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MISTIC 200 FAMILY DATA BOOK

Form 532-9508015—August 1995

OPTO 22

43044 Business Park Drive • Temecula, CA 92590-3614

Phone: 800/321-OPTO (6786) or 909/695-3000

Fax: 800/832-OPTO (6786) or 909/695-2712

Internet Web site: <http://www.opto22.com>

Product Support Services:

800/TEK-OPTO (835-6786) or 909/695-3080

Fax: 909/695-3017

E-mail: support@opto22.com

Bulletin Board System (BBS): 909/695-1367

FTP site: [ftp.opto22.com](ftp://ftp.opto22.com)

***mistic* 200 Family Data Book**
Form 532-950803—August 1995

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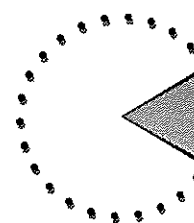
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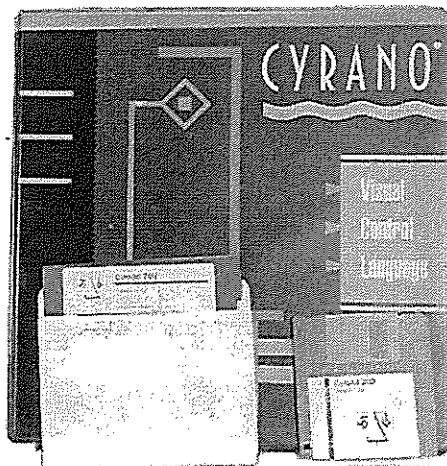
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®

mistic
CONTROLLER



OPTO 22

**CYRANO 200
SOFTWARE**

MODEL CYRANO 200

DESCRIPTION

CYRANO 200 is a powerful, easy-to-use software package for Opto 22's *mistic* 200 industrial control system. Cyrano lets you represent control logic in a visually intuitive flowchart format.

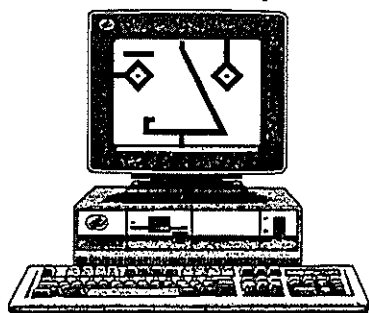
FEATURES

- ♦ Dramatically Reduces Software Development Time
- ♦ Generate Solutions By Drawing Charts
- ♦ Debug By Watching Execution Of Chart
- ♦ Floating-point Math
- ♦ Full Function ASCII String Library
- ♦ High Performance, Multitasking Solutions
- ♦ Non-proprietary Communications Protocol For Networked Applications
- ♦ ARCNET Networking Support
- ♦ Stand Alone As Well As Networked Solutions
- ♦ All Text In Programming Environment Contained In ASCII Files
- ♦ Define Control In Direct Terms (i.e., 'Turn On Pump #5')
- ♦ Develop Control Solutions Over Complete Spectrum Of Industrial Applications
- ♦ No Copy Protection
- ♦ Mouse And Menu Driven

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DEVELOP, DOWNLOAD, ***RUN*** AS EASY AS 1...2...3

1. **Develop** application on PC Workstation using CYRANO 200.



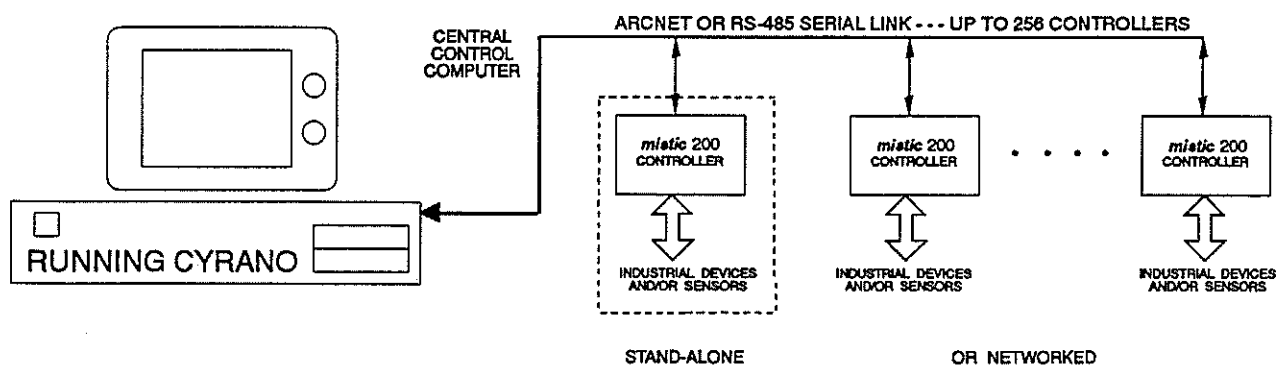
DEVELOP APPLICATION

MINIMUM HARDWARE CONFIGURATION

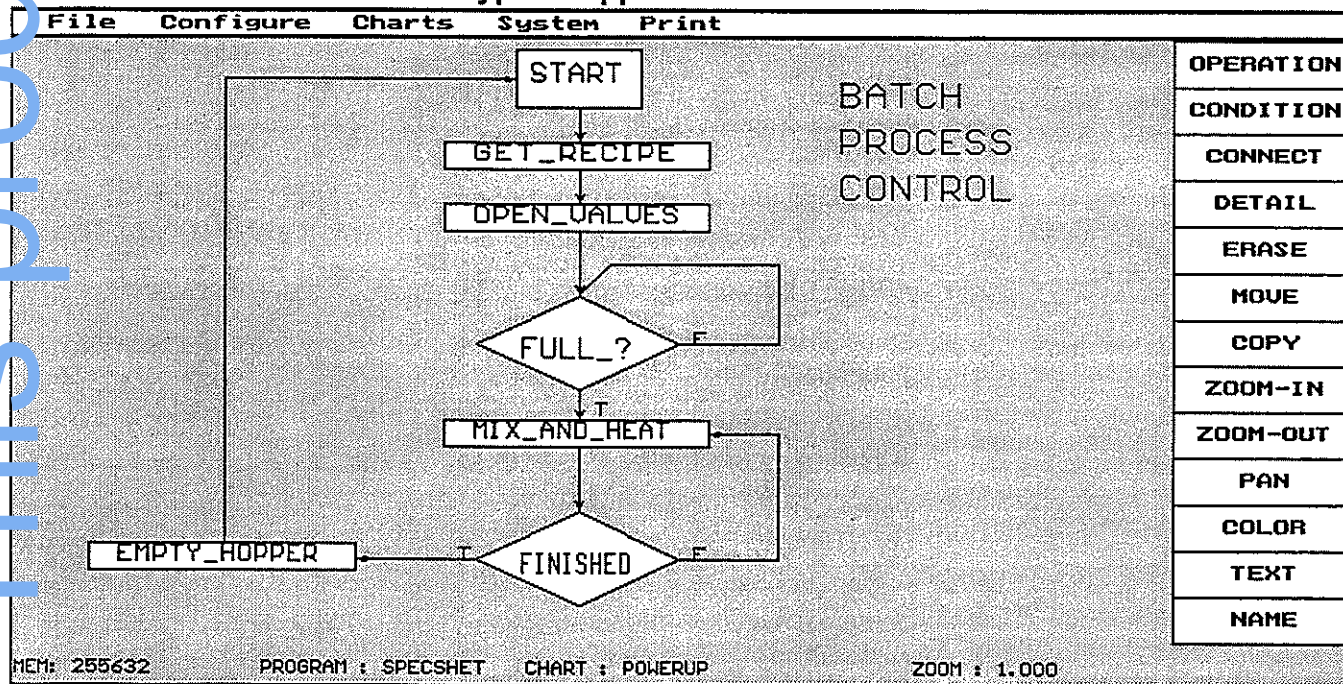
IBM PC / AT or EQUAL WITH:

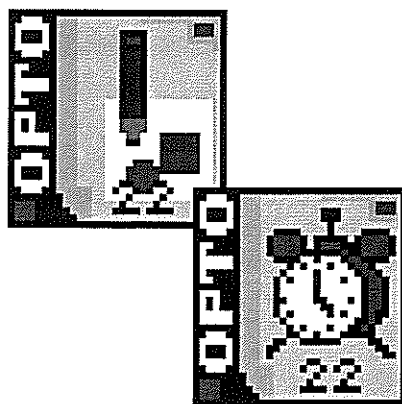
- * 640Kbytes RAM
- * Hard Disk
- * EGA / VGA Video Adapter (256K card)
- * Mouse
- * Serial / Parallel Port

2. **Download** application to a *mistic* 200 controller and debug using CYRANO debugger running on PC workstation.
3. **Run** application stand-alone or networked.



Typical Application Flowchart





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mistic MMI

DESCRIPTION

mistic MMI is a sophisticated operator interface software package for Opto 22's *mistic* 200 control system. Utilizing the Microsoft Windows™ graphical user interface, the user can quickly and easily build complex graphics screens to access I/O, control variables, log data to disk, trend real-time information, and much more. Network support provides easy access to all *mistic* processors on the link, allowing supervisory control and monitoring from any MMI station.

The MMI is tightly integrated with all Opto 22 *mistic* 200 hardware, taking full advantage of the on-board intelligence of the processor and smart I/O brick functions. The high degree of integration between the Cyrano control software and the MMI means two databases and typing in tag names are a thing of the past. This seamless coupling between the real-time control layer and the operator interface world translates into a massive savings in total project development time and costs.

FEATURES

- ◆ Tightly Integrated with Cyrano Control Software and *mistic* 200 Hardware
- ◆ Single Database - Uses Tag Names Generated from User's Cyrano Control Program
- ◆ Sophisticated Object Oriented Draw Environment
- ◆ Ability to Import Bitmapped Graphics
- ◆ Built-in Object Symbol Library
- ◆ Real-time Trending
- ◆ Historical Logging to Disk
- ◆ Multimedia Sound Card Support
- ◆ Complete Object Animation
- ◆ Full *mistic* 200 ARCNET Network Support
- ◆ On-line Help
- ◆ Save Acquired Data in Delimited ASCII for Easy Importation into Spreadsheets, Word Processors, SQC, and SPC Programs
- ◆ No Site Licenses or Copy Protection

THE WORKSPACE ENVIRONMENT

Architecture

mistic MMI is comprised of two parts; the configurator and the runtime. The configurator is a powerful but easy to use, object based draw package. In the configurator, the user designs the graphics, applies dynamic animation attributes, and connects to Cyrano data to be accessed by the runtime environment. The runtime environment is used to access the desired real-time data and apply the dynamic attributes designed in the configurator.

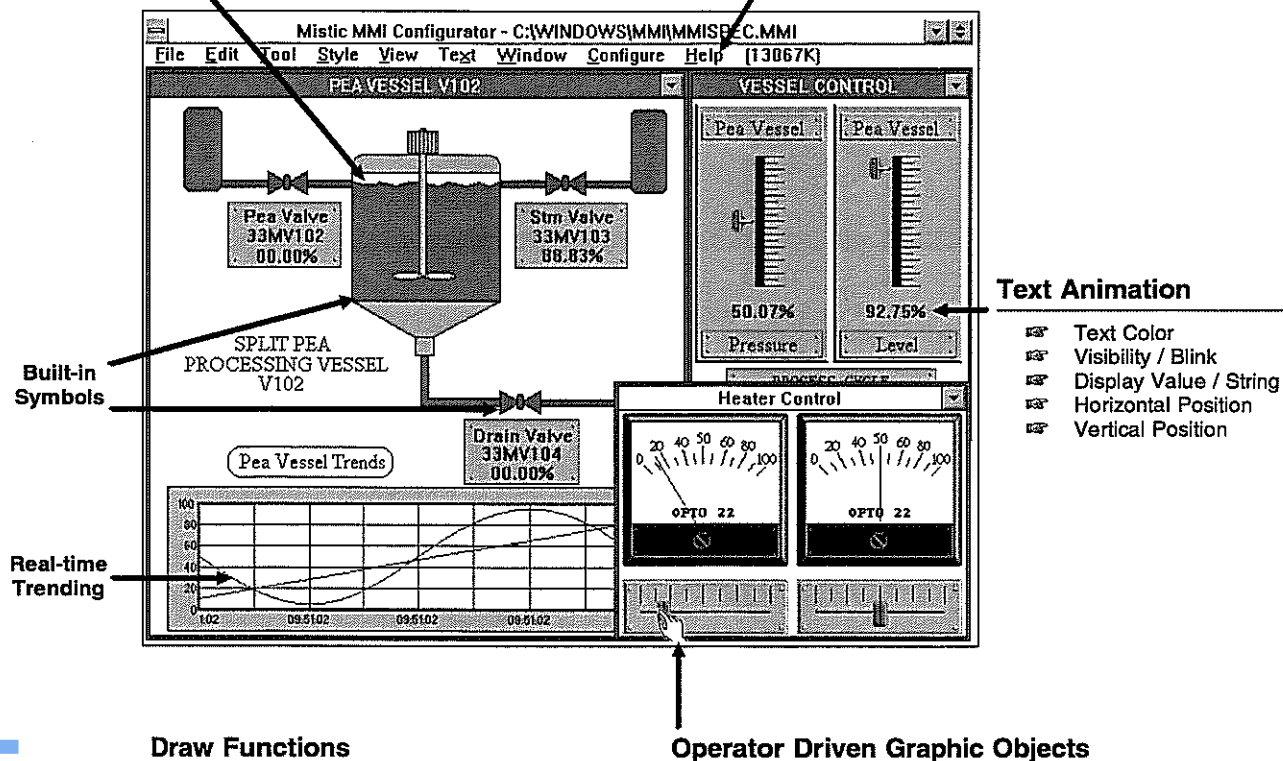
Controller Driven

Object animation is determined by the status of Cyrano program data in the *mistic* 200 controller.

- ☛ Line Color
- ☛ Fill Color
- ☛ Visibility / Blink
- ☛ Horizontal Size
- ☛ Horizontal Position
- ☛ Vertical Size
- ☛ Vertical Position
- ☛ Rotate Object

On-line Help

A Context Sensitive help system saves wasted time normally spent wading through hardcopy documentation.



Draw Functions

These tools assist in quick and efficient screen formatting.

- ☛ Align Objects
- ☛ Bring to front
- ☛ Send to back
- ☛ Resize
- ☛ Snap Grid

Operator Driven Graphic Objects

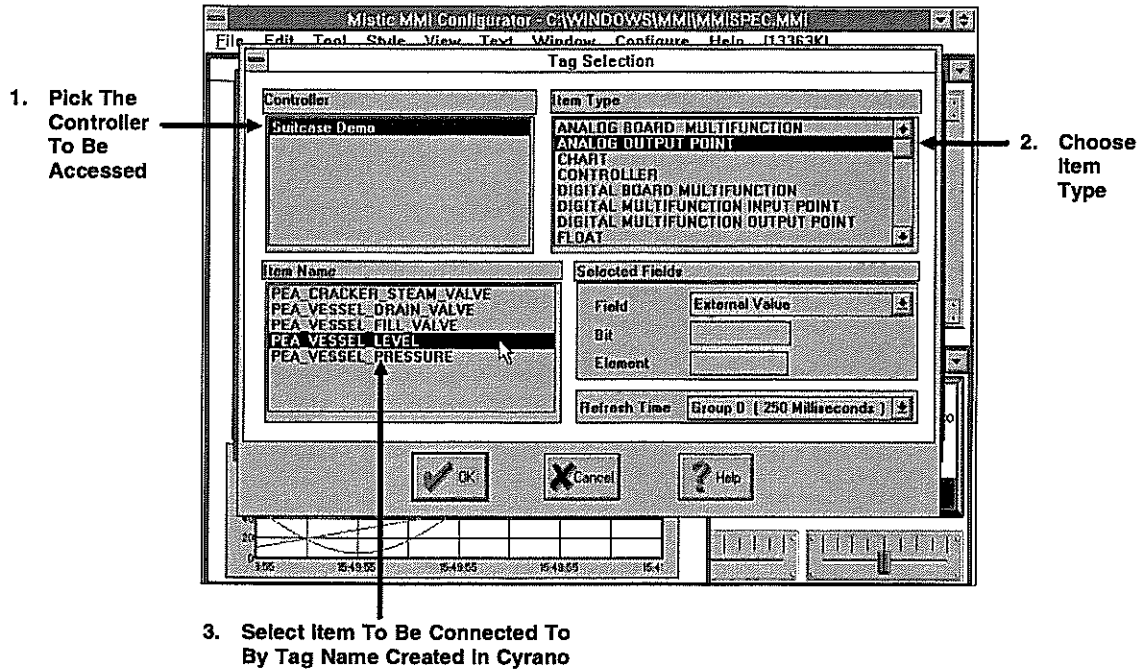
Permits users to manipulate Cyrano program data from the MMI runtime environment.

- ☛ Horizontal Slider
- ☛ Vertical Slider
- ☛ Touch - Pop Window
- ☛ Touch - Send Value to Controller
- ☛ Touch - Send Discrete to Controller
- ☛ Touch - Send String to Controller

THE WORKSPACE ENVIRONMENT

Connecting An Object To The Controller

A unique shared database approach allows the *mistic* MMI to access data generated by the Cyrano control program directly by tag name. Because this selection process is completely menu driven and only valid data types can be selected, typographical and syntactical errors are eliminated. Tying a graphic object created in the MMI Configurator to the desired Cyrano data is accomplished by double clicking on the object and then selecting the proper Cyrano item from a series of menus.

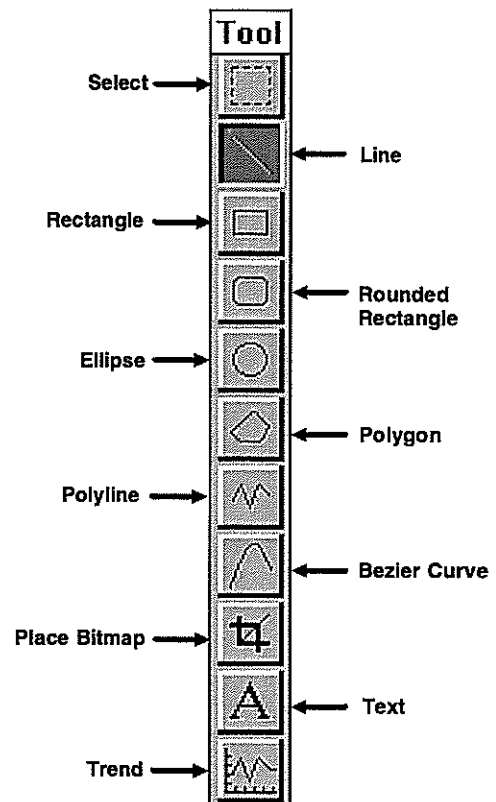


Drawing

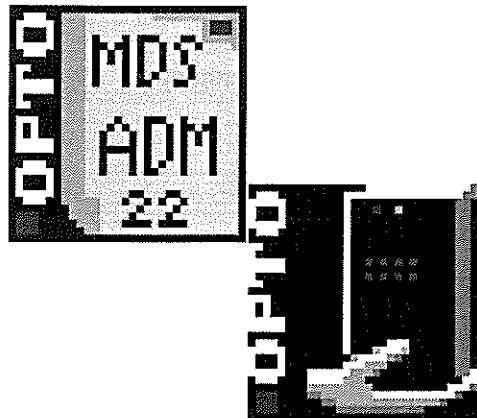
The MMI configurator contains a comprehensive set of drawing tools that enable the user to create complex graphic objects. Bitmapped images can be imported and animated or used as backdrops to provide additional graphic detail.

Animation

Any object can be assigned one or more dynamic animation attributes. An object can have its fill color controlled by an analog output and have its vertical position determined by a floating point variable. The same object can also be configured to send data to the controller when accessed by the user at runtime.



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mistic Data Server MDS

DESCRIPTION

Implement client/server architectures for real-time data reporting from *mistic* systems with the *mistic* Data Server (MDS) software package. Based on Microsoft's Dynamic Data Exchange (DDE) protocol and Windows for Workgroups' networking features, MDS shares *mistic* controller information with *mistic* MMI and DDE-aware software applications such as Microsoft Excel, Word, and Visual Basic. MDS reads any control object item (variable, PID parameter, table, I/O point, etc.) available from a *mistic* controller and reports all changes in data to registered clients. A backup server capability for the *mistic* MMI provides uninterrupted service in the event the main MDS server fails.

MDS is ideal for integrating a factory floor of *mistic* systems throughout an entire enterprise.

FEATURES

- ♦ Client/server based
- ♦ Real-time data updates
- ♦ Seamless integration with *mistic* MMI
- ♦ Third-party software data acquisition solution for *mistic* systems
- ♦ Backup server option for added protection of *mistic* MMI clients
- ♦ Operates over any network's physical layer (Ethernet, ARCnet, etc.)
- ♦ No copy protection

SYSTEM REQUIREMENTS

PC Hardware

IBM-compatible 386 personal computer (486 recommended)
Hard disk with 10 MB of free space
8 MB of RAM
Microsoft Mouse or other compatible pointing device
VGA or compatible display

Software

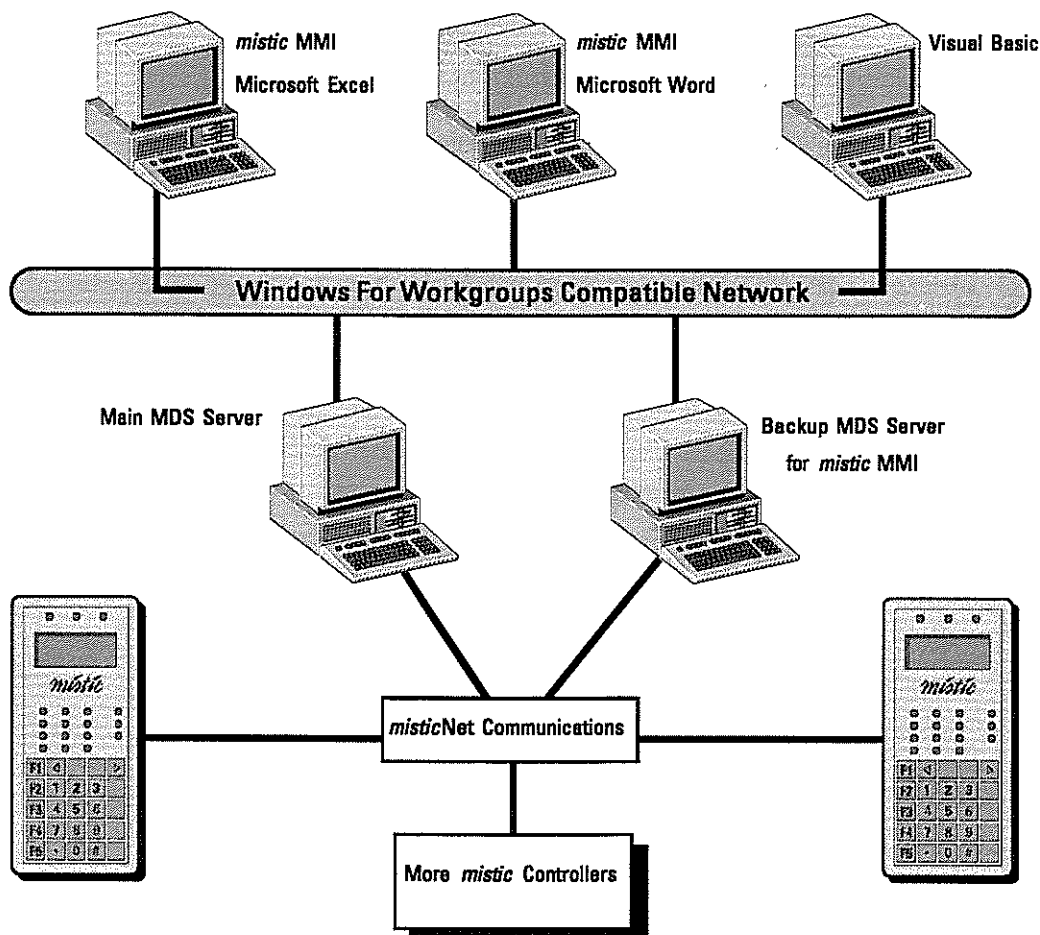
MS-DOS version 5.0 or later
Microsoft Windows for Workgroups version 3.11 or later
NetBIOS or NetBEUI-compatible network protocol (required for *mistic* MMI clients)

mistic Products

Any *mistic* controller with EPROM, version 1.43 or later
Cyrano software, version 1.5 or later
mistic MMI version 2.0 or above (optional)

SYSTEM CONFIGURATION

MDS in a *mistic* system



This product is obsolete.



OPTO 22

**SOFTWARE
DRIVER FOR *mistic*
MODEL 200 BRICKS**

MODEL *misticWARE*

DESCRIPTION

misticWARE is a software package designed to simplify the writing of application programs to control *mistic* 200 Bricks. The *misticWARE* package consists of:

- misticWARE* - A Set Of 'C' Functions And Examples For Interfacing Between *mistic* 200 Bricks And High Level Computer Languages
- misticSCAN* - Software Package Used To Debug *mistic* 200 Systems

FEATURES

- ♦ Fast Assembly Language Communications Subroutines
- ♦ Easy-to-use
- ♦ Works With Microsoft 'C', Borland's Turbo 'C', And Microsoft Quick Basic 4.5 And Above
- ♦ Works With Model 200 Local Or Remote Bricks
- ♦ Fully Supports Model 200 Brick Features Such As:
 - Event / Reaction Programming
 - Engineering Units
 - Interrupt Generation
 - PID Loops
- ♦ Supplied On Both 3.5 Inch, 720 Kb Format And 5.25 Inch, 360 Kb Format Floppy Disk
- ♦ Includes Full 'C' Language And Assembly Source Code
- ♦ Over 100 K Of Example Source Code

DESCRIPTION

The *mistic* 200 driver provides the software interface between the *mistic* 200 I/O units and an application program written in a high level language. The driver is written as a function call (subroutine) for use with the Borland Turbo C or Microsoft C languages. An example is also provided for using the driver with Microsoft's QUICKBASIC compiler.

The *mistic* driver is written for the IBM-PC family of computers using Borland's Turbo C 2.0 and the low level communication routines are written using Borland's Turbo Assembler 1.0. A small one-line change is required to compile the driver under Microsoft C. Complete source code is therefore included for your convenience.

The *mistic* 200 I/O driver performs the following functions:

- ◆ Builds and transmits *mistic* 200 I/O command messages
- ◆ Carries out all necessary handshaking and communications
- ◆ Converts the data returned by a *mistic* 200 I/O unit in a form that is easily manipulated By the application program
- ◆ Performs extensive error checking and returns diagnostic error codes

To use the *mistic* 200 I/O driver in an application program, one must know the following:

- ◆ How to call a 'C' function from an application program
- ◆ How to use a linker to link 'C' and Assembly modules in a program
- ◆ How to tell the driver what command to send by assigning values to the proper parameters
- ◆ How to interpret the data passed back by the driver

*mistic*WARE fully supports the AC37 and AC39 adapter cards for IBM or compatible AT class computers. The AC37 is used for Model 200 Remote Systems and the AC39 is used for Model 200 Local Systems.

The Event / Reaction Commands are an important feature of Model 200 Bricks. After the Event / Reaction Commands have been issued to a Brick, the host computer is no longer needed. When a trigger event occurs (i.e.; a set of digital inputs in a selected state or an analog peak value is reached), the corresponding reaction will happen (i.e.; turn on digital output or change analog PID setpoint).

The command set for *mistic*WARE can be grouped as follows:

- Setup / System Commands
- Digital Commands
- Analog Commands
- PID Commands
- Event / Reaction Commands
- Driver Configuration

For a complete description of each low-level *mistic* 200 I/O command, please refer to OPTO 22's *mistic* Analog and Digital Commands Manual (Form 270). On the following 2 pages is a list of all the driver commands available.

DRIVER COMMANDS

Setup And System Commands:

Power Up Clear
RESET
Set System Options
Store System Configuration in EEPROM
Identify Unit
Repeat Last Response
Set Serial Watchdog Time
Set Serial Watchdog Data For Outputs
Set Serial Watchdog MOMO* and Delay
Report ROM version/Revision Date

Digital Commands:

Set I/O Configuration
Read I/O Configuration
Read I/O Module State
Set Output Module State
Read Input Latches
Enable Counters
Disable Counters
Clear Counter
Read Counter Enable/Disable Status
Read 32-Bit Counters
Read and Clear 32-Bit Counters
Read 16-Bit Counter
Read and Clear 16-Bit Counter
Read Pulse/Period Complete Status
Read 32-Bit Pulse/Period Measurement
Read & Re-start 32-Bit Pulse/Period
Read 16-Bit Pulse Measurement
Read and Restart 16-Bit Pulse Measurement
Read Frequency Measurement
Read Event Latches
Read and Clear Event Latches
Read and Clear Positive Latch
Read and Clear Negative Latch
Read and Clear All Latches
Clear Output
Set Output
Start ON Pulse
Start OFF Pulse
Start Square Wave
Generate n Pulses
Set TPO** Channel
Set TPO %
Read Remaining Time On Pulse Output

Analog Commands:

Read Raw Input
Read Averaged Input
Read Peak
Read Low
Read Totalized
Read Input EUI***
Read Averaged Input EUI
Read Peak EUI
Read Low EUI
Read Totalized EUI
Read and Clear Raw Input
Read and Clear Averaged Input
Read and Clear Peak
Read and Clear Low
Read and Clear Totalized
Read and Clear Input EUI 32-bit
Read and Clear Averaged Input EUI
Read and Clear Peak EUI
Read and Clear Low EUI
Read and Clear Totalized EUI
Read Square Root of Raw Input
Read Square Root of Averaged Input
Read Square Root of Peak
Read Square Root of Low
Read Square Root of Totalized
Read Square Root of Input EUI
Read Square Root of Averaged Input EUI
Read Square Root of Peak EUI
Read Square Root of Low EUI
Read Square Root of Totalized EUI
Read and Clear Square Root of Raw Input
Read and Clear Square Root of Averaged Input
Read and Clear Square Root of Peak
Read and Clear Square Root of Low
Read and Clear Square Root of Totalized
Read and Clear Square Root of Input EUI
Read and Clear Square Root of Averaged Input EUI
Read and Clear Square Root of Peak EUI
Read and Clear Square Root of Low EUI
Read and Clear Square Root of Totalized EUI
Set Scaling Parameters
Set Totalize Parameters
Set Average Parameters
Calculate and Set Offset
Calculate and Set Gain
Set Offset
Set Gain
Ramp to Point

* MOMO - Must Be On, Must Be Off - Used To Set Or Test State Of Digital Outputs Or Inputs.

** TPO - Time Proportional Output.

*** EUI - Engineering Units Input.

Driver Commands (continued)

PID Commands:

Initialize PID Loop
Enable/Disable PID Options
Set PID Setpoint
Set Proportional Term
Set Integral Term
Set Derivative Term
Set Setpoint Max/Min Limits
Read PID Loop Raw Data
Read Control Word
Read Scan Rate Word
Read Output Counts
Read Loop Channels
Read Measure (Process Variables)
Read Setpoint
Read Output
Read Gain
Read Integral
Read Derivative
Read Max Setpoint Limit
Read Min Setpoint Limit
Set Output Max/Min Limits

Driver Configuration Commands:

Set Checksum Type
Set Turn-Around Delay
Set Port and Baud
Set Retries
Set Mode (BINARY or ASCII)
Set User Defined COM port
Read Driver Version and Date

Event Reaction Commands:

Clear Event Reaction Table
Clear Event Table Entry
Read Event Enable/Disable Status
Read ALL Events Enable/Disable Status
Enable Event
Disable Event
Enable ALL Events
Disable ALL Events
Read Event Table Entry
Read Event Latches
Read ALL Event Latches
Read and Clear Event Latches
Read and Clear ALL Event Latches
Enable Event Interrupt
Disable Event Interrupt
Set Event On A Communications Watchdog Condition
Set Event On MOMO Match
Set Event On Counter Greater or Equal
Set Reaction To A Null
Set Reaction To Write MOMO
Set Reaction To Start ON-PULSE
Set Reaction To Start OFF-PULSE
Set Reaction To Enable/Disable Counter
Set Reaction To Clear Counter
Set Reaction To Enable/Disable an Event
Set Reaction To Disable All Events
Set Reaction To Store Counter Value In Hold Buffer
Read Event/Reaction Hold Buffer
Set Event On Raw Input
Set Event On Averaged Input
Set Event On Peak
Set Event On Low
Set Event On Totalized
Set Event On Input EUI
Set Event On Averaged Input EUI
Set Event On Peak EUI
Set Event On Low EUI
Set Event On Totalized EUI
Set Reaction To Write Output
Set Reaction To Write Output EUI
Set Reaction To Ramp Output To an Endpoint
Set Reaction To Enable/Disable Event Groups
Set Reaction To Set PID SETPOINT
Set Reaction To Set PID Outputs MIN/MAX limits
Set Reaction To Enable/Disable PID Loop
Set Reaction To Store Analog Value In Hold Buffer
Event/Reaction Hold Buffer



OPTO 22

***mistic* 200 CONTROLLER**

MODEL G4LC32

DESCRIPTION

The G4LC32 Controller is a high performance real-time industrial microcomputer designed to work within the *mistic* 200 family of rugged and compact controllers and I/O units. A 32-bit 68020 microprocessor and a 68881 floating point math coprocessor are the heart and speed of the controller. Expandable battery backed RAM and Flash EPROMs can accommodate large user applications and data collection requirements. Four serial ports, an ARCNET port, and a high-speed local port provide flexible communication choices.

The controller is easily programmed with Cyrano 200, Opto 22's flow chart based programming language. Complex control problems are broken down into logical pieces with Cyrano's sequential logic presentation.

FEATURES

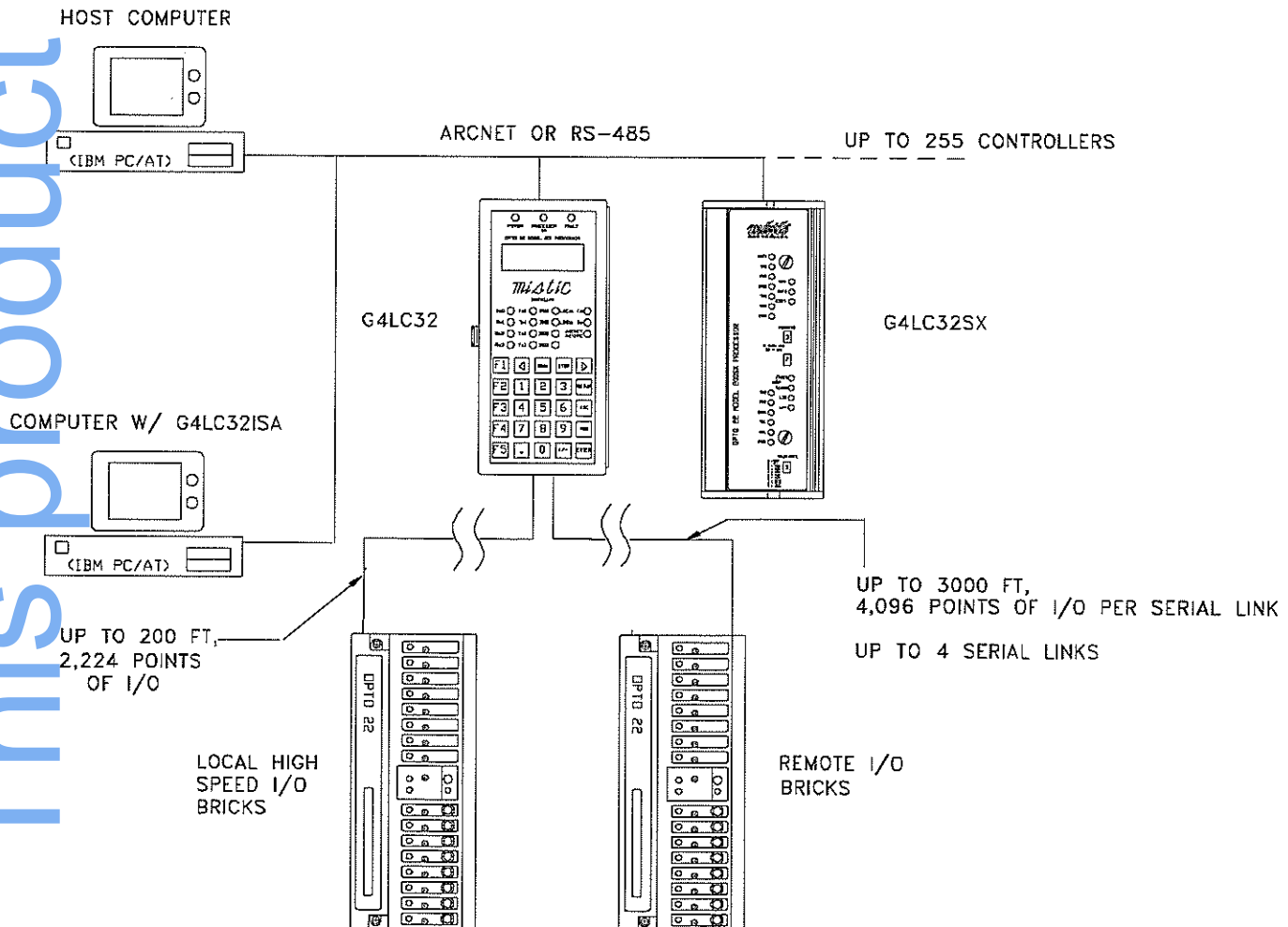
- ♦ 32-bit Microprocessor with 68881 Math Coprocessor
- ♦ IEEE Floating Point Math
- ♦ **Memory:**
 - RAM - 512 KB, Battery Backed
(Expandable to 4 MB)
 - FLASH EPROM - 512 KB
(Expandable to 1 MB)
- ♦ **I/O Interface:**
 - High-speed *mistic* 200 Local Bus
 - Two RS-232 or RS-422/485 Ports
 - Two RS-422/485 Ports
 - ARCNET Port
- ♦ 4-line by 20 Character Backlit LCD Display
- ♦ 25-button Membrane Keypad
- ♦ Controls up to 2224 Points of Local I/O, up to 16,384 Points of Remote I/O
- ♦ Up to 255 Controllers Per Network
- ♦ Compatible with *mistic* 200 Controller Software Drivers

SPECIFICATIONS

CPU:	Motorola 68020 32-bit microprocessor
NPU:	Motorola 68881 math coprocessor
Power Requirements:	5 VDC \pm 0.1 V at 2.0 A (at 25° C ambient)
Temperature:	0° C to 60° C (operating) 0° C to 50° C for LCD display (based on 5% to 95% relative humidity)
Communications:	Two full-duplex, RS-422/485 serial ports, 300-115.2 KBd Two full-duplex, combined RS-232 or RS-422/485 serial ports, 300-115.2 KBd One <i>mistic</i> 200 Local bus port, 1.44 MB/s One ARCNET port @ 2.5 Mbits/s
CPU Clock Frequency:	16.67 MHz
FLASH EPROM Memory:	512 KB, expandable to 1 MB
RAM:	512 KB with battery backup, expandable to 4 MB

SYSTEM CONFIGURATION

DISTRIBUTED CONTROL WITH HOST

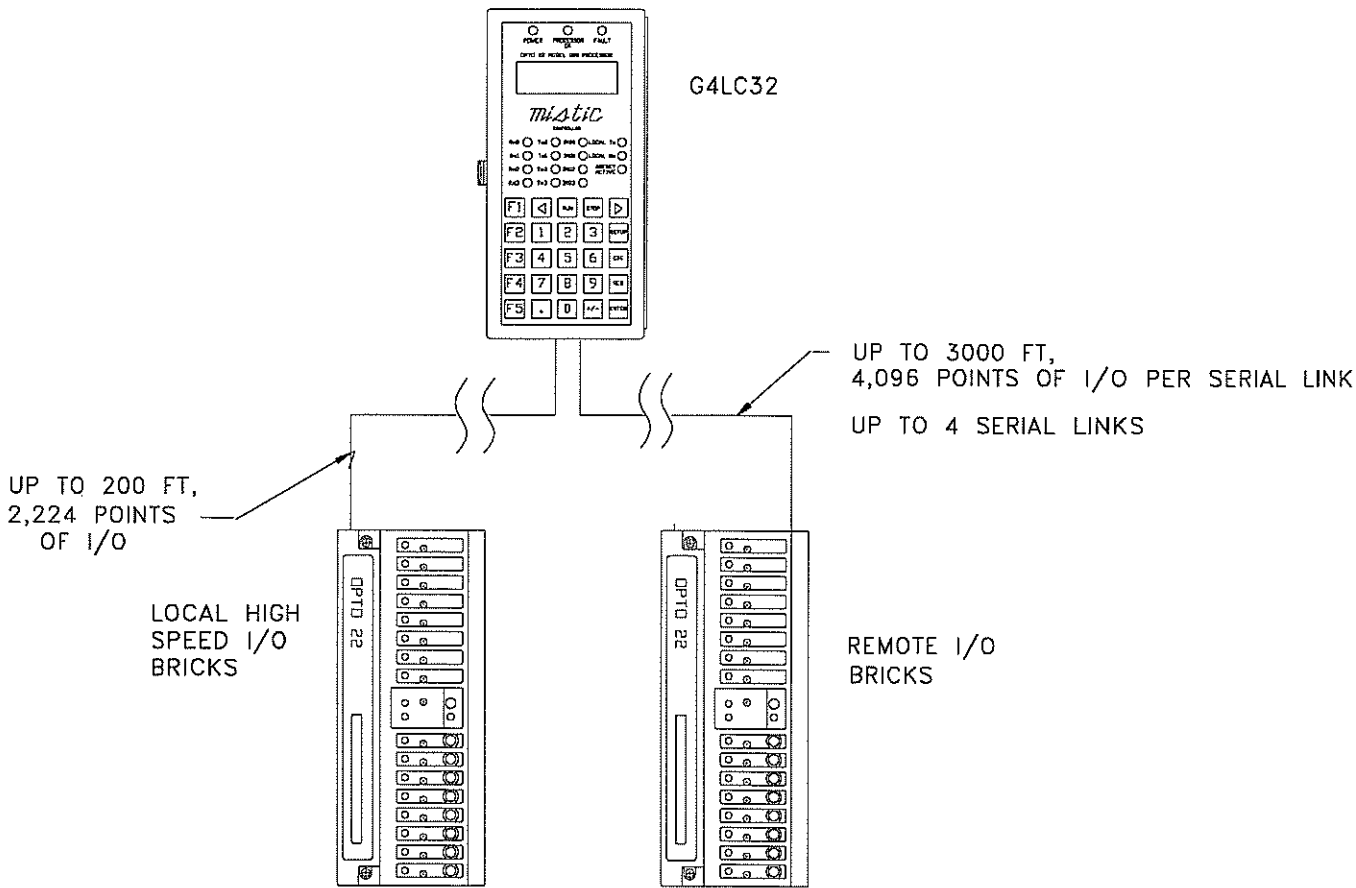


SPECIFICATIONS

Watchdog Timer:	Hardware
Real Time Clock:	Epson 62421A clock/calendar, with battery backup
Front Panel Display:	4 line by 20 character backlit LCD
Front Panel Keyboard:	25-button keypad
RAM/Clock Battery:	3.6 V lithium, non-rechargeable
Software:	Cyrano 200

SYSTEM CONFIGURATION

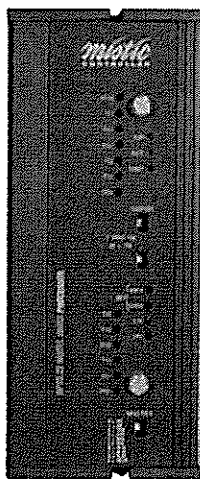
STAND ALONE



This product is obsolete.

®

mistic
CONTROLLER



OPTO 22

**MODEL 200 SX
CONTROLLER**

MODEL G4LC32SX

DESCRIPTION

The G4LC32SX is an economically priced high performance controller designed to work within the **mistic** 200 family of rugged, compact controllers and I/O units. A 32-bit 68020 microprocessor is the heart and speed of the controller. Up to four serial ports, a selectable ARCnet port, and a high speed local port offer flexible communication choices.

Programming is accomplished with Cyrano 200, Opto 22's revolutionary flow chart based CASE tool. Programs are transportable across the entire line of **mistic** 200 processors.

FEATURES

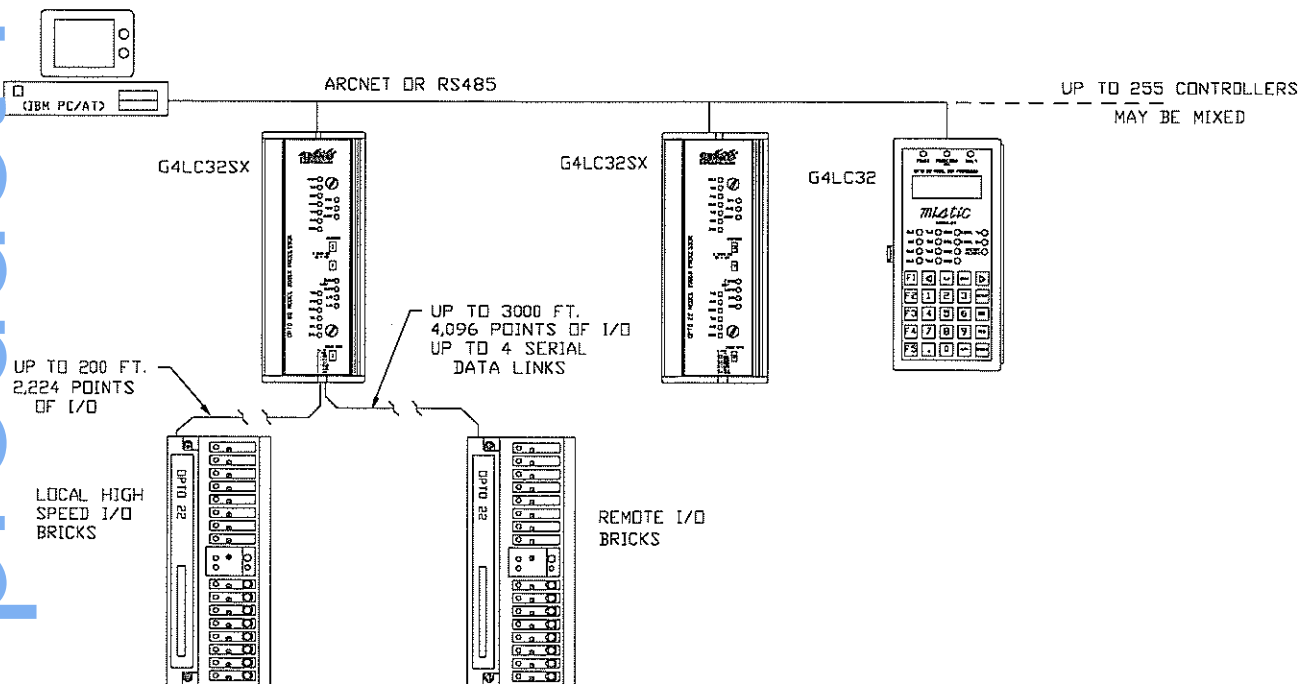
- ◆ 32-bit microprocessor
- ◆ IEEE floating point math
- ◆ **Memory:**
 - RAM - 256 KB battery backed
 - Flash EPROM - 256 KB (program may be stored and executed from Flash)
- ◆ **I/O Interface:**
 - High-speed **mistic** 200 local bus
 - Two RS-232/485 serial ports
- ◆ **Expansion Options:**
 - G4LC32SER - plug-in daughter board with two OR'd RS-232/485 serial ports
 - G4LC32ARC - plug-in daughter board with ARCnet interface and two RS-485 serial ports
- ◆ Up to 200 controllers per network
- ◆ Compatible with **mistic** 200 controller software drivers

SPECIFICATIONS

CPU:	Motorola 68020 32-bit microprocessor
CPU clock frequency:	16.67 MHz
Power requirements:	5 VDC \pm 0.1 V at 2.0 A (at 25° C ambient)
Temperature:	0° C to 70° C (operating, based on 5% to 95% relative humidity)
Communications:	Two full-duplex combined RS-232 or RS-422/485 serial ports, 300 - 115.2 KBd
Flash EPROM memory:	256 KB

SYSTEM CONFIGURATION

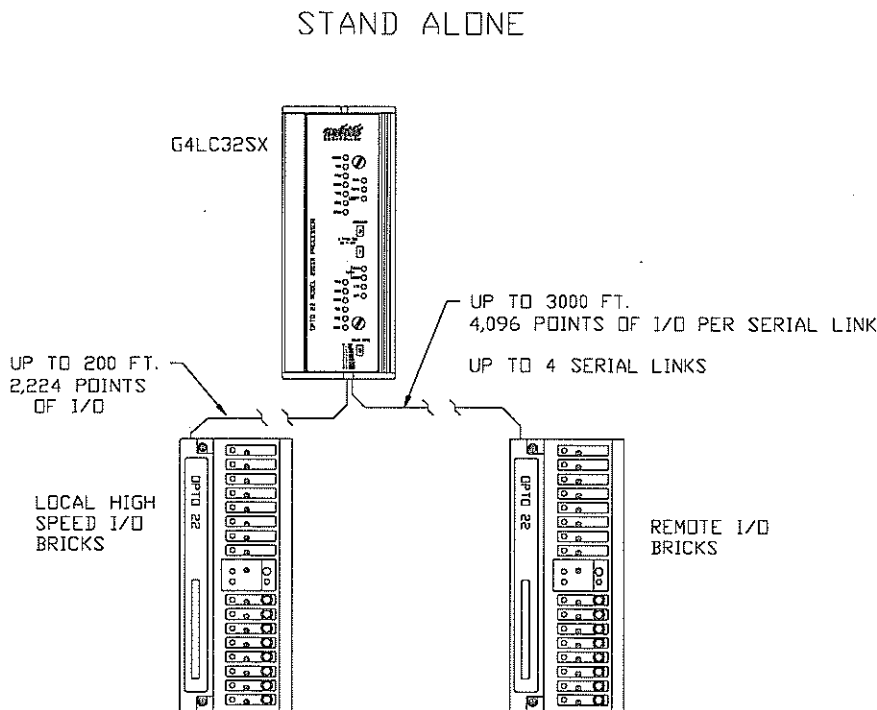
DISTRIBUTED CONTROL WITH HOST



SPECIFICATIONS

RAM:	256 KB with battery backup
Watchdog timer:	Hardware
Real time clock:	Epson 62421A clock/calendar, with battery backup
RAM/clock battery:	3.6 V lithium, nonrechargeable
Software:	Cyrano 200
Expansion options:	G4LC32SER daughter board with two full-duplex, combined RS-232 or RS-422/485 serial ports, 300 - 115.2 KBd G4LC32ARC daughter board with ARCnet network interface, 2.5 Mb/s two full-duplex, RS-422/485 serial ports, 300 - 115.2 KBd

SYSTEM CONFIGURATION



MODEL G4LC32SER

The G4LC32SER daughter card is serial port interface card for the G4LC32SX controller and provides COM0 and COM1, RS-232 or RS-422/485 serial ports. Expand the controller's serial ports with an additional G4LC32SER for COM2 and COM3 connections. Simply plug the daughter card into the controller's expansion slot and attach your cable wires to the card's screw type terminal blocks.

Each RS-232 port is equipped with a convenient + 5 VDC source for wiring to an external device such as bar code wand. The operating baud rate range is between 300 to 115.2 KBd.

MODEL G4LC32ARC

The G4LC32ARC daughter card is an ARCnet and RS-485 serial port interface card for the G4LC32SX controller. One dedicated ARCnet port with a BNC connector and two RS-485 ports, COM2 and COM3, increase the controller's communication connections from the two factory default RS-232 and/or RS-422/485 serial ports.

SPECIFICATIONS

G4LC32SER

Power requirements: 5 VDC \pm 0.25 V at 0.5 A

Temperature: 0° C to 70° C

Baud rate: 300 - 115.2 KBd

RS-485: 2-wire or 4-wire

RS-232: Tx, Rx, Gnd, RTS, CTS

G4LC32ARC

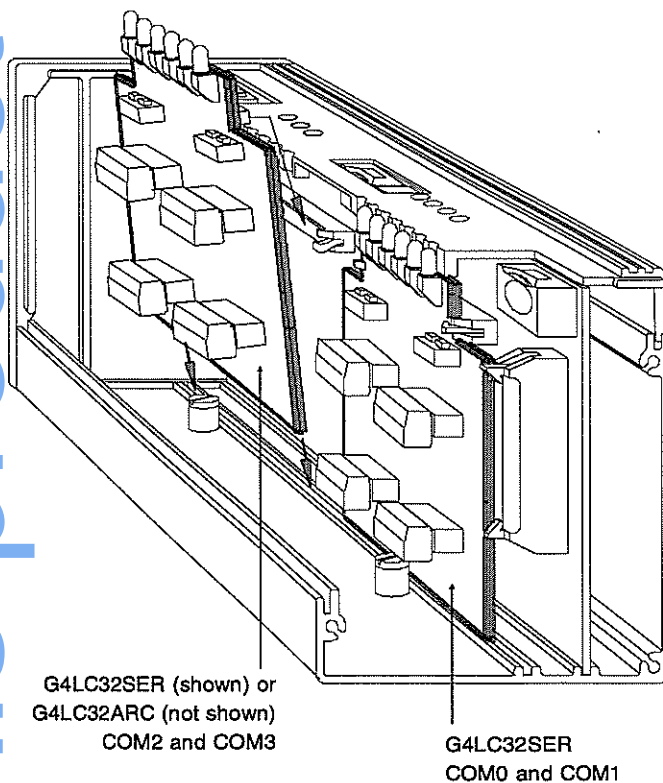
Power requirements: 5 VDC \pm 0.25 V at 0.5 A

Temperature: 0° C to 70° C

ARCnet Transfer rate: 2.5 Mb/s

Baud rate: 300 - 115.2 KBd

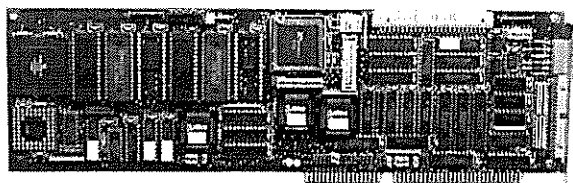
RS-485: 2-wire or 4-wire



G4LC32SX Daughter Cards

®

mistic
CONTROLLER



OPTO 22

***mistic* 200
ISA
CONTROLLER**

MODEL G4LC32ISA

DESCRIPTION

The outstanding price-performance standard set by the 200 SX controller is now available in an ISA adapter. The G4LC32ISA Controller is a high performance real-time controller designed to work within the *mistic* 200 family of processors and I/O control units. It mounts in both active or passive AT backplanes, and communicates directly with other devices on the bus as a "Bus Master".

Programming is accomplished with Cyrano 200, Opto 22's revolutionary flow chart based CASE tool. Programs are transportable across the entire line of *mistic* 200 processors.

