



Figure similar

SIMATIC S7-400, analog input SM 431, isolated 8 AI, resolution 14 bit, U/I/Resistor/Thermocouple/Pt100

| 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 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                                                            |
| • -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                                                            |
| • -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                       |
| • 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 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                        |
| • 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                        |
| — external temperature compensation with            | Yes                        |

|                                                                        |                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| compensations socket                                                   |                                                                                                                                                                                                                                                                                                                                                                                     |
| — dynamic reference temperature value                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Characteristic linearization</b>                                    |                                                                                                                                                                                                                                                                                                                                                                                     |
| • parameterizable                                                      | Yes                                                                                                                                                                                                                                                                                                                                                                                 |
| — for thermocouples                                                    | Type B, E, J, K, L, N, R, S, T, U                                                                                                                                                                                                                                                                                                                                                   |
| — for resistance thermometer                                           | Pt100, Pt200, Pt500, Pt1000, Ni100, Ni1000                                                                                                                                                                                                                                                                                                                                          |
| <b>Cable length</b>                                                    |                                                                                                                                                                                                                                                                                                                                                                                     |
| • shielded, max.                                                       | 200 m; 50 m with thermocouples and input ranges $\leq 80$ mV                                                                                                                                                                                                                                                                                                                        |
| <b>Analog value generation for the inputs</b>                          |                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Integration and conversion time/resolution per channel</b>          |                                                                                                                                                                                                                                                                                                                                                                                     |
| • 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                                                                                                                                                                                                                                                                                                                                                                          |
| • Basic execution time of the module (all channels released)           | 161 ms; 161 / 188 ms                                                                                                                                                                                                                                                                                                                                                                |
| <b>Encoder</b>                                                         |                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Connection of signal encoders</b>                                   |                                                                                                                                                                                                                                                                                                                                                                                     |
| • 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                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Errors/accuracies</b>                                               |                                                                                                                                                                                                                                                                                                                                                                                     |
| Temperature error (relative to input range), (+/-)                     | 0.004 %/K                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Operational error limit in overall temperature range</b>            |                                                                                                                                                                                                                                                                                                                                                                                     |
| • Voltage, relative to input range, (+/-)                              | 0.38 %; $\pm 0.38$ % at $\pm 80$ mV; $\pm 0.35$ % at $\pm 250$ mV, $\pm 500$ mV, $\pm 1$ V, $\pm 2.5$ V, $\pm 5$ V, 1 to 5 V, $\pm 10$ V                                                                                                                                                                                                                                            |
| • Current, relative to input range, (+/-)                              | 0.35 %; $\pm 20$ 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 ( $\pm 14.8$ K), TC Type R ( $\pm 9.4$ K), TC Type S ( $\pm 10.6$ K), TC Type T ( $\pm 2.2$ K), TC Type E ( $\pm 4.0$ K), TC Type J ( $\pm 5.2$ K), TC Type K ( $\pm 7.6$ K), TC Type U ( $\pm 3.5$ K), TC Type L ( $\pm 5.1$ K), TC Type N ( $\pm 5.5$ K)                                                                                                                |
| <b>Basic error limit (operational limit at 25 °C)</b>                  |                                                                                                                                                                                                                                                                                                                                                                                     |
| • Voltage, relative to input range, (+/-)                              | 0.15 %; $\pm 0.15$ % ( $\pm 250$ mV, $\pm 500$ mV, $\pm 1$ V, $\pm 2.5$ V, $\pm 5$ V, 1 to 5 V, $\pm 10$ V); $\pm 0.17$ % ( $\pm 80$ mV)                                                                                                                                                                                                                                            |
| • Current, relative to input range, (+/-)                              | 0.15 %; $\pm 20$ 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), 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 ( $\pm 8.2$ K), TC Type R ( $\pm 5.2$ K), TC Type S ( $\pm 5.9$ K), TC Type T ( $\pm 1.2$ K), TC Type E ( $\pm 1.8$ K), TC Type J ( $\pm 2.3$ K), TC Type K ( $\pm 3.4$ K), TC Type U ( $\pm 1.8$ K), TC Type L ( $\pm 2.3$ K), TC Type N ( $\pm 2.9$ K)                                                                                                                  |
| <b>Interrupts/diagnostics/status information</b>                       |                                                                                                                                                                                                                                                                                                                                                                                     |
| Diagnostics function                                                   | No                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Potential separation</b>                                            |                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Potential separation analog inputs</b>                              |                                                                                                                                                                                                                                                                                                                                                                                     |
| • 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                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Isolation</b>                                                       |                                                                                                                                                                                                                                                                                                                                                                                     |
| 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 |
| <b>Dimensions</b>      |                                    |
| Width                  | 25 mm                              |
| Height                 | 290 mm                             |
| Depth                  | 210 mm                             |
| <b>Weights</b>         |                                    |
| Weight, approx.        | 500 g                              |
| <b>Classifications</b> |                                    |

|  |        | 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

[Miscellaneous](#)



[China RoHS](#)



##### General Product Approval      EMV      For use in hazardous locations

[Metrological Approval](#)



[EM](#)

##### For use in hazardous locations      Maritime application



[Type Examination Certificate](#)



##### Maritime application



[NK / Nippon Kaiji Kyokai](#)



##### Maritime application

[CCS \(China Classification Society\)](#)

