

PIC AND MMC FAMILY BLOCK I/O MODULES

This PDF document is a subset of the Sheffield Automation MMC Controls, Block I/O and Cimrex HMI Product Guide, P/N M.1301.6219.

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**MMC CONTROLS, BLOCK I/O AND CIMREX HMI
MOTION SOLUTIONS PRODUCT GUIDE**

PiC and MMC Family Block I/O Modules

Sheffield Automation

Block I/O Expansion

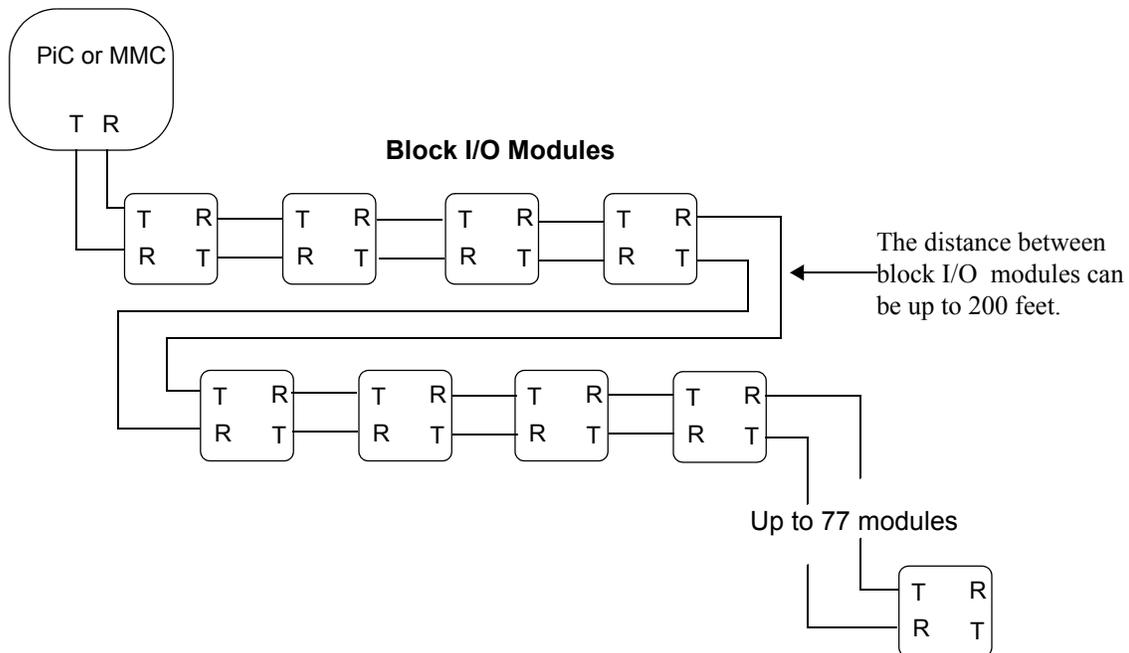
Block I/O is a self-contained I/O interface with its own logic power supply derived from an external 24V DC source. Each block has a communication interface that includes two transmitters (RS485) and two receivers (optically isolated). Blocks differ as to the type of I/O interface (analog or digital) provided.

Block I/O is standard on MMC controls and can be used as an alternative to rack I/O expansion on PiC900 controls. It is used to distribute small groups of interface logic close to the actual location of I/O devices. It allows you to replace long runs of I/O cables with twisted pairs of communication wires. The Block I/O footprint has been minimized for easy installation into small enclosures or junction boxes.

NOTE: Block I/O cannot be intermixed within a rack I/O expansion loop. Block I/O uses a slower data rate and optical isolation to accommodate longer distances between modules. For PiC90 and PiC900 systems, the communications option is required on the CPU to use Block I/O.

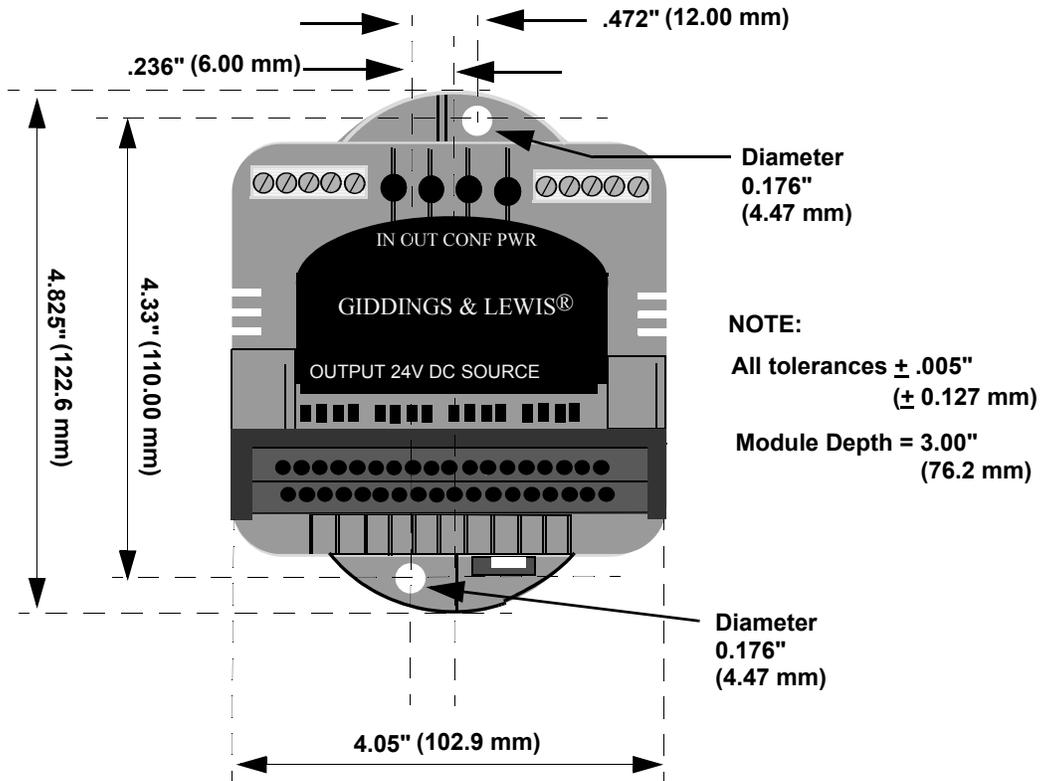
One possible layout for I/O expansion using block I/O modules is shown below. There can be up to 200 feet between block I/O modules. The recommended wire is Belden 9729, 24 AWG stranded conductors, twisted pair (100Ω characteristic impedance) with shield.

