



SIMATIC S7-300, Analog input SM 331, isolated, 8 AI, Resolution 9/12/14 bits, U/I/thermocouple/resistor, alarm, diagnostics, 1x 20-pole  
Removing/inserting with active backplane bus

| Supply voltage                                                        |                                                                |
|-----------------------------------------------------------------------|----------------------------------------------------------------|
| Load voltage L+                                                       |                                                                |
| • Rated value (DC)                                                    | 24 V                                                           |
| • Reverse polarity protection                                         | Yes                                                            |
| Input current                                                         |                                                                |
| from load voltage L+ (without load), max.                             | 30 mA                                                          |
| from backplane bus 5 V DC, max.                                       | 50 mA                                                          |
| Power loss                                                            |                                                                |
| Power loss, typ.                                                      | 1 W                                                            |
| Analog inputs                                                         |                                                                |
| Number of analog inputs                                               | 8                                                              |
| • For resistance measurement                                          | 4                                                              |
| permissible input voltage for voltage input (destruction limit), max. | 20 V; continuous; 75 V for max. 1 s (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                                 |                                                                |
| • 0 to +10 V                                                          | No                                                             |
| • 1 V to 5 V                                                          | Yes                                                            |
| — Input resistance (1 V to 5 V)                                       | 100 kΩ                                                         |
| • 1 V to 10 V                                                         | No                                                             |
| • -1 V to +1 V                                                        | Yes                                                            |
| — Input resistance (-1 V to +1 V)                                     | 10 MΩ                                                          |
| • -10 V to +10 V                                                      | Yes                                                            |
| — Input resistance (-10 V to +10 V)                                   | 100 kΩ                                                         |
| • -2.5 V to +2.5 V                                                    | Yes                                                            |
| — Input resistance (-2.5 V to +2.5 V)                                 | 100 kΩ                                                         |
| • -250 mV to +250 mV                                                  | Yes                                                            |
| — Input resistance (-250 mV to +250 mV)                               | 10 MΩ                                                          |
| • -5 V to +5 V                                                        | Yes                                                            |
| — Input resistance (-5 V to +5 V)                                     | 100 kΩ                                                         |
| • -50 mV to +50 mV                                                    | No                                                             |

