

SIMATIC S7-1200 basic controller

I/O modules

Analog modules

SM 1231 analog input modules**Overview**

- Analog inputs for SIMATIC S7-1200
- With extremely short conversion times
- For connecting analog sensors without additional amplifiers
- For solving even more complex automation tasks

Technical specifications

Article number	6ES7231-4HD32-0XB0 ANALOG INPUT SM 1231, 4AI	6ES7231-4HF32-0XB0 ANALOG INPUT SM 1231, 8AI	6ES7231-5ND32-0XB0 ANALOG INPUT SM 1231, 4AI 16BIT
Product type designation			
Supply voltage			
Rated value (DC)			
• 24 V DC	Yes	Yes	Yes
Input current			
Current consumption, typ.	45 mA	45 mA	65 mA
from backplane bus 5 V DC, typ.	80 mA	90 mA	80 mA
Power losses			
Power loss, typ.	1.5 W	1.5 W	1.8 W
Analog inputs			
Number of analog inputs	4; Current or voltage differential inputs	8; Current or voltage differential inputs	4; Current or voltage differential inputs
permissible input frequency for current input (destruction limit), max.	± 35 V	± 35 V	± 35 V
permissible input voltage for voltage input (destruction limit), max.	35 V	35 V	35 V
permissible input current for voltage input (destruction limit), max.	40 mA	40 mA	40 mA
permissible input current for current input (destruction limit), max.	40 mA	40 mA	40 mA
Cycle time (all channels) max.	625 µs	625 µs	625 µs
Input ranges			
• Voltage	Yes; ±10V, ±5V, ±2.5V	Yes; ±10V, ±5V, ±2.5V	Yes; ±10V, ±5V, ±2.5V or ±1.25V
• Current	Yes; 4 to 20 mA, 0 to 20 mA	Yes; 4 to 20 mA, 0 to 20 mA	Yes; 4 to 20 mA, 0 to 20 mA
• Thermocouple	No	No	No
• Resistance thermometer	No	No	No
• Resistance	No	Yes	Yes
Input ranges (rated values), voltages			
• -1.25 V to +1.25 V			Yes
• -10 V to +10 V	Yes	Yes	Yes
• Input resistance (-10 V to +10 V)	≥9 MOhm	≥9 MOhm	≥9 MOhm
• -2.5 V to +2.5 V	Yes	Yes	Yes
• Input resistance (-2.5 V to +2.5 V)	≥9 MOhm	≥9 MOhm	≥9 MOhm
• -5 V to +5 V	Yes	Yes	Yes
• Input resistance (-5 V to +5 V)	≥9 MOhm	≥9 MOhm	≥9 MOhm

Technical specifications (continued)

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Input ranges (rated values), currents			
• 0 to 20 mA	Yes	Yes	Yes
• Input resistance (0 to 20 mA)	280 Ω	280 Ω	
• 4 mA to 20 mA	Yes		Yes
Thermocouple (TC)			
Temperature compensation			
- Parameterizable		No	
Analog outputs			
Number of analog outputs	0	0	0
Analog value creation			
Integration and conversion time/ resolution per channel			
• Resolution with overrange (bit including sign), max.	12 bit; + sign	12 bit; + sign	15 bit; + sign
• Integration time, parameterizable	Yes	Yes	Yes
• Interference voltage suppression for interference frequency f1 in Hz	40 dB, DC to 60 V for interference frequency 50 / 60 Hz	40 dB, DC to 60 V for interference frequency 50 / 60 Hz	40 dB, DC to 60 V for interference frequency 50 / 60 Hz
Smoothering of measured values			
• Parameterizable	Yes	Yes	Yes
• Step: None	Yes	Yes	Yes
• Step: low	Yes	Yes	Yes
• Step: Medium	Yes	Yes	Yes
• Step: High	Yes	Yes	Yes
Errors/accuracies			
Temperature error (relative to input range), (+/-)	25 °C ±0.1%, to 55 °C ±0.2% total measurement range	25 °C ±0.1%, to 55 °C ±0.2% total measurement range	25 °C ±0.1% / ±0.3% total measurement range
Basic error limit (operational limit at 25 °C)			
• Voltage, relative to input area, (+/-)	0.1 %	0.1 %	0.1 %
• Current, relative to input area, (+/-)	0.1 %	0.1 %	0.1 %
Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interference frequency			
• common mode voltage, max.	12 V	12 V	12 V
Interrupts/diagnostics/ status information			
Alarms			
• Alarms	Yes	Yes	Yes
• Diagnostic alarm	Yes	Yes	Yes
Diagnostic messages			
• Diagnostic functions	Yes	Yes	Yes
• Monitoring the supply voltage	Yes	Yes	Yes
• Wire break	Yes	Yes	Yes
Diagnostics indication LED			
• for status of the inputs	Yes	Yes	Yes
• for maintenance	Yes	Yes	Yes
Galvanic isolation analog outputs			
• between the channels and the power supply of the electronics	No	No	No
Degree and class of protection			
Degree of protection to EN 60529			
• IP20	Yes	Yes	Yes

