



SM 1231 analog input modules

Overview

- Analog inputs for SIMATIC S7-1200
- Extremely short conversion times
- For the connection of analog sensors without additional amplifiers
- For solving even more complex automation tasks

Application

The SM 1231 analog input signal modules allow the connection of the controller to analog signals of the process.

This provides users with the following advantages:

- Optimal adaptation:
With analog signal modules, users can optimally adapt their controllers even to more complex tasks
- Direct connection of sensors:
Up to 14 bit resolution and different input ranges permit the connection of sensors without additional amplifier
- Flexibility:
If the task is expanded subsequently, the controller can be upgraded. Updating of the user program is extremely simple

Design

The signal modules have the same design features as the basic devices.

- Installation on DIN rails:
The modules are snapped onto the rail next to the CPU on the right and are electrically and mechanically connected to each other and to the CPU by the integral slide mechanism.
- Direct installation:
Horizontal or vertical mounting on DIN rail or direct mounting in the cabinet using integral lugs.

Function

The SM 1231 analog input signal modules convert analog signals from the process into digital signals for internal processing by the SIMATIC S7-1200 controller.

Technical specifications

Article number	6ES7231-4HD32-0XB0	6ES7231-4HF32-0XB0	6ES7231-5ND32-0XB0
	Analog Input SM 1231, 4AI	Analog Input SM 1231, 8AI	Analog Input SM 1231, 4AI 16bit
General information			
Product type designation	SM 1231, AI 4x13 bit	SM 1231, AI 8x13 bit	SM 1231, AI 4x16 bit
Supply voltage			
Rated value (DC)	24 V	24 V	24 V
Input current			
Current consumption, typ.	45 mA	45 mA	65 mA
from backplane bus 5 V DC, typ.	80 mA	90 mA	80 mA

	6ES7231-4HD32-0XB0	6ES7231-4HF32-0XB0	6ES7231-5ND32-0XB0
Power loss			
Power loss, typ.	1.5 W	1.5 W	1.8 W
Article number	6ES7231-4HD32-0XB0	6ES7231-4HF32-0XB0	6ES7231-5ND32-0XB0
	Analog Input SM 1231, 4AI	Analog Input SM 1231, 8AI	Analog Input SM 1231, 4AI 16bit
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 voltage for voltage input (destruction limit), max.	35 V	35 V	±35 V
permissible input current for current input (destruction limit), max.	40 mA	40 mA	40 mA
Cycle time (all channels) max.	625 µs	625 µs	100 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	No
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	≥1 MOhm
• -2.5 V to +2.5 V	Yes	Yes	Yes
— Input resistance (-2.5 V to +2.5 V)	≥9 MOhm	≥9 MOhm	≥1 MOhm
• -5 V to +5 V	Yes	Yes	Yes
— Input resistance (-5 V to +5 V)	≥9 MOhm	≥9 MOhm	≥1 MOhm
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	Yes
— Input resistance (4 mA to 20 mA)	280 Ω	280 Ω	
Thermocouple (TC)			
Temperature compensation			
— parameterizable		No	
Analog value generation for the inputs			
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
Smoothing of measured values			
• parameterizable	Yes	Yes	Yes
• Step: None	Yes	Yes	Yes
• Step: low	Yes	Yes	Yes

	6ES7231-4HD32-0XB0	6ES7231-4HF32-0XB0	6ES7231-5ND32-0XB0
• Step: Medium	Yes	Yes	Yes
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• 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 range, (+/-)	0.1 %	0.1 %	0.1 %
• Current, relative to input range, (+/-)	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	Yes	Yes	Yes
Diagnostics function	Yes	Yes	Yes
Alarms			
• Diagnostic alarm	Yes	Yes	Yes
Diagnoses			
• 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
Degree and class of protection			
IP degree of protection	IP20	IP20	IP20
Standards, approvals, certificates			
CE mark	Yes	Yes	Yes
CSA approval	Yes	Yes	Yes
UL approval	Yes	Yes	Yes
cULus	Yes	Yes	Yes
FM approval	Yes	Yes	Yes
RCM (formerly C-TICK)	Yes	Yes	Yes
KC approval	Yes	Yes	Yes
Marine approval	Yes	Yes	Yes
Ambient conditions			
Free fall			
• Fall height, max.	0.3 m; five times, in product package	0.3 m; five times, in product package	0.3 m; five times, in product package
Ambient temperature during operation			
• min.	-20 °C	-20 °C	-20 °C
• max.	60 °C	60 °C	60 °C
• horizontal installation, min.	-20 °C	-20 °C	-20 °C
• horizontal installation, max.	60 °C	60 °C	60 °C

	-20 °C	-20 °C	-20 °C
• vertical installation, min.			
• vertical installation, max.	50 °C	50 °C	50 °C
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Ambient temperature during storage/transportation			
• 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			
• Operation at 25 °C without condensation, max.	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 / header			
required front connector	Yes	Yes	Yes
Mechanics/material			
Enclosure material (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