



SIMATIC S7-400, analog input SM 431, isolated 8 AI, resolution 14 bit, U/I/Resistor/Thermocouple/Pt100

Figure similar

Supply voltage	
Load voltage L+	
• Rated value (DC)	24 V; Only required for supplying 2-wire transmitters
• Reverse polarity protection	Yes
Input current	
from load voltage L+ (without load), max.	200 mA; for 8 connected, fully controlled 2-wire transmitters
from backplane bus 5 V DC, max.	600 mA
Power loss	
Power loss, typ.	3.5 W
Analog inputs	
Number of analog inputs	8
• For voltage/current measurement	8
• For resistance measurement	4
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; Permanent
Constant measurement current for resistance-type transmitter, typ.	1.67 mA
Input ranges	
• Voltage	Yes
• Current	Yes
• Thermocouple	Yes
• Resistance thermometer	Yes
• Resistance	Yes
Input ranges (rated values), voltages	
• 1 V to 5 V	Yes
— Input resistance (1 V to 5 V)	1 MΩ
• -1 V to +1 V	Yes
— Input resistance (-1 V to +1 V)	1 MΩ
• -10 V to +10 V	Yes
— Input resistance (-10 V to +10 V)	1 MΩ
• -2.5 V to +2.5 V	Yes
— Input resistance (-2.5 V to +2.5 V)	1 MΩ
• -250 mV to +250 mV	Yes
— Input resistance (-250 mV to +250 mV)	1 MΩ
• -5 V to +5 V	Yes
— Input resistance (-5 V to +5 V)	1 MΩ
• -500 mV to +500 mV	Yes
— Input resistance (-500 mV to +500 mV)	1 MΩ

• -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
• 4 mA to 20 mA	Yes
— Input resistance (4 mA to 20 mA)	50 Ω
Input ranges (rated values), thermocouples	
• Type B	Yes
— Input resistance (Type B)	1 M Ω
• Type E	Yes
— Input resistance (Type E)	1 M Ω
• Type J	Yes
— Input resistance (type J)	1 M Ω
• Type K	Yes
— Input resistance (Type K)	1 M Ω
• Type L	Yes
— Input resistance (Type L)	1 M Ω
• Type N	Yes
— Input resistance (Type N)	1 M Ω
• Type R	Yes
— Input resistance (Type R)	1 M Ω
• Type S	Yes
— Input resistance (Type S)	1 M Ω
• Type T	Yes
— Input resistance (Type T)	1 M Ω
• Type U	Yes
— Input resistance (Type U)	1 M Ω
Input ranges (rated values), resistance thermometer	
• Ni 100	Yes
— Input resistance (Ni 100)	1 M Ω
• Ni 1000	Yes
— Input resistance (Ni 1000)	1 M Ω
• Pt 100	Yes
— Input resistance (Pt 100)	1 M Ω
• Pt 1000	Yes
• Pt 10000	Yes
• Pt 200	Yes
— Input resistance (Pt 200)	1 M Ω
• Pt 500	Yes
— Input resistance (Pt 500)	1 M Ω
Input ranges (rated values), resistors	
• 0 to 48 ohms	Yes
— Input resistance (0 to 48 ohms)	1 M Ω
• 0 to 150 ohms	Yes
— Input resistance (0 to 150 ohms)	1 M Ω
• 0 to 300 ohms	Yes
— Input resistance (0 to 300 ohms)	1 M Ω
• 0 to 600 ohms	Yes
— Input resistance (0 to 600 ohms)	1 M Ω
• 0 to 6000 ohms	Yes; Usable up to 5000 Ohm
— Input resistance (0 to 6000 ohms)	1 M Ω
Thermocouple (TC)	
Temperature compensation	
— parameterizable	Yes
— internal temperature compensation	No
— external temperature compensation with Pt100	Yes
— external temperature compensation with compensations socket	Yes
— dynamic reference temperature value	Yes
Characteristic linearization	

