



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"> 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.	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"> For voltage/current measurement 	8
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> Voltage 	Yes
<ul style="list-style-type: none"> Current 	Yes
<ul style="list-style-type: none"> Thermocouple 	Yes
<ul style="list-style-type: none"> Resistance thermometer 	Yes
<ul style="list-style-type: none"> Resistance 	Yes
Input ranges (rated values), voltages	
<ul style="list-style-type: none"> 1 V to 5 V <ul style="list-style-type: none"> Input resistance (1 V to 5 V) 	Yes 1 MΩ
<ul style="list-style-type: none"> -1 V to +1 V <ul style="list-style-type: none"> Input resistance (-1 V to +1 V) 	Yes 1 MΩ
<ul style="list-style-type: none"> -10 V to +10 V <ul style="list-style-type: none"> Input resistance (-10 V to +10 V) 	Yes 1 MΩ
<ul style="list-style-type: none"> -2.5 V to +2.5 V <ul style="list-style-type: none"> Input resistance (-2.5 V to +2.5 V) 	Yes 1 MΩ
<ul style="list-style-type: none"> -250 mV to +250 mV <ul style="list-style-type: none"> Input resistance (-250 mV to +250 mV) 	Yes 1 MΩ
<ul style="list-style-type: none"> -5 V to +5 V <ul style="list-style-type: none"> Input resistance (-5 V to +5 V) 	Yes 1 MΩ
<ul style="list-style-type: none"> -500 mV to +500 mV <ul style="list-style-type: none"> Input resistance (-500 mV to +500 mV) 	Yes 1 MΩ

<ul style="list-style-type: none"> ● -80 mV to +80 mV — Input resistance (-80 mV to +80 mV) 	<p>Yes</p> <p>1 MΩ</p>
Input ranges (rated values), currents	
<ul style="list-style-type: none"> ● 0 to 20 mA — Input resistance (0 to 20 mA) ● 4 mA to 20 mA — Input resistance (4 mA to 20 mA) 	<p>Yes</p> <p>50 Ω</p> <p>Yes</p> <p>50 Ω</p>
Input ranges (rated values), thermocouples	
<ul style="list-style-type: none"> ● 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) 	<p>Yes</p> <p>1 MΩ</p> <p>Yes</p> <p>1 MΩ</p> <p>Yes</p> <p>1 MΩ</p> <p>Yes</p> <p>1 MΩ</p> <p>Yes</p> <p>1 MΩ</p> <p>Yes</p> <p>1 MΩ</p> <p>Yes</p> <p>1 MΩ</p> <p>Yes</p> <p>1 MΩ</p> <p>Yes</p> <p>1 MΩ</p> <p>Yes</p> <p>1 MΩ</p> <p>Yes</p> <p>1 MΩ</p>
Input ranges (rated values), resistance thermometer	
<ul style="list-style-type: none"> ● Ni 100 — Input resistance (Ni 100) ● Ni 1000 — Input resistance (Ni 1000) ● Pt 100 — Input resistance (Pt 100) ● Pt 1000 ● Pt 10000 ● Pt 200 — Input resistance (Pt 200) ● Pt 500 — Input resistance (Pt 500) 	<p>Yes</p> <p>1 MΩ</p> <p>Yes</p> <p>1 MΩ</p> <p>Yes</p> <p>1 MΩ</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>1 MΩ</p> <p>Yes</p> <p>1 MΩ</p>
Input ranges (rated values), resistors	
<ul style="list-style-type: none"> ● 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 — Input resistance (0 to 600 ohms) ● 0 to 6000 ohms — Input resistance (0 to 6000 ohms) 	<p>Yes</p> <p>1 MΩ</p> <p>Yes</p> <p>1 MΩ</p> <p>Yes</p> <p>1 MΩ</p> <p>Yes</p> <p>1 MΩ</p> <p>Yes; Usable up to 5000 Ohm</p> <p>1 MΩ</p>
Thermocouple (TC)	
Temperature compensation	
<ul style="list-style-type: none"> — parameterizable — internal temperature compensation — external temperature compensation with Pt100 — external temperature compensation with compensations socket — dynamic reference temperature value 	<p>Yes</p> <p>No</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>
Characteristic linearization	

<ul style="list-style-type: none"> parameterizable <ul style="list-style-type: none"> — 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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> Resolution with overrange (bit including sign), max. Integration time, parameterizable Basic conversion time (ms) Integration time (ms) Interference voltage suppression for interference frequency f_1 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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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, 1 to 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)	
<ul style="list-style-type: none"> 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, 1 to 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	
<ul style="list-style-type: none"> 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:

3/2/2021 