

## Genius Distributed I/O

By providing distributed control on the factory floor, Genius I/O systems offer fewer terminations to document, dramatically shorter wiring runs, and simpler, more effective troubleshooting. Genius I/O blocks automatically provide diagnostic information on field wiring, power conditions and loads, as well as the state of the communication network, blocks and circuits. Genius diagnostics sharply reduce the time needed for initial control and debugging.

Genius blocks provide predictable system operation in the event of a CPU, bus interface or network cable

failure. When connected in a redundant configuration with two or more CPUs running simultaneously, the Genius blocks will shift automatically to a backup CPU if the main controller fails to communicate.

Genius blocks communicate with the system CPU over the Genius LAN, greatly simplifying system installation, and with network tools such as the hand-held monitor, troubleshooting is a snap. In addition to Genius I/O blocks, VersaMax I/O may also be integrated into a single Genius LAN.

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## Publication Reference Chart

GEK-90486D	I/O Discrete and Analog Blocks
GEK-90486F-1	I/O System and Communications
GFK-0074A	Genius I/O PCIM User's Manual
GFK-0415E	High Speed Counter
GFK-0450D	PowerTRAC
GFK-0881	Single Slot Personal Computer Interface Module (PCIM)
GFK-1179J	Installation Requirements for Conformance to Standards



### AC Discrete I/O Modules

Control power for the block is tapped off the input/output device voltages wired to the terminals. No separate block power supply is needed. Configurable features include; Output Pulse Test capability, Selectable Input Filter Time from 10mS to 100mS, Output powerup defaults, Output Hold Last State or default, each circuit has electronic fusing.

	IC660BBD110	IC660BBD101	IC660BBS102	IC660BBS103	IC660BBR100	IC660BBR101
Product Name	Genius Discrete Input Block, 115 VAC Grouped, 16 Point	Genius Discrete I/O Block, 115 VAC Grouped, 8 Point	Genius Discrete I/O Block, 115 VAC/125 VDC Isolated, 8 Point	Genius Discrete I/O Block, 115 VAC/125 VDC Isolated, 8 Point, w/o Failed Switch Diagnostic	Genius Relay Output Block, Grouped, 16 Points, Normally Closed	Genius Relay Output Block, Grouped, 16 Points, Normally Open
Lifecycle Status	Mature	Mature	Mature	Mature	Mature	Mature
Network Support	Genius Bus	Genius Bus	Genius Bus	Genius Bus	Genius Bus	Genius Bus
Input Range	93-132 VAC	93-132 VAC	115 VAC / 125 VDC	115 VAC / 125 VDC	N/A	N/A
Output Range	N/A	93-132 VAC	115 VAC / 125 VDC	115 VAC / 125 VDC	5V to 250 VAC or 5V to 220 VDC; Relay Normally-Closed Relays	5V to 250 VAC or 5V to 220 VDC; Relay Normally-Open Relays
Number of Points	16	8	8	8	16	16
Input and Output Response Time - ON/OFF (msec.)	Input 1 msec plus configurable filter 10 to 100mS in 10mS increments	Input 2msec plus configurable filter 10 to 100mS in 10mS increments; Outputs Zero crossing	Input 2msec plus configurable filter 10 to 100mS in 10mS increments; Outputs Zero crossing	Input 2msec plus configurable filter 10 to 100mS in 10mS increments; Outputs Zero crossing	5.0 msec.	5.0 msec.
Input Impedance	11.6K ohms	13K ohms	13K ohms	13K ohms	N/A	N/A
Load Current Per Point	N/A	2 Amp	2.0 Amp	2.0 Amp	2 Amp	2 Amp
Points Per Common	Two groups of 8	One group of 8	Four groups of 2	Four groups of 2	Four groups of 4	Four groups of 4
Protection	N/A	Internal electronic short circuit trip, 100ms long time trip	Internal electronic short circuit trip, 100ms (AC), 10ms (DC) long time trip	Internal electronic short circuit trip, 100ms (AC), 10ms (DC) long time trip	N/A	N/A
Diagnostics	Input Diagnostics: Open Wire, Short Circuit	Input Diagnostics: Open Wire, Overtemperature, Failed Switch Output Diagnostics: Short Circuit, Overload, No Load, Failed Switch, Overtemperature, Pulse Test	Input Diagnostics: Open Wire, Overtemperature, Loss of I/O Power, Failed Switch Output Diagnostics: Short Circuit, Overload, No Load, Overtemp., Loss of I/O Power, Failed Switch, Pulse Test	Input Diagnostics: Open Wire, Overtemperature, Loss of I/O Power, Failed Switch Output Diagnostics: Short Circuit, Overload, No Load, Overtemp., Loss of I/O Power, Failed Switch, Pulse Test	None	None
Operating Voltage	93-132 VAC	93-132 VAC	93-132 VAC / 105-132 VDC	93-132 VAC / 105-132 VDC	93-132 VAC / 185-265 VAC	93-132 VAC / 185-265 VAC
Dimensions (H x W x D)	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)