• parameterizable — for thermocouples — for resistance thermometer	Yes Type B, E, J, K, L, N, R, S, T, U Pt100, Pt200, Pt500, Pt1000, Ni100, Ni1000
Cable length	
• shielded, max.	200 m; 50 m with thermocouples and input ranges ≤ 80 mV
Analog value generation for the inputs	
Integration and conversion time/resolution per channel	
• Resolution with overrange (bit including sign), max. • Integration time, parameterizable • Basic conversion time (ms) • Integration time (ms) • Interference voltage suppression for interference frequency f1 in Hz • Basic execution time of the module (all channels released)	14 bit; with activated filtering: 16 bit Yes 20.1 / 23.5 ms 16,7 / 20 ms 50 / 60 Hz 161 ms; 161 / 188 ms
Encoder	
Connection of signal encoders	
• for voltage measurement • for current measurement as 2-wire transducer • for current measurement as 4-wire transducer • for resistance measurement with two-wire connection • for resistance measurement with three-wire connection • for resistance measurement with four-wire connection	Yes; possible Yes Yes Yes; Line resistances are also measured Yes Yes
Errors/accuracies	
Temperature error (relative to input range), (+/-)	0.004 %/K
Operational error limit in overall temperature range	
• Voltage, relative to input range, (+/-) • Current, relative to input range, (+/-) • Resistance, relative to input range, (+/-) • Resistance thermometer, relative to input range, (+/-) • Thermocouple, relative to input range, (+/-)	0.38 %; ± 0.38 % at ± 80 mV; ± 0.35 % at ± 250 mV, ± 500 mV, ± 1 V, ± 2.5 V, ± 5 V, ± 10 V 0.35 %; ± 20 mA, 0 to 20 mA, 4 to 20 mA 0.5 % 0.5 % TC Type B (± 14.8 K), TC Type R (± 9.4 K), TC Type S (± 10.6 K), TC Type T (± 2.2 K), TC Type E (± 4.0 K), TC Type J (± 5.2 K), TC Type K (± 7.6 K), TC Type U (± 3.5 K), TC Type L (± 5.1 K), TC Type N (± 5.5 K)
Basic error limit (operational limit at 25 °C)	
• Voltage, relative to input range, (+/-) • Current, relative to input range, (+/-) • Resistance, relative to input range, (+/-) • Resistance thermometer, relative to input range, (+/-) • Thermocouple, relative to input range, (+/-)	0.15 %; ± 0.15 % (± 250 mV, ± 500 mV, ± 1 V, ± 2.5 V, ± 5 V, ± 10 V); ± 0.17 % (± 80 mV) 0.15 %; ± 20 mA, 0 to 20 mA, 4 to 20 mA 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), 0 to 600 ohms (4-conductor measurement), 0 to 5000 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) 0.3 % TC Type B (± 8.2 K), TC Type R (± 5.2 K), TC Type S (± 5.9 K), TC Type T (± 1.2 K), TC Type E (± 1.8 K), TC Type J (± 2.3 K), TC Type K (± 3.4 K), TC Type U (± 1.8 K), TC Type L (± 2.3 K), TC Type N (± 2.9 K)
Interrupts/diagnostics/status information	
Diagnostics function	No
Potential separation	
Potential separation analog inputs	
• Potential separation analog inputs • between the channels • between the channels and backplane bus • Between the channels and load voltage L+	Yes; internal/external No Yes Yes
Isolation	
Isolation tested with	2 120 V DC between bus and L+/M; 2 120 V DC between bus and analog section; 500 V DC between bus and local ground; 500 V DC between analog section and L+/M; 2 120 V DC between analog section and local ground; 2 120 V DC between L+/M and local ground
Dimensions	
Width	25 mm
Height	290 mm
Depth	210 mm

Weights	
Weight, approx.	500 g

last modified: 8/30/2023 