

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

Ordering data

Article No.

SM 1231 analog input signal module

4 analog inputs, $\pm 10\text{V}$, $\pm 5\text{V}$, $\pm 2.5\text{V}$, or 0 ... 20 mA, 16 bits

6ES7231-5ND32-0XB0

4 analog inputs, $\pm 10\text{V}$, $\pm 5\text{V}$, $\pm 2.5\text{V}$, or 0 ... 20 mA, 12 bits + sign

6ES7231-4HD32-0XB0

8 analog inputs, $\pm 10\text{V}$, $\pm 5\text{V}$, $\pm 2.5\text{V}$, 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 6ES7231-5ND32-0XB0,
6ES7231-4HD32-0XB0,
6ES7231-4HF32-0XB0

- 7-pin, gold-plated; 4 units
- Screw-type system
- Push-in system

6ES7292-1BG30-0XA0
6ES7292-2BG30-0XA0**Front flap set (spare part)**

For modules with a width of 45 mm

6ES7291-1BA30-0XA0

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
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	$\pm 35\text{ V}$
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; $\pm 10\text{V}$, $\pm 5\text{V}$, $\pm 2.5\text{V}$	Yes; $\pm 10\text{V}$, $\pm 5\text{V}$, $\pm 2.5\text{V}$	Yes; $\pm 10\text{V}$, $\pm 5\text{V}$, $\pm 2.5\text{V}$ or $\pm 1.25\text{V}$
• 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
• -2.5 V to +2.5 V	Yes	Yes	Yes
• -5 V to +5 V	Yes	Yes	Yes
Input ranges (rated values), currents			
• 0 to 20 mA	Yes	Yes	Yes
• 4 mA to 20 mA	Yes	Yes	Yes
Thermocouple (TC)			
Temperature compensation			
- parameterizable		No	

SIMATIC S7-1200 Basic Controllers

I/O modules

Analog modules

SM 1231 analog input modules

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
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 f_1 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
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 $f = n \times (f_1 \pm 1 \%)$, $f_1 =$ 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

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
Ambient conditions			
Ambient temperature during operation			
• min.	-20 °C	-20 °C	-20 °C
• max.	60 °C	60 °C	60 °C
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

SIMATIC S7-1200 Basic Controllers

I/O modules

Analog modules

SB 1231 analog input modules

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Overview

- Analog input for SIMATIC S7-1200
- Extremely short conversion times
- For the connection of analog sensors without additional amplifiers
- For solving even more complex automation tasks
- Can be plugged directly into the CPU

Ordering data

Article No.

SB 1231 signal board analog input module

1 analog input, ± 10 V with 12 bits or 0 ... 20 mA with 11 bits

6ES7231-4HA30-0XB0

Terminal block (spare part)

for signal board
with 6 screws, gold-plated; 4 pcs.

6ES7292-1BF30-0XA0

Technical specifications

Article number	6ES7231-4HA30-0XB0 Signal Board SB 1231, 1 AI
General information	
Product type designation	SB 1231, AI 1x12 bit
Supply voltage	
Rated value (DC)	24 V
Input current	
from backplane bus 5 V DC, typ.	55 mA
Analog inputs	
Number of analog inputs	1; Current or voltage differential inputs
permissible input voltage for current input (destruction limit), max.	± 35 V
permissible input voltage for voltage input (destruction limit), max.	35 V
permissible input current for voltage input (destruction limit), max.	40 mA
permissible input current for current input (destruction limit), max.	40 mA
Cycle time (all channels) max.	156.25 μ s; 400 Hz suppression
Input ranges	
• Voltage	Yes; ± 10 V, ± 5 V, ± 2.5 V
• Current	Yes; 0 to 20 mA
• Thermocouple	No
• Resistance thermometer	No
• Resistance	No
Input ranges (rated values), voltages	
• -10 V to +10 V	Yes
• -2.5 V to +2.5 V	Yes
• -5 V to +5 V	Yes
Input ranges (rated values), currents	
• 0 to 20 mA	Yes
Analog outputs	
Number of analog outputs	0
Cable length	
• shielded, max.	100 m; shielded, twisted pair
Analog value generation for the inputs	
Integration and conversion time/resolution per channel	
• Resolution with overrange (bit including sign), max.	11 bit; + sign
• Integration time, parameterizable	Yes
• Interference voltage suppression for interference frequency f_1 in Hz	40 dB, DC to 60 Hz
Smoothing of measured values	
• parameterizable	Yes

