

SIMATIC S7-400, SM 431 ANALOG INPUT MODULE OPTIC.
ISOLATED, 16 AI, 16 BIT RESOLUTION, U//RESIST./
THERMOEL./PT100,ALARM,DIAGNOST.



Supply voltage	
Load voltage L+	
<ul style="list-style-type: none"> Rated value (DC) 	24 V; Only required for supplying 2-wire transmitters
<ul style="list-style-type: none"> Reverse polarity protection 	Yes
Input current	
from load voltage L+ (without load), max.	400 mA
from backplane bus 5 V DC, max.	700 mA
Power losses	
Power loss, typ.	4.5 W
Hardware configuration	
Slots	
<ul style="list-style-type: none"> Required slots 	1
Analog inputs	
Number of analog inputs	16
Number of analog inputs for voltage/current measurement	16
Number of analog inputs for resistance measurement	8

permissible input voltage for voltage input (destruction limit), max.	18 V; 18 V continuous, 75 V for 1 ms (mark to space ratio 1:20)
permissible input current for current input (destruction limit), max.	40 mA
Input ranges	
• Voltage	Yes
• Current	Yes
• Thermocouple	Yes
• Resistance thermometer	Yes
• Resistance	Yes
Input ranges (rated values), voltages	
• 1 to 5 V	Yes
• Input resistance (1 to 5 V)	1 M Ω
• -1 V to +1 V	Yes
• Input resistance (-1 V to +1 V)	1 M Ω
• -10 V to +10 V	Yes
• Input resistance (-10 V to +10 V)	1 M Ω
• -2.5 V to +2.5 V	Yes
• Input resistance (-2.5 V to +2.5 V)	1 M Ω
• -25 mV to +25 mV	Yes
• Input resistance (-25 mV to +25 mV)	1 M Ω
• -250 mV to +250 mV	Yes
• Input resistance (-250 mV to +250 mV)	1 M Ω
• -5 V to +5 V	Yes
• Input resistance (-5 V to +5 V)	1 M Ω
• -50 mV to +50 mV	Yes
• Input resistance (-50 mV to +50 mV)	1 M Ω
• -500 mV to +500 mV	Yes
• Input resistance (-500 mV to +500 mV)	1 M Ω
• -80 mV to +80 mV	Yes
• Input resistance (-80 mV to +80 mV)	1 M Ω
Input ranges (rated values), currents	
• 0 to 20 mA	Yes
• Input resistance (0 to 20 mA)	50 Ω
• -10 to +10 mA	Yes
• Input resistance (-10 to +10 mA)	50 Ω
• -20 to +20 mA	Yes
• Input resistance (-20 to +20 mA)	50 Ω
• 4 to 20 mA	Yes
• Input resistance (4 to 20 mA)	50 Ω
• -5 to +5 mA	Yes
• Input resistance (-5 to +5 mA)	50 Ω
Input ranges (rated values), thermoelements	
• Type B	Yes

• Type E	Yes
• Type J	Yes
• Type K	Yes
• Type L	Yes
• Type N	Yes
• Type R	Yes
• Type S	Yes
• Type T	Yes
• Type U	Yes
Input ranges (rated values), resistance thermometer	
• Ni 100	Yes
• Input resistance (Ni 100)	1 MΩ
• Ni 1000	Yes
• Input resistance (Ni 1000)	1 MΩ
• Pt 100	Yes
• Input resistance (Pt 100)	1 MΩ
• Pt 1000	Yes
• Input resistance (Pt 1000)	1 MΩ
• Pt 200	Yes
• Input resistance (Pt 200)	1 MΩ
• Pt 500	Yes
• Input resistance (Pt 500)	1 MΩ
Input ranges (rated values), resistors	
• 0 to 150 ohms	Yes
• Input resistance (0 to 150 ohms)	1 MΩ
• 0 to 300 ohms	Yes
• Input resistance (0 to 300 ohms)	1 MΩ
• 0 to 48 ohms	Yes
• Input resistance (0 to 48 ohms)	1 MΩ
• 0 to 600 ohms	Yes
• Input resistance (0 to 600 ohms)	1 MΩ
• 0 to 6000 ohms	Yes; Usable up to 5000 Ohm
• Input resistance (0 to 6000 ohms)	1 MΩ
Thermocouple (TC)	
Temperature compensation	
— external temperature compensation with compensations socket	Yes
— external temperature compensation with Pt100	Yes
— dynamic reference temperature value	Yes
Characteristic linearization	
• Parameterizable	Yes
— for thermocouples	Type B, E, J, K, L, N, R, S, T, U

— for resistance thermometer

Pt100, Pt200, Pt500, Pt1000, Ni100, Ni1000

Cable length	
• Cable length, shielded, max.	200 m; 50 m with thermocouples and input ranges ≤ 80 mV

Analog value creation

Integration and conversion time/resolution per channel	
• Resolution with overrange (bit including sign), max.	16 bit; 16 / 16 / 16
• Integration time, parameterizable	Yes
• Basic conversion time, ms	6 / 20,1 / 23,5 ms
• Integration time, ms	2,5 / 16,7 / 20 ms
• Basic conversion time, including integration time, ms	
— additional conversion time for wire break monitoring	4.3 / 4.3 / 4.3 ms
— additional conversion time for resistance measurement	12 / 40,2 / 47 ms
— additional conversion time for wire break monitoring and resistance measurement	5,5 ms
• Interference voltage suppression for interference frequency f1 in Hz	400 / 60 / 50 Hz

Encoder

Connection of signal encoders	
• for current measurement as 2-wire transducer	Yes
• for current measurement as 4-wire transducer	Yes
• for resistance measurement with two-wire connection	Yes; Line resistances are also measured
• for resistance measurement with three-wire connection	Yes
• for resistance measurement with four-wire connection	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;
• Current, relative to input area, (+/-)	0.3 %; at 0 to 20 mA, +/-5 mA, +/-10 mA, +/- 20 mA, 4 to 20 mA
• Resistance, 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 thermometer, relative to input area, (+/-)	0.4 %

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;
• Current, relative to input area, (+/-)	0.15 %; at 0 to 20 mA, +/-5 mA, +/-10 mA, +/- 20 mA, 4 to 20 mA
• Resistance, relative to input area, (+/-)	0.15 %; +/-0.15% at 0 to 48 ohms (4-conductor measurement), 0 to 150 ohms (4-conductor measurement), 0 to 300 ohms (4-conductor measurement, in range of 6000 ohms); +/-0.3% at 0 to 300 ohms (3-conductor measurement), 0 to 600 ohms (3-conductor measurement), 0 to 5000 ohms (3-conductor measurement, in range of 6000 ohms)
• Resistance thermometer, relative to input area, (+/-)	0.3 %

Interrupts/diagnostics/status information

Alarms	
• Diagnostic alarm	Yes; Parameterizable
• Limit value alarm	Yes; Parameterizable
Diagnostic messages	
• Diagnostics	Yes; Parameterizable

Galvanic isolation

Galvanic isolation analog inputs	
• Galvanic isolation analog inputs	Yes; internal/external
• between the channels	No

Permissible potential difference

between the inputs (UCM)	120 V AC
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Isolation

Isolation checked with	2120 V DC between bus and L+/M; 2120 V DC 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
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Dimensions

Width	25 mm
Height	290 mm
Depth	210 mm

Weights

Weight, approx.	500 g
last modified:	14.10.2014