## DC Discrete I/O Modules

Genius DC Discrete I/O blocks interface to a wide range of input devices, including both 2-wire and 3-wire electronic proximity switches. Outputs may be low-power control and indicating devices such as relays, contactors, and lamps. These blocks have identical discrete I/O circuits, each easily configured to be an input or an output. Output circuits can be directly connected to input circuits without the use of other components or inversion of logic states. This flexibility provides maximum design and application efficiency. Each circuit contains built-in protection when used as an output, protecting the driver while allowing short-time surges. It also protects against shorted loads caused by wiring errors.

	IC660BBD020	IC660BBD021	IC660BBD022	IC660BBD023	IC660BBD024
<b>Product Name</b>	Genius Discrete I/O Block, 24/48 VDC Grouped, 16 Point, Source	Genius Discrete I/O Block, 24/48 VDC Grouped, 16 Point, Sink	Genius Discrete I/O Block, 24 VDC Grouped, 16 Point, Source	Genius Discrete I/O Block, 24 VDC Grouped, 16 Point, Sink	Genius Discrete I/O Block, 12/24 VDC Grouped, 32 Point, Source
<b>Lifecycle Status</b>	Mature	Mature	Mature	Mature	Mature
<b>Network Support</b>	Genius Bus	Genius Bus	Genius Bus	Genius Bus	Genius Bus
<b>Input Range</b>	18-56 VDC (24/48 V)	18-56 VDC (24/48 V)	18-30 VDC (24 V)	18-30 VDC (24 V)	18-30 VDC (24 V)
<b>Sink/Source</b>	Source	Sink	Source	Sink	Source
<b>Output Range</b>	18-56 VDC (24/48 V)	18-56 VDC (24/48 V)	18-30 VDC (24 V)	18-30 VDC (24 V)	18-30 VDC (24 V)
<b>Number of Points</b>	16	16	16	16	32
<b>Input and Output Response Time - ON/OFF (msec.)</b>	Input 1.7 msec plus configurable filter: 5 to 100mS for input; Output 1.0 msec	Input 1.7 msec plus configurable filter: 5 to 100mS for input; Output 1.0 msec	Input 1.7 msec plus configurable filter: 5 to 100mS for input; Output 1.0 msec	Input 1.7 msec plus configurable filter: 5 to 100mS for input; Output 1.0 msec	Input 1.4 msec plus configurable filter: 1 to 100mS for input; Output 0.5 msec
<b>Input Impedance</b>	5.6K ohms (24/48V), 1.8K ohms (24V)	5.6K ohms (24/48V), 1.8K ohms (24V)	5.6K ohms (24/48V), 1.8K ohms (24V)	5.6K ohms (24/48V), 1.8K ohms (24V)	3.3 K ohms
<b>Load Current Per Point</b>	2 Amp	2 Amp	2 Amp	2 Amp	0.5 Amp
<b>Points Per Common</b>	One group of 16	One group of 16	One group of 16	One group of 16	One group of 32
<b>Protection</b>	Short circuit level sensor at the switching device	Short circuit level sensor at the switching device	Short circuit level sensor at the switching device	Short circuit level sensor at the switching device	Short circuit level sensor at the switching device
<b>Diagnostics</b>	Input Diagnostics: Open wire, Overtemperature, Failed Switch Output Diagnostics: Short Circuit, Overload, No Load, Failed Switch, Overtemperature, Pulse Test	Input Diagnostics: Open wire, Overtemperature, Failed Switch Output Diagnostics: Short Circuit, Overload, No Load, Failed Switch, Overtemperature, Pulse Test	Input Diagnostics: Open wire, Overtemperature, Failed Switch Output Diagnostics: Short Circuit, Overload, No Load, Failed Switch, Overtemperature, Pulse Test	Input Diagnostics: Open wire, Overtemperature, Failed Switch Output Diagnostics: Short Circuit, Overload, No Load, Failed Switch, Overtemperature, Pulse Test	Output Diagnostics: Short Circuit, Overload, Failed Switch, Pulse Test
<b>Operating Voltage</b>	18-56 VDC (24/48 V)	18-56 VDC (24/48 V)	18-30 VDC (24 V)	18-30 VDC (24 V)	10-30 VDC
<b>Dimensions (H x W x D)</b>	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)



