



SIMATIC S7-300, Analog input SM 331, isolated, 2 AI, Resolution 9/12/14 bits, U/I/thermocouple/resistor, alarm, diagnostics, 1x 20-pole, Removing/inserting with active backplane bus

Supply voltage	
Load voltage L+	
• Rated value (DC)	24 V
• Reverse polarity protection	Yes
Input current	
from load voltage L+ (without load), max.	30 mA
from backplane bus 5 V DC, max.	50 mA
Power loss	
Power loss, typ.	1 W
Analog inputs	
Number of analog inputs	2
• For resistance measurement	1
permissible input voltage for voltage input (destruction limit), max.	20 V; continuous; 75 V for max. 1 s (mark to space ratio 1:20)
permissible input current for current input (destruction limit), max.	40 mA
Constant measurement current for resistance-type transmitter, typ.	1.67 mA
Input ranges	
• Voltage	Yes
• Current	Yes
• Thermocouple	Yes
• Resistance thermometer	Yes
• Resistance	Yes
Input ranges (rated values), voltages	
• 0 to +10 V	No
• 1 V to 5 V	Yes
— Input resistance (1 V to 5 V)	100 kΩ
• 1 V to 10 V	No
• -1 V to +1 V	Yes
— Input resistance (-1 V to +1 V)	10 MΩ
• -10 V to +10 V	Yes
— Input resistance (-10 V to +10 V)	100 kΩ
• -2.5 V to +2.5 V	Yes
— Input resistance (-2.5 V to +2.5 V)	100 kΩ
• -250 mV to +250 mV	Yes
— Input resistance (-250 mV to +250 mV)	10 MΩ
• -5 V to +5 V	Yes
— Input resistance (-5 V to +5 V)	100 kΩ
• -50 mV to +50 mV	No

<ul style="list-style-type: none"> <li>● -500 mV to +500 mV <ul style="list-style-type: none"> <li>— Input resistance (-500 mV to +500 mV)</li> </ul> </li> <li>● -80 mV to +80 mV <ul style="list-style-type: none"> <li>— Input resistance (-80 mV to +80 mV)</li> </ul> </li> </ul>	<p>Yes</p> <p>10 MΩ</p> <p>Yes</p> <p>10 MΩ</p>
<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>● -10 mA to +10 mA <ul style="list-style-type: none"> <li>— Input resistance (-10 mA to +10 mA)</li> </ul> </li> <li>● -20 mA to +20 mA <ul style="list-style-type: none"> <li>— Input resistance (-20 mA to +20 mA)</li> </ul> </li> <li>● -3.2 mA to +3.2 mA <ul style="list-style-type: none"> <li>— Input resistance (-3.2 mA to +3.2 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>	<p>Yes</p> <p>25 Ω</p> <p>Yes</p> <p>25 Ω</p> <p>Yes</p> <p>25 Ω</p> <p>Yes</p> <p>25 Ω</p> <p>Yes</p> <p>25 Ω</p>
<b>Input ranges (rated values), thermocouples</b>	
<ul style="list-style-type: none"> <li>● Type B</li> <li>● Type E <ul style="list-style-type: none"> <li>— Input resistance (Type E)</li> </ul> </li> <li>● Type J <ul style="list-style-type: none"> <li>— Input resistance (type J)</li> </ul> </li> <li>● Type K <ul style="list-style-type: none"> <li>— Input resistance (Type K)</li> </ul> </li> <li>● Type L</li> <li>● Type N <ul style="list-style-type: none"> <li>— Input resistance (Type N)</li> </ul> </li> <li>● Type R</li> <li>● Type S</li> <li>● Type T</li> <li>● Type U</li> <li>● Type TXK/TXK(L) to GOST</li> </ul>	<p>No</p> <p>Yes</p> <p>10 MΩ</p> <p>Yes</p> <p>10 MΩ</p> <p>Yes</p> <p>10 MΩ</p> <p>No</p> <p>Yes</p> <p>10 MΩ</p> <p>No</p> <p>No</p> <p>No</p> <p>No</p> <p>No</p> <p>No</p>
<b>Input ranges (rated values), resistance thermometer</b>	
<ul style="list-style-type: none"> <li>● Cu 10</li> <li>● Ni 100 <ul style="list-style-type: none"> <li>— Input resistance (Ni 100)</li> </ul> </li> <li>● Ni 1000</li> <li>● LG-Ni 1000</li> <li>● Ni 120</li> <li>● Ni 200</li> <li>● Ni 500</li> <li>● Pt 100 <ul style="list-style-type: none"> <li>— Input resistance (Pt 100)</li> </ul> </li> <li>● Pt 1000</li> <li>● Pt 200</li> <li>● Pt 500</li> </ul>	<p>No</p> <p>Yes</p> <p>10 MΩ; Standard</p> <p>No</p> <p>No</p> <p>No</p> <p>No</p> <p>No</p> <p>Yes</p> <p>10 kΩ; Standard</p> <p>No</p> <p>No</p> <p>No</p>
<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> <li>● 0 to 600 ohms <ul style="list-style-type: none"> <li>— Input resistance (0 to 600 ohms)</li> </ul> </li> <li>● 0 to 6000 ohms</li> </ul>	<p>Yes</p> <p>10 MΩ</p> <p>Yes</p> <p>10 MΩ</p> <p>Yes</p> <p>10 MΩ</p> <p>No</p>
<b>Thermocouple (TC)</b>	
<b>Temperature compensation</b>	
<ul style="list-style-type: none"> <li>— parameterizable</li> <li>— internal temperature compensation</li> <li>— external temperature compensation with compensations socket</li> <li>— for definable comparison point temperature</li> </ul>	<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>