Article number	6ES7231-4HA30-0XB0 Signal Board SB 1231, 1 AI
Errors/accuracies	
Temperature error (relative to input range), (+/-)	25 °C $\pm 0.3\%$, to 55 °C $\pm 0.6\%$ total measurement range
Interrupts/diagnostics/status information	
Alarms	Yes
Diagnostics function	Yes
Alarms	
• Diagnostic alarm	Yes
Diagnoses	
• Wire-break	No
Diagnostics indication LED	
• for status of the inputs	Yes
• for maintenance	Yes
Standards, approvals, certificates	
CE mark	Yes
CSA approval	Yes
UL approval	Yes
cULus	Yes
FM approval	Yes
RCM (formerly C-TICK)	Yes
KC approval	Yes
Marine approval	Yes
Ambient conditions	
Ambient temperature during operation	
• min.	-20 °C
• max.	60 °C
Pollutant concentrations	
• SO ₂ at RH < 60% without condensation	SO ₂ : < 0.5 ppm; H ₂ S: < 0.1 ppm; RH < 60% condensation-free
connection method / header	
required front connector	Yes
Mechanics/material	
Enclosure material (front)	
• Plastic	Yes
Dimensions	
Width	38 mm
Height	62 mm
Depth	21 mm
Weights	
Weight, approx.	35 g

Overview



- Analog outputs for SIMATIC S7-1200
- Extremely short conversion times
- For connecting analog actuators without additional amplifiers
- For solving even more complex automation tasks

Ordering data

Article No.

SM 1232 analog output signal module

2 analog outputs, ± 10 V with 14 bits or 0 ... 20 mA with 13 bits

6ES7232-4HB32-0XB0

4 analog outputs, ± 10 V with 14 bits or 0 ... 20 mA with 13 bits

6ES7232-4HD32-0XB0

Terminal block (spare part)

For 6ES7232-4HB32-0XB0, 6ES7232-4HD32-0XB0

- 7-pin, gold-plated; 4 units
 - Screw-type system
 - Push-in system

6ES7292-1BG30-0XA0

6ES7292-2BG30-0XA0

Extension cable for two-tier configuration

For connecting digital/analog signal modules; length 2 m

6ES7290-6AA30-0XA0

Front flap set (spare part)

For modules with a width of 45 mm

6ES7291-1BA30-0XA0

Technical specifications

Article number	6ES7232-4HB32-0XB0 Analog Output SM 1232, 2AO	6ES7232-4HD32-0XB0 Analog Output SM 1232, 4AO
General information		
Product type designation	SM 1232, AQ 2x14 bit	SM 1232, AQ 4x14 bit
Supply voltage		
Rated value (DC)	24 V	24 V
Input current		
Current consumption, typ.	45 mA	45 mA
from backplane bus 5 V DC, typ.	80 mA	80 mA
Analog outputs		
Number of analog outputs	2; Current or voltage	4; Current or voltage
Output ranges, voltage		
• -10 V to +10 V	Yes	Yes
Output ranges, current		
• 0 to 20 mA	Yes	Yes
Load impedance (in rated range of output)		
• with voltage outputs, min.	1 000 Ω	1 000 Ω
• with current outputs, max.	600 Ω	600 Ω
Cable length		
• shielded, max.	100 m; shielded, twisted pair	100 m; shielded, twisted pair
Analog value generation for the outputs		
Integration and conversion time/resolution per channel		
• Resolution with overrange (bit including sign), max.	14 bit; Voltage: 14 bit; Current : 13 bit	14 bit; Voltage: 14 bit; Current : 13 bit
Errors/accuracies		
Temperature error (relative to output range), (+/-)	25 °C $\pm 0.3\%$, to 55 °C $\pm 0.6\%$ total measurement range	25 °C $\pm 0.3\%$, to 55 °C $\pm 0.6\%$ total measurement range
Basic error limit (operational limit at 25 °C)		
• Voltage, relative to output range, (+/-)	0.3 %	0.3 %
• Current, relative to output range, (+/-)	0.3 %	0.3 %
Interference voltage suppression for $f = n \times (f_1 \pm 1 \%)$, $f_1 =$ interference frequency		
• Common mode voltage, max.	12 V	12 V

