



SIMATIC ET 200AL, AI 4xRTD/TC, 4x M12, degree of protection IP67

General information	
Product type designation	AI 4xRTD/TC
HW functional status	FS01
Firmware version	V1.0.x
Product function	
<ul style="list-style-type: none"> <li>I&amp;M data</li> </ul>	Yes; I&M0 to I&M3
Engineering with	
<ul style="list-style-type: none"> <li>STEP 7 TIA Portal configurable/integrated from version</li> </ul>	STEP 7 V16 or higher
<ul style="list-style-type: none"> <li>STEP 7 configurable/integrated from version</li> </ul>	V5.5 SP4 and higher
<ul style="list-style-type: none"> <li>PROFIBUS from GSD version/GSD revision</li> </ul>	GSD as of Revision 5
<ul style="list-style-type: none"> <li>PROFINET from GSD version/GSD revision</li> </ul>	GSDML V2.34
Supply voltage	
power supply according to NEC Class 2 required	No
Load voltage 1L+	
<ul style="list-style-type: none"> <li>Rated value (DC)</li> </ul>	24 V
<ul style="list-style-type: none"> <li>permissible range, lower limit (DC)</li> </ul>	20.4 V
<ul style="list-style-type: none"> <li>permissible range, upper limit (DC)</li> </ul>	28.8 V
<ul style="list-style-type: none"> <li>Reverse polarity protection</li> </ul>	Yes; against destruction
Input current	
Current consumption (rated value)	25 mA; without load
from load voltage 1L+ (unswitched voltage)	4 A; Maximum value
from load voltage 2L+, max.	4 A; Maximum value
Power loss	
Power loss, typ.	0.6 W
Analog inputs	
Number of analog inputs	4
<ul style="list-style-type: none"> <li>For voltage measurement</li> </ul>	4
<ul style="list-style-type: none"> <li>For resistance/resistance thermometer measurement</li> </ul>	4
<ul style="list-style-type: none"> <li>For thermocouple measurement</li> </ul>	4
permissible input voltage for voltage input (destruction limit), max.	15 V
Constant measurement current for resistance-type transmitter, typ.	230 ... 300 $\mu$ A
Cycle time (all channels), min.	90 ms
Technical unit for temperature measurement adjustable	Yes; Degrees Celsius / degrees Fahrenheit / Kelvin
Input ranges (rated values), voltages	
<ul style="list-style-type: none"> <li>-80 mV to +80 mV</li> </ul>	Yes; 16 bit incl. sign
— Input resistance (-80 mV to +80 mV)	10 M $\Omega$

Input ranges (rated values), thermocouples	
• Type B — Input resistance (Type B)	Yes; 16 bit incl. sign 10 MΩ
• Type C — Input resistance (Type C)	Yes; 16 bit incl. sign 10 MΩ
• Type E — Input resistance (Type E)	Yes; 16 bit incl. sign 10 MΩ
• Type J — Input resistance (type J)	Yes; 16 bit incl. sign 10 MΩ
• Type K — Input resistance (Type K)	Yes; 16 bit incl. sign 10 MΩ
• Type L — Input resistance (Type L)	Yes; 16 bit incl. sign 10 MΩ
• Type N — Input resistance (Type N)	Yes; 16 bit incl. sign 10 MΩ
• Type R — Input resistance (Type R)	Yes; 16 bit incl. sign 10 MΩ
• Type S — Input resistance (Type S)	Yes; 16 bit incl. sign 10 MΩ
• Type T — Input resistance (Type T)	Yes; 16 bit incl. sign 10 MΩ
• Type U — Input resistance (Type U)	Yes; 16 bit incl. sign 10 MΩ
Input ranges (rated values), resistance thermometer	
• Ni 100 — Input resistance (Ni 100)	Yes; Standard/climate 10 MΩ
• Ni 1000 — Input resistance (Ni 1000)	Yes; Standard/climate 10 MΩ
• Pt 100 — Input resistance (Pt 100)	Yes; Standard/climate 10 MΩ
• Pt 1000 — Input resistance (Pt 1000)	Yes; Standard/climate 10 MΩ
Input ranges (rated values), resistors	
• 0 to 150 ohms — Input resistance (0 to 150 ohms)	Yes 10 MΩ
• 0 to 300 ohms — Input resistance (0 to 300 ohms)	Yes 10 MΩ
Thermocouple (TC)	
Temperature compensation	
— parameterizable	Yes
— internal temperature compensation	Yes
— external temperature compensation with compensations socket	Yes
— dynamic reference temperature value	Yes
— fixed reference temperature	Yes
Cable length	
• shielded, max.	30 m
Analog value generation for the inputs	
Measurement principle	integrating
Integration and conversion time/resolution per channel	
• Resolution with overrange (bit including sign), max.	16 bit
• Integration time, parameterizable	Yes; channel by channel
• Integration time (ms)	16.7 / 20 / 60
• Basic conversion time, including integration time (ms)	18 / 21 / 61 ms
— additional conversion time for wire-break monitoring	4 ms
— additional conversion time for resistance measurement	2 ms
• Interference voltage suppression for interference frequency f1 in Hz	60 / 50 / 16.7