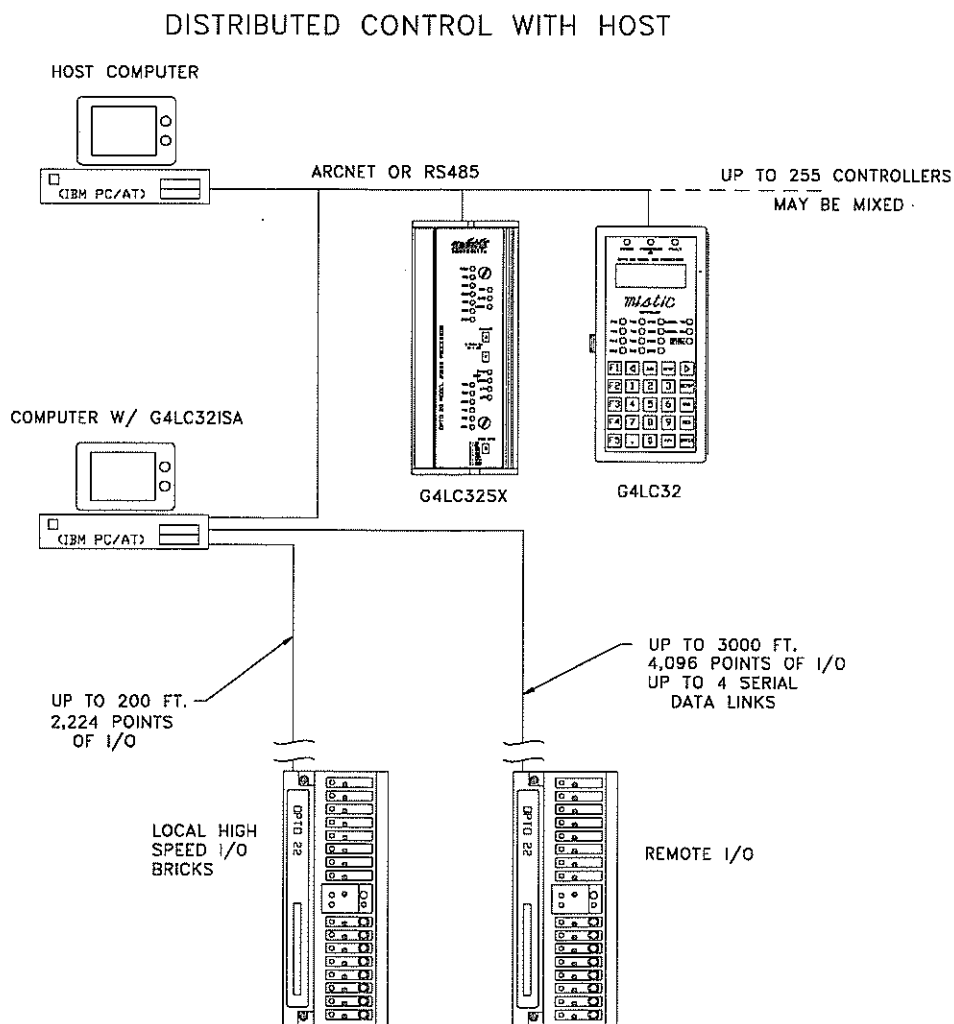
FEATURES

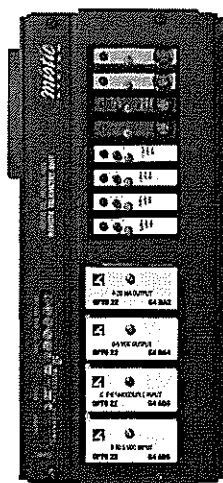
- ♦ 32-bit Microprocessor with Math Coprocessor Socket
- ♦ IEEE Floating Point Math
- ♦ **Memory:**
 - RAM - 256 KB Battery Backed (Expandable to 2 MB)
 - FLASH - 256 KB (User Program may be Stored and Executed from FLASH, Expandable to 1 MB)
- ♦ **I/O Interface:**
 - High-speed *mistic* 200 Local Bus
 - One 2-wire RS-485 Serial Port
- ♦ **Expansion Options:**
 - G4LC32ISA Serial Daughter Board with One 2-wire RS-485 and Two Configurable RS-232/485 Serial Ports (occupies an ISA Slot)
 - G4LC32ISA ARCNET Interface Daughter Board (occupies an ISA Slot)
 - General Purpose Processor Expansion Bus for Future Expansion Capabilities
- ♦ Up to 255 Controllers Per Network
- ♦ Compatible with *mistic* 200 Controller Software Drivers

SPECIFICATIONS

CPU:	Motorola 68020 32-bit microprocessor
Optional:	Motorola 68881/2 math coprocessor
Power Requirements:	5 VDC at 1.5 A
Temperature:	0° C to 70° C
CPU Clock Frequency:	16.67 MHz
FLASH Memory:	256 KB expandable to 1 MB
RAM:	256 KB with battery backup expandable to 2 MB
Communications:	One 2-wire, half-duplex, RS-485 port baud rate 300 baud - 115 KBd One <i>mistic</i> 200 Local Bus port 1.44 MB/s

SYSTEM CONFIGURATION





OPTO 22

**REMOTE
TELEMETRY
UNIT**

MODEL M4RTU

DESCRIPTION

The M4RTU is a powerful, yet easy-to-use, remote telemetry unit designed specifically for industrial field applications, such as waste water treatment, well monitoring, tank farms, gas, petro-chemical and many others. The M4RTU is a two processor system; one processor manages host communications and program control and the other handles I/O interfacing and control for both digital and analog signals. A total of eight digital and four analog I/O channels are available on the M4RTU base unit and may be populated with standard Opto 22 G4 Analog and Digital I/O modules. Communication with other intelligent devices such as process control units (M4RTU and/or *mistic* 200 Controller units) or industrial PCs is easy via serial and network expansion options.

Like Opto 22's other *mistic* 200 processors, the M4RTU is compatible with Cyrano 200 and *mistic* MMI software.

FEATURES

- ◆ Integrated, modular design
 - * Single unit form factor houses process control & I/O
 - * Supports up to three daughter card options
- ◆ Modular power supply options
- ◆ Removable connector technology throughout for easy maintenance
- ◆ Compatible with Cyrano 200 and *mistic* MMI
- ◆ Remote software access (kernel, programs, data, debugging)
- ◆ Compliant with AGA flows and reports

SPECIFICATIONS

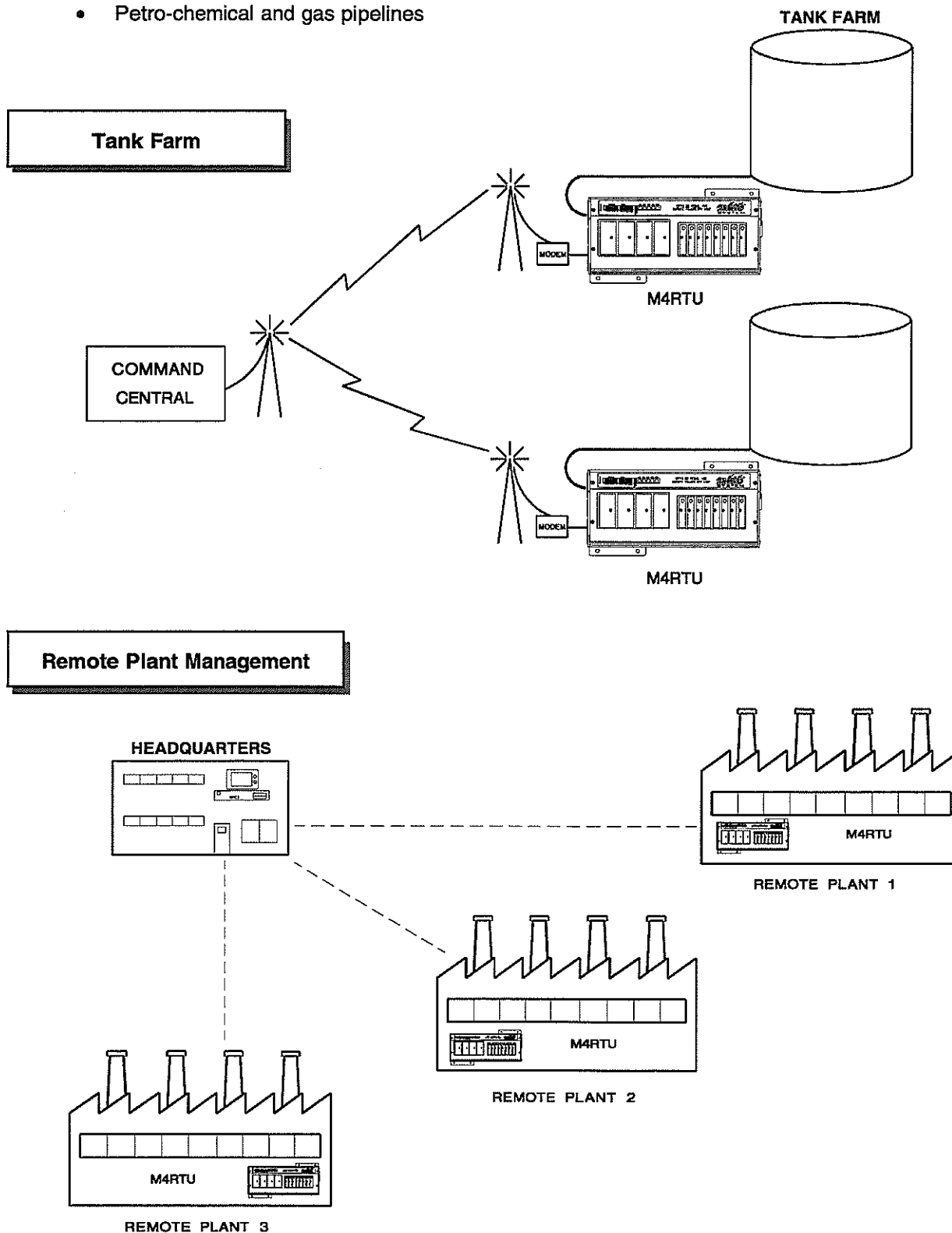
CPU:	32-bit, Motorola 68020 processor 16-bit 80C196 I/O processor IEEE floating point math
CPU clock frequency:	16.67 MHz
Memory	
RAM:	256 KB - 1 MB with battery backup (user programs and data)
FLASH	
Controller:	256 KB - 1 MB (Cyrano firmware & user programs)
Brainboard:	128 KB (brick firmware)
RAM/clock battery:	3.6 volt lithium, non-rechargeable
I/O	
Base unit:	(4) analog, (8) digital, multifunction
Extender unit:	Adds (4) analog, (8) digital multifunction
Expansion:	Via RS-485 ports, using standard <i>mistic</i> 200 bricks
Communication	
Base unit:	(1) RS-232 & (1) RS-485 port
Expansion:	Via daughter cards: configurable serial ports and ARCnet
Modem support:	Direct, lease, and radio
Real-time clock:	Clock/calendar, Epson 62421A with battery backup
Power requirements:	5 VDC at 3.0 A (maximum) 24 VDC at 300 mA (maximum)
Temperature:	0° C to 70° C (operating)
Humidity:	5% to 95% relative humidity
Software:	Cyrano 200 and <i>mistic</i> MMI
System monitors:	Watchdog timers Power monitor Ambient temperature Power supply type and voltage RAM battery level

SYSTEM CONFIGURATION

1. Applications

Typical applications for the M4RTU Remote Telemetry Unit include sites where process control and data acquisition need to be done remotely. Applications include:

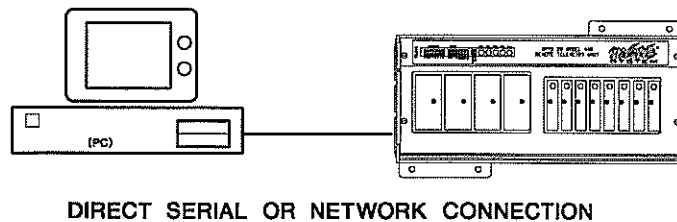
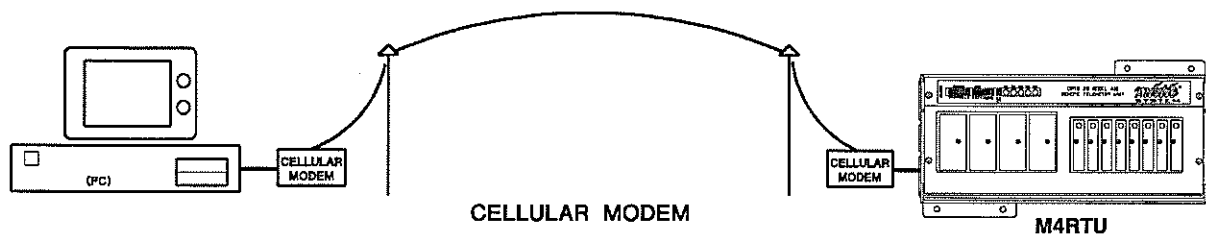
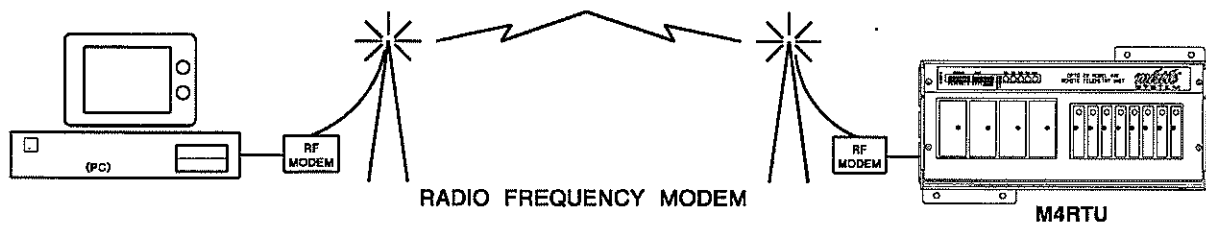
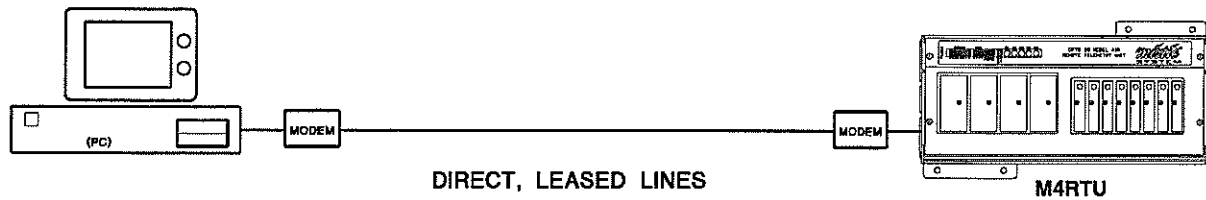
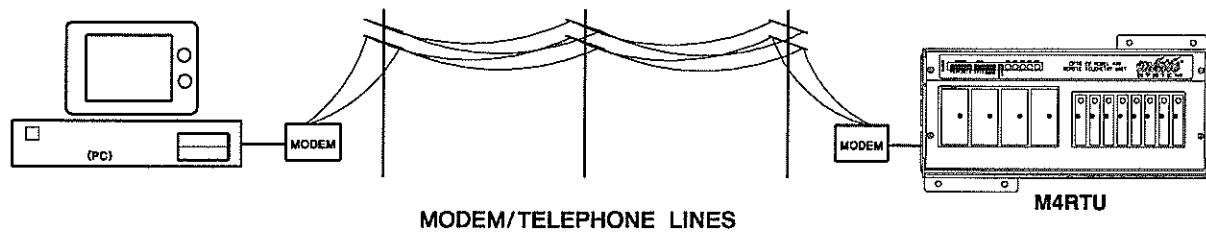
- Waste water management
- Tank farms
- Well monitoring
- Remote office/plant management
- Petro-chemical and gas pipelines



SYSTEM CONFIGURATION

2. Communication

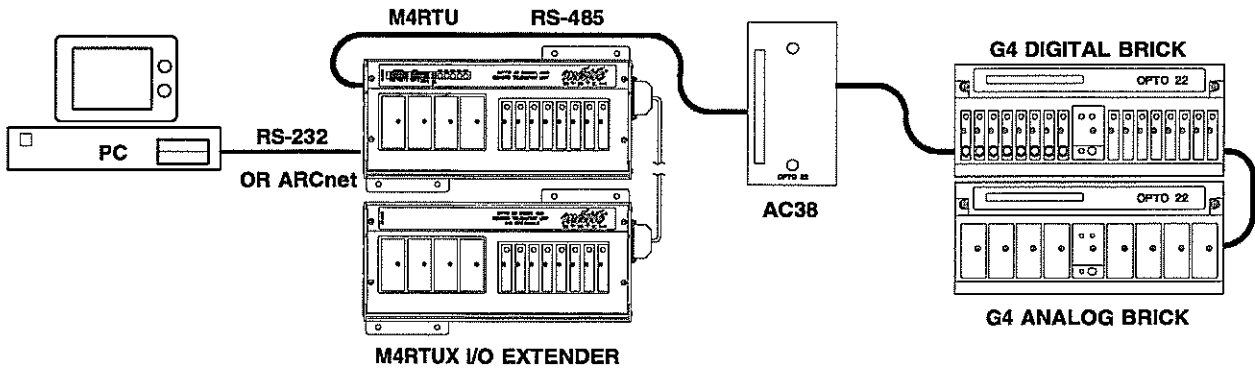
The M4RTU in the field can communicate with a PC or other processing unit(s) using modems connected to standard telephone lines, leased dial-up lines, and radio frequency transceivers. The following are examples of typical communications configurations:



SYSTEM CONFIGURATION

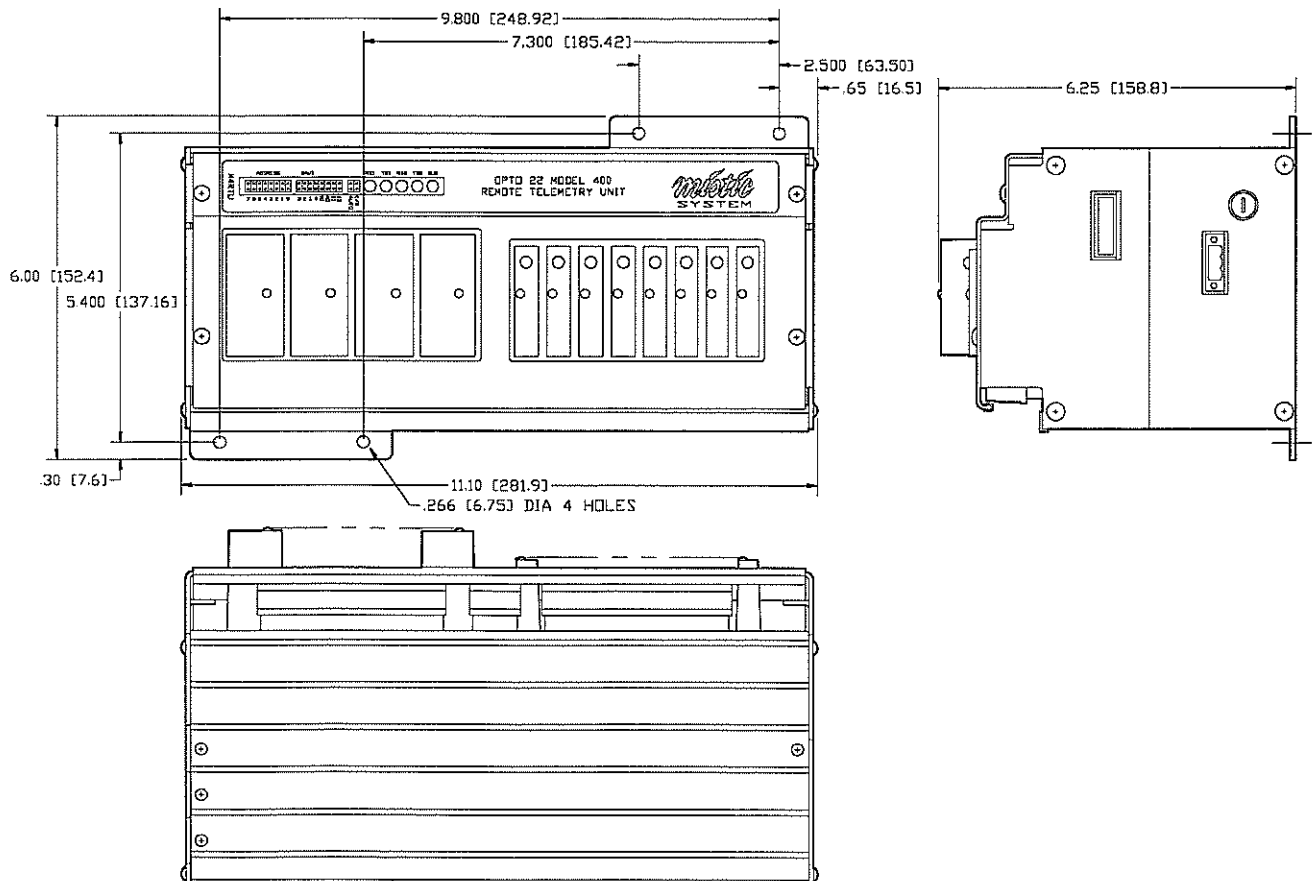
3. Integration

The M4RTU Remote Telemetry Unit can be used as a standalone, process control device or as a highly intelligent, gateway device to other control devices, such as *mistic* processors and PLCs. Additional I/O bricks can be connected using the built-in, serial expansion port (COM 1). The M4RTU's three, internal expansion slots can be used with additional serial or network connections.



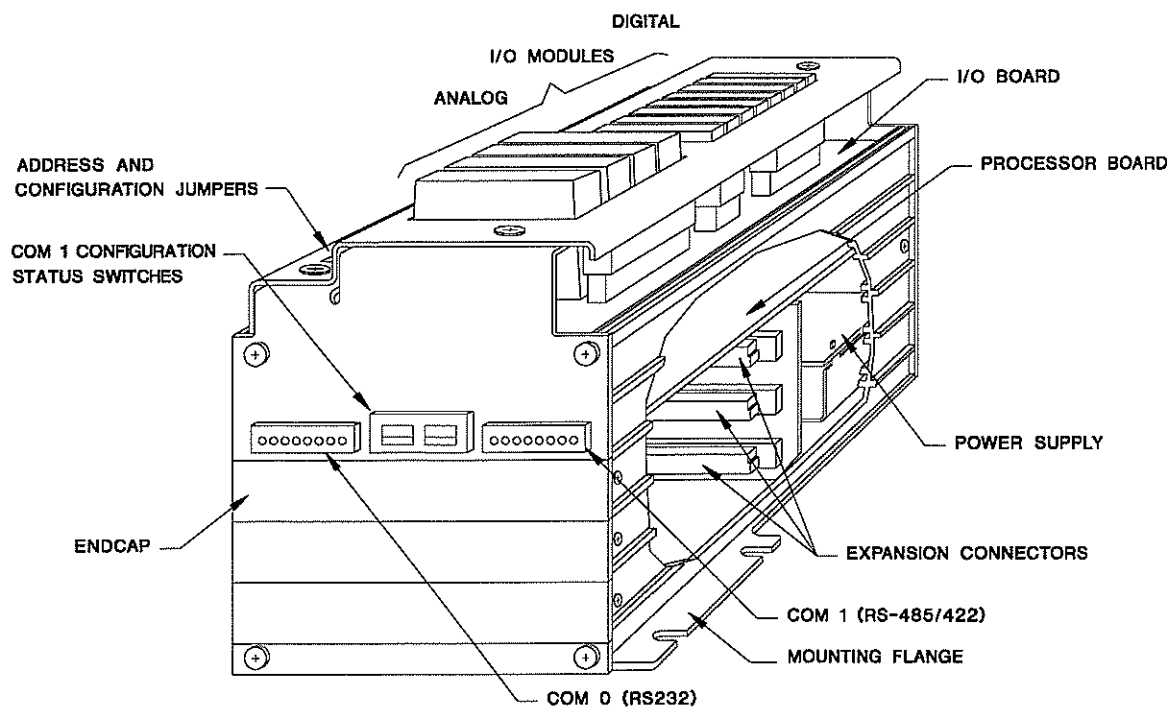
Integrating the M4RTU with Other Intelligent Control Units

DIMENSIONS



This product is obsolete.

PACKAGING

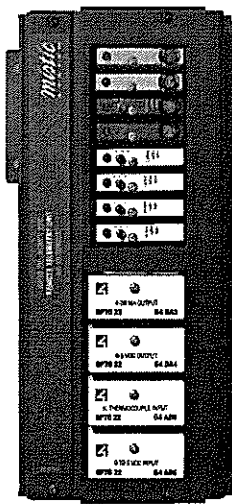


POWER SUPPLY OPTIONS

Model Number	Description	See Form Number
M4PS12D	12 VDC input (9 - 15 V)	672
M4PS24D	24 VDC input (18 - 30 V)	
M4PS48D	48 VDC input (36 - 60 V)	
M4PS125D	125 VDC input (94 - 156 V)	
M4PS120A	120 VAC input (90 - 130 V)	
M4PS240A	240 VAC input (180 - 250 V)	
M4PSF	Line Filter - requires 24 VDC/5 VDC	

EXPANSION OPTIONS

Model Number	Description	See Form Number
M4RTUX	I/O Extender Unit	671
M4SSER	M4RTU Serial Expansion Card	664
M4SARC	M4RTU ARCnet Expansion Card	631



OPTO 22

M4RTU I/O Extender Unit

MODEL M4RTUX

DESCRIPTION

The M4RTUX I/O Extender is an expansion option for the M4RTU Remote Telemetry Unit which provides eight digital and four analog I/O channels. Together the M4RTU and M4RTUX Extender support a total of sixteen digital and eight analog channels. With packaging similar to the M4RTU, the I/O Extender plugs easily into the external connector on the M4RTU processor board using a single, 25-pin, M4RTUXCAB, connector/cable assembly, which is included with the Extender unit.

FEATURES

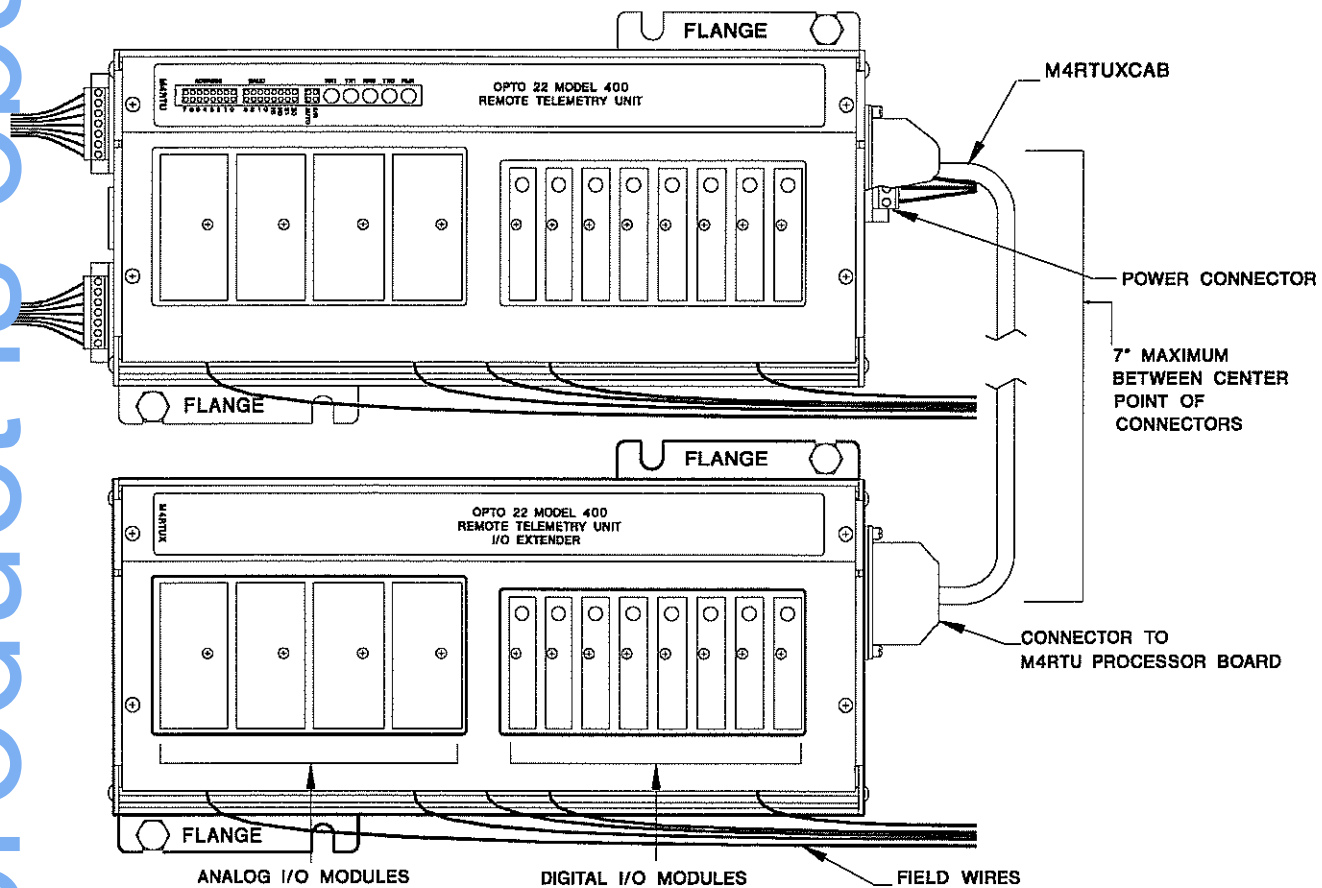
- ◆ Provides 8 digital and 4 analog I/O channels
- ◆ Expands M4RTU I/O to 16 digital and 8 analog channels
- ◆ Flexible mounting options
- ◆ Single cable assembly design simplifies installation process

SPECIFICATIONS

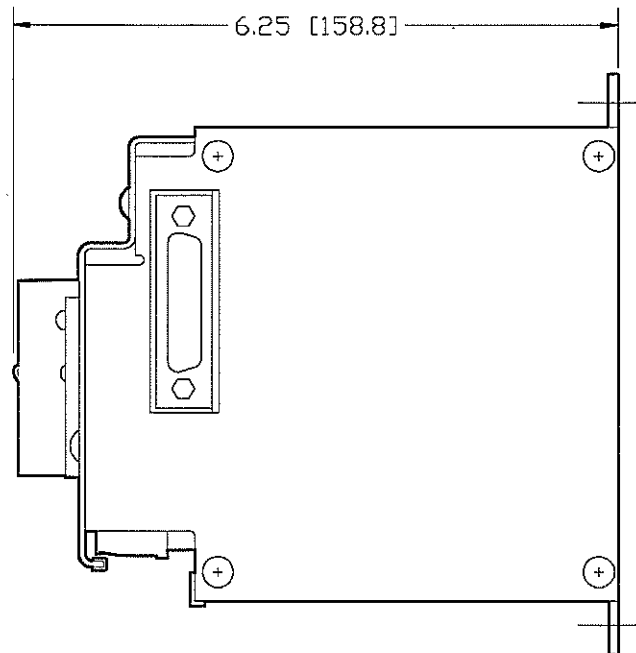
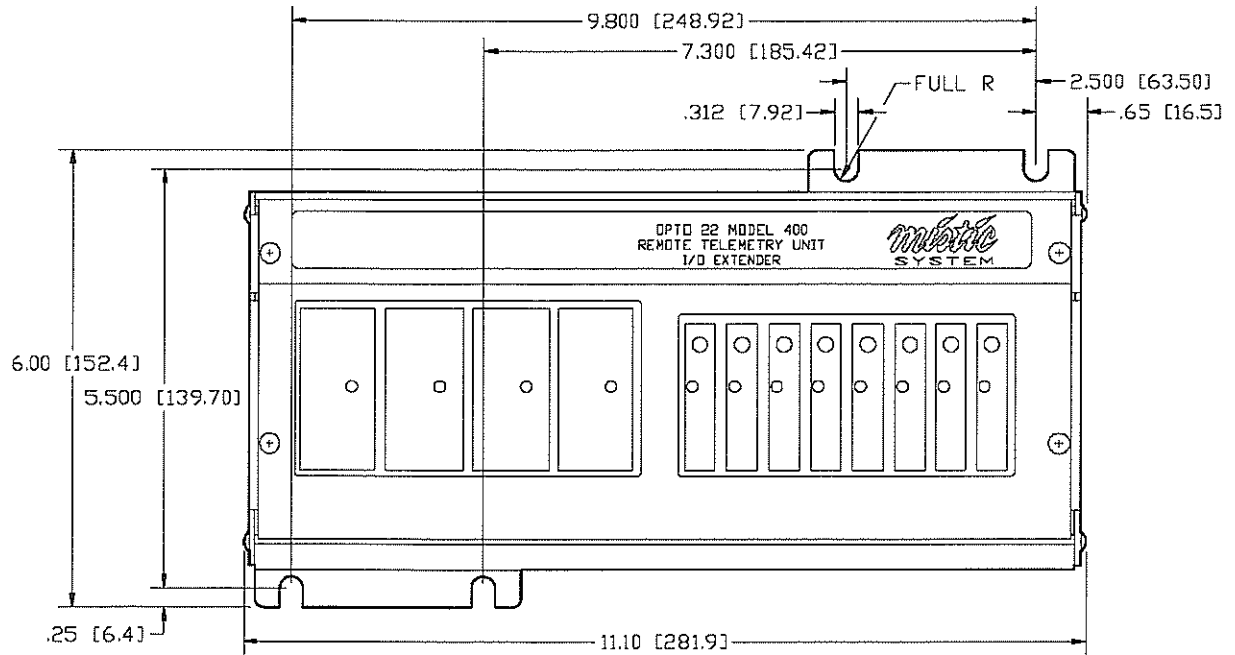
I/O board supports 8 digital and 4 analog modules

25-pin, M4RTUXCAB, connector and shielded cable included with the unit

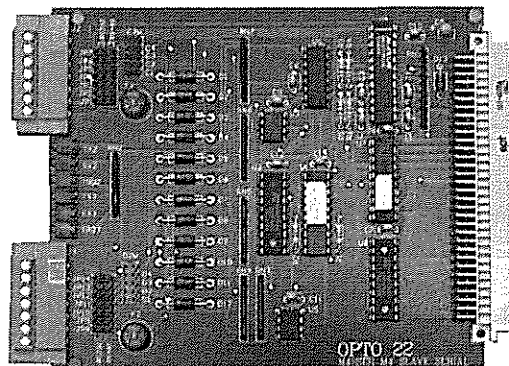
CONFIGURATION



DIMENSIONS



This product is obsolete.



OPTO 22

M4BUS SERIAL EXPANSION CARD

MODEL M4SSER

DESCRIPTION

The M4SSER Serial Expansion Card provides two additional serial connections, RS-232 and RS-485/422, for the M4RTU Remote Telemetry Unit. It is designed to plug into the M4RTU's internal expansion slots so other serial devices, such as digital and/or analog bricks, can be connected with minimum effort.

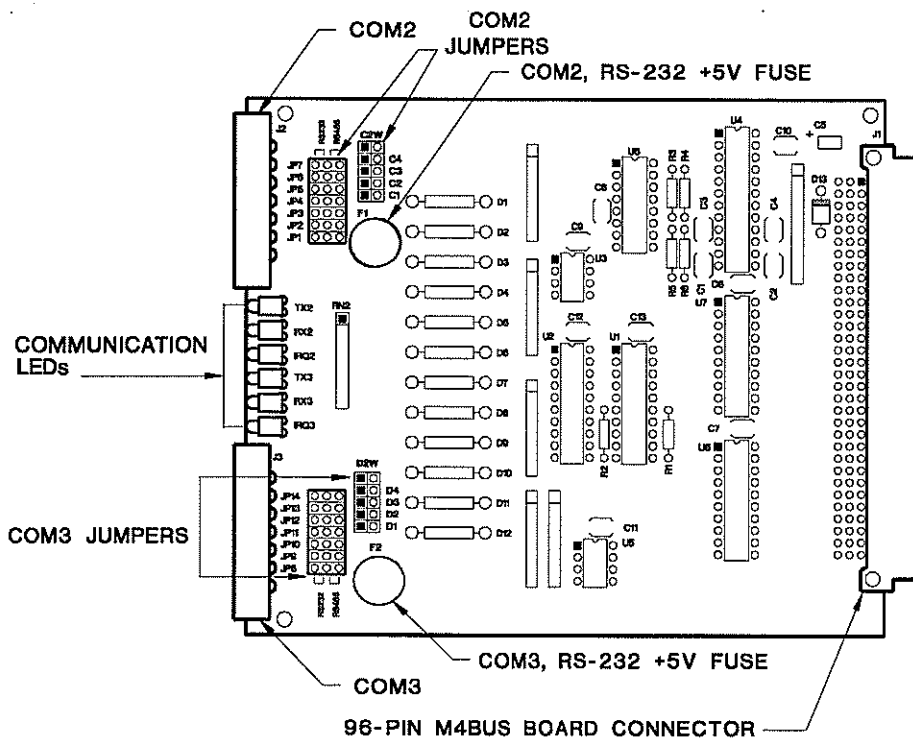
FEATURES

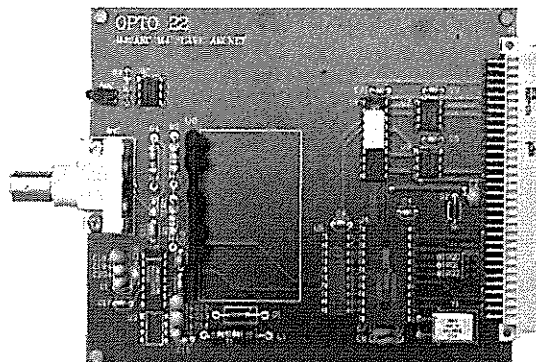
- ◆ Supports OR'd configuration for RS-485/422 and RS-232 connections
- ◆ Provides connection mechanism for an additional 4096 I/O points on each serial port
- ◆ Interfaces to third party hardware, such as intelligent valves, analyzers, scales, etc...
- ◆ High performance communications (up to 115.2 KBd)
- ◆ Flexible development environment using ASCII or binary protocols
- ◆ 2-wire or 4-wire support (full and half duplex)
- ◆ Modem compatible

SPECIFICATIONS

Communication:	300 - 115.2 KBd maximum
Maximum connection distance:	3000 ft. (more with repeater)
Port configuration for the M4RTU	
COM3:	RS-232 or RS-485
COM4:	RS-232 or RS-485
RS-232:	TX, RX, RTS, CTS, DTR (+9V)
RS-485:	2-wire, half-duplex 4-wire, full-duplex
Cable specifications	
RS-485:	#24 gauge 7 x 32 stranded 100 ohm nominal impedance 12.5 pF/ft.
RS-232:	#28 gauge #24 gauge 4-, 6-, or 8- conductor
Connectors	
RS-485:	Green pluggable, 7-position, terminal mini-plug
RS-232:	Green pluggable, 7-position, terminal mini-plug
Manufacturer:	Phoenix Contact p/n - MC1, 5/7-ST-3, 81

DIAGRAM OF M4SSER





OPTO 22

M4BUS ARCNET EXPANSION CARD

MODEL M4SARC

DESCRIPTION

The M4SARC ARCnet Card is a network expansion daughter card designed to plug into any M4BUS product's internal expansion slot. The M4SARC provides a high performance ARCnet, peer-to-peer, network connection to other M4BUS controllers and *mistic* 200 processors, as well as industrial PCs and workstations.

The M4SARC card is especially useful for connecting M4BUS controllers to PCs running Cyrano 200 and the *mistic* MMI.

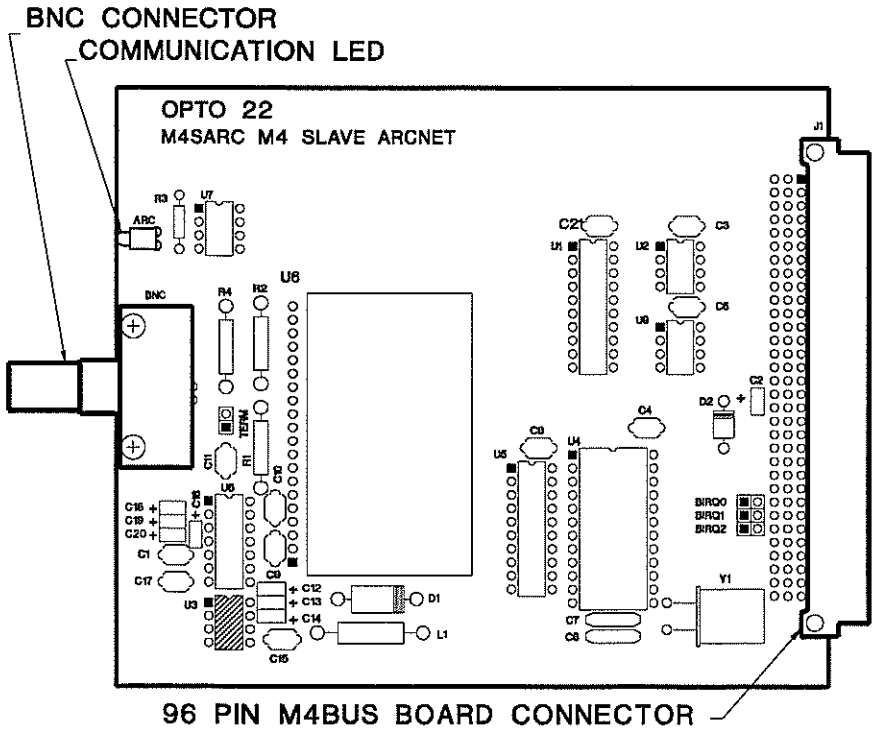
FEATURES

- ◆ Peer-to-peer
- ◆ High-speed networking
- ◆ Supports star topology
- ◆ Transparent to software
- ◆ Deterministic throughput, ideal for the factory floor
- ◆ M4BUS compatible

SPECIFICATIONS

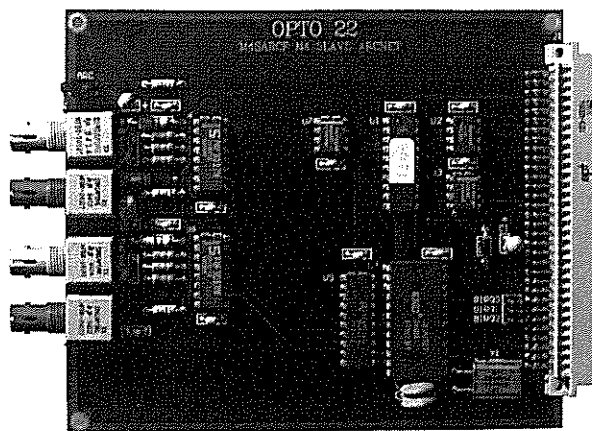
Transfer rate:	2.5 Mb/s
Power requirement (at 5 VDC):	140 mA
Typical Operating temperature:	- 20° C to 70° C
Storage temperature:	- 40° C to 85° C
Termination:	93 ohms
Address range:	1 to 255
Cable/connector type:	RG-62 A/U / BNC
Maximum cable lengths	
Total network distance:	20,000 ft
Active hub to active hub:	2,000 ft
Active hub to M4BUS product:	2,000 ft
Active hub to passive hub:	100 ft
Passive hub to M4BUS product:	100 ft

DIAGRAM OF M4SARC





PC-BASED INDUSTRIAL
AUTOMATION SYSTEM



OPTO 22

M4BUS FIBER OPTIC ARCNET EXPANSION CARD

MODELS:

**M4SARCF
M4SARCFR**

DESCRIPTION

The M4SARCF and M4SARCFR cards are fiber optic ARCnet network expansion daughter cards designed to plug into any M4BUS product's internal expansion slots. Both cards provide a fiber optic, peer-to-peer, network connection to other M4BUS controllers as well as industrial PCs and workstations equipped with an ARCnet fiber optic communication card. The M4SARCFR model also features a built-in fiber optic repeater pair to extend the link over greater distances.

Fiber cable's immunity to electrical interference and decreased signal loss make these expansion cards ideal for electrically noisy environments and distributed control applications.

FEATURES

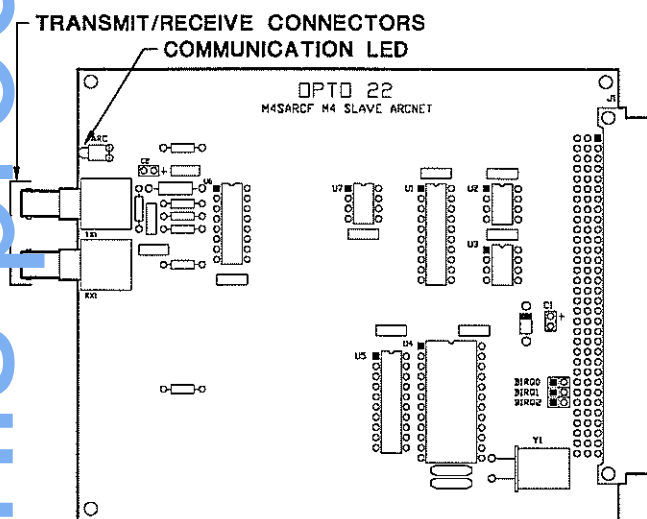
- ◆ EMI/RFI immunity
- ◆ Electrically isolated communication
- ◆ Peer-to-peer
- ◆ High-speed networking
- ◆ Transparent to software
- ◆ Supports star or multidrop topology
- ◆ Deterministic throughput, ideal for remotely distributed applications
- ◆ M4BUS compatible

SPECIFICATIONS

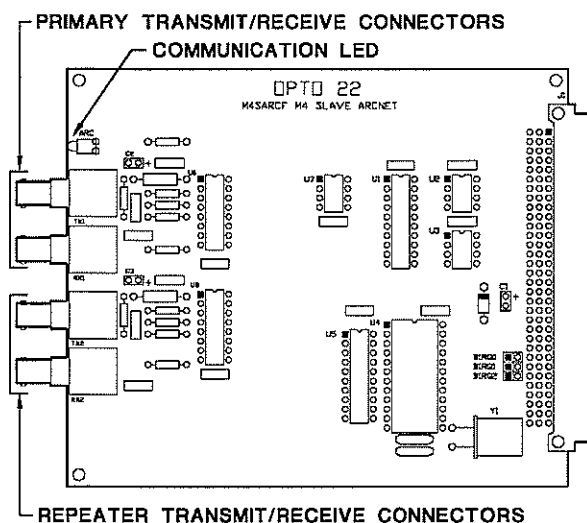
Transfer rate:	2.5 Mb/s
Power requirement (at 5VDC)	
M4SARCF:	150 mA
M4SARCFR:	220 mA
Typical operating temperature:	-20°C to 70°C
Storage temperature:	-40°C to 85°C
Address range:	1 to 255
Recommended fiber size:	62.5/125 μ m
Recommended fiber optic cable:	Belden p/n 225812 (Duplex) Belden p/n 225811 (Single, 2 required)
Connector:	ST
Topology:	Star and multidrop
Maximum cable lengths	
Total network distance:	256,000 ft (approx. 48 miles)
M4SARCFR to M4SARCF or M4SARCFR:	16,000 ft (approx. 3 miles)
If you are using a hub, consult the hub specifications for maximum link distances.	
Transmitter characteristics (typical)	
Optical power output:	- 10 dBm
Peak emission wavelength:	820 nm
Numerical aperture:	0.31
Optical port diameter:	150 μ m
Receiver characteristics (typical)	
Receiver sensitivity:	- 24 dBm
Equivalent numerical aperture:	0.50
Optical port diameter:	400 μ m

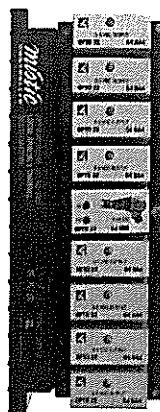
DIAGRAMS

M4SARCF



M4SARCFR





OPTO 22

ANALOG 8 CHANNEL I/O BRICK

MODELS:

G4A8L

G4A8R

DESCRIPTION

The G4A8L and G4A8R are high performance analog I/O bricks for the *mistic* 200 family of processors and I/O. They provide intelligent and flexible single point I/O control in a rugged, deadfront, compact package. Choose only the modules you need in any combination of 8 analog I/O modules, or up to 16 with available expansion options. Each module has channel to channel isolation and provides 12 bits of resolution. Onboard brick intelligence offers PID loop control, HI/LO limit monitoring, thermocouple linearization, event/reactions, and many other control functions. Event/reactions direct orderly shutdowns and execute high speed deterministic responses to sophisticated control sequences, alarm monitoring, diagnostics, host interrupts.

Analog bricks are available for high speed parallel local, or high speed serial remote communications. Programming is accomplished with *mistic's* intuitive multitasking, flowchart-based language, or by using a host computer and Opto 22's *misticWARE* software driver with the software language of your choice.

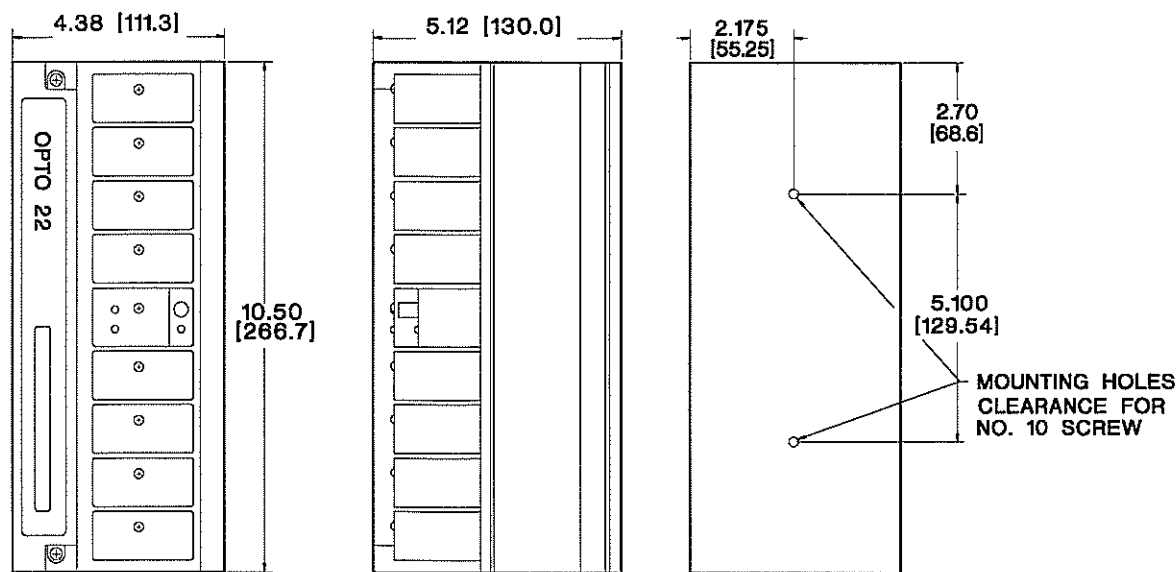
FEATURES

- ◆ PID loop control
- ◆ HI/LO limit monitoring
- ◆ Thermocouple linearization
- ◆ Filtering
- ◆ Input totalization
- ◆ Running average calculation
- ◆ Ramping and waveform generation
- ◆ Current loop supply built into analog modules
- ◆ Programmable offset/gain
- ◆ Host interrupt capability
- ◆ Square root extraction
- ◆ Optically and electrically isolated control signals for increased system reliability
- ◆ Precalibrated modules

SPECIFICATIONS

CPU:			16-bit, Intel 80C196 processor
CPU clock frequency:			12 MHz processor
Communications			
Bus speed:		Local Bus	1.4 Mbps
Cable type:			34 conductor, ribbon
Maximum cable length:		Local Bus	200 ft
Mode:			Binary
		Remote Bus	300 - 115.2 KBd
			3 wire, twisted pair + GND, Interrupt uses 2nd wire pair
			3000 ft (more with repeaters)
			Binary or ASCII
Typical I/O times (includes communication transfer time)			
Read 16 channels:		Local Bus	1.03 ms
Write 16 channels:			2.48 ms
		Remote Bus	5.53 ms
			6.52 ms
Input/output update rate			
Input:			7 ms
Output:			50 ms
PID scan rate:			100 ms for all 8 PID's
			4 PID loops/brick
			Up to 8 PID loops with brick expansion option
Typical Event/Reaction time (≤ 16 Event/Reactions):			4 ms
System power consumption @ 24 VDC ± 0.1 V (excludes analog modules)			
Terminated (last brick on the bus):		Local Bus	276 mA
Non-terminated (all other bricks):			180 mA
Analog expansion brick:			180 mA
Typical analog module:			65 mA
			45 mA
Isolation			
Input to output:			4000 V _{rms}
Output to analog supply:			4000 V _{rms}
Temperature			
Operating:			0° C to 70° C
Storage:			- 40° C to 80° C
Humidity:			5% to 95% relative humidity
Software:			Cyrano 200 and <i>misticWARE</i>
Expansion options:			Adds 8 additional analog I/O channels on a separate brick unit
			G4LAX Local analog expansion brick
			G4RAX Remote analog expansion brick

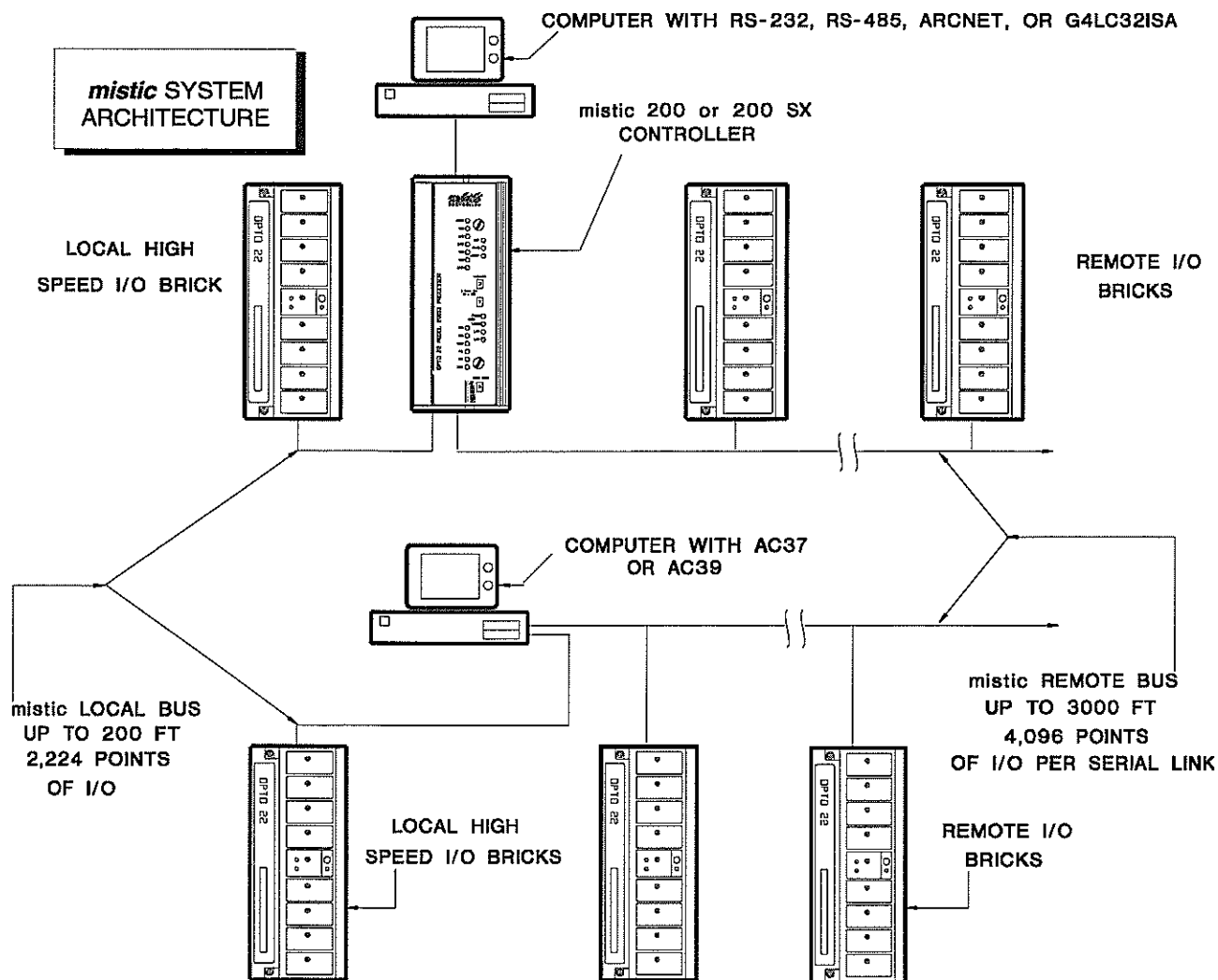
DIMENSIONS



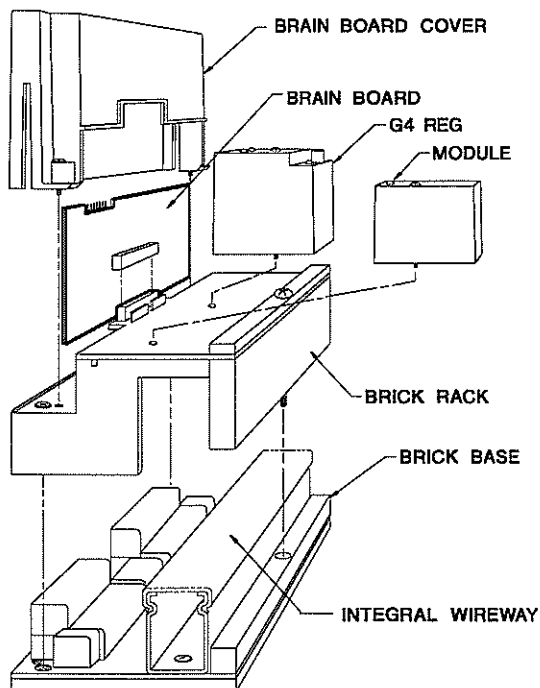
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DIMENSIONAL UNITS: INCHES [MILLIMETERS]

SYSTEM CONFIGURATION



BRICK CONSTRUCTION



COMMAND SET

Setup and System Commands

Identify Type
Power Up Clear
Repeat Last Response
Reset
Reset All Parameters to Default
Set Comm Link Watchdog and Delay
Set Comm Link Watchdog Time-out Data
Set Response Delay
Set System Options

Analog I/O Configuration Commands

Calculate and Set ADC Module Offset
Calculate and Set ADC Module Gain
Read Module Configuration
Set ADC Module Offset
Set ADC Module Gain
Set Averaging Sample Weight (Digital Filtering)
Set Channel Configuration
Set Engineering Unit Scaling Parameters
Set I/O Configuration - Group
Set Totalization Sample Rate
Set TPO Resolution
Store System Configuration

Analog Read/Write/Output Commands

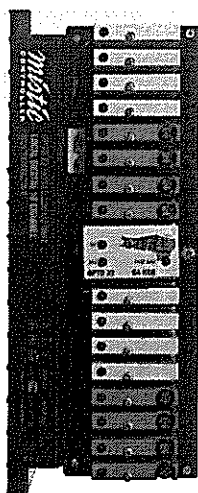
Ramp DAC Output to Endpoint
Read and Clear I/O Module Data
Read and Clear I/O Module Data-Group
Read I/O Module Magnitude
Read I/O Module Magnitude-Group
Set DAC Module Magnitude, Eng. Units
Set DAC Module Magnitude, Eng. Units-Group
Set DAC Module Magnitude, Counts
Set DAC Module Magnitude, Counts-Group

Analog Event/Reaction Commands

Clear Event/Reaction Table
Clear Event Table Entry
Clear Interrupt
Enable/Disable Event Entry Group
Enable/Disable Event Table Entry
Read and Clear Event Latches
Read Event Data Holding Buffer
Read Event Entry Enable/Disable Status
Read Event Latches
Read and Optionally Clear Event Latch
Read Event Table Entry
Set Event Interrupt Status
Set Event on Comm Link Watchdog Time-Out
Set Event on I/O Setpoint
Set Event on I/O Setpoint
Set Event Reaction Command

Analog PID Loop Commands

Initialize PID Loop
Read All PID Loop Parameters
Read PID Loop Parameter
Set PID Loop Control Options
Set PID Loop Derivative Rate Constant
Set PID Loop Gain
Set PID Loop Integral Reset Rate
Set PID Loop Min-Max Output Limits
Set PID Loop Min-Max Setpoint Limits
Set PID Loop Setpoint



OPTO 22

DIGITAL 16 CHANNEL I/O BRICK

MODELS:

G4D16L

G4D16R

DESCRIPTION

The G4D16L and G4D16R are high performance digital I/O bricks for the *mistic* 200 family of processors and I/O. They provide intelligent and flexible single point I/O control for up to 16 digital I/O modules in a rugged, deadfront, compact package. Onboard brick intelligence offers latching, pulse train generation, time delays, counting, event/reactions, and many other control functions. Event/reactions direct orderly shutdowns and execute high speed deterministic responses to sophisticated control sequences, alarm monitors, diagnostics, and host interrupts.

