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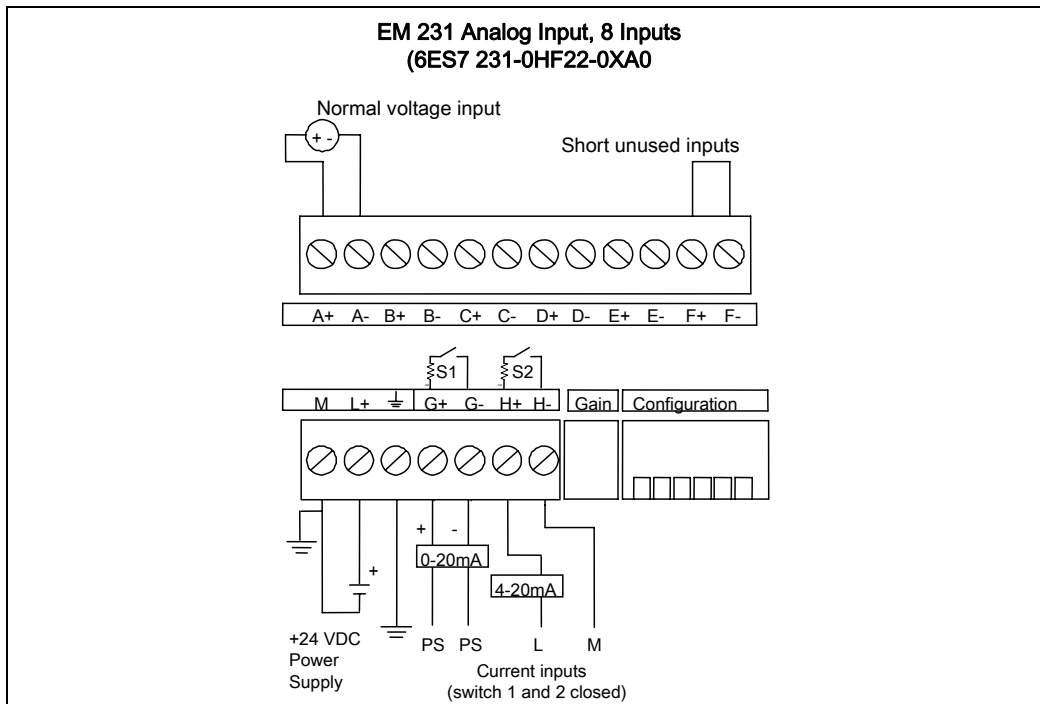
Product Information

August 2007

Analog Expansion Module EM 231 Analog Input, 8 Inputs

This Product Information contains information about the new EM 231 Analog Input, 8 Inputs expansion module. For more technical information about this module, refer to the S7-200 Programmable Controller System Manual. This manual can be viewed on the STEP 7-Micro/WIN documentation CD, on the Internet at <http://www.siemens.com/S7-200>, or ordered (order number 6ES7 298-8FA24-8BH0).

Description	EM 231 Analog Input, 8 Inputs
Order Number	6ES7 231-0HF22-0XA0
Dimensions (W x H x D)	71.2 mm x 80 mm x 62 mm
Weight	190 g
Dissipation	2 W
VDC requirements +5 VDC + 24 V	20 mA 60 mA
Number of inputs	8
Removable connector	no
Data word format Bipolar, full-scale range Unipolar, full-scale range	-32000 to +32000 0 to +32000
DC input impedance	>2 M Ω voltage input, 250 Ω current
Input filter attenuation	-3db at 3.1kHz
Maximum input voltage	30 VDC
Maximum input current	40 mA
Resolution Bipolar Unipolar	11 bits plus 1 sign bit 11 bits
Isolation (field to logic)	None
Input type	Differential voltage, one channel selectable for current
Input ranges Ch 0-5 Ch 6-7	+10, +5, \pm 5, and \pm 2.5 +10, +5, \pm 5, \pm 2.5, and 0 ... 20 mA
Input resolution	see Table on page 2
Analog to digital conversion time	< 250 μ S
Analog input step response	1.5 mS to 95%
Common mode rejection	40 db, DC to 60 Hz
Common mode voltage	Signal voltage plus common mode voltage must be < \pm 12 V
LED indicator	One - illuminated if external 24 VDC is present
24 VDC supply voltage range	20.4 to 28.8 VDC (Class 2, Limited Power, or sensor power from PLC)



Analog LED Indicators

The LED indicators for the analog module are shown below.

LED Indicator	ON	OFF
24 VDC Power Supply Good	No faults	No 24 VDC power

Note

The state of user power is also reported in Special Memory (SM) bits. For more information, see the *S7-200 Programmable Controller System Manual*, Appendix D, SMB8 to SMB21, I/O Module ID and Error Registers.