SIMATIC S7-1200 Basic Controllers

I/O modules

Analog modules

SM 1232 analog output modules

Technical specifications

Article number	6ES7232-4HB32-0XB0	6ES7232-4HD32-0XB0
	Analog Output SM 1232, 2AO	Analog Output SM 1232, 4AO
Interrupts/diagnostics/ status information		
Alarms	Yes	Yes
Diagnostics function	Yes	Yes
Alarms		
• Diagnostic alarm	Yes	Yes
Diagnoses		
• Monitoring the supply voltage	Yes	Yes
• Wire-break	Yes	Yes
• Short-circuit	Yes	Yes
Diagnostics indication LED		
• for status of the outputs	Yes	Yes
• for maintenance	Yes	Yes
Degree and class of protection		
IP degree of protection	IP20	IP20
Standards, approvals, certificates		
CE mark	Yes	Yes
CSA approval	Yes	Yes
UL approval	Yes	Yes
cULus	Yes	Yes
FM approval	Yes	Yes
RCM (formerly C-TICK)	Yes	Yes
KC approval	Yes	Yes
Marine approval	Yes	Yes
Ambient conditions		
Ambient temperature during operation		
• min.	-20 °C	-20 °C
• max.	60 °C	60 °C
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
connection method / header		
required front connector	Yes	Yes
Mechanics/material		
Enclosure material (front)		
• Plastic	Yes	Yes
Dimensions		
Width	45 mm	45 mm
Height	100 mm	100 mm
Depth	75 mm	75 mm
Weights		
Weight, approx.	180 g	180 g

Overview



- Analog output for SIMATIC S7-1200
- Can be plugged directly into the CPU

Ordering data

Article No.

SB 1232 analog output signal board

1 analog output, ± 10 V with 12 bits or 0 ... 20 mA with 11 bits

6ES7232-4HA30-0XB0

Terminal block (spare part)

for signal board
with 6 screws, gold-plated; 4 pcs.

6ES7292-1BF30-0XA0

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Technical specifications

Article number	6ES7232-4HA30-0XB0 Signal Board SB 1232, 1 AO
General information	
Product type designation	SB 1232, AQ 1x12 bit
Input current	
from backplane bus 5 V DC, typ.	15 mA
output voltage / header	
supply voltage of the transmitters / header	
• Supply current, max.	25 mA
Analog inputs	
Number of analog inputs	0
Analog outputs	
Number of analog outputs	1
Cycle time (all channels) max.	Voltage: 300 μ S (R), 750 μ S (1 uF) Current: 600 ms (1 mH); 2 ms (10 mH)
Output ranges, voltage	
• -10 V to +10 V	Yes
Output ranges, current	
• 0 to 20 mA	Yes
Load impedance (in rated range of output)	
• with voltage outputs, min.	1 000 Ω
• with current outputs, max.	600 Ω
Cable length	
• shielded, max.	100 m; shielded, twisted pair
Analog value generation for the outputs	
Conversion principle	Differential
Integration and conversion time/resolution per channel	
• Resolution with overrange (bit including sign), max.	12 bit
Errors/accuracies	
Temperature error (relative to output range), (+/-)	25 °C $\pm 0.5\%$, to 55 °C $\pm 1\%$

Article number	6ES7232-4HA30-0XB0 Signal Board SB 1232, 1 AO
Interrupts/diagnostics/status information	
Alarms	Yes
Diagnostics function	Yes
Diagnostics indication LED	
• for status of the outputs	Yes
Standards, approvals, certificates	
CE mark	Yes
CSA approval	Yes
UL approval	Yes
cULus	Yes
FM approval	Yes
RCM (formerly C-TICK)	Yes
KC approval	Yes
Marine approval	Yes
Ambient conditions	
Ambient temperature during operation	
• min.	-20 °C
• max.	60 °C
Pollutant concentrations	
• SO ₂ at RH < 60% without condensation	SO ₂ : < 0.5 ppm; H ₂ S: < 0.1 ppm; RH < 60% condensation-free
Mechanics/material	
Enclosure material (front)	
• Plastic	Yes
Dimensions	
Width	38 mm
Height	62 mm
Depth	21 mm
Weights	
Weight, approx.	40 g

SIMATIC S7-1200 Basic Controllers

I/O modules

Analog modules

SM 1234 analog input/output modules

3

Overview



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

Ordering data

Article No.

SM 1234 analog input/output signal module

4 analog inputs, ± 10 V, ± 5 V, ± 2.5 V, or 0 ... 20 mA, 12 bits + sign;
2 analog outputs, ± 10 V with 14 bits or 0 ... 20 mA with 13 bits

6ES7234-4HE32-0XB0

Terminal block (spare part)

For 6ES7234-4HE32-0XB0

- 7-pin, gold-plated; 4 units
 - Screw-type system
 - Push-in system

6ES7292-1BG30-0XA0
6ES7292-2BG30-0XA0

Extension cable for two-tier configuration

For connecting digital/analog signal modules; length 2 m

6ES7290-6AA30-0XA0

Front flap set (spare part)