Block I/O Layout for PiC or MMC I/O Expansion



NOTE: Unlike wiring for I/O expansion racks, it is not necessary to return the last block I/O module back to the PiC900. The interconnecting cable between block I/O modules contains both a forward and a return communication path.

Block I/O Mounting Dimensions



If you are not using a DIN rail to mount a block I/O module, the mounting dimensions are shown above.

Part Number
Block I/O Modules Manual - M.1300.7589

Specification Table

The specifications in the table below apply to all block I/O modules. Individual block I/O modules with specifications that differ from these will list their specification explicitly.

CE Marked	<p>Conforms to Directives 73/23/EEC, 89/336/EEC, 92/31/EEC, 93/68/EEC by conforming to the following standards:</p> <p>EN 50081-2:1993 EMC Generic Industrial Emissions EN 50082-2:1995 EMC Generic Industrial Immunity EN 61131-2:1994/A11:1996 Low voltage directive requirements for programmable controllers EN 61000-6-2:1990 Immunity for Industrial Environments</p> <p>Operates with emissions below EN55011/ CISPR 11 Class A limits</p> <p>Immune to:</p> <ul style="list-style-type: none"> • Electrostatic discharge (4K V contact mode, 8K V air discharge) per EN61000-4-2 • RF electromagnetic fields per EN61000-4-3, ENV 50141, and ENV50204 • Electrical fast transients per EN61000-4-4 • Magnetic fields per EN61000-4-8 • Surges per EN61000-4-5 • Voltage dips, short interruptions, and voltage variations per EN61000-4-11 <p>Refer to the EMC Guidelines for more information.</p>
UL and C/UL Listed	File No. E126417 NRAQ Programmable Controllers
Operating temperature range	7° C to 55° C (45° F to 131° F)
Storage temperature range	-40° C to 85° C (-40° F to 185° F)
Humidity	5 to 95%, non-condensing
Physical size	4.05" wide x 4.825" high x 3" deep 102.9 mm x 122.6 mm x 76.2 mm
Vibration (per IEC 68-2-6)	10-57 Hz (constant amplitude .15 mm) 57 - 2000 Hz (acceleration 2 g)
Shock (per IEC 68-2-27)	Four shocks per axis (15g/11 msec)
Logic side LEDs, module status	Data In LED Data Out LED Configured LED Power LED

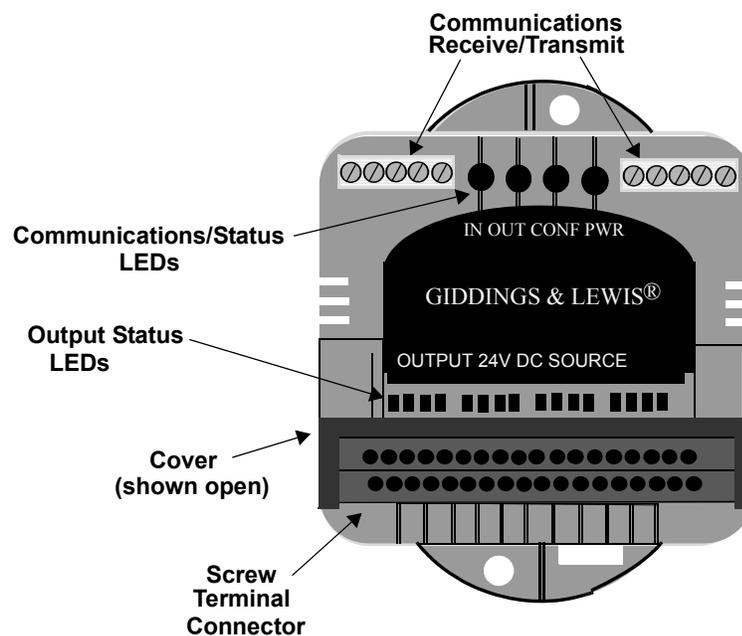
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Block Output 24V DC Source Module (16 Points)

The 16 point 24V DC block output module sources voltage for individual loads from one or more DC power supplies. Each external supply is nominally 24 volts, but can be between 20 and 30 volts.

16 LEDs near the field terminal connector of the module indicate the logic state that drives each output. Another LED labeled SC turns on if any output attempts to drive a short circuit.

Block Output 24V DC Source Module (16 point)



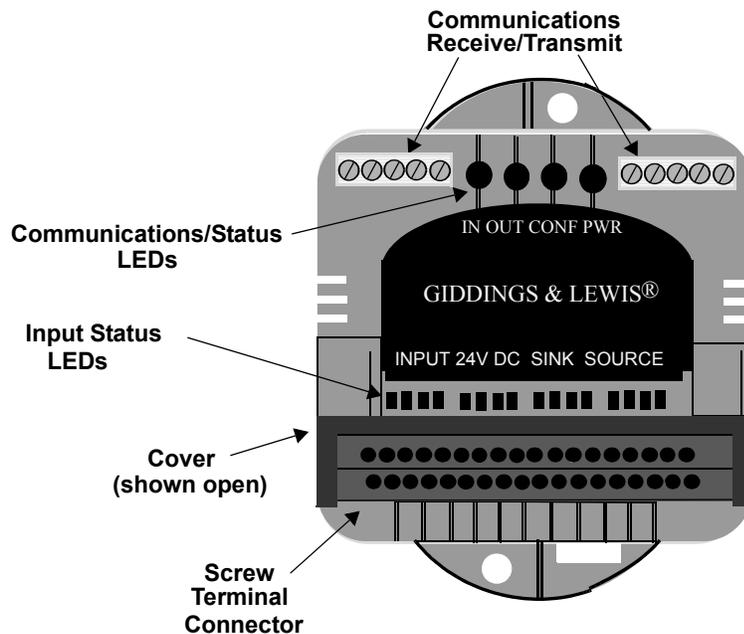
Specification Table

Characteristic	Block Output 24V DC module specifications
Function	Sources an external DC supply to 16 loads
Part number	M.1017.3095
DC source requirements	Nominal 24V DC; range 20 to 30 VDC
Field side connector	Two 12-pin connectors, screw terminals
Protection of logic circuits	Optical isolation between the logic and field side, transient suppression on the 24V external supply
Grouping of outputs	Two groups of 8 solid-state switches. Each group may use its own DC supply, or one supply may be daisy-chained. These must be referenced to 0V.
Short circuit protection for each group	Pulses output for about 130 μ sec every 100 msec until short is removed
Maximum current per group	4 A of continuous current for the group; each switch is rated at .5 A continuous
Logic side LEDs, output status	A yellow LED for each output
Logic side LED, short circuit status	A red LED lights to indicate a short circuit condition
Switch characteristics	Solid-state switches
Time delay on for resistive loads	50 μ sec max
Time delay off for resistive loads	50 μ sec max
Leakage current in off state	0.5 mA max
Switch voltage, maximum ON	1 VDC max
Surge current, maximum	25 A for 130 μ sec, every 100 msec
Response to scan loss	All outputs are reset to the OFF state
Module power requirements	100 mA from an external 24V DC supply (20 to 30V DC range) NOTE: 2.5A, 250 microsecond inrush at power on

Block Input 24V DC Module/J (16 Points)

The input 24V DC module converts DC signals from devices into logic levels that the CPU can use. Each signal is converted into a corresponding logic 1 or 0, which is transmitted through the communication interface to the CPU module. An “on” signal is nominally 24 VDC, but can be any level between 15 and 30 volts. An “off” signal is any level below 5V. The wiring configurations may be sink or source.

