



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> <li>Current</li> <li>Thermocouple</li> <li>Resistance thermometer</li> <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> <li>-1 V to +1 V                             <ul style="list-style-type: none"> <li>Input resistance (-1 V to +1 V)</li> </ul> </li> <li>-10 V to +10 V                             <ul style="list-style-type: none"> <li>Input resistance (-10 V to +10 V)</li> </ul> </li> <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> <li>-250 mV to +250 mV                             <ul style="list-style-type: none"> <li>Input resistance (-250 mV to +250 mV)</li> </ul> </li> <li>-5 V to +5 V                             <ul style="list-style-type: none"> <li>Input resistance (-5 V to +5 V)</li> </ul> </li> <li>-500 mV to +500 mV                             <ul style="list-style-type: none"> <li>Input resistance (-500 mV to +500 mV)</li> </ul> </li> </ul>	Yes
	1 MΩ
	Yes
	1 MΩ
	Yes
	1 MΩ
	Yes
	1 MΩ
	Yes
	1 MΩ
	Yes
	1 MΩ

• -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 compensations socket	Yes
— dynamic reference temperature value	Yes
<b>Characteristic linearization</b>	

<ul style="list-style-type: none"> <li>parameterizable <ul style="list-style-type: none"> <li>— for thermocouples</li> <li>— for resistance thermometer</li> </ul> </li> </ul>	Yes Type B, E, J, K, L, N, R, S, T, U Pt100, Pt200, Pt500, Pt1000, Ni100, Ni1000
<b>Cable length</b>	
<ul style="list-style-type: none"> <li>shielded, max.</li> </ul>	200 m; 50 m with thermocouples and input ranges $\leq 80$ mV
<b>Analog value generation for the inputs</b>	
<b>Integration and conversion time/resolution per channel</b>	
<ul style="list-style-type: none"> <li>Resolution with overrange (bit including sign), max.</li> <li>Integration time, parameterizable</li> <li>Basic conversion time (ms)</li> <li>Integration time (ms)</li> <li>Interference voltage suppression for interference frequency <math>f_1</math> in Hz</li> <li>Basic execution time of the module (all channels released)</li> </ul>	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
<b>Encoder</b>	
<b>Connection of signal encoders</b>	
<ul style="list-style-type: none"> <li>for voltage measurement</li> <li>for current measurement as 2-wire transducer</li> <li>for current measurement as 4-wire transducer</li> <li>for resistance measurement with two-wire connection</li> <li>for resistance measurement with three-wire connection</li> <li>for resistance measurement with four-wire connection</li> </ul>	Yes; possible Yes Yes Yes; Line resistances are also measured Yes Yes
<b>Errors/accuracies</b>	
Temperature error (relative to input range), (+/-)	0.004 %/K
<b>Operational error limit in overall temperature range</b>	
<ul style="list-style-type: none"> <li>Voltage, relative to input range, (+/-)</li> <li>Current, relative to input range, (+/-)</li> <li>Resistance, relative to input range, (+/-)</li> <li>Resistance thermometer, relative to input range, (+/-)</li> <li>Thermocouple, relative to input range, (+/-)</li> </ul>	0.38 %; $\pm 0.38$ % at $\pm 80$ mV; $\pm 0.35$ % at $\pm 250$ mV, $\pm 500$ mV, $\pm 1$ V, $\pm 2.5$ V, $\pm 5$ V, 1 to 5 V, $\pm 10$ V 0.35 %; $\pm 20$ mA, 0 to 20 mA, 4 to 20 mA 0.5 % 0.5 % TC Type B ( $\pm 14.8$ K), TC Type R ( $\pm 9.4$ K), TC Type S ( $\pm 10.6$ K), TC Type T ( $\pm 2.2$ K), TC Type E ( $\pm 4.0$ K), TC Type J ( $\pm 5.2$ K), TC Type K ( $\pm 7.6$ K), TC Type U ( $\pm 3.5$ K), TC Type L ( $\pm 5.1$ K), TC Type N ( $\pm 5.5$ K)
<b>Basic error limit (operational limit at 25 °C)</b>	
<ul style="list-style-type: none"> <li>Voltage, relative to input range, (+/-)</li> <li>Current, relative to input range, (+/-)</li> <li>Resistance, relative to input range, (+/-)</li> <li>Resistance thermometer, relative to input range, (+/-)</li> <li>Thermocouple, relative to input range, (+/-)</li> </ul>	0.15 %; $\pm 0.15$ % ( $\pm 250$ mV, $\pm 500$ mV, $\pm 1$ V, $\pm 2.5$ V, $\pm 5$ V, 1 to 5 V, $\pm 10$ V); $\pm 0.17$ % ( $\pm 80$ mV) 0.15 %; $\pm 20$ mA, 0 to 20 mA, 4 to 20 mA 0.15 %; $\pm 0.15$ % 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); $\pm 0.3$ % 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 ( $\pm 8.2$ K), TC Type R ( $\pm 5.2$ K), TC Type S ( $\pm 5.9$ K), TC Type T ( $\pm 1.2$ K), TC Type E ( $\pm 1.8$ K), TC Type J ( $\pm 2.3$ K), TC Type K ( $\pm 3.4$ K), TC Type U ( $\pm 1.8$ K), TC Type L ( $\pm 2.3$ K), TC Type N ( $\pm 2.9$ K)
<b>Interrupts/diagnostics/status information</b>	
Diagnostics function	No
<b>Potential separation</b>	
<b>Potential separation analog inputs</b>	
<ul style="list-style-type: none"> <li>Potential separation analog inputs</li> <li>between the channels</li> <li>between the channels and backplane bus</li> <li>Between the channels and load voltage L+</li> </ul>	Yes; internal/external No Yes 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
<b>Dimensions</b>	
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	9	EC001420
ETIM	8	EC001420
ETIM	7	EC001420
IDEA	4	3562
UNSPSC	15	32-15-17-05

**Approvals / Certificates**

**General Product Approval**

[Miscellaneous](#)



[KC](#)

[Metrological Approval](#)

**General Product Approval**      **EMV**      **For use in hazardous locations**



[EM](#)



**For use in hazardous locations**      **Marine / Shipping**



[Type Examination Certificate](#)



**Marine / Shipping**



[NK / Nippon Kaiji Kyokai](#)



[CCS \(China Classification Society\)](#)

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