For modules with a width of 45 mm

6ES7291-1BA30-0XA0

Technical specifications

Article number	6ES7234-4HE32-0XB0
	Analog I/O SM 1234, 4AI/2AO
General information	
Product type designation	SM 1234, AI 4x13 bit/AQ 2x14 bit
Supply voltage	
Rated value (DC)	24 V
Input current	
Current consumption, typ.	60 mA
from backplane bus 5 V DC, typ.	80 mA
Analog inputs	
Number of analog inputs	4; Current or voltage differential inputs
permissible input voltage for voltage input (destruction limit), max.	35 V
permissible input current for current input (destruction limit), max.	40 mA
Cycle time (all channels) max.	625 μ s
Input ranges	
• Voltage	Yes; ± 10 V, ± 5 V, ± 2.5 V
• Current	Yes; 4 to 20 mA, 0 to 20 mA
Input ranges (rated values), voltages	
• -10 V to +10 V	Yes
• -2.5 V to +2.5 V	Yes
• -5 V to +5 V	Yes
Input ranges (rated values), currents	
• 0 to 20 mA	Yes
• 4 mA to 20 mA	Yes

Article number	6ES7234-4HE32-0XB0
	Analog I/O SM 1234, 4AI/2AO
Analog outputs	
Number of analog outputs	2; Current or voltage
Output ranges, voltage	
• -10 V to +10 V	Yes
Output ranges, current	
• 0 to 20 mA	Yes
• 4 mA to 20 mA	Yes
Load impedance (in rated range of output)	
• with voltage outputs, min.	1 000 Ω
• with current outputs, max.	600 Ω
Cable length	
• shielded, max.	100 m; shielded, twisted pair
Analog value generation for the inputs	
Integration and conversion time/resolution per channel	
• Resolution with overrange (bit including sign), max.	12 bit; + sign
• Integration time, parameterizable	Yes
• Interference voltage suppression for interference frequency f1 in Hz	40 dB, DC to 60 V for interference frequency 50 / 60 Hz
Smoothing of measured values	
• parameterizable	Yes
Analog value generation for the outputs	
Integration and conversion time/resolution per channel	
• Resolution with overrange (bit including sign), max.	14 bit; Voltage: 14 bit; Current : 13 bit

Technical specifications

Article number	6ES7234-4HE32-0XB0 Analog I/O SM 1234, 4AI/2AO
Errors/accuracies	
Temperature error (relative to input range), (+/-)	25 °C ±0.1%, to 55 °C ±0.2% total measurement range
Temperature error (relative to output range), (+/-)	25 °C ±0.3%, to 55 °C ±0.6% total measurement range
Basic error limit (operational limit at 25 °C)	
• Voltage, relative to input range, (+/-)	0.1 %
• Current, relative to input range, (+/-)	0.1 %
• Voltage, relative to output range, (+/-)	0.3 %
• Current, relative to output range, (+/-)	0.3 %
Interference voltage suppression for $f = n \times (f1 \pm 1 \%)$, $f1 =$ interference frequency	
• Common mode voltage, max.	12 V
Interrupts/diagnostics/status information	
Alarms	Yes
Diagnostics function	Yes
Alarms	
• Diagnostic alarm	Yes
Diagnoses	
• Monitoring the supply voltage	Yes
• Wire-break	Yes
• Short-circuit	Yes
Diagnostics indication LED	
• for status of the inputs	Yes
• for status of the outputs	Yes
• for maintenance	Yes
Potential separation	
Potential separation analog outputs	
• between the channels and the power supply of the electronics	No

Article number	6ES7234-4HE32-0XB0 Analog I/O SM 1234, 4AI/2AO
Degree and class of protection	
IP degree of protection	IP20
Standards, approvals, certificates	
CE mark	Yes
CSA approval	Yes
UL approval	Yes
cULus	Yes
FM approval	Yes
RCM (formerly C-TICK)	Yes
KC approval	Yes
Marine approval	Yes
Ambient conditions	
Ambient temperature during operation	
• min.	-20 °C
• max.	60 °C
Pollutant concentrations	
• SO ₂ at RH < 60% without condensation	SO ₂ : < 0.5 ppm; H ₂ S: < 0.1 ppm; RH < 60% condensation-free
connection method / header	
required front connector	Yes
Mechanics/material	
Enclosure material (front)	
• Plastic	Yes
Dimensions	
Width	45 mm
Height	100 mm
Depth	75 mm
Weights	
Weight, approx.	220 g

SIMATIC S7-1200 Basic Controllers

I/O modules

Analog modules

SM 1231 thermocouple module

Overview

- For the convenient recording of temperatures with great accuracy
- 7 common thermocouple types can be used
- Also for the measurement of analog signals with a low level (± 80 mV)
- Can easily be retrofitted to existing plant

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Ordering data

SM 1231 thermocouple module

4 inputs +/- 80 mV, resolution 15 bits + sign, thermocouple types J, K, S, T, R, E, N

8 inputs +/- 80 mV, resolution 15 bits + sign, thermocouple types J, K, T, E, R, S, N, C, TXK/XK(L)

Article No.

