

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+ | |
| • Rated value (DC) | 24 V; Only required for supplying 2-wire transmitters |
| • 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 |
| • For voltage/current measurement | 8 |
| • 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 | |
| • 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 |
| • -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 |
| • -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 |
| • 4 mA to 20 mA | Yes |
| — Input resistance (4 mA to 20 mA) | 50 Ω |
| Input ranges (rated values), thermocouples | |
| • Type B | Yes |
| — Input resistance (Type B) | 1 M Ω |
| • Type E | Yes |
| — Input resistance (Type E) | 1 M Ω |
| • Type J | Yes |
| — Input resistance (type J) | 1 M Ω |
| • Type K | Yes |
| — Input resistance (Type K) | 1 M Ω |
| • Type L | Yes |

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| — Input resistance (Type L) | 1 MΩ |
| • Type N | Yes |
| — Input resistance (Type N) | 1 MΩ |
| • Type R | Yes |
| — Input resistance (Type R) | 1 MΩ |
| • Type S | Yes |
| — Input resistance (Type S) | 1 MΩ |
| • Type T | Yes |
| — Input resistance (Type T) | 1 MΩ |
| • Type U | Yes |
| — Input resistance (Type U) | 1 MΩ |
| Input ranges (rated values), resistance thermometer | |
| • Ni 100 | Yes |
| — Input resistance (Ni 100) | 1 MΩ |
| • Ni 1000 | Yes |
| — Input resistance (Ni 1000) | 1 MΩ |
| • Pt 100 | Yes |
| — Input resistance (Pt 100) | 1 MΩ |
| • Pt 1000 | Yes |
| • Pt 10000 | Yes |
| • Pt 200 | Yes |
| — Input resistance (Pt 200) | 1 MΩ |
| • Pt 500 | Yes |
| — Input resistance (Pt 500) | 1 MΩ |
| Input ranges (rated values), resistors | |
| • 0 to 48 ohms | Yes |
| — Input resistance (0 to 48 ohms) | 1 MΩ |
| • 0 to 150 ohms | Yes |
| — Input resistance (0 to 150 ohms) | 1 MΩ |
| • 0 to 300 ohms | Yes |
| — Input resistance (0 to 300 ohms) | 1 MΩ |
| • 0 to 600 ohms | Yes |
| — Input resistance (0 to 600 ohms) | 1 MΩ |
| • 0 to 6000 ohms | Yes; Usable up to 5000 Ohm |
| — Input resistance (0 to 6000 ohms) | 1 MΩ |
| Thermocouple (TC) | |
| Temperature compensation | |
| — parameterizable | Yes |
| — internal temperature compensation | No |
| — external temperature compensation with Pt100 | Yes |

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| — external temperature compensation with compensations socket | Yes |
| — dynamic reference temperature value | Yes |
| Characteristic linearization | |
| • parameterizable | Yes |
| — for thermocouples | Type B, E, J, K, L, N, R, S, T, U |
| — for resistance thermometer | Pt100, Pt200, Pt500, Pt1000, Ni100, Ni1000 |
| 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. | 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 |
| 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, (+/-) | 0.38 %; ± 0.38 % at ± 80 mV; ± 0.35 % at ± 250 mV, ± 500 mV, ± 1 V, $\pm 2,5$ 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) |
| Basic error limit (operational limit at 25 °C) | |

- Voltage, relative to input range, (+/-) 0.15 %; $\pm 0.15\%$ (± 250 mV, ± 500 mV, ± 1 V, ± 2.5 V, ± 5 V, 1 to 5 V, ± 10 V); $\pm 0.17\%$ (± 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 %; $\pm 0.15\%$ 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)
- 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)

Interrupts/diagnostics/status information

Diagnostics function No

Potential separation

Potential separation analog inputs

- 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

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: 08/25/2020