type: none"> <li>• American Bureau of Shipping</li> <li>• Bureau Veritas</li> <li>• Det Norske Veritas</li> <li>• Germanischer Lloyd</li> <li>• Lloyds Register of Shipping</li> </ul>	
Max. permissible environmental temperature: 60 °C for all components	
Earthquake resistance	

<sup>1)</sup> As SIPLUS extreme component also for corrosive atmosphere/condensation (for further details, see page 98 or [www.siemens.com/siplus-extreme](http://www.siemens.com/siplus-extreme))