



SIMATIC S7-1200, Analog input, SM 1231 TC, 8 AI thermocouples

| General information                                                   |                                                                   |
|-----------------------------------------------------------------------|-------------------------------------------------------------------|
| Product type designation                                              | SM 1231, AI 8x16 bit TC                                           |
| Supply voltage                                                        |                                                                   |
| Rated value (DC)                                                      | 24 V                                                              |
| Input current                                                         |                                                                   |
| Current consumption, typ.                                             | 40 mA                                                             |
| from backplane bus 5 V DC, typ.                                       | 80 mA                                                             |
| Power loss                                                            |                                                                   |
| Power loss, typ.                                                      | 1.5 W                                                             |
| Analog inputs                                                         |                                                                   |
| Number of analog inputs                                               | 8; Thermocouples                                                  |
| permissible input voltage for voltage input (destruction limit), max. | ±35 V                                                             |
| Technical unit for temperature measurement adjustable                 | Degrees Celsius/degrees Fahrenheit                                |
| Input ranges                                                          |                                                                   |
| • Voltage                                                             | Yes                                                               |
| • Current                                                             | No                                                                |
| • Thermocouple                                                        | Yes; J, K, T, E, R & S, B, N, C, TXK/XK(L); voltage range: ±80 mV |
| • Resistance thermometer                                              | No                                                                |
| • Resistance                                                          | No                                                                |
| Input ranges (rated values), voltages                                 |                                                                   |
| • -80 mV to +80 mV                                                    | Yes                                                               |
| — Input resistance (-80 mV to +80 mV)                                 | ≥1 MOhm                                                           |
| Input ranges (rated values), thermocouples                            |                                                                   |
| • Type B                                                              | Yes                                                               |
| • Type C                                                              | Yes                                                               |
| • Type E                                                              | Yes                                                               |
| • Type J                                                              | Yes                                                               |
| • Type K                                                              | Yes                                                               |
| • Type N                                                              | Yes                                                               |
| • Type R                                                              | Yes                                                               |
| • Type S                                                              | Yes                                                               |
| • Type T                                                              | Yes                                                               |
| • Type TXK/TXK(L) to GOST                                             | Yes                                                               |
| Thermocouple (TC)                                                     |                                                                   |
| Temperature compensation                                              |                                                                   |
| — parameterizable                                                     | No                                                                |
| Analog value generation for the inputs                                |                                                                   |
| Measurement principle                                                 | integrating                                                       |
| Integration and conversion time/resolution per channel                |                                                                   |