## DC Discrete I/O Modules

Genius DC Discrete I/O blocks interface to a wide range of input devices, including both 2-wire and 3-wire electronic proximity switches. Outputs may be low-power control and indicating devices such as relays, contactors, and lamps. These blocks have identical discrete I/O circuits, each easily configured to be an input or an output. Output circuits can be directly connected to input circuits without the use of other components or inversion of logic states. This flexibility provides maximum design and application efficiency. Each circuit contains built-in protection when used as an output, protecting the driver while allowing short-time surges. It also protects against shorted loads caused by wiring errors.

	IC660BBD025	IC660BBS102	IC660BBS103	IC660BBR100	IC660BBR101
<b>Product Name</b>	Genius Discrete I/O Block, 5/12/24 VDC Grouped, 32 Point, Sink	Genius Discrete I/O Block, 115 VAC/125 VDC Isolated, 8 Point	Genius Discrete I/O Block, 115 VAC/125 VDC Isolated, 8 Point, w/o Failed Switch Diagnostic	Genius Relay Output Block, Grouped, 16 Points, Normally Closed	Genius Relay Output Block, Grouped, 16 Points, Normally Open
<b>Lifecycle Status</b>	Mature	Mature	Mature	Mature	Mature
<b>Network Support</b>	Genius Bus	Genius Bus	Genius Bus	Genius Bus	Genius Bus
<b>Input Range</b>	10-30 VDC (12/24 V), 4.9-5.3 VDC (5 V)	115 VAC / 125 VDC	115 VAC / 125 VDC	N/A	N/A
<b>Sink/Source</b>	Sink	N/A	N/A	N/A	N/A
<b>Output Range</b>	10-30 VDC (12/24 V), 4.9-5.3 VDC (5 V)	115 VAC / 125 VDC	115 VAC / 125 VDC	5V to 250 VAC or 5V to 220 VDC; Relay Normally-Closed Relays	5V to 250 VAC or 5V to 220 VDC; Relay Normally-Open Relays
<b>Number of Points</b>	32	8	8	16	16
<b>Input and Output Response Time - ON/OFF (msec.)</b>	Input 1.4 msec plus configurable filter: 1 to 100mS for input; Output 0.5 msec	Input 2msec plus configurable filter 10 to 100mS in 10mS increments; Outputs Zero crossing	Input 2msec plus configurable filter 0 to 100mS in 10mS increments; Outputs Zero crossing	5.0 msec.	5.0 msec.
<b>Input Impedance</b>	3.3 K ohms	13K ohms	13K ohms	N/A	N/A
<b>Load Current Per Point</b>	0.5 Amp	2.0 Amp	2.0 Amp	2 Amp	2 Amp
<b>Points Per Common</b>	One group of 32	Four groups of 2	Four groups of 2	Four groups of 4	Four groups of 4
<b>Protection</b>	Short circuit level sensor at the switching device	Internal electronic short circuit trip. 100ms (AC), 10ms (DC) long time trip	Internal electronic short circuit trip. 100ms (AC), 10ms (DC) long time trip	N/A	N/A
<b>Diagnostics</b>	Output Diagnostics: Short Circuit, Overload, Failed Switch, Pulse Test	Input Diagnostics: Open Wire, Overtemperature, Loss of I/O Power, Failed Switch Output Diagnostics: Short Circuit, Overload, No Load, Overtemp., Loss of I/O Power, Failed Switch, Pulse Test	Input Diagnostics: Open Wire, Overtemperature, Loss of I/O Power, Failed Switch Output Diagnostics: Short Circuit, Overload, No Load, Overtemp., Loss of I/O Power, Failed Switch, Pulse Test	None	None
<b>Operating Voltage</b>	10-30 VDC (12/24 V), 4.9-5.3 VDC (5 V)	93-132 VAC / 105-132 VDC	93-132 VAC / 105-132 VDC	93-132 VAC / 185-265 VAC	93-132 VAC / 185-265 VAC
<b>Dimensions (H x W x D)</b>	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)