Configuration for EM 231

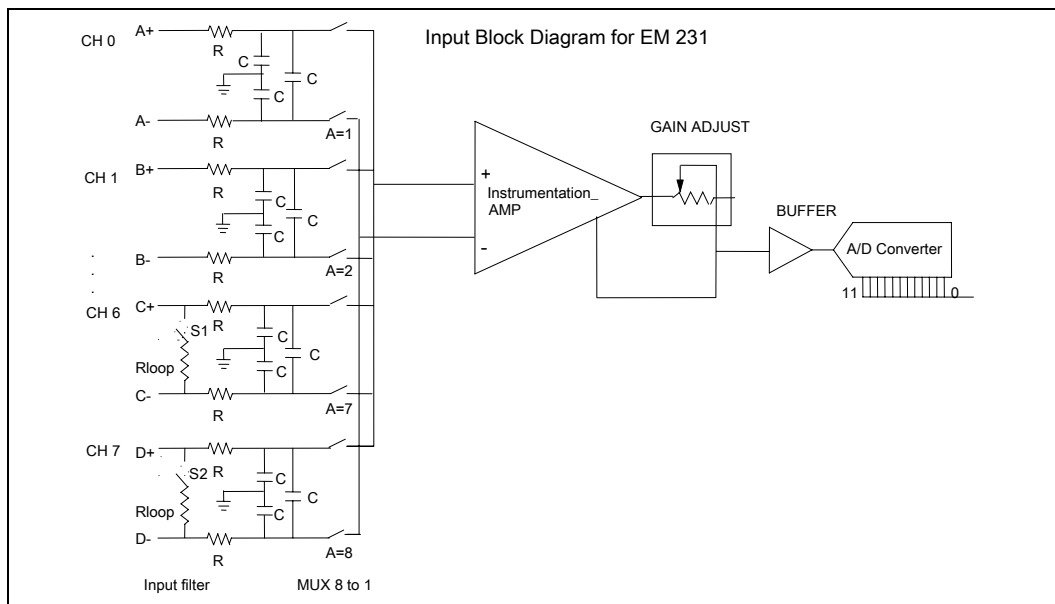
The table below shows how to configure the EM 231 module using the configuration DIP switches. Switches 3, 4, and 5 select the analog input range. Use Switch 1 and Switch 2 to select the current mode input. All inputs are set to the same analog input range. In this table, ON is closed, and OFF is open. The switch settings are read only when the power is turned on.

Unipolar			Full-Scale Input	Resolution
SW3	SW4	SW5		
ON	OFF	ON	0 to 10 V	2.5 mV
	ON	OFF	0 to 5 V	1.25 mV
			0 to 20 mA	5 μ A
Bipolar			Full-Scale Input	Resolution
SW3	SW4	SW5		
OFF	OFF	ON	\pm 5 V	2.5 mV
	ON	OFF	\pm 2.5 V	1.25 mV

Definitions of the Analog Specifications

- Accuracy: deviation from the expected value on a given point
- Resolution: the effect of an LSB change reflected on the output.

Full Scale Input Range	Repeatability		Mean (average) Accuracy ^{1,2,3,4}	
	% of Full Scale	Counts	% of Full Scale	Counts
EM 231 Specifications				
0 to 5 V	± 0.075%	± 24	± 0.1%	± 32
0 to 20 mA				
0 to 10 V		± 48	± 0.5%	
± 2.5 V				
± 5 V				
¹ Measurements made after the selected input range has been calibrated ² The offset error in the signal near zero analog input is not corrected, and is not included in the accuracy specifications ³ There is a channel-to-channel carryover conversion error, due to the finite settling time of the analog multiplexer. The maximum carryover error is 0.1% of the difference between channels. ⁴ Mean accuracy includes effects of non-linearity and drift from 0 to 55 degrees C.				



Installation Guidelines

Use the following guidelines to ensure accuracy and repeatability:

- Ensure that the 24-VDC Sensor Supply is free of noise and is stable.
- Use the shortest possible sensor wires.
- Use shielded twisted pair wiring for sensor wires.
- Terminate the shield at the Sensor location only.
- Short the inputs for any unused channels, as shown above.
- Avoid bending the wires into sharp angles.
- Use wireways for wire routing.
- Avoid placing signal wires parallel to high-energy wires. If the two wires must meet, cross them at right angles.
- Ensure that the input signals are within the common mode voltage specification by isolating the input signals or referencing them to the external 24V common of the analog module.

Note

The EM 231 expansion module is not recommended for use with thermocouples.