Digital bricks are available for high speed parallel local, or high speed serial remote communications. Programming is accomplished with Cyrano, *mistic's* intuitive multitasking, flowchart-based language, or by using a host computer and Opto 22's *misticWare* software driver with the software language of your choice.

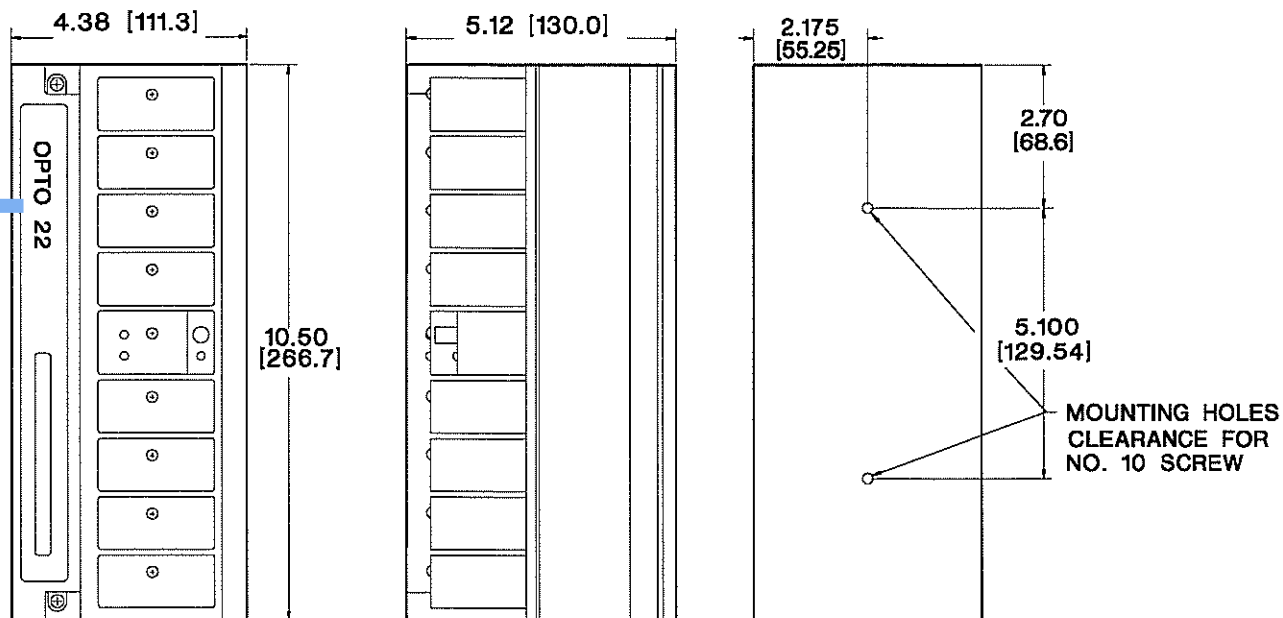
FEATURES

- ◆ Input latching/timing/counting/totalizing
- ◆ Output timing, pulse/waveform generation, and time proportional output
- ◆ Built-in diagnostics
- ◆ Host interrupt capability
- ◆ Communications link watchdog timer
- ◆ On board EEPROM for system configuration
- ◆ Optically and electrically isolated control signals for increased system reliability
- ◆ 100% *mistic* I/O bus-compatible

SPECIFICATIONS

CPU:	16-bit, Intel 80C196 processor	
CPU clock frequency:	12 MHz processor	
Communications	Local Bus	Remote Bus
Bus speed:	1.4 Mbps	300 - 115.2 KBd
Cable type:	34 conductor, ribbon	3 wire, twisted pair + GND, Interrupt uses 2nd wire pair
Maximum cable length:	200 ft	3000 ft (more with repeaters)
Mode:	Binary	Binary or ASCII
Typical I/O times (includes communication transfer time)	Local Bus	Remote Bus
Read 16 channels:	0.68 ms	1.76 ms
Write 16 channels:	1.0 ms	2.27 ms
Counters (frequency measure)		
Maximum rate:	20 KHz	
Data size:	32 bits	
Minimum pulse width ON:	10 μ s	
Minimum pulse width OFF:	10 μ s	
Latching (minimum pulse width):	10 μ s	
Output pulse		
Maximum continuous rate:	500 Hz	
Minimum pulse width ON:	1 ms	
Minimum pulse width OFF:	1 ms	
Time proportional output (TPO) minimum period:	100 ms	
Typical Event/Reaction time (≤ 16 Event/Reactions):	4 ms	
System power consumption @ 24 VDC \pm 0.1V	Local Bus	Remote Bus
Terminated (last brick on the bus):	425 mA	250 mA
Non-terminated (all other bricks):	375 mA	250 mA
Temperature		
Operating:	0° C to 70° C	
Storage:	-40° C to 80° C	
Humidity:	5% to 95% relative humidity	
Software:	Cyrano 200 and <i>misticWARE</i>	

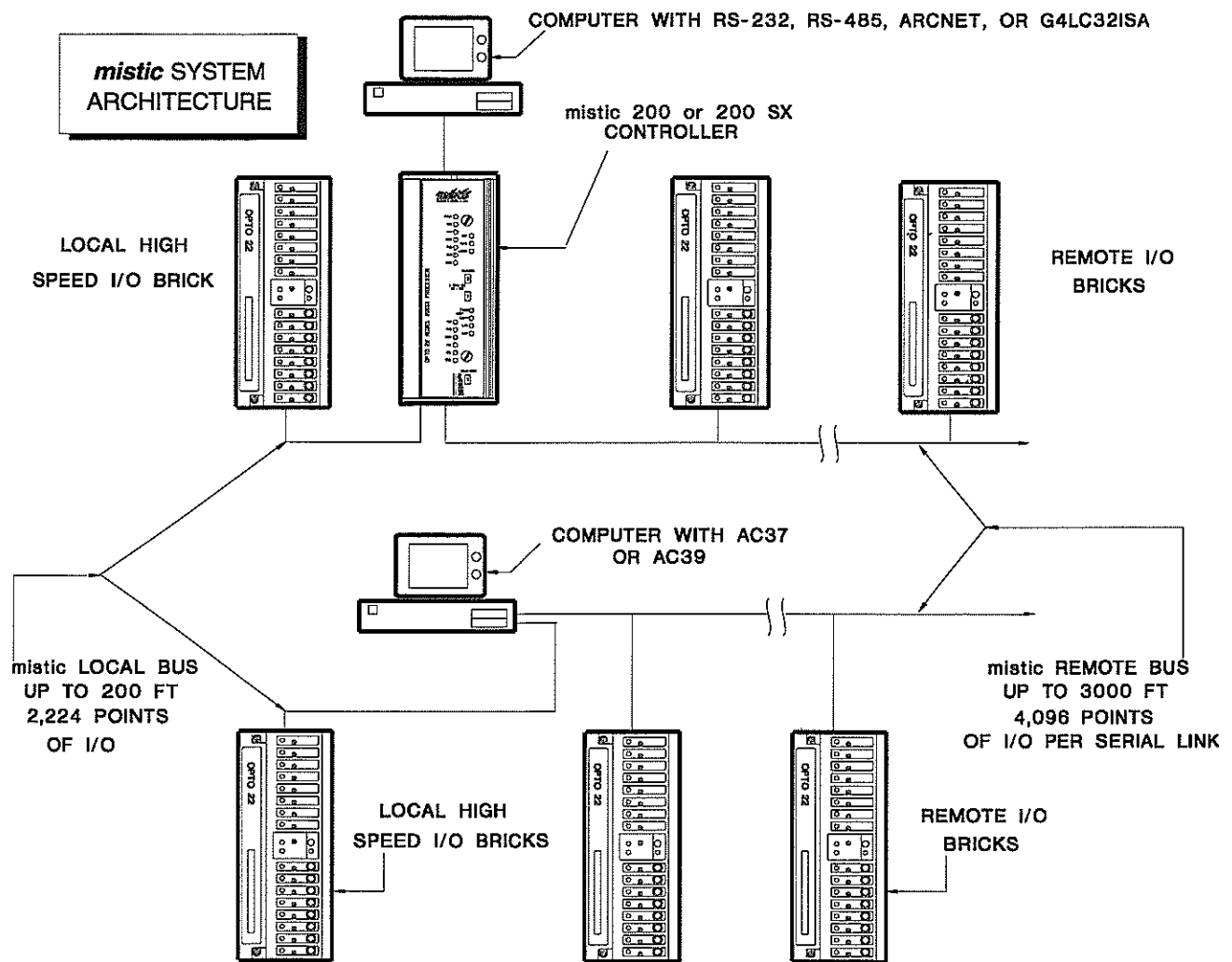
DIMENSIONS



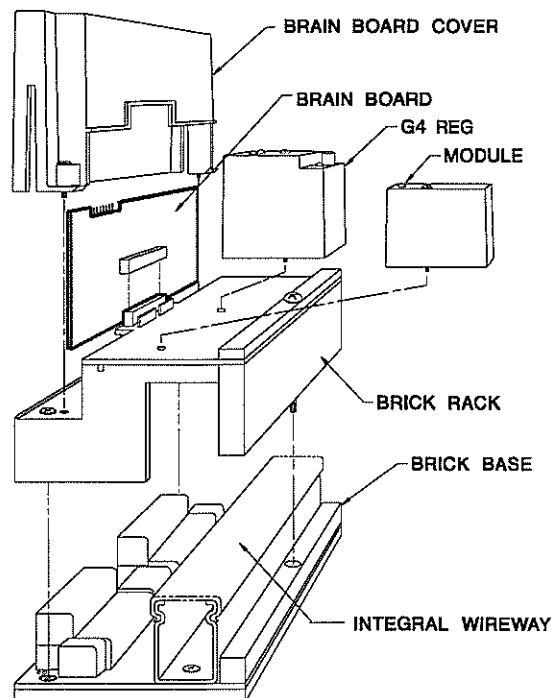
TOLERANCES: .xx \pm .02 [.5]

DIMENSIONAL UNITS: INCHES [MILLIMETERS]

SYSTEM CONFIGURATION



BRICK CONSTRUCTION



COMMAND SET

Setup And System Commands

Identify Unit
Power Up Clear
Repeat Last Response
Reset
Reset All Parameters to Default
Set Comm Link Watchdog MOMO* and Delay
Set Response Delay
Set System Options

Digital I/O Configuration Commands

Read Module Configuration
Set Channel Configuration
Set I/O Configuration - Group
Store System Configuration

Digital Read/Write, Latch Commands

Clear Output
Read and Optionally Clear Input Latches Group
Read and Optionally Clear Input Latch
Read Module Status
Set Output Module State - Group
Set Outputs

Digital Counter, Frequency Commands

Clear Counter
Enable/Disable Counter Group
Enable/Disable Counter
Read 16 Bit Counter
Read 32 Bit Counter Group
Read 32 Bit Counter
Read and Clear 16 Bit Counter
Read and Clear 32 Bit Counter Group
Read and Clear 32 Bit Counter
Read and Clear Enable/Disable Status
Read Frequency Measurement
Read Frequency Measurement Group

Digital Time Delay, Pulse Output Commands

Generate N Pulses
Read Output Timer Counter
Set Time Proportional Output Period
Set Time Proportional Output Percentage
Start Continuous Square Wave
Start Off Pulse
Start On Pulse

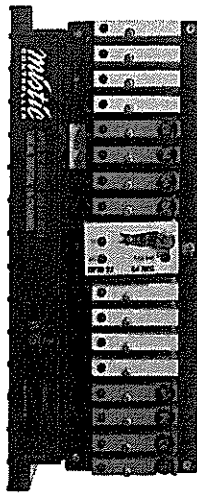
Digital Pulse/Period Measurement Commands

Read 16 Bit Pulse/Period Measurement
Read 32 Bit Pulse/Period Group
Read 32 Bit Pulse/Period Measurement
Read and Restart 16 Bit Pulse/Period
Read and Restart 32 Bit Pulse/Period
Read and Restart 32 Bit Pulse/Period Group
Read Pulse/Period Complete Status

Event Reaction Commands

Clear Event/Reaction Table
Clear Event Entry
Clear Interrupt
Enable/Disable Event Entry Group
Enable/Disable Event Entry
Read and Optionally Clear Event Latch
Read and Clear Event Latches
Read Event Enable/Disable Status
Read Event Latches
Read Event/Data Hold Buffer
Read Event Entry
Set Event Interrupt Status
Set Event On A Communications Watchdog Time Out
Set Event On Counter Greater or Equal
Set Event On Timer Greater or Equal
Set Event On Counter Less Than or Equal
Set Event on Timer Less Than or Equal
Set Event On MOMO* Match
Set Reaction To Null
Set Reaction To Clear Counter/Timer
Set Reaction To Output a Module State
Set Reaction To Enable/Disable Counter
Set Reaction To Enable/Disable an Event
Set Reaction To Enable/Disable Event Groups
Set Reaction To Start OFF-PULSE
Set Reaction To Start ON-PULSE
Set Reaction To Read and Hold Counter Value
Set Reaction To Read and Hold Timer Value
Set Reaction To Write MOMO*

* MOMO - Must Be On, Must Be Off - Used to set
or test state of digital outputs or inputs.



OPTO 22

**DIGITAL
16 CHANNEL
LOCAL SIMPLE
I/O BRICK**

MODEL G4D16LS

DESCRIPTION

The G4D16LS digital I/O brick features ultra high-speed response for time critical on/off control. Each brick unit offers flexible single point I/O control for up to 16 digital I/O modules in a rugged, deadfront, compact package.

This digital brick integrates transparently into the ***mistic*** 200 family of processors and I/O bricks on the local data link. Programming is accomplished with Cyrano, ***mistic's*** intuitive, multitasking, flowchart-based language, or by using a host computer and Opto 22's ***misticWARE*** software driver with the software language of your choice.

FEATURES

- ◆ High-speed response to I/O control
- ◆ All control signals are optically isolated
- ◆ 100% ***mistic*** I/O bus-compatible

SPECIFICATIONS

Local bus communication

Bus speed:	1.4 Mbps
Cable type:	34 conductor, ribbon
Maximum cable length:	200 ft
Mode:	Binary

Typical I/O times (includes communication transfer time)

Read 16 channels:	180 μ s, typical
Write 16 channels:	180 μ s, typical

System power consumption @ 24 VDC \pm 0.1 V

Terminated (last brick on the bus):	250 mA
Non-terminated (all other bricks):	210 mA

Temperature

Operating:	0° C to 70° C
Storage:	- 40° C to 80° C

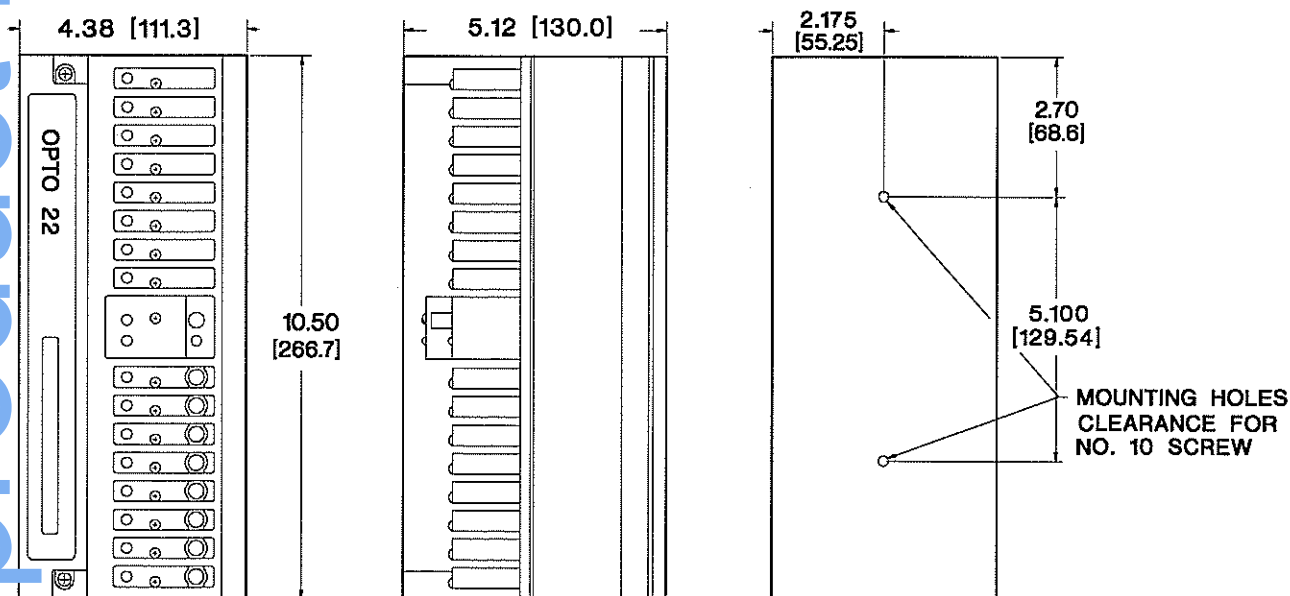
Humidity:

5% to 95% relative humidity

Software:

Cyrano 200 and *misticWARE*

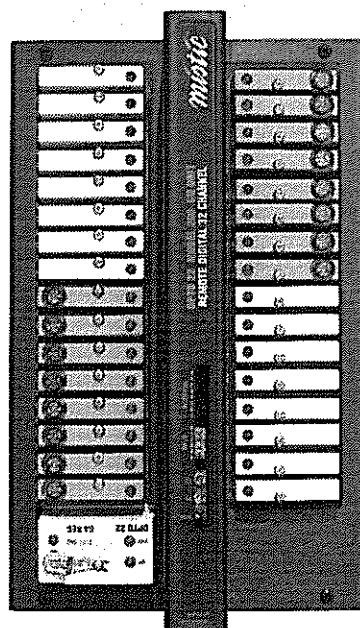
DIMENSIONS



TOLERANCES: .XX \pm .02 [.5] .XXX \pm .010 [.25]
 DIMENSIONAL UNITS: INCHES [MILLIMETERS]



PC-BASED INDUSTRIAL
AUTOMATION SYSTEM



OPTO 22

**DIGITAL
32-CHANNEL
REMOTE SIMPLE
I/O UNIT**

MODEL G4D32RS

DESCRIPTION

The G4D32RS is a low-cost, high-I/O-capacity digital unit for the *mistie* family of PC based control products. Each unit offers flexible, single-point, on/off control and latching for up to 32 digital I/O points. An easily accessible circuit board makes field wiring simple to install. Communication connections are to a 3-wire terminal block and seamlessly integrate with RS-485 *mistie* remote systems. An onboard regulator ensures power protection to the modules and provides a regulated voltage source.

G4D32RS's programming is accomplished with Cyrano, *mistie*'s intuitive multitasking, flowchart-based language, or using a host computer and Opto 22's *mistie*WARE software driver with the software language of your choice.

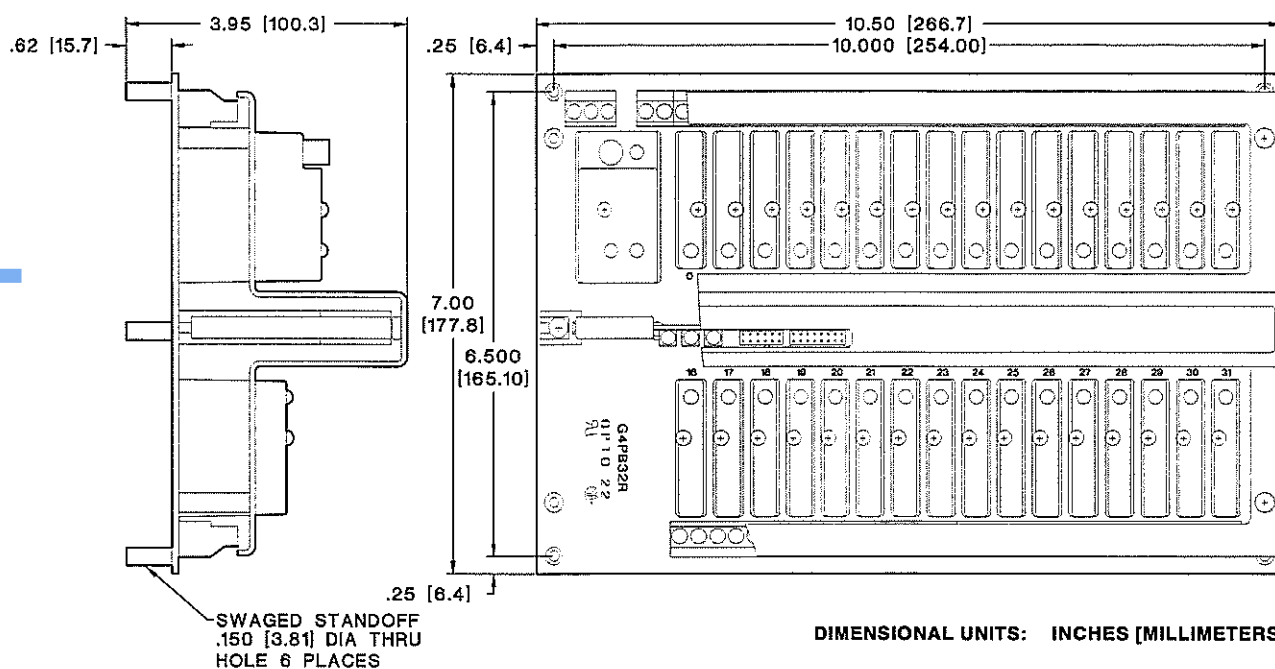
FEATURES

- ♦ Low cost, high I/O capacity
- ♦ Input latching
- ♦ Optically and electrically isolated control signals for increased system reliability
- ♦ Onboard isolated 24 to 5 VDC power regulator
- ♦ 100% *mistie* I/O bus compatible

SPECIFICATIONS

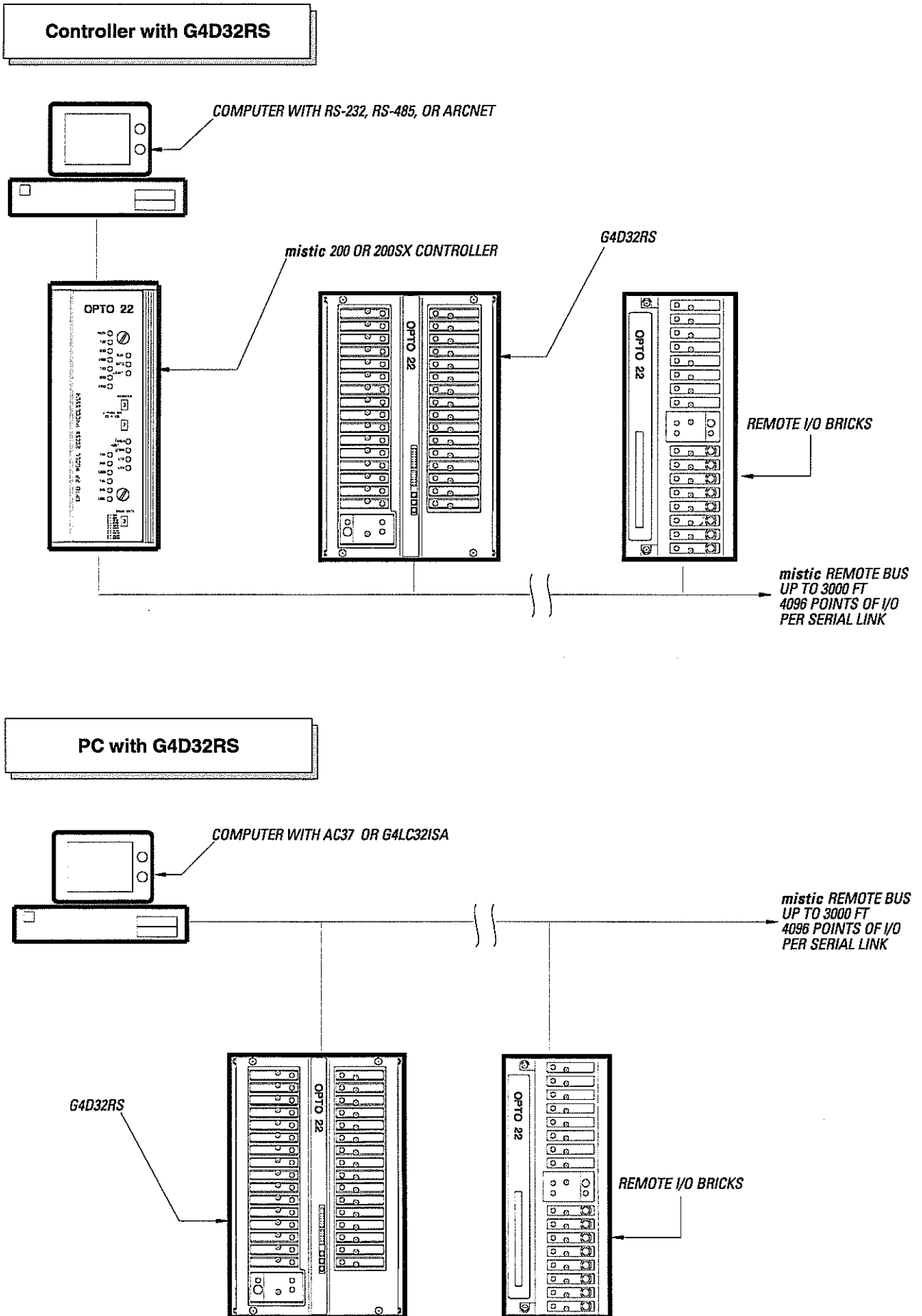
CPU:	8-bit 87C51 processor
CPU clock frequency:	22 MHz
Communications	
Bus speed:	300 - 115.2 KBd (76.8 K, 150, and 110 baud not supported)
Cable type:	3-wire, twisted pair + GND
Maximum cable length:	3000 ft. (more with repeaters)
Mode:	Binary or ASCII
Protocol:	RS-485, half-duplex
Typical I/O times (includes communication transfer time)	
Read 16 channels:	1.6 ms
Write 16 channels:	1.8 ms
Latching (minimum pulse width):	100 μ s
Typical operating temperature:	-20°C to 70°C
Storage temperature:	-40°C to 85°C
Humidity:	5% to 95% relative humidity
Software:	Cyrano 200 and <i>misticWARE</i>
Power requirements @ 24 VDC \pm 0.5V with 32 modules installed	
Terminated (last brick on the bus):	220 mA
Non-terminated (all other bricks):	220 mA
Maximum rack field current rating: (32 x G4 digital I/O)	48A

DIMENSIONS

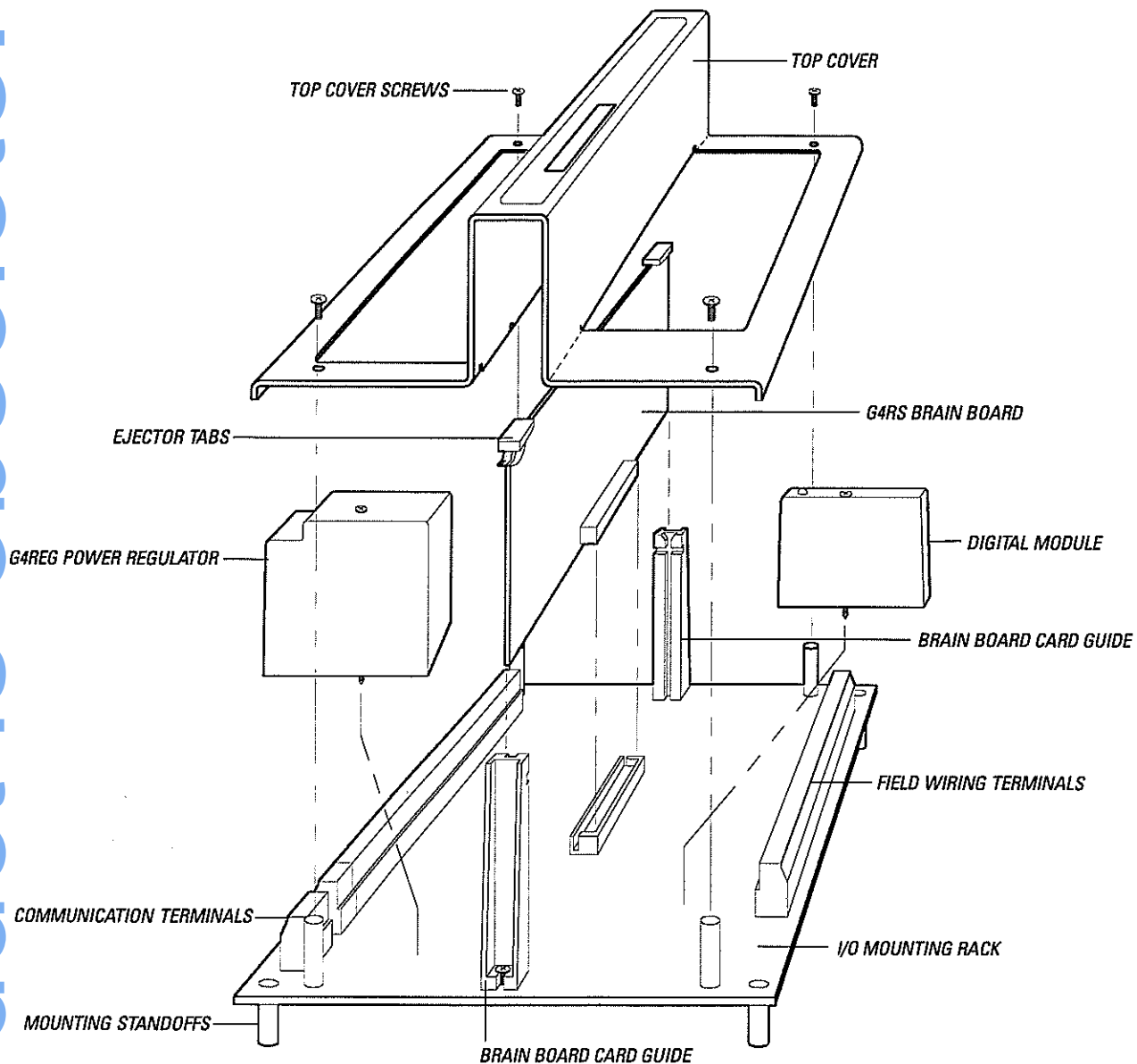


DIMENSIONAL UNITS: INCHES [MILLIMETERS]

SYSTEM CONFIGURATION



DIAGRAM



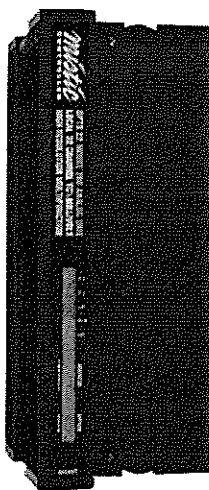
COMMAND SET

Setup and System Commands

- Identify unit
- Power up clear
- Repeat last response
- Reset
- Set response delay

Digital Read/Write, Latch Commands

- Read and optionally clear input latches (group command)
- Read and optionally clear input latch
- Read module status
- Set output module state (group command)
- Set output
- Clear output



OPTO 22

HIGH RESOLUTION HIGH DENSITY ANALOG BRICK

MODELS:

G4HDAL

G4HDAR

DESCRIPTION

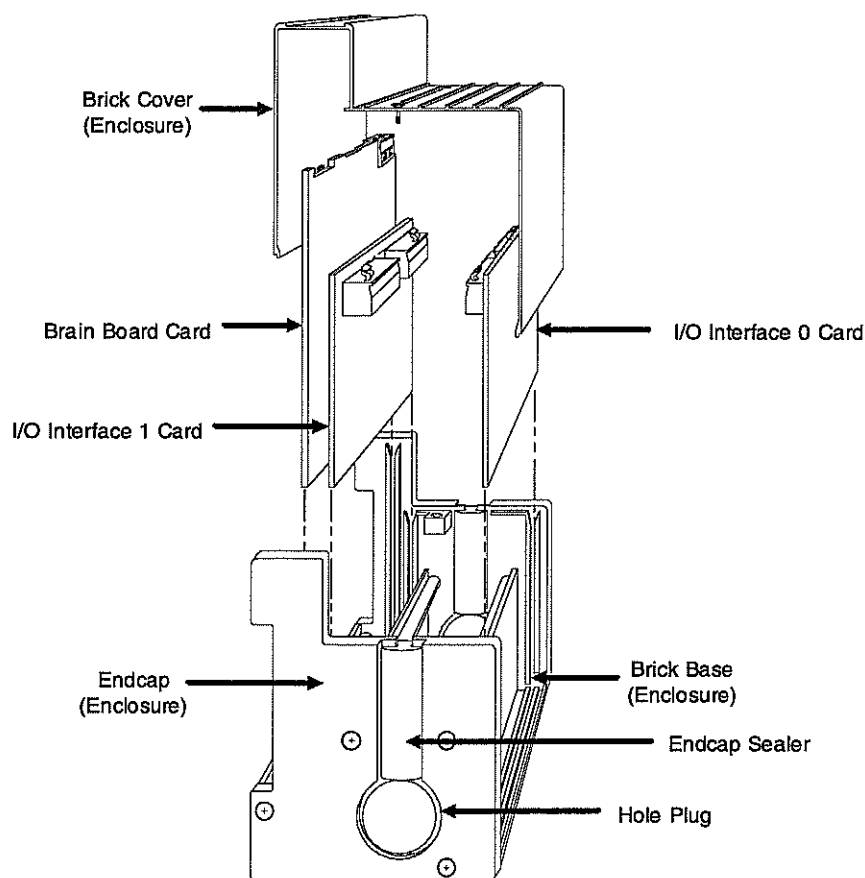
The HRD line of **mistic** 200 analog I/O bricks provide high resolution and high density in a compact, modular brick package. Up to 32 channels of I/O can be interfaced to a single 4 by 10 inch unit. Bricks are available for **mistic** 200 local or remote data links.

HRD bricks integrate transparently into the **mistic** 200 family of processors and I/O. Programming is accomplished with Cyrano, **mistic's** intuitive multitasking flowchart based language, or by utilizing a host computer, Opto 22's **misticWare** software driver and a high-level language of choice.

FEATURES

- ◆ Up to two user selectable high resolution I/O card slots
- ◆ High density
- ◆ Digital filtering
- ◆ Built-in diagnostics
- ◆ Returns readings in user defined engineering units
- ◆ Factory calibrated - no adjustments

HRD BRICK CONSTRUCTION

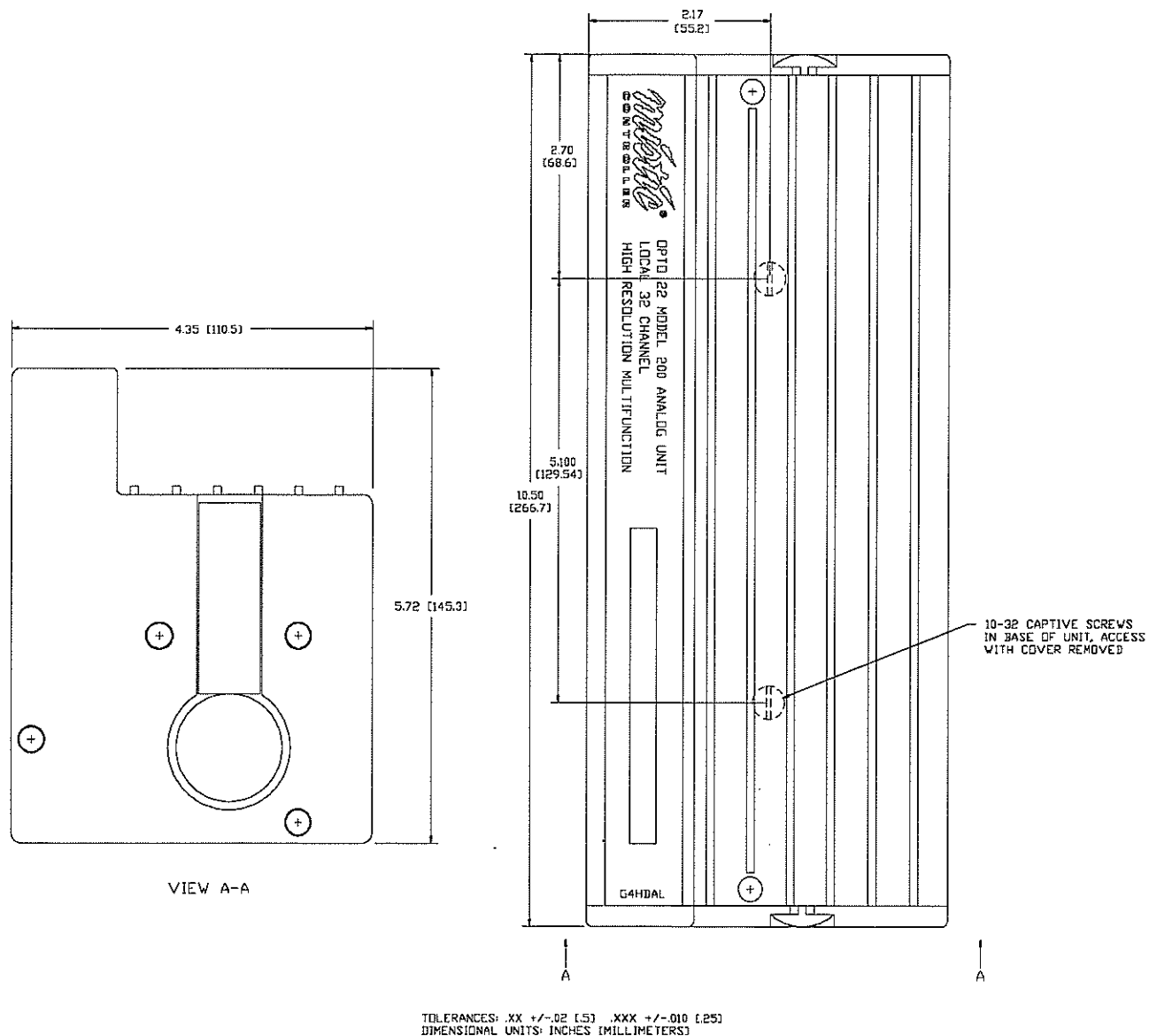


The HRD brick's primary components are the brick housing, a brain board card, and 1 or 2 high density I/O interface cards. The housing and communication card are sold as a single part number; G4HDAL for *mistic* 200 local bus (high speed parallel) applications and G4HDAR for remote (serial) interfaces. I/O cards are purchased as separate components, giving the user flexibility to mix and match signal types in 8 or 16 point increments. All high density I/O cards have 16 points except the RTD input cards which have 8 points. **Example:** For a *mistic* local bus application that requires 16 thermocouples and 16 current (4 - 20 milliamp) inputs, the user would need 1-G4AITM, 1-G4AIVA, and 1-G4HDAL.

PART NUMBERS

Part Number	HRD Analog Brick Enclosures
G4HDAL	Local Brick
G4HDAR	Remote Brick
Part Number	HRD I/O Interface Cards
G4AITM	16 Point - Thermocouple / Millivolt
G4AIVA	16 Point Input - Volt / Current
G4AIRT	8 Point Input RTD (2-wire, 3-wire, or 4-wire)
G4AOV	16 Point Voltage Output
G4AOA	16 Point Current Output

HRD BRICK DIMENSIONS



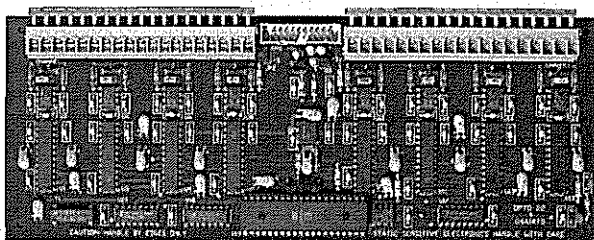
SYSTEM POWER CONSUMPTION

System Power Consumption @24 VDC		
Part Number	Without Termination*	With Termination**
G4HDAL	250 mA	300 mA
G4HDAR	200 mA	200 mA
G4AITM	100 mA	100 mA
G4AIVA	150 mA	150 mA
G4AIRTD	75 mA	75 mA
G4AOV	150 mA	150 mA
G4AOA	75 mA	75 mA

* Without Termination = A brick not physically at the end of the communication bus does not need termination.

** With Termination = The last physical brick on the communication bus needs termination.

This product is obsolete.



OPTO 22

HIGH RESOLUTION HIGH DENSITY ANALOG I/O INTERFACE CARD

RTD Input

MODEL G4AIRTD

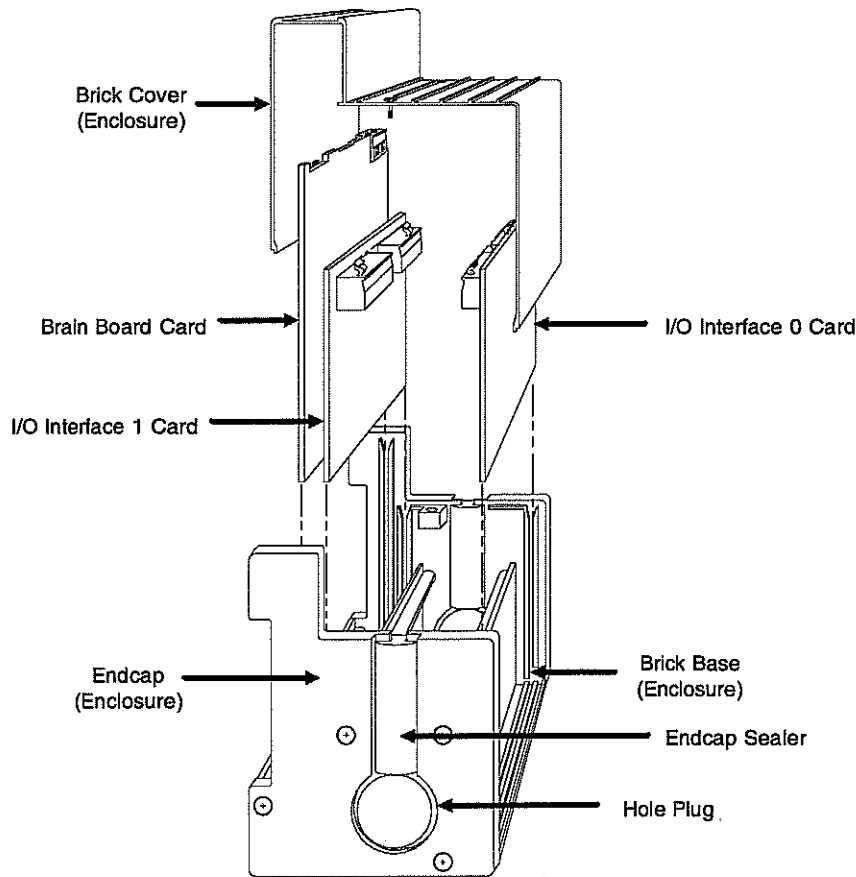
DESCRIPTION

The G4AIRTD RTD Interface Card is designed to be used with the Opto 22 HDR line of *mistic* 200 bricks. It can be used with either a Local or Remote brick enclosure. The G4AIRTD provides for up to 8 channels of RTD inputs. Each brick can accept two interface cards for a total of 16 I/O points in one compact unit. Any channel can be configured for 4-wire or 3-wire RTD connections. Accepts platinum RTDs per DIN 43760, BS 1904:1984, IEC, OIML 1985, GOST 6651-84, JIS C 1604-1989, SAMA RC21-4-1966 and ITS-90. Also accepts 10 ohm copper, 120 ohm nickel, and 604 ohm nickel iron. RTD types can be mixed or matched on any channel.

FEATURES

- ◆ Provision for Eight Precision RTD Inputs
- ◆ Two, Three, or Four-Wire RTD Connections -- Compensation for Lead Resistance is Provided for Three-Wire RTDs
- ◆ Accepts 100 Ohm Platinum, 10 Ohm Copper, 120 Ohm Nickel, and 604 Ohm Nickel Iron
- ◆ RTD Break Detection is Built-in
- ◆ Provides 200 μ A Constant Current Source for Each RTD
- ◆ 16-bits Resolution
- ◆ Accuracy is Better Than 0.1% of Full Scale Range
- ◆ Programmable Low Pass Digital Filter Noise Rejection is 100 db Minimum at 50 or 60 Hz
- ◆ Factory System Calibration -- No Field Calibration Required
- ◆ Returns Readings in $^{\circ}$ F, $^{\circ}$ C, Ohms, or User Defined Engineering Units

G4AIRTD CARD INSTALLATION



To install the G4AIRTD into the HRD brick (G4HDAL Local or G4HDAR Remote), remove the two Phillip's head screws that secure the brick cover. Remove the cover. Install the G4AIRTD I/O Interface Card as shown in the above illustration. It can be installed as I/O Interface Card 0 or as I/O Interface Card 1. Connect the 20 conductor flat ribbon cable from the Brain Card to the Interface Card. Make sure that the cable is connected to the proper connector on the Brain Card. Use P1 for I/O Interface Card 1 and P2 for I/O Interface Card 0. For the Interface Card nearest to the Brain Card (I/O Card 1) use the short cable. For the Interface Card farthest from the Brain Card (I/O Card 0) use the long cable.

Connect your field wiring to the terminal strips on the interface card. Interface cards (types) can be mixed or matched within the brick.

G4AIRTD DESCRIPTION

The G4AIRTD is an 8 channel RTD input board that allows users to select on a point-by-point basis from a variety of precision RTD temperature sensors. The temperature verse resistance characteristic of each RTD type is stored in the brain board. Returns readings in ° F, ° C, ohms or user defined Engineering Units. Resistance in ohms allows the user to use special RTDs. The G4AIRTD board will accept 4-wire, 3-wire, and 2-wire RTD connections. The 4-wire uses Kelvin connections. No lead compensation is required. Factory system calibration is provided. No field calibration is ever needed. Use of stable low drift components assure permanent accuracy. Calibration parameters are stored in EEPROM. There are no calibration resistors, trim pots, or DIP switches to adjust. The G4AIRTD is isolated in groups of 8 input channels. Each group of 8 inputs has its own isolated power supply. CMOS ICs are used for low power consumption. Automatic RTD linearization. An integrated ADC/DSP combination chip provides a programmable gain front-end and digital filtering. The proper gain setting is automatically selected based on the RTD type. These features provide maximum signal resolution over a given span.