Block Input 24V DC Module/J (16 point)



Specification Table

Characteristic	Block Input 24V DC module/J specifications
Function	Monitors on.off states from DC voltage inputs
Part number	M.1300.7372
Field side connector	Two 18-pin connectors, screw terminals
Input signals (meet IEC standards)	Nominal 24 VDC on, 0 VDC off
UH Max (Max. allowable voltage)	30 VDC
IH Max (Max, current @ 30 VDC)	7.5 mA
UL Min	Polarity independent
Guaranteed on	15 VDC
IH Min (min, current @ UH min)	2.8 mA
Guaranteed off	5 VDC
IT Min (current allowed when off)	.75 mA
Time delay on	1 ms max.
Time delay off	1 ms max.
Protection of logic circuits	Optical isolation between the logic and field sides, transient suppression on the 24V external supply
Logic side LEDs, module status	Data In LED Data Out LED Configured LED Power LED
Logic side LEDs, input circuits	A yellow LED for each input
Module power requirements	100 mA from an external 24V DC supply (20 to 30V DC range) NOTE: 2.5A, 250 microsecond inrush at power on

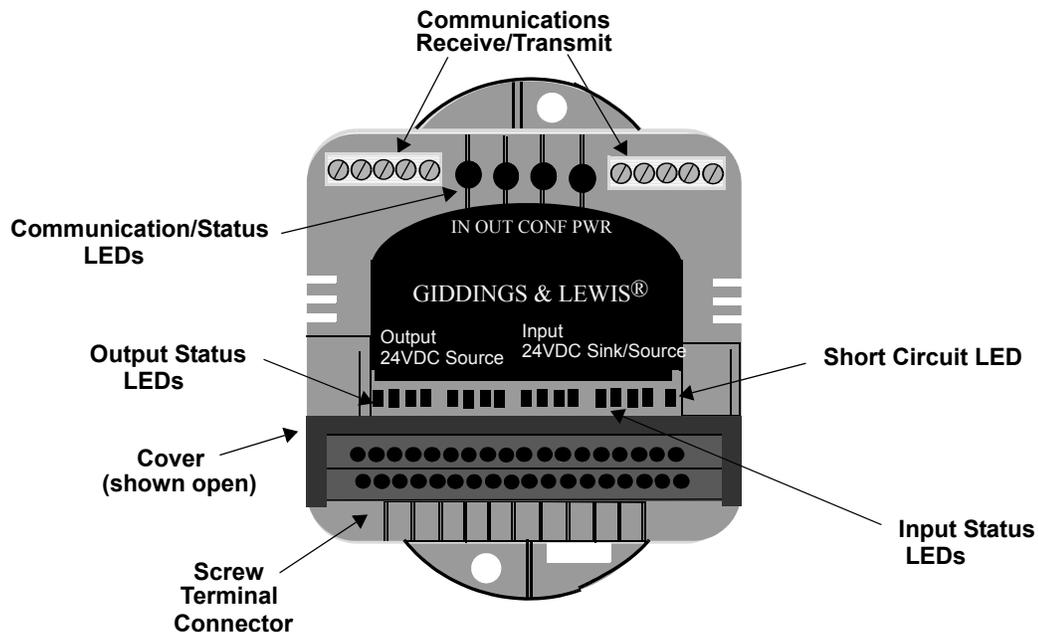
Block 24V DC 8 In/8 Out Module/J

The Block 24V DC 8/8 module provides eight output points and eight input points.

The eight point output section sources voltage for individual loads from a DC power supply. The external supply is nominally 24 volts, but can be between 20 and 30 volts. Eight LEDs near the field terminal connector of the module indicate the logic state that drives each output. Another LED labeled SC turns on if any output attempts to drive a short circuit.

The eight point input section converts DC signals from devices into logic levels that the CPU can use. Each signal is converted into a corresponding logic 1 or 0 which is transmitted through the communication interface to the CPU module. An "on" signal is nominally 24 VDC, but can be any level between 15 and 30 volts. An "off" signal is any level below 5V. The wiring configurations may be sink or source. Eight LEDs near the field terminal connector of the module indicate the logic state of each input.

