

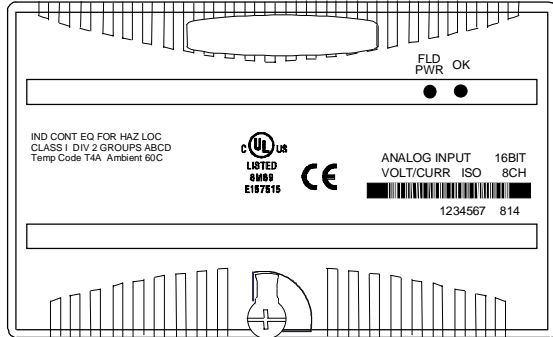
# Analog Input Module, 16-Bit, 8 Isolated Inputs

June 2001

GFK-1522A

## Product Description

The Analog Input Module with 8 isolated inputs is an intelligent module that accepts input signals from up to 8 analog devices and provides input data with 16 bits of resolution.



In current mode, a separate power supply may be required for isolated inputs. Module features include:

- Eight isolated 4-20mA current input channels
- Sixteen-bit converter resolution
- Open wire detection
- High-accuracy factory calibration

The following additional features are software-configurable:

- Per-channel selection of 4-20mA current or +/-10V voltage inputs
- Selectable input filter to reject normal mode AC pickup noise
- Selection of default/hold last state operation
- Per-channel selection of default values
- Per-channel selection of under-range and over-range diagnostics levels
- Per-channel selection of alarm levels
- Per-channel scaling
- Field re-calibration on command

## Host Interface

The module provides 8 words of analog input data

## Diagnostics

The module reports over/under range, open wire, loss of field power supply, non-volatile memory storage fault, and high/low alarm diagnostics.

## LED Indicators

The green FLD PWR LED indicates the presence of both backplane power and field power for the analog field-side circuits. The absence of either backplane or field power turns off the FLD PWR LED.

The OK LED indicates module status:

- On green indicates normal operation
- Flashing green indicates boot mode or update
- Flashing amber indicates self-diagnostic error

## Module Characteristics

Channels	8 inputs
Module ID	FFFF9802
Isolation: User input to logic (optical) and to frame ground, Group to Group Channel to channel	250VAC continuous; 1500VAC for 1 minute  Not applicable 250VAC continuous; 1500VAC for 1 minute
LED indicators	FLD PWR LED indicates the presence of both logic power and user power. OK LED indicates module status.
Backplane current consumption	5V output: 15mA maximum. 3.3V output: 120mA maximum
External power supply: Range Current consumption	+19.5 to +30VDC including ripple 100mA maximum plus load currents
Thermal derating	None
Diagnostics	High/Low Limit, Over/Underrange, Open Wire, Loss of Field Power Supply, Non-volatile memory fault

## Input Characteristics

Input operating range	Current mode: +1 to 20mA Voltage mode: +/-10VDC
Accuracy at 25 degrees C	+/- 0.1% maximum of full scale
Temperature coefficient	Current mode: 45ppm/°C typical, 90 ppm/°C maximum Voltage mode: 30ppm/°C typical, 60 ppm/°C maximum
Analog Resolution (1 LSB)	Current mode: 381 nA nominal Voltage mode: 381 $\mu$ V nominal
Channel data update rate	Approximately 20 mS max. @ 50 Hz filter frequency Approximately 16.7 mS max. @ 60 Hz filter frequency
Channel-to-channel crosstalk rejection	70dB minimum
Input default	Hold Last State (default) 0 (configurable)
Field input DC resistance	Current mode: 150 Ohms Voltage mode: 760 KOhms
Field input filter	Type: Digital w/programmable notches at 50 or 60 Hz 3 dB Corner Frequency: 10Hz $\pm$ 25%
Normal mode (power line frequency) rejection	35 dB minimum
Field Input Ranges	Current mode: Approximately 0 mA to +25 mA Voltage mode: Approximately -12.5 V to +12.5 V
Maximum field input (without damage)	Current mode: $\pm$ 35 mA continuous Voltage mode: $\pm$ 17.5 V continuous

## Preinstallation Check

Carefully inspect all shipping containers for damage. If any equipment is damaged, notify the delivery service immediately. Save the damaged shipping container for inspection by the delivery service. After unpacking the equipment, record all serial numbers. Save the shipping containers and packing material in case it is necessary to transport or ship any part of the system.