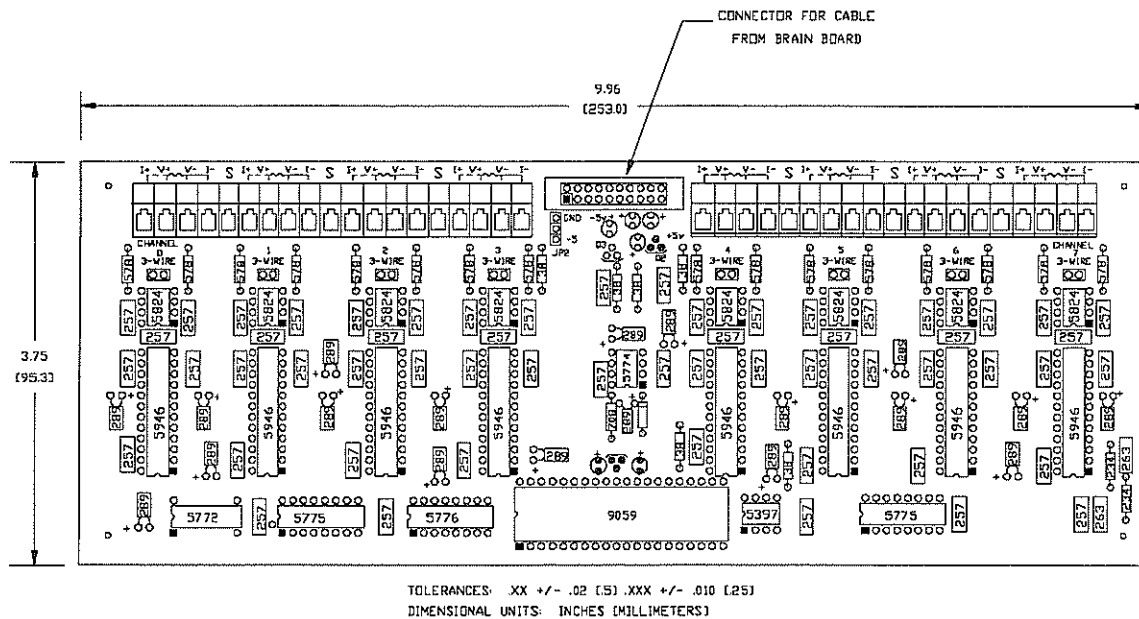
RTD TYPES AND RANGES

RTD Type	TCR ($\Omega / \Omega / ^\circ\text{C}$) (Alpha)	Temperature Range	Resistance Range - Ohms	Resolution in Ohms $^\circ\text{C}$	
100 ohm Pt - DIN 43760	0.00385	-200° to +850° C	18.493 to 390.263	0.00596	0.015
100 ohm Pt - BS 1904:1984	0.00385	-200° to +850° C	18.493 to 390.263	0.00596	0.015
100 ohm Pt - IEC 751	0.00385	-200° to +850° C	18.493 to 390.263	0.00596	0.015
100 ohm Pt - OIML 1985	0.00385	-200° to +850° C	18.493 to 390.263	0.00596	0.015
100 ohm Pt - GOST 6651-84	0.00385	-200° to +850° C	18.493 to 390.263	0.00596	0.015
100 ohm Pt - JIS C 1604 Pt100	0.00385	-200° to +650° C	18.493 to 332.660	0.00596	0.015
100 ohm Pt - GOST 6651-84	0.00391	-200° to +850° C	17.246 to 395.075	0.01192	0.030
100 ohm Pt - OIML 1985	0.00391	-200° to +850° C	17.285 to 394.944	0.01192	0.030
100 ohm Pt - JEMIMA	0.003916	-200° to +600° C	17.14 to 287.40	0.00596	0.015
100 ohm Pt - JIS C 1604 JPt100	0.003916	-200° to +510° C	17.084 to 287.999	0.00596	0.015
100 ohm Pt - SAMA RC21-4-1966	0.003923	-200° to +600° C	16.665 to 311.875	0.00596	0.015
100 ohm Pt - ITS-90	0.003928	-259° to +962° C	0.1187 to 428.642	0.01192	0.030
10 ohm at 25°C Cu	0.00427	-100° to +260° C	5.128 to 19.116	0.00149	0.038
10 ohm Cu - SAMA RC21-4-1966	0.00426	-70° to +150° C	6.331 to 14.82	0.00149	0.038
120 ohm Ni	0.00672	-80° to +260° C	66.60 to 380.31	0.00596	0.0074
100 ohm Ni - DIN 43760	0.00618	-60° to +250° C	69.52 to 289.16	0.00596	0.0074
604 ohm Ni-Fe	0.00518	-100° to +200° C	372.79 to 1301.86	0.02384	0.0076

SPECIFICATIONS

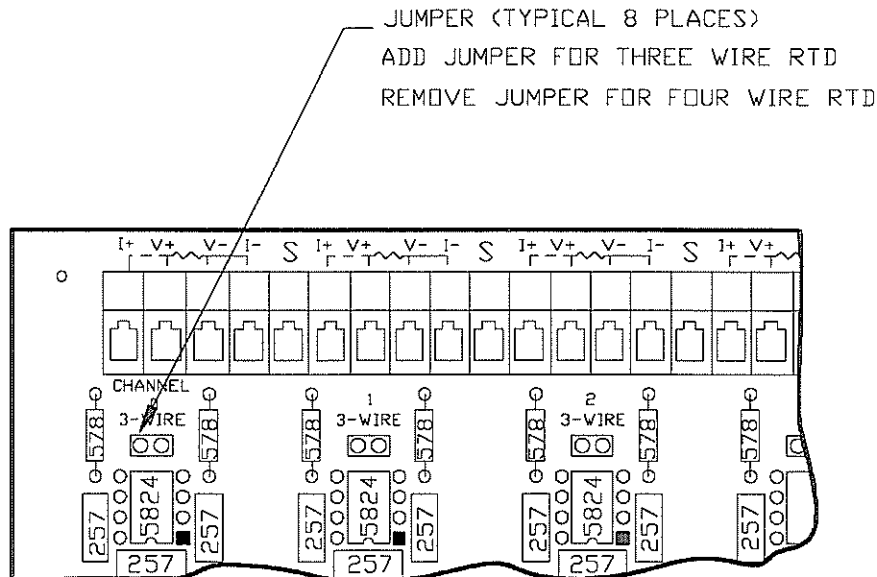
Isolation:	Input to Case or Input to Output or I/O Board to Other I/O Board	750 V _{rms}
Integral Nonlinearity:	$\pm 0.0075\%$ of Full Scale Range maximum	
Full Scale Drift:	35 ppm / $^\circ\text{C}$ typical	
Input Response Time:	120 ms	
Data Refresh Rate:	All 8 I/O points are updated every 120 ms	
Noise Rejection:	100 db minimum at 50 or 60 Hz	
Ambient Temperature:		
Operating:	0° C to + 70° C	
Storage:	- 25° C to + 85° C	
Resolution:	16-bits	
Accuracy:	0.1% of range	
System Power Consumption:	75 mA @ 24 VDC	

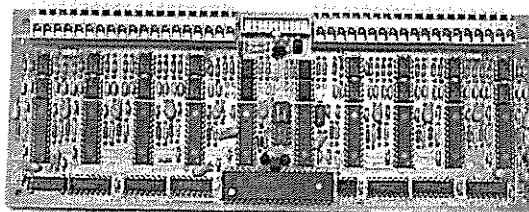
G4AIRTD INTERFACE CARD DIMENSIONS



JUMPER SETTINGS

For each I/O point that is to be configured as a three wire input, install a jumper. Omit the jumper for all I/O points configured as four wire inputs. See diagram below.





OPTO 22

HIGH RESOLUTION HIGH DENSITY ANALOG I/O INTERFACE CARD

Thermocouple
Millivolt Input

DESCRIPTION

The G4AITM Thermocouple/Millivolt Interface Card is designed to be used with the Opto 22 HDR line of *mistic* 200 bricks. It can be used with either a Local or Remote brick enclosure.

The G4AITM provides up to 16 channels of thermocouple inputs and/or low level millivolt inputs. Each brick can accept 2 interface cards for a total of 32 I/O points in one compact unit. Accepts thermocouple types: J, K, R, S, T, B, E, N, G, C & D. Four millivolt ranges are provided; 0 to +78.125, 0 to +156.25, -78.125 to +78.125 and -156.25 to +156.25. Any of the 16 I/O channels can be configured to accept any of the above type thermocouples or millivolt ranges.

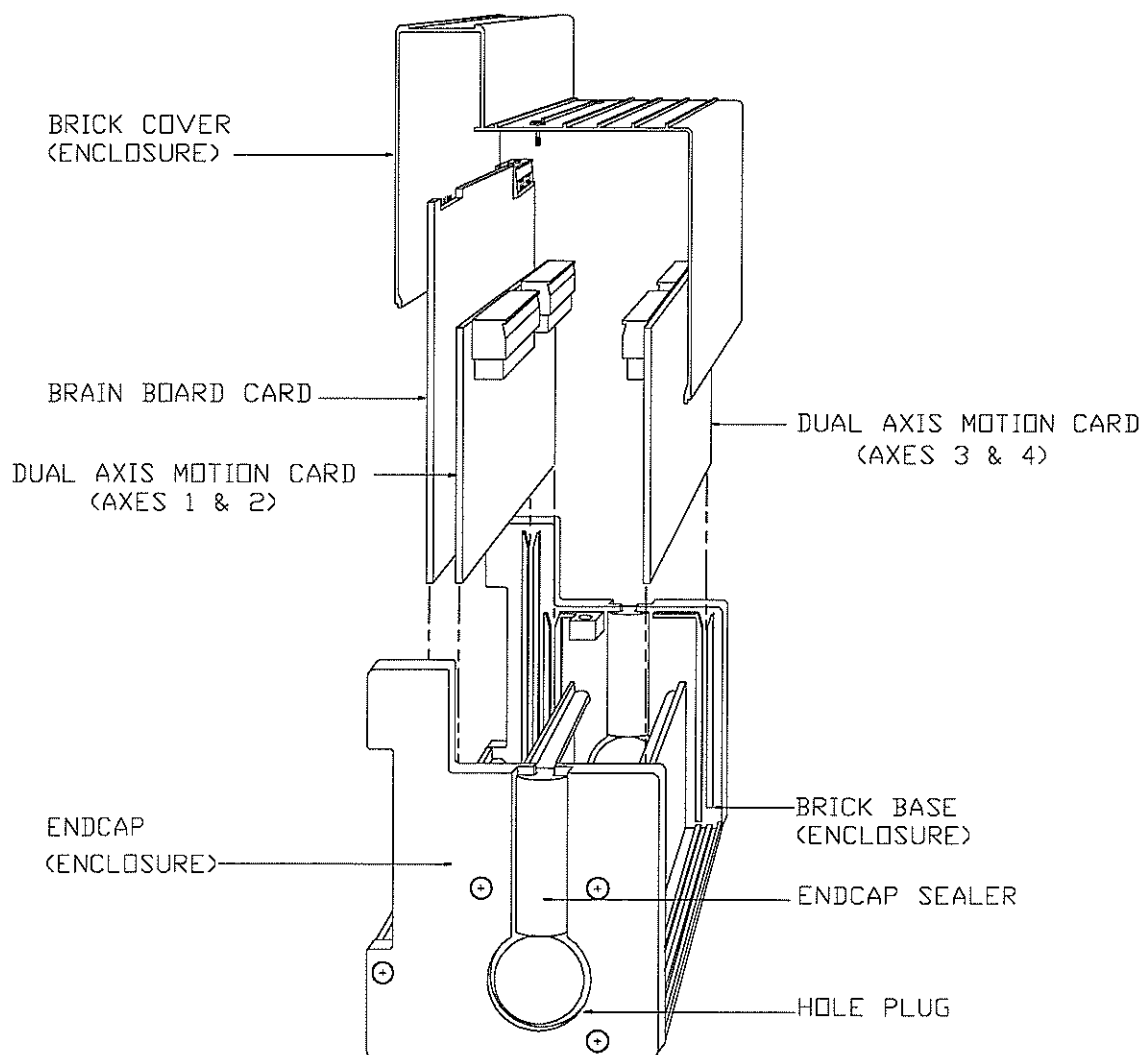
Cold junction compensation is accomplished by means of software. Reference junction temperature is continuously measured using 4 precision platinum RTDs.

MODEL G4AITM

FEATURES

- ◆ 16-bit Resolution
- ◆ 0.05% Accuracy
- ◆ High Density
- ◆ Digital Filtering
- ◆ Thermocouple Break Detection
- ◆ Automatic Thermocouple Linearization
- ◆ Returns Readings In ° F, ° C, or User Defined Engineering Units
- ◆ No Field Calibration Needed
- ◆ Low Cost Per Channel
- ◆ All Inputs are Differential

G4AITM CARD INSTALLATION



To install the G4AITM into the HRD brick (G4HDAL Local or G4HDAR Remote), remove the two Phillip's head screws that secure the brick cover. Remove the cover. Install the G4AITM I/O Interface Card as shown in the above illustration. It can be installed as I/O Interface Card 0 or as I/O Interface Card 1. Connect the 20 conductor flat ribbon cable from the Brain Card to the Interface Card. Make sure that the cable is connected to the proper connector on the Brain Card. Use P1 for I/O Interface Card 1 and P2 for I/O Interface Card 0. For the Interface Card nearest to the Brain Card (I/O Card 1) use the short cable. For the Interface Card farthest from the Brain Card (I/O Card 0) use the long cable.

Connect your field wiring to the terminal strips on the interface card. Interface cards (types) can be mixed or matched within the brick.

G4AITM DESCRIPTION

The G4AITM is a 16 channel, thermocouple/millivolt input board that allows users to select on a point-by-point basis any type thermocouple or millivolt field device. Millivolt inputs (including bridge inputs) may require the physical removal of some resistors. See Opto 22 "*mistic* 200 Systems Installation Guide" Form 595 for further details

An integrated ADC/DSP combination chip provides a programmable gain front-end and digital filtering. The proper gain setting is automatically selected based on the thermocouple type. Millivolt inputs can be configured in unipolar or bipolar mode. These features provide maximum signal resolution over a given span.

Isolation is provided in groups of 16 inputs.

THERMOCOUPLE TYPES AND RANGES

Thermocouple Type	J	K	T	E	R	S
Nom. Temp. Range ° C	-210 to 1200	-270 to 1372	-270 to 400	-270 to 1000	-50 to +1768	-50 to 1768
Nom. Temp. Range ° F	-346 to 2192	-454 to 2501.6	-454 to 752	-454 to 1832	-58 to 3214.4	-58 to 3214.4

Thermocouple Type	B	N	G	C	D
Nom. Temp. Range ° C	+42 to 1820	-270 to 1300	0 to 2320	0 to 2320	0 to 2320
Nom. Temp. Range ° F	107.6 to 3308	-454 to 2372	32 to 4208	32 to 4208	32 to 4208

MILLIVOLT INPUT RANGES

Range	Polarity	Resolution
0 to 78.125 mV	Unipolar	1.192 μ V
0 to 156.25 mV	Unipolar	2.384 μ V
-78.125 to +78.125 mV	Bipolar	2.384 μ V
-156.25 to +156.25 mV	Bipolar	4.768 μ V

SPECIFICATIONS

Isolation:

Input to Case or
Input to Output or
I/O Board to I/O Board

750 V_{rms}

Common Mode Input Voltage Range: ± 5 VDC

Cold Junction Compensated: yes

Open Thermocouple Detection: yes

Input Response Time: 120 ms

Data Refresh Rate: All 16 I/O points are updated every 120 ms

Ambient Temperature:

Operating
Storage

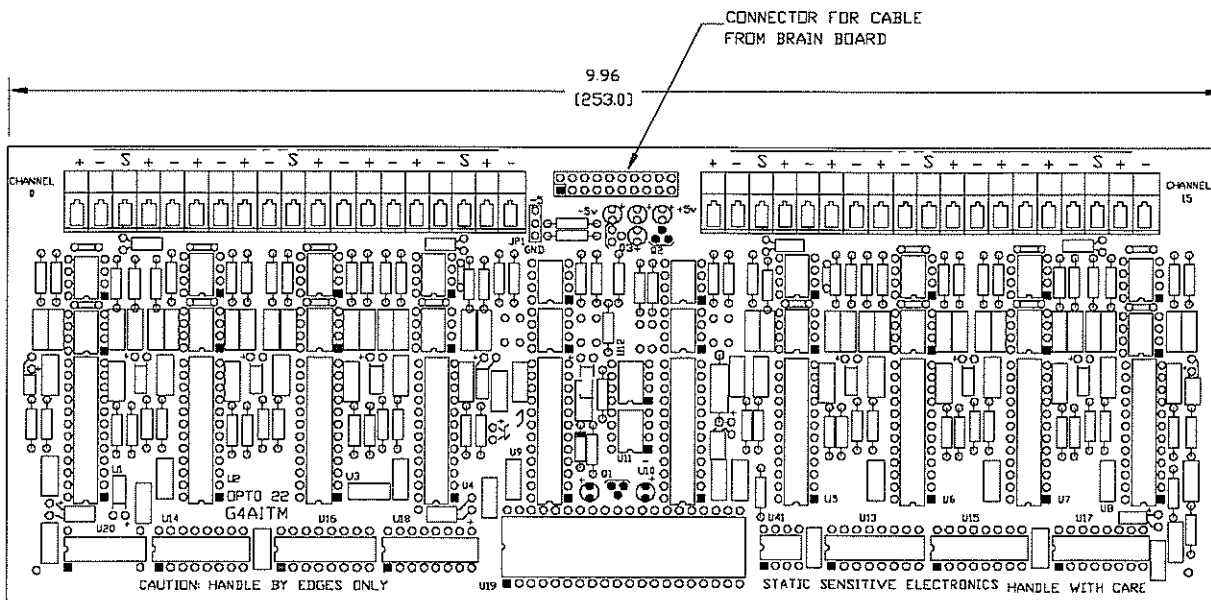
0° C to + 70° C
- 25° C to + 85° C

Resolution: 16-bits

Accuracy: 0.05% of range

System Power Consumption: 100 mA @ 24 VDC

G4AITM INTERFACE CARD DIMENSIONS

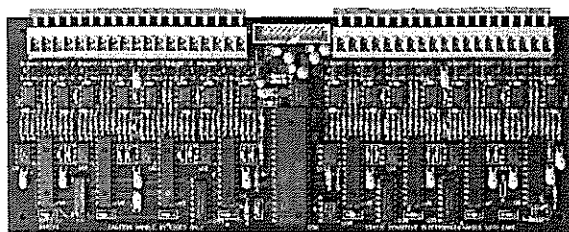


TOLERANCES: .XX +/- .02 [.5] .XXX +/- .010 [.25]

DIMENSIONAL UNITS: INCHES [MILLIMETERS]



PC-BASED INDUSTRIAL
AUTOMATION SYSTEM



OPTO 22

**HIGH RESOLUTION
HIGH DENSITY
ANALOG I/O
INTERFACE CARD**

Voltage Current Input

MODEL G4AIVA

DESCRIPTION

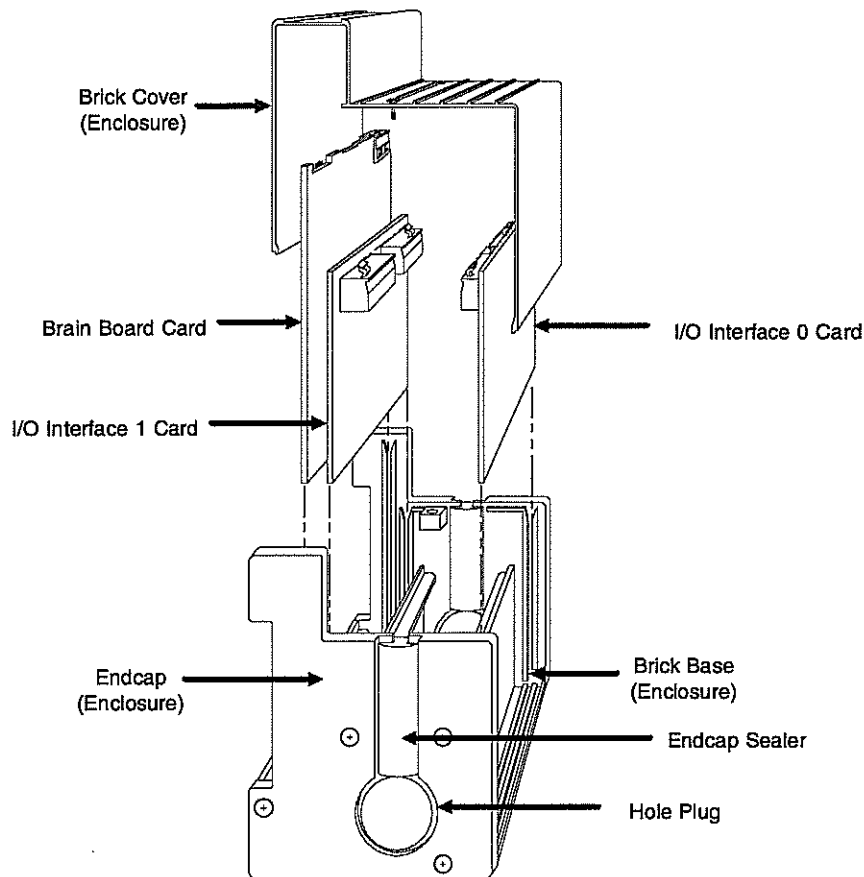
The G4AIVA Voltage/Current Input Interface Card is designed to be used with the Opto 22 HDR line of *mistic* 200 bricks. It can be used with either a Local or Remote brick enclosure.

The G4AIVA provides for up to 16 channels of voltage and/or current (milliampere) inputs. Each brick can accept two interface cards for a total of 32 I/O points in one compact unit. Five voltage ranges are provided; -10 to +10VDC, 0 to +10VDC, -5 to +5VDC, 0 to +5VDC, and 0 to +1.25VDC. Two current ranges are provided, 0 to 20 mA and 4 to 20 mA. Any of the 16 I/O channels can be configured to accept any of the above voltage and/or current ranges. A jumper must be installed for each I/O point that is configured for current input. A fuse is provided to prevent resistor burn out in event the input current source is shorted or mis-wired.

FEATURES

- ◆ 16-bit resolution and high density
- ◆ 12-bit 0.025% accuracy
- ◆ Digital filtering is provided
- ◆ Input fault protection
- ◆ Returns readings in volts, millivolt, or user defined engineering units
- ◆ No field calibration needed
- ◆ Low Cost Per Channel
- ◆ Instrumentation amplifier differential inputs
- ◆ High common mode rejection

SPECIFICATIONS



To install the G4AIVA into the HRD brick (G4HDAL Local or G4HDAR Remote), remove the two Phillip's head screws that secure the brick cover. Remove the cover. Install the G4AIVA I/O Interface Card as shown in the above illustration. It can be installed as I/O Interface Card 0 or as I/O Interface Card 1. Connect the 20 conductor flat ribbon cable from the Brain Card to the Interface Card. Make sure that the cable is connected to the proper connector on the Brain Card. Use P1 for I/O Interface Card 1 and P2 for I/O Interface Card 0. For the Interface Card nearest to the Brain Card (I/O Card 1) use the short cable. For the Interface Card farthest from the Brain Card (I/O Card 0) use the long cable.

Connect your field wiring to the terminal strips on the interface card. Interface cards (types) can be mixed or matched within the brick.

G4AIVA DESCRIPTION

The G4AIVA is a 16 channel, voltage/current input board that allows users to select on a point-by-point basis any voltage or current input in the ranges shown in the tables below.

An integrated ADC/DSP combination chip provides a programmable gain front-end and digital filtering. The proper gain setting is automatically selected based on the input type. The input types and range is selected by means of software when the I/O points are configured. In addition to the software selection, a jumper must be installed for all I/O points that are to be configured as current inputs. The jumper must be removed for voltage inputs. The digital filters are optimized for 60 cycle noise rejection or 50 cycle noise rejection. A jumper is provided on the brain board for selecting the digital filter frequency. These features provide maximum signal resolution over a given span.

Isolation is provided in groups of 16 inputs.

INPUT VOLTAGE AND CURRENT RANGES

Input Voltage Range	Resolution @ 16 Bits	Polarity
-10 VDC to +10 VDC	0.305 mV	Bipolar
-5 VDC to +5 VDC	0.152 mV	Bipolar
0 to +10 VDC	0.152 mV	Unipolar
0 to +5 VDC	0.076 mV	Unipolar
0 to +1.25 VDC	0.019 mV	Unipolar

Input Current Range	Resolution @ 16 Bits	Polarity
0 to +20 mA	0.305 μ A	Unipolar
4 to +20 mA	0.305 μ A	Unipolar

SPECIFICATIONS

Isolation:

Input to Case or
Input to Output or
I/O Board to Other I/O Board

750 V_{rms}

Integral Nonlinearity: $\pm 0.0075\%$ of FSR maximum

Common-Mode Voltage Range: - 15 VDC to + 15 VDC

Full Scale Drift: 3 μ V / °C typical

Input Response Time: 120 ms

Data Refresh Rate: All 16 I/O points are updated every 120 ms

Common-Mode Rejection: 100 dB minimum at 50 or 60 Hz

Ambient Temperature:

Operating
Storage

0° C to + 70° C
- 25° C to + 85° C

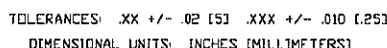
Resolution: 16-bits

Accuracy: 0.025% of range

Input Impedance: 1 M Ω

System Power Consumption: 150 mA @ 24 VDC

This product is obsolete.

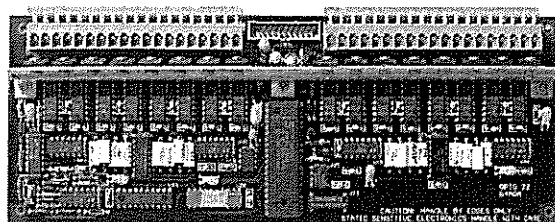


For each I/O point that is to be configured as a current input, install a jumper. Omit the jumper for all I/O points configured as voltage inputs. See diagram below.





PC-BASED INDUSTRIAL
AUTOMATION SYSTEM



OPTO 22

**HIGH RESOLUTION
HIGH DENSITY
ANALOG I/O
INTERFACE CARD**

Current Output

MODEL G4AOA

DESCRIPTION

The G4AOA is a 16-point output current interface card for the *mistec* 200 family of high resolution, high density (HRD) analog bricks. Configure I/O channels on a point-by-point basis from two available current ranges. The G4AOA features 15-bit to 16-bit resolution for each I/O point with 0.02% accuracy of span. CMOS ICs are used for low power consumption. Each factory calibrated channel accepts a nominal loop supply voltage of 24 VDC and allows a maximum load resistance of 1000 ohms. No field calibration is ever needed because stable, low drift components are used to assure permanent accuracy.

Intelligent, precise, distributed I/O responds quickly to your process' requirements. Mix or match the G4AOA I/O card with other I/O analog interface cards for up to 32 I/O points in a single HRD brick enclosure - flexibility in one compact, economically priced unit.

FEATURES

- ◆ Fast 15-bit to 16-bit DAC resolution
- ◆ 16 voltage output channels
- ◆ Output ranges: 0 to 20 mA
4 to 20 mA
- ◆ Unipolar current output
- ◆ Factory calibrated, permanent 0.02% accuracy
- ◆ Drives 0 to 20 mA loads
- ◆ Low power consumption
- ◆ Isolated power supply

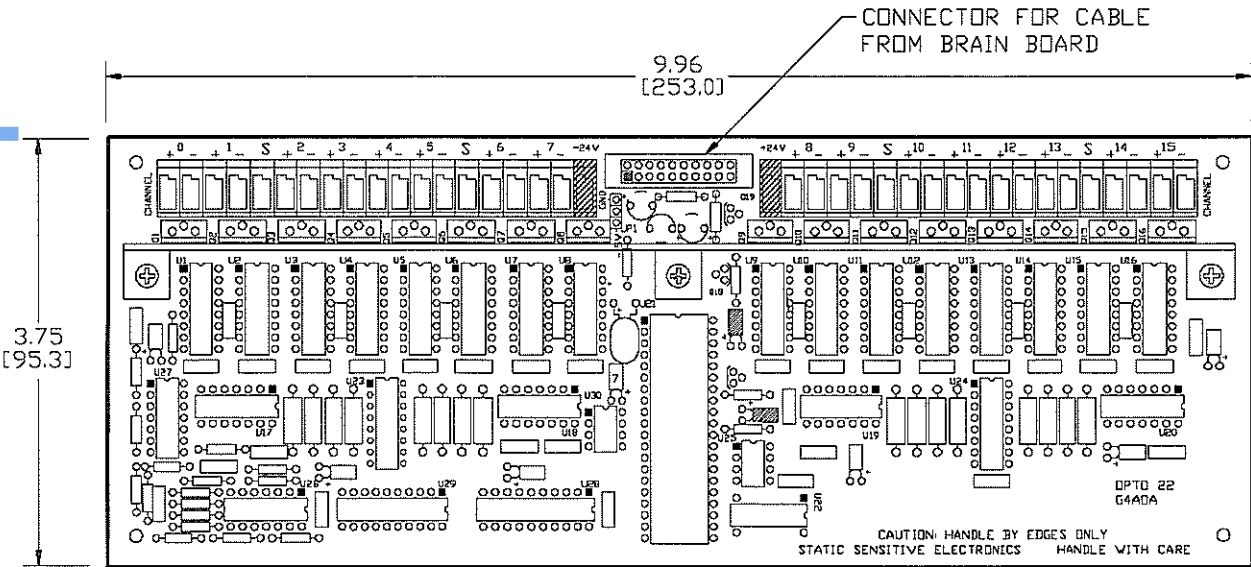
SPECIFICATIONS

Isolation:	Input-to-Case or Input-to-Output or I/O Board to Other I/O Board	750 V _{rms}
Integral Nonlinearity:		± 4 LSB
Differential Nonlinearity:		± 4 LSB
Gain Error:		± 0.02% Full Scale Range
Offset Error:		± 0.02% Full Scale Range
Full Scale Drift:		0.005% of span per ° C typical
Input Response Time:		10 ms
Data Refresh Rate:		All 16 I/O points are updated every 10 ms
Voltage Compliance:		20 V with a 24 VDC loop supply
Loop Supply Voltage:		13.5 V to 40 V
Maximum Load Resistance:		1000 Ω
Ambient Temperature:		
Operating		0° C to + 70° C
Storage		- 25° C to + 85° C
Relative Humidity		5% to 95%, noncondensing
Accuracy:		0.024% of range
System Power Consumption:		75 mA @ 24 VDC

CURRENT OUTPUT RANGES

Current Output Range	Polarity	Resolution - Bits	Resolution - Milliampères
0 to 20 mA	Unipolar	16-bits	0.000305
4 to 20 mA	Unipolar	15.678-bits	0.000305

DIMENSIONS

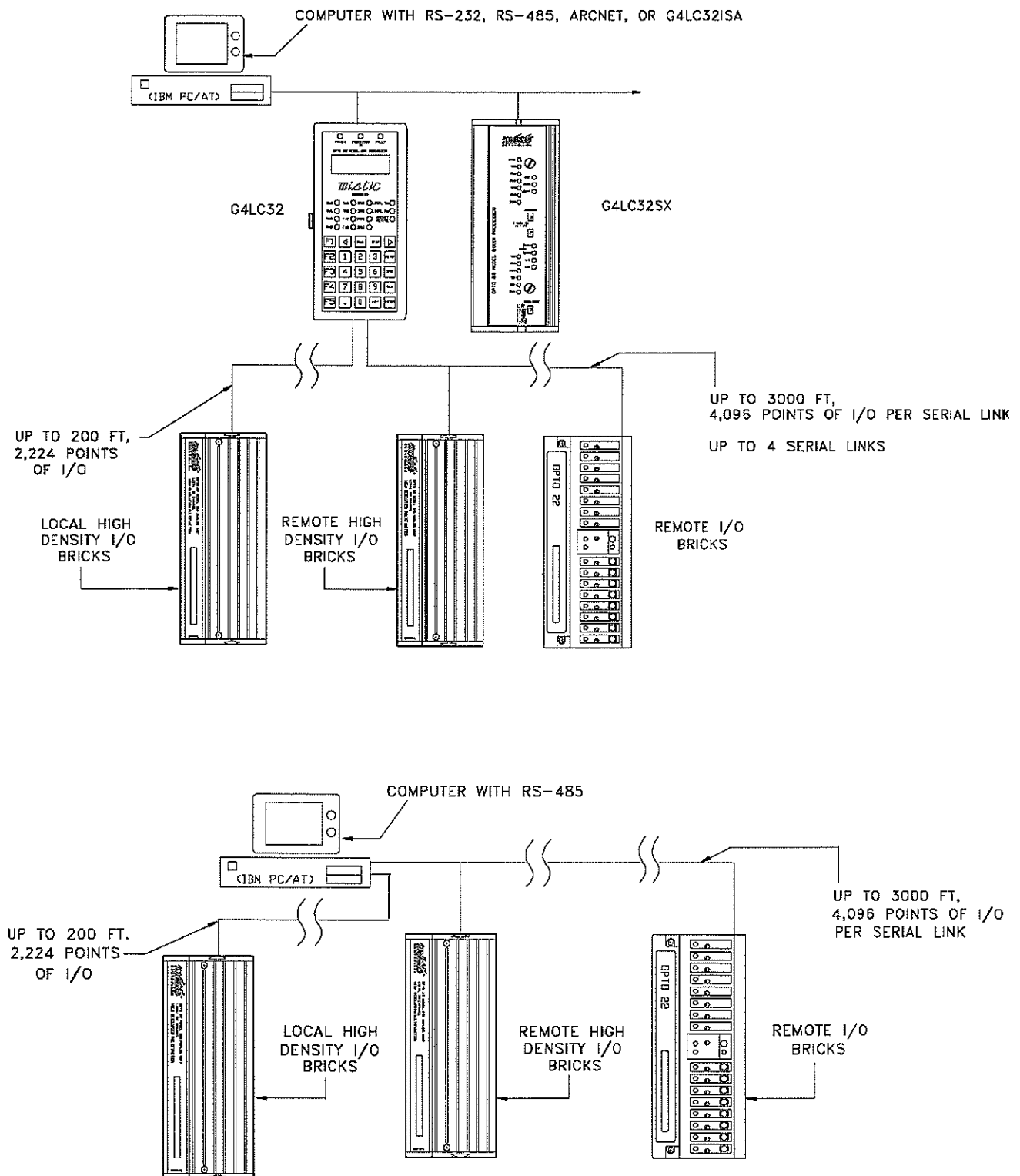


TOLERANCES: XX +/- .02 [5] XXX +/- .010 [25]

SYSTEM CONFIGURATION

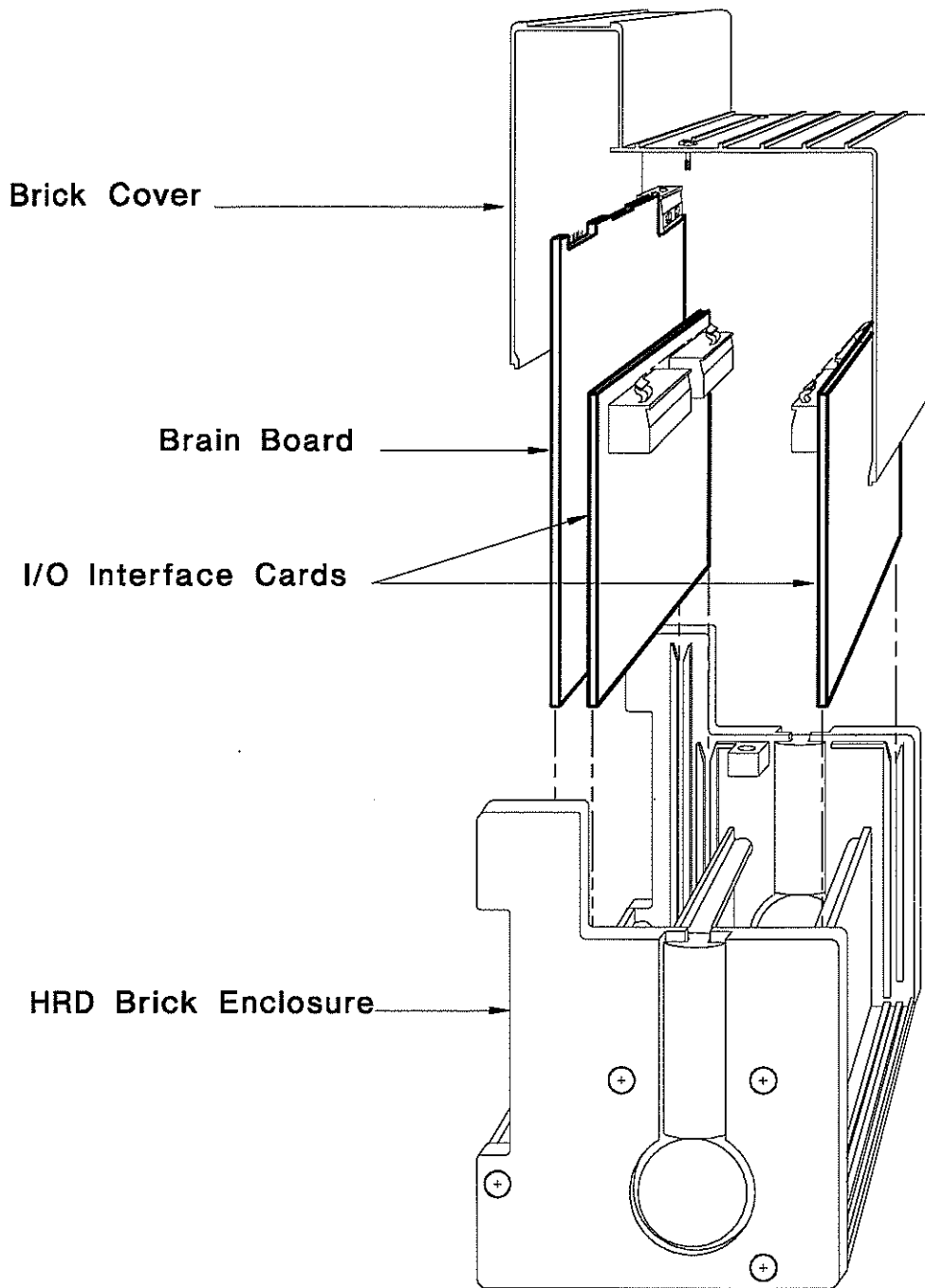
The HRD brick enclosures offer "remote control" (two-wire, RS-485, 115.2 Kbd serial link) or "local control" (34-conductor flat ribbon cable, 1.4 MHz parallel bus) compatibility. Place the I/O bricks anywhere from a few feet to thousands of feet away from a *mistic* controller or host computer.

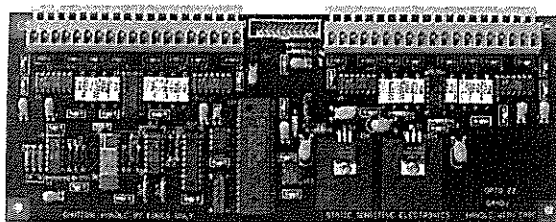
Distributed Control with Host



BRICK CONSTRUCTION

Combine the G4AOA with any of the other HRD I/O Interface Cards available in a high density brick enclosure.





OPTO 22

**HIGH RESOLUTION
HIGH DENSITY
ANALOG I/O
INTERFACE CARD**

Voltage Output

MODEL G4AOV

DESCRIPTION

The G4AOV is a 16-point output voltage interface card for the *mistic* 200 family of high resolution, high density (HRD) analog bricks. Configure I/O channels on a point-by-point basis from any of the four available voltage ranges. The G4AOV features 12-bit to 16-bit resolution for each I/O point with 0.02% accuracy of span. CMOS ICs are used for low power consumption and each factory calibrated channel can drive a 5 mA load. No field calibration is ever needed because stable, low drift components are used to assure permanent accuracy.

Intelligent, precise, distributed I/O responds quickly to your process' requirements. Mix or match the G4AOV I/O card with other I/O analog interface cards for up to 32 I/O points in a single HRD brick enclosure - flexibility in one compact, economically priced unit.

FEATURES

- ◆ Fast 12-bit to 16-bit DAC resolution
- ◆ 16 voltage output channels
- ◆ Output ranges: ± 10 V, 0 to 10 V
 ± 5 V, 0 to 5 V
- ◆ Unipolar or bipolar voltage output
- ◆ Factory calibrated 0.02% accuracy
- ◆ Drives 5 mA loads
- ◆ Low power consumption
- ◆ Isolated Power Supply

SPECIFICATIONS

Isolation:

Input to Case	750 V _{rms}
Input to Output	750 V _{rms}
I/O Board to Other I/O Board	750 V _{rms}

All analog output channels share a common ground.

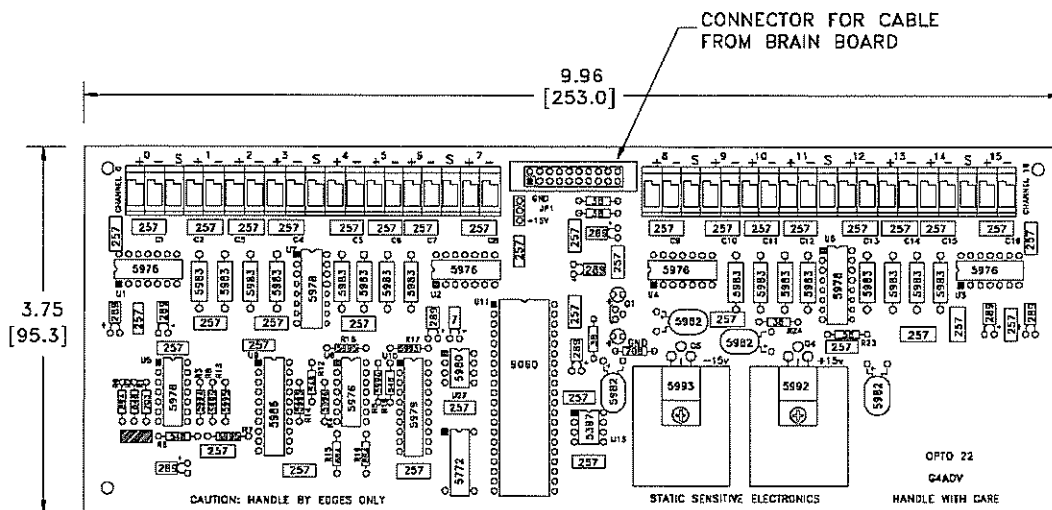
Integral Nonlinearity:	± 4 LSB
Differential Nonlinearity:	± 4 LSB
Gain Error:	± 0.02% Full Scale Range
Offset Error:	± 0.02% Full Scale Range
Full Scale Drift:	25 ppm/° C typical
Input Response Time:	10 ms
Data Refresh Rate:	All 16 I/O points are updated every 10 ms
Output Current*:	5 mA max
Ambient Temperature:	
Operating	0° C to + 70° C
Storage	- 25° C to + 85° C
Relative Humidity	5% to 95%, non-condensing
Accuracy:	0.024% of range
System Power Consumption:	150 mA @ 24 VDC

* When driving external loads, make allowances for errors due to the voltage drop in the external wiring.

VOLTAGE OUTPUT RANGES

Voltage Output Range	Polarity	Resolution - Bits	Resolution - Volts
- 10 VDC to + 10 VDC	Bipolar	16 bits	0.000305
- 5 VDC to + 5 VDC	Bipolar	15 bits	0.000305
0 VDC to + 10 VDC	Unipolar	15 bits	0.000305
0 VDC to + 5 VDC	Unipolar	14 bits	0.000305

DIMENSIONS

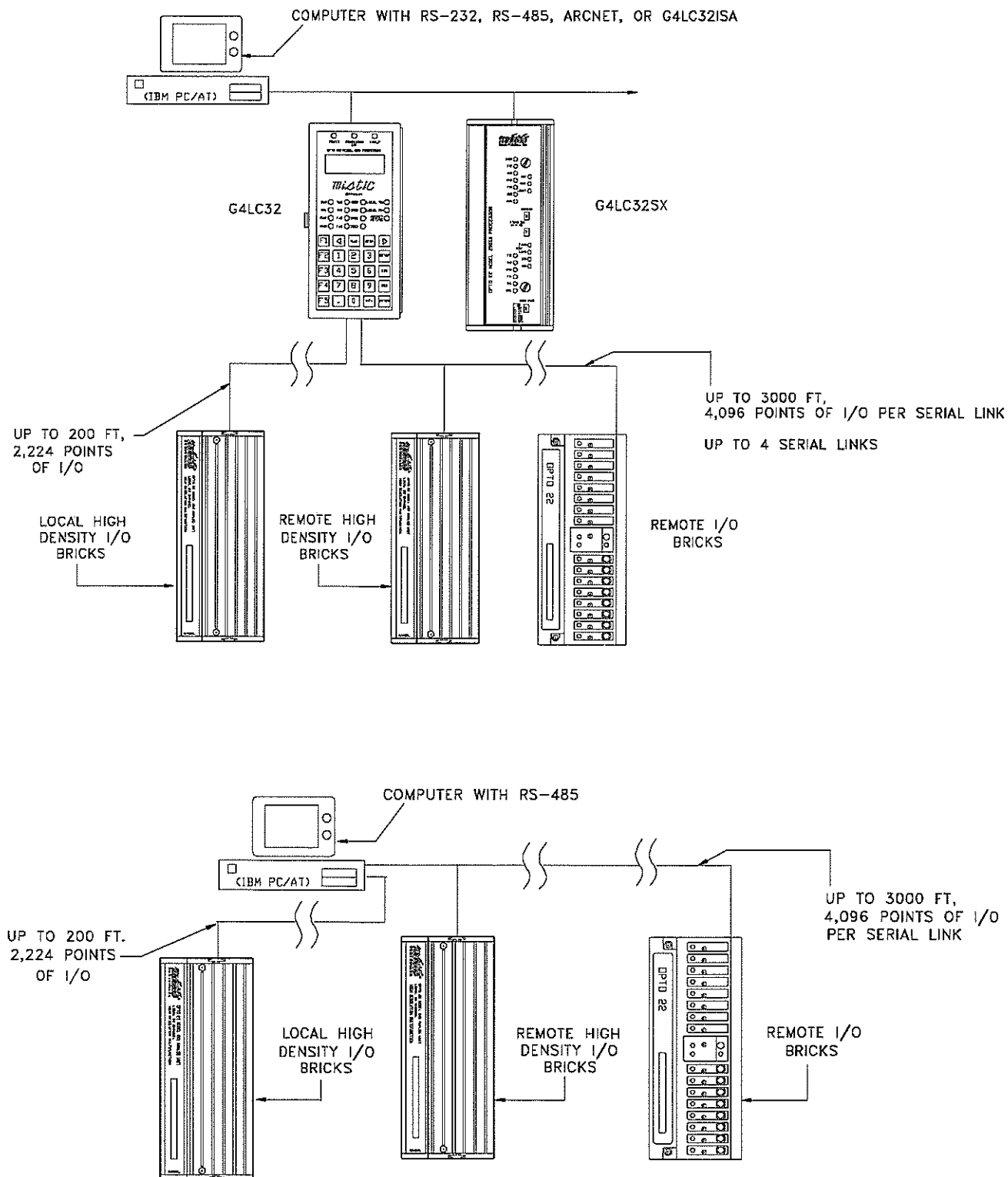


TOLERANCES: .XX +/- .02 [.5] .XXX +/- .010 [.25]
 DIMENSIONAL UNITS: INCHES [MILLIMETERS]

SYSTEM CONFIGURATION

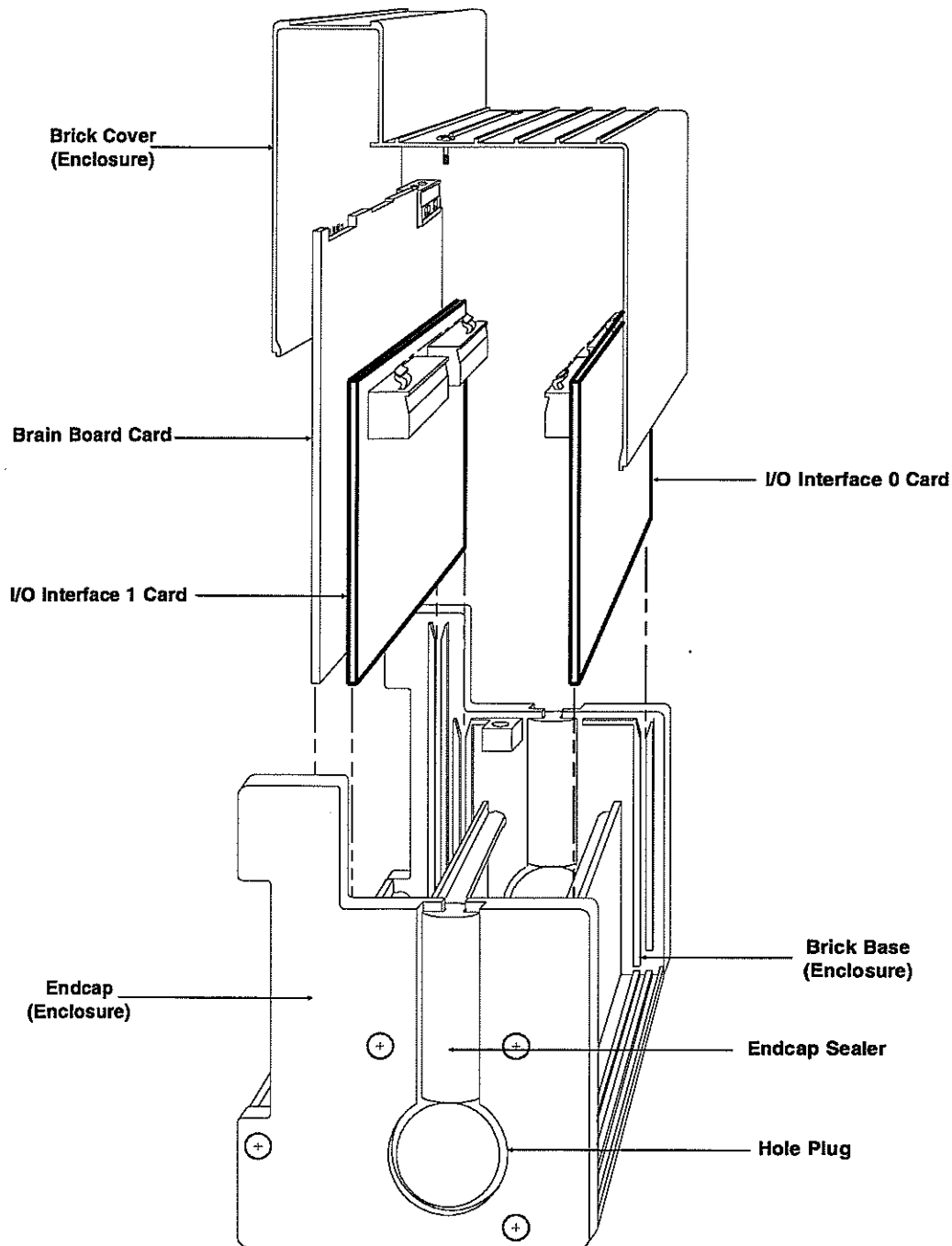
The HRD brick enclosures offer "remote control" (two-wire RS-485, 115.2 KBd serial link) or "local control" (34-conductor flat ribbon cable, 1.4 MHz parallel bus) compatibility. Place the I/O bricks anywhere from a few feet to thousands of feet away from a *mistic* controller or host computer.

Distributed Control with Host



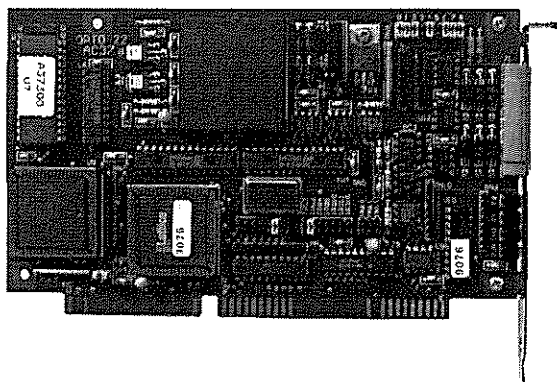
BRICK CONSTRUCTION

Combine the G4AOV with any of the other HRD I/O Interface Cards available in a high density brick enclosure.





PC-BASED INDUSTRIAL
AUTOMATION SYSTEM



OPTO 22

**AC37
HIGH-SPEED
SERIAL
COMMUNICATION
ADAPTER CARD**

DESCRIPTION

The AC37 is an isolated, high-speed serial interface for AT-class IBM-compatible computers. Reliable half- and full-duplex RS-485 communication is provided through a single shielded twisted-pair cable. Hardware interrupts over the mistic remote bus are added by attaching a second twisted-pair.

Deep buffering on the card prevents loss of data and provides optical and transformer isolation as well as transient protection to the RS-485 communication lines. These features make the AC37 a truly reliable communication interface.

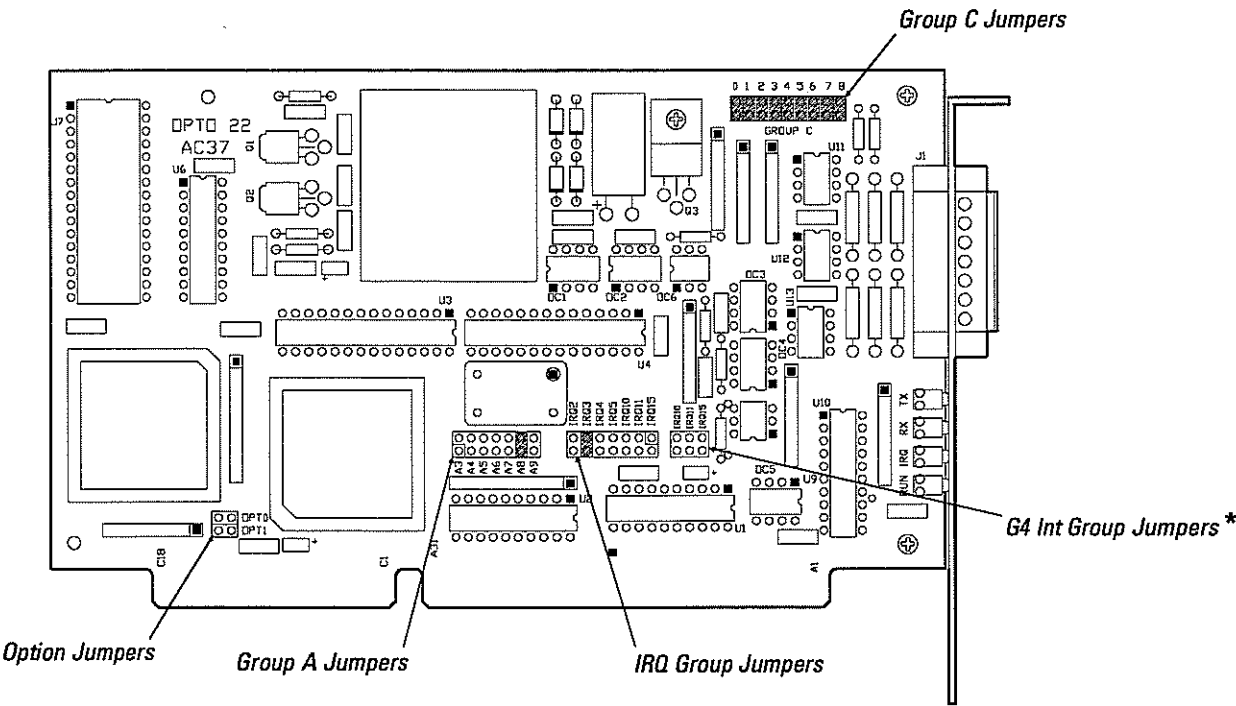
FEATURES

- ◆ Optical and transformer isolated
- ◆ 460.8K maximum baud rate
- ◆ 16550 compatible UART interface
- ◆ AT class IBM compatibles only
- ◆ 512 byte receive and transmit buffers
- ◆ Full G4 interrupt support
- ◆ Full transient protection on RS-485 lines
- ◆ Indicators for transmit, receive, interrupt receive, and running
- ◆ Supports 2-wire or 4-wire RS-485 communication
- ◆ Programmable for use as a Protocol converter

SPECIFICATIONS

Power requirements:	5 VDC @ 800 mA
Operating temperature range:	0°C to 60°C 95% relative humidity, non-condensing
Isolation:	2,500 VAC transient
Baud rates:	Serial link to 460,800 baud
Cable length distance:	Up to 3,000 ft. @ 115,200 baud
Communications:	RS-485 2-wire half-duplex or 4-wire full-duplex operation
Indicators:	Transmit, receive, IRQ, and run LEDs

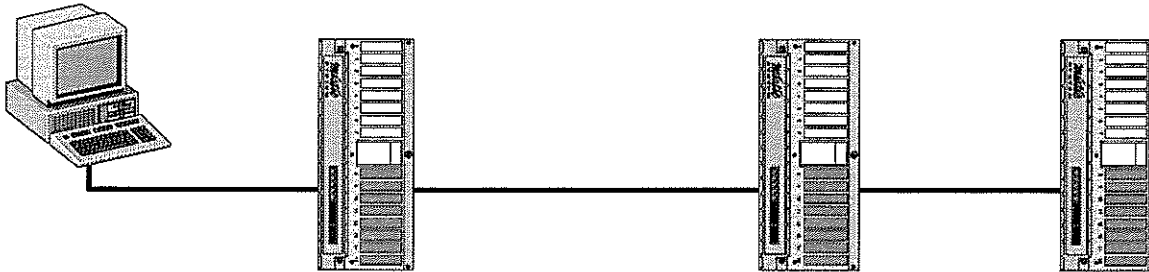
LOCATION DRAWING



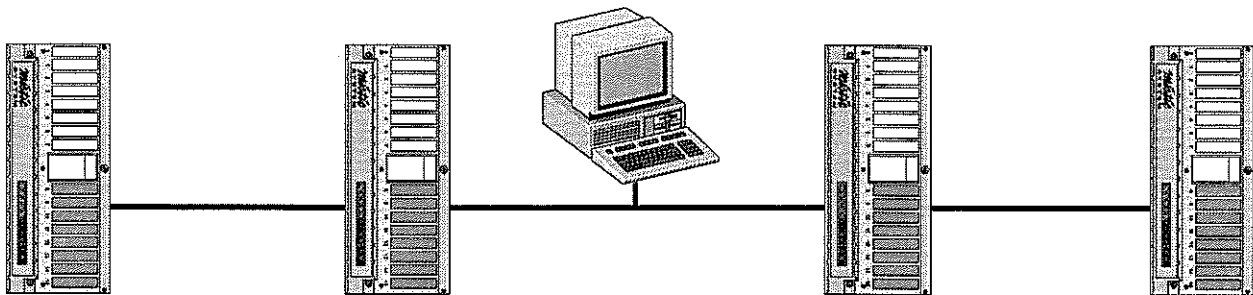
* Do not install any jumpers here if using Cyrano software.

