

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



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.	400 mA; for 16 connected, fully controlled 2-wire transmitters
from backplane bus 5 V DC, max.	700 mA
Power loss	
Power loss, typ.	4.5 W
Analog inputs	
Number of analog inputs	16
<ul style="list-style-type: none"> <li>For voltage/current measurement</li> </ul>	16
<ul style="list-style-type: none"> <li>For resistance measurement</li> </ul>	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
<b>Input ranges</b>	
• Voltage	Yes
• Current	Yes
• Thermocouple	Yes
• Resistance thermometer	Yes
• Resistance	Yes
<b>Input ranges (rated values), voltages</b>	
• 1 V to 5 V	Yes
• Input resistance (1 V to 5 V)	1 M $\Omega$
• -1 V to +1 V	Yes
• Input resistance (-1 V to +1 V)	1 M $\Omega$
• -10 V to +10 V	Yes
• Input resistance (-10 V to +10 V)	1 M $\Omega$
• -2.5 V to +2.5 V	Yes
• Input resistance (-2.5 V to +2.5 V)	1 M $\Omega$
• -25 mV to +25 mV	Yes
• Input resistance (-25 mV to +25 mV)	1 M $\Omega$
• -250 mV to +250 mV	Yes
• Input resistance (-250 mV to +250 mV)	1 M $\Omega$
• -5 V to +5 V	Yes
• Input resistance (-5 V to +5 V)	1 M $\Omega$
• -50 mV to +50 mV	Yes
• Input resistance (-50 mV to +50 mV)	1 M $\Omega$
• -500 mV to +500 mV	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 $\Omega$
• -10 mA to +10 mA	Yes
• Input resistance (-10 mA to +10 mA)	50 $\Omega$
• -20 mA to +20 mA	Yes
• Input resistance (-20 mA to +20 mA)	50 $\Omega$
• 4 mA to 20 mA	Yes
• Input resistance (4 mA to 20 mA)	50 $\Omega$
• -5 mA to +5 mA	Yes
• Input resistance (-5 mA to +5 mA)	50 $\Omega$
<b>Input ranges (rated values), thermocouples</b>	

• 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
<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
• Input resistance (Pt 1000)	1 M $\Omega$
• 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>	
— external temperature compensation with compensations socket	Yes
— external temperature compensation with Pt100	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 <= 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> </ul>	16 bit; 16 / 16 / 16
<ul style="list-style-type: none"> <li>• Integration time, parameterizable</li> </ul>	Yes
<ul style="list-style-type: none"> <li>• Basic conversion time (ms)</li> </ul>	6 / 20,1 / 23,5 ms
<ul style="list-style-type: none"> <li>• Integration time (ms)</li> </ul>	2,5 / 16,7 / 20 ms
<ul style="list-style-type: none"> <li>• Basic conversion time, including integration time (ms) <ul style="list-style-type: none"> <li>— additional conversion time for wire-break monitoring</li> <li>— additional conversion time for resistance measurement</li> <li>— additional conversion time for wire-break monitoring and resistance measurement</li> </ul> </li> </ul>	4.3 / 4.3 / 4.3 ms  12 / 40,2 / 47 ms  5,5 ms
<ul style="list-style-type: none"> <li>• Interference voltage suppression for interference frequency f1 in Hz</li> </ul>	400 / 60 / 50 Hz

<b>Encoder</b>	
<b>Connection of signal encoders</b>	
<ul style="list-style-type: none"> <li>• for voltage measurement</li> </ul>	Yes; possible
<ul style="list-style-type: none"> <li>• for current measurement as 2-wire transducer</li> </ul>	Yes
<ul style="list-style-type: none"> <li>• for current measurement as 4-wire transducer</li> </ul>	Yes
<ul style="list-style-type: none"> <li>• for resistance measurement with two-wire connection</li> </ul>	Yes; Line resistances are also measured
<ul style="list-style-type: none"> <li>• for resistance measurement with three-wire connection</li> </ul>	Yes
<ul style="list-style-type: none"> <li>• for resistance measurement with four-wire connection</li> </ul>	Yes

<b>Errors/accuracies</b>	
<b>Operational error limit in overall temperature range</b>	
<ul style="list-style-type: none"> <li>• Voltage, relative to input range, (+/-)</li> </ul>	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;
<ul style="list-style-type: none"> <li>• Current, relative to input range, (+/-)</li> </ul>	0.3 %; at 0 to 20 mA, +/-5 mA, +/-10 mA, +/- 20 mA, 4 to 20 mA

- Resistance, relative to input range, (+/-) 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 range, (+/-) 0.4 %

#### Basic error limit (operational limit at 25 °C)

- Voltage, relative to input range, (+/-) 0.15 %; ±0.15% at ±250 mV, ±500 mV, ±1 V, ±2.5 V, ±5 V, 1 V to 5 V, ±10 V; ±0.17% at ±80 mV; ±0.19% at ±50 mV; ±0.23% at ±25 mV
- Current, relative to input range, (+/-) 0.15 %; at 0 to 20 mA, +/-5 mA, +/-10 mA, +/- 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 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 %

#### Interrupts/diagnostics/status information

Diagnostics Yes; Parameterizable

#### Alarms

- Diagnostic alarm Yes; Parameterizable
- Limit value alarm Yes; Parameterizable

#### Potential separation

##### Potential separation analog inputs

- Potential separation analog inputs Yes; internal/external
- between the channels No

#### 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:

03/24/2017