6ES7231-5QD32-0XB0

6ES7231-5QF32-0XB0

Article No.

Accessories

Terminal block (spare part)

For 6ES7231-5QD32-0XB0, 6ES7231-5QF32-0XB0

- 7-pin, gold-plated; 4 units

- Screw-type system
- Push-in system

6ES7292-1BG30-0XA0

6ES7292-2BG30-0XA0

Extension cable for two-tier configuration

For connecting digital/analog signal modules; length 2 m

6ES7290-6AA30-0XA0

Front flap set (spare part)

For modules with a width of 45 mm

6ES7291-1BA30-0XA0

Technical specifications

Article number	6ES7231-5QD32-0XB0	6ES7231-5QF32-0XB0
	S7-1200, analog Input SM 1231 TC, 4 AI	S7-1200, analog Input SM 1231 TC, 8 AI
General information		
Product type designation	SM 1231, AI 4x16 bit TC	SM 1231, AI 8x16 bit TC
Supply voltage		
Rated value (DC)	24 V	24 V
Input current		
Current consumption, typ.	40 mA	40 mA
from backplane bus 5 V DC, typ.	80 mA	80 mA
Analog inputs		
Number of analog inputs	4; Thermocouples	8; Thermocouples
permissible input voltage for voltage input (destruction limit), max.	± 35 V	± 35 V
Technical unit for temperature measurement adjustable	Degrees Celsius/degrees Fahrenheit	Degrees Celsius/degrees Fahrenheit
Input ranges		
• Voltage	Yes	Yes
• Current	No	No
• Thermocouple	Yes; J, K, T, E, R, S, N, C, TXK/XK(L); voltage range: ± 80 mV	Yes; J, K, T, E, R & S, B, N, C, TXK/XK(L); voltage range: ± 80 mV
• Resistance thermometer	No	No
• Resistance	No	No
Input ranges (rated values), voltages		
• -80 mV to +80 mV	Yes	Yes
Input ranges (rated values), thermocouples		
• Type B	Yes	Yes
• Type C	Yes	Yes
• Type E	Yes	Yes
• Type J	Yes	Yes
• Type K	Yes	Yes
• Type N	Yes	Yes
• Type R	Yes	Yes
• Type S	Yes	Yes
• Type T	Yes	Yes
• Type TXK/TXK(L) to GOST	Yes	Yes
Thermocouple (TC)		
Temperature compensation		
- parameterizable	No	No

Technical specifications

Article number	6ES7231-5QD32-0XB0	6ES7231-5QF32-0XB0
	S7-1200, analog Input SM 1231 TC, 4 AI	S7-1200, analog Input SM 1231 TC, 8 AI
Analog value generation for the inputs		
Integration and conversion time/resolution per channel		
• Resolution with overrange (bit including sign), max.	15 bit; + sign	15 bit; + sign
• Integration time, parameterizable	No	No
• Interference voltage suppression for interference frequency f1 in Hz	85 dB at 50 / 60 / 400 Hz	85 dB at 50 / 60 / 400 Hz
Smoothing of measured values		
• parameterizable	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
Repeat accuracy in steady state at 25 °C (relative to output range), (+/-)	0.5 %	0.5 %
Interference voltage suppression for $f = n \times (f1 \pm 1 \%)$, f1 = interference frequency		
• Common mode interference, min.	120 dB	120 dB
Interrupts/diagnostics/status information		
Alarms	Yes	Yes
Diagnostics function	Yes; Can be read out	Yes; Can be read out
Alarms		
• Diagnostic alarm	Yes	Yes
Diagnoses		
• Monitoring the supply voltage	Yes	Yes
• Wire-break	Yes	Yes
Diagnostics indication LED		
• for status of the inputs	Yes	Yes
• for maintenance	Yes	Yes
Degree and class of protection		
IP degree of protection	IP20	IP20
Standards, approvals, certificates		
CE mark	Yes	Yes
CSA approval	Yes	Yes
UL approval	Yes	Yes
cULus	Yes	Yes
FM approval	Yes	Yes
RCM (formerly C-TICK)	Yes	Yes
KC approval	Yes	Yes
Marine approval	Yes	Yes
Ambient conditions		
Ambient temperature during operation		
• min.	-20 °C	-20 °C
• max.	60 °C	60 °C
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
connection method / header		
required front connector	Yes	Yes
Mechanics/material		
Enclosure material (front)		
• Plastic	Yes	Yes
Dimensions		
Width	45 mm	45 mm
Height	100 mm	100 mm
Depth	75 mm	75 mm
Weights		
Weight, approx.	180 g	220 g

SIMATIC S7-1200 Basic Controllers

I/O modules

Analog modules

SB 1231 thermocouple signal board

3

Overview

- For the convenient recording of temperatures with great accuracy
- 1 input with 16-bit resolution
- Common thermocouple types can be used
- Also for the measurement of analog signals with a low level (± 80 mV)
- Can easily be retrofitted to existing plant
- Can be plugged directly into the CPU

Ordering data

Article No.

