



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	
<ul style="list-style-type: none"> <li>• Voltage</li> <li>• Current</li> <li>• Thermocouple</li> <li>• Resistance thermometer</li> <li>• Resistance</li> </ul>	<ul style="list-style-type: none"> <li>Yes</li> <li>No</li> <li>Yes; J, K, T, E, R &amp; S, B, N, C, TXK/XK(L); voltage range: ±80 mV</li> <li>No</li> <li>No</li> </ul>
Input ranges (rated values), voltages	
<ul style="list-style-type: none"> <li>• -80 mV to +80 mV</li> <li>— Input resistance (-80 mV to +80 mV)</li> </ul>	<ul style="list-style-type: none"> <li>Yes</li> <li>≥1 MOhm</li> </ul>
Input ranges (rated values), thermocouples	
<ul style="list-style-type: none"> <li>• Type B</li> <li>• Type C</li> <li>• Type E</li> <li>• Type J</li> <li>• Type K</li> <li>• Type N</li> <li>• Type R</li> <li>• Type S</li> <li>• Type T</li> <li>• Type TXK/TXK(L) to GOST</li> </ul>	<ul style="list-style-type: none"> <li>Yes</li> <li>Yes</li> <li>Yes</li> <li>Yes</li> <li>Yes</li> <li>Yes</li> <li>Yes</li> <li>Yes</li> <li>Yes</li> <li>Yes</li> </ul>
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 <math>f_1</math> in Hz</li> </ul>	15 bit; + sign No 85 dB at 50 / 60 / 400 Hz
<b>Smoothing of measured values</b>	
<ul style="list-style-type: none"> <li>parameterizable</li> </ul>	Yes
<b>Errors/accuracies</b>	
Temperature error (relative to input range), (+/-)	25 °C $\pm$ 0.1%, to 55 °C $\pm$ 0.2% total measurement range
Repeat accuracy in steady state at 25 °C (relative to output range), (+/-)	0.5 %
<b>Interference voltage suppression for <math>f = n \times (f_1 \pm 1 \%)</math>, <math>f_1</math> = interference frequency</b>	
<ul style="list-style-type: none"> <li>Common mode interference, min.</li> </ul>	120 dB
<b>Interrupts/diagnostics/status information</b>	
Alarms	Yes
Diagnostics function	Yes; Can be read out
<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 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 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>Ecological footprint</b>	
<ul style="list-style-type: none"> <li>environmental product declaration</li> </ul>	Yes
<b>Global warming potential</b>	
— global warming potential, (total) [CO <sub>2</sub> eq]	43.1 kg
— global warming potential, (during production) [CO <sub>2</sub> eq]	7.62 kg
— global warming potential, (during operation) [CO <sub>2</sub> eq]	36 kg
— global warming potential, (after end of life cycle) [CO <sub>2</sub> eq]	-0.544 kg
<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 60 °C -20 °C 60 °C -20 °C 50 °C
<b>Ambient temperature during storage/transportation</b>	
<ul style="list-style-type: none"> <li>min.</li> <li>max.</li> </ul>	-40 °C 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 1 080 hPa 660 hPa 1 080 hPa

<b>Relative humidity</b>	
• Operation at 25 °C without condensation, max.	95 %
<b>Pollutant concentrations</b>	
• SO2 at RH < 60% without condensation	SO2: < 0.5 ppm; H2S: < 0.1 ppm; RH < 60% condensation-free
<b>connection method</b>	
required front connector	Yes
<b>Mechanics/material</b>	
Enclosure material (front)	
• Plastic	Yes
<b>Dimensions</b>	
Width	45 mm
Height	100 mm
Depth	75 mm
<b>Weights</b>	
Weight, approx.	220 g

**last modified:** 10/9/2024 