|                                                                                                                                                                                                                                 |                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Resolution with overrange (bit including sign), max.</li> <li>Integration time, parameterizable</li> <li>Interference voltage suppression for interference frequency f1 in Hz</li> </ul> | 15 bit; + sign<br>No<br>85 dB at 50 / 60 / 400 Hz     |
| Smoothing of measured values                                                                                                                                                                                                    |                                                       |
| <ul style="list-style-type: none"> <li>parameterizable</li> </ul>                                                                                                                                                               | Yes                                                   |
| Errors/accuracies                                                                                                                                                                                                               |                                                       |
| Temperature error (relative to input range), (+/-)                                                                                                                                                                              | 25 °C ±0.1%, to 55 °C ±0.2% total measurement range   |
| Repeat accuracy in steady state at 25 °C (relative to output range), (+/-)                                                                                                                                                      | 0.5 %                                                 |
| Interference voltage suppression for $f = n \times (f_1 \pm 1 \%)$ , f1 = interference frequency                                                                                                                                |                                                       |
| <ul style="list-style-type: none"> <li>Common mode interference, min.</li> </ul>                                                                                                                                                | 120 dB                                                |
| Interrupts/diagnostics/status information                                                                                                                                                                                       |                                                       |
| Alarms                                                                                                                                                                                                                          | Yes                                                   |
| Diagnostics function                                                                                                                                                                                                            | Yes; Can be read out                                  |
| Alarms                                                                                                                                                                                                                          |                                                       |
| <ul style="list-style-type: none"> <li>Diagnostic alarm</li> </ul>                                                                                                                                                              | Yes                                                   |
| Diagnoses                                                                                                                                                                                                                       |                                                       |
| <ul style="list-style-type: none"> <li>Monitoring the supply voltage</li> <li>Wire-break</li> </ul>                                                                                                                             | Yes<br>Yes                                            |
| Diagnostics indication LED                                                                                                                                                                                                      |                                                       |
| <ul style="list-style-type: none"> <li>for status of the inputs</li> <li>for maintenance</li> </ul>                                                                                                                             | Yes<br>Yes                                            |
| Degree and class of protection                                                                                                                                                                                                  |                                                       |
| IP degree of protection                                                                                                                                                                                                         | IP20                                                  |
| Standards, approvals, certificates                                                                                                                                                                                              |                                                       |
| 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                                                   |
| Ecological footprint                                                                                                                                                                                                            |                                                       |
| <ul style="list-style-type: none"> <li>environmental product declaration</li> </ul>                                                                                                                                             | Yes                                                   |
| Global warming potential                                                                                                                                                                                                        |                                                       |
| — global warming potential, (total) [CO2 eq]                                                                                                                                                                                    | 43.1 kg                                               |
| — global warming potential, (during production) [CO2 eq]                                                                                                                                                                        | 7.62 kg                                               |
| — global warming potential, (during operation) [CO2 eq]                                                                                                                                                                         | 36 kg                                                 |
| — global warming potential, (after end of life cycle) [CO2 eq]                                                                                                                                                                  | -0.544 kg                                             |
| Ambient conditions                                                                                                                                                                                                              |                                                       |
| Free fall                                                                                                                                                                                                                       |                                                       |
| <ul style="list-style-type: none"> <li>Fall height, max.</li> </ul>                                                                                                                                                             | 0.3 m; five times, in product package                 |
| Ambient temperature during operation                                                                                                                                                                                            |                                                       |
| <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 |
| Ambient temperature during storage/transportation                                                                                                                                                                               |                                                       |
| <ul style="list-style-type: none"> <li>min.</li> <li>max.</li> </ul>                                                                                                                                                            | -40 °C<br>70 °C                                       |
| Air pressure acc. to IEC 60068-2-13                                                                                                                                                                                             |                                                       |
| <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          |

|                                                 |                                                            |
|-------------------------------------------------|------------------------------------------------------------|
| Relative humidity                               |                                                            |
| • Operation at 25 °C without condensation, max. | 95 %                                                       |
| Pollutant concentrations                        |                                                            |
| • SO2 at RH < 60% without condensation          | SO2: < 0.5 ppm; H2S: < 0.1 ppm; RH < 60% condensation-free |
| connection method                               |                                                            |
| required front connector                        | Yes                                                        |
| Mechanics/material                              |                                                            |
| Enclosure material (front)                      |                                                            |
| • Plastic                                       | Yes                                                        |
| Dimensions                                      |                                                            |
| Width                                           | 45 mm                                                      |
| Height                                          | 100 mm                                                     |
| Depth                                           | 75 mm                                                      |
| Weights                                         |                                                            |
| Weight, approx.                                 | 220 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   | 9       | EC001420       |
| ETIM   | 8       | EC001420       |
| ETIM   | 7       | EC001420       |
| IDEA   | 4       | 3562           |
| UNSPSC | 15      | 32-15-17-05    |

|                          |  |
|--------------------------|--|
| Approvals / Certificates |  |
| General Product Approval |  |



[Manufacturer Declaration](#)



[Metrological Approval](#)



|     |                                |
|-----|--------------------------------|
| EMV | For use in hazardous locations |
|-----|--------------------------------|



[FM](#)



|                                |                   |             |
|--------------------------------|-------------------|-------------|
| For use in hazardous locations | Marine / Shipping | Environment |
|--------------------------------|-------------------|-------------|

[CCC-Ex](#)



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



last modified: 10/9/2024