<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>	<p>Yes</p> <p>Yes; 1x cycle time</p> <p>Yes; 4x cycle time</p> <p>Yes; 16x cycle time</p> <p>Yes; 32x cycle time</p>
<b>Encoder</b>	
<b>Connection of signal encoders</b>	
<ul style="list-style-type: none"> <li>• for resistance measurement with two-wire connection</li> <li>• for resistance measurement with three-wire connection</li> <li>• for resistance measurement with four-wire connection</li> </ul>	<p>Yes</p> <p>Yes</p> <p>Yes</p>
<b>Errors/accuracies</b>	
Linearity error (relative to input range), (+/-)	0.025 %
Temperature error (relative to input range), (+/-)	0.01 %/K
Crosstalk between the inputs, max.	-70 dB
Repeat accuracy in steady state at 25 °C (relative to input range), (+/-)	0.01 %; 0.02% for Pt1000
Temperature error of internal compensation	±4 °C
<b>Operational error limit in overall temperature range</b>	
<ul style="list-style-type: none"> <li>• Voltage, relative to input range, (+/-)</li> <li>• Resistance, relative to input range, (+/-)</li> <li>• Resistance thermometer, relative to input range, (+/-)</li> <li>• Thermocouple, relative to input range, (+/-)</li> </ul>	<p>0.35 %</p> <p>0.25 %</p> <p>0.25 %</p> <p>TC type E, J, K, N, C, U, L: 0.35 %; TC type R, S, T: 0.4 %; TC type B: 0.45 %</p>
<b>Basic error limit (operational limit at 25 °C)</b>	
<ul style="list-style-type: none"> <li>• Voltage, relative to input range, (+/-)</li> <li>• Resistance, relative to input range, (+/-)</li> <li>• Resistance thermometer, relative to input range, (+/-)</li> <li>• Thermocouple, relative to input range, (+/-)</li> </ul>	<p>0.25 %</p> <p>0.15 %</p> <p>0.15 %</p> <p>0.25 %</p>
<b>Interference voltage suppression for <math>f = n \times (f_1 \pm 0.5 \%)</math>, <math>f_1 =</math> interference frequency</b>	
<ul style="list-style-type: none"> <li>• Series mode interference (peak value of interference &lt; rated value of input range), min.</li> </ul>	40 dB
<b>Interrupts/diagnostics/status information</b>	
<b>Alarms</b>	
<ul style="list-style-type: none"> <li>• Diagnostic alarm</li> <li>• Limit value alarm</li> </ul>	<p>Yes; Parameterizable</p> <p>Yes; Parameterizable</p>
<b>Diagnoses</b>	
<ul style="list-style-type: none"> <li>• Wire-break</li> <li>• Overflow/underflow</li> </ul>	<p>Yes; Not for ±80 mV</p> <p>Yes</p>
<b>Diagnostics indication LED</b>	
<ul style="list-style-type: none"> <li>• Channel status display</li> <li>• for module diagnostics</li> </ul>	<p>Yes; green LED</p> <p>Yes; green/red LED</p>
<b>Potential separation</b>	
between the load voltages	Yes
<b>Potential separation channels</b>	
<ul style="list-style-type: none"> <li>• between the channels</li> <li>• between the channels and backplane bus</li> <li>• between the channels and the power supply of the electronics</li> </ul>	<p>No</p> <p>Yes</p> <p>No</p>
<b>Isolation</b>	
Isolation tested with	707 V DC (type test)
<b>Degree and class of protection</b>	
IP degree of protection	IP65/67
<b>Standards, approvals, certificates</b>	
Suitable for safety-related tripping of standard modules	Yes; From FS01
Suitable for applications according to AMS 2750	Yes; Declaration of Conformity, see online support entry 109757262

Suitable for applications according to CQI-9	Yes; Based on AMS 2750 E
<b>Highest safety class achievable for safety-related tripping of standard modules</b>	
<ul style="list-style-type: none"> <li>• Performance level according to ISO 13849-1</li> <li>• Category according to ISO 13849-1</li> <li>• SIL acc. to IEC 62061</li> </ul>	PL d Cat. 3 SIL 2
<b>Ambient conditions</b>	
<b>Ambient temperature during operation</b>	
<ul style="list-style-type: none"> <li>• min.</li> <li>• max.</li> </ul>	-30 °C 55 °C
<b>connection method / header</b>	
Design of electrical connection for the inputs and outputs	M12, 5-pole
Design of electrical connection for supply voltage	M8, 4-pole
<b>ET-Connection</b>	
<ul style="list-style-type: none"> <li>• ET-Connection</li> </ul>	M8, 4-pin, shielded
<b>Dimensions</b>	
Width	30 mm
Height	159 mm
Depth	40 mm
<b>Weights</b>	
Weight, approx.	168 g
<b>last modified:</b>	3/7/2022 