SYSTEM WIRING

A G4 remote I/O bus will always use one twisted-pair cable for communication. A second pair can optionally be used in systems needing the G4 interrupt capability. All wiring must be terminated at both ends of the cable. In most cases, the AC37 will be one of the ends. An additional wire should be used as a common reference to eliminate potential common mode voltage problems. A grounded shield should also be used in electrically noisy environments.



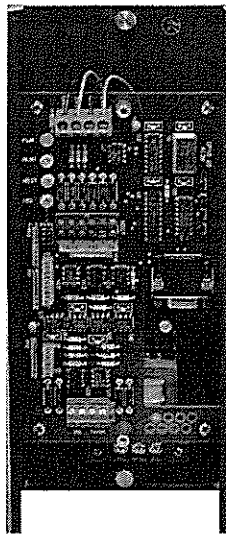
**When AC37 is at the physical end of communication wiring,
you should install all 'C' jumpers.**



**When AC37 is not at the physical end of communication
wiring, you should install all 'C' jumpers except C1 and C4.**

This product is obsolete.

[®]
mistic
CONTROLLER



DESCRIPTION

The AC38 is an optically isolated RS-485 repeater. The AC38 can operate at up to 115.2K baud and is completely independent of parity, stop bits and data word size considerations. The AC38 has 3 connection ports; the host RS-485 port, the host RS-232 port, and the remote RS-485 port. The remote RS-485 port is always a 2-wire connection and the host RS-485 port can be 2-wire or 4-wire mode. The AC38 fully supports the *mistic* IRQ interrupt line.

FEATURES

- ◆ 2-wire (RS-485) To 2-wire (RS-485) Repeater Functions
- ◆ 4-wire (RS-485) To 2-wire (RS-485) Repeater/Translator Functions
- ◆ RS-232 To 2-wire (RS-485) Repeater/Translator Functions
- ◆ Allows 'T Branch' Wiring Techniques
- ◆ Mounts On *mistic* Panels
- ◆ AC38A For 120 VAC
- ◆ AC38B For 240 VAC
- ◆ Supports *mistic* IRQ Interrupt Line
- ◆ Optically Isolated Between Remote And Host Ports
- ◆ Independent Of Parity, Stop Bits And Data Word Size
- ◆ Baud Rates To 115.2K Baud

OPTO 22

**ISOLATED
HIGH-SPEED
RS-485
MULTIDROP
REPEATER**

MODELS:

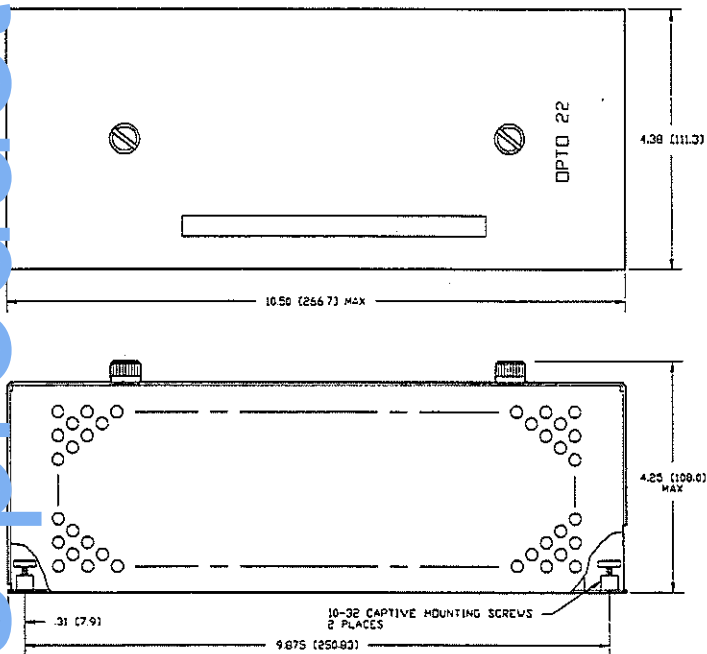
AC38A

AC38B

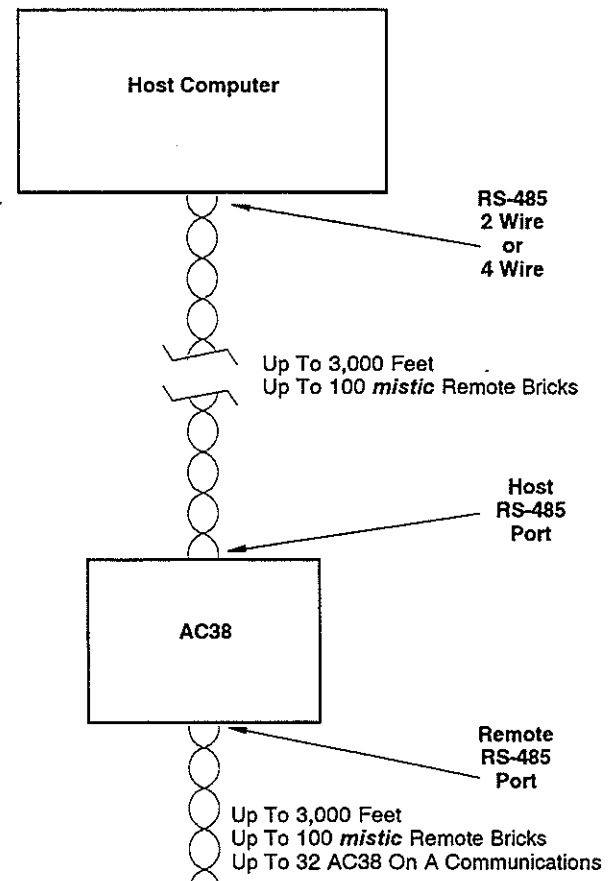
SPECIFICATIONS

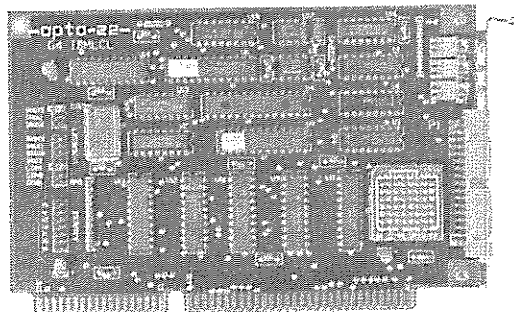
Host RS-485 Port:	3,000 feet twisted pair wire 2-wire or 4-wire hook ups asynchronous operation, independent of baud rate, parity, stop bits or data word size 115.2K baud maximum supports <i>mistic</i> IRQ interrupt line
Host RS-232 Port:	30 feet maximum 38.4K baud maximum <i>mistic</i> IRQ interrupt line is on pin 8 of connector (CTS) has pin 2 - 3 reverse jumpers
Remote RS-485 Port:	3,000 feet twisted pair wiring 2-wire hook up only asynchronous operation independent of baud rate, parity, stop bits or data word size 115.2K baud maximum supports <i>mistic</i> IRQ interrupt line

DIMENSIONS



SAMPLE APPLICATION





OPTO 22

**IBM AT
TO MODEL 200
LOCAL BUS
ADAPTER CARD**

MODEL AC39

DESCRIPTION

The AC39 is a high-speed Model 200 Local Bus interface for AT class IBM compatible computers. The card provides a reliable communications channel to G4 Model 200 Local I/O units. The interface to the AT computer is deeply buffered to prevent loss of response data.

FEATURES

- ◆ AT Class IBM Compatibles Only
- ◆ 256 Byte Receive Buffers
- ◆ Full G4 Interrupt Support
- ◆ Indicators for Transmit, Receive, and Interrupt
- ◆ Removable Terminator

INSTALLATION DETAILS

JUMPERS

Port	Hex Address	A Group Jumpers							IRQ Group Jumper	G4 Int* Select Jumper
		A9	A8	A7	A6	A5	A4	A3		
COM1	3F8	0	0	0	0	0	0	0	COM1	IRQ15
COM2	2F8	0	X	0	0	0	0	0	COM2	IRQ15
COM3	348	0	0	X	0	X	X	0	IRQ2	IRQ15
COM4	340	0	0	X	0	X	X	X	IRQ5	IRQ15
COM5	248	0	X	X	0	X	X	0	IRQ10	IRQ15
COM6	240	0	X	X	0	X	X	X	IRQ11	IRQ15

X = Jumper installed.

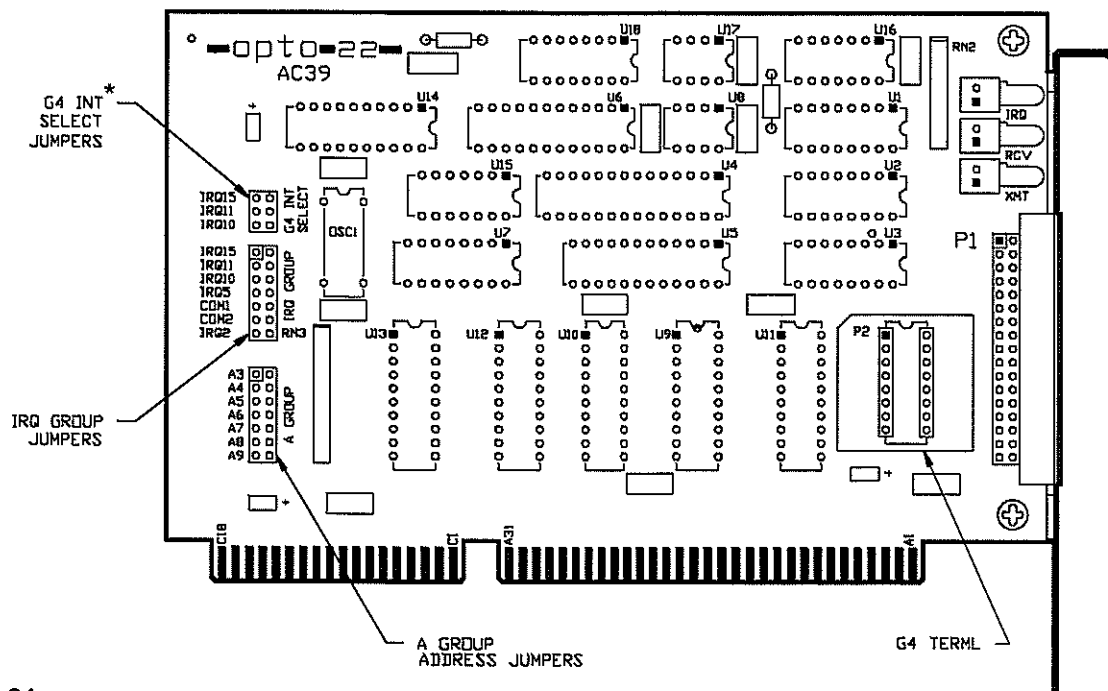
0 = Jumper not installed.

* Only install if needed.

Step-by-Step Installation Procedure

1. Select communications port you want.
2. Install address and IRQ Jumpers.
3. If G4 interrupt capability is needed, install G4 Int Jumper.
4. Turn off computer; remove computer case and install adapter card in 16-bit slot.
5. Run ACTEST.EXE program. This is available on the diskette included with all adapter cards.
6. If adapter passes test, reassemble your computer. If it fails, check your work!

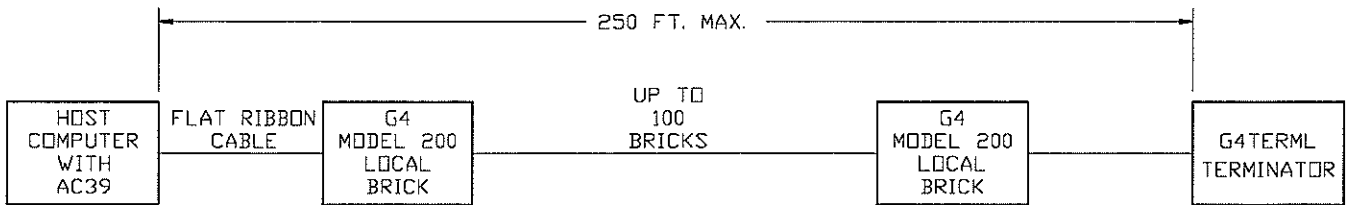
LOCATION DRAWING



SYSTEM WIRING

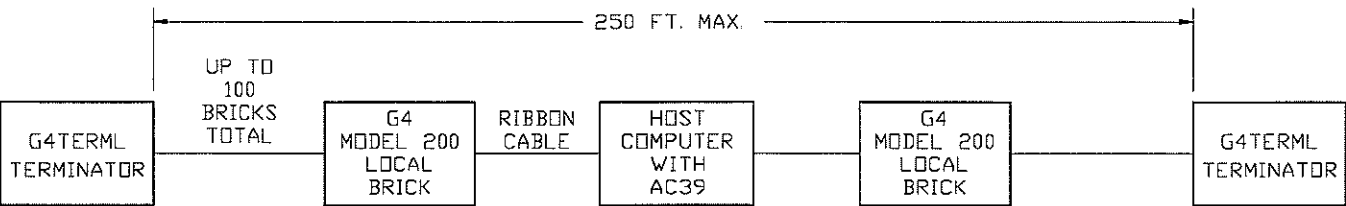
The AC39 requires a 34-pin flat ribbon cable. This cable should never exceed 250 feet. For operation in high noise environments or with high capacitance shielded cables, the maximum distance is 100 feet. All wiring must be terminated at both ends of the cable. In most cases, the IBM adapter will be one of the ends.

SYSTEM I WIRING



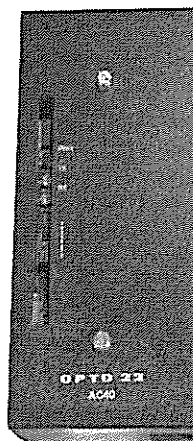
When AC39 is at physical end of ribbon cable, you should install the G4TERML terminator at both the AC39 and the last G4 Model 200 Local Brick.

SYSTEM II WIRING



When AC39 is not at physical end of ribbon cable, you should install the G4TERML terminator at the two G4 Model 200 Local Bricks at the physical end of the cable.

This product is obsolete.



OPTO 22

FIBER OPTIC DATA LINK ADAPTER

MODELS:

AC40A

AC40B

AC40C

DESCRIPTION

The AC40 is designed to allow RS-485 communication devices to interface over a fiber optic link. The AC40 has a host fiber link port, a repeater fiber link port, and a RS-485 port. A daisy chain of AC40's connected by fiber optic cable provides complete electrical isolation and high baud rates over huge distances.

FEATURES

- ◆ Baud Rates up to 115.2K baud
- ◆ Up to 13,000 ft. Between AC40's
- ◆ Up to 32 AC40's on a Fiber Link
- ◆ RS-485 Port Capable 2-wire or 4-wire
- ◆ Automatic Baud Rate Selection
- ◆ Fiber Optic Link is Actively Repeated
- ◆ ST Style Fiber Connectors
- ◆ Metal Enclosure
- ◆ AC40A for 120 VAC
- ◆ AC40B for 240 VAC
- ◆ AC40C for 24 VDC
- ◆ Status LED's for Power, TX and RX

SPECIFICATIONS

Fiber Optics:

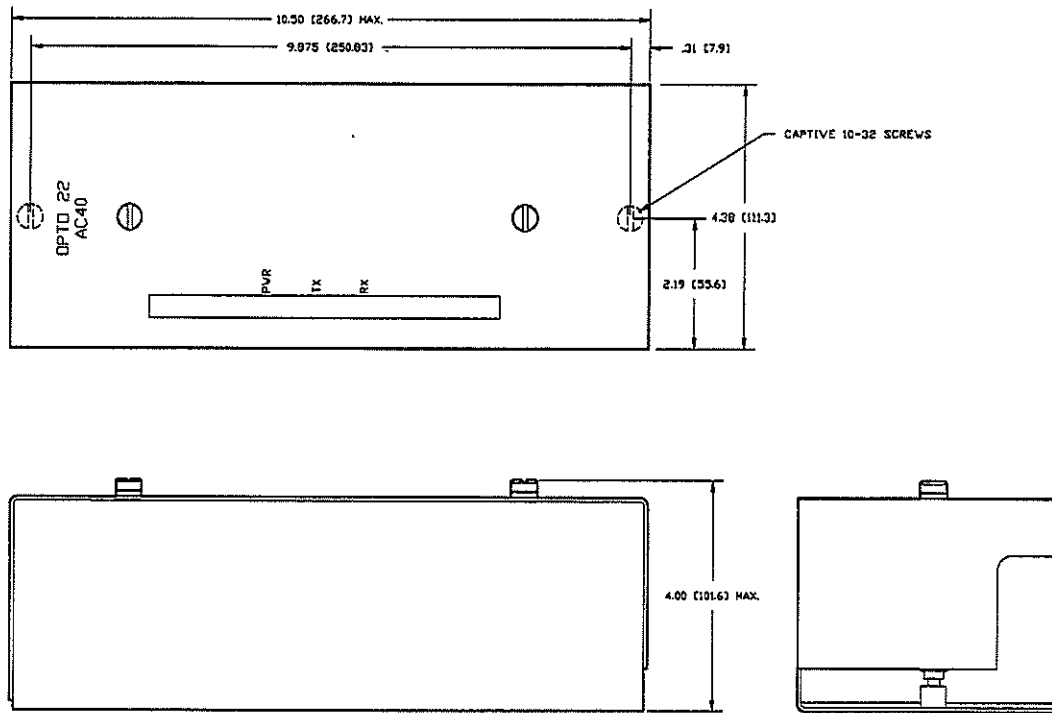
4 Kilometer Distance Between AC40's
ST Style Connectors/Duplex Cable
Optimized for 62.5/125 μ m Cable

RS-485:

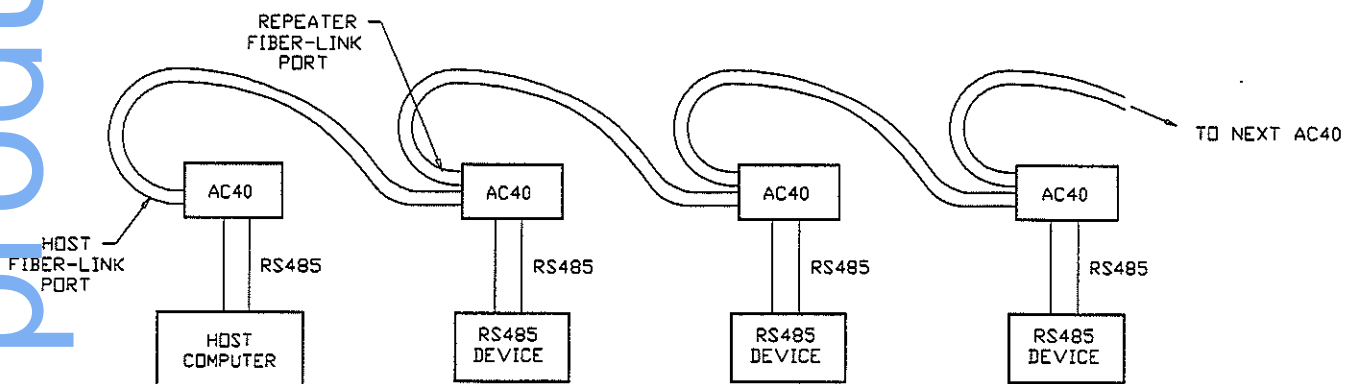
4,000 Feet Twisted Pair Wiring
2-wire or 4-wire Hook-ups
Asynchronous Operation Independent of
Baud Rate, Parity or Stop Bits
0 - 115.2 KB
Jumpers for Termination and Biasing

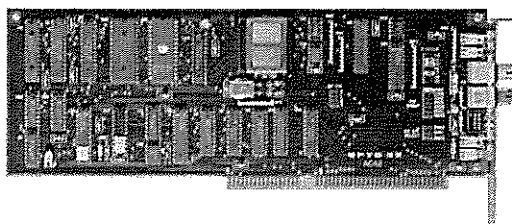
This product is obsolete.

DIMENSIONS



SAMPLE APPLICATION





OPTO 22

**IBM AT
FIBER OPTIC
COMMUNICATIONS
COPROCESSOR**

MODEL AC42

DESCRIPTION

The AC42 is a fiber optic serial communications interface for AT class computers. The AC42 provides an excellent electrically isolated communications link to G4 Remote I/O units when used with the AC40 fiber optic to RS-485 bridge. The transmit and receive buffers are 256 bytes, allowing error free operation under multitasking operating systems.

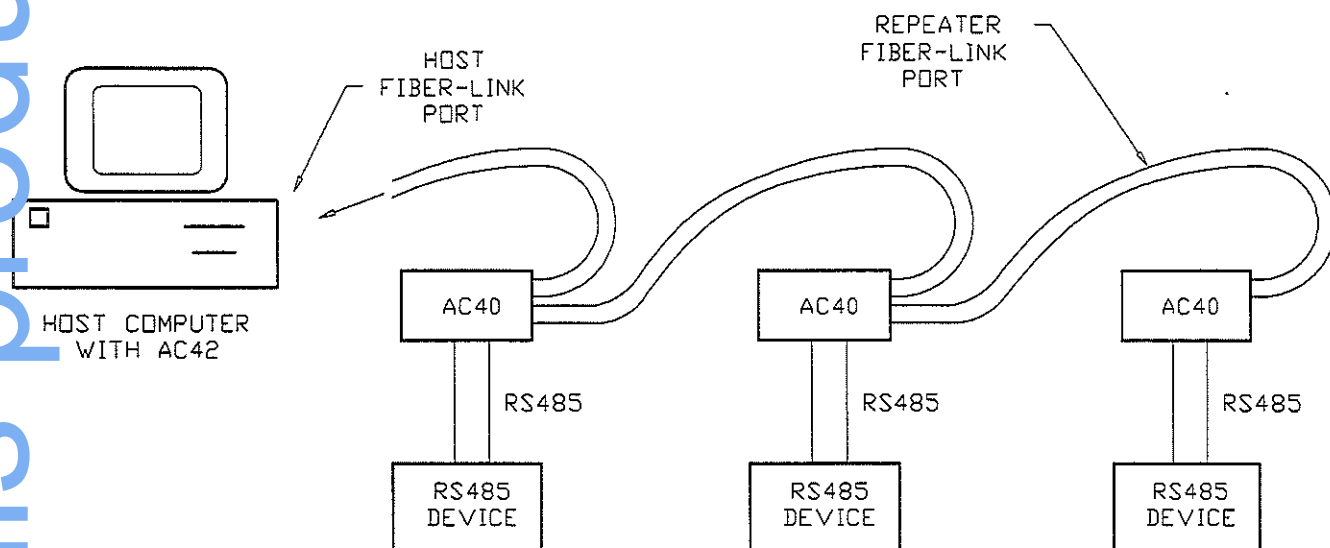
FEATURES

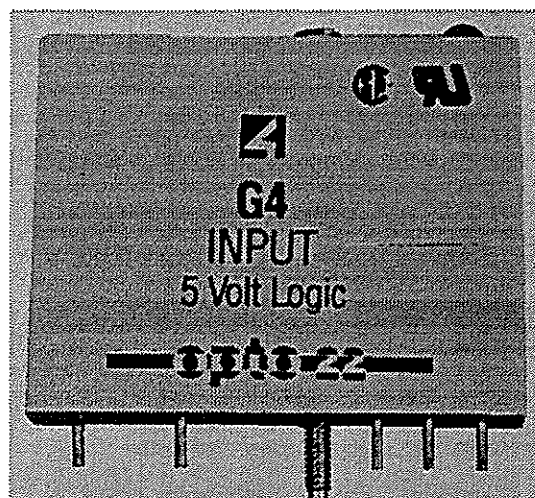
- ◆ Baud Rates Up To 115.2K Baud
- ◆ Distances Up To 3.5 Kilometers
- ◆ 'ST' Style Fiber Connectors
- ◆ 16550 Compatible UART Interface
- ◆ AT Class IBM Compatibles Only
- ◆ 256 Byte Receive And Transmit Buffers
- ◆ Full G4 Interrupt Support
- ◆ Indicators For Transmit, Receive, Interrupt Receive, And Running
- ◆ Communications Link Immune To EMI And RFI Interference
- ◆ Eliminates Ground Loop Problems
- ◆ Provides Safety From Lightning And Other High Voltage

SPECIFICATIONS

Power Requirements:	800 mA @ 5.0 VDC
Ambient Temperature:	0° to 70° C
Recommended Fiber Size:	62.5/125 μ m
Recommended Fiber: 'ST' Style Connectors	Belden Type 225812 (Duplex) Belden Type 225811 (Single)
Maximum Fiber Length:	3.5 kilometers
Transmitter Characteristics (All Typical)	
Optical Power Output:	-12.0 dBm
Peak Emission Wavelength:	820 nm
Numerical Aperture:	0.31
Optical Port Diameter:	150 μ m
Receiver Characteristics (All Typical)	
Receiver Sensitivity:	-24.0 dBm
Equivalent Numerical Aperture:	0.50
Optical Port Diameter:	400 μ m

DIAGRAM





OPTO 22

**DIGITAL
DC INPUT
MODULES**

DESCRIPTION

DC input modules are used for sensing ON/OFF DC voltage levels. All DC input modules with the exception of the G4IDC5K and the G4IDC5D are designed with filtering on the input of a hysteresis amplifier for high noise rejection and transient free "clean" switching.

The G4IDC5K module is a fast switching input module for signals produced by photoelectric switches or TTL level devices. The G4IDC5D is a low cost, DC only, input module for use in data acquisition applications.

Each module provides up to 4000 V_{rms} of optical isolation between the field inputs and the output side of the circuit.

Typical uses and applications include sensing the presence or absence of voltage or sensing contact closures from sources such as:

- Proximity Switches
- Limit Switches
- Selector Switches
- Push Buttons
- Photoelectric Switches
- TTL Compatible Devices

FEATURES

- ◆ 4000 VAC Optical Isolation
- ◆ UL Recognized
- ◆ CSA Certified
- ◆ 5, 15 and 24 VDC Logic Levels
- ◆ Built-in LED Status Indicator
- ◆ Passes NEMA Showering Arc Test [ICS 2-230]
- ◆ Meets IEEE Surge Withstand Specification [IEEE-472]

ORDERING GUIDE

LINE VOLTAGE VDC	LOGIC VOLTAGE	PART NUMBER
10 - 32	5	G4IDC5
2.5 - 16	5	G4IDC5K
2.5 - 28	5	G4IDC5D
4 - 16	5	G4IDC5B
35 - 60	5	G4IDC5G
90 - 140	5	G4IAC5
180 - 280	5	G4IAC5A
10 - 32	15	G4IDC15
90 - 140	15	G4IAC15
180 - 280	15	G4IAC15A
10 - 32	24	G4IDC24
90 - 140	24	G4IAC24

SPECIFICATIONS

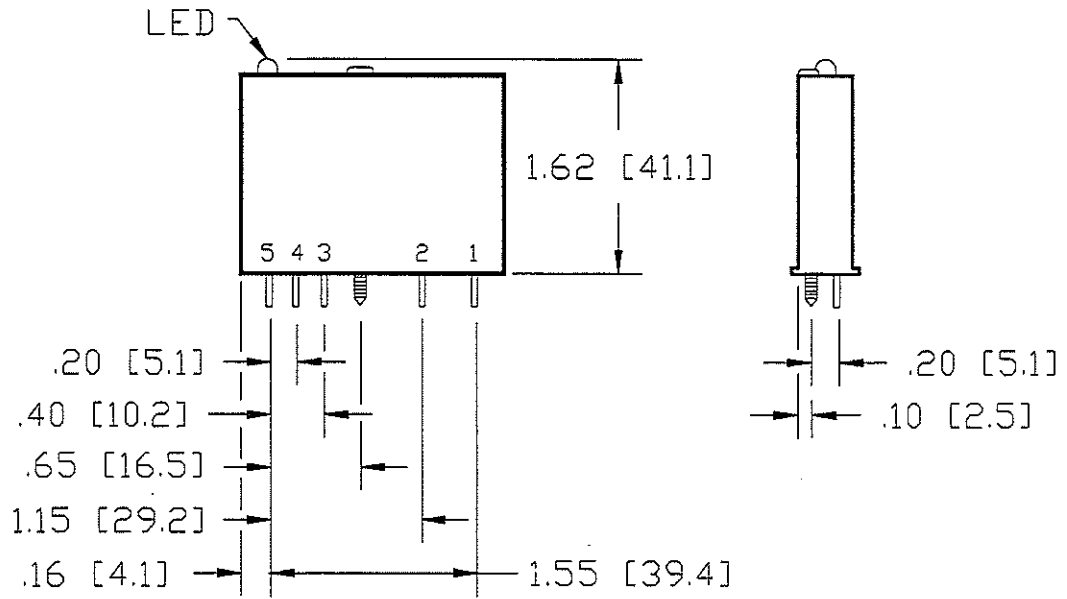
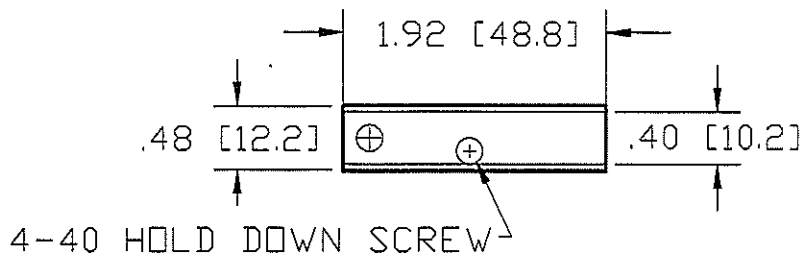
GENERAL / APPLIES TO ALL MODELS

Operating Ambient Temperature:	- 30° C to 70° C
Isolation Input-to-Output:	4000 V _{rms}
Output Voltage Drop:	0.4 V @ 50 mA
Output Current (Sinking):	50 mA
Output Leakage with No Input:	100 µA @ 30 VDC
G4IDC5D Only:	10 µA @ 30 VDC
Transistor:	30 V breakdown

	UNITS	G4IDC5	G4IDC5B	G4IDC5K	G4IDC5D
Input Voltage Range:	VDC	10 - 32	4 - 16	2.5 - 16	2.5 - 28
Input Current @ Maximum Line:	mA	25	45	30	30
Turn-on Time:	ms	5	0.05	0.025*	1
Turn-off Time:	ms	5	0.1	0.025*	1.5
Input Allowed for No Output:	mA, V	1, 3	0.7, 1	0.2, 1	0.2, 1
Output Supply Voltage - Nominal:	VDC	5	5	5	5
Output Supply Voltage Range:	VDC	4.5 - 6	4.5 - 6	4.5 - 6	4.5 - 6
Output Supply Current: @ Nominal Logic Voltage	mA	12	12	12	12
Input Resistance: (R ₁ in Schematic Diagram)	ohms	1.5K	300	500	900
Control Resistance: (R _c in Schematic Diagram)	ohms	220	220	220	470

* @ 5V_{p-p} squarewave input, 50% duty cycle

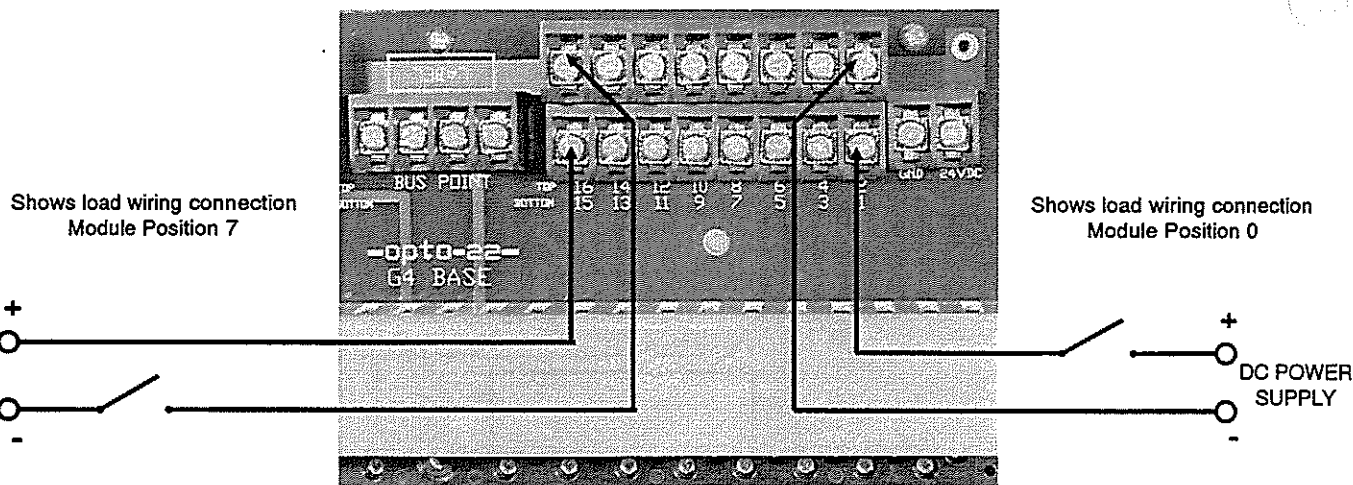
DIMENSIONS



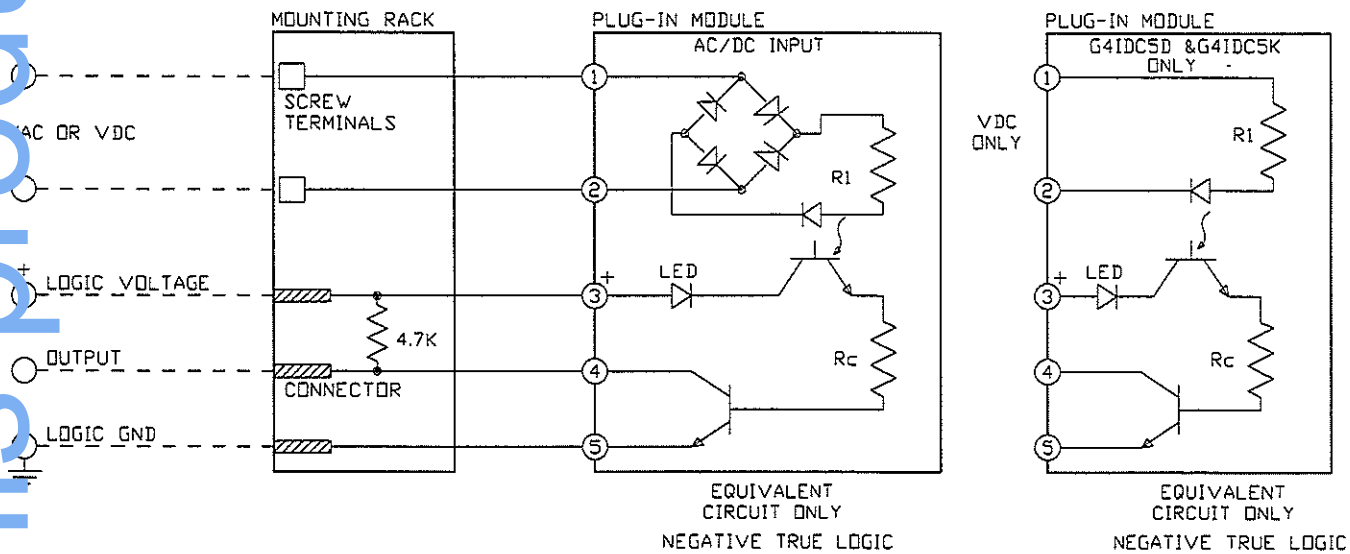
G4IDC5G	G4IDC15	G4IDC24	G4IAC5	G4IAC15	G4IAC24	G4IAC5A	G4IAC15A
35 - 60	10 - 32	10 - 32	90 - 140	90 - 140	90 - 140	180 - 280	180 - 280
6	25	25	11	11	11	4.5	4.5
10	5	5	20	20	20	20	20
10	5	5	20	20	20	20	20
0.7, 7	1, 3	1, 3	3, 45	3, 45	3, 45	0.7, 45	0.7, 45
5	15	24	5	15	24	5	15
4.5 - 6	12 - 18	20 - 30	4.5 - 6	12 - 18	20 - 30	4.5 - 6	12 - 18
12	15	15	12	15	18	12	15
10K	1.5K	1.5K	14K	14K	14K	70K	70 K
220	1K	2.2K	220	1K	2.2K	220	1K

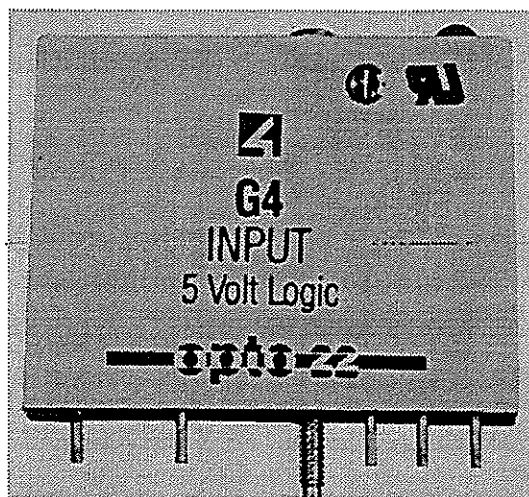
This product is obsolete.

CONNECTION DIAGRAM



SCHEMATIC





OPTO 22

DIGITAL AC INPUT MODULES

DESCRIPTION

AC input modules are used for sensing ON/OFF alternating current (AC) voltage levels. All AC input modules are designed with filtering on the input and a hysteresis amplifier for high noise rejection and transient free "clean" switching.

Each module provides 4000 V_{rms} of optical isolation between the field inputs and the logic output of the circuit.

Typical uses and applications include sensing the presence or absence of voltage or sensing contact closures from sources such as:

- Proximity Switches
- Limit Switches
- Float Switches
- Selector Switches
- Push Button
- Toggle Switches
- Thermostats

FEATURES

- ♦ Minimum Footprint Design Saves Approximately 50% in Mounting Space
- ♦ 4000 VAC Optical Isolation
- ♦ UL Recognized
- ♦ CSA Certified
- ♦ Operating Temperature: - 30° C to 70° C
- ♦ Built in Filtering for Transient Suppression and Noise Rejection
- ♦ Built in LED Indicator
- ♦ Individual Retaining Screw
- ♦ Passes NEMA Showering Arc Test [ICS 2-230]
- ♦ Meets IEEE Surge Withstand Specification [IEEE-472]

ORDERING GUIDE

INPUT VOLTAGE VAC	OUTPUT VOLTAGE	PART NUMBER
12 - 32	5	G4IDC5
35 - 60	5	G4IDC5G
90 - 140	5	G4IAC5
180 - 280	5	G4IAC5A
12 - 32	15	G4IDC15
90 - 140	15	G4IAC15
180 - 280	15	G4IAC15A
12 - 32	24	G4IDC24
90 - 140	24	G4IAC24
180 - 280	24	G4IAC24A

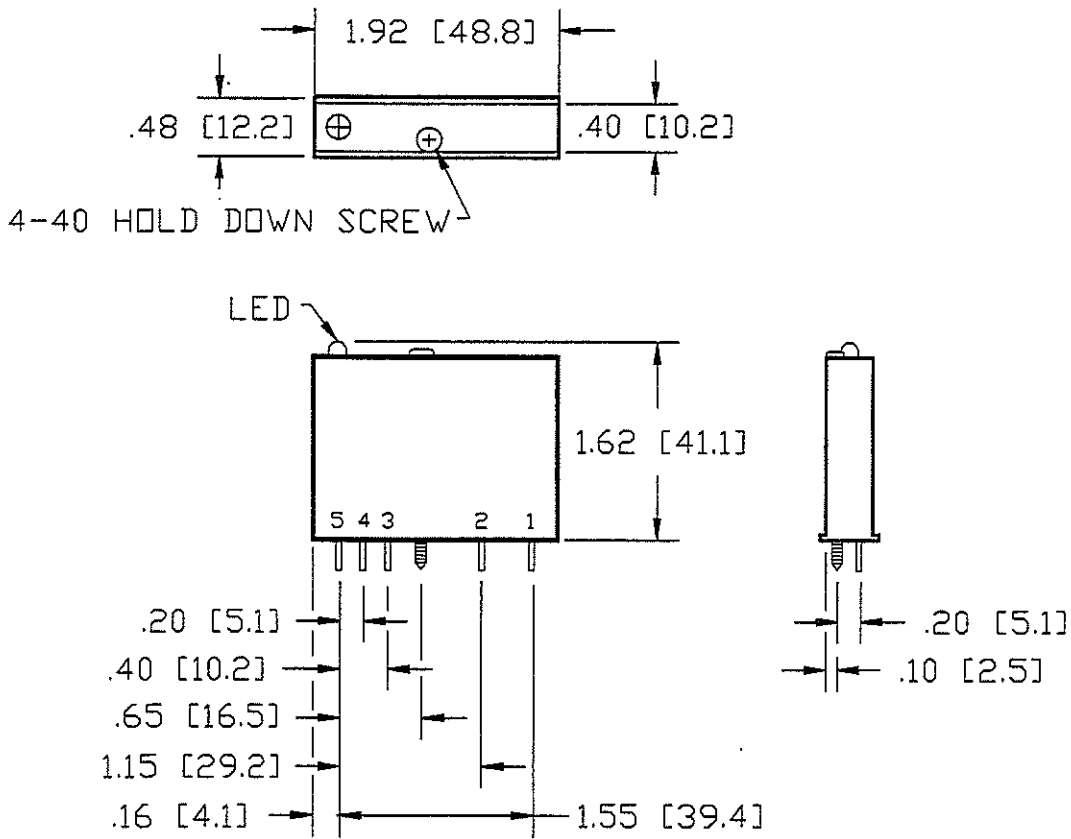
SPECIFICATIONS

GENERAL / APPLIES TO ALL MODELS

Operating Ambient Temperature:	- 30° C to 70° C
Isolation Input-to-Output:	4000 V _{rms}
Output Voltage Drop:	0.4 volts @ 50 milliamperes
Output Current:	50 milliamperes
Output Leakage With No Input:	100 microamperes @ 30 VDC
Output Transistor:	30 volts breakdown

	UNITS	G4IDC5	G4IDC5G
Input Voltage Range:	VAC	12 - 32	35 - 60
Input Current @ Max Line:	mA	25	6
Turn-on Time:	msec	5	10
Turn-off Time:	msec	5	15
Input Allowed for No Output:	mA,V	1, 3	0.7, 7
Output Supply Voltage - Nominal:	VDC	5	5
Output Supply Voltage Range:	VDC	4.5 - 6	4.5 - 6
Output Supply Current: @ Nominal Logic Voltage	mA	12	12
Input Resistance: (R ₁ in Schematic Diagram)	ohms	1.5K	10K
Control Resistance: (R _c in Schematic Diagram)	ohms	220	220

DIMENSIONS

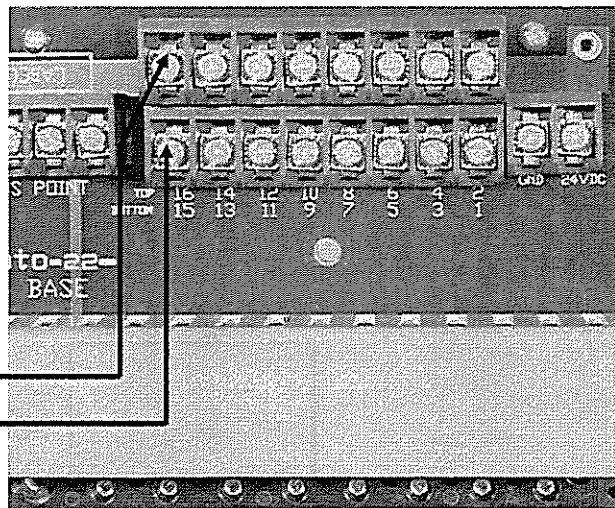


G4IDC15	G4IDC24	G4IAC5	G4IAC15	G4IAC24	G4IAC5A	G4IAC15A	G4IAC24A
12 - 32	12 - 32	90 - 140	90 - 140	90 - 140	180 - 280	180 - 280	180 - 280
25	25	11	11	11	5.0	5.0	5.0
5	5	20	20	20	2	20	20
5	5	20	20	20	20	20	20
1, 3	1, 3	3, 45	3, 45	3, 45	1, 45	1, 45	1, 45
5	24	5	15	24	5	15	24
12 - 18	20 - 30	4.5 - 6	12 - 18	20 - 30	4.5 - 6	12 - 18	20 - 30
15	15	12	15	15	12	15	15
1.5K	1.5K	14K	14K	14K	70K	70K	70K
1K	2.2K	220	1K	2.2K	220	1K	2.2K

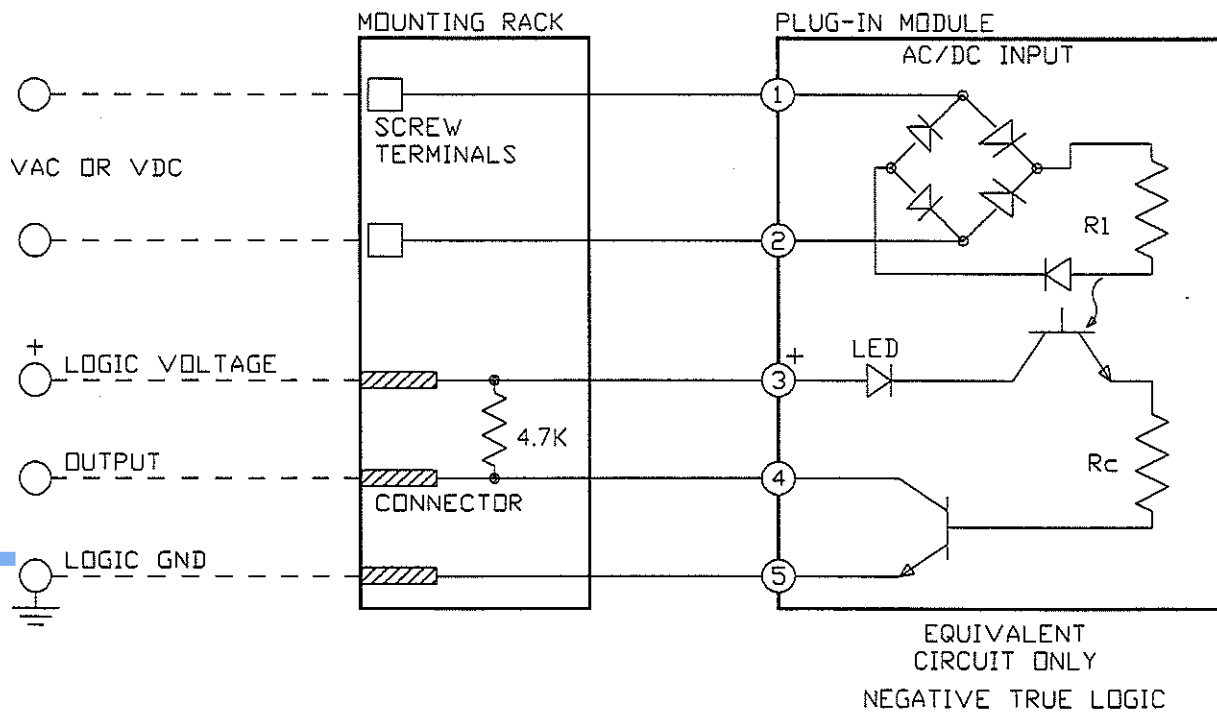
CONNECTION DIAGRAM

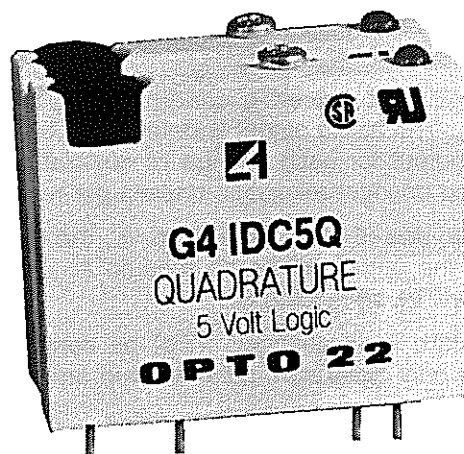
Input device may be in series with either line.
Shows wiring connection for module position 7.

AC POWER
SOURCE



SCHEMATIC





OPTO 22

DIGITAL QUADRATURE INPUT MODULE PAIR

MODEL G4IDC5Q

DESCRIPTION

The G4IDC5Q quadrature input module pair is designed to allow a digital *mistic* 200 multi-function I/O Brick to resolve positional information from quadrature encoder devices. The module will output a pulse to the Brick each quadrature state change. The Brick will count the module outputs and keep track of direction of rotation.

FEATURES

- ◆ 4000 V_{rms} optical isolation
- ◆ Built-in LED status indicators
- ◆ 4 times encoder resolution
- ◆ Installs on *mistic* 200 bricks
- ◆ Input signals in 4 - 16 VDC range

MODULE OPERATION

The G4IDC5Q Quadrature Input Module pair will convert a quadrature signal to a pulse stream which is output on one of the two logic side outputs. The active output is determined by the direction of rotation of the encoder. One 0.8 microsecond pulse is output for each change of quadrature state transition. The actual resolution of the position count is 4 times the encoder resolution (pulses per revolution).

The G4IDC5Q is actually a pair of modules, one of which is labeled 'A', the other 'B'. When the signal into module A leads the signal into module B, the output will be on module A. When the signal into module B leads the signal into module A, the output will be on module B.

On a Digital *mistic* 200 I/O Unit, quadrature input channels must be configured in pairs, with the lower channel number being even. Therefore the only quadrature pairs allowed are channels 0 & 1, 2 & 3, 4 & 5, 6 & 7, 8 & 9, 10 & 11, 12 & 13 and 14 & 15.

The positional count will increment when the signal into the odd numbered channel leads the signal into the even numbered channel. It will decrement when the signal into the even numbered channel leads the signal into the odd numbered channel.

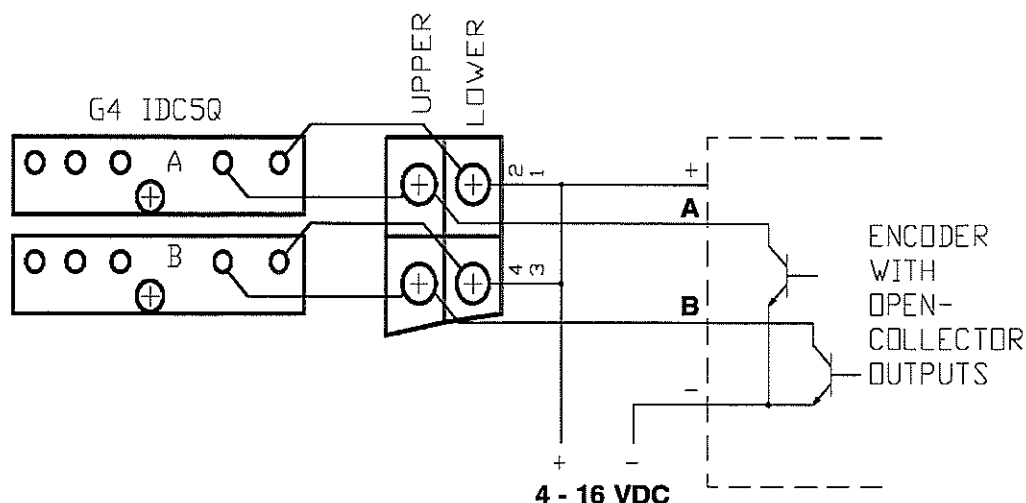
Since the Digital *mistic* 200 I/O Unit has a maximum input count rate, the maximum allowable RPM which the encoder may turn will be related to the number of cycles per turn the encoder outputs. The relationship between the two numbers is such:

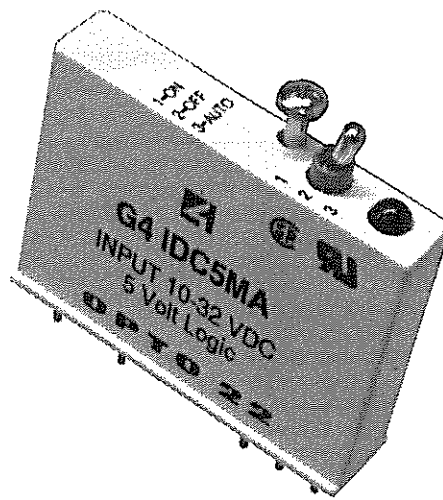
$$750,000 = \text{Maximum Allowable RPM} = 750,000 / \text{Encoder Pulses Per Revolution}$$

SPECIFICATIONS

Logic voltage:	5 VDC
Operating ambient temperature:	- 30° C to 70° C
Isolation input-to-output:	4000 V _{rms}
Input voltage range:	4 - 16 VDC
Input current:	8 mA (constant)
Input allowed for no output:	1 V
Logic supply current @ 5 VDC:	60 mA
Maximum input frequency, 50% duty cycle:	12.5 KHz
Minimum time between quadrature state changes at 90°:	20 µsec

CONNECTION DIAGRAM





OPTO 22

MANUAL ON/OFF AUTOMATIC INPUT DIAGNOSTIC RELAYS

MODELS:

G4IAC5MA

G4IDC5MA

DESCRIPTION

The G4IAC5MA and G4IDC5MA solid state input modules feature an integral three-position Manual On/Off and Automatic Operation override switch. By flipping the switch, they can be used as operator inputs or as standard input modules.

The three-position switch is in series with an internal current limiting resistor on the optically isolated control side of the module. This provides a simulated input and eliminates the need for actual real world devices during program development. Once development is complete, the same module can be used in the final application.

These modules offer high density performance in the industry's smallest I/O package. They are *mistic* controller system compatible and are supported by a variety of G4 I/O racks.