Block 24V DC 8In/8 Out Module/J



Specification Table

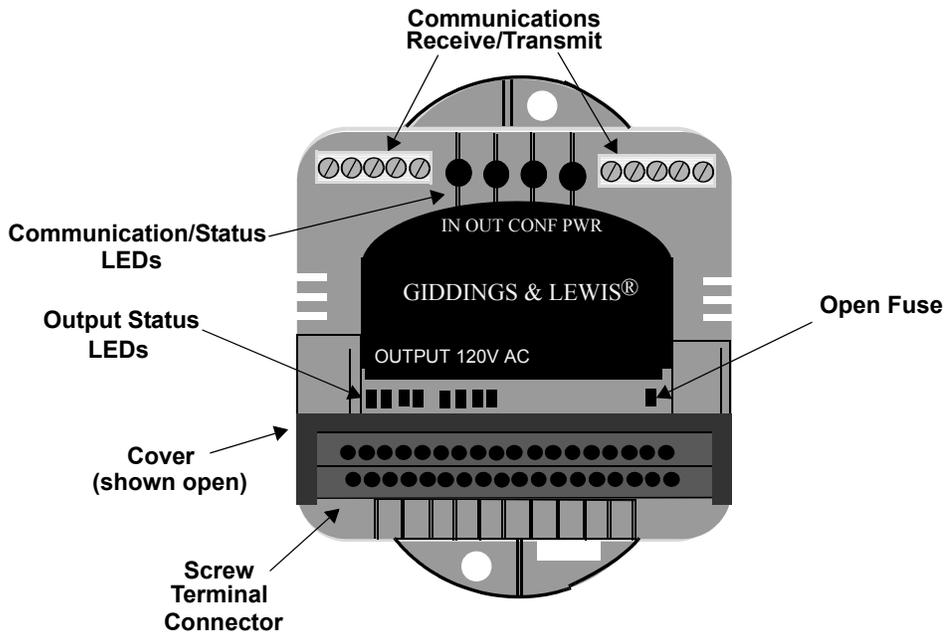
Characteristic	Block 24V DC 8 In/8 Out Module/J Specifications
Function	Monitors on/off states from eight DC voltage inputs and sources an external DC supply to eight loads
Part number	M. 1017.6042
Field side connector	Two 18-pin connectors, screw terminals
Protection of logic circuits	Optical isolation between the logic and field sides, transient suppression for the 24V external supply
Logic side LEDs, input status	A yellow LED for each input
Logic side LEDs, output status	A yellow LED for each output
Logic side LED, short circuit status	A red LED lights to indicate a short circuit condition
Module power requirements	100 mA from an external 24V DC supply ; (20 to 30V DC range) NOTE: 2.5A, 250 microsecond inrush at power on
Input Section	
Input signals	Nominal 24 VDC on, 0 VDC off, conforming to IEC Type 1 inputs per IEC 1131-2
UH Max (max. allowed voltage)	30 VDC
IH Max (max. current @ 30 VDC)	7.5 mA
UL Min	Polarity independent
Guaranteed on	15 VDC
IH Min (min. current @ UH Min)	2.8 mA
Guaranteed off	5 VDC
IT Min (current allowed when off)	.75 mA
Time delay on	1 ms max.
Time delay off	1 ms max.
Output Section	
DC source requirements	Nominal 24V DC; range 20 to 30V DC
Output group	One group of eight solid-state switches. The group uses an external DC supply. It must be referenced to SPG.
Short circuit protection for the group	Pulses output for about 130 μ sec every 100 msec until short is removed
Maximum current per group	4 A of continuous current for the group; each switch is rated at .5 A continuous
Switch characteristics	Solid-state switches
Time delay on for resistive loads	50 μ sec max
Time delay off for resistive loads	50 μ sec max
Leakage current in off state	0.5 mA max
Switch voltage, maximum ON	1 VDC max
Surge current, maximum	25 A for about 130 μ sec every 100 msec
Response to scan loss	All outputs are reset to the OFF state

Block Output 120V AC Module (8 points)

The 120V AC block output module switches voltage for eight individual loads from one or two AC power sources. Each external AC source is nominally 115VAC, but can be between 48 and 138 volts.

8 LEDs in the lower section of the module indicate the logic state that drives each output. Another LED labeled SC turns on if the AC power is not connected.

Block Output 120V AC Source Module (8 points)



Specification Table

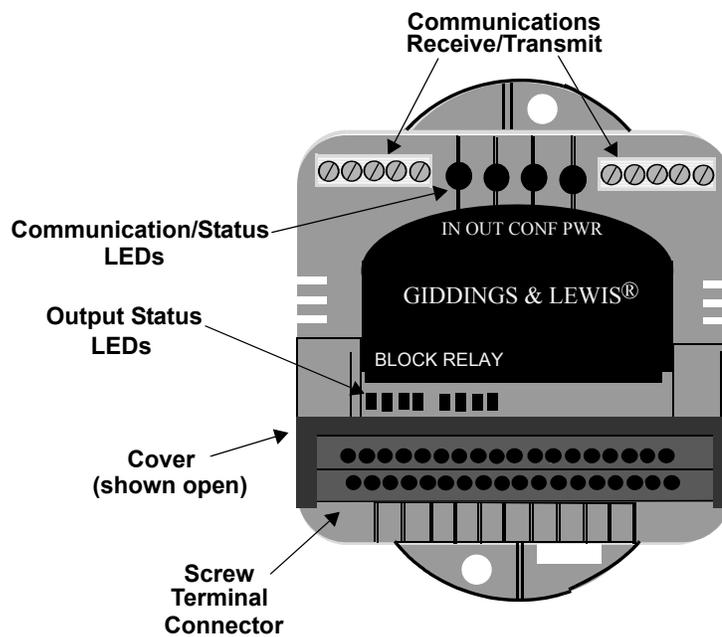
Characteristic	BlockOutput 120V AC module (8 Point)
Function	Switches an external AC source to 8 loads
Part number	M.1300.4948
AC source requirements	Nominal 115 VAC, range 48 to 138 VAC
Field side connector	Two 12-pin connectors, screw terminals
Protection of logic circuits	Optical isolation between the logic and field side; Transient protection on outputs.
Arrangement of outputs	Two groups of 4 solid-state switches. Each group can use its own AC source, or one source can be daisy-chained. UL 508 spacing
Fuse per group of 4	Fast-acting, UL rated 3A
Maximum current per group	2A of continuous current for the group; 4 points each switch is rated at .75 A continuous
Indicator lights, output circuits	An LED for each output
Indicator light, fuses	A logic side LED lights to indicate a condition when power to a group is missing or has an open fuse.
Switch characteristics	Solid-state switches.
Switch voltage, maximum ON	1V AC @ .75A RMS
Surge current, maximum	20 A for 2 cycles, every 2 seconds; fuse blows if this is exceeded.
Frequency	50 / 60 Hz. \pm 5%
Time delay on, maximum	1/2 cycle (turns on at zero voltage)
Time delay off, maximum	1/2 cycle (turns off at zero voltage)
Minimum load current	50 mA
Leakage current in OFF state, maximum	4 mA @ 120 VAC
Module power requirements	65 mA from an external 24V DC supply (20 to 30V DC range) NOTE: 2.5A, 250 microsecond inrush at power on

Block Relay Module (8 points)

The relay output module can switch eight relay contacts. Four relays are normally open (NO)/normally closed (NC) form C type and four are normally open (NO) form A type.

Eight LEDs in the upper section of the module indicate the logic state that drives each relay.

