SIEMENS

## Data sheet 6ES7431-7QH00-0AB0



Figure similar

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

| | |
|---|---|
| **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. | 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 |
| ● For voltage/current measurement | 16 |
| ● 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 |
| 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 MΩ |
| ● -1 V to +1 V | Yes |
| — Input resistance (-1 V to +1 V) | 1 MΩ |
| ● -10 V to +10 V | Yes |
| — Input resistance (-10 V to +10 V) | 1 MΩ |
| ● -2.5 V to +2.5 V | Yes |
| — Input resistance (-2.5 V to +2.5 V) | 1 MΩ |
| ● -25 mV to +25 mV | Yes |
| — Input resistance (-25 mV to +25 mV) | 1 MΩ |
| ● -250 mV to +250 mV | Yes |
| — Input resistance (-250 mV to +250 mV) | 1 MΩ |
| ● -5 V to +5 V | Yes |
| — Input resistance (-5 V to +5 V) | 1 MΩ |


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| | |
|---|---|
| ● -50 mV to +50 mV | Yes |
| — Input resistance (-50 mV to +50 mV) | 1 MΩ |
| ● -500 mV to +500 mV | Yes |
| — Input resistance (-500 mV to +500 mV) | 1 MΩ |
| ● -80 mV to +80 mV | Yes |
| — Input resistance (-80 mV to +80 mV) | 1 MΩ |
| 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 | Yes |
| — Input resistance (Type B) | 1 MΩ |
| ● Type E | Yes |
| — Input resistance (Type E) | 1 MΩ |
| ● Type J | Yes |
| — Input resistance (type J) | 1 MΩ |
| ● Type K | Yes |
| — Input resistance (Type K) | 1 MΩ |
| ● Type L | Yes |
| — 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 |
| — Input resistance (Pt 1000) | 1 MΩ |
| ● 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 |


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| | |
|---|---|
| — 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 |
| — 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. | 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** | |
| Temperature error (relative to input range), (+/-) | 0.004 %/K |
| 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 |
| ● 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 % |
| ● 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) | |
| ● 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 % |
| ● 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** | |
| Diagnostics function | Yes; Parameterizable |
| Alarms | |
| ● Diagnostic alarm | Yes; Parameterizable |
| ● Limit value alarm | Yes; Parameterizable |
| ● Hardware interrupt | Yes; Parameterizable |


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| | |
|---|---|
| Diagnoses | |
| ● Diagnostic information readable | Yes |
| Diagnostics indication LED | |
| ● internal fault INTF (red) | Yes |
| ● external fault EXTF (red) | Yes |
| **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 |

**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 | 10 | EC001420 |
| ETIM | 9 | EC001420 |
| ETIM | 8 | EC001420 |
| ETIM | 7 | EC001420 |
| IDEA | 4 | 3562 |
| UNSPSC | 15 | 32-15-17-05 |

**Approvals / Certificates**

**General Product Approval**

CE EG-Konf. | UKCA | Manufacturer Declaration | Miscellaneous | China RoHS | UL

| General Product Approval | | EMV | | | For use in hazardous locations |
|---|---|---|---|---|---|
| KC | Metrological Approval | RCM | RCM | RCM | ATEX |

**For use in hazardous locations**


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FM







Type Examination Certificate




**Maritime application**













NK / Nippon Kaiji Kyokai




**Maritime application**







CCS (China Classification Society)

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