



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+	
<ul style="list-style-type: none"> <li>Rated value (DC)</li> </ul>	24 V; Only required for supplying 2-wire transmitters
<ul style="list-style-type: none"> <li>Reverse polarity protection</li> </ul>	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
<ul style="list-style-type: none"> <li>For voltage/current measurement</li> </ul>	8
<ul style="list-style-type: none"> <li>For resistance measurement</li> </ul>	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	
<ul style="list-style-type: none"> <li>Voltage</li> </ul>	Yes
<ul style="list-style-type: none"> <li>Current</li> </ul>	Yes
<ul style="list-style-type: none"> <li>Thermocouple</li> </ul>	Yes
<ul style="list-style-type: none"> <li>Resistance thermometer</li> </ul>	Yes
<ul style="list-style-type: none"> <li>Resistance</li> </ul>	Yes
Input ranges (rated values), voltages	
<ul style="list-style-type: none"> <li>1 V to 5 V                             <ul style="list-style-type: none"> <li>Input resistance (1 V to 5 V)</li> </ul> </li> </ul>	Yes 1 MΩ
<ul style="list-style-type: none"> <li>-1 V to +1 V                             <ul style="list-style-type: none"> <li>Input resistance (-1 V to +1 V)</li> </ul> </li> </ul>	Yes 1 MΩ
<ul style="list-style-type: none"> <li>-10 V to +10 V                             <ul style="list-style-type: none"> <li>Input resistance (-10 V to +10 V)</li> </ul> </li> </ul>	Yes 1 MΩ
<ul style="list-style-type: none"> <li>-2.5 V to +2.5 V                             <ul style="list-style-type: none"> <li>Input resistance (-2.5 V to +2.5 V)</li> </ul> </li> </ul>	Yes 1 MΩ
<ul style="list-style-type: none"> <li>-250 mV to +250 mV                             <ul style="list-style-type: none"> <li>Input resistance (-250 mV to +250 mV)</li> </ul> </li> </ul>	Yes 1 MΩ
<ul style="list-style-type: none"> <li>-5 V to +5 V                             <ul style="list-style-type: none"> <li>Input resistance (-5 V to +5 V)</li> </ul> </li> </ul>	Yes 1 MΩ
<ul style="list-style-type: none"> <li>-500 mV to +500 mV</li> </ul>	Yes

— Input resistance (-500 mV to +500 mV)	1 M $\Omega$
• -80 mV to +80 mV	Yes
— Input resistance (-80 mV to +80 mV)	1 M $\Omega$
<b>Input ranges (rated values), currents</b>	
• 0 to 20 mA	Yes
— Input resistance (0 to 20 mA)	50 $\Omega$
• 4 mA to 20 mA	Yes
— Input resistance (4 mA to 20 mA)	50 $\Omega$
<b>Input ranges (rated values), thermocouples</b>	
• type B	Yes
— Input resistance (Type B)	1 M $\Omega$
• Type E	Yes
— Input resistance (Type E)	1 M $\Omega$
• Type J	Yes
— Input resistance (type J)	1 M $\Omega$
• Type K	Yes
— Input resistance (Type K)	1 M $\Omega$
• Type L	Yes
— Input resistance (Type L)	1 M $\Omega$
• Type N	Yes
— Input resistance (Type N)	1 M $\Omega$
• Type R	Yes
— Input resistance (Type R)	1 M $\Omega$
• Type S	Yes
— Input resistance (Type S)	1 M $\Omega$
• Type T	Yes
— Input resistance (Type T)	1 M $\Omega$
• Type U	Yes
— Input resistance (Type U)	1 M $\Omega$
<b>Input ranges (rated values), resistance thermometer</b>	
• Ni 100	Yes
— Input resistance (Ni 100)	1 M $\Omega$
• Ni 1000	Yes
— Input resistance (Ni 1000)	1 M $\Omega$
• Pt 100	Yes
— Input resistance (Pt 100)	1 M $\Omega$
• Pt 1000	Yes
• Pt 10000	Yes
• Pt 200	Yes
— Input resistance (Pt 200)	1 M $\Omega$
• Pt 500	Yes
— Input resistance (Pt 500)	1 M $\Omega$
<b>Input ranges (rated values), resistors</b>	
• 0 to 48 ohms	Yes
— Input resistance (0 to 48 ohms)	1 M $\Omega$
• 0 to 150 ohms	Yes
— Input resistance (0 to 150 ohms)	1 M $\Omega$
• 0 to 300 ohms	Yes
— Input resistance (0 to 300 ohms)	1 M $\Omega$
• 0 to 600 ohms	Yes
— Input resistance (0 to 600 ohms)	1 M $\Omega$
• 0 to 6000 ohms	Yes; Usable up to 5000 Ohm
— Input resistance (0 to 6000 ohms)	1 M $\Omega$
<b>Thermocouple (TC)</b>	
<b>Temperature compensation</b>	
— Parameterizable	Yes
— internal temperature compensation	No
— external temperature compensation with Pt100	Yes
— external temperature compensation with	Yes