## Analog Input Modules

Genius Analog Input blocks provide 6 channels of current inputs with powerful diagnostics.

	IC660BBA026	IC660BBA106
<b>Product Name</b>	Genius Analog Input Block, Current-source, 6 Channels, 24/48 VDC Powered	Genius Analog Input Block, Current-source, 6 Channels, 115 VAC/125 VDC Powered
<b>Lifecycle Status</b>	Mature	Mature
<b>Network Support</b>	Genius Bus	Genius Bus
<b>Input Range</b>	4 mA to 20 mA 0 mA to 25 mA	4 mA to 20 mA 0 mA to 25 mA
<b>Number of Points</b>	6	6
<b>Points Per Common</b>	Channel to Channel Isolation. 6 isolated points	Channel to Channel Isolation. 6 isolated points
<b>Resolution</b>	1 micro Amp	1 micro Amp
<b>Update Rate</b>	16.6mS to 400mS (user selectable)	16.6mS to 400mS (user selectable)
<b>Accuracy</b>	0.1% of full scale reading	0.1% of full scale reading
<b>Diagnostics</b>	Underrange, Overrange, High Alarm, Low Alarm, Open Wire	Underrange, Overrange, High Alarm, Low Alarm, Open Wire
<b>Operating Voltage</b>	18-56 VDC	93-132 VAC / 105-145 VDC
<b>Dimensions (W x H x D)</b>	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)



### Analog Output Modules

Genius Analog Output blocks provide 6 channels of current and voltage outputs with powerful diagnostics.

	IC660BBA025	IC660BBA105
<b>Product Name</b>	Genius Analog Output Block, Current-source, 6 Channels, 24/48 VDC Powered	Genius Analog Output Block, Current-source, 6 Channels, 115 VAC/125 VDC Powered
<b>Lifecycle Status</b>	Mature	Mature
<b>Network Support</b>	Genius Bus	Genius Bus
<b>Output Range</b>	4 mA to 20 mA 0 mA to 24 mA	4 mA to 20 mA 0 mA to 24 mA
<b>Number of Points</b>	6 Outputs	6 Outputs
<b>Points Per Common</b>	One group of 6	One group of 6
<b>Operating Voltage</b>	18-56 VDC	93-132 VAC / 105-145 VDC
<b>Resolution</b>	6 micro Amp	6 micro Amp
<b>Update Rate</b>	25mS	25mS
<b>Accuracy</b>	0.15% of full-scale reading	0.15% of full-scale reading
<b>Dimensions (W x H x D)</b>	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)



## Analog Mixed Modules

Genius Analog Mixed blocks provide 4 channels of inputs and 2 channels of outputs. The channels can be configured for current or voltage with powerful diagnostics.