<b>Characteristic linearization</b>	
<ul style="list-style-type: none"> <li>parameterizable <ul style="list-style-type: none"> <li>for thermocouples</li> <li>for resistance thermometer</li> </ul> </li> </ul>	Yes Type E, J, K, L, N Pt100 (standard, climatic range), Ni100 (standard, climatic range)
<b>Cable length</b>	
<ul style="list-style-type: none"> <li>shielded, max.</li> </ul>	200 m; 50 m at 80 mV and thermocouples
<b>Analog value generation for the inputs</b>	
<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>Basic conversion time (ms)</li> <li>Interference voltage suppression for interference frequency f1 in Hz</li> </ul>	15 bit; Unipolar: 9/12/12/14 bit; bipolar: 9 bit + sign/12 bit + sign/12 bit + sign/14 bit + sign Yes; 2,5 / 16,67 / 20 / 100 ms 3 / 17 / 22 / 102 ms 400 / 60 / 50 / 10 Hz
<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> <li>for resistance measurement with four-wire connection</li> </ul>	Yes Yes Yes Yes Yes Yes
<b>Errors/accuracies</b>	
<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> <li>Thermocouple, relative to input range, (+/-)</li> </ul>	1 %; ±1% (80 mV); ±0.6% (250 mV to 1 000 mV); ±0.8% (2.5 V to 10 V) 0.7 %; From 3.2 to 20 mA 0.7 %; 150, 300, 600 Ohm 0.7 %; ±0.7 % (Pt100/ Ni100); ±0.8 % (Pt100 climate) 1.1 %; Type E, J, K, L, N
<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> <li>Resistance, relative to input range, (+/-)</li> <li>Resistance thermometer, relative to input range, (+/-)</li> <li>Thermocouple, relative to input range, (+/-)</li> </ul>	0.6 %; ±0.6% (80 mV, 2.5 V to 10 V); ±0.4% (250 mV to 1 000 mV) 0.5 %; 3.2 to 20 mA 0.5 %; 150, 300, 600 Ohm 0.6 %; ±0.5% (Pt100/ Ni100), ±0.6% (Pt100 climate) 0.7 %; Type E, N, J, K, L
<b>Interrupts/diagnostics/status information</b>	
Diagnostics function	Yes; Parameterizable
<b>Alarms</b>	
<ul style="list-style-type: none"> <li>Diagnostic alarm</li> <li>Limit value alarm</li> </ul>	Yes Yes; Parameterizable, channel 0
<b>Diagnoses</b>	
<ul style="list-style-type: none"> <li>Diagnostic information readable</li> </ul>	Yes
<b>Diagnostics indication LED</b>	
<ul style="list-style-type: none"> <li>Group error SF (red)</li> </ul>	Yes
<b>Potential separation</b>	
<b>Potential separation analog inputs</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 Yes; Not for 2-wire transmitters
<b>Isolation</b>	
Isolation tested with	500 V DC
<b>connection method / header</b>	
required front connector	20-pin
<b>Dimensions</b>	
Width	40 mm

Height	125 mm
Depth	120 mm
<b>Weights</b>	
Weight, approx.	250 g
<b>last modified:</b>	3/2/2021 