compensations socket	
— dynamic reference temperature value	Yes
<b>Characteristic linearization</b>	
• Parameterizable	Yes
— for thermocouples	Type B, E, J, K, L, N, R, S, T, U
— for resistance thermometer	Pt100, Pt200, Pt500, Pt1000, Ni100, Ni1000
<b>Cable length</b>	
• shielded, max.	200 m; 50 m with thermocouples and input ranges ≤ 80 mV
<b>Analog value generation for the inputs</b>	
<b>Integration and conversion time/resolution per channel</b>	
• Resolution with overrange (bit including sign), max.	14 bit; with activated filtering: 16 bit
• Integration time, parameterizable	Yes
• Basic conversion time (ms)	20.1 / 23.5 ms
• Integration time (ms)	16,7 / 20 ms
• Interference voltage suppression for interference frequency f1 in Hz	50 / 60 Hz
• Basic execution time of the module (all channels released)	161 ms; 161 / 188 ms
<b>Encoder</b>	
<b>Connection of signal encoders</b>	
• for voltage measurement	Yes; possible
• 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
<b>Errors/accuracies</b>	
Temperature error (relative to input range), (+/-)	0.004 %/K
<b>Operational error limit in overall temperature range</b>	
• Voltage, 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, 1 to 5 V, ±10 V
• Current, relative to input range, (+/-)	0.35 %; ±20 mA, 0 to 20 mA, 4 to 20 mA
• Resistance, relative to input range, (+/-)	0.5 %
• Resistance thermometer, relative to input range, (+/-)	0.5 %
• Thermocouple, relative to input range, (+/-)	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)
<b>Basic error limit (operational limit at 25 °C)</b>	
• Voltage, relative to input range, (+/-)	0.15 %; ±0.15 % (±250 mV, ±500 mV, ±1 V, ±2.5 V, ±5 V, 1 to 5 V, ±10 V); ±0.17% (±80 mV)
• Current, relative to input range, (+/-)	0.15 %; ±20 mA, 0 to 20 mA, 4 to 20 mA
• Resistance, relative to input range, (+/-)	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)
• Resistance thermometer, relative to input range, (+/-)	0.3 %
• Thermocouple, relative to input range, (+/-)	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)
<b>Interrupts/diagnostics/status information</b>	
Diagnostics function	No
<b>Potential separation</b>	
<b>Potential separation analog inputs</b>	
• Potential separation analog inputs	Yes; internal/external
• between the channels	No
• between the channels and backplane bus	Yes
• Between the channels and load voltage L+	Yes
<b>Isolation</b>	
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
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**Classifications**

	Version	Classification
eClass	14	27-24-22-01
eClass	12	27-24-22-01
eClass	9.1	27-24-22-01
eClass	9	27-24-22-01
eClass	8	27-24-22-01
eClass	7.1	27-24-22-01
eClass	6	27-24-22-01
ETIM	10	EC001420
ETIM	9	EC001420
ETIM	8	EC001420
ETIM	7	EC001420
IDEA	4	3562
UNSPSC	15	32-15-17-05

**Approvals / Certificates**

General Product Approval

[Miscellaneous](#)



[Metrological Approval](#)

General Product Approval

EMV

For use in hazardous locations



[China RoHS](#)

[Miscellaneous](#)



For use in hazardous locations

Maritime application

[FM](#)



[Type Examination Certificate](#)



Maritime application



[NK / Nippon Kaiji Kyokai](#)



Maritime application



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