	IC660BBA020	IC660BBA100	IC660BBA024	IC660BBA104
<b>Product Name</b>	Genius Analog I/O Block, Voltage/Current, 4 Inputs/ 2 Outputs, 24/48 VDC Powered	Genius Analog I/O Block, Voltage/Current, 4 Inputs/ 2 Outputs, 115 VAC Powered	Genius Analog I/O Block, Current-source, 4 Inputs/ 2 Outputs, 24/48 VDC Powered	Genius Analog I/O Block, Current-source, 4 Inputs/ 2 Outputs, 115 VAC/ 125 VDC Powered
<b>Lifecycle Status</b>	Mature	Mature	Mature	Mature
<b>Network Support</b>	Genius Bus	Genius Bus	Genius Bus	Genius Bus
<b>Number of Points</b>	4 In / 2 Out	4 In / 2 Out	4 In / 2 Out	4 In / 2 Out
<b>Points Per Common</b>	One group of 4 Inputs and one group of 2 Outputs	One group of 4 Inputs and one group of 2 Outputs	One group of 4 Inputs and one group of 2 Outputs	One group of 4 Inputs and one group of 2 Outputs
<b>Input Range</b>	0–10 VDC, 10 VDC, 5 VDC, 0–5 VDC, 4–20 mA (or 1–5 VDC)	0–10 VDC, 10 VDC, 5 VDC, 0–5 VDC, 4–20 mA (or 1–5 VDC)	4 mA to 20 mA	4 mA to 20 mA
<b>Output Range</b>	0–10 VDC, 10 VDC, 5 VDC, 0–5 VDC, 4–20 mA (or 1–5 VDC)	0–10 VDC, 10 VDC, 5 VDC, 0–5 VDC, 4–20 mA (or 1–5 VDC)	4 mA to 20 mA	4 mA to 20 mA
<b>Operating Voltage</b>	18-56 VDC	98-132 VAC	18-56 VDC	93-132 VAC / 105-145 VDC
<b>Resolution</b>	12 bit + sign	12 bit + sign	Input: 1 micro Amp Output: 6 micro Amp	Output: 6 mA
<b>Update Rate</b>	Once every 4mS	Once every 4mS	Input: 16.6mS to 400mS (user selectable) Output: 6mS to 8mS typical	Input: 16.6mS to 400mS (user selectable) Output: 6mS to 8mS typical
<b>Accuracy</b>	Typical: 0.2% of full scale; Maximum: 0.5% of full scale: within 50mV on the 10 volt range, 25mV on the 5 volt range, and 100mA on the 4 to 20 mA range.	Typical: 0.2% of full scale; Maximum: 0.5% of full scale: within 50mV on the 10 volt range, 25mV on the 5 volt range, and 100mA on the 4 to 20 mA range.	Input: 0.1% of full scale reading Output: 0.15% of full scale reading	Input: 0.1% of full scale reading Output: 0.15% of full scale reading
<b>Input Filter Response</b>	none, 8, 16, 32, 64, 128, 256, 512, 1024mS	none, 8, 16, 32, 64, 128, 256, 512, 1024mS	16.6mS to 400mS (user selectable)	16.6mS to 400mS (user selectable)
<b>Diagnostics</b>	Input: Underrange, Overrange, High Alarm, Low Alarm, Open Wire Output: Underrange, Overrange	Input: Underrange, Overrange, High Alarm, Low Alarm, Open Wire Output: Underrange, Overrange	Input: Underrange, Overrange, High Alarm, Low Alarm, Open Wire Output: Underrange, Overrange, Feedback error	Input: Underrange, Overrange, High Alarm, Low Alarm, Open Wire, Output: Underrange, Overrange, Feedback error
<b>Dimensions (W x H x D)</b>	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)



## RTD and Thermocouple Modules

Genius Temperature Sensor blocks support a wide range of temperature sensors. The blocks support powerful diagnostics.