FEATURES

- ◆ Solid State Switching
- ◆ 4000 V Optical Isolation
- ◆ LED Status Indicator
- ◆ UL Recognized
- ◆ CSA Certified
- ◆ Small Footprint
- ◆ Passes NEMA Showering Arc Test [ICS2-230]
- ◆ Meets IEEE Surge Withstand Specification [IEEE-472]
- ◆ Compatible with *mistic* Control Systems and G4 Racks

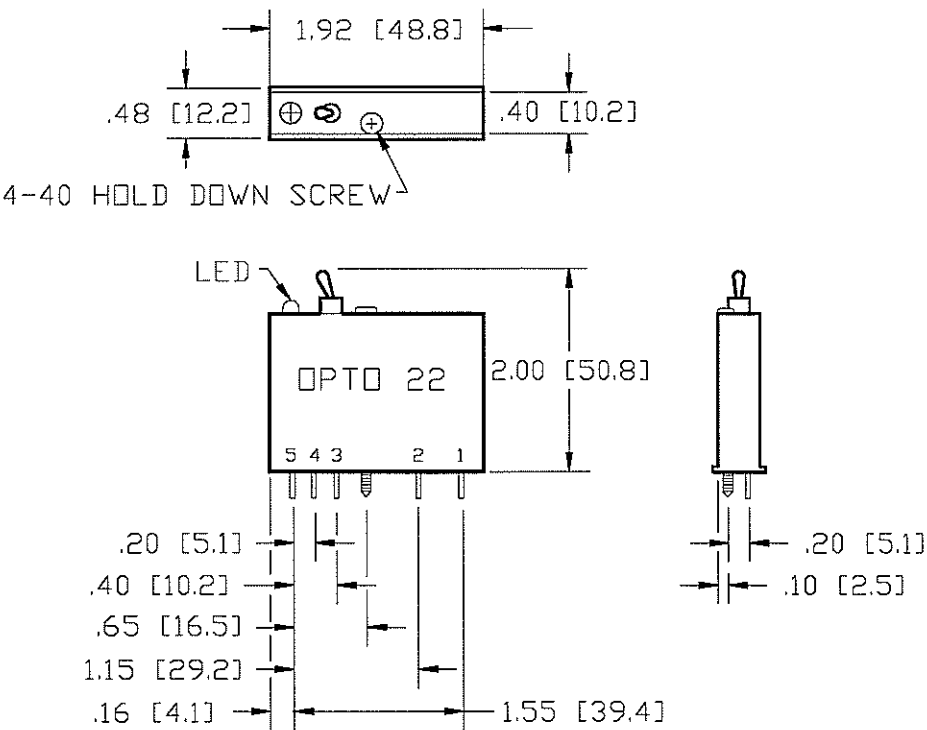
SPECIFICATIONS

GENERAL / APPLIES TO ALL MODELS

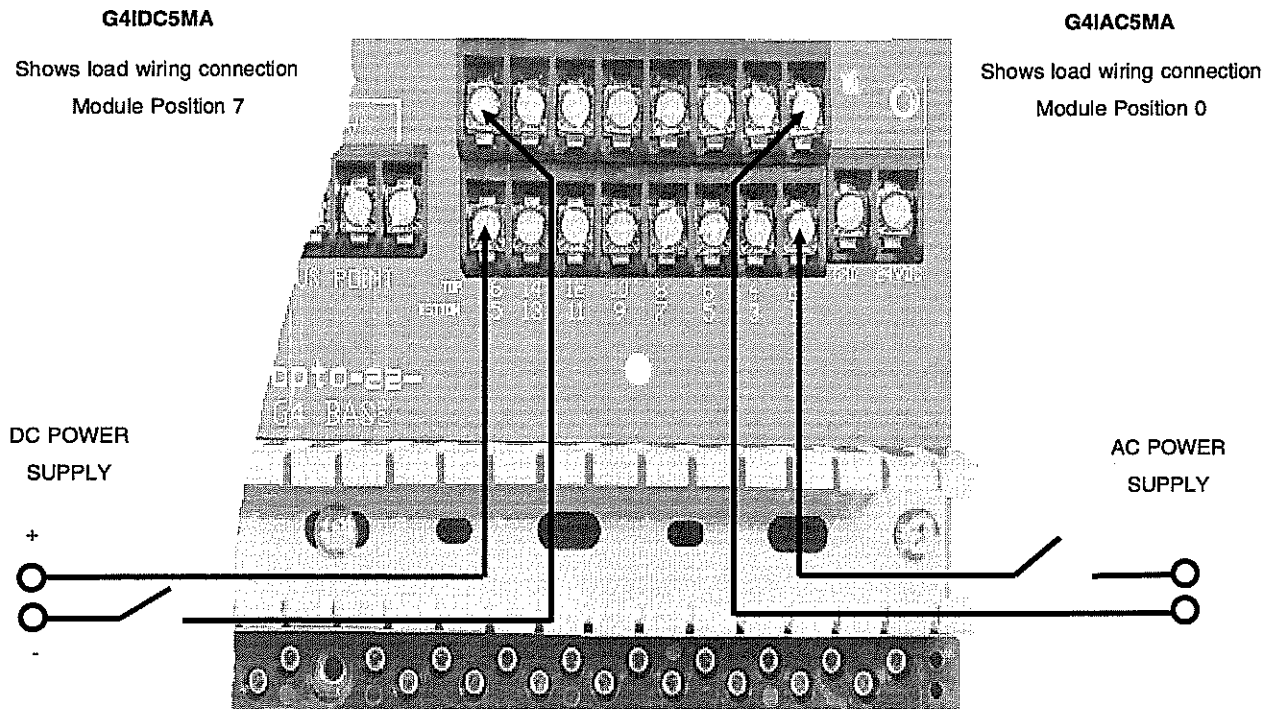
Operating Ambient Temperature:	- 30° C to 70° C
Isolation Input-to-Output:	4000 V _{rms}
Output Voltage Drop:	0.4 V @ 50 mA
Output Current:	50 mA
Output Leakage With No Input:	100 µA @ 30 VDC
Output Transistor:	30 V breakdown

	G4IAC5MA	G4IDC5MA
Input Voltage Range:	90 - 140 VDC 90 - 140 VAC	10 - 32 VDC 12 - 32 VAC
Input Current @ Max Line:	11 mA	25 mA
Turn-on Time:	20 ms	5 ms
Turn-off Time:	20 ms	5 ms
Input Allowed for No Output:	3 V, 45 mA	1 V, 3 mA
Output Supply Voltage - Nominal:	5 VDC	5 VDC
Output Supply Voltage Range:	4.5 - 6 VDC	4.5 - 6 VDC
Output Supply Current: @ Nominal Logic Voltage	12 mA	12 mA
Input Resistance: (R ₁ in Schematic Diagram)	14 K ohms	1.5 K ohms
Control Resistance: (R _c in Schematic Diagram)	220 ohms	220 ohms

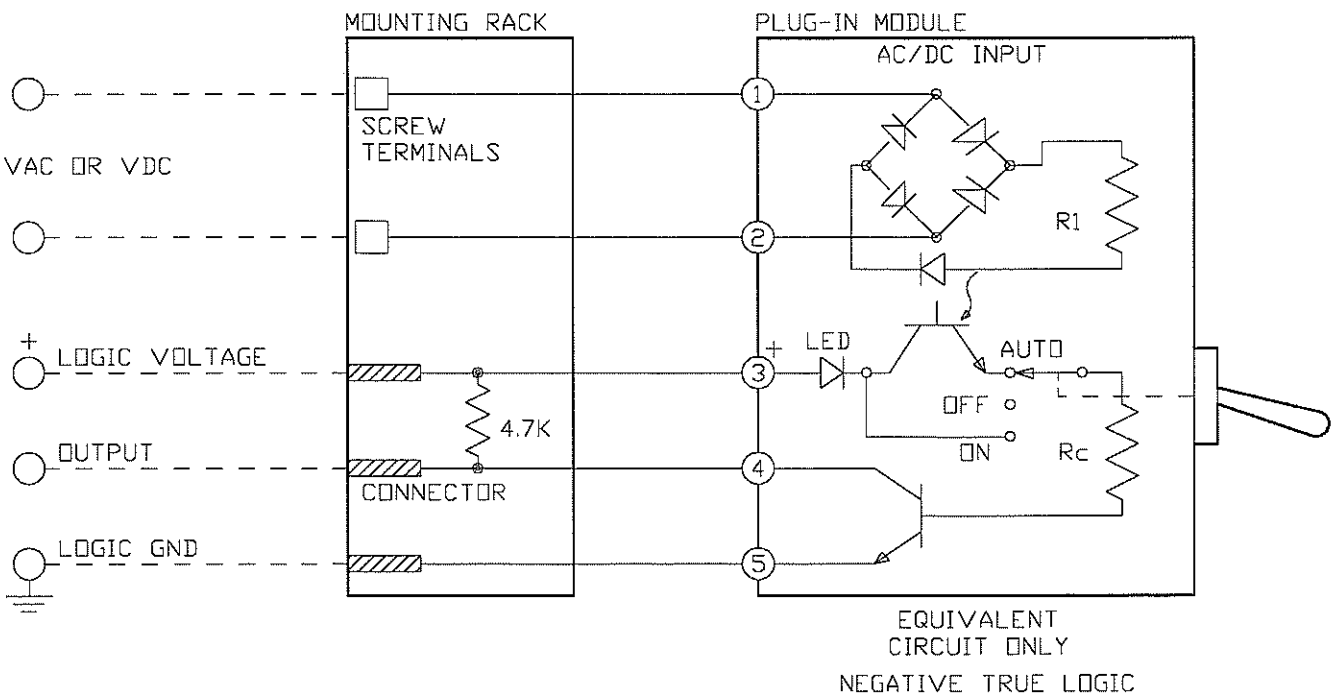
DIMENSIONS



CONNECTION DIAGRAM

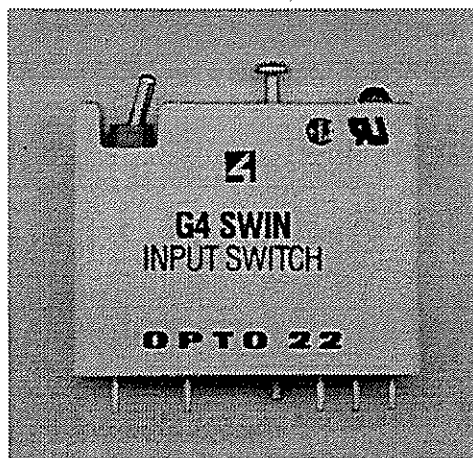


SCHEMATIC



This product is obsolete.

mistic[®]
CONTROLLER



OPTO 22

G4 INPUT TEST MODULE

MODEL G4SWIN

DESCRIPTION

The OPTO 22 G4SWIN input test module is a device which simulates an input on an I/O mounting rack. Each module contains a toggle switch that closes a contact on the logic side of the module. An internal resistor limits the current through the switch-contact and provides a load similar to an actual module. An internal debounce circuit allows rapid switch closures without false counts. The G4SWIN module works with logic voltages of 5, 15, and 24 volts. Internally, there is no connection on the field inputs.

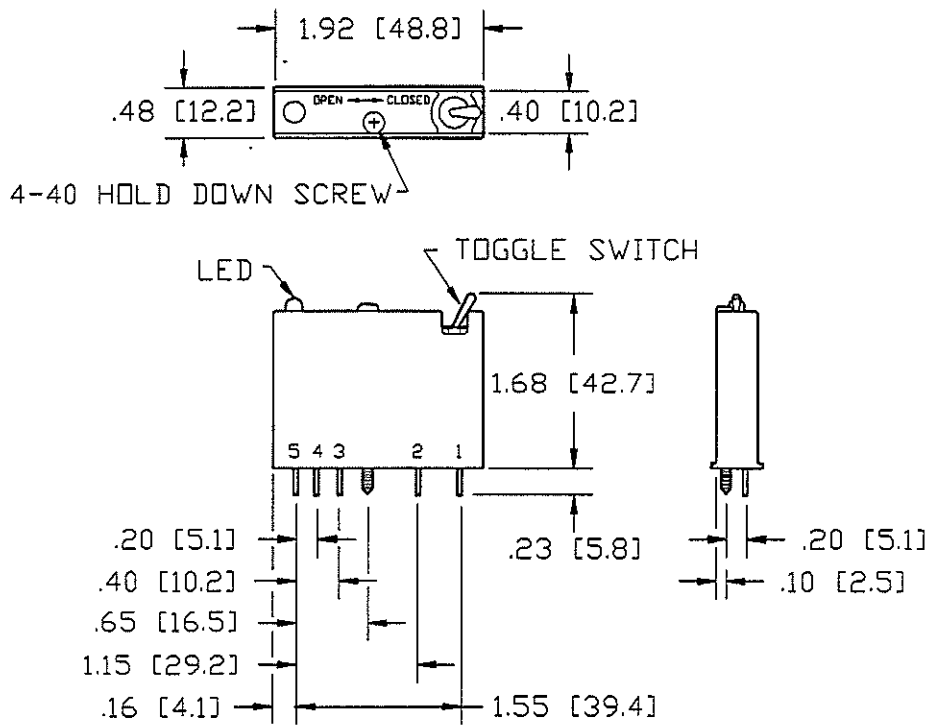
The G4SWIN module is ideal for simulating external discrete events in order to test the application software.

FEATURES

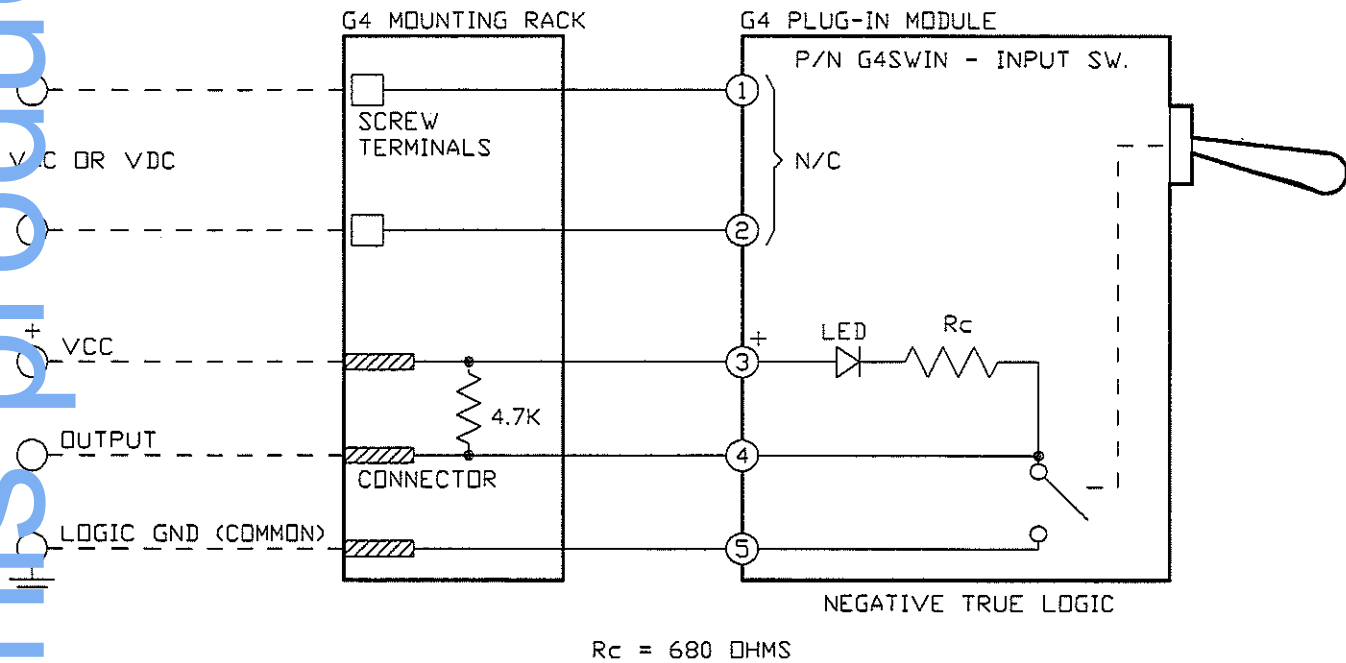
- ◆ Simulates an External Input
- ◆ 5, 15 and 24 VDC Logic Levels
- ◆ Built-in LED Status Indicator
- ◆ Ideal for Testing Application Software
- ◆ Package Size Same as G4 I/O Modules
- ◆ Plugs Into G4 I/O Mounting Racks
- ◆ Plugs Into *mistic* 100 Digital Bricks
- ◆ Plugs Into *mistic* 200 Digital Bricks
- ◆ Debounced For Rapid Counting

This product is obsolete.

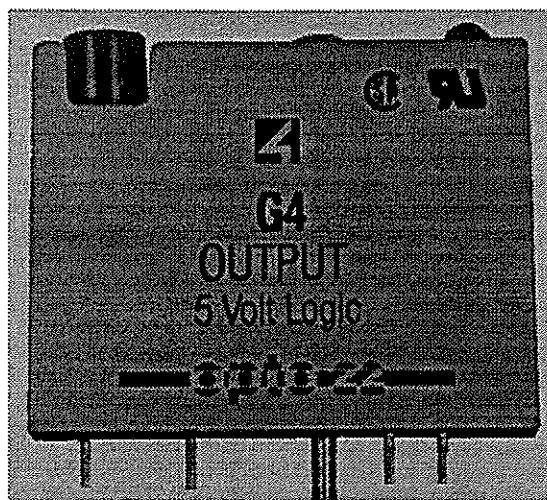
DIMENSIONS



SCHEMATIC



modulo[®]
CONTROLLER



DESCRIPTION

DC output modules are used for controlling or switching DC loads. Each module provides 4000 V_{rms} of optical isolation between the field devices and the control logic.

Typical uses and applications for DC output modules include switching the following loads:

- DC Relays
- DC Solenoids
- DC Motor Starters
- DC Lamps or Indicators

FEATURES

- ◆ 4000 VAC Optical Isolation
- ◆ Built-in LED Status Indicator
- ◆ Removable Fuse
- ◆ Withstands One Second Surge @ 5 Amperes
- ◆ UL Recognized
- ◆ CSA Certified
- ◆ 5, 15 and 24 VDC Logic Levels
- ◆ Operating Temperature: - 30° C to 70° C
- ◆ Passes NEMA Showering Arc Test [ICS 2-230]
- ◆ Meets IEEE Surge Withstand Specification [IEEE-472]

OPTO 22

DIGITAL DC OUTPUT MODULES

ORDERING GUIDE

LINE VOLTAGE VDC	LOGIC VOLTAGE	PART NUMBER
5 - 60	5	G4ODC5
5 - 200	5	G4ODC5A
5 - 60	15	G4ODC15
5 - 60	24	G4ODC24

SPECIFICATIONS

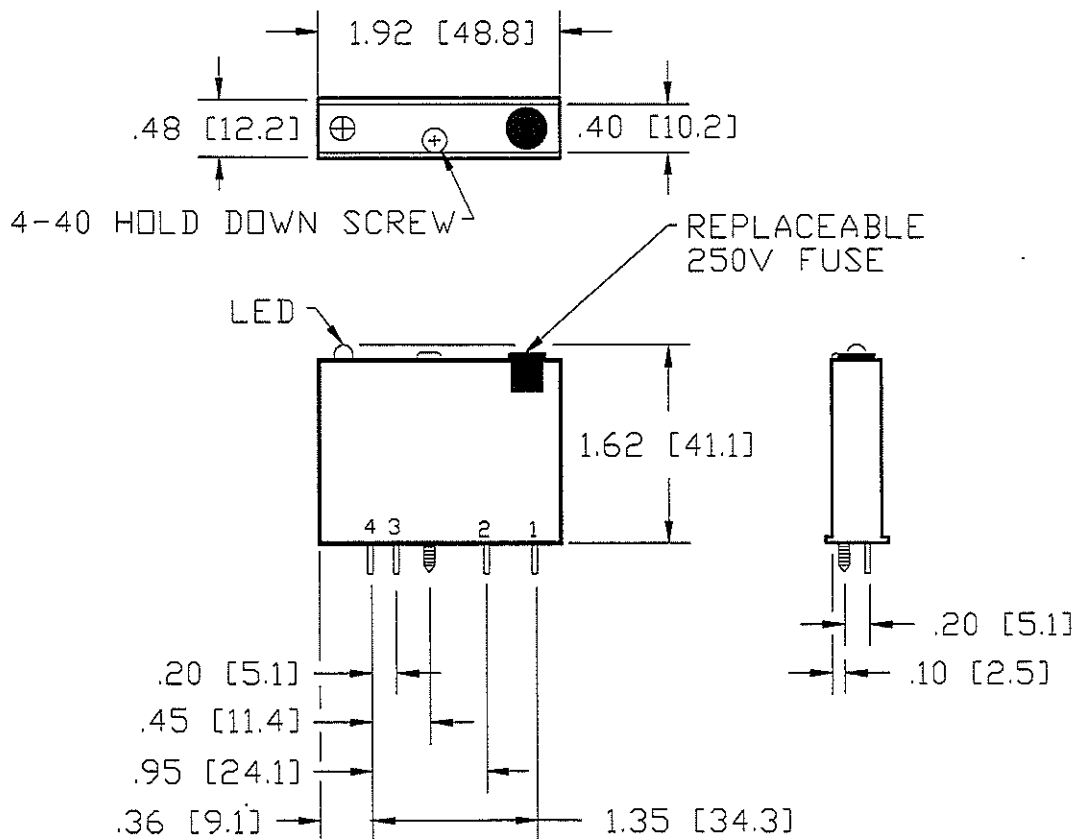
GENERAL / APPLIES TO ALL MODELS

One Second Surge:	5 amperes
Operating Ambient Temperature:	- 30° C to 70° C
Isolation Input-to-Output:	4000 V _{rms}
Turn-on Time:	50 microseconds (100 microseconds for G4ODC5A)
Turn-off Time:	50 microseconds (750 microseconds for G4ODC5A)
Output Voltage Drop Maximum Peak:	1.6 volts

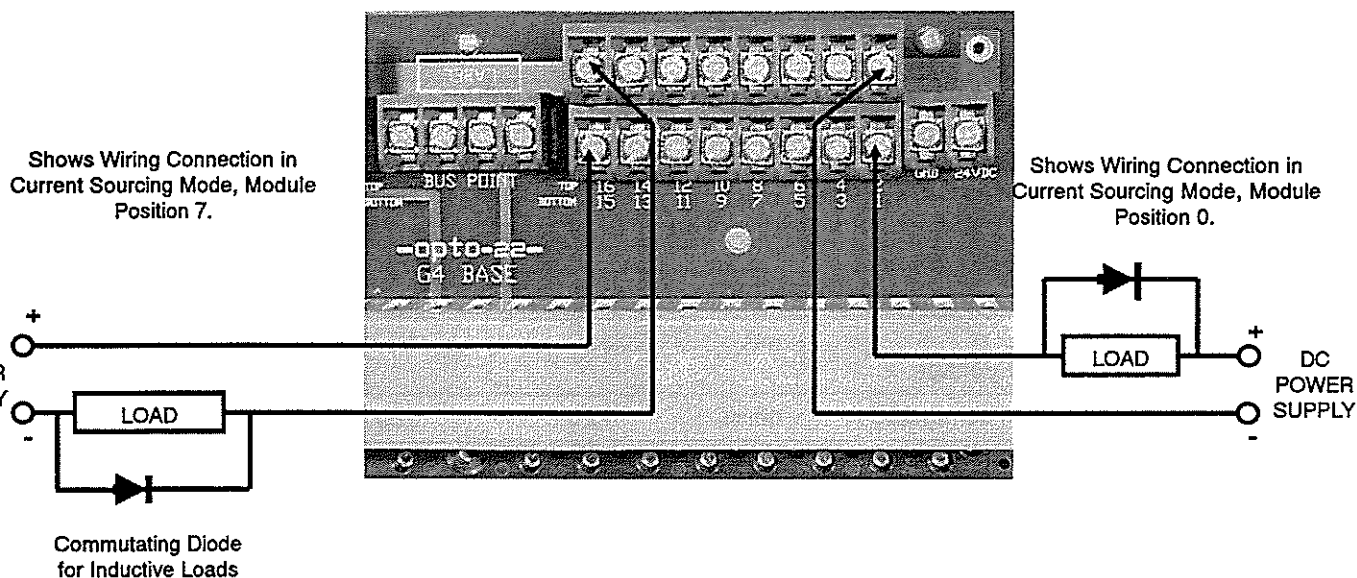
SPECIFICATIONS

	UNITS	G40DC5	G40DC5A	G40DC15	G40DC24
Line Voltage - Maximum:	VDC	60	200	60	60
Operating Voltage Range:	VDC	5 - 60	5 - 200	5 - 60	5 - 60
Current Rating:					
@ 45° C Ambient	amps	3	1	3	3
@ 70° C Ambient	amps	2	0.55	2	2
Off-State Leakage @ Maximum Voltage:	mA	1	2	1	1
Logic Voltage - Nominal:	VDC	5	5	15	24
Logic Voltage Range (V _{cc}):	VDC	4 - 8	4 - 8	10.5 - 16	19.5 - 32
Logic Pickup Voltage:	VDC	4	4	10.5	19.5
Logic Dropout Voltage:	VDC	1	1	1	1
Logic Input Current: @ Nominal Logic Voltage	mA	12	12	15	18
Control Resistance (RC in schematic):	ohms	220	220	1k	2.2k

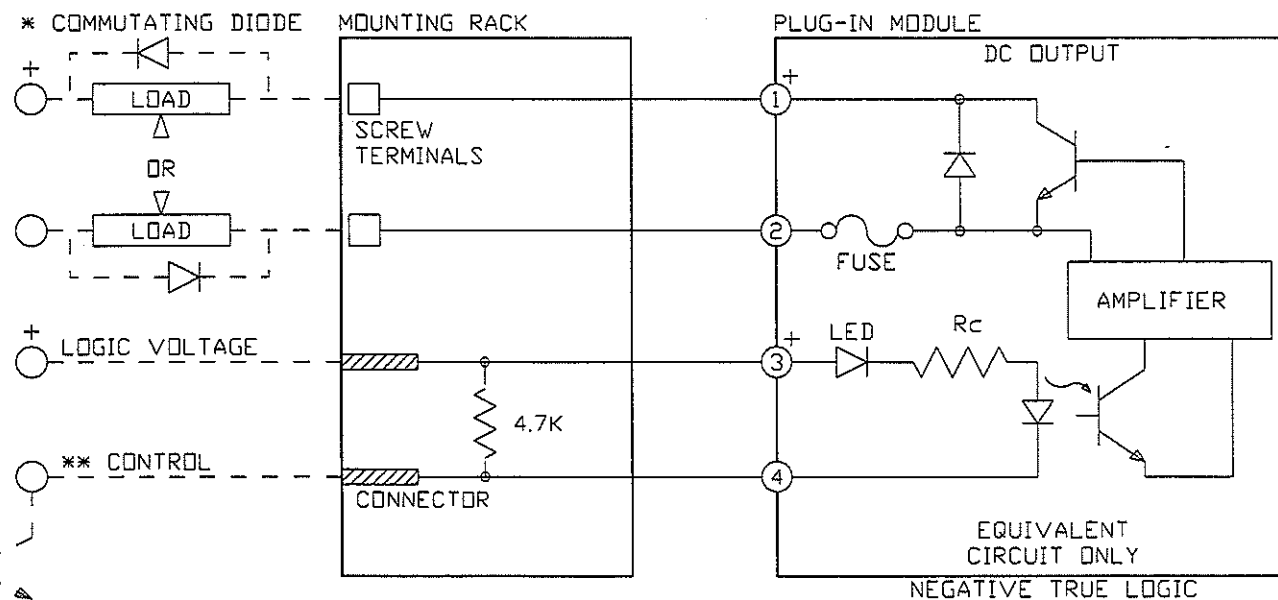
DIMENSIONS



CONNECTION DIAGRAM



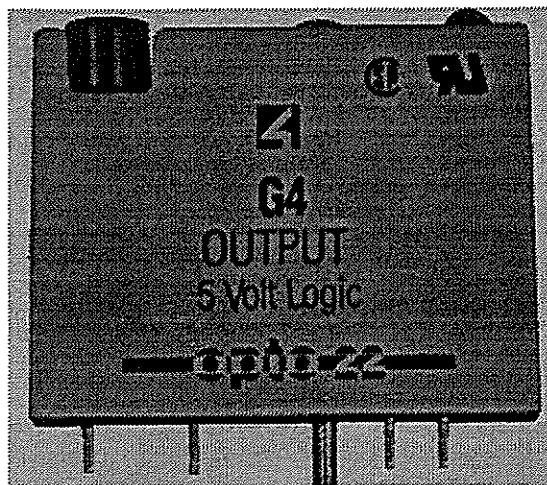
SCHEMATIC



* Must be used on inductive loads.

** Control line is compatible with Totem Pole or Tri State Output device.

MODIC®
CONTROLLER



OPTO 22

**DIGITAL
AC OUTPUT
MODULES**

DESCRIPTION

AC output modules are used for controlling or switching AC loads. Each module provides 4000 V_{rms} of optical isolation between the field devices and the control logic. With the exception of the G4OAC5A5 module, all AC output modules are equivalent to a single pole, single throw, normally open contact (FORM A, SPST-NO, Make). The G4OAC5A5 is equivalent to a single pole, single throw, normally closed contact (FORM B, SPST-NC, Break). All AC output modules feature zero voltage turn-on and zero current turn-off.

Typical uses and applications for AC output modules include switching the following loads:

- Relays
- Solenoids
- Motor Starters
- Heaters
- Lamps or Indicators

FEATURES

- ◆ 4000 VAC Optical Isolation
- ◆ Built-in LED Status Indicator
- ◆ Removable Fuse
- ◆ Current Rating: 3 amperes @ 45° C
- ◆ Withstands One Cycle Surge of 80 Amperes
- ◆ UL Recognized
- ◆ CSA Certified
- ◆ 5, 15 and 24 VDC Logic Levels
- ◆ Operating Temperature: - 30° C to 70° C
- ◆ Passes NEMA Showering Arc Test [ICS 2-230]
- ◆ Meets IEEE Surge Withstand Specification IEEF-4721

ORDERING GUIDE

LINE VOLTAGE VAC	LOGIC VOLTAGE	PART NUMBER
12 - 140	5	G4OAC5
24 - 280	5	G4OAC5A
24 - 280 (Normally Closed, NC)	5	G4OAC5A5
12 - 140	15	G4OAC15
24 - 280	15	G4OAC15A
12 - 140	24	G4OAC24
24 - 280	24	G4OAC24A

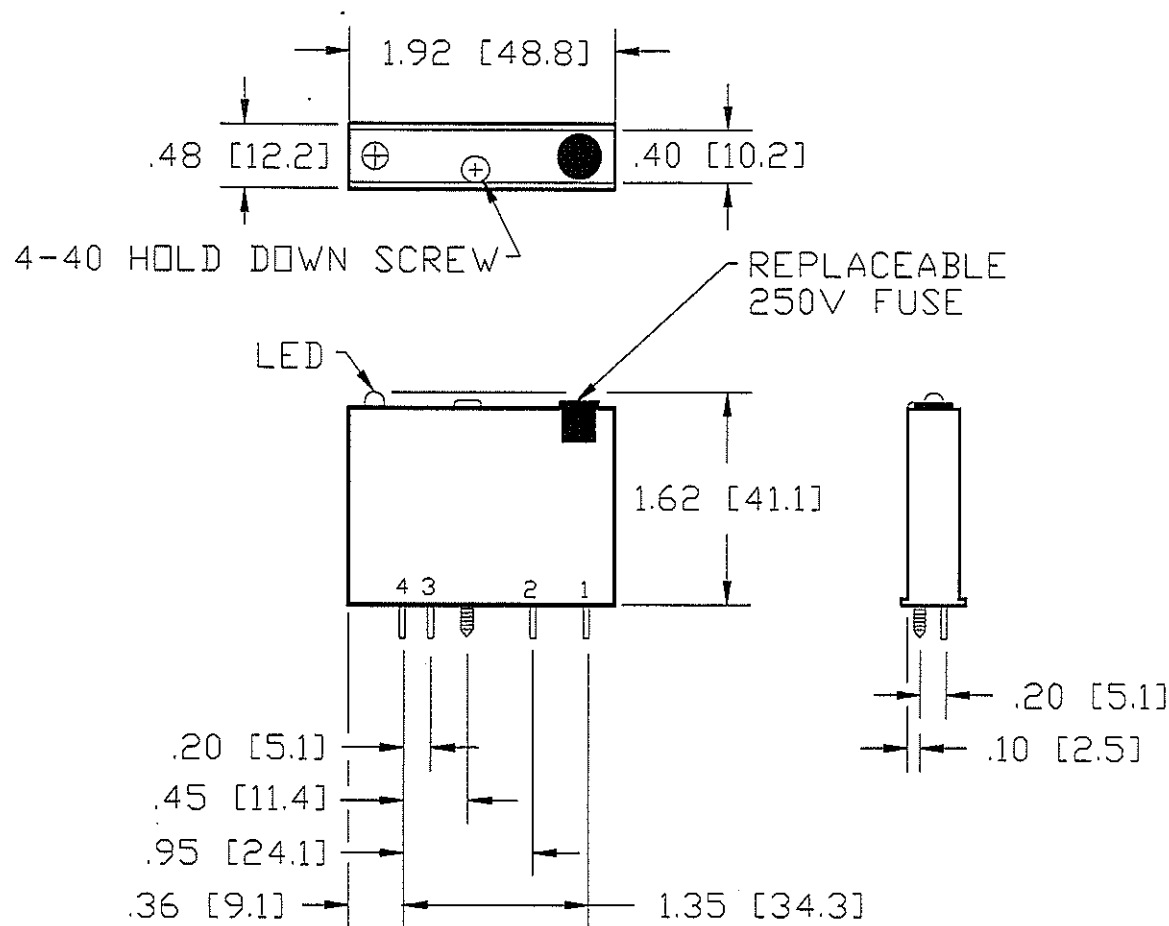
SPECIFICATIONS

GENERAL/APPLIES TO ALL MODELS

Current Rating:	@ 45° C Ambient @ 70° C Ambient	3 amperes 2 amperes
One Cycle Surge:		80 amperes peak
Peak Repetitive Voltage:		500 volts
Operating Ambient Temperature:		- 30° to 70° C
Isolation Input-to-Output:		4000 V _{rms}
Minimum Load Current:		20 milliamperes
Operating Frequency:		25 - 65 Hz
Turn-on Time:		1/2 cycle maximum-zero voltage
Turn-off Time:		1/2 cycle maximum-zero current
dV/dT - Off-State:		200 volts / microseconds
dV/dT - Commutating:		snubbed for rated 0.5 power factor load
Output Voltage Drop Maximum Peak:		1.6 volts
Off-State Leakage:	@ Nominal Voltage - 60 Hz	5 milliamperes rms 2.5 milliamperes rms for G4OAC5A G4OAC5A5, G4OAC15A, and G4OAC24A @ 120 VAC

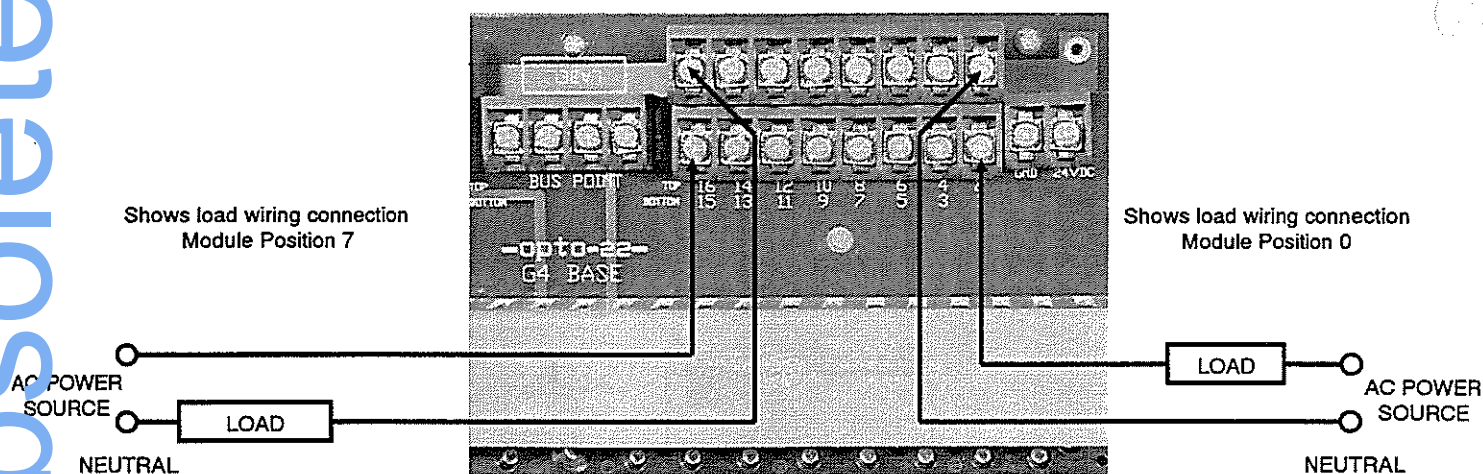
	UNITS	G4OAC5
Line Voltage - Nominal:	VAC	120
Operating Voltage Range:	VAC	12 - 140
Logic Voltage - Nominal:	VDC	5
Logic Voltage Range (V _{cc}):	VDC	4 - 8
Logic Pickup Voltage:	VDC	4
Logic Dropout Voltage:	VDC	1
Logic Input Current - @ Normal Logic Voltage: (I _{out} in schematic diagram)	mA	12
Control Resistance: (R _c in schematic diagram)	Ohms	220

DIMENSIONS

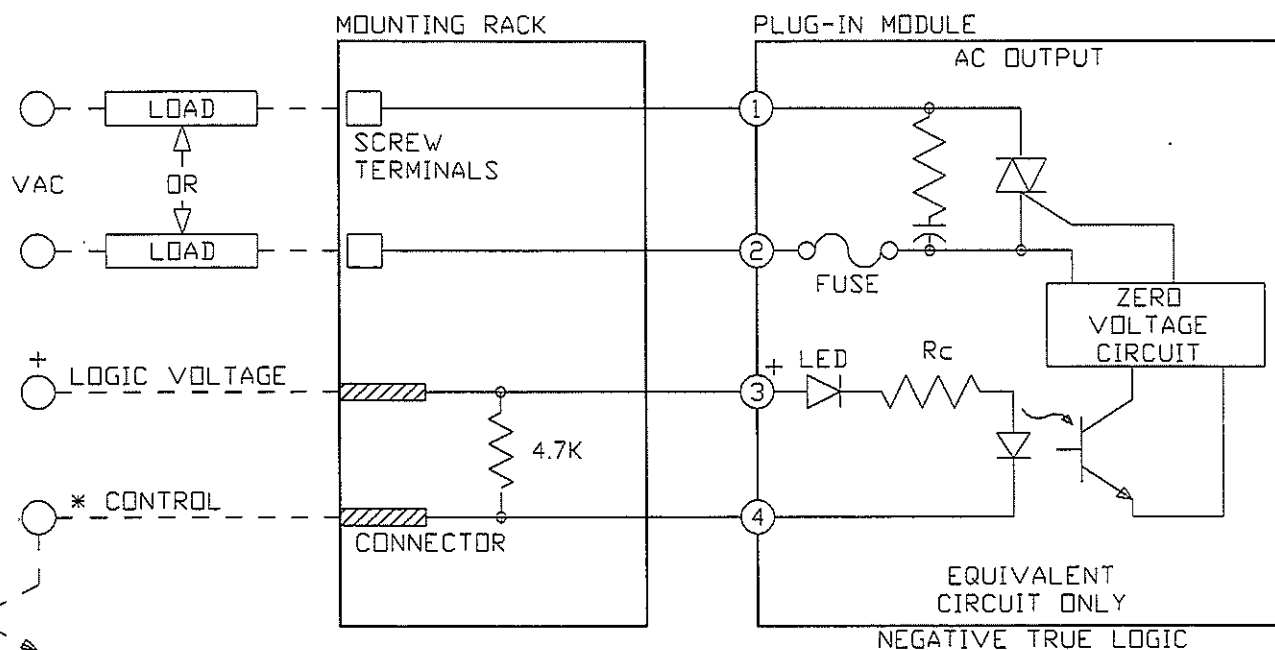


G40AC5A	G40AC5A5 (NC)	G40AC15	G40AC15A	G40AC24	G40AC24A
240	120 / 240	120	240	120	240
24 - 280	24 - 280	12 - 140	24 - 280	12 - 140	24 - 280
5	5	15	15	24	24
4 - 8	4 - 8	10.5 - 16	10.5 - 16	19.5 - 32	19.5 - 32
4	4	10.5	10.5	19.5	19.5
1	1	1	1	1	1
12	12	15	15	18	18
220	220	1K	1K	2.2K	2.2K

CONNECTION DIAGRAM



SCHEMATIC



* Control line is compatible with Totem Pole or Tri State Output device.

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OPTO 22

**DRY CONTACT
OUTPUT MODULE
SINGLE-CHANNEL
PLUG-IN**

MODELS:

**G4ODC5R
G4ODC5R5**

DESCRIPTION

The G4ODC5R is a Form A mechanical relay I/O module and the G4ODC5R5 is a Form B mechanical relay I/O module. Analog signal and communication line multiplexing are examples of ideal applications for these dry-contact, low-contact resistance modules.

FEATURES

- ◆ G4ODC5R - SPST - Normally Open
- ◆ G4ODC5R5 - SPST - Normally Closed
- ◆ Contact Switching Voltage 100 VDC Maximum or 130 VAC Maximum
- ◆ Contact Switching Current 0.5 A Maximum
- ◆ Contact Resistance 200 m Ω Maximum
- ◆ Life 5 x 10⁶ Cycles
- ◆ Coil 5 VDC at 14 mA
- ◆ Operating Temperature: 0° C to 70° C

SPECIFICATIONS

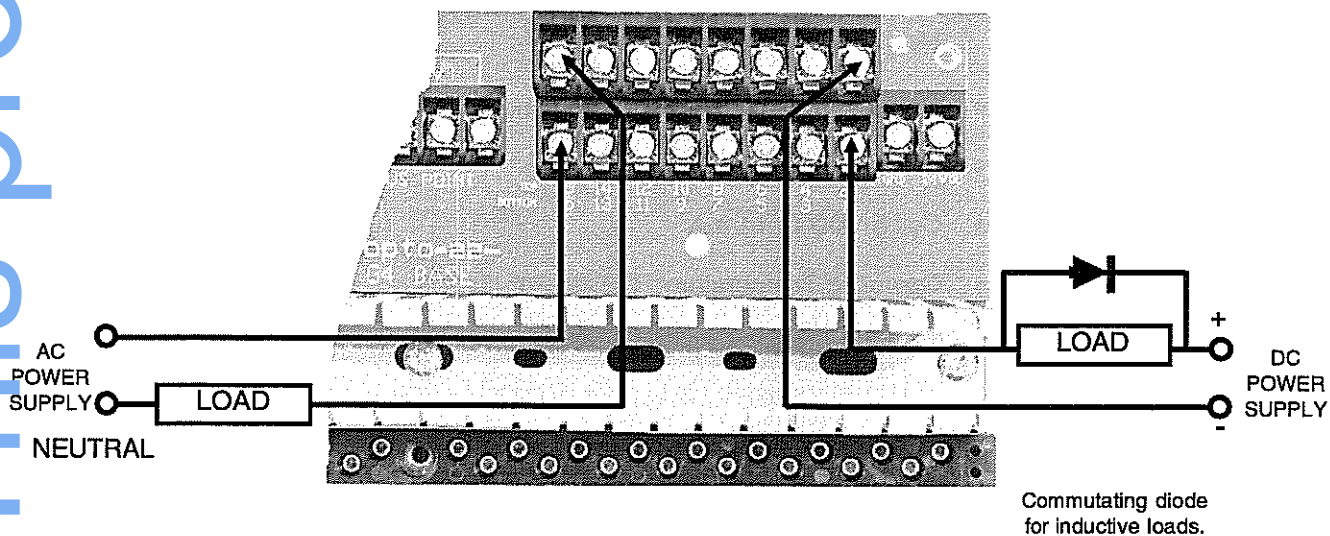
Contact Form:	G4ODC5R G4ODC5R5	Form A SPST - normally open Form B SPST - normally closed
Contact Rating:		10 VA
Switching Volts:		100 VDC / 130 VAC maximum
Switching Current:		0.5 A maximum
Carry Current:		1.5 A maximum
Contact On - Resistance:		200 mΩ
Turn-on Time:		500 μs
Turn-off Time:		500 μs
Contact Bounce:		250 μs
Mechanical Life:		5 x 10 ⁶ cycles
Logic Voltage Range:		4.8 - 6 V
Logic Pickup Voltage*:		0.8 V
Logic Dropout Voltage*:		3.8 V
Logic Input Current:		14 mA at nominal logic voltage
Isolation Voltage:		1500 VDC input-to-output
Temperature:	Operating Storage	0° C to 70° C - 60° C to 105° C

* Pickup and dropout voltages are measured from 5 VDC logic ground.

CONNECTION DIAGRAM

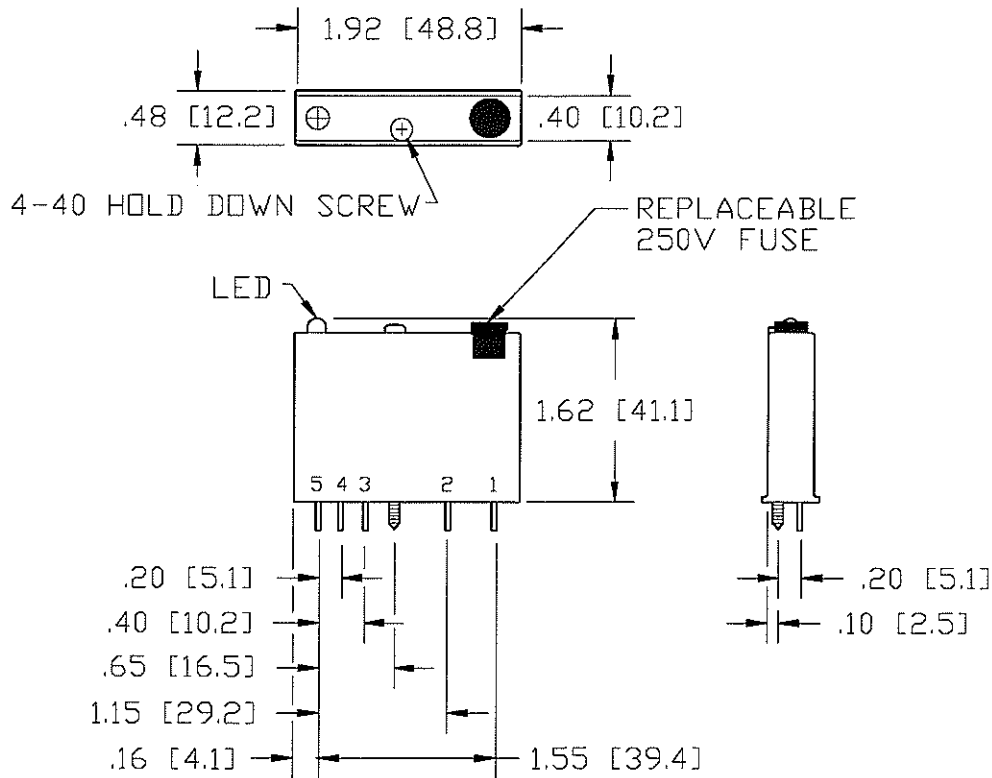
Shows load wiring connection in module position 7 using AC load.

Shows load wiring connection in module position 0 using DC load.

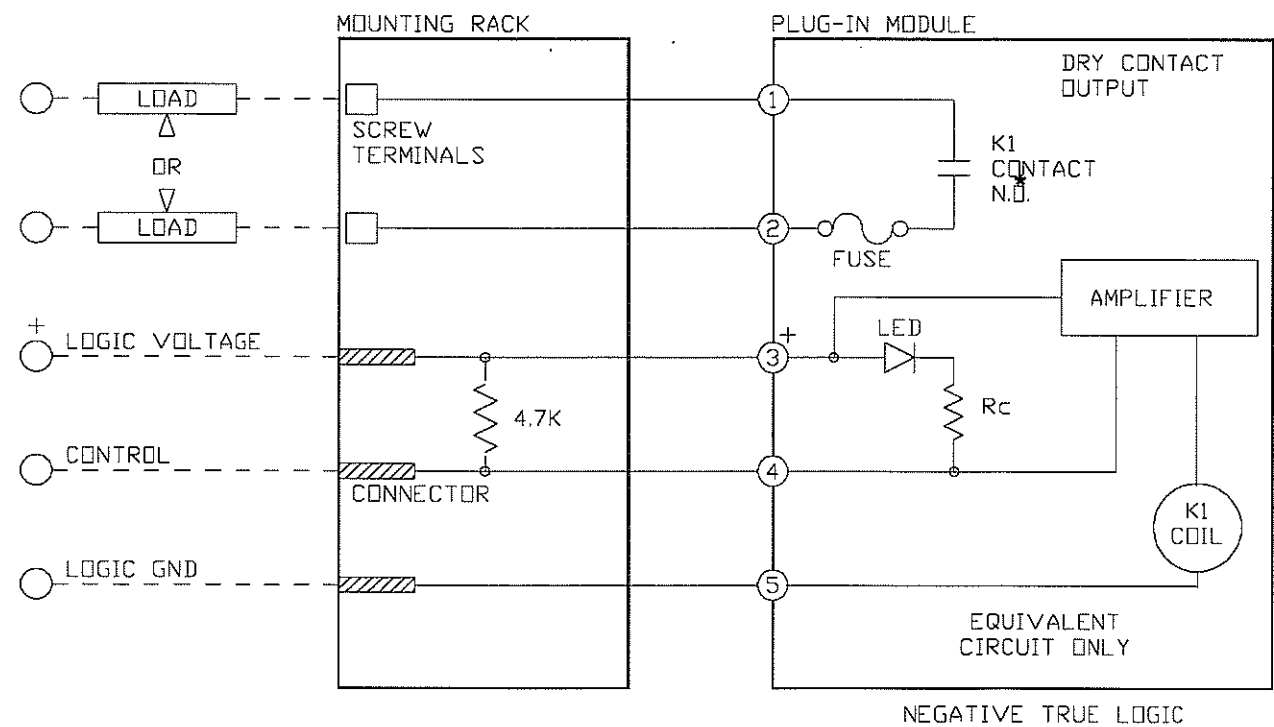


This product is obsolete.

DIMENSIONS



SCHEMATIC



Note: Also compatible with Totem Pole or 3-State Output.
Will not plug into G4PB4R or PB4R mounting rack.

* Normally open for G4ODC5R.
Normally closed for G4ODC5R5.

This product is obsolete.



DESCRIPTION

The G4OAC5AMA, G4OAC5MA, and G4ODC5MA are solid state output modules with an integral three position manual-on/manual-off and automatic mode control toggle switch.

These modules eliminate costly external maintenance and diagnostic circuitry by allowing the user to manually control the status of the output. The override switch is in series with the logic half of the relay and the load is switched by a solid state device which provides excellent reliability and isolation.

The AC output modules are equivalent to a single pole, single throw, normally open contact (FORM A, SPST-NO, Make) and feature zero voltage turn-on and zero current turn-off.

FEATURES

- ♦ Solid State Switching
- ♦ 4000 V Optical Isolation
- ♦ LED Indicator
- ♦ Built-in Fuse
- ♦ UL Recognized
- ♦ CSA Certified
- ♦ Small Footprint
- ♦ Compatible with *mistic* Control Systems and G4 Racks

OPTO 22

MANUAL ON/OFF AUTOMATIC OUTPUT DIAGNOSTIC RELAYS

MODELS:

G4OAC5AMA
G4OAC5MA
G4ODC5MA

SPECIFICATIONS

G4OAC5AMA

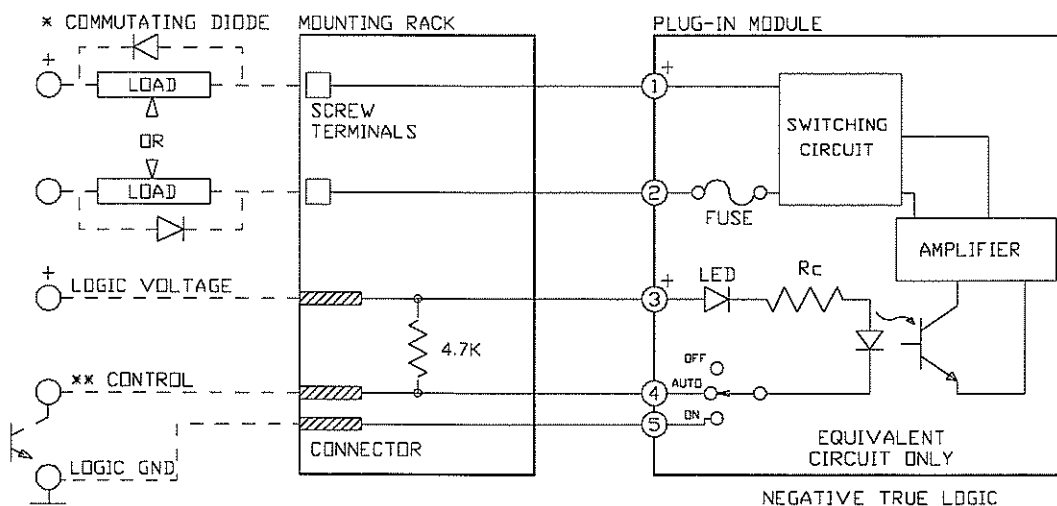
G4OAC5MA

G4ODC5MA

Current Rating:			
@ 45° C Ambient	3 A	3 A	3 A
@ 70° C Ambient	2 A	2 A	2 A
One Second Surge:	N/A	N/A	5 A
One Cycle Surge:	80 A peak	80 A	N/A
Peak Repetitive Voltage:	500 V	500 V	N/A
Operating Ambient Temperature:	- 30° C to 70° C	- 30° C to 70° C	- 30° C to 70° C
Isolation Input-to-Output:	4000 V _{rms}	4000 V _{rms}	4000 V _{rms}
Minimum Load Current:	20 mA	20 mA	N/A
Operating Frequency:	25 - 65 Hz	25 - 65 Hz	N/A
Turn-on Time:	1/2 cycle max zero voltage	1/2 cycle max zero voltage	50 μs max
Turn-off Time:	1/2 cycle max zero current	1/2 cycle max zero current	50 μs max
dv/dt - Off-state:	200 V / μS	200 V / μS	N/A
dv/dt - Commutating:	snubbed for 0.5 power factor load	snubbed for 0.5 power factor load	N/A
Output Voltage Drop Maximum Peak:	1.6 V	1.6 V	1.6 V
Off-state Leakage:	2.5 mA, rms*	5 mA, rms*	1 mA
Line Voltage:	240 VAC, nominal	120 VAC, nominal	60 VDC, max
Operating Voltage Range:	24 - 280 VAC	12 - 140 VAC	5 - 60 VDC
Logic Voltage - Nominal:	5 VDC	5 VDC	5 VDC
Logic Voltage Range (V _{cc}):	4 - 8 VDC	4 - 8 VDC	4 - 8 VDC
Logic Pickup Voltage:	4 VDC	4 VDC	4 VDC
Logic Dropout Voltage:	1 VDC	1 VDC	1 VDC
Logic Current @ Normal Logic Voltage:	12 mA	12 mA	12 mA
Control Resistance (R _c):	220 ohms	220 ohms	220 ohms

* 120 VAC - 60 Hz

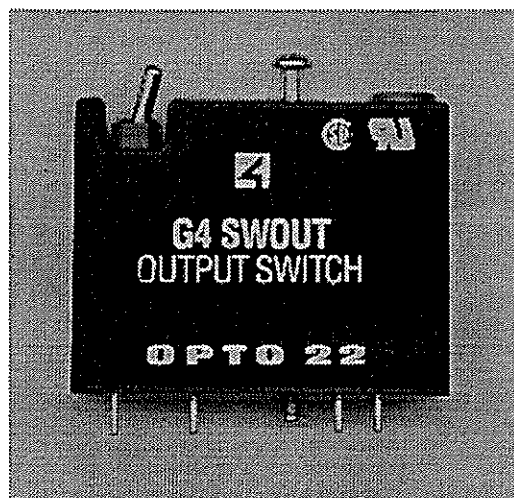
SCHEMATIC



* Must be used on inductive loads

** Control line is compatible with Totem Pole or Tri-State Output device

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OPTO 22

**G4 OUTPUT
TEST MODULE**

MODEL G4SWOUT

DESCRIPTION

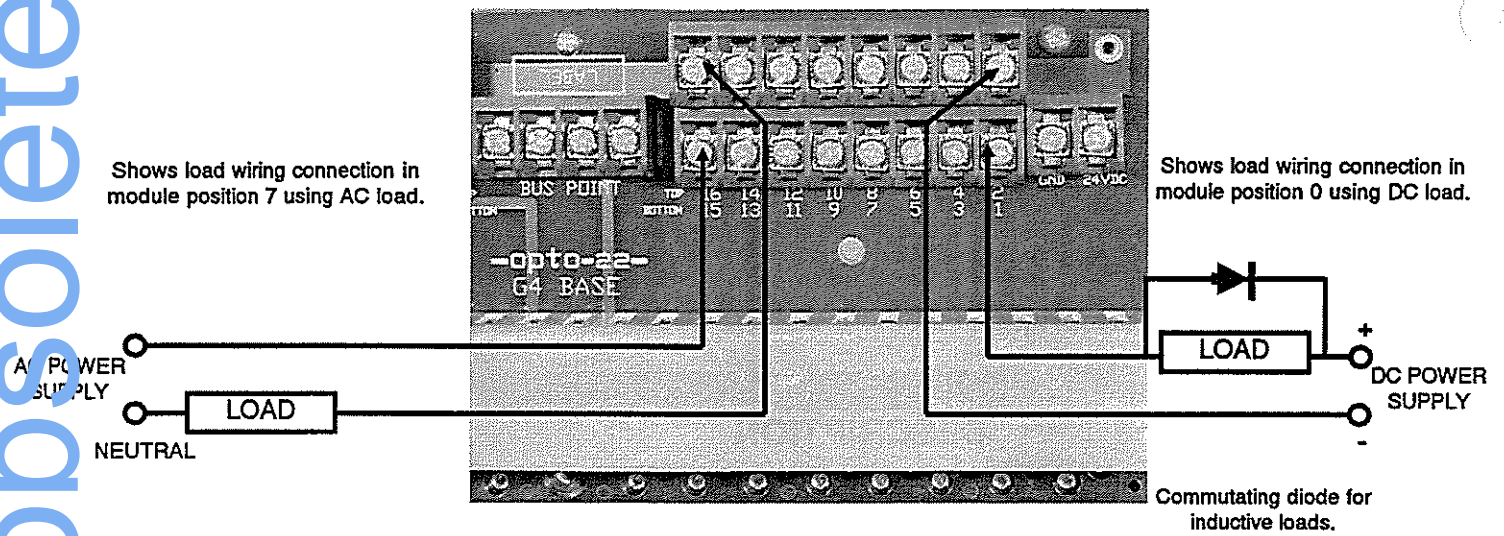
The OPTO 22 G4SWOUT output test module is a device which provides a manual toggle switch on the field side. The toggle switch closes a contact which shorts the field terminals to turn on a field output. Internally, there is no connection on the logic side of the module.

