



SIMATIC S7-1200, Analog input, SM 1231, 8 AI, +/-10 V, +/-5 V, +/-2.5 V, or 0-20 mA/4-20 mA, 12 bit+sign or (13 bit ADC)

| General information                                                   |                                           |
|-----------------------------------------------------------------------|-------------------------------------------|
| Product type designation                                              | SM 1231, AI 8x13 bit                      |
| Supply voltage                                                        |                                           |
| Rated value (DC)                                                      | 24 V                                      |
| Input current                                                         |                                           |
| Current consumption, typ.                                             | 60 mA                                     |
| from backplane bus 5 V DC, typ.                                       | 90 mA                                     |
| Power loss                                                            |                                           |
| Power loss, typ.                                                      | 1.5 W                                     |
| Analog inputs                                                         |                                           |
| Number of analog inputs                                               | 8; Current or voltage differential inputs |
| permissible input voltage for voltage input (destruction limit), max. | 35 V                                      |
| permissible input current for current input (destruction limit), max. | 40 mA                                     |
| Cycle time (all channels) max.                                        | 625 µs                                    |
| Input ranges                                                          |                                           |
| • Voltage                                                             | Yes; ±10V, ±5V, ±2.5V                     |
| • Current                                                             | Yes; 4 to 20 mA, 0 to 20 mA               |
| • Thermocouple                                                        | No                                        |
| • Resistance thermometer                                              | No                                        |
| • Resistance                                                          | Yes                                       |
| Input ranges (rated values), voltages                                 |                                           |
| • -10 V to +10 V                                                      | Yes                                       |
| — Input resistance (-10 V to +10 V)                                   | ≥9 MOhm                                   |
| • -2.5 V to +2.5 V                                                    | Yes                                       |
| — Input resistance (-2.5 V to +2.5 V)                                 | ≥9 MOhm                                   |
| • -5 V to +5 V                                                        | Yes                                       |
| — Input resistance (-5 V to +5 V)                                     | ≥9 MOhm                                   |
| Input ranges (rated values), currents                                 |                                           |
| • 0 to 20 mA                                                          | Yes                                       |
| — Input resistance (0 to 20 mA)                                       | 280 Ω                                     |
| • 4 mA to 20 mA                                                       | Yes                                       |
| — Input resistance (4 mA to 20 mA)                                    | 280 Ω                                     |
| Thermocouple (TC)                                                     |                                           |
| Temperature compensation                                              |                                           |
| — parameterizable                                                     | No                                        |
| Analog value generation for the inputs                                |                                           |
| Integration and conversion time/resolution per channel                |                                           |
| • Resolution with overrange (bit including sign), max.                | 12 bit; + sign                            |