SB 1231 thermocouple signal board

1 input +/- 80 mV,
resolution 15 bits + sign,
thermocouples type J, K

Accessories

Terminal block (spare part)

for signal board

with 6 screws, gold-plated; 4 pcs.

6ES7231-5QA30-0XB0

6ES7292-1BF30-0XA0

Technical specifications

Article number	6ES7231-5QA30-0XB0
	Signal Board SB 1231 TC, 1 AI
General information	
Product type designation	SB 1231, AI 1x16 bit TC
Supply voltage	
Rated value (DC)	24 V
Input current	
Current consumption, typ.	5 mA
from backplane bus 5 V DC, typ.	20 mA
Analog inputs	
Number of analog inputs	1; Thermocouples
permissible input voltage for current input (destruction limit), max.	± 35 V
permissible input voltage for voltage input (destruction limit), max.	± 35 V
Technical unit for temperature measurement adjustable	Degrees Celsius/degrees Fahrenheit
Input ranges	
• Voltage	Yes
• Current	No
• Thermocouple	Yes; J, K, T, E, R & S, B, N, C, TXK/XK(L); voltage range: ± 80 mV
• Resistance thermometer	No
• Resistance	No
Input ranges (rated values), voltages	
• -80 mV to +80 mV	Yes
Input ranges (rated values), thermocouples	
• Type J	Yes
• Type K	Yes
Thermocouple (TC)	
Temperature compensation	
- parameterizable	No
Analog outputs	
Number of analog outputs	0
Cable length	
• shielded, max.	100 m; shielded, twisted pair
Analog value generation for the inputs	
Integration and conversion time/resolution per channel	
• Resolution with overrange (bit including sign), max.	15 bit; + sign
• Integration time, parameterizable	No
• Interference voltage suppression for interference frequency f1 in Hz	85 dB at 10 / 50 / 60 / 400 Hz
Smoothing of measured values	
• parameterizable	Yes

Article number	6ES7231-5QA30-0XB0
	Signal Board SB 1231 TC, 1 AI
Errors/accuracies	
Temperature error (relative to input range), (+/-)	25 °C $\pm 0.1\%$, to 55 °C $\pm 0.2\%$ total measurement range
Repeat accuracy in steady state at 25 °C (relative to output range), (+/-)	0.5 %
Interference voltage suppression for $f = n \times (f1 \pm 1 \%)$, $f1 =$ interference frequency	
• Common mode interference, min.	120 dB
Interrupts/diagnostics/status information	
Alarms	Yes
Diagnostics function	Yes; Can be read out
Alarms	
• Diagnostic alarm	Yes
Diagnoses	
• Wire-break	Yes
Diagnostics indication LED	
• for status of the inputs	Yes
• for maintenance	Yes
Standards, approvals, certificates	
CE mark	Yes
CSA approval	Yes
UL approval	Yes
cULus	Yes
FM approval	Yes
RCM (formerly C-TICK)	Yes
KC approval	Yes
Marine approval	Yes
Ambient conditions	
Ambient temperature during operation	
• min.	-20 °C
• max.	60 °C
Pollutant concentrations	
• SO ₂ at RH < 60% without condensation	SO ₂ : < 0.5 ppm; H ₂ S: < 0.1 ppm; RH < 60% condensation-free
connection method / header	
required front connector	Yes
Mechanics/material	
Enclosure material (front)	
• Plastic	Yes
Dimensions	
Width	38 mm
Height	62 mm
Depth	21 mm
Weights	
Weight, approx.	35 g

Overview

- For the convenient recording of temperatures with great accuracy
- 4 inputs
- Most popular resistance temperature sensors can be used
- Can easily be retrofitted to existing installation

Ordering data

Ordering data	Article No.	Ordering data	Article No.
SM 1231 RTD signal module		Accessories	
4 inputs for resistance temperature sensors Pt10/50/100/200/500/1000, Ni100/120/200/500/1000, Cu10/50/100, LG-Ni1000; resistance 150/300/600 ohms, resolution 15 bits + sign	6ES7231-5PD32-0XB0	Terminal block (spare part)	
8 inputs for resistance temperature sensors Pt10/50/100/200/500/1000, Ni100/120/200/500/1000, Cu10/50/100, LG-Ni1000; resistance 150/300/600 ohms, resolution 15 bits + sign	6ES7231-5PF32-0XB0	For 6ES7231-5PD32-0XB0	
		• 7-pin, gold-plated; 4 units	6ES7292-1BG30-0XA0
		- Screw-type system	6ES7292-2BG30-0XA0
		- Push-in system	
		For 6ES7231-5PF32-0XB0	
		• 11-pin, gold-plated; 4 units	6ES7292-1BL30-0XA0
		- Screw-type system	6ES7292-2BL30-0XA0
		- Push-in system	
		Extension cable for two-tier configuration	6ES7290-6AA30-0XA0
		for connecting digital/analog signal modules; length 2 m	
		Front flap set (spare part)	
		For modules with a width of 45 mm	6ES7291-1BA30-0XA0
		For modules with a width of 70 mm	6ES7291-1BB30-0XA0