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| <ul style="list-style-type: none"> <li>• -500 mV to +500 mV <ul style="list-style-type: none"> <li>— Input resistance (-500 mV to +500 mV)</li> </ul> </li> <li>• -80 mV to +80 mV <ul style="list-style-type: none"> <li>— Input resistance (-80 mV to +80 mV)</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                       | Yes<br>10 MΩ<br>Yes<br>10 MΩ                                                                                 |
| Input ranges (rated values), currents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                              |
| <ul style="list-style-type: none"> <li>• 0 to 20 mA <ul style="list-style-type: none"> <li>— Input resistance (0 to 20 mA)</li> </ul> </li> <li>• -10 mA to +10 mA <ul style="list-style-type: none"> <li>— Input resistance (-10 mA to +10 mA)</li> </ul> </li> <li>• -20 mA to +20 mA <ul style="list-style-type: none"> <li>— Input resistance (-20 mA to +20 mA)</li> </ul> </li> <li>• -3.2 mA to +3.2 mA <ul style="list-style-type: none"> <li>— Input resistance (-3.2 mA to +3.2 mA)</li> </ul> </li> <li>• 4 mA to 20 mA <ul style="list-style-type: none"> <li>— Input resistance (4 mA to 20 mA)</li> </ul> </li> </ul>                                                          | Yes<br>25 Ω<br>Yes<br>25 Ω<br>Yes<br>25 Ω<br>Yes<br>25 Ω<br>Yes<br>25 Ω                                      |
| Input ranges (rated values), thermocouples                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                              |
| <ul style="list-style-type: none"> <li>• Type B</li> <li>• Type C</li> <li>• Type E <ul style="list-style-type: none"> <li>— Input resistance (Type E)</li> </ul> </li> <li>• Type J <ul style="list-style-type: none"> <li>— Input resistance (type J)</li> </ul> </li> <li>• Type K <ul style="list-style-type: none"> <li>— Input resistance (Type K)</li> </ul> </li> <li>• Type L <ul style="list-style-type: none"> <li>— Input resistance (Type L)</li> </ul> </li> <li>• Type N <ul style="list-style-type: none"> <li>— Input resistance (Type N)</li> </ul> </li> <li>• Type R</li> <li>• Type S</li> <li>• Type T</li> <li>• Type U</li> <li>• Type TXK/TXK(L) to GOST</li> </ul> | No<br>No<br>Yes<br>10 MΩ<br>Yes<br>10 MΩ<br>Yes<br>10 MΩ<br>Yes<br>10 MΩ<br>No<br>No<br>No<br>No<br>No<br>No |
| Input ranges (rated values), resistance thermometer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                              |
| <ul style="list-style-type: none"> <li>• Cu 10</li> <li>• Ni 100 <ul style="list-style-type: none"> <li>— Input resistance (Ni 100)</li> </ul> </li> <li>• Ni 1000</li> <li>• LG-Ni 1000</li> <li>• Ni 120</li> <li>• Ni 200</li> <li>• Ni 500</li> <li>• Pt 100 <ul style="list-style-type: none"> <li>— Input resistance (Pt 100)</li> </ul> </li> <li>• Pt 1000</li> <li>• Pt 200</li> <li>• Pt 500</li> </ul>                                                                                                                                                                                                                                                                            | No<br>Yes; Standard<br>10 MΩ<br>No<br>No<br>No<br>No<br>No<br>Yes; Standard<br>10 MΩ<br>No<br>No<br>No       |
| Input ranges (rated values), resistors                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                              |
| <ul style="list-style-type: none"> <li>• 0 to 150 ohms <ul style="list-style-type: none"> <li>— Input resistance (0 to 150 ohms)</li> </ul> </li> <li>• 0 to 300 ohms <ul style="list-style-type: none"> <li>— Input resistance (0 to 300 ohms)</li> </ul> </li> <li>• 0 to 600 ohms <ul style="list-style-type: none"> <li>— Input resistance (0 to 600 ohms)</li> </ul> </li> <li>• 0 to 6000 ohms</li> </ul>                                                                                                                                                                                                                                                                              | Yes<br>10 MΩ<br>Yes<br>10 MΩ<br>Yes<br>10 MΩ<br>No                                                           |
| Thermocouple (TC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                              |
| Temperature compensation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                              |
| <ul style="list-style-type: none"> <li>— parameterizable</li> <li>— internal temperature compensation</li> <li>— external temperature compensation with</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Yes<br>Yes<br>Yes                                                                                            |