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SM 1231 analog input modules**Technical specifications (continued)**

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Standards, approvals, certificates			
CE mark	Yes	Yes	Yes
CSA approval	Yes	Yes	Yes
FM approval	Yes	Yes	Yes
RCM (formerly C-TICK)	Yes	Yes	Yes
Marine approval			
• Marine approval	Yes	Yes	Yes
Highest safety class achievable in safety mode			
• SIL according to IEC 61508		none	none
Ambient conditions			
Free fall			
• Drop height, max. (in packaging)	0.3 m; five times, in dispatch package	0.3 m; five times, in dispatch package	0.3 m; five times, in dispatch package
Ambient temperature in operation			
• Permissible temperature range	-20 °C to +60 °C horizontal mounting, -20 °C to 50 °C vertical mounting, 95% humidity, non-condensing	-20 °C to +60 °C horizontal mounting, -20 °C to 50 °C vertical mounting, 95% humidity, non-condensing	-20 °C to +60 °C horizontal mounting, -20 °C to 50 °C vertical mounting, 95% humidity, non-condensing
• Min.	-20 °C	-20 °C	-20 °C
• max.	60 °C	60 °C	60 °C
Storage/transport temperature			
• Min.	-40 °C	-40 °C	-40 °C
• max.	70 °C	70 °C	70 °C
Air pressure acc. to IEC 60068-2-13			
• Operation, min.	795 hPa	795 hPa	795 hPa
• Operation, max.	1 080 hPa	1 080 hPa	1 080 hPa
• Storage/transport, min.	660 hPa	660 hPa	660 hPa
• Storage/transport, max.	1 080 hPa	1 080 hPa	1 080 hPa
Relative humidity			
• Permissible range (without condensation) at 25 °C	95 %	95 %	95 %
Pollutant concentrations			
- SO ₂ at RH < 60% without condensation	SO ₂ : < 0.5 ppm; H ₂ S: < 0.1 ppm; RH < 60% condensation-free	SO ₂ : < 0.5 ppm; H ₂ S: < 0.1 ppm; RH < 60% condensation-free	SO ₂ : < 0.5 ppm; H ₂ S: < 0.1 ppm; RH < 60% condensation-free
Connection method			
required front connector	Yes	Yes	Yes
Mechanics/material			
Type of housing (front)			
• plastic	Yes	Yes	Yes
Dimensions			
Width	45 mm	45 mm	45 mm
Height	100 mm	100 mm	100 mm
Depth	75 mm	75 mm	75 mm
Weights			
Weight, approx.	180 g	180 g	180 g

Ordering data**Article No.****Article No.****SM 1231 analog input signal module**4 analog inputs, ± 10V, ± 5V, ± 2.5V,
or 0 ... 20 mA, 16 bits**6ES7231-5ND32-0XB0**4 analog inputs, ± 10V, ± 5V, ± 2.5V,
or 0 ... 20 mA, 12 bits + sign**6ES7231-4HD32-0XB0**8 analog inputs, ± 10V, ± 5V, ± 2.5V,
or 0 ... 20 mA, 12 bits + sign**6ES7231-4HF32-0XB0****Extension cable for two-tier configuration**for connecting digital/analog
signal modules;
length 2 m**6ES7290-6AA30-0XA0****Terminal block (spare part)**for 8/16-channel analog signal
modules

with 7 screws, gold-plated; 4 pcs.

6ES7292-1BG30-0XA0**Front flap set (spare part)**

for 8/16-channel signal modules

6ES7291-1BA30-0XA0