

Analog Current Input - 4 Channel IC693ALG221

The **4-Channel Analog Current Input module** for the Series 90-30 Programmable Logic Controller provides four input channels, each capable of converting an analog input signal to a digital signal for use as required by your application. This module provides two input ranges. The default range is 4 to 20 mA with user data scaled so that 4 mA corresponds to a count of 0 and 20 mA corresponds to a count of 32000 with each 1000 counts representing 0.5 mA. When a jumper is added to the I/O terminal board, the input range is changed to 0 to 20 mA with user data scaled so that 0 mA corresponds to a count of 0 and 20 mA corresponds to a count of 32000 with each 800 counts representing 0.5 mA. Two range jumpers are provided with the module; one for channels one and two, and the other for channels three and four.

Conversion speed for each of the four channels is one-half millisecond. This provides an update rate of two milliseconds for any channel. Resolution of the converted signal is 12 bits binary (1 part in 4096) over either range. User data in the %AI registers is in 16-bit 2's complement format. The placement of the 12 bits from the A/D converter in the %AI data word is shown below. The relationship between the current input and the data from the A/D converter is shown in Figures 3-14 and 3-15.

MSB												LSB			
X	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0	X	X	X

X=not applicable to this discussion.

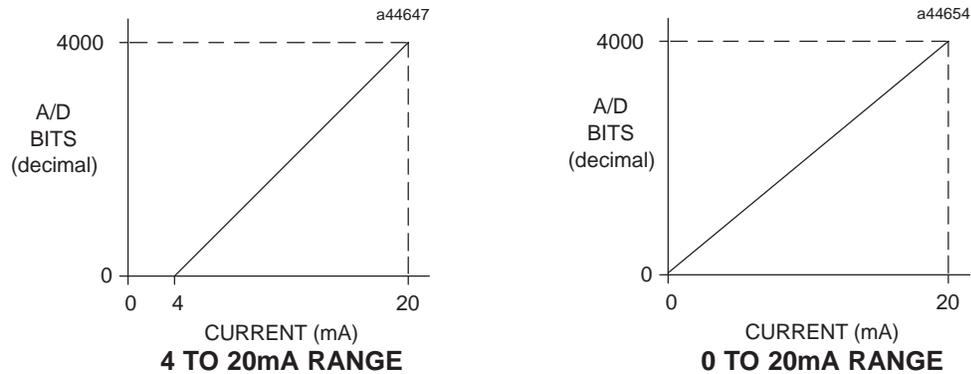


Figure 10-5. A/D Bits vs. Current Input

If the current source is reversed into the input, or is less than the low end of the current range, then the module will output a data word corresponding to the low end of the current range (0000H in %AI). If an input that is out of range is entered (that is, it is greater than 20 mA), the A/D converter will output up to full scale (corresponding to 7FF8H in %AI).

Input scaling is shown in the next figure.

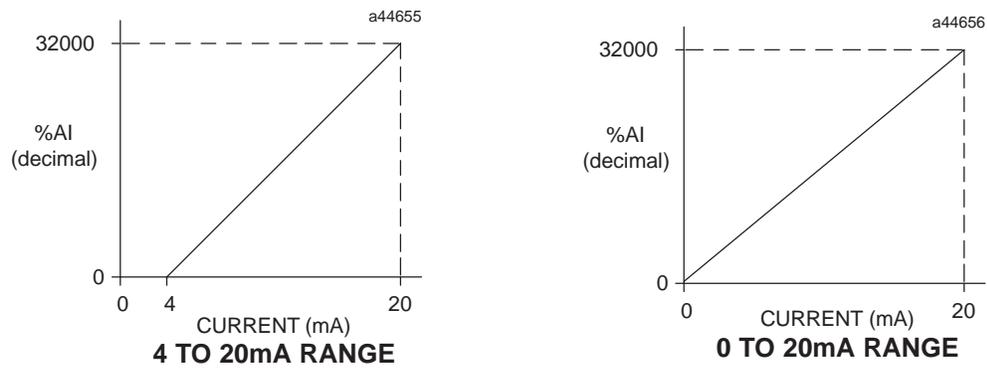


Figure 10-6. Scaling for Analog Current Input

Input protection for the module is sufficient to guarantee operation with reduced performance with up to 200V common-mode. The module provides electrical isolation of externally generated noise between field wiring and the backplane through the use of optical isolation.

To minimize the capacitive loading and noise, all field connections to the module should be wired using a good grade of twisted, shielded instrumentation cable. The shields can be connected to either COM or GND. The COM connection provides access to the common of the analog circuitry in the module. The GND connection provides access to the baseplate (frame ground).

An LED at the top of the faceplate is ON when the module’s power supply is operating. The main power source for the module is the isolated +24 VDC power supplied by the PLC power supply. This voltage is routed through an inverter/regulator to provide the operating voltage for the module. This module also consumes power from the +5 VDC output of the PLC power supply to drive the isolation circuitry. This module can be installed in any I/O slot of a 5 or 10-slot baseplate in a Series 90-30 PLC system. See page 3-11 to determine the number of Analog Current Input modules that can be installed in a system.

