SIEMENS

SIMATIC
S7-1200
SM 1231 RTD Signal Module

Product Information

Product Information

New S7-1200 RTD analog signal module available

The S7-1200 SM 1231 RTD analog signal module has been added to the S7-1200 family. The order number for this signal module is shown below.

Signal Module	Order Number
SM 1231 AI 4 x RTD x 16 bit	6ES7 231-5PD30-0XB0

The SM 1231 RTD analog signal module measures the value of resistance connected to the module inputs. This value can be either temperature or resistance.

- If resistance, the nominal range full scale value will be decimal 27648.
- If temperature, the value will be reported in degrees multiplied by ten (for example, 25.3 degrees will be reported as decimal 253).

The SM 1231 RTD module supports measurements with 2 wire, 3 wire and 4 wire connections to the sensor resistor.

This product information includes details about the characteristics and technical specifications of this signal module. Refer to the SIMATIC S7-1200 Programmable Controller System Manual for more information about the S7-1200 product family.

Additional assistance

For assistance in answering technical questions, for training on these products, or for ordering, contact your Siemens distributor or sales office.

SM 1231 AI4 Analog Input RTD

Model	SM 1231 AI 4 x RTD x 16bit
Order number (MLFB)	6ES7 231-5PD30-0XB0
Dimensions W x H x D (mm)	45 x 100 x 75
Weight	220 grams
Power dissipation	1.5 W
Current consumption (SM Bus)	80 mA
Current consumption (24 VDC) [1]	40 mA
Number of inputs	4
Type	Module referenced RTD
Range	See RTD Sensor Selection Table
Full scale range (data word)	See RTD Sensor Selection Table
Overshoot/undershoot range (data word)	See RTD Sensor Selection Table
Overflow/underflow (data word)	See RTD Sensor Selection Table
Resolution Temperature Resistance	 0.1° C/0.1° F 15 bits plus sign
Maximum withstand voltage	± 35 V
Noise rejection	85 dB for the selected filter setting (10 Hz, 50 Hz, 60 Hz and 400 Hz)
Impedance	≥ 10 MΩ
Isolation Field side to logic Field to 24 VDC 24 VDC to logic Channel to channel isolation	 500 VAC 500 VAC 500 VAC none
Accuracy	See RTD Sensor Selection Table
Repeatability	±0.05% FS
Maximum sensor dissipation	0.5m W
Measuring principle	Integrating
Module update time	See Filter Selection Table
Cable length (meters)	100 meters to sensor max.
Wire resistance	20 Ω, 2.7 Ω for 10 Ω RTD max.
Common mode rejection	> 120dB
Diagnostics	
Overflow/underflow alarm[2] [3]	Yes
Wire break alarm [4]	Yes
24 VDC low voltage alarm[2]	Yes

[1] 20.4 to 28.8 VDC (Class 2, Limited Power, or sensor power from CPU)

[2] The overflow, underflow and low voltage diagnostic alarm information will be reported in the analog data values even if the alarms are disabled in the module configuration.

[3] For resistance ranges underflow detection is never enabled.

[4] When wire break alarm is disabled and an open wire condition exists in the sensor wiring, the module may report random values.

SM 1231 RTD Sensor Selection Table

The ranges and accuracy for the different sensors supported by the 1231 RTD signal module are shown in the table below.

RTD Type	Alpha	Ohms	Under range minimum	Nominal range low limit	Nominal range high limit	Over range maximum	Normal range accuracy @ 25°C	Normal range accuracy 0°C to 55°C
Pt	0.003850 ITS90 DIN EN 60751	10	-243.0°C	-200.0°C	850.0°C	1000.0°C	± 1.0°C	± 2.0°C
		50					± 0.5°C	± 1.0°C
		100						
		200						
		500						
		1000						
Pt	0.003902 0.003916 0.003920	100	-243.0°C	-200.0°C	850.0°C	1000.0°C	± 0.5°C	± 1.0°C
		200						
		500						
		1000						
Pt	0.003910	10	-273.2°C	-240.0°C	1100.0°C	1295°C	± 1.0°C	± 2.0°C
		50					± 0.8°C	± 1.6°C
		100						
		500						
Ni	0.006720 0.006180	100	-105.0°C	-60.0°C	250.0°C	295.0°C	± 0.5°C	±1.6°C
		120						
		200						
		500						
		1000						
LG-Ni	0.005000	1000						
Ni	0.006170	100	-105.0°C	-60.0°C	180.0°C	212.4°C	± 0.5°C	± 1.0°C
Cu	0.004270	10	-240.0°C	-200.0°C	280.0°C	312.0°C	± 1.0°C	± 2.0°C
Cu	0.004260	10	-60.0°C	-50.0°C	200.0°C	240.0°C	± 1.0°C	± 2.0°C
		50					± 0.6°C	± 1.2°C
		100						
Cu	0.004280	10	-240.0°C	-200.0°C	200.0°C	240.0°C	± 1.0°C	± 2.0°C
		50					± 0.7°C	± 1.4°C
		100						
Resistance								
Range		150	n/a	0	150 Ω	176.383 Ω	± 0.05%	± 0.1%
		300	n/a	0	300 Ω	352.767 Ω	± 0.05%	± 0.1%
		600	n/a	0	600 Ω	705.534 Ω	± 0.05%	± 0.1%

Note

The module will report 32767 on any activated channel with no sensor connected. If open wire detection is also enabled, the module will flash the appropriate red LEDs.

When 500 Ω and 1000 Ω RTD ranges are used with other lower value resistors, the error may increase to two times the specified error.

Best accuracy will be achieved for the 10 Ω RTD ranges if 4 wire connections are used.

The resistance of the connection wires in 2 wire mode will cause an error in the sensor reading and therefore accuracy is not guaranteed.

Filter Selection Table

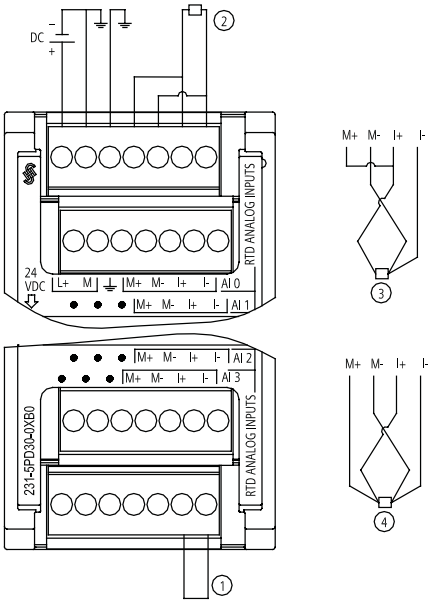
Noise rejection frequency (Hz)	Integration time (ms)	4/2 wire 4 channel module Update time (seconds)	3 wire 4 channel module update time (seconds)
10	100	1.222	2.444
50	20	0.262	0.524
60	16.67	0.222	0.444
400[1]	10	0.142	0.284

[1] To maintain module resolution and accuracy when the 400 Hz filter is selected, the integration time is 10 ms. This selection also rejects 100 Hz and 200 Hz noise.

Note

After applying power to the RTD module, the module performs internal calibration for the Analog to Digital converter. During this time the module reports a value of 32767 on each channel until valid data is available on that channel. The PLC program may need to allow for this initialization time.

SM 1231 AI 4 x RTD x 16bit wiring diagram



6ES7 231-5PD30-0XB0

① Loop-back unused RTD inputs

② 2 wire RTD

③ 3 wire RTD

④ 4 wire RTD

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