|                                                                                                                                                                                                                              |                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Integration time, parameterizable</li> <li>Interference voltage suppression for interference frequency f1 in Hz</li> </ul>                                                            | Yes<br>40 dB, DC to 60 V for interference frequency 50 / 60 Hz |
| <b>Smoothing of measured values</b>                                                                                                                                                                                          |                                                                |
| <ul style="list-style-type: none"> <li>parameterizable</li> <li>Step: None</li> <li>Step: low</li> <li>Step: Medium</li> <li>Step: High</li> </ul>                                                                           | Yes<br>Yes<br>Yes<br>Yes<br>Yes                                |
| <b>Errors/accuracies</b>                                                                                                                                                                                                     |                                                                |
| Temperature error (relative to input range), (+/-)                                                                                                                                                                           | 25 °C ±0.1%, to 55 °C ±0.2% total measurement range            |
| <b>Basic error limit (operational limit at 25 °C)</b>                                                                                                                                                                        |                                                                |
| <ul style="list-style-type: none"> <li>Voltage, relative to input range, (+/-)</li> <li>Current, relative to input range, (+/-)</li> </ul>                                                                                   | 0.1 %<br>0.1 %                                                 |
| <b>Interference voltage suppression for <math>f = n \times (f1 \pm 1 \%)</math>, f1 = interference frequency</b>                                                                                                             |                                                                |
| <ul style="list-style-type: none"> <li>Common mode voltage, max.</li> </ul>                                                                                                                                                  | 12 V                                                           |
| <b>Interrupts/diagnostics/status information</b>                                                                                                                                                                             |                                                                |
| Alarms                                                                                                                                                                                                                       | Yes                                                            |
| Diagnostics function                                                                                                                                                                                                         | Yes                                                            |
| <b>Alarms</b>                                                                                                                                                                                                                |                                                                |
| <ul style="list-style-type: none"> <li>Diagnostic alarm</li> </ul>                                                                                                                                                           | Yes                                                            |
| <b>Diagnoses</b>                                                                                                                                                                                                             |                                                                |
| <ul style="list-style-type: none"> <li>Monitoring the supply voltage</li> <li>Wire-break</li> </ul>                                                                                                                          | Yes<br>Yes                                                     |
| <b>Diagnostics indication LED</b>                                                                                                                                                                                            |                                                                |
| <ul style="list-style-type: none"> <li>for status of the inputs</li> <li>for maintenance</li> </ul>                                                                                                                          | Yes<br>Yes                                                     |
| <b>Degree and class of protection</b>                                                                                                                                                                                        |                                                                |
| IP degree of protection                                                                                                                                                                                                      | IP20                                                           |
| <b>Standards, approvals, certificates</b>                                                                                                                                                                                    |                                                                |
| CE mark                                                                                                                                                                                                                      | Yes                                                            |
| CSA approval                                                                                                                                                                                                                 | Yes                                                            |
| UL approval                                                                                                                                                                                                                  | Yes                                                            |
| cULus                                                                                                                                                                                                                        | Yes                                                            |
| FM approval                                                                                                                                                                                                                  | Yes                                                            |
| RCM (formerly C-TICK)                                                                                                                                                                                                        | Yes                                                            |
| KC approval                                                                                                                                                                                                                  | Yes                                                            |
| Marine approval                                                                                                                                                                                                              | Yes                                                            |
| <b>Ambient conditions</b>                                                                                                                                                                                                    |                                                                |
| <b>Free fall</b>                                                                                                                                                                                                             |                                                                |
| <ul style="list-style-type: none"> <li>Fall height, max.</li> </ul>                                                                                                                                                          | 0.3 m; five times, in product package                          |
| <b>Ambient temperature during operation</b>                                                                                                                                                                                  |                                                                |
| <ul style="list-style-type: none"> <li>min.</li> <li>max.</li> <li>horizontal installation, min.</li> <li>horizontal installation, max.</li> <li>vertical installation, min.</li> <li>vertical installation, max.</li> </ul> | -20 °C<br>60 °C<br>-20 °C<br>60 °C<br>-20 °C<br>50 °C          |
| <b>Ambient temperature during storage/transportation</b>                                                                                                                                                                     |                                                                |
| <ul style="list-style-type: none"> <li>min.</li> <li>max.</li> </ul>                                                                                                                                                         | -40 °C<br>70 °C                                                |
| <b>Air pressure acc. to IEC 60068-2-13</b>                                                                                                                                                                                   |                                                                |
| <ul style="list-style-type: none"> <li>Operation, min.</li> <li>Operation, max.</li> <li>Storage/transport, min.</li> <li>Storage/transport, max.</li> </ul>                                                                 | 795 hPa<br>1 080 hPa<br>660 hPa<br>1 080 hPa                   |
| <b>Relative humidity</b>                                                                                                                                                                                                     |                                                                |
| <ul style="list-style-type: none"> <li>Operation at 25 °C without condensation, max.</li> </ul>                                                                                                                              | 95 %                                                           |
| <b>Pollutant concentrations</b>                                                                                                                                                                                              |                                                                |
| <ul style="list-style-type: none"> <li>SO2 at RH &lt; 60% without condensation</li> </ul>                                                                                                                                    | SO2: < 0.5 ppm; H2S: < 0.1 ppm; RH < 60% condensation-free     |

| connection method          |                                                                                             |
|----------------------------|---------------------------------------------------------------------------------------------|
| required front connector   | Yes                                                                                         |
| Mechanics/material         |                                                                                             |
| Enclosure material (front) | Yes                                                                                         |
| • Plastic                  |                                                                                             |
| Dimensions                 |                                                                                             |
| Width                      | 45 mm                                                                                       |
| Height                     | 100 mm                                                                                      |
| Depth                      | 75 mm                                                                                       |
| Weights                    |                                                                                             |
| Weight, approx.            | 180 g                                                                                       |
| last modified:             | 4/25/2024  |