	IC660BBA021	IC660BBA101	IC660BBA023	IC660BBA103
<b>Product Name</b>	Genius Analog Input Block, RTD, 6 Channel, 24/48 VDC Powered	Genius Analog Input Block, RTD, 6 Channel, 115 VAC/125 VDC Powered	Genius Analog Input Block, Thermocouple, 6 Channel, 24/48 VDC Powered	Genius Analog Input Block, Thermocouple, 6 Channel, 115 VAC/125 VDC Powered
<b>Lifecycle Status</b>	Mature	Mature	Mature	Mature
<b>Network Support</b>	Genius Bus	Genius Bus	Genius Bus	Genius Bus
<b>Number of Points</b>	6	6	6	6
<b>Points Per Common</b>	3 groups of 2	3 groups of 2	3 groups of 2	3 groups of 2
<b>Input Range</b>	2 and 3 wire Platinum (DIN 43760), Nickel (DIN 43760), Copper, Linear	2 and 3 wire Platinum (DIN 43760), Nickel (DIN 43760), Copper, Linear	J, K, T, E, B, R, S, and N (#14 AWG Nicrosil vs. Nisil) thermocouples	J, K, T, E, B, R, S, and N (#14 AWG Nicrosil vs. Nisil) thermocouples
<b>Operating Voltage</b>	18-56 VDC	93-132 VAC / 105-145 VDC	18-56 VDC	93-132 VAC / 105-145 VDC
<b>Resolution</b>	0.1°C	0.1°C	Less than 0mV error typ, 20mV max.	Less than 0mV error typ, 20mV max.
<b>Update Rate</b>	Once every 400 ms, 800 ms, or 1600 ms	Once every 400 ms, 800 ms, or 1600 ms	2.0 sec (typ), 3.0 sec (max)	2.0 sec (typ), 3.0 sec (max)
<b>Accuracy</b>	At 25°C - Platinum or Nickel: 0.5°C typical, 1.0°C maximum 10W Copper: 5°C typical, 10°C maximum	At 25°C - Platinum or Nickel: 0.5°C typical, 1.0°C maximum 10W Copper: 5°C typical, 10°C maximum	8 Hz at 25°C	8 Hz at 25°C
<b>Diagnostics</b>	Input shorted, Internal fault, Wiring error, Open wire, Overrange, Underrange, High Alarm, Low Alarm	Input shorted, Internal fault, Wiring error, Open wire, Overrange, Underrange, High Alarm, Low Alarm	Open Wire, Overrange, Underrange, High Alarm, Low Alarm, Internal Fault	Open Wire, Overrange, Underrange, High Alarm, Low Alarm, Internal Fault
<b>Dimensions (W x H x D)</b>	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)





## High Speed Counter

The Genius I/O High-speed Counter block is a self-contained, configurable I/O module which provides direct processing of rapid pulse signals up to 200kHz.

IC660BBD120

<b>Product Name</b>	<b>Genius High Speed Counter Block</b>
<b>Lifecycle Status</b>	Mature
<b>Network Support</b>	Genius Bus
<b>Input Range</b>	5 VDC to 30 VDC
<b>Count Rate</b>	high-frequency filter selected 200 kHz maximum low-frequency filter selected 40 Hz maximum
<b>Output Range</b>	4.75 VDC to 5.25 VDC
<b>Number of Points</b>	4 Type A or 2 Type B or 1 Type C (12 inputs and 4 outputs)
<b>Input and Output Response Time - ON/OFF (msec.)</b>	high-frequency filter selected 2.5mS minimum low-frequency filter selected 12.5mS minimum
<b>Input Filter Response</b>	High (2.5mS) or low (12.5mS) frequency
<b>Input Impedance</b>	4.0K ohms
<b>Accuracy</b>	0.50% reading + 0.50% full scale
<b>Load Current Per Point</b>	200 mA
<b>Operating Voltage</b>	93-132 VAC / 10-30 VDC
<b>Diagnostics</b>	Outputs: Pulse Test, Failed Switch
<b>Dimensions (W x H x D)</b>	8.83" (22.44cm) x 3.50" (8.89cm) x 3.94" (10.00cm)



## PowerTRAC Monitoring Module

The Genius PowerTRAC block is used in many types of power monitoring and industrial applications. The PowerTRAC block monitors current and voltage inputs and stores digitized waveform values for each input. From these values, the block calculates RMS voltage, current, active power, reactive power, KWH, and power factor. The block automatically sends this calculated data to a host PLC or computer approximately twice per second. The same data can be displayed on a Genius Hand-held Monitor, either locally or from any connection point on the bus.

A PowerTRAC block can be used with a wye- or delta-configured three-phase power system or with a single-phase power system. It accepts voltage inputs from one to three potential transformers, and current inputs from up to three line current transformers, plus a neutral current transformer.