The G4SWOUT output test module is ideal for testing field wiring and devices by simulating an output from the computer. The switch will handle 3A @ 250 VAC/VDC.

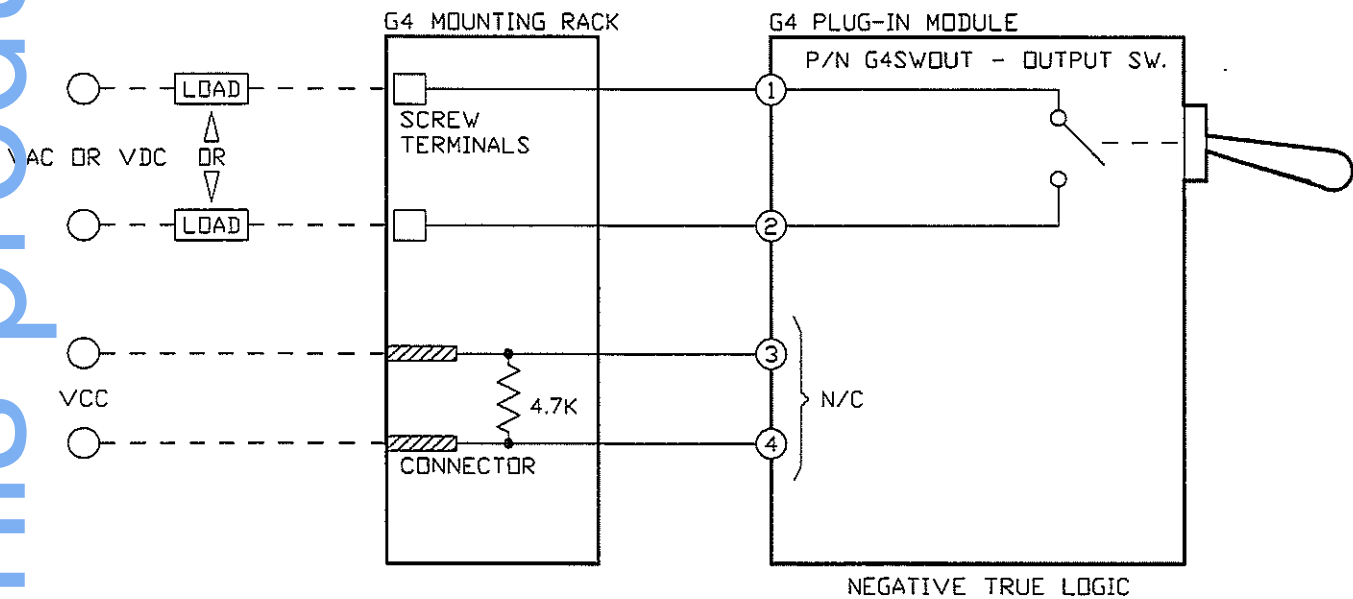
FEATURES

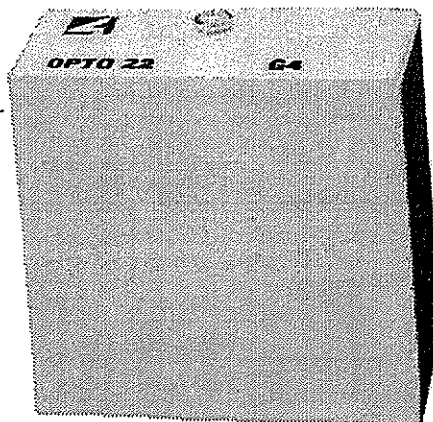
- ◆ Simulates a G4 Module Output.
- ◆ Contact Rating is 3A @ 250 VAC
- ◆ Ideal For Testing Field Wiring.
- ◆ Package Size Same As G4 I/O Modules
- ◆ Plugs Into G4 I/O Mounting Racks
- ◆ Plugs Into *mistic* 100 Digital Bricks
- ◆ Plugs Into *mistic* 200 Digital Bricks
- ◆ Switches AC or DC Loads

CONNECTION DIAGRAM



SCHEMATIC





OPTO 22

ANALOG MODULE

Voltage Input

MODELS:

G4AD6

G4AD6HS

G4AD7

G4AD7HS

G4AD9

G4AD11

G4AD12

G4AD13

G4AD22

DESCRIPTION

OPTO 22's voltage input modules provide a single channel of transformer and optically isolated voltage-to-digital conversion. The modules offer wide nominal input and special over/under range capabilities. Complete electrical channel-to-channel isolation is provided which eliminates troublesome ground loop problems. Modules plug into an OPTO 22 *mistic* Controller analog I/O Brick and are secured by a captive screw. Field connections are made via four terminals on the Brick base.

FEATURES

- ◆ Rugged Packaging
- ◆ 4000 V_{rms} Transient Isolation
- ◆ True Differential (Floating) Inputs
- ◆ 12-bit Resolution
- ◆ Factory Calibrated, No User Adjustments
- ◆ Runs on a Single 24 VDC Supply
- ◆ Operating Temperature: 0° to 70° C

TABLE

Part Number	Nominal Voltage Input	Over/Under Range	Accuracy*	Response Time % Of Scale Change	
				5%	63%
G4AD6	0 to 5 VDC	- .3 to 11 VDC	± 5 mV	8.4 msec	165 msec
G4AD6HS	0 to 5 VDC	- .3 to 11 VDC	± 5 mV	< 3 msec	< 3 msec
G4AD7	0 to 10 VDC	- .6 to 22 VDC	± 10 mV	8.4 msec	165 msec
G4AD7HS	0 to 10 VDC	- .6 to 22 VDC	± 10 mV	< 3 msec	< 3 msec
G4AD9	0 to 50 mV	- .3 to 110 mV	± 100 μ V	2 msec	36 msec
G4AD11	- 5 to + 5 VDC	- 5.6 to 21 VDC	± 10 mV	8.4 msec	165 msec
G4AD12	- 10 to + 10 VDC	- 11.2 to 42 VDC	± 20 mV	8.4 msec	165 msec
G4AD13	0 to 100 mV	- 6 to 220 mV	± 100 μ V	2 msec	36 msec
G4AD22	0 to 1 VDC	- 60 mV to 2.2 VDC	± 1 mV	< 3 msec	< 10 msec

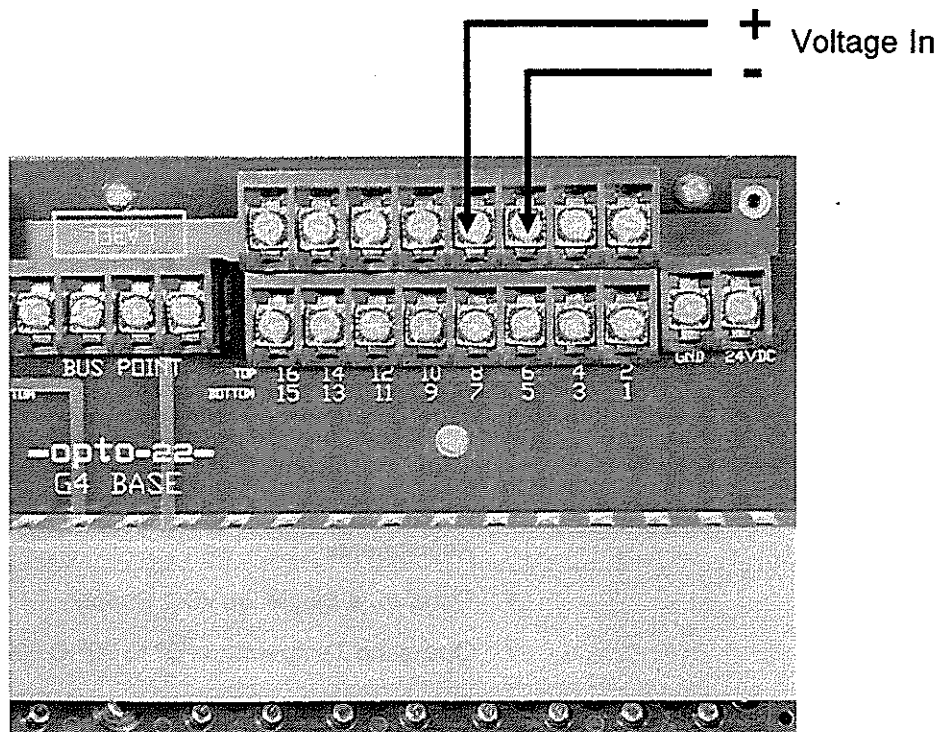
*Accuracy figure requires use of gain and offset commands.

SPECIFICATIONS

Resolution:	12 bits
Isolation: (Transient)	Input-to-Output Input-to-Analog Supply 4000 V_{rms} 4000 V_{rms}
Ambient Temperature:	Operating Storage 0° to 70° C - 25° to 85° C

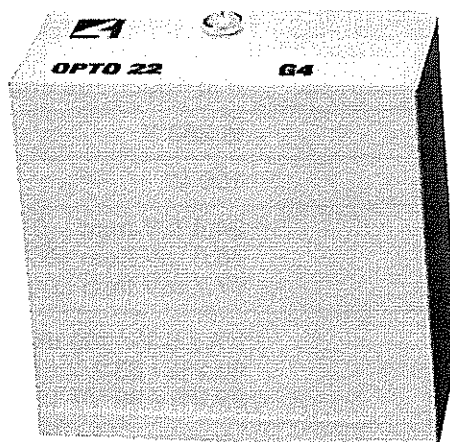
CONNECTION DIAGRAM

Note: Picture shows connection for module in position 1.



This product is obsolete.

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OPTO 22

**0 TO 100 VOLTS
ANALOG INPUT
MODULE**

MODEL G4AD25

DESCRIPTION

The G4AD25 module provides a single channel of transformer and optically isolated analog-to-digital conversion. The nominal input range is 0 to 100 volts AC or DC with an over/range capability to 263 volts. The G4AD25 module can survive to 500 volts peak applied directly across its inputs. The G4AD25 may be used to monitor 120/240 volt AC/DC and 12/24/48 volt AC/DC system voltage. The module plugs into the Opto 22 *mistic* series analog brick mounting racks and is secured by a captive screw. The field connections are made via the terminal strip located on the mounting rack.

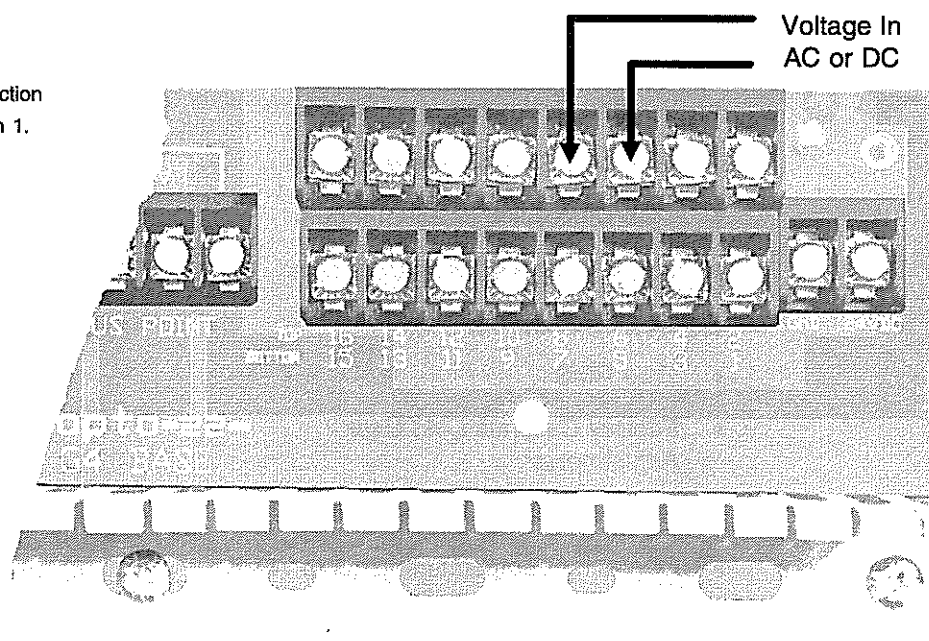
FEATURES

- ◆ Rugged Packaging
- ◆ 4000 V of Transient Isolation
- ◆ True Differential (floating) Inputs
- ◆ 750 V Common Mode Operation
- ◆ 12-bit Resolution
- ◆ True RMS
- ◆ Factory Calibrated, No User Adjustments
- ◆ Survives 500 V Peak to Inputs
- ◆ Operating Temperature: 0° C to 70° C

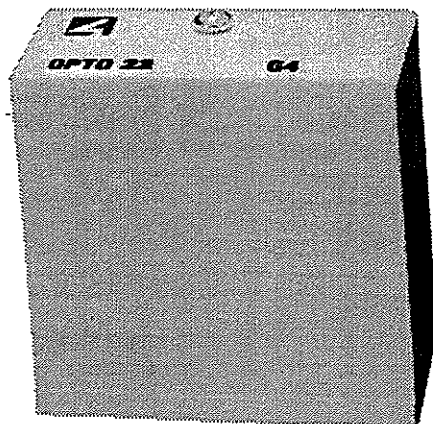
SPECIFICATIONS

Nominal Input Range:	0 to 100 V true rms AC/DC
Input Over Range:	to 263 V
Span:	100 V
Resolution:	24.4 mV from 0 to 100 V 48.8 mV from 100 to 200 V 97.7 mV from 200 to 263.7 V
Input Response Time:	5% / 5 V / 100 mS (% of span / ΔV / Δ time) 63.2% / 63.2 V / 200 ms 99.9% / 99 V / 1200 ms
DC Common Mode Rejection:	- 120 dB
AC Common Mode Rejection:	- 120 dB @ 60 Hz
Maximum Operating Common Mode Voltage:	750 VDC or peak AC
Input vs Output:	
Zero Scale (1920 Hz)	0 V
Full Scale (9600 Hz)	100 V
Accuracy:	0.5 V (0.5%)
DC Reversal:	± 0.3 V (0.3%)
Power Requirements:	24 VDC (± 0.5 V) @ 40 mA logic supply 5.5 V maximum @ 15 mA
Optical Coupler:	I _{out} low sink 1.6 mA (open collector output) V _{out} hi 5.5 V maximum
Input Resistance:	
Differential	1 M Ω
Common Mode	1000 M Ω
Ambient Temperature:	
Operating	0° to 70° C
Storage	- 25° to 85° C

Note: Picture shows connection for module in position 1.



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OPTO 22

ANALOG MODULE

4-20 milliamp Input

MODEL G4AD3

DESCRIPTION

The G4AD3 module provides a single channel of transformer and optically isolated current-to-digital conversion. The nominal input range is 4 to 20 milliamps with an under/over range capability from less than 3 milliamps to greater than 35 milliamps. One of the unique features is the loop supply can be provided by the G4AD3. This eliminates the need for the user to provide the loop supply (typically 15-48 V) and also saves the associated wiring, barrier strips, etc. The G4AD3 module also includes complete electrical channel-to-channel isolation which eliminates troublesome ground loop problems. The module plugs into an OPTO 22 *mistec* Controller analog I/O Brick and is secured by a captive screw. Field connections are made via four terminals on the Analog I/O Brick base.

FEATURES

- ◆ Rugged Packaging
- ◆ 4000 V_{rms} Transient Isolation
- ◆ Module Sourcing or User Sourced Loop Supply
- ◆ True Differential (Floating) Inputs
- ◆ 12-bit Resolution
- ◆ Factory Calibrated, No User Adjustments
- ◆ Runs on a Single 24 VDC Supply
- ◆ Operating Temperature: 0° to 70° C

SPECIFICATIONS

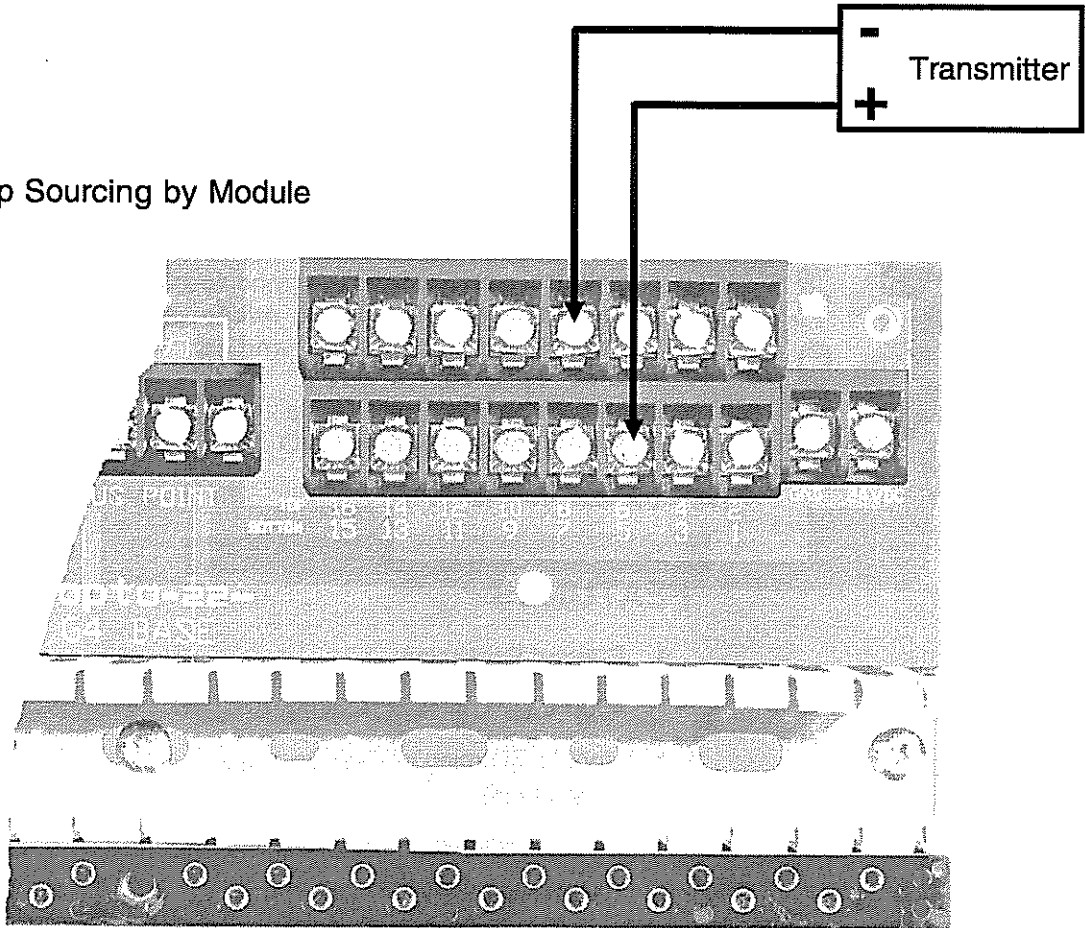
Nominal Input Range:		4 to 20 mA into 249 ohms
Over/Under Range:		3 to 35 mA
Loop Supply:		28 VDC nominal
Accuracy:*		16 μ A
Response Time:		full scale step change in 3 ms
Resolution:		12 bits
Isolation: (Transient)	Input-to-Output Input-to-Analog Supply	4000 V _{rms} 4000 V _{rms}
Ambient Temperature:	Operating Storage	0° C to 70° C - 25° C to 85° C

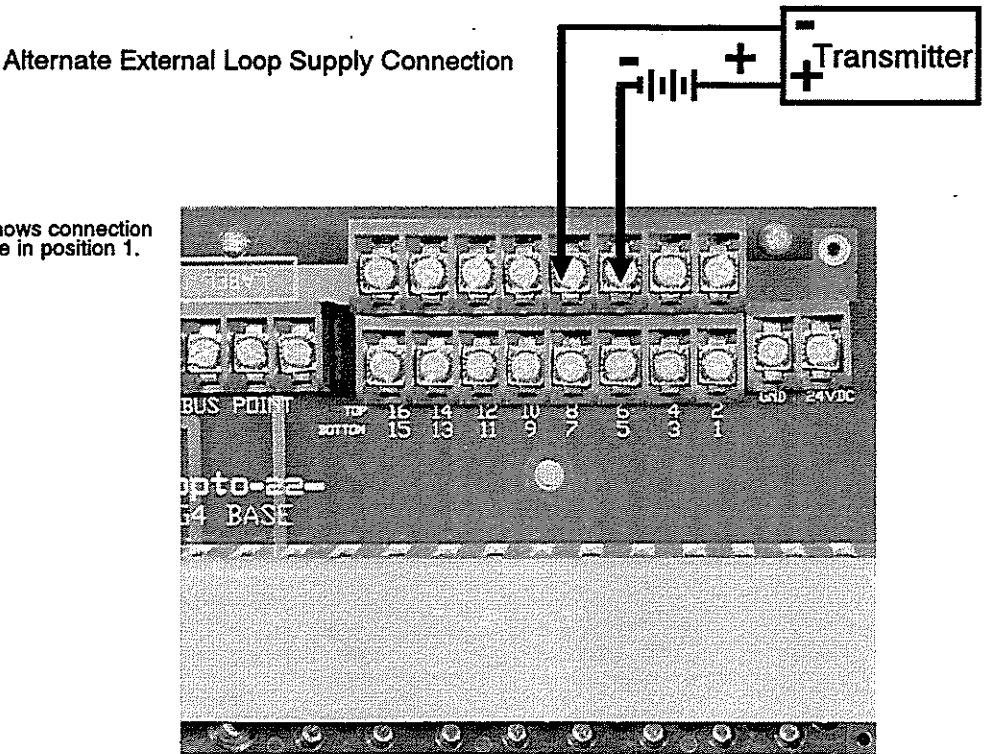
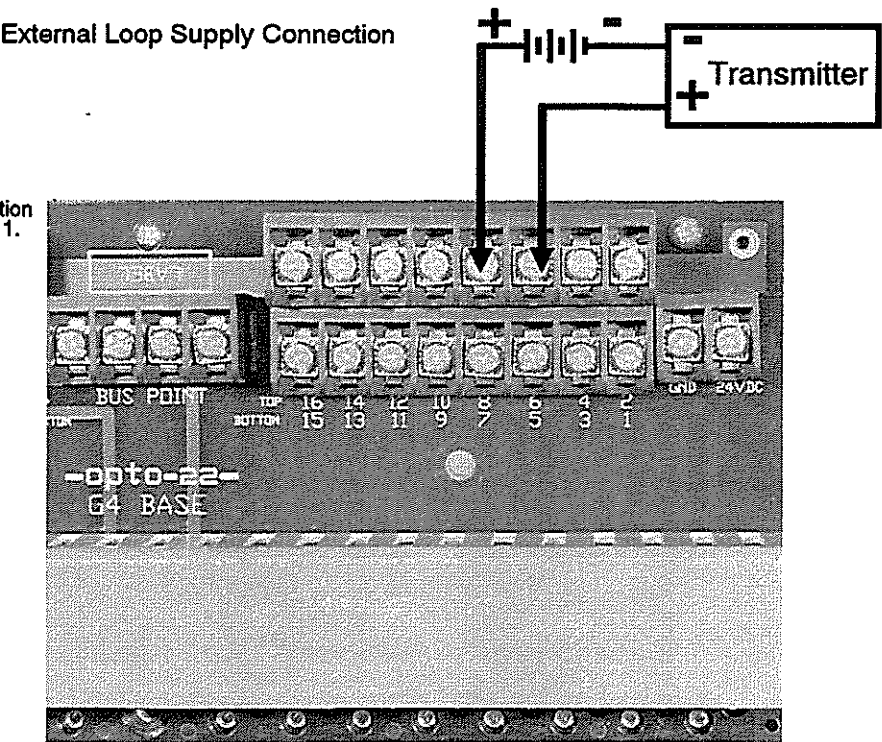
* Accuracy figure requires use of gain and offset commands.

CONNECTION DIAGRAMS

Connection for Loop Sourcing by Module

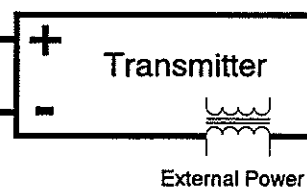
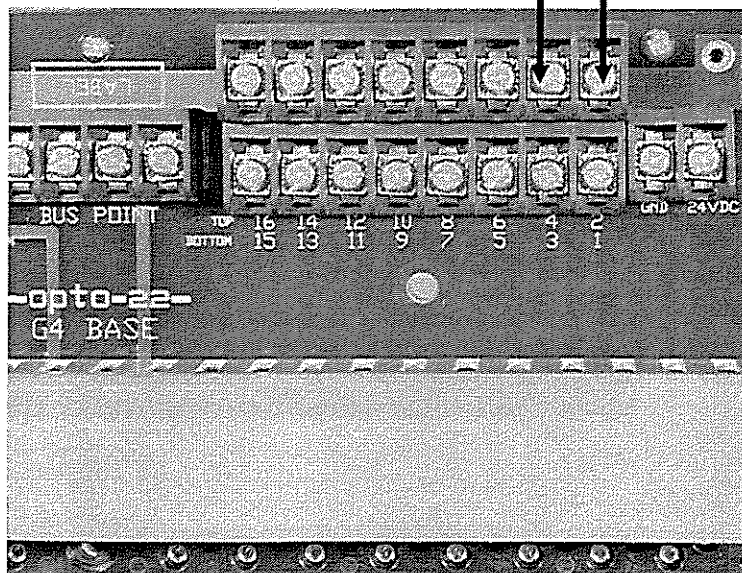
Note: Picture shows conn
for module in posit

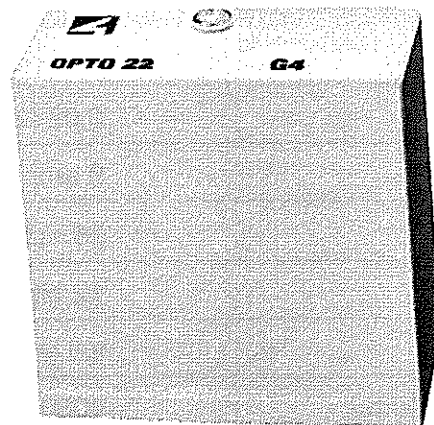




Connection For Self-Powered Transmitter

Note: Picture shows connection for module in position 0.





OPTO 22

ANALOG MODULE

0 - 5 Amp, AC/DC
Current Input

MODEL G4AD16

DESCRIPTION

The G4AD16 module provides a single channel of optically isolated true RMS current-to-digital conversion. The module plugs into any Opto 22 *mistic* Controller Analog I/O brick and is secured by a captive screw. Field connections are made via four terminals on the base of the Analog I/O brick. The G4AD16 module also includes complete electrical channel-to-channel isolation which eliminates troublesome ground loop problems. An ideal input is the 5 ampere secondary of a standard current transformer used to monitor AC line current.

FEATURES

- ◆ Small size, rugged packaging
- ◆ Optical and transformer isolation
- ◆ 4000 V_{rms} transient isolation
- ◆ Over/under range features
- ◆ Runs on a single 24 VDC supply
- ◆ 12-bit resolution
- ◆ Factory calibrated, no user adjustments
- ◆ True RMS
- ◆ Operating temperature: 0° C to 70° C

This product is obsolete

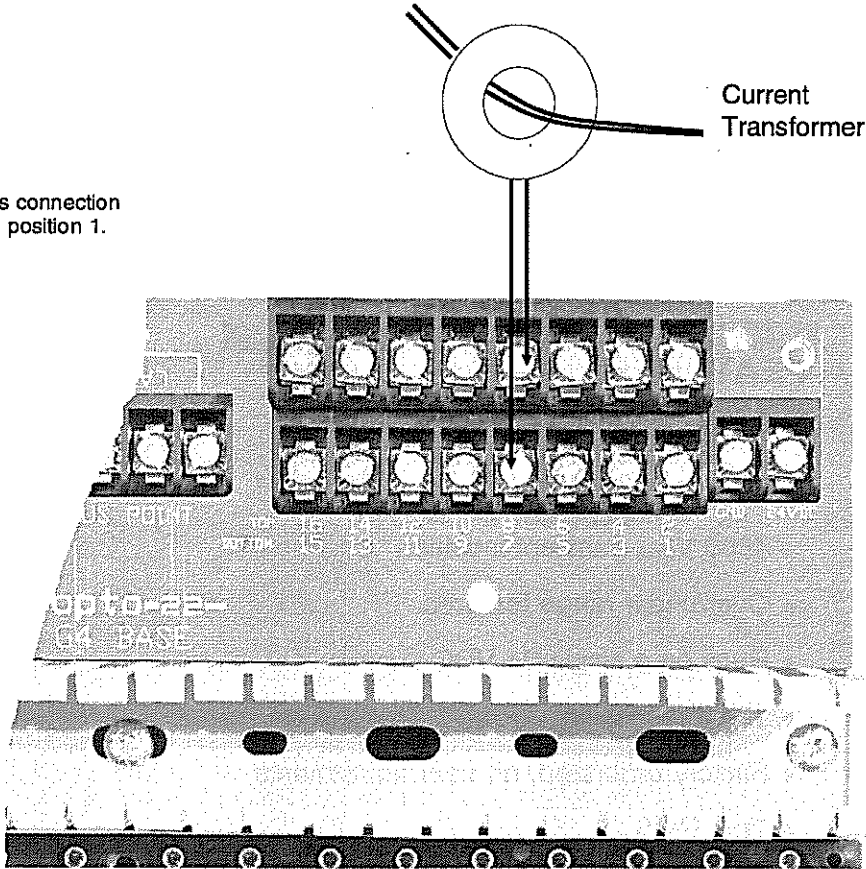
SPECIFICATIONS

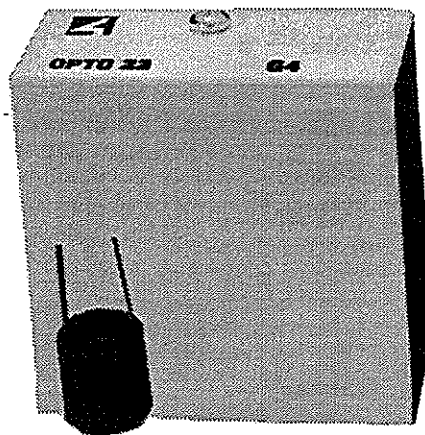
Input:		0 - 5 amps AC/DC
Input Impedience:		0.02 Ω
Maximum Input:		8 amps AC/DC
Accuracy:*		25 mA
Resolution:		12 bits
Response Time:		full scale step change in 1200 ms
Isolation: (Transient)	Input-to-Output	4000 V _{rms}
	Input-to-Analog Supply	4000 V _{rms}
Ambient Temperature:	Operating	0° to 70° C
	Storage	- 25° to 85° C

* Accuracy figure requires use of gain and offset commands.

CONNECTION DIAGRAM

Note: Picture shows connection for module in position 1.





OPTO 22

ANALOG MODULE

Thermocouple Input

MODELS:

G4AD5	'J'
G4AD8	'K'
G4AD17	'R'
G4AD18	'T'
G4AD19	'E'
G4AD23	'S'
G4AD24	'B'

DESCRIPTION

Thermocouple analog modules provide a single channel of transformer and optically isolated temperature-to-digital conversion. The modules offer wide nominal input and special over/under range capabilities. The modules also include complete electrical channel-to-channel isolation which eliminates troublesome ground loop problems. Modules plug into an OPTO 22 *mistic* Controller analog I/O Brick and are secured by a captive screw. The field connections are made through four gold plated contacts to the terminal strip located on the Brick base.

FEATURES

- ◆ Rugged Packaging
- ◆ 4000 V_{rms} Transient Isolation
- ◆ True Differential (Floating) Inputs
- ◆ 12-bit Resolution
- ◆ Factory Calibrated, No User Adjustments
- ◆ Operating Temperature: 0° to 70° C

TABLE

	G4AD5	G4AD8	G4AD17	G4AD18	G4AD19	G4AD23	G4AD24
Thermocouple Type	J	K	R	T	E	S	B
Nominal Temperature Range ° C	0° to 485°	-100° to 460°	0° to 960°	-200° to 224°	-100° to 435°	0° to 1034°	42° to 1492°
Nominal Temperature Range ° F	32° to 905°	-148° to 860°	32° to 1760°	-328° to 435°	-148° to 815°	32° to 1893°	107.9° to 2717.3°
Accuracy*	± 1° C	± 1° C	± 2.5° C	± 0.9° C	± 0.9° C	± 2.5° C	± 5° C
Over/Under Range Capability ° C	-32° to 1200°	-150° to 1372°	0° to 1768°	-270° to 400°	-155° to 1000°	0° to 1768°	42° to 1820°
Over/Under Range Capability ° F	-25° to 2192°	-238° to 2501°	-32° to 3214°	-454° to 752°	-247° to 1832°	-32° to 3214°	107.9° to 3308°
Over/Under Range Accuracy	± 2° C	± 2° C	± 2.5° C	± 1.8° C	± 1.8° C	± 2.5° C	± 5° C

SPECIFICATIONS

Isolation:	Input-to-Output	4000 V _{rms}
(Transient)	Input-to-Analog Supply	4000 V _{rms}
Cold Junction Compensated:		Yes
Open Thermocouple Detection:		Yes
Input Response Time:		5% of scale change in 8.5 ms 63% of scale change in 165 ms
Ambient Temperature:	Operating	0° to 70° C
	Storage	- 25° to 85° C
Resolution:		12 bits

* Accuracy figure requires use of gain and offset commands.

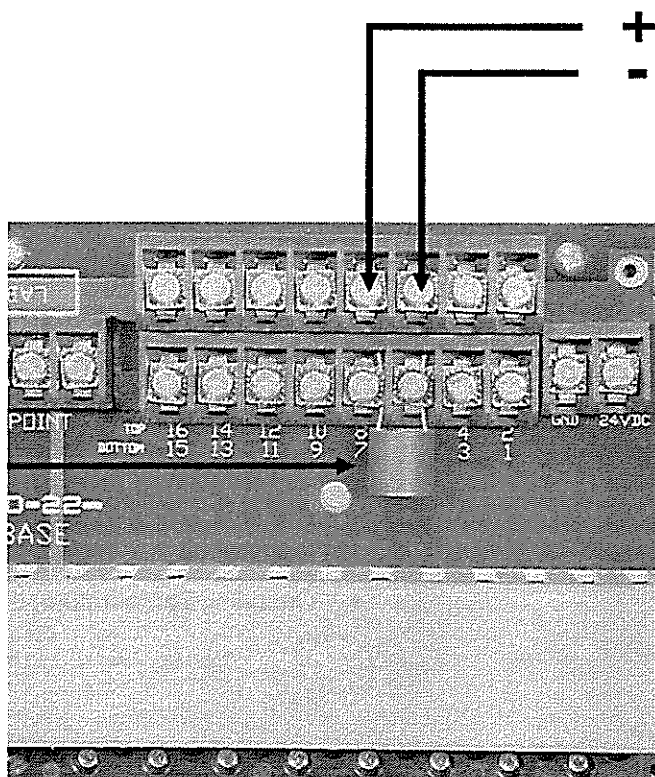
CONNECTION DIAGRAM

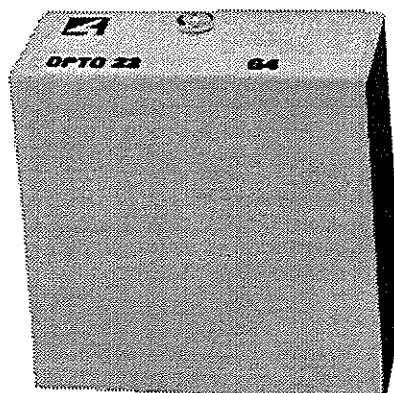
model	t/c type	POLARITY/COLOR	
		+	-
G4AD5	J	WHITE	RED
G4AD8	K	YELLOW	RED
G4AD17	R	BLACK	RED
G4AD18	T	BLUE	RED
G4AD19	E	PURPLE	RED
G4AD23	S	BLACK	RED
G4AD24**	B	GREY	RED

G4AD24 does not require a cold junction comp

Note: Picture shows connection for module in position 1.

Cold Junction Compensator





OPTO22

ANALOG MODULE

100 Ohm RTD
Input Module

MODEL G4AD10

DESCRIPTION

The G4AD10 module provides a single channel of optically isolated temperature-to-digital conversion. This module also includes complete electrical channel-to-channel isolation, which eliminates troublesome ground loop problems. The module plugs into any OPTO 22 *mistic* Controller Analog I/O Brick and is secured by a captive screw. Field connections are made via four terminals on the base of the Analog I/O Brick. The G4AD10 is suitable for temperature measurement where the RTD probe is grounded or when ground loop currents exist.

FEATURES

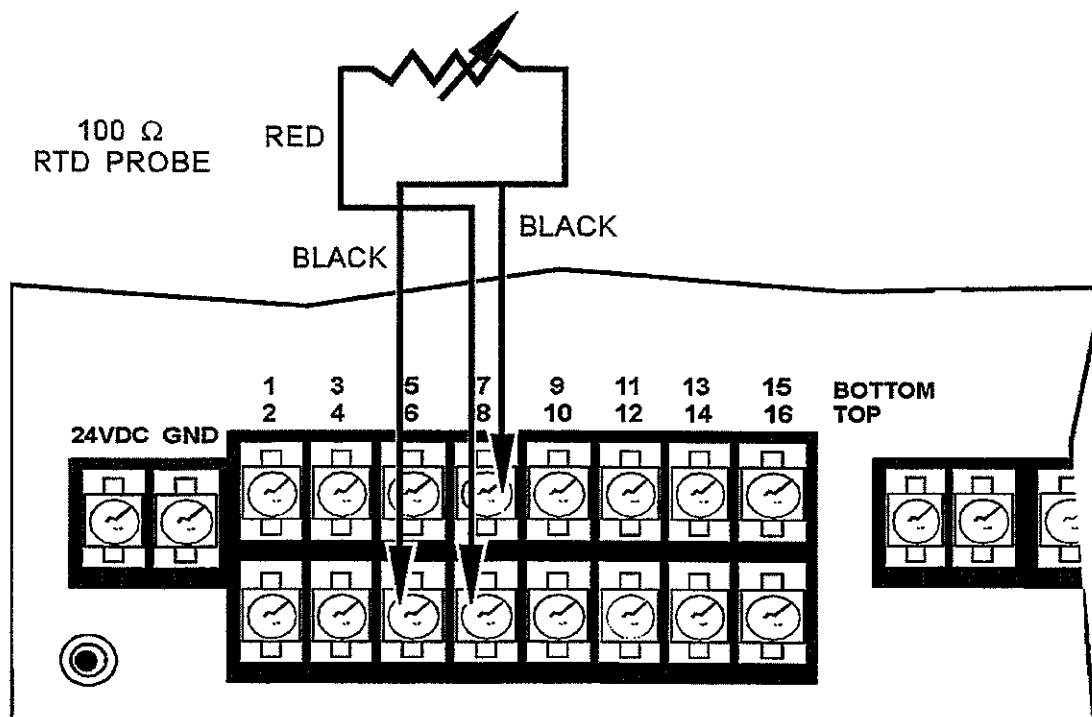
- ◆ Small Size, Rugged Packaging
- ◆ Optical & Transformer Isolation
- ◆ 4000 V_{rms} Transient
- ◆ Over / Under Range Features
- ◆ Runs on a Single 24 VDC Supply
- ◆ 12-bit Resolution
- ◆ Factory Calibrated, No User Adjustments
- ◆ Operating Temperature: 0° to 70° C

SPECIFICATIONS

RTD input	100 Ω platinum ($\alpha = 0.00385$)
Nominal temperature range °C	-50° to 350° C
Nominal temperature range °F	-58° to 662° F
Over/under range °C	-72° to 812° C
Over/under range °F	-97.6° to 1493° F
Accuracy*	$\pm 0.8^\circ$ C
Resolution	12 bits
Response time	Full-scale step change in 100 ms
Isolation (Transient) Input-to-output Input-to-analog supply	4,000 Vrms 4,000 Vrms
Ambient temperature Operating Storage	0° to 70° C -25° to 85° C

*Accuracy figure requires use of gain and offset commands.

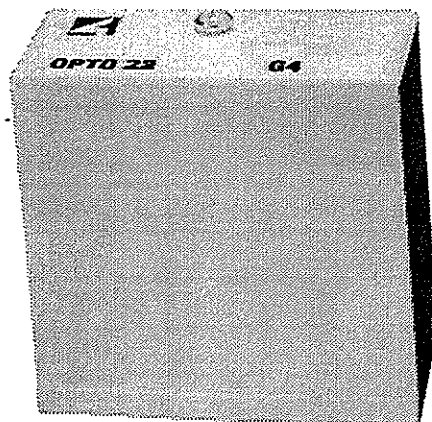
CONNECTION DIAGRAM



NOTE: PICTURE SHOWS CONNECTION FOR MODULE IN POSITION 1.

This product is obsolete.

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OPTO 22

ANALOG MODULE

Temperature Input
Module To Be Used
With OPTO 22
ICTD Probe

MODEL G4AD4

DESCRIPTION

The G4AD4 module works in conjunction with OPTO 22's ICTD temperature probe and provides a single channel of optically isolated temperature-to-digital conversion. The module plugs into any OPTO 22 *mistic* Controller Analog I/O Brick and is secured by a captive screw. Field connections are made via four terminals on the base of the Analog I/O Brick. The G4AD4 module also includes complete electrical channel-to-channel isolation which eliminates troublesome ground loop problems. The ICTD can be used in energy management, freezer control, etc.

FEATURES

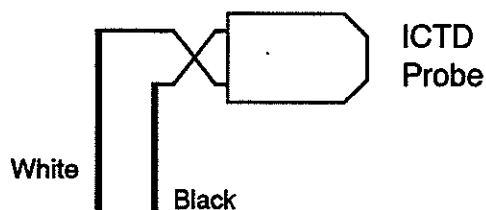
- ◆ Small Size, Rugged Packaging
- ◆ Optical & Transformer Isolation
- ◆ 4000 V_{rms} Transient
- ◆ Runs on a Single 24 VDC Supply
- ◆ 12-bit Resolution
- ◆ Factory Calibrated, No User Adjustments
- ◆ Operating Temperature: 0° to 70° C

SPECIFICATIONS - AD4 with ICTD

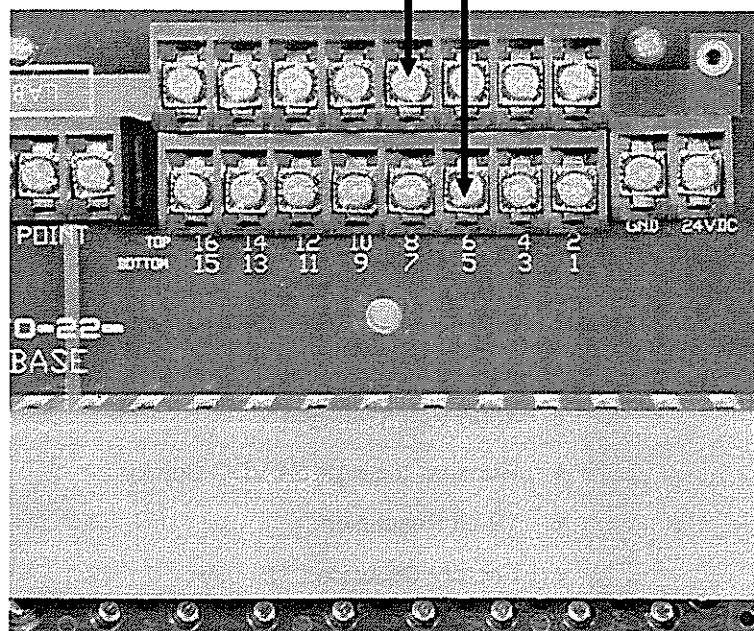
Input Temperature Range:	- 40° to 100° C	
Input Response Time:	5% full scale step change in 7.8 seconds 63% full scale step change in 150 seconds	
Output Accuracy:*	± 0.8° C	
Resolution:	12 bits	
Thermal Time Constant:	2.5 minutes typical (still air)	
Cable Length:	> 2,000 ft (610 meters)	
Isolation: (Transient)	Input-to-Output: Input-to-Analog Supply	4000 V _{rms} 4000 V _{rms}
Module Ambient Temperature:	Operating Storage	0° to 70° C - 25° to 85° C

*Accuracy figure requires use of gain and offset commands.

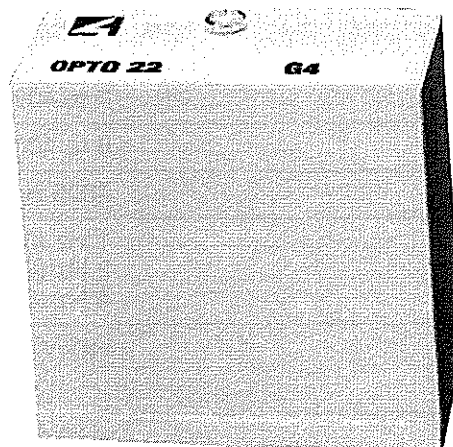
CONNECTION DIAGRAM



Note: Picture shows connect for module in position



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OPTO 22

RATE MODULE

MODEL G4AD20

DESCRIPTION

The G4AD20 module provides a single channel of transformer and optically isolated analog to digital conversion. The nominal input range is 0 to 4095 Hz with an over range capability to greater than 10800 Hz. There is an internal pull up supply provided through a 10K ohm resistor. Used with devices that have open collector outputs, this eliminates the need for the user to provide the pull up voltage supply and associated wiring, barrier strips, etc. Truly a 2-wire hook up. The G4AD20 module also includes complete electrical channel-to-channel isolation which eliminates troublesome ground loop problems. The module plugs into the OPTO 22 **mistic** series analog Brick mounting racks and is secured by a captive screw. The field connections are made via the terminal strip located on the Brick base.

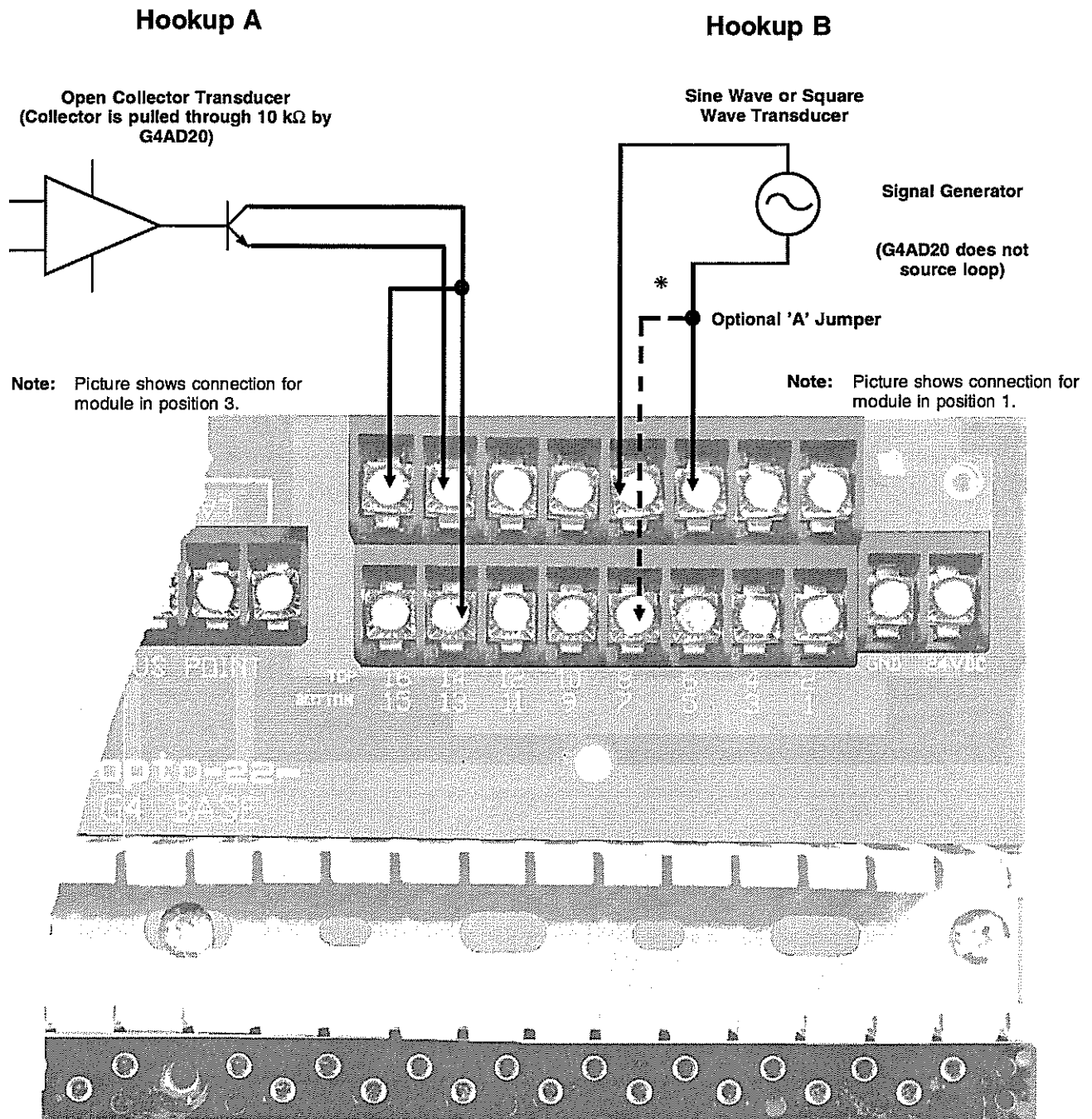
FEATURES

- ◆ Rugged packaging
- ◆ 4000 V transient isolation
- ◆ Internal pull up source and resistor for open collector outputs
- ◆ 2-wire hook up true differential (floating) Inputs
- ◆ 750 V common mode operation
- ◆ 12-bit resolution
- ◆ Factory calibrated, no user adjustments
- ◆ Operating temperature: 0° C to 70° C

SPECIFICATIONS

Nominal Input Range:	0 to 4095 Hz
Input Over Range:	0 to 10800 Hz
Span:	4095 Hz
Resolution:	1 Hz (0 to 4095 Hz) 2 Hz (4096 to 8191 Hz) 4 Hz (8192 to 10800 Hz)
Input Response Time: (% of Span / ΔV / Δ Time)	99% / 4054 Hz / 1 s
DC Common Mode Rejection:	-120 dB
AC Common Mode Rejection:	-120 dB at 60 Hz
Maximum Operating Common Mode Voltage:	750 VDC or peak AC
Input vs Output:	
Zero Scale (1920 Hz)	0 Hz
Full Scale (9600 Hz)	4095 Hz
Accuracy:	± 2 Hz or $\pm 0.5\%$ of the input frequency (whichever is greater)
Gain Tempco.:	200 ppm / ° C
Offset Tempco.:	50 ppm / ° C
Input Parameters:	
Hookup A: Input From an Open Collector Output	Collector is pulled through 10 k Ω by G4AD20
Hookup B: Input From a Signal Generator - Sine Wave	5 to 24 V _{p-p} 2.5 to 24 V _{p-p} (with 'A' jumper)
Square Wave	0.5 to 24 V _{p-p} 0.25 to 24 V _{p-p} (with 'A' jumper)
Minimum Pulse Width:	40 μ s
Input Impedance:	50 k Ω (- input to + input)
Pull-up Voltage:	12 to 15 V
Pull-up Resistor:	10 k Ω
Power Requirements:	24 VDC (± 0.5 V) at 40 mA
Logic Supply:	5.5 V maximum at 15 mA
Optical Coupler (open collector output)	I _{out} low sink 1.6 mA V _{out} hi 5.5 V maximum
Ambient Temperature:	
Operating	0° to 70° C
Storage	- 25° to 85° C

CONNECTION DIAGRAM

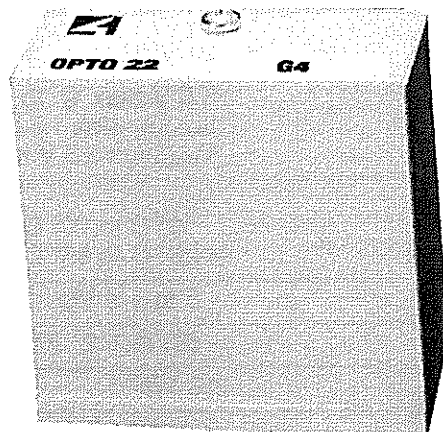


* Optional 'A' jumper changes input amplitude range

Square wave input:
from: 0.5 to 24 V_{p-p}
to: 0.25 to 24 V_{p-p}

Sine wave input:
from: 5 to 24 V_{p-p}
to: 2.5 to 24 V_{p-p}

This product is obsolete.



