

SIMATIC S7-400, analog input SM 431, isolated 16 AI; resolution 16 bit, U/I/Resistor/Thermocouple/Pt100 , alarm, diagnostics



Figure similar

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; 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"> For voltage/current measurement 	16
<ul style="list-style-type: none"> 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 V to 5 V	Yes
• Input resistance (1 V 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 mA to +10 mA	Yes
• Input resistance (-10 mA to +10 mA)	50 Ω
• -20 mA to +20 mA	Yes
• Input resistance (-20 mA to +20 mA)	50 Ω
• 4 mA to 20 mA	Yes
• Input resistance (4 mA to 20 mA)	50 Ω
• -5 mA to +5 mA	Yes
• Input resistance (-5 mA to +5 mA)	50 Ω
Input ranges (rated values), thermocouples	

- Type B
- Input resistance (Type B)
- Type E
- Input resistance (Type E)
- Type J
- Input resistance (type J)
- Type K
- Input resistance (Type K)
- Type L
- Input resistance (Type L)
- Type N
- Input resistance (Type N)
- Type R
- Input resistance (Type R)
- Type S
- Input resistance (Type S)
- Type T
- Input resistance (Type T)
- Type U
- Input resistance (Type U)

Yes
1 MΩ
Yes
1 MΩ
Yes
1 MΩ
Yes
1 MΩ
Yes
1 MΩ
Yes
1 MΩ
Yes
1 MΩ
Yes
1 MΩ
Yes
1 MΩ
Yes
1 MΩ

Input ranges (rated values), resistance thermometer

- Ni 100
- Input resistance (Ni 100)
- Ni 1000
- Input resistance (Ni 1000)
- Pt 100
- Input resistance (Pt 100)
- Pt 1000
- Input resistance (Pt 1000)
- Pt 200
- Input resistance (Pt 200)
- Pt 500
- Input resistance (Pt 500)

Yes
1 MΩ
Yes
1 MΩ
Yes
1 MΩ
Yes
1 MΩ
Yes
1 MΩ
Yes
1 MΩ

Input ranges (rated values), resistors

- 0 to 48 ohms
- Input resistance (0 to 48 ohms)
- 0 to 150 ohms
- Input resistance (0 to 150 ohms)
- 0 to 300 ohms
- Input resistance (0 to 300 ohms)
- 0 to 600 ohms

Yes
1 MΩ
Yes
1 MΩ
Yes
1 MΩ
Yes

<ul style="list-style-type: none"> • Input resistance (0 to 600 ohms) 	1 MΩ
<ul style="list-style-type: none"> • 0 to 6000 ohms 	Yes; Usable up to 5000 Ohm
<ul style="list-style-type: none"> • Input resistance (0 to 6000 ohms) 	1 MΩ
Thermocouple (TC)	
Temperature compensation	
— parameterizable	Yes
— external temperature compensation with Pt100	Yes
— external temperature compensation with compensations socket	Yes
— dynamic reference temperature value	Yes
Characteristic linearization	
• parameterizable	Yes
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.	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
• Interference voltage suppression for interference frequency f1 in Hz	400 / 60 / 50 Hz
Encoder	
Connection of signal encoders	
• 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
Errors/accuracies	
Operational error limit in overall temperature range	
• Voltage, relative to input range, (+/-)	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 range, (+/-)	0.3 %; at 0 to 20 mA, ±5 mA, ±10 mA, ±20 mA, 4 to 20 mA

<ul style="list-style-type: none"> 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);
<ul style="list-style-type: none"> Resistance thermometer, relative to input range, (+/-) 	0.4 %
<ul style="list-style-type: none"> Thermocouple, relative to input range, (+/-) 	TC Type B (±11.5 K), TC Type R (±7.3 K), TC Type S (±8.3 K), TC Type T (±1.7 K), TC Type E (±3.2 K), TC Type J (±4.3 K), TC Type K (±6.2 K), TC Type U (±2.8 K), TC Type L (±4.2 K), TC Type N (±4.4 K)

Basic error limit (operational limit at 25 °C)

<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> Current, relative to input range, (+/-) 	0.15 %; at 0 to 20 mA, ±5 mA, ±10 mA, ±20 mA, 4 to 20 mA
<ul style="list-style-type: none"> 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, 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)
<ul style="list-style-type: none"> Resistance thermometer, relative to input range, (+/-) 	0.3 %
<ul style="list-style-type: none"> Thermocouple, relative to input range, (+/-) 	TC Type B (±7.6 K), TC Type R (±4.8 K) TC Type S (±5.4 K), TC Type T (±1.1 K), TC Type E (±1.8 K), TC Type J (±2.3 K), TC Type K (±3.4 K), TC Type U (±1.7 K), TC Type L (±2.3 K), TC Type N (±2.6 K)

Interrupts/diagnostics/status information

<ul style="list-style-type: none"> Diagnostics function 	Yes; Parameterizable
Alarms	
<ul style="list-style-type: none"> Diagnostic alarm 	Yes; Parameterizable
<ul style="list-style-type: none"> Limit value alarm 	Yes; Parameterizable
<ul style="list-style-type: none"> Hardware interrupt 	Yes; Parameterizable
Diagnostic messages	
<ul style="list-style-type: none"> Diagnostic information readable 	Yes
Diagnostics indication LED	
<ul style="list-style-type: none"> internal fault INTF (red) 	Yes
<ul style="list-style-type: none"> external fault EXTF (red) 	Yes
Potential separation	
Potential separation analog inputs	
<ul style="list-style-type: none"> Potential separation analog inputs 	Yes; internal/external

- between the channels
- between the channels and backplane bus
- Between the channels and load voltage L+

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: 11/19/2019