### IC660BPM100

<b>Product Name</b>	<b>Genius I/O PowerTrac Monitoring Block, Accurately measures RMS voltage, current, power, VARs, power factor, watt-hours, and line frequency, even with distorted waveforms. 115 VAC/125 VDC Powered</b>
<b>Lifecycle Status</b>	Mature
<b>Network Support</b>	Genius Bus
<b>Input Range</b>	0 to 120 VAC RMS at 47 to 63 Hz
<b>Number of Points</b>	(1) Three Phase
<b>Calculated Data</b>	Voltage phase A to B Voltage phase B to C Voltage phase C to A Voltage phase A to N (for line-to-neutral potential transformers only) Voltage phase B to N (for line-to-neutral potential transformers only) Voltage phase C to N (for line-to-neutral potential transformers only) Current phase A Current phase B Current phase C Auxiliary CT current Active power phase A Active power phase B Active power phase C Reactive power phase A Reactive power phase B Reactive power phase C Total power factor Total watt-hours/KWH/MWH Fundamental VARs phase A Fundamental VARs phase B Fundamental VARs phase C Fundamental Power Factor Harmonic VARs as % of Volt-Amps phase A Harmonic VARs as % of Volt-Amps phase B Harmonic VARs as % of Volt-Amps phase C Total Harmonic VARs as % of Volt-Amps Line Frequency Temperature Alarm Extended Watt-hours (high) Extended Watt-hours (low)
<b>Accuracy</b>	0.25% reading +0.25% full scale
<b>Operating Voltage</b>	115 VAC/230 VAC (90–265 VAC), 47–63Hz or 125 VDC (100–150 VDC), 35 VA max.
<b>Dimensions (W x H x D)</b>	11.00" (27.94cm) x 5.21" (13.23cm) x 8.06" (20.47)

### Accessories and Cables

IC660BSM021	Genius Bus Switching Module, 24/48 VDC	Mature
IC660BSM120	Genius Bus Switching Module, 115 VAC/125 VDC	Mature
IC660BLC001	Genius bus Cable w/Connectors Alpha 9823 15 In (Qty 3)	Active
IC660BLC003	Genius bus Cable w/Connectors Alpha 9823 3 Ft	Active
IC660BLM506	Bus Terminator 150 Ohm (Qty 4)	Active
IC660BLM508	Bus Terminator 75 Ohm (Qty 4)	Active
IC660BLM507	Genius Block Puller	Active

### Hand Held Monitor

IC660HHM501	Hand-Held Monitor can be used to configure and trouble shoot Genius blocks. Kit includes Cable and Battery Charger	Mature
IC660BCM501	Hand-Held Monitor Battery Charger	Active
IC660BPM500	Hand-Held Monitor Battery Pack	Mature

## Configuration Guidelines

When configuring a Genius network the following guidelines should be considered

1. Genius LAN is limited to 32 devices. Remember that the Genius Bus Controller reserves one address and if a Hand-Held configurator is used, it also reserves an address.
2. If the application requires redundant networks, a Bus Switching Module is required (IC660BSMxxx).
3. Termination is required at the end of each network (IC660BLM50x)
4. For long distances, beyond 4,500 feet, the number of devices is limited to 16.