Block Relay Module (8 Point)



Specification Table

Characteristic	Output relay (8) module specification
Function	Switches eight relay contacts
Part number	M.1300.4981
Field side connector	Two 12 pin connectors, screw terminals
Output channels	4 NO, 4 NO/NC
Relay characteristics Contact types	Four form C (NO/NC) Four form A (NO)
Maximum switching voltage	150 VAC resistive load; 150 VDC resistive load
Minimum switching current	100 mA
Maximum switching power (DC)	200 watts @ 4 Amps maximum
Maximum switching current (AC)	0-120 VAC @ 4 Amps maximum
Initial contact resistance	100 mΩ
Turn on time (resistive load)	6 msec typical
Turn off time (resistive load)	2.5 msec typical
Expected life, electrical	10 ⁵ operations minimum
Expected life, mechanical	10 ⁷ operations minimum
Breakdown voltage between contacts	1000 V _{rms}
Logic side LEDs, input circuits	A yellow LED for each output
Module power requirements	120 mA from an external 24V DC supply (20 to 30V DC range) NOTE: 2.5A, 250 microsecond inrush at power on
Breakdown voltage between contacts and coil	4000 V _{rms}
Maximum switching frequency	20 energize/de-energize cycles/min. (to satisfy expected life ratings)
Indicator light, module	A logic side LED for each relay turns on when the logic side energizes the relay.
Isolation	Electromechanical relay provides protection between logic and field side
24 Volts power requirements	205 mA max
Operating temperature range	7° C to 55° C (45° F to 131° F) *

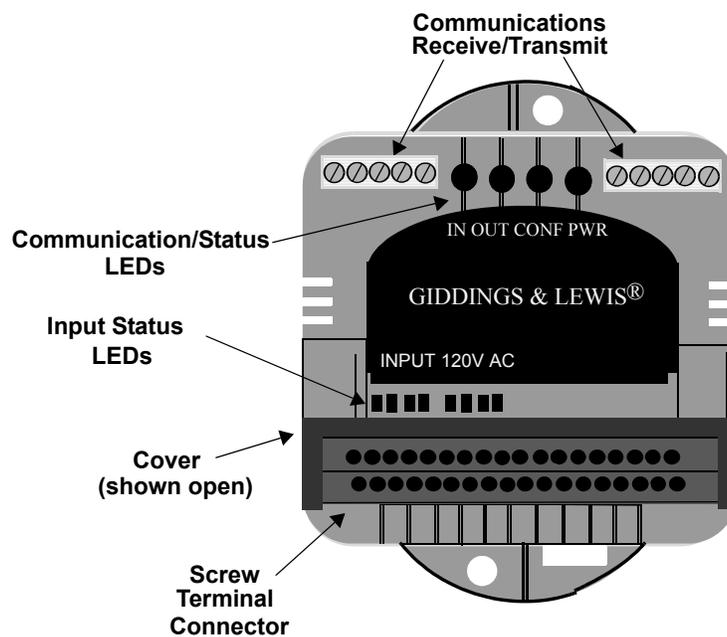
* To conform to temperature specifications, the unit must be mounted vertically.

Block Input 120V AC Module (8 points)

The input 120V AC module converts AC signals from 8 devices into logic levels that the CPU can use. Each signal is converted into a corresponding logic 1 or 0. An "on" signal is nominally 120 VAC, but can be any level between 79 and 132 volts. An "off" signal is any level below 20 VAC. The wiring configurations may be sink or source.

8 LEDs in the upper section of the module indicate the logic state of each input.

Block Input 120V AC Module (8 Point)



Specification Table

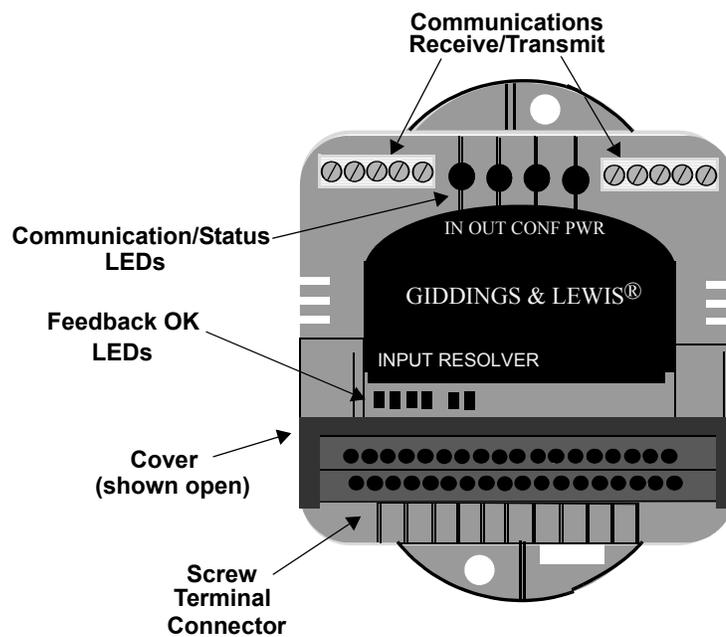
Characteristic	Block Input 120V AC Module
Function	Monitors on/off states from up to 8 AC voltage inputs
Part number	M.1017.4298
Field side connector	Two 12 pin connectors connectors, screw terminals
Input signals	Nominal 120 VAC on, 0 VAC off, conforming to IEC Type 1 inputs per IEC 1131-2 (two groups of four inputs)
UH Max (max. allowed voltage)	132 VAC
IH Max (max. current @ 132 VAC)	8.7 mA
UL Min	0 V
Guaranteed on	79 VAC
IH Min (min. current @ UH Min)	4.6 mA
Guaranteed off	20 VAC
IT Min (current allowed when off)	1 mA
Frequency	50/60 Hz \pm 5%
Time delay on, max.	14 ms
Time delay off, max.	20 ms
Protection of logic circuits	Optical isolation between the logic and field sides, 1780 VAC
Field side power dissipation, worst case	9.2 W
Module power requirements	45 mA from an external 24V DC supply (20 to 30V DC range) NOTE: 2.5A, 250 microsecond inrush at power on

Block Input Resolver Module (6 channel)

The block input resolver module can interface to 6 independent resolvers (or equivalent transducers). Feedback information from the resolvers is used to update the on-board memory. The position of each resolver can be read at any time.

The module generates two sine waves (RPO and QPO) 90° out of phase with each other and each channel receives a signal whose phase represents the angular position of the resolver. The resolution of the angular position is 4000 counts per revolution or 0.09 degrees.

Block Input Resolver Module (6 Channel)



Specification Table

Characteristic	Block Input Resolver (6 ch) Module Specifications
Function	Measures the position of a transducer that accepts a 2-phase quadrature excitation, such as a resolver or potentiometer
Part number	M.1017.3138
Field side connector	Two 18 pin connectors, screw terminals
Excitation method	2-phase quadrature for control transformer type of resolver
RPO and QPO outputs	
Frequency	4KHz
Output voltage	15 V _{P-P} (5.3V _{RMS})
Current per output channel, max.	100 mA
Resolver	
Transformer Ratio	.5 to 1.0
Resolution, resolver	4000 Feedback Units (FUs) per electrical revolution
Resolution, potentiometer	1000 Feedback Units (FUs) per electrical revolution
Accuracy at constant temperature	± 12 arc minutes
Accuracy over temperature range	± 5.4 arc minutes /10°F
Velocity, max.	15000 electrical RPM (1M FU/Sec.)
Cable length, max.	6 ft. from module to terminal block (18 AWG) 100 ft. from terminal block to resolvers (twisted pair)
Stored position value range	0-3999
Module power requirements	200 mA from an external 24V DC supply (20 to 30V DC range) NOTE: 2.5A, 250 microsecond inrush at power on
Recommended resolver	Giddings & Lewis part number M.1200.0399 Harowe 11BRW 300-F-1/10
Other suggested resolvers	Clifton 11BHW-0IE/A004 Kearfott CR410959