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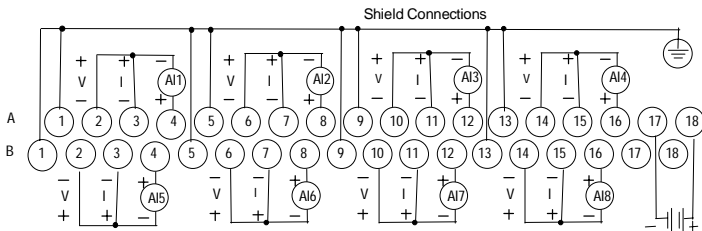
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## Field Wiring Terminals

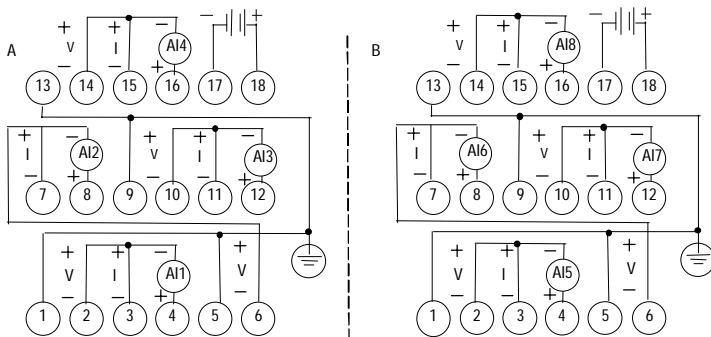
Number	Connection	Number	Connection
A1	Shield Ground	B1	Shield Ground
A2	VIN1-	B2	VIN5-
A3	IIN1-	B3	IIN5-
A4	VINIIN1+	B4	VINIIN5+
A5	Shield Ground	B5	Shield Ground
A6	VIN2-	B6	VIN6-
A7	IIN2-	B7	IIN6-
A8	VINIIN2+	B8	VINIIN6+
A9	Shield Ground	B9	Shield Ground
A10	VIN3-	B10	VIN7-
A11	IIN3-	B11	IIN7-
A12	VINIIN3+	B12	VINIIN7+
A13	Shield Ground	B13	Shield Ground
A14	VIN4-	B14	VIN8-
A15	IIN4-	B15	IIN8-
A16	VINIIN4+	B16	VINIIN8+
A17	DC-	B17	No connection
A18	DC+	B18	No connection

A 24 volt power supply must be connected to A17 and A18 to operate the module. The power wiring does not require shielding. Current inputs are applied with positive current flow into VININn+ and out of IINn-. Both negative terminals IINn- and VINn- of the channel should be connected together for best accuracy on current ranges. Voltage inputs are applied between VININn+ and VINn- with positive to VININn+.

## Wiring Connections for Carriers with Two Rows of Terminals



## Wiring Connections for Carriers with Three Rows of Terminals



## Cable Shield Connections

If the module is installed on a Terminal-style I/O Carrier or a Compact Terminal-style I/O Carrier, the cable shield can be connected directly to the carrier.

If the module is installed on a Connector-style I/O Carrier, the cable shield can be connected directly to an Interposing Terminal. A shielded interposing cable (shielded cables are available separately) must be used between the Connector-style I/O Carrier and the Interposing Terminal.

An Auxiliary I/O Terminal can also be added to the Interposing Terminal if additional shield connections are required.

## Product Version Information

Revision Letters:	AA
Firmware version:	1.00
Firmware upgrades:	Initial release

## Compatibility

This module is compatible with:

- PLC CPU firmware version 1.20 or later.
- EtherNet NIU EBI001 all versions.
- Genius NIU GBI001 Firmware version 1.10 or later\*
- Profibus NIU PBI001 Firmware version 1.10 or later\*
- DeviceNet NIU DBI001 Firmware version 2.10 or later

\* For GBI001 and PBI001, NIU version 2.0 or above is required to perform software configuration.

## Diagnostics

**Over-Range:** The module reports an Over Range fault if an input value is greater than approximately +12.5 volts or 25mA.

**Under-Range:** The module reports an Under Range fault if an input value is approximately 0mA on an current channel or -12.5 volts on a voltage channel.

**Open Wire:** The module reports an Open Wire fault on current inputs if the configuration of the low end of the range is greater than or equal to approximately 2.0mA, but the input is not detecting current.

**Loss of Field Power Supply:** The module reports a Loss of Field Power fault if field power is not present (also indicated by the FLD PWR LED). Inputs default as specified by the configuration.

**High Limit:** The module reports a High Alarm fault if an input value is greater than or equal to the value specified by the "Alarm High" configuration parameter.