## Cable Selection

Cable # & Make	Outer Diameter	Terminating Resistor* -10% to +20% 1/2 Watt	Number of Conductors/ AWG	Dielectric Voltage Rating	Ambient Temp Rating	Maximum Length Cable Run, feet/meters at baudrate			
						153.6s	153.6e	76.8	38.4*
(A)9823 (B)9182 (C)4596 (M)M39240	.350 in 8.89mm	150 ohms	2/#22	30V	60°C	2000ft 606m	3500ft 1061m	4500ft 1364m	7500ft 2283m
(B)89182	.322in 8.18mm	150 ohms	2/#22	150V	200°C	2000ft 606m	3500ft 1061m	4500ft 1364m	7500ft 2283m
(B)9841 (M)M3993	.270in 6.86mm	*120 ohms	2/#24	30V	80°C	1000ft 303m	1500ft 455m	2500ft 758m	3500ft 1061m
(A)9818C (B)9207 (M)M4270	.330in 8.38mm	100 ohms	2/#20	300V	80°C	1500ft 455m	2500ft 758m	3500ft 1061m	6000ft 1818m
(A)9109 (B)89207 (C)4798 (M)M44270	.282in 7.16mm	100 ohms	2/#20	150V	200°C	1500ft 455m	2500ft 758m	3500ft 1061m	6000ft 1818m
(A)9818D (B)9815	.330in 8.38mm	100 ohms	2/#20			1500ft 455m	2500ft 758m	3500ft 1061m	6000ft 1818m
(A)9818 (B)9855 (M)M4230	.315in 8.00mm	100 ohms	4 (two pair) #22	150V	60°C	1200ft 364m	1700ft 516m	3000ft 909m	4500ft 1364m
(A)9110 (B)89696 (B)89855 (M)M64230	.274in 6.96mm	100 ohms	4 (two pair) #22	150V	200°C	1200ft 364m	1700ft 516m	3000ft 909m	4500ft 1364m
(A)9814C (B)9463 (M)M4154	0.243 6.17mm	75 ohms	2/#20	150V	60°C	800ft 242m	1500ft 455m	2500ft 758m	3500ft 1061m
(A)5902C (B)9302 (M)M17002	.244in 6.20mm	75 ohms	4 (two pair) #22	300V	80°C	200ft 60m	500ft 152m	1200ft 333m	2500ft 758m

Notes: A=Alpha, B=Belden, C=Consolidated, M=Manhattan, \* = Limited to 16 taps at 38.4 Kbaud

## Examples of Typical Application

**Configuration for Controller** (Example application requiring (120) 24 VDC inputs and (80) Relay outputs AC power supply) for local control. System also has five remote cabinets, with each cabinet requiring (64) 24 VDC Inputs, (21) 24 VDC 0.5 Amp, Source Outputs and (2) current inputs and (2) current outputs (24 VDC power source). Maximum distance from control cabinet to the last remote cabinet is 3,500 feet.

### Control Cabinet

Backplane Slots Required	Power Supply Current Required (mA)	Qty	Part Number	Description
2	1250mA @ 3.3 VDC; 1000mA @ 5 VDC	1	IC695CPU310	CPU with two built-in serial ports
2		1	IC695PSA040	120/240 VAC, 125 VDC Power Supply, current available 9 Amps @ 3.3 VDC; 6 Amps @ 5 VDC; 1.6 Amps @ 24 VDC maximum
	600mA @ 3.3 VDC; 240 mA @ 5 VDC	1	IC695CHS016	16 Slot Universal Base
4	1200mA @ 5V	4	IC694MDL660	Discrete Input Module, 24 VDC Positive Logic, 32 points (Requires terminal block)
5	35mA @ 5V; 110mA @ 24 VDC Relay	5	IC694MDL940	Discrete Output Module, Relay 2.0 A per point Form A, 16 points (Terminal block included).
		4	IC694TBB032	Terminal Block, Box Style
1	300 mA @ 5 VDC	1	IC694BEM331	Genius Bus Controller (GBC), supports up to 32 devices on a Genius Bus to control remote I/O, Global Data and Datagrams
		1	BC646MPP001	Logic Developer - PLC Professional
14	Total current from power supply required: 2775mA @ 5V; 1850 @ 3.3V; 110mA @ 24 VDC Relay. Only one power supplied needed.			

### Remote Cabinets (Qty 5)

	15	IC660BBD024	Block 12/24 VDC Source I/O 32 Circuits
	5	IC660BBA020	Block 24/48 VDC Analog 4 Inputs / 2 Outputs
	1	IC660BLM506	Bus Terminator 150 Ohm (Qty 4)

### Options to consider

	1	IC660HHM501	Hand-Held Monitor can be used to configure and troubleshoot Genius blocks. Kit includes Cable and Battery Charger
	5	IC660BLM507	Genius Block Puller
840mA @ 3.3 VDC; 614 mA @ 5 VDC	1	IC695ETM001	RX3i Ethernet module 10/100 Mbits 2 RJ45 connections one IP address occupies one slot on system base
	6	IC690PWR024	24 VDC, 5 Amp Output Power and 120/230 VAC Input Power Power Supply
	1	IC693ACC302	RX3i Long term battery for CPU
	1	IC754VSI06STD	QuickPanel View Intermediate 6 inch STN Touch Operator Interface