Table 10-2. Specifications for Analog Current Input Module - IC693ALG221

Input Current Ranges	4 to 20 mA and 0 to 20 mA
Calibration	Factory calibrated to 4 μ A per count
Update Rate	2 msec (all four channels)
Resolution at 4-20 mA	4 μ A (1 LSB = 4 μ A)
Resolution at 0-20 mA	5 μ A (1 LSB = 5 μ A)
Absolute Accuracy †	0.1% full scale + 0.1% reading
Common Mode Voltage	200 volts
Linearity	< 1 Least Significant Bit
Isolation	1500 volts between field side and logic side
Common Mode Rejection	> 70 db at DC; >70 db at 60 Hz
Cross-Channel Rejection	> 80 db from DC to 1 kHz
Input Impedance	250 ohms
Input Filter Response	325 Hz
Internal Power Consumption	100 mA from the isolated +24 volt supply 25 mA from +5 volt bus on the backplane

Refer to Appendix B for product standards and general specifications.

† In the presence of severe RF interference (IEC 801-3, 10V/m), accuracy may be degraded to $\pm 0.5\%$ FS.

IC693ALG221 Analog Current Input Block Diagram

The following figure is a block diagram of the 4-Channel Analog Current Input Module.

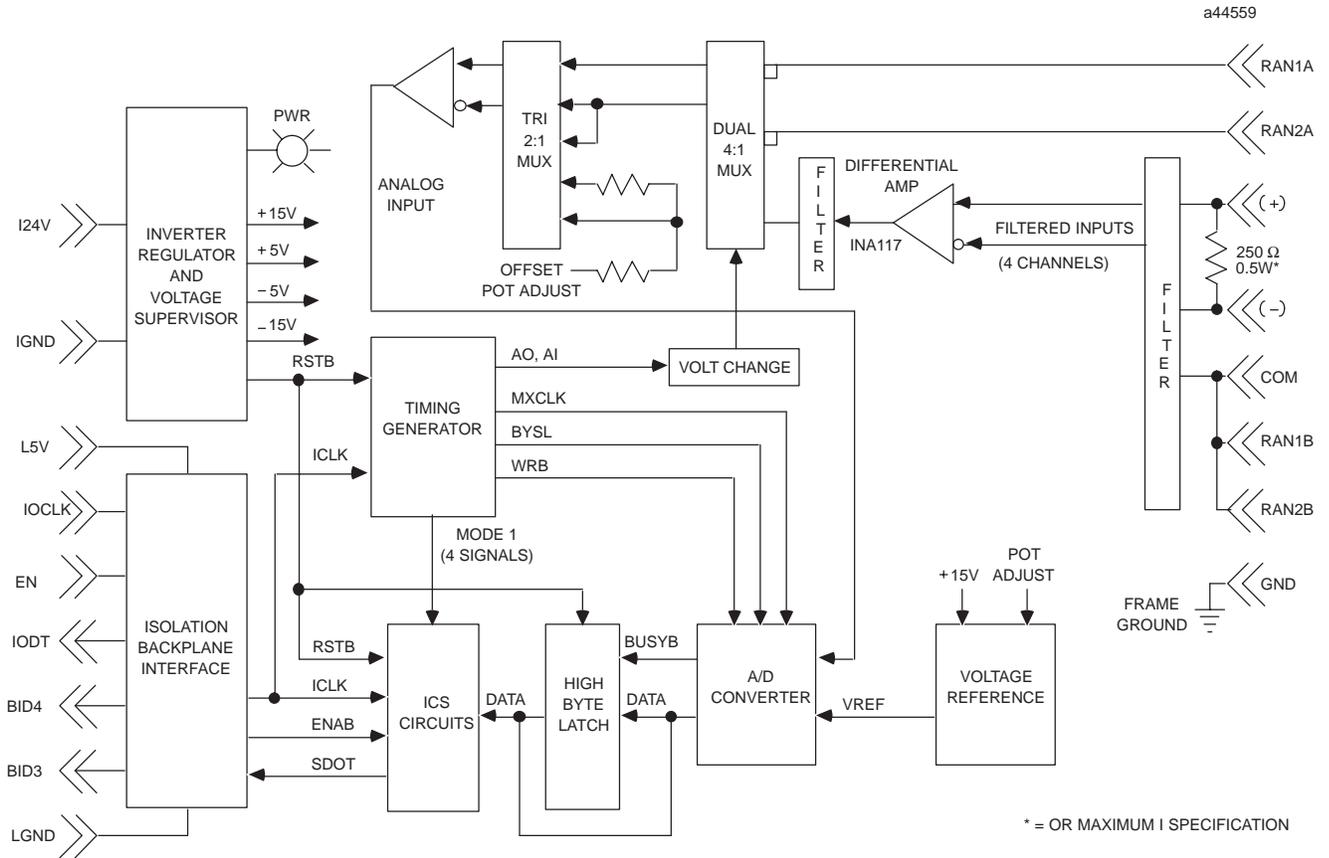


Figure 10-7. Analog Current Input Module Block Diagram - IC693ALG221