



**THE DATASHEET OF  
6ES71445KD000BA0**






SIMATIC ET 200AL, AI 4xU/I/RTD, 4x M12, Degree of protection IP67



General information	
Product type designation	AI 4xU/I/RTD
HW functional status	FS04
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 V13 SP1 or higher
<ul style="list-style-type: none"> <li>STEP 7 configurable/integrated from version</li> </ul>	From V5.5 SP4 Hotfix 3
<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 V2.3.1
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)	35 mA; without load
from load voltage 1L+ (unswitched voltage)	4 A; Maximum value
from load voltage 2L+, max.	4 A; Maximum value
Encoder supply	
Number of outputs	4
24 V encoder supply	
<ul style="list-style-type: none"> <li>Short-circuit protection</li> </ul>	Yes; per channel, electronic
<ul style="list-style-type: none"> <li>Output current, max.</li> </ul>	0.5 A; Per channel, total current of all channels max. 1 A
Power loss	
Power loss, typ.	1.5 W
Analog inputs	
Number of analog inputs	4
<ul style="list-style-type: none"> <li>For current measurement</li> </ul>	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
permissible input voltage for voltage input (destruction limit), max.	30 V
permissible input current for current input (destruction limit), max.	50 mA

Cycle time (all channels), min.	8 ms
Technical unit for temperature measurement adjustable	Yes; Degrees Celsius / degrees Fahrenheit / Kelvin
<b>Input ranges (rated values), voltages</b>	
<ul style="list-style-type: none"> <li>• 0 to +10 V <ul style="list-style-type: none"> <li>— Input resistance (0 to 10 V)</li> </ul> </li> <li>• 1 V to 5 V <ul style="list-style-type: none"> <li>— Input resistance (1 V to 5 V)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Yes</li> <li>10 MΩ</li> <li>Yes</li> <li>10 MΩ</li> </ul>
<b>Input ranges (rated values), currents</b>	
<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>• 4 mA to 20 mA <ul style="list-style-type: none"> <li>— Input resistance (4 mA to 20 mA)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Yes</li> <li>50 Ω</li> <li>Yes</li> <li>50 Ω</li> </ul>
<b>Input ranges (rated values), resistance thermometer</b>	
<ul style="list-style-type: none"> <li>• Ni 100 <ul style="list-style-type: none"> <li>— Input resistance (Ni 100)</li> </ul> </li> <li>• Pt 100 <ul style="list-style-type: none"> <li>— Input resistance (Pt 100)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Yes; Standard/climate</li> <li>10 MΩ</li> <li>Yes; Standard/climate</li> <li>10 MΩ</li> </ul>
<b>Input ranges (rated values), resistors</b>	
<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> </ul>	<ul style="list-style-type: none"> <li>Yes</li> <li>10 MΩ</li> <li>Yes</li> <li>10 MΩ</li> </ul>
<b>Cable length</b>	
<ul style="list-style-type: none"> <li>• shielded, max.</li> </ul>	30 m
<b>Analog value generation for the inputs</b>	
Measurement principle	integrating
<b>Integration and conversion time/resolution per channel</b>	
<ul style="list-style-type: none"> <li>• Resolution with overrange (bit including sign), max.</li> <li>• Integration time, parameterizable</li> <li>• Integration time (ms)</li> <li>• Interference voltage suppression for interference frequency f1 in Hz</li> <li>• Conversion time (per channel)</li> </ul>	<ul style="list-style-type: none"> <li>16 bit</li> <li>Yes; channel by channel</li> <li>0,3 / 16,7 / 20 / 60</li> <li>3 600 / 60 / 50 / 16.7</li> <li>2 / 18 / 21 / 61 ms</li> </ul>
<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>	<ul style="list-style-type: none"> <li>Yes</li> <li>Yes; 1x cycle time</li> <li>Yes; 4x cycle time</li> <li>Yes; 16x cycle time</li> <li>Yes; 32x cycle time</li> </ul>
<b>Encoder</b>	
<b>Connection of signal encoders</b>	
<ul style="list-style-type: none"> <li>• for voltage measurement</li> <li>• for current measurement as 2-wire transducer</li> <li>• for current measurement as 4-wire transducer</li> <li>• for resistance measurement with two-wire connection</li> <li>• for resistance measurement with three-wire connection</li> </ul>	<ul style="list-style-type: none"> <li>Yes</li> <li>Yes</li> <li>Yes</li> <li>Yes</li> <li>Yes</li> </ul>
<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 %
<b>Operational error limit in overall temperature range</b>	
<ul style="list-style-type: none"> <li>• Voltage, relative to input range, (+/-)</li> <li>• Current, relative to input range, (+/-)</li> <li>• Resistance, relative to input range, (+/-)</li> <li>• Resistance thermometer, relative to input range, (+/-)</li> </ul>	<ul style="list-style-type: none"> <li>0.35 %</li> <li>0.45 %</li> <li>0.25 %</li> <li>0.25 %</li> </ul>
Basic error limit (operational limit at 25 °C)	

<ul style="list-style-type: none"> <li>• Voltage, relative to input range, (+/-)</li> <li>• Current, relative to input range, (+/-)</li> <li>• Resistance, relative to input range, (+/-)</li> <li>• Resistance thermometer, relative to input range, (+/-)</li> </ul>	0.25 % 0.25 % 0.15 % 0.15 %
Interference voltage suppression for $f = n \times (f_1 \pm 0.5 \%)$ , $f_1 =$ interference frequency	
<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>	Yes; Parameterizable Yes; Parameterizable
<b>Diagnoses</b>	
<ul style="list-style-type: none"> <li>• Wire-break</li> <li>• Short-circuit</li> <li>• Overflow/underflow</li> </ul>	Yes; at 4 mA to 20 mA and 1 V to 5 V Yes; Encoder supply to M, channel by channel Yes
<b>Diagnostics indication LED</b>	
<ul style="list-style-type: none"> <li>• Channel status display</li> <li>• for module diagnostics</li> </ul>	Yes; green LED Yes; green/red LED
<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>	No Yes No
<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 FS02
<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> <li>• remark on safety-oriented shutdown</li> </ul>	PL d Cat. 3 SIL 2 <a href="https://support.industry.siemens.com/cs/de/en/view/39198632">https://support.industry.siemens.com/cs/de/en/view/39198632</a>
<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>	4/11/2022 

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