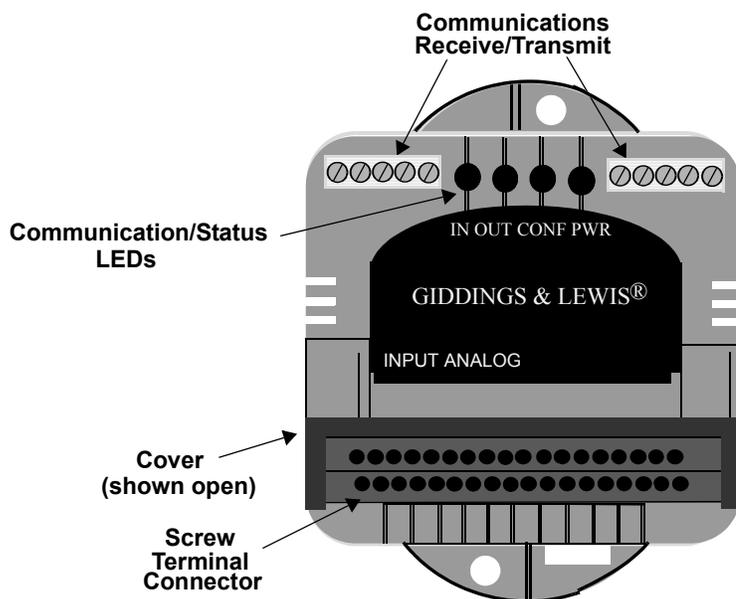
Block Input Analog Module (4 Channel)

The block analog input module is designed to interface with voltage or current output devices to monitor such things as pressure, flow, speed, position, or temperature.

The module has four independent analog conversion channels. Each channel converts a unipolar or bipolar analog input voltage or current into a 14-bit digital value.

There is an internal current sense resistor for each channel for use with 0 to 20 mA or 4 to 20 mA devices. This module contains no user adjustable potentiometers or hardware switches. All necessary gain adjustments are done in software.

Block Input Analog Module (4 Channel)



Specification Table

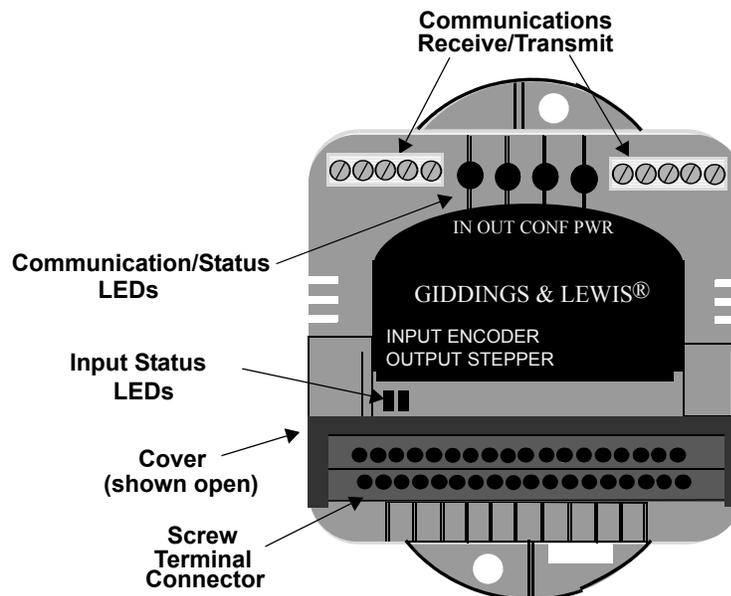
Characteristic	Block Input Analog (4 ch) module specification
Function	Converts an analog input signal into a 14-bit digital word for each of four channels.
Part number	M.1017.3098
Field side connector	Two 12 pin connectors, screw terminals
Input channels	4
Resolution	14 bits, or 16384 steps over the full input range
Input sensitivity (software selectable)	
Voltage ranges	Unipolar Bipolar 0 to 10 V ±10 V 0 to 5 V ±5 V
Current range	0 to 20 mA, 4 to 20 mA
Common mode maximum voltage (The maximum voltage that can safely be applied between either input terminal and circuit common.)	±35V with power on ±20V with power off
Internal current sense resistor	250 ohms
Maximum current sense resistor power	.12 W
Differential input resistance (each input to ground)	1 M Ohms
Filter time constant	1 ms
Accuracy of 4-20 mA range	14-bit - .15% of FSR at 25°C ± 100 PPM /°C
Accuracy of all other ranges	14-bit - .2% of FSR at 25°C ± 100 PPM /°C
0 Offset	±5 counts @ 10V
Module power requirements	160 mA from an external 24V DC supply (20 to 30V DC range) NOTE: 2.5A, 250 microsecond inrush at power on

Block Output Stepper/Input Encoder/ Input 24V DC Module (2/2/2 Channel)

This block I/O module provides the following:

- Two output stepper channels
- Two input encoder channels
- Two 24V DC inputs

Block Output Stepper/Input Encoder/Input 24V DC Module (2/2/2 Ch)



Specification Table

Characteristic	Block Output Stepper/Input Encoder/Input 24V DC (2/2/2 ch)
Function	Includes two stepper outputs, two encoder inputs and two DC inputs
Part number	M.1017.3143
Field side connector	Two 18-pin connectors, screw terminals
Module power requirements	300 mA from an external 24 VDC supply (20 to 30 VDC range) NOTE: 1.1 A, 250 microsecond inrush at power on
Current output from +5V Out pins	500 mA total available from the module
Stepper Section	
+V input (from external supply)	4.5 VDC to 20 VDC, 45 mA per connected channel
Step/CW output rating Direction/CCW output rating	Totem pole, 15 mA sink, 5 mA source
Protection of logic circuits	Optical isolation between the logic and field side
Position range	±2,147,352,575 steps
Step rate	0 to 1,000,000 steps/sec
Step rate accuracy	$ActualRate = \frac{10 \times 10^6}{X}$ <p>where X is the integer quotient of $\frac{10 \times 10^6}{ProgrammedRate}$</p>
Acceleration/deceleration rate	1 to 16,777,215 steps/sec/sec
Reference range	±2,147,352,575 steps
Response to scan loss	Pulse output halted
Encoder Section	
Encoder (A, B, and index)	2231 Differential Receiver
Guaranteed on, min.	2.5 VDC @ 2.5 mA
Input voltage, max.	7 VDC
Input current, max.	22 mA @ 7 VDC
Signal pulse width, min.	.6 μs(600 ns)
Quad signal freq, max.	250 KHz for A or B input (1 M FU count rate)
Encoder device	Quadrature type incremental encoder
Position range	24-bit up/down counter
Cable length, max.	200 ft. @ 250 KHz and 45° quad error
DC Input Section	
Input signals (meet IEC standards)	Nominal 24 VDC on, 0 VDC off
UH Max (max. allowed voltage)	30 VDC
IH Max (max. current @ 30 VDC)	7.5 mA
UL Min	Polarity independent
Guaranteed on	15 VDC
IH Min (min. current @ UH Min)	2.8 mA