|                                                                        |                                                                                                   |
|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| compensations socket                                                   |                                                                                                   |
| — for definable comparison point temperature                           | Yes                                                                                               |
| <b>Characteristic linearization</b>                                    |                                                                                                   |
| • parameterizable                                                      | Yes                                                                                               |
| — for thermocouples                                                    | Type E, J, K, L, N                                                                                |
| — for resistance thermometer                                           | Pt100 (standard, climatic range), Ni100 (standard, climatic range)                                |
| <b>Cable length</b>                                                    |                                                                                                   |
| • shielded, max.                                                       | 200 m; 50 m at 80 mV and thermocouples                                                            |
| <b>Analog value generation for the inputs</b>                          |                                                                                                   |
| <b>Integration and conversion time/resolution per channel</b>          |                                                                                                   |
| • Resolution with overrange (bit including sign), max.                 | 15 bit; Unipolar: 9/12/12/14 bit; bipolar: 9 bit + sign/12 bit + sign/12 bit + sign/14 bit + sign |
| • Integration time, parameterizable                                    | Yes; 2,5 / 16,67 / 20 / 100 ms                                                                    |
| • Basic conversion time (ms)                                           | 3 / 17 / 22 / 102 ms                                                                              |
| • Interference voltage suppression for interference frequency f1 in Hz | 400 / 60 / 50 / 10 Hz                                                                             |
| <b>Encoder</b>                                                         |                                                                                                   |
| <b>Connection of signal encoders</b>                                   |                                                                                                   |
| • for voltage measurement                                              | Yes                                                                                               |
| • for current measurement as 2-wire transducer                         | Yes                                                                                               |
| • for current measurement as 4-wire transducer                         | Yes                                                                                               |
| • for resistance measurement with two-wire connection                  | Yes                                                                                               |
| • for resistance measurement with three-wire connection                | Yes                                                                                               |
| • for resistance measurement with four-wire connection                 | Yes                                                                                               |
| <b>Errors/accuracies</b>                                               |                                                                                                   |
| <b>Operational error limit in overall temperature range</b>            |                                                                                                   |
| • Voltage, relative to input range, (+/-)                              | 1 %; ±1% (80 mV); ±0.6% (250 mV to 1 000 mV); ±0.8% (2.5 V to 10 V)                               |
| • Current, relative to input range, (+/-)                              | 0.7 %; From 3.2 to 20 mA                                                                          |
| • Resistance, relative to input range, (+/-)                           | 0.7 %; 150, 300, 600 Ohm                                                                          |
| • Resistance thermometer, relative to input range, (+/-)               | 0.7 %; ±0.7 % (Pt100/ Ni100); ±0.8 % (Pt100 climate)                                              |
| • Thermocouple, relative to input range, (+/-)                         | 1.1 %; Type E, J, K, L, N                                                                         |
| <b>Basic error limit (operational limit at 25 °C)</b>                  |                                                                                                   |
| • Voltage, relative to input range, (+/-)                              | 0.6 %; ±0.4 % (250 mV to 1 000 mV); ±0.6 % (2.5 mV to 10 mV); ±0.7 % (80 mV)                      |
| • Current, relative to input range, (+/-)                              | 0.5 %; 3.2 to 20 mA                                                                               |
| • Resistance, relative to input range, (+/-)                           | 0.5 %; 150, 300, 600 Ohm                                                                          |
| • Resistance thermometer, relative to input range, (+/-)               | 0.6 %; ±0.5% (Pt100/ Ni100), ±0.6% (Pt100 climate)                                                |
| • Thermocouple, relative to input range, (+/-)                         | 0.7 %; Type E, N, J, K, L                                                                         |
| <b>Interrupts/diagnostics/status information</b>                       |                                                                                                   |
| Diagnostics function                                                   | Yes; Parameterizable                                                                              |
| <b>Alarms</b>                                                          |                                                                                                   |
| • Diagnostic alarm                                                     | Yes; Parameterizable, channels 0 and 2                                                            |
| • Limit value alarm                                                    | Yes; Parameterizable                                                                              |
| <b>Diagnoses</b>                                                       |                                                                                                   |
| • Diagnostic information readable                                      | Yes                                                                                               |
| <b>Diagnostics indication LED</b>                                      |                                                                                                   |
| • Group error SF (red)                                                 | Yes                                                                                               |
| <b>Potential separation</b>                                            |                                                                                                   |
| <b>Potential separation analog inputs</b>                              |                                                                                                   |
| • between the channels                                                 | No                                                                                                |
| • between the channels and backplane bus                               | Yes                                                                                               |
| • between the channels and the power supply of the electronics         | Yes                                                                                               |
| <b>Isolation</b>                                                       |                                                                                                   |
| Isolation tested with                                                  | 500 V DC                                                                                          |
| <b>connection method / header</b>                                      |                                                                                                   |

|                          |                                                                                            |
|--------------------------|--------------------------------------------------------------------------------------------|
| required front connector | 20-pin                                                                                     |
| <b>Dimensions</b>        |                                                                                            |
| Width                    | 40 mm                                                                                      |
| Height                   | 125 mm                                                                                     |
| Depth                    | 117 mm                                                                                     |
| <b>Weights</b>           |                                                                                            |
| Weight, approx.          | 250 g                                                                                      |
| <b>last modified:</b>    | 3/2/2021  |