Technical specifications

Article number	6ES7231-5PD32-0XB0	6ES7231-5PF32-0XB0
	S7-1200, analog Input SM 1231 RTD, 4 AI	S7-1200, analog Input SM 1231 RTD, 8 AI
General information		
Product type designation	SM 1231, AI 4x16 bit RTD	SM 1231, AI 8x16 bit RTD
Supply voltage		
Rated value (DC)	24 V	24 V
Input current		
Current consumption, typ.	40 mA	40 mA
from backplane bus 5 V DC, typ.	80 mA	80 mA
Analog inputs		
Number of analog inputs	4; Resistance thermometer	8; Resistance thermometer
permissible input voltage for voltage input (destruction limit), max.	±35 V	±35 V
Technical unit for temperature measurement adjustable	Degrees Celsius/degrees Fahrenheit	Degrees Celsius/degrees Fahrenheit
Input ranges		
• Voltage	No	No
• Current	No	No
• Thermocouple	No	No
• Resistance thermometer	Yes; Resistance-type transmitter: Pt10, Pt50, Pt100, Pt200, Pt500, Pt1000, Ni100, Ni120, Ni200, Ni500, Ni1000, Cu10, Cu50, Cu100, LG-Ni1000	Yes; Resistance-type transmitter: Pt10, Pt50, Pt100, Pt200, Pt500, Pt1000, Ni100, Ni120, Ni200, Ni500, Ni1000, Cu10, Cu50, Cu100, LG-Ni1000
• Resistance	Yes; 150 Ω, 300 Ω, 600 Ω	Yes; 150 Ω, 300 Ω, 600 Ω

SIMATIC S7-1200 Basic Controllers

I/O modules

Analog modules

SM 1231 RTD signal module

Technical specifications

Article number	6ES7231-5PD32-0XB0	6ES7231-5PF32-0XB0
	S7-1200, analog Input SM 1231 RTD, 4 AI	S7-1200, analog Input SM 1231 RTD, 8 AI
Input ranges (rated values), resistance thermometer		
• Cu 10	Yes	Yes
• Ni 100	Yes	Yes
• Ni 1000	Yes	Yes
• LG-Ni 1000	Yes	Yes
• Ni 120	Yes	Yes
• Ni 200	Yes	Yes
• Ni 500	Yes	Yes
• Pt 100	Yes	Yes
• Pt 1000	Yes	Yes
• Pt 200	Yes	Yes
• Pt 500	Yes	Yes
Input ranges (rated values), resistors		
• 0 to 150 ohms	Yes	Yes
• 0 to 300 ohms	Yes	Yes
• 0 to 600 ohms	Yes	Yes
Thermocouple (TC)		
Temperature compensation		
- parameterizable	No	No
Analog value generation for the inputs		
Integration and conversion time/resolution per channel		
• Resolution with overrange (bit including sign), max.	15 bit; + sign	15 bit; + sign
• Integration time, parameterizable	No	No
• Interference voltage suppression for interference frequency f1 in Hz	85 dB at 50 / 60 / 400 Hz	85 dB at 50 / 60 / 400 Hz
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
Repeat accuracy in steady state at 25 °C (relative to output range), (+/-)	0.05 %	0.05 %
Interference voltage suppression for $f = n \times (f1 \pm 1 \%)$, $f1 =$ interference frequency		
• Common mode interference, min.	120 dB	120 dB
Interrupts/diagnostics/status information		
Alarms	Yes	Yes
Diagnostics function	Yes; Can be read out	Yes; Can be read out
Alarms		
• Diagnostic alarm	Yes	Yes
Diagnoses		
• Monitoring the supply voltage	Yes	Yes
• Wire-break	Yes	Yes
Diagnostics indication LED		
• for status of the inputs	Yes	Yes
• for maintenance	Yes	Yes
Degree and class of protection		
IP degree of protection	IP20	IP20