**Low Limit:** The module reports a Low Alarm fault if an input value is less than or equal to the value specified by the "Alarm Low" configuration parameter.

**Non-volatile Memory Fault:** The module reports this fault only during field recalibration, if a non-volatile memory fault is detected.

## Calibration

The module is calibrated at the factory. For most applications, no further calibration is required. It is possible to perform recalibration in either of the following ways:

- By changing a module's scaling so its scaled data agrees with metered values.
- By sending the module a recalibration message as described in the *PLC User's Manual*. Note that the module must be power cycled when reverting from field calibration back to factory calibration.

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## Configurable Features

The default parameters of this module can be used in many applications. The module can be software-configured when it is installed in a PLC system, or an I/O Station controlled by a Network Interface Unit that supports software configuration, as listed on the previous page.

The module is configured at startup. After configuration, the module begins providing signals from the voltage or current output devices connected to it to the CPU or NIU.

Parameter	Description	Default	Choices
Analog Input Data Reference	Starting offset for the module's analog input data.		user selectable
Analog Input Data Length	Word length of the module's analog input data.	8	0-8
Line Frequency	Specifies the line filter frequency.	60 Hz	50 Hz, 60 Hz
Report Faults	Enables or disables Fault Reporting for the entire Module.	Enabled	Enabled, Disabled
%AI Default / Hold Last State	Specifies whether the module will go to the specified channel defaults (see below) or hold their last states if power or communications are lost.	Default	Default /Hold
Current / Voltage	Specifies whether the channel will be a voltage or current input. If the Channel type is Current, the range is 4 to 20mA. If Channel type is Voltage, the range is -10 to +10V.	I (Current)	I (Current), V (Voltage)
Channel Active	Specifies if the channel should input data received from the CPU or NIU. If a channel is "inactive" space is still allocated for it.	Active	Inactive (off), Active (on)
Span Low	Actual current (in microAmps) or voltage (in millivolts) to be scaled from low engineering units value.	4,000 $\mu$ A	0 to 25,000 $\mu$ A -10,000 to +10,000mV
Span High	Actual current in microAmps or voltage in millivolts to be scaled from the high engineering units value.	20,000 $\mu$ A	0 to 25,000 $\mu$ A -10,000 to +10,000mV
Engineering Low	The engineering units value that is considered equivalent to the low span (actual) value.	4000	0 to 25,000 $\mu$ A -10,000 to +10,000mV
Engineering High	The engineering units value that is considered equivalent to the high span (actual) value.	20000	0 to 25,000 $\mu$ A -10,000 to +10,000mV
Alarm Low	The low alarm limit for the channel, in engineering units.	4000	-32768 to +32767
Alarm High	The high alarm limit for the channel, in engineering units.	20000	-32768 to +32767
Default	The value to be input when the module is in a default condition.	0	-32768 to +32767

## Description of Configurable Features

**Channel Active:** Each channel can be configured as either active or inactive. If a channel is inactive, it is not scanned and a value of 0 is returned by the module.

**Low Alarm Limit and High Alarm Limit:** Each input channel can have a low alarm limit and a high alarm limit. If an input reaches one of its limits, the module reports the actual value and sends the appropriate diagnostic input bit. Alarms do not stop the process or change the value of the input.

Alarm limits can be set anywhere over the dynamic range of the signal. The range for each is -32,768 to +32,767. The high alarm limit must be greater than the low alarm limit. If alarm reporting is not wanted, alarm limits can be set beyond the dynamic range of the signal so they will never be activated.

**Scaling:** The module converts electrical signals (either current or voltage, as configured) into digital output values for the CPU or NIU. By default, the module converts this data from 1 millivolt or 1 microamp "internal units" for convenience in scaling and comparing to actual meter measurements.

The module's default scaling can be changed to tailor the data for a specific application. Typically, engineering units represent millivolts or microamps. But they may also represent physical units such as degrees or centimeters per second. When reconfiguring scaling, it is important to be sure that the chosen Engineering Units values would not result in Overrange or Underrange output levels.

The scaling for each channel can be configured independently. Scaling is configured by selecting corresponding low and high engineering units values and low and high span values for two points.

During operation, the module will use the straight line defined by these two pairs of configured scaling values to convert internal values to current or voltage signal levels that represent appropriate engineering units.

**Fault Reporting:** By default, the module is configured for fault reporting. The module reports faults as soon as they are detected. Once a fault has been reported, the same fault is not reported again until the fault has been cleared. Fault reporting can be disabled via configuration. If disabled, faults are not reported.