Block Output Stepper/Input Encoder/ Input 24V DC Module (2/2/2 Channel)

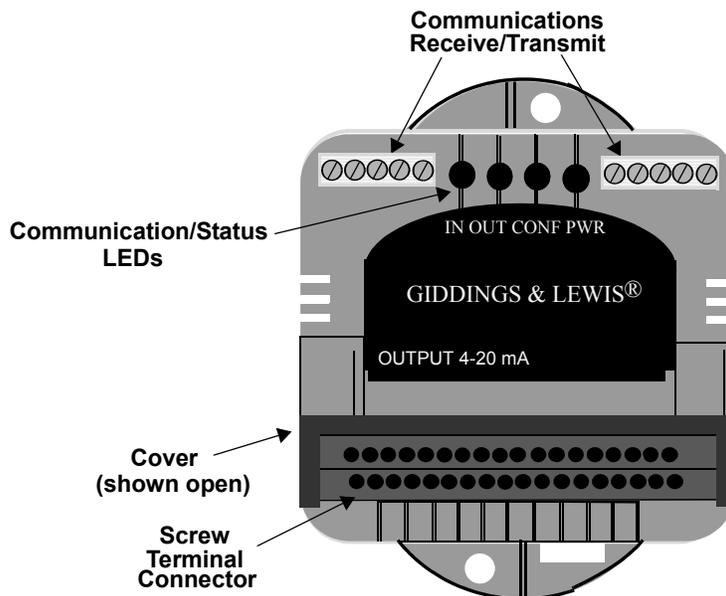
Guaranteed off	5 VDC
IT Min (current allowed when off)	.75 mA
Time delay on	1 ms max.
Time delay off	1 ms max.
Protection of logic circuits	Optical isolation between the logic and field sides, transient suppression on the 24V external supply
DC inputs	IEC Type 1 inputs per IEC 1131-2. UL 508 spacing
Logic side LEDs, input circuits	A yellow LED for each input

Block Output 4-20mA Module (4 Channel)

The block 4-20mA output module has four independent 4-20mA conversion channels. Each channel converts a 15-bit digital value into a single ended type 4-20mA analog current output signal. The full range of the output signal is 4mA to 20mA, with a 15-bit resolution of one part in 32,768.

A typical use for this module is to supply a control signal to valves. This module contains no user-adjusted potentiometers or hardware switches. All necessary adjustments are done in software.

Block Output 4-20mA Module (4 Channel).



Specification Table

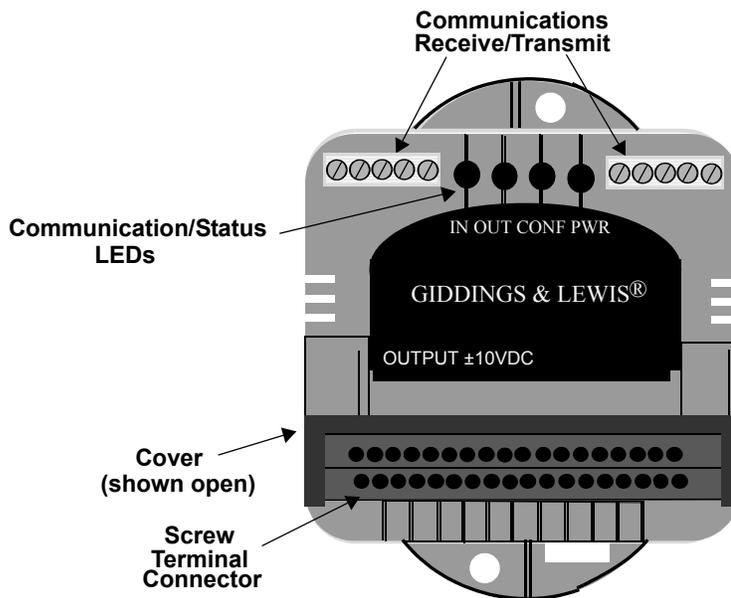
Characteristic	Block Output 4-20mA (4 ch) specification
Function	Converts a 15-bit digital value into a 4-20mA analog current signal for each of four channels
Part number	M.1017.3101
Field side connector	Two 12 pin connectors, screw terminals
Output channels	4
Resolution	15 bits, or 32,768 steps over the full output range
Output characteristics @24V DC supply, with temperature = 25° (77°F)	
Accuracy	.25% FSR (Full Scale Range)
Output current, max.	20 mA
Output voltage after power up	$V_{OUT} = 4mA * R_{LOAD}$
Response to "scan loss"	All outputs reset to 4mA
Short circuit protection	Current is limited to: $I_{OUT} =$ where $I_{OUT} = 4$ to 20mA
Module power requirements	200 mA from an external 24V DC supply (20 to 30V DC range) NOTE: 2.5A, 250 microsecond inrush at power on

Block Output $\pm 10V$ DC Module (4 Channel)

The output $\pm 10V$ DC module has four independent D/A conversion channels. Each channel converts a 16-bit digital word into a differential type analog output signal. The full range of the output signal is - 10 V to + 10 V, with a resolution of 1 part in 65,536.

This module contains no potentiometers or hardware switches. All necessary adjustments are done in software.