Technical specifications

Article number	6ES7231-5PD32-0XB0	6ES7231-5PF32-0XB0
	S7-1200, analog Input SM 1231 RTD, 4 AI	S7-1200, analog Input SM 1231 RTD, 8 AI
Standards, approvals, certificates		
CE mark	Yes	Yes
CSA approval	Yes	Yes
UL approval	Yes	Yes
cULus	Yes	Yes
FM approval	Yes	Yes
RCM (formerly C-TICK)	Yes	Yes
KC approval	Yes	Yes
Marine approval	Yes	Yes
Ambient conditions		
Ambient temperature during operation		
• min.	-20 °C	-20 °C
• max.	60 °C	60 °C
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
connection method / header		
required front connector	Yes	Yes
Mechanics/material		
Enclosure material (front)		
• Plastic	Yes	Yes
Dimensions		
Width	45 mm	70 mm
Height	100 mm	100 mm
Depth	75 mm	75 mm
Weights		
Weight, approx.	220 g	220 g

SIMATIC S7-1200 Basic Controllers

I/O modules

Analog modules

SB 1231 RTD signal board

3

Overview

- For the convenient recording of temperatures with great accuracy
- 1 input with 16-bit resolution
- Common resistance-type temperature sensors can be used
- Can easily be retrofitted to existing plant
- Can be plugged directly into the CPU

Ordering data

Article No.

RTD signal board SB 1231

1 input for resistance temperature sensors Pt 100, Pt 200, Pt 500, Pt 1000, resolution 15 bits + sign

6ES7231-5PA30-0XB0

Accessories

Terminal block (spare part)

for signal board

with 6 screws, gold-plated; 4 pcs.

6ES7292-1BF30-0XA0

Technical specifications

Article number	6ES7231-5PA30-0XB0
	Signal Board SB 1231 RTD
General information	
Product type designation	SB 1231, AI 1x16 bit RTD
Supply voltage	
Rated value (DC)	24 V
Input current	
Current consumption, typ.	5 mA
from backplane bus 5 V DC, typ.	20 mA
Analog inputs	
Number of analog inputs	1; Resistance thermometer
permissible input voltage for current input (destruction limit), max.	±35 V
Technical unit for temperature measurement adjustable	Degrees Celsius/degrees Fahrenheit
Input ranges	
• Voltage	Yes
• Current	No
• Thermocouple	No
• Resistance thermometer	Yes; Platinum (Pt)
• Resistance	Yes; 150 Ω, 300 Ω, 600 Ω
Input ranges (rated values), resistance thermometer	
• Pt 100	Yes
• Pt 1000	Yes
• Pt 200	Yes
• Pt 500	Yes
Input ranges (rated values), resistors	
• 0 to 150 ohms	Yes
• 0 to 300 ohms	Yes
• 0 to 600 ohms	Yes
Thermocouple (TC)	
Temperature compensation	
- parameterizable	No
Analog outputs	
Number of analog outputs	0
Cable length	
• shielded, max.	100 m; shielded, twisted pair
Analog value generation for the inputs	
Integration and conversion time/resolution per channel	
• Resolution with overrange (bit including sign), max.	15 bit; + sign
• Integration time, parameterizable	No
• Interference voltage suppression for interference frequency f1 in Hz	85 dB at 10 / 50 / 60 / 400 Hz

Article number	6ES7231-5PA30-0XB0
	Signal Board SB 1231 RTD
Errors/accuracies	
Temperature error (relative to input range), (+/-)	25 °C ±0.1%, to 55 °C ±0.2% total measurement range
Repeat accuracy in steady state at 25 °C (relative to output range), (+/-)	0.05 %
Interference voltage suppression for $f = n \times (f1 \pm 1 \%)$, f1 = interference frequency	
• Common mode interference, min.	120 dB
Interrupts/diagnostics/status information	
Alarms	Yes
Diagnostics function	Yes; Can be read out
Alarms	
• Diagnostic alarm	Yes
Diagnoses	
• Wire-break	Yes
Diagnostics indication LED	
• for status of the inputs	Yes
• for maintenance	Yes
Standards, approvals, certificates	
CE mark	Yes
CSA approval	Yes
UL approval	Yes
cULus	Yes
FM approval	Yes
RCM (formerly C-TICK)	Yes
KC approval	Yes
Marine approval	Yes
Ambient conditions	
Ambient temperature during operation	
• min.	-20 °C
• max.	60 °C
Pollutant concentrations	
• SO ₂ at RH < 60% without condensation	SO ₂ : < 0.5 ppm; H ₂ S: < 0.1 ppm; RH < 60% condensation-free
connection method / header	
required front connector	Yes
Mechanics/material	
Enclosure material (front)	
• Plastic	Yes
Dimensions	
Width	38 mm
Height	62 mm
Depth	21 mm
Weights	
Weight, approx.	35 g