

MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

GENERAL ELECTRIC

IC694ALG223-DB

ANALOG CURRENT INPUT MODULE

Used with the applicable PACSystems RX3i configuration.

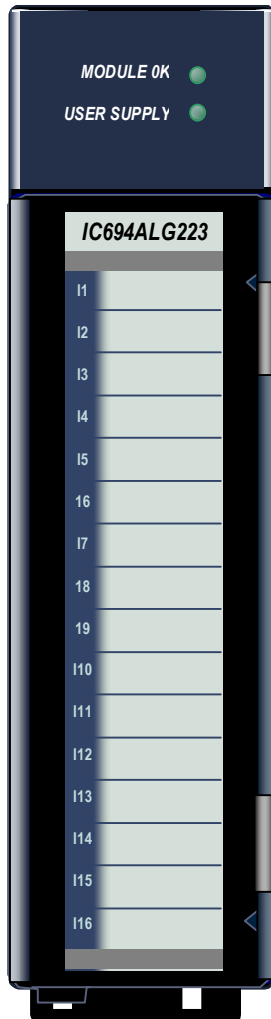
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OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: GE Fanuc GFK-2314C, chapter 9, IC694ALG223

Analog Input Module, 16 Channel, Current: IC694ALG223



The **16-Channel Analog Current Input** module, IC694ALG223, provides 16 single-ended inputs. Each input can be configured using the configuration software for any of three input ranges:

- 4 to 20 mA
- 0 to 20 mA
- 4 to 20 mA Enhanced

High and Low alarm limits are available on all ranges. In the 4 to 20 mA Enhanced range, a low alarm limit can be set up to detect input current from 4 mA to 0 mA, providing open-wire fault detection in 4 to 20 mA applications.

The module also reports module status and external power supply status to the CPU using its assigned program reference addresses.

This module can be installed in any I/O slot in an RX3i system.

Module Power

This module consumes 120 mA from the 5 VDC bus on the PLC backplane. It also requires 65 mA plus current loop current(s) from a user-supplied +24 VDC supply.

LEDs

The **MODULE OK** LED provides module status information on power-up as follows:

- **ON:** status is OK, module configured;
- **OFF:** no backplane power or software not running (watchdog timer timed out);
- **Continuous rapid flashing:** configuration data not received from CPU;
- **Slow flashes, then OFF:** failed power-up diagnostics or encountered code execution error.

The **User Supply** LED indicates that the external 24 VDC supply is within specifications.

Specifications: IC694ALG223

Number of Channels	1 to 16 selectable; single-ended
Input Current Ranges	0 to 20 mA, 4 to 20 mA and 4 to 20 mA Enhanced (selectable per channel)
Calibration	Factory calibrated to: 4 μ A per count on 4 to 20 mA range 5 μ A per count on 0 to 20 mA and 4 to 20 mA Enhanced range
Update Rate	13 milliseconds (all 16 channels)
Resolution at 4–20 mA	4 μ A (4 μ A/bit)
Resolution at 0–20 mA	5 μ A (5 μ A/bit)
Resolution at 4–20 mA Enhanced	5 μ A (5 μ A/bit)
Absolute Accuracy *	+/-0.25% of full scale @ 25°C (77°F): +/- 0.5% of full scale over specified operating temperature range
Linearity	< 1 LSB from 4 to 20 mA (4 to 20 mA range) < 1 LSB from 100 μ A to 20 mA (0 to 20 mA and 4 to 20 mA Enhanced ranges)
Isolation, Field to Backplane (optical) and to frame ground	250 VAC continuous; 1500 VAC for 1 minute
Common Mode Voltage	0 volts (single-ended channels)
Cross-Channel Rejection	> 80dB from DC to 1kHz
Input Impedance	250 Ohms
Input Low Pass Filter Response	19 Hz
External Supply Voltage Range	20 to 30 VDC
External Supply Voltage Ripple	10%
Internal Power Consumption	120 mA from the +5 VDC bus on the backplane 65 mA from 24 VDC external user power supply (in addition to current loop currents)

Refer to Appendix A for product standards and general specifications.

* In the presence of severe RF interference (IEC 801–3, 10V/m), accuracy may be degraded to +/-5% FS.

Configuration: IC694ALG223

Module IC694ALG223 is configured with the configuration software. Its configurable parameters are described below.

Parameter	Choices	Description
<i>Active Channels</i>	1 to 16	The number of channels to be scanned. Channels are scanned in sequential, contiguous order.
<i>Reference Address for Input Data</i>		The memory location for input data from the module. Each channel provides 16 bits of analog input data to the PLC CPU.
<i>Reference Address for Status Data</i>		The memory location for where status information from the module starts.
<i>Length</i>	8, 16, 24, 32, 40	The number of status bits reported to the PLC. Bits 1 – 8 provide basic module diagnostics. Bits 9 – 24 contain channel 1 – 8 high alarm and low alarm status. Bits 25 – 40 contain channel 9 – 16 high alarm and low alarm status. Data formats are shown in this section.
<i>Range</i>	4-20 mA (default), 0-20 mA, or 4-20 mA enhanced	In the 4-20 mA range, input currents from 4 to 20 mA are reported to the CPU as values from 0 to 32000 units. In the 0 to 20 mA range, input currents from 0 to 20 mA are reported to the CPU as values from 0 to 3200 units. In the 4 to 20 mA enhanced range, currents from 4 to 20 mA are reported to the CPU as values from 0 to 32000 units. Currents below 4 mA are reported as negative values with 0 represented as –8000 units.
<i>Alarm Low</i>	4-20 mA = 0 to 32759	Each channel can be assigned a low alarm limit alarm. Values entered without a sign are assumed to be positive. Be sure the alarm low values are appropriate for the selected range.
	0-20 mA = 0 to 32759	
	4-20 mA enhanced = -8000 to +32759	
<i>Alarm High</i>	4-20 mA = 1 to 32760	Each channel can also be assigned a high alarm limit. Values entered without a sign are assumed to be positive. Be sure the alarm high values are appropriate for the selected range.
	0-20 mA = 1 to 32760	
	4-20 mA enhanced = -7999 to +32760	
<i>I/O Scan Set</i>	Default = 1	Assign the module to one of the I/O Scan Sets defined in the CPU configuration.

Data Format: IC694ALG223

The 12-bit resolution module analog input data is stored in the PLC CPU in 16-bit 2's complement format as shown below.

MSB													LSB		
X	11	10	9	8	7	6	5	4	3	2	1	0	X	X	X

Input Scaling

In the 4 to 20 mA range, input data is scaled so that 4 mA corresponds to a count of 0 and 20 mA corresponds to a count of 32000.

In the 0 to 20 mA range, 0 mA corresponds to a count of 0 and 20 mA corresponds to a count of 32000. Full 12-bit resolution is available over the 4 to 20 mA and 0 to 20 mA ranges.

4 to 20 mA Enhanced range can also be configured. In that range, 0 mA corresponds to a count of -8000, 4 mA corresponds to a count of 0 (zero) and 20 mA corresponds to a count of +32000. A low alarm limit can be set up to detect input current from 4 mA to 0 mA, providing open-wire fault detection in 4 to 20 mA applications.

Analog values are scaled over the range of the converter. Factory calibration adjusts the analog value per bit (resolution) to a multiple of full scale ($4 \mu\text{A/bit}$). This calibration leaves a normal 12-bit converter with 4000 counts (normally $2^{12} = 4096$ counts). The data is then scaled with the 4000 counts over the analog range. The data is scaled as shown below.