Block Output $\pm 10V$ DC Module (4 Ch)



Specification Table

Characteristic	Output $\pm 10V$ DC module specification
Function	Converts a 16-bit digital word into a $\pm 10 V$ analog signal for each of the four channels.
Part number	M.1017.3140
Field side connector	Two 12 pin connectors, screw terminals
Output channels	4
Resolution	16 bits, or 65536 steps over the full output range
Output voltage characteristics @24V DC supply, with temperature = 25° (77°F)	
Nominal voltage range	$\pm 10 VDC$
Voltage accuracy	$\pm 1\%$ FSR (Full Scale Range)
Output current, max. @ $\pm 10V$	$\pm 10 mA$ (1K Ω resistor)
Output voltage after power-up	0 V $\pm 50 mV$
Response to scan loss	All outputs reset to 0 V $\pm 50 mV$
Short circuit protection	Current limited options

Block Input/Output Analog Module (4 In 4 Out)

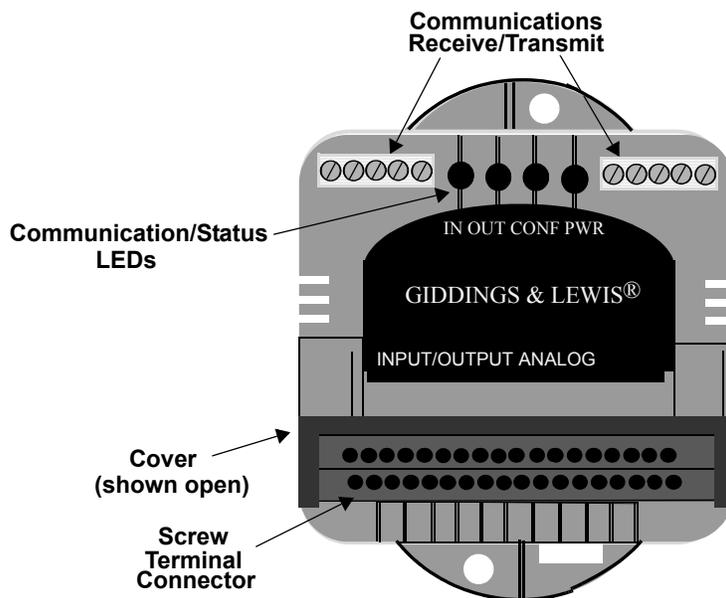
The analog input section is designed to interface with voltage output devices to monitor such things as pressure, flow, speed, position, or temperature.

This section has four independent analog conversion channels. Each channel converts a unipolar or bipolar analog input voltage or current into a 14-bit digital value.

An external current sense resistor can be added for each channel for use with 0 to 20 mA or 4 to 20 mA devices. This analog input section of the module contains no user adjustable potentiometers or hardware switches.

The analog output section has four independent D/A conversion channels. Each channel converts a 16-bit digital word into an analog output signal. The full range of the output signal is - 10 V to + 10 V, with a resolution of 1 part in 65,536. This section contains no potentiometers or hardware switches.

Block Input/Output Analog Module (4 In 4 Out)



Specification Table

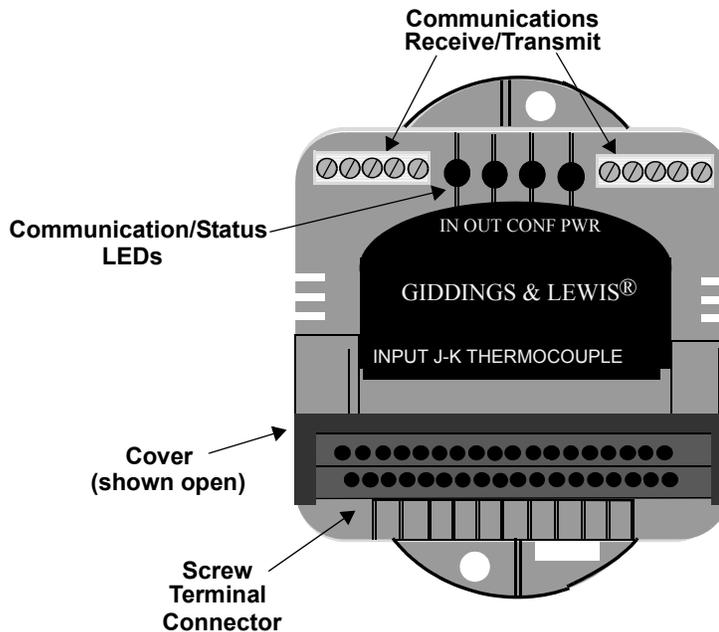
Characteristic	Block Input/Output Analog Module (4 In 4 Out) Specification
Function	Converts an analog input signal into a 14-bit digital word for each of four channels. Converts a 16-bit digital word into a ± 10 V analog signal for each of four channels.
Part number	M.1301.4145
Output channels	4
Input channels	4
Resolution	14 bits, or 16384 steps over the full input range, 16 bits, or 65536 steps over the full output range.
Voltage Range	Output ± 10 V, Input ± 10 V
Maximum Output Current (1K Ω load)	± 10 mA
Power on output voltage	0V ± 100 mV
Scan loss output voltage	0V ± 100 mV
Accuracy	Analog Output $\pm 0.375\%$ of FSR Drift ± 50 ppm/ $^{\circ}$ C, Analog Input $\pm 0.25\%$ of FSR
Sample Rate	800 μ sec (200 μ sec per channel)
Update rate	200 μ sec (50 μ sec per channel)
Common mode filter	3 dB @ 10 KHz
Differential mode filter	3 dB @ 475 Hz
Field side connector	Two 18 pin connectors, screw terminals
Module power requirements	120 mA from an external 24V DC supply (20 to 30V DC range)

Block Input J-K Thermocouple Module (8 channel)

The input J-K thermocouple module has independent thermocouple or analog conversion channels which receive signals from J or K type thermocouples or from a voltage source. Each channel converts an analog signal into a 14-bit digital word.

This module requires no hardware adjustments. All adjustments such as Fahrenheit or Celsius scaling and thermocouple ranges are software selectable.

Block Input J-K Thermocouple (8 Channel)



Specification Table

Characteristic	Thermocouple module specification
Function	Measure J or K type thermocouple wire inputs or ± 100 mV analog inputs
Part numbers	M.1301.9806
Input channels	8
Resolution	14 bits (13 bits and sign bit)
Input voltage sensitivity (software selectable)	± 100 mV max
J type thermocouple temperature ranges (at 25°C)	-150°C to 1200°C (-238°F to 2192° F) -35°C to to 620°C (-31°F to 1148° F) -10°C to 280°C (+14°F to 536° F)
K type thermocouple temperature ranges (at 25°C)	-200°C to 300°C (328°F to 2372° F) -80°C to 20°C (-112°F to 1508° F) -35°C to 415°C (-31°F to 779° F)
J or K type accuracy	J type .26% of the 1350°C span K type .23% of the 1500°C span
± 100 mV accuracy	$\pm .1\%$ full scale
Time between samples	47 msec
Noise rejection	-150 dB @ 60 Hz common mode -7 dB @ 60 Hz differential mode
Cold junction compensation	Over full temperature range of module
Open thermocouple detection	Indicated by software
Module power requirements	60 mA from an external 24VDC power supply (20 to 30 VDC range)

Block Input J-K Thermocouple Module (8 channel)