OPTO 22

ANALOG MODULE

Velocity Input

MODEL G4AD26

DESCRIPTION

The G4AD26 Velocity Input Module provides a single channel of transformer and optically isolated analog-to-digital conversion. This module offers a wide nominal input range and excellent over/underrange capabilities. Air/hydraulic cylinders and forward, reversing, or rotating machinery with potentiometer-based transducers are typical inputs for the G4AD26 module. It can measure piston velocity in both forward and reverse directions, or derive acceleration for use in a PID control system.

The G4AD26 plugs into the Opto 22 *mistic* Controller Analog I/O Brick and is secured by a captive screw. Field connections are made with four terminals on the base of the Analog I/O Brick. The G4AD26 module also includes complete electrical channel-to-channel isolation, eliminating troublesome ground loop problems.

FEATURES

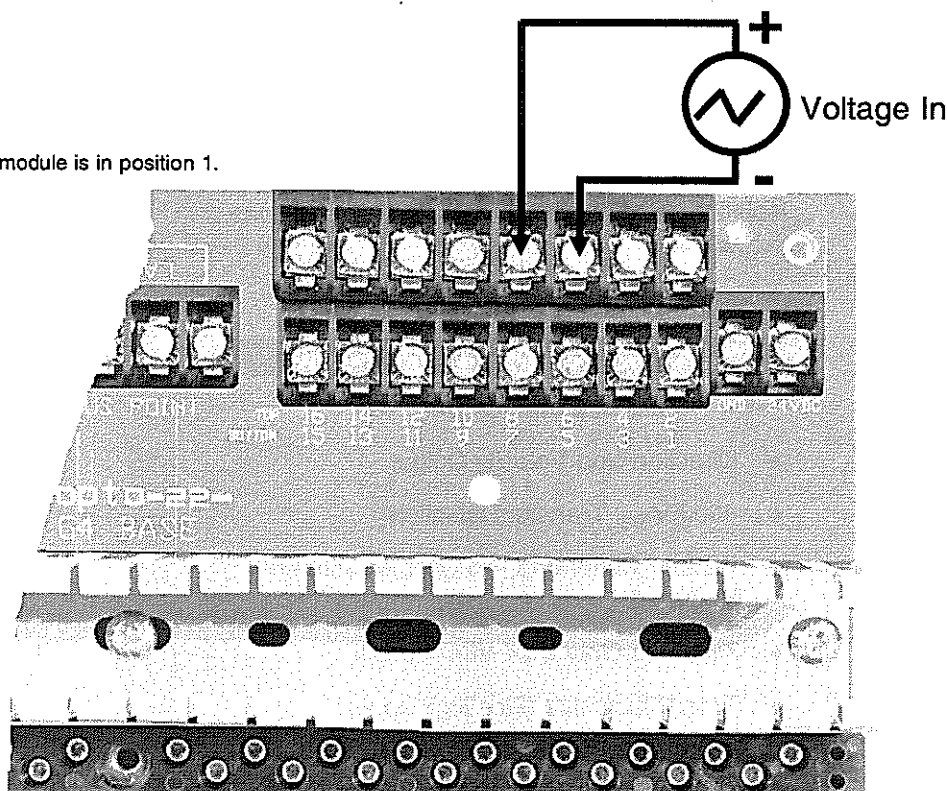
- ◆ Direction and Velocity Output
- ◆ 4000 V_{rms} Transient Isolation
- ◆ Factory Calibrated, No User Adjustment Required
- ◆ Requires Only a 24 VDC Supply
- ◆ True Differential (Floating) Inputs
- ◆ 750 V Common Mode Operation
- ◆ Survives 100 V Peak Inputs
- ◆ Operating Temperature: 0° C to 70° C

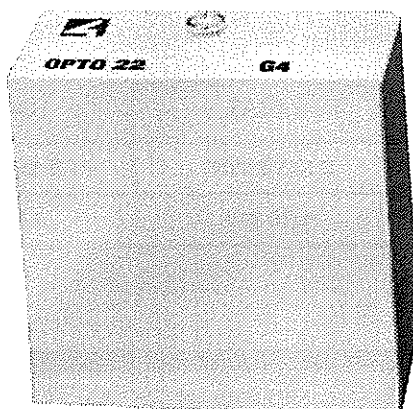
SPECIFICATIONS

Power Requirements:	24 VDC (± 0.5 V) @ 40 mA
Logic Supply:	5.5 V max @ 15 mA
Optical Coupler (open collector output)	I_{out} low sink 1.6 mA V_{out} high 5.5 V max
Ambient Temperature:	
Operating	0° C to 70° C
Storage	- 25° C to 85° C
Nominal Input Range:	- 5 to + 5 V/s
Over/Under Range:	- 5.6 to + 21.37 V/s
Span:	10 V/s
Resolution mV/S:	2.4 mV/s from - 5 to + 5 V/s 4.8 mV/s from 5 to 15 V/s 9.8 mV/s from 15 to 21.37 V/s
Output Accuracy:	$\pm 5\%$ of Span (V/s)
Input Response Time:	63% / 3.15 V/s / 15 ms
(% of Span / ΔV / ΔT / ΔT)	90% / 4.50 V/s / 45 ms
DC Common Mode Rejection:	> - 120 dB
AC Common Mode Rejection:	> - 120 dB @ 60 Hz
DC Reversal Error:	$\pm 0.2\%$ of Span
Input Resistance:	
Differential	750 K Ω
Common Mode	> 1000 M Ω

CONNECTION DIAGRAM

NOTE: Connection for module is in position 1.





OPTO 22

ANALOG MODULE

Voltage Output

MODELS:

G4DA4

G4DA5

G4DA6

G4DA7

DESCRIPTION

The modules provide a single channel of transformer and optically isolated digital to voltage conversion. The modules are available in unipolar and bipolar versions. The modules also include complete electrical channel-to-channel isolation which eliminates troublesome ground problems. Modules plug into an OPTO 22 *mistic* Controller analog I/O Brick and are secured by a captive screw. Field connections are made via four terminals on the Brick base.

FEATURES

- ◆ Rugged Packaging
- ◆ 4000 V_{rms} Transient Isolation
- ◆ True Differential (Floating) Inputs
- ◆ 12-bit Resolution
- ◆ Factory Calibrated, No User Adjustments
- ◆ Runs on a Single 24 VDC Supply
- ◆ Operating Temperature: 0° to 70° C

This product is obsolete

TABLE

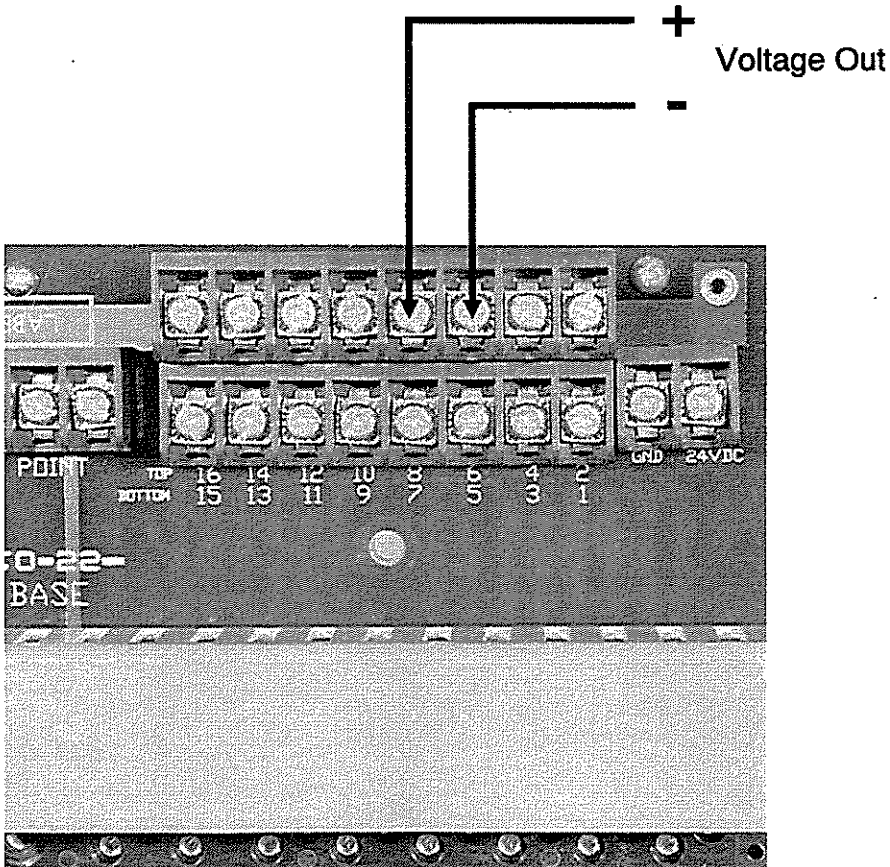
	G4DA4	G4DA5	G4DA6	G4DA7
Output Voltage	0 to 5 VDC	0 to 10 VDC	- 5 to + 5 VDC	- 10 to + 10 VDC
Accuracy	± 5 mV	± 10 mV	± 10 mV	± 20 mV

SPECIFICATIONS

Output Current:		20 mA
Output Response Time:		full scale step change in 3 ms
Resolution:		12 bits
Isolation: (Transient)	Input-to-Output Input-to-Analog Supply	4000 V _{rms} 4000 V _{rms}
Ambient Temperature:	Operating Storage	0° to 70° C - 25° to 85° C

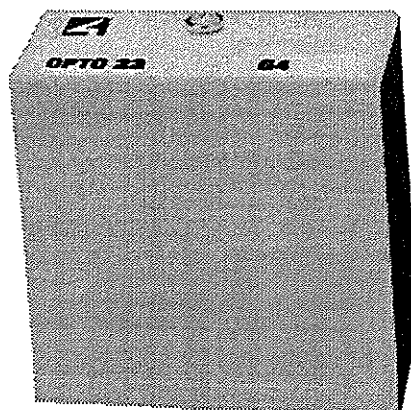
CONNECTION DIAGRAM

Note: Picture shows connection for module in position 1.



This product is obsolete.

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OPTO 22

ANALOG MODULES

Current Output

MODELS:

G4DA3

G4DA8

DESCRIPTION

The modules provide a single channel of transformer and optically isolated digital-to-current conversion. One of the unique features is the loop supply can be provided by the modules. This eliminates the need for the user to provide the loop power supply (typically 15-48 V) and also saves the associated wiring, barrier strips, etc. The modules also include complete electrical channel-to-channel isolation which eliminates troublesome ground loop problems. Modules plug into an OPTO 22 *mistic* Controller analog I/O Brick and are secured by a captive screw. Field connections are made via four terminals on the Brick base.

FEATURES

- ◆ Rugged Packaging
- ◆ Module Sourcing or User Sourced Loop Supply
- ◆ 4000 V_{rms} Transient Isolation
- ◆ True Differential (Floating) Output
- ◆ 12-bit Resolution
- ◆ Factory Calibrated, No User Adjustments
- ◆ Runs on a Single 24 VDC Supply
- ◆ Operating Temperature: 0° to 70° C

This product is obsolete

TABLE

	G4DA3	G4DA8
Output Current	4 - 20 mA	0 - 20 mA
Accuracy	16 μ A	20 μ A

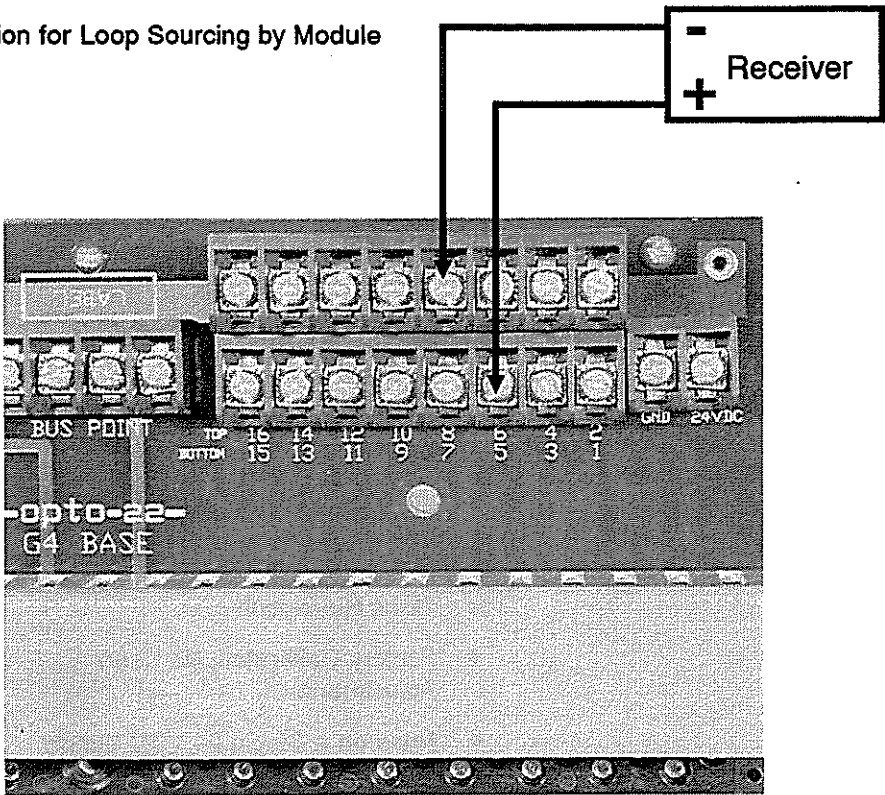
SPECIFICATIONS

Response Time:	full scale step change in 3 ms	
Maximum Loop Resistance When Sourcing Loop:	650 Ω	
Resolution:	12 bits	
Isolation: (Transient)	Input-to-Output Input-to-Analog Supply	4000 V _{rms} 4000 V _{rms}
Ambient Temperature:	Operating Storage	0° to 70° C - 25° to 85° C

CONNECTION DIAGRAMS

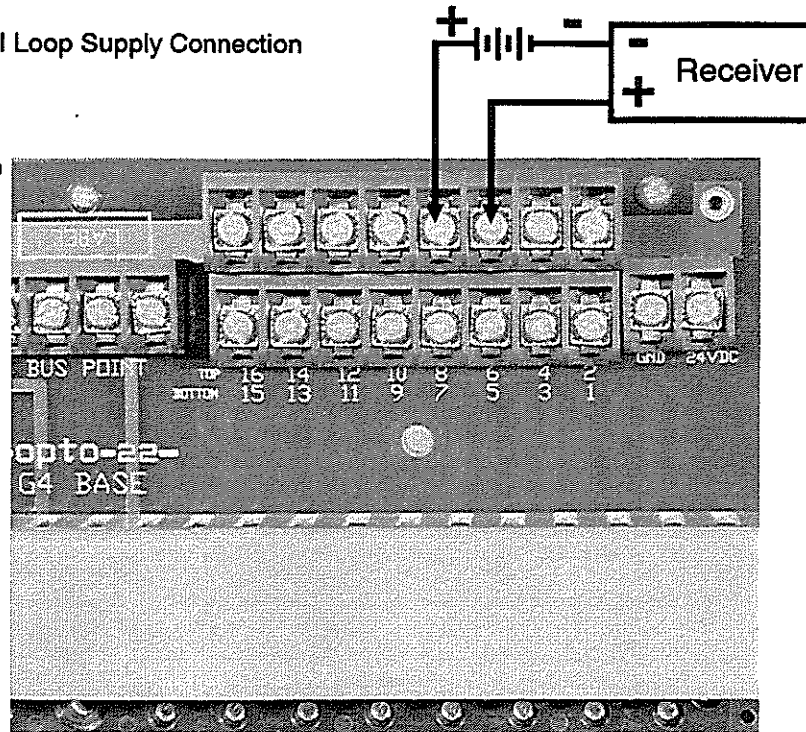
Connection for Loop Sourcing by Module

Note: Picture shows connection for module in position 1.



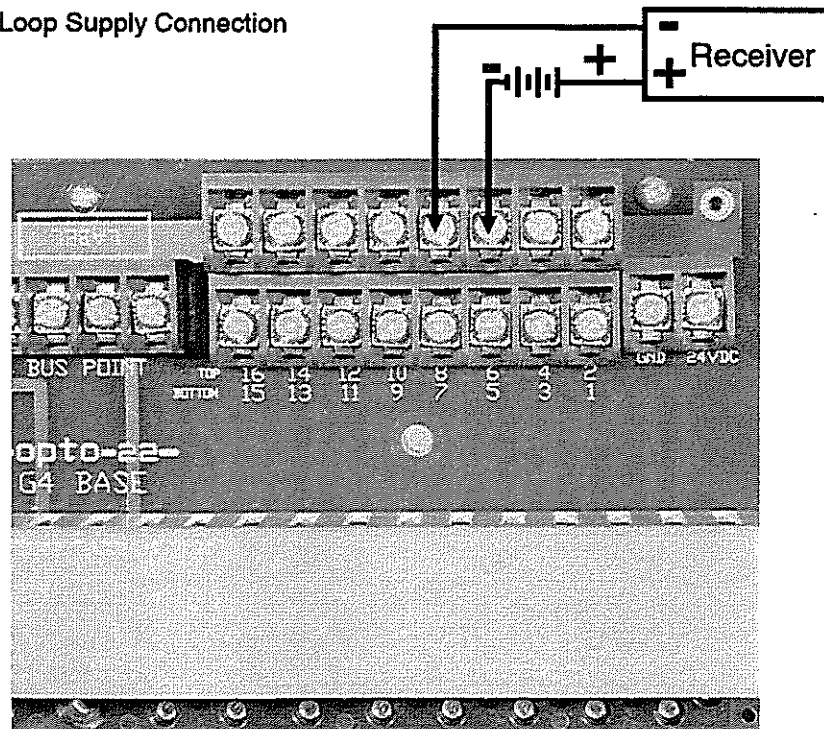
External Loop Supply Connection

Note: Picture shows connection for module in position 1.

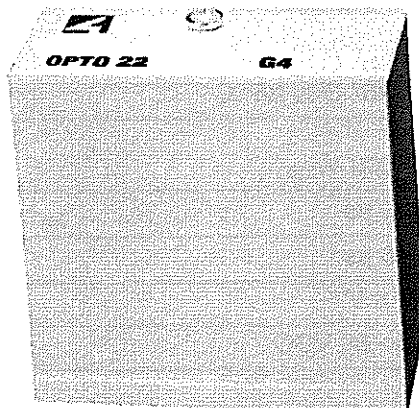


Alternate External Loop Supply Connection

Note: Picture shows connection for module in position 1.



This product is obsolete.



OPTO 22

ANALOG MODULE

Time Proportional
Output

MODELS:

G4DA9

G4DA10

DESCRIPTION

The G4DA9 and G4DA10 time proportional output (TPO) modules provide digital control from a **mistic** Analog I/O brick. Each module is optically isolated to 4000 volts from field devices and features point-to-point electrical isolation on the Brick. Modules switch either 5 - 60 VDC (for the G4DA9) or 12 - 280 VAC (for the G4DA10) and together with a power SSR, are ideal for controlling heater circuits.

FEATURES

- ◆ Rugged Packaging
- ◆ 4000 V_{rms} Transient Isolation
- ◆ Built-in LED Status Indicator
- ◆ 12-bit Resolution
- ◆ Factory Calibrated, No User Adjustments
- ◆ Operating Temperature: 0° C to 70° C

SPECIFICATIONS

G4DA9

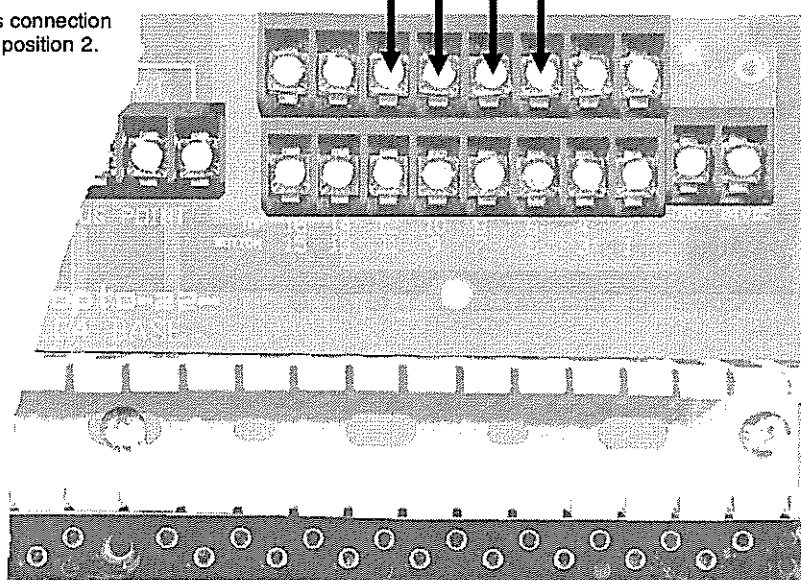
G4DA10

Ambient Temperature:		
Operating	0° C to 70° C	0° C to 70° C
Storage	- 25° C to 85° C	- 25° C to 85° C
Isolation:		
Input-to-Output	4000 V _{rms}	4000 V _{rms}
Turn-on Time:	50 µs	half c
Turn-off Time:	50 µs	half c
Output Voltage Drop Maximum Peak:	1.6 V	1.6 V
Operating Voltage Range:	5 - 60 VDC	12 - 280 VAC
Current Rating:		
at 45° C Ambient	0.5 A	0.5 A
at 70° C Ambient	0.3 A	0.3 A
Surge Rating:	1 A for 1 s	80 A (peak) for 1 c
Off State Leakage at Maximum Voltage:	1 mA at 60 VDC	3 mA at 280 VAC
Period:	2.048 s to 8.7 min 4.096 s default	2.048 s to 8.7 min 4.096 s default
Resolution:	12 bit 0.5 ms/b for a 2.048 s period 127 ms/b for a 8.7 min period 1 ms/b default	12 bit 0.5 ms/b for a 2.048 s period 127 ms/b for a 8.7 min period 1 ms/b default
Power Requirements:	5 V at 25 mA	5 V at 25 mA

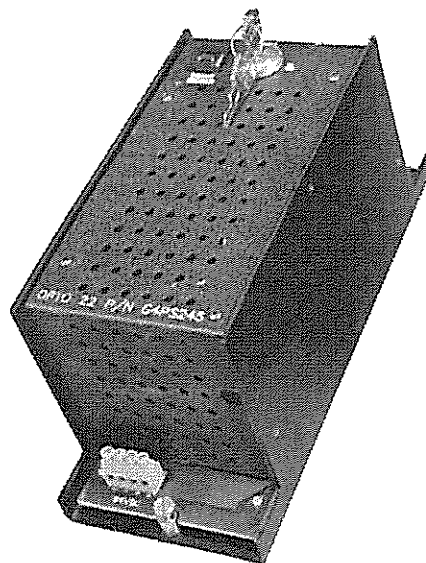
CONNECTION DIAGRAM



Note: Picture shows connection for module in position 2.



Note: Picture shows connection for module in position 1.



OPTO 22

mistic
CONTROLLER
POWER SUPPLIES

MODELS:

G4PS245A

G4PS245B

G4PS24XA

G4PS24XB

DESCRIPTION

Four models of input power supplies are available for the G4LC32 and G4LC32SX controllers, and family of *mistic* I/O bricks. Models are available to accommodate specific AC input requirements and *mistic* brick panels equipped with or without controllers.

Power supplies can be panel mounted and support a flexible array of I/O bricks.

FEATURES

- ◆ High power, lightweight modern design
- ◆ Supports flexible combination of I/O bricks
- ◆ Metal enclosure
- ◆ 'A' suffix for 120 VAC input
- ◆ 'B' suffix for 240 VAC input
- ◆ Regulated outputs
- ◆ Optimized for *mistic* controllers

TABLE

Model	Nominal Input Voltage	Nominal Input Current	Output Voltage	Output Current	Max. Units Supplied
G4PS245	A 100 - 135 VAC B 180 - 250 VAC	2.2 A 1.5 A	24 ± 0.5 VDC 5 ± 0.1 VDC - 5 ± 0.25 VDC	4 A 4 A 20 mA	One <i>mistic</i> controller and six bricks or
G4PS24X	A 100 - 135 VAC B 180 - 250 VAC	2.1 A 1.3 A	24 ± 0.5 VDC	4 A	Any combination of bricks with up to 7 digital bricks or 6 analog bricks

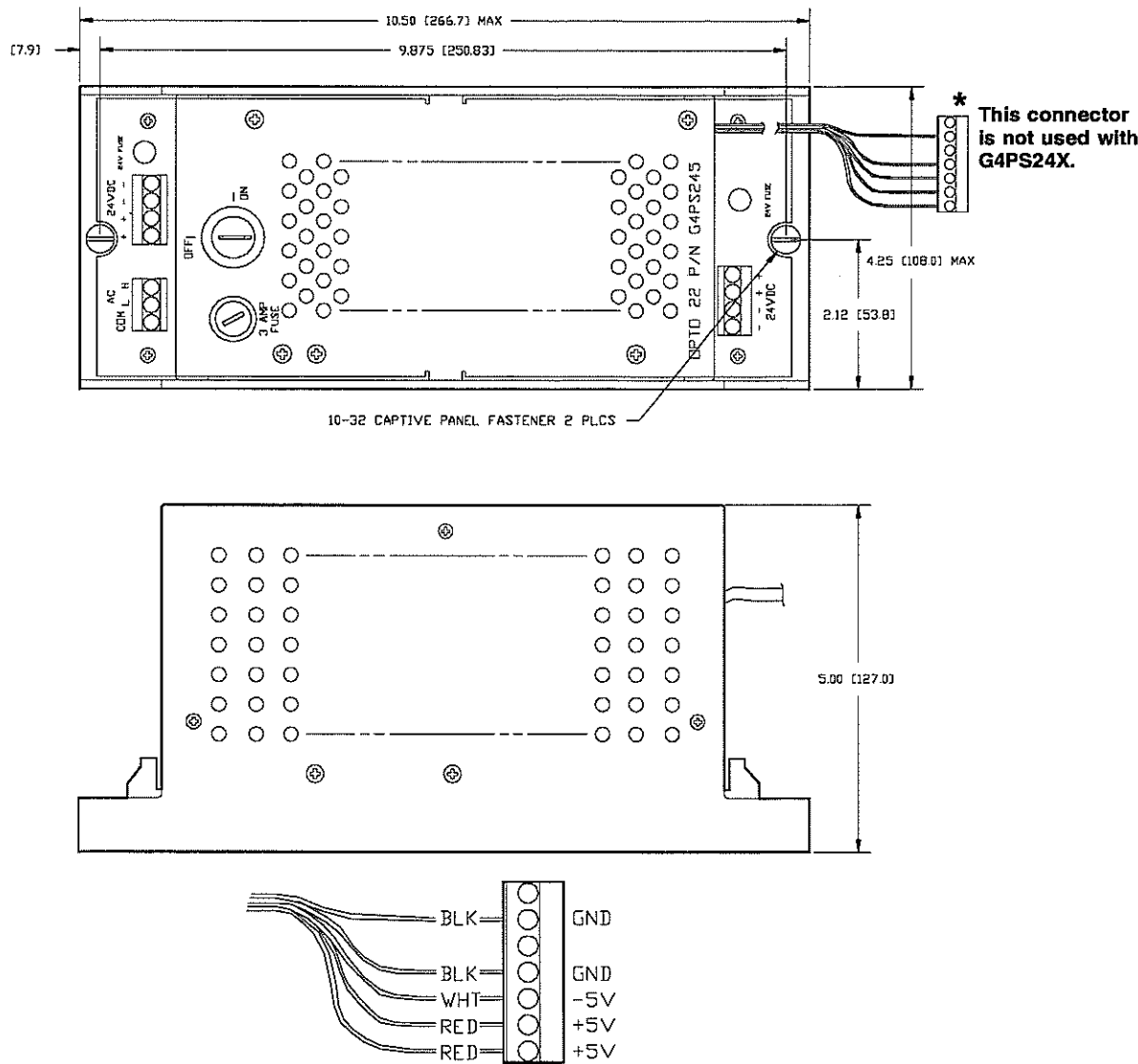
SPECIFICATIONS

Ambient Temperature

Operating:
Storage:

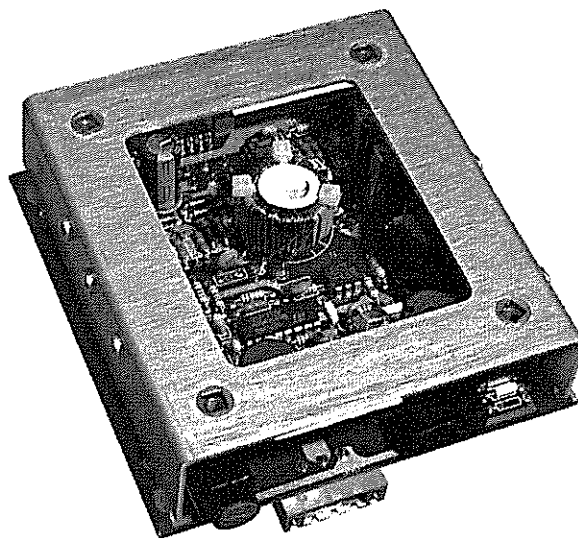
0° C to 70° C
- 25° C to 85° C

DIMENSIONS





PC-BASED INDUSTRIAL
AUTOMATION SYSTEM



OPTO 22

M4BUS POWER SUPPLIES

MODELS:

M4PS12D

M4PS24D

M4PS48D

M4PS125D

M4PS120A

M4PS240A

M4PSF (Line Filter)

DESCRIPTION

There are six models of input power supplies available for any M4BUS Controller. Each power supply model uses a specific AC or DC voltage input range to accommodate a wide variety of field applications.

A 24 VDC/5 VDC Line Filter is also available if the M4BUS will be connected to an external power supply unit.

FEATURES

- ◆ M4BUS compatible
- ◆ Available in four DC and two AC voltage ranges to accommodate a variety of power standards
- ◆ Efficient, compact design
- ◆ Space saving internal installation
- ◆ Isolated, regulated outputs
- ◆ Fuse protected
- ◆ Built-in EMI input filter
- ◆ On/Off switch
- ◆ 24/5 VDC Line Filter also available for use with external power supplies

This product is obsolete.

SPECIFICATIONS

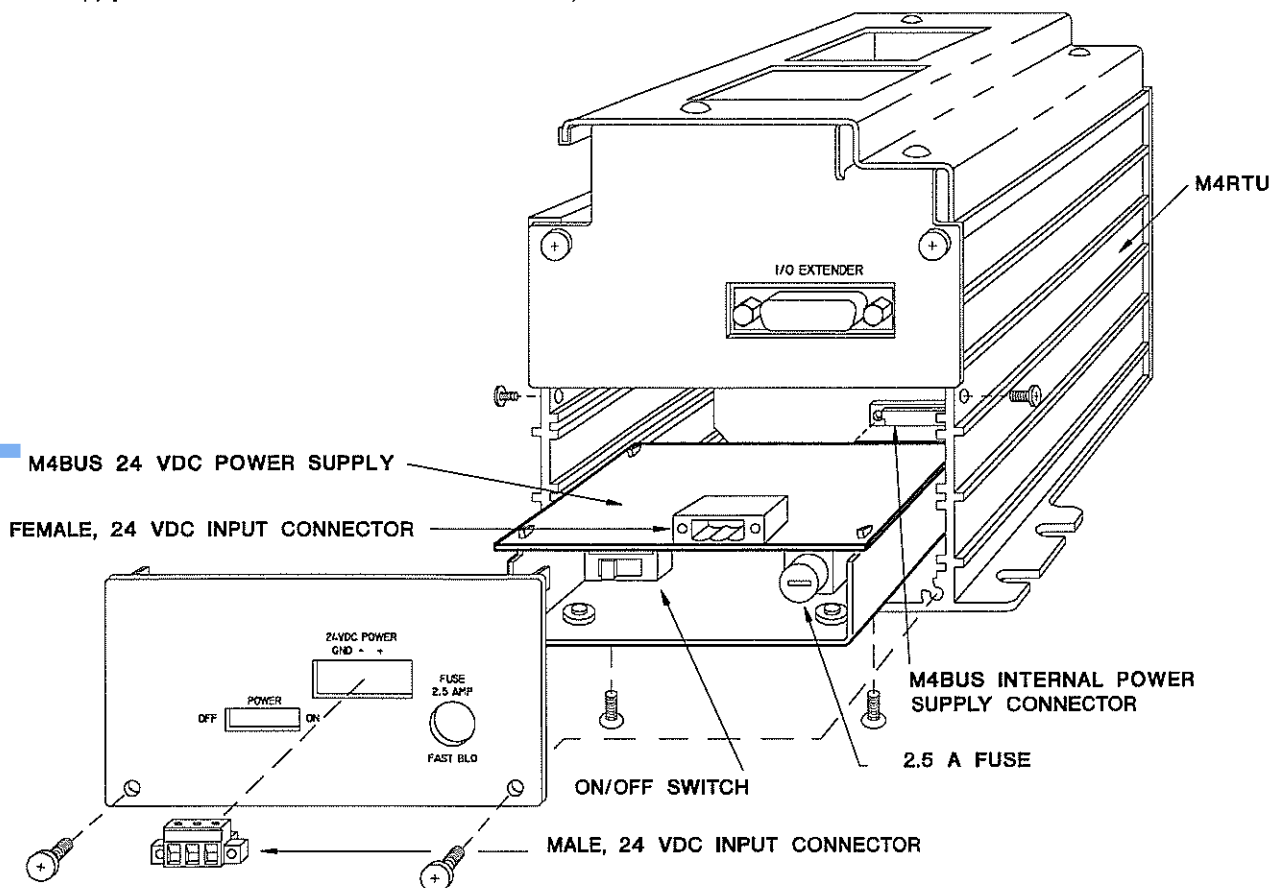
Typical Operating temperature:
Storage temperature:

-20°C to 70°C
-40°C to 85°C

Model	Input Voltage Range	Fuse
M4PS12D	9 - 15 VDC	5.0 A
M4PS24D	18 - 30 VDC	2.5 A
M4PS48D	36 - 60 VDC	1.5 A
M4PS125D	94 - 156 VDC	0.5 A
M4PS120A	95 - 130 VAC	0.5 A
M4PS240A	190 - 250 VAC	0.375 A
M4PSF	Line Filter,	
	24 VDC: 5 VDC:	0.5 A 4.0 A

DIAGRAM

This diagram features the M4PS24D DC Input Power Supply plugging into a M4RTU.
(Power supply installation is identical for all available models.)



POWER REQUIREMENTS

M4BUS Power Consumption Worksheet for the M4RTU *			
Hardware	Watts (W)	Quantity (Q)	Total (W x Q)
M4RTU Base Unit	7.5	1.0	7.5
M4RTUX I/O Extender Unit	0		0
Daughter Cards:			
M4SSER Serial Expansion Card	1.6		
M4SARC ARCnet Expansion Card	1.0		
Digital I/O Modules:			
G4 Digital AC/DC Input/Output [♥]	0.086		
G4ODC5R, G4ODCR5 Dry Contact Output, Single Channel	0.10		
G4IDC5Q Digital Quadrature Input Pair	0.43		
Analog I/O Modules:			
G4ADX*	1.6		
G4AD3 4-20 mA Input			
	<i>Sourcing:</i>	2.6	
	<i>Non-sourcing:</i>	1.6	
G4DA4 Voltage Output			
	<i>Sourcing:</i>	2.2	
	<i>Non-sourcing:</i>	1.1	
G4DA3, G4DA8 Current Output			
	<i>Sourcing:</i>	2.6	
	<i>Non-sourcing:</i>	1.2	
G4DA9, G4DA10 Time Proportional Output	0.18		
Powered RS-232 devices, i.e., bar code reader			
Total Watts (TW):			W
Your supplied input voltage:			V
TW / Your supplied input voltage = Input current requirements:			A

♥ If the digital module you are using does not appear below, then use the G4 Digital AC/DC Input/Output module wattage.

* If the analog module you are using does not appear below, then use the G4ADX wattage.

Instructions:

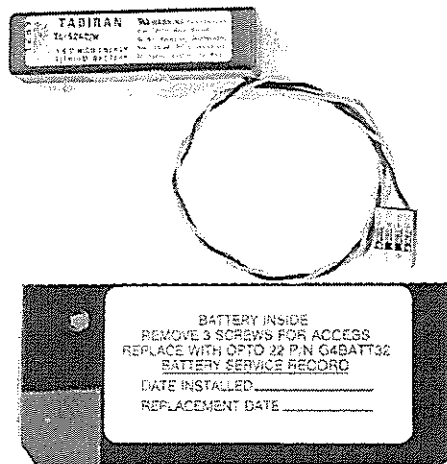
1. In the table above, locate the daughter cards and digital and/or analog modules which you will be using with the M4RTU. Enter a quantity for each item in the "Quantity" column. Also, fill in any RS-232 devices on the line provided.
2. Multiply the value in the "Watts" column by the quantity entered in the "Quantity" column and enter the result in the "Total" column for each component used.
Example: (8) G4 digital modules total 0.688 W. (4) G4ADX analog modules total 6.4 W.
3. Add up the values in the "Total" column, including the value entered for the M4RTU base unit, and enter the number on the "TOTAL WATTS (TW)" line.
Example: 0.688 W (digital modules) + 6.4 W (analog modules) + 7.5 W (base RTU) = 14.588 W.
4. Enter the supplied input voltage for your installation on the "Your supplied input voltage" line.
Example: 24 VDC.
5. Divide the total on the "TOTAL WATTS" line by the number entered in step 4 to get total input current requirements. Enter this number on the last line of the table.
Example: 14.588 (W) / 24 VDC (supplied input) = 0.6 A required input current for the M4RTU.

* For currently available power supplies.

This product is obsolete.

This product is obsolete.

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OPTO 22

**BATTERY
REPLACEMENT
FOR G4LC32**

MODEL G4BATT32

DESCRIPTION

The G4BATT32 is a kit to replace a discharged memory retention battery on the G4LC32. The battery is designed for easy user replacement.

FEATURES

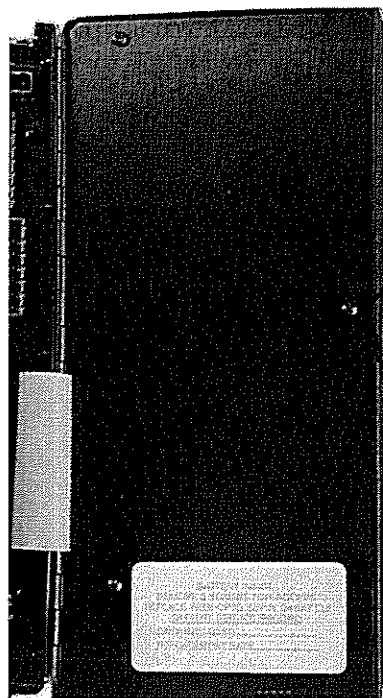
- ◆ Velcro® Mounting for Battery
- ◆ Keyed Connector for Solderless Replacement
- ◆ Lithium Battery for Long Life
- ◆ Includes Replacement Date Sticker
- ◆ Low Self-discharge Rate Allows up to 10 Years Shelf Life Before Installation

This product is obsolete.

SPECIFICATIONS

Lithium Battery Operation Life:	2 - 5 years
Shelf Life:	10 years
Voltage:	3 volts

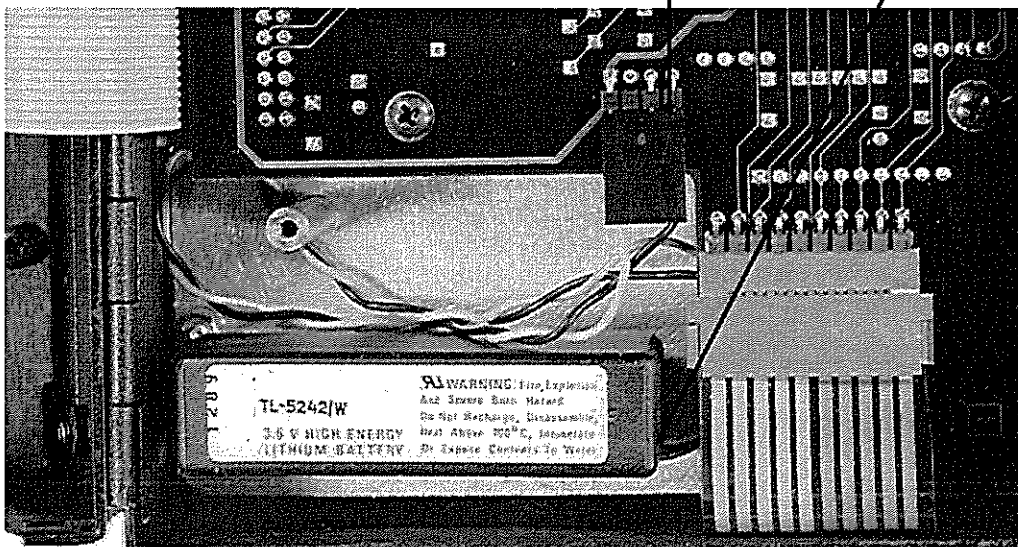
INSTALLATION



- 1) Remove display lid retaining screws.
- 2) Remove display lid.

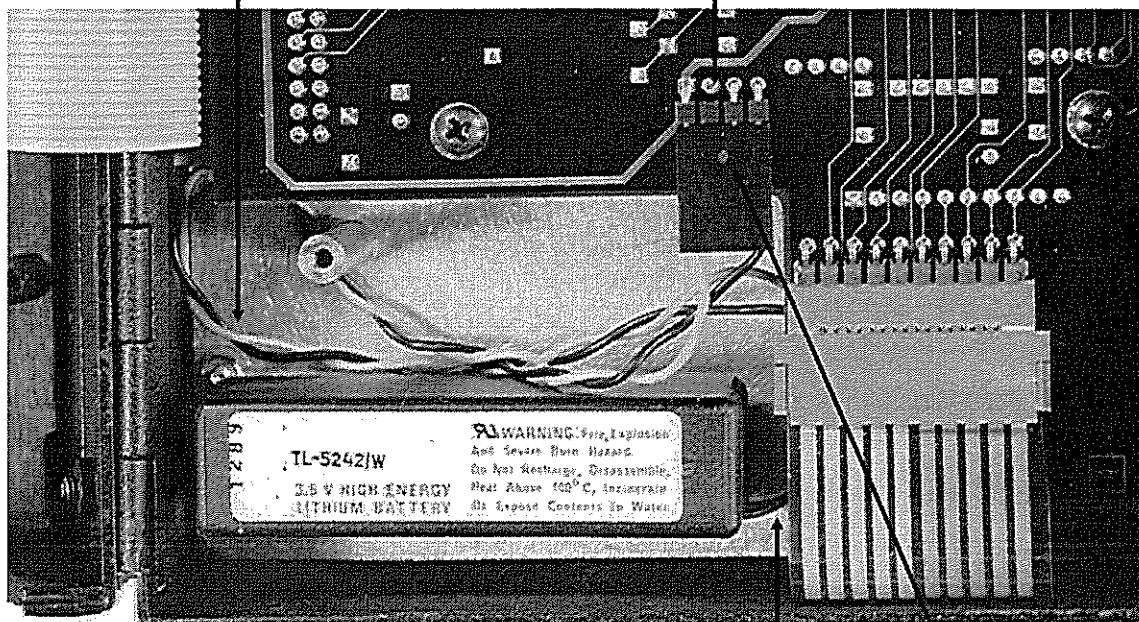
- 3) Disconnect battery cable.

- 4) Remove battery. The battery is held in place by Velcro.[®]



- 7) Pack excess wire to prevent damage when reassembling cover.

Note:
This is keyed pin.



- 8) Reassemble display lid.

- 9) Fill out replacement date sticker. The replacement date should be 5 years for G4LC32 with 1/2 meg of RAM.

If you have a RAM expansion or if your environment is damp or dusty, use a 2 year replacement date.

- 6) Attach battery connector to power pins.

- 5) Use Velcro® to secure battery to case. (Velcro® included with kit.)

CONNECTOR PINOUT

PIN:

1. Red +3V
2. Keying Plug
3. Unused
4. Black Ground

This product is obsolete.



OPTO 22

JUMPER STRAPS FOR *mistic* BRICKS

MODEL BRICKSTRAP

DESCRIPTION

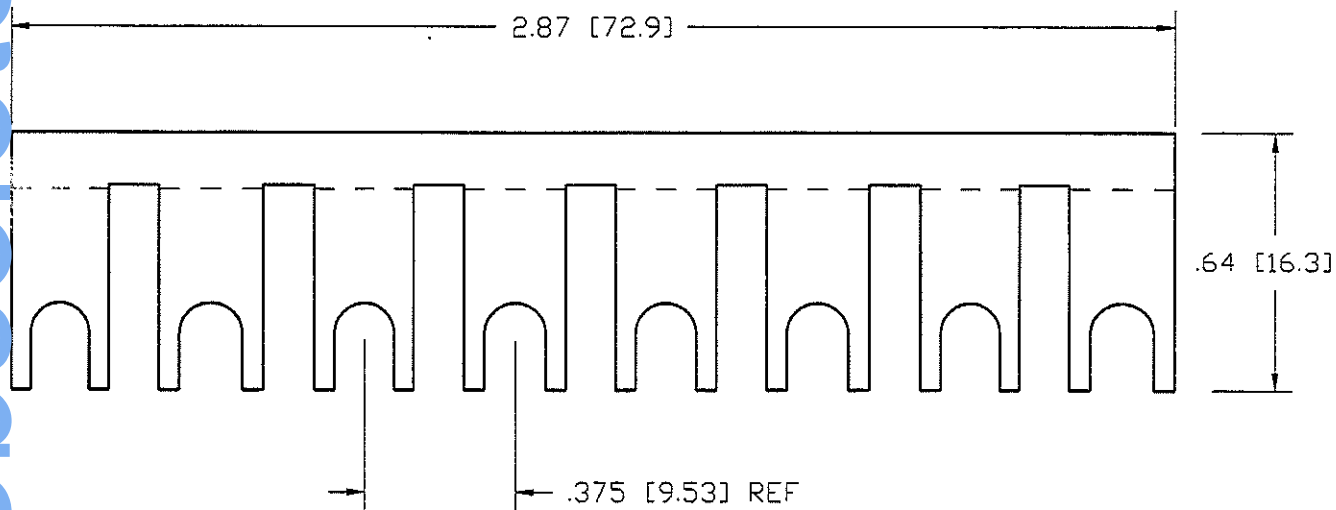
The BRICKSTRAP is available for applications which require that one field side line of each I/O module position be a common connection.

The BRICKSTRAP can be used with the OPTO 22 Brick system of field wiring.

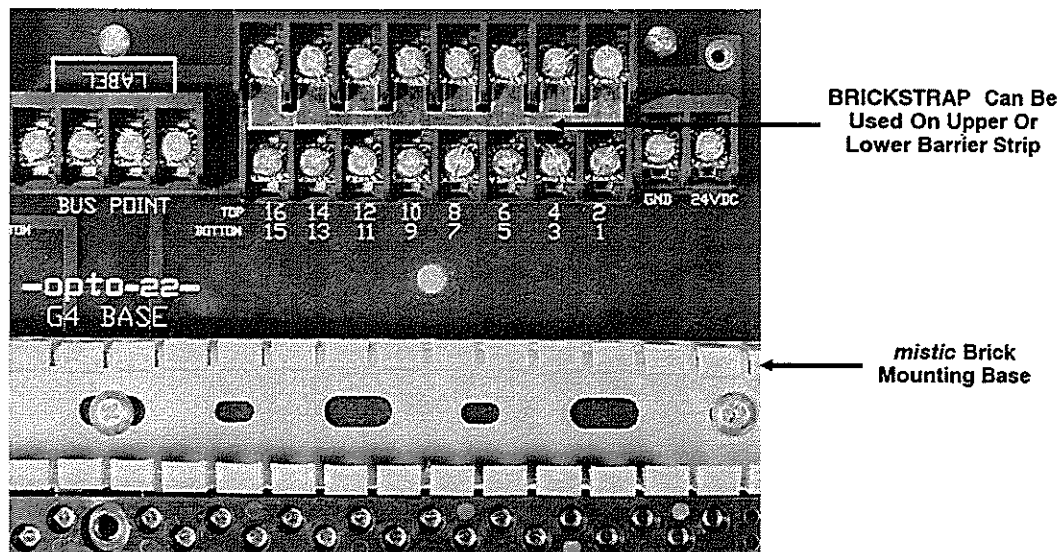
FEATURES

- ◆ Simplifies Wiring
- ◆ Insulated Coating
- ◆ Can Be Cut To Size
- ◆ Works With OPTO 22 Bricks

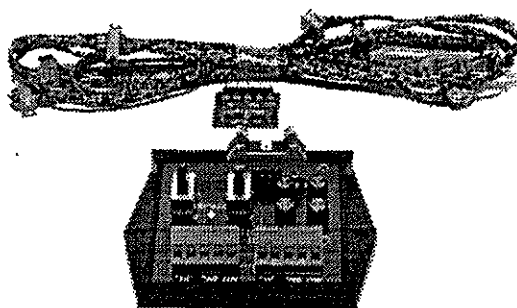
DIMENSIONS



INSTALLATION



mistic®
CONTROLLER



OPTO 22

mistic 200
**REMOTE
COMMUNICATIONS
CONNECTION KIT**

MODEL G4RCOMMKIT

DESCRIPTION

The G4RCOMMKIT is a collection of communication components used by remote Bricks. The G4RCOMMKIT is only needed when OPTO 22 mounting panels are not being used. The components include:

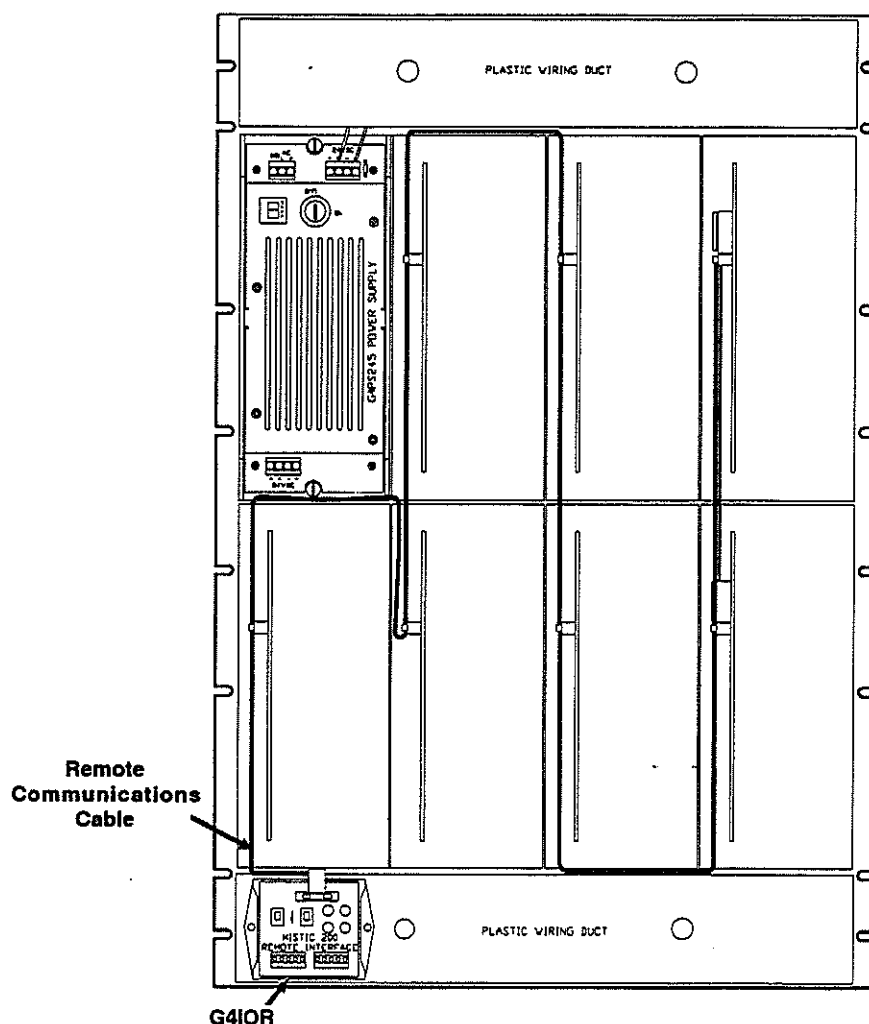
- A Remote Cable With Connectors
- A G4IOR Connector Adapter
- A G4TERMR Terminator

The G4IOR assembly converts the remote cable to screw terminals. The G4TERMR is used for termination of the serial link on the last panel.

FEATURES

- ◆ Remote Cable With Connectors
(7 Brick Position)
- ◆ G4IOR Converts Remote Cable To
Screw Terminals
- ◆ G4TERMR For Serial Link
Termination

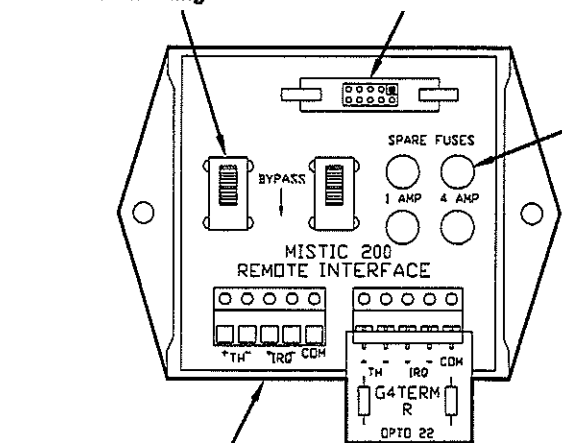
REMOTE CABLE ROUTING AND G4IOR FEATURES



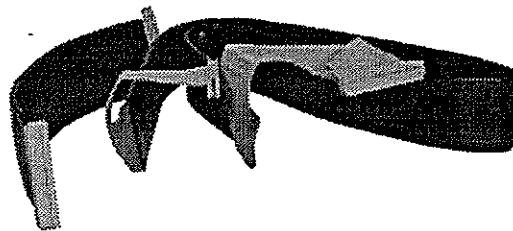
Bypass Switch Used For Isolating Sections Of The Remote System When Troubleshooting

Connection For Remote Cable

**4 Amp Fuses For G4 Output Modules.
1 Amp Fuses For G4 Regulators**



G4TERM R Is Used On Last G4IOR Only



OPTO 22

***mistic* MODEL 200
INTERPANEL
COMMUNICATION
CABLES**

MODELS:

HHG4V2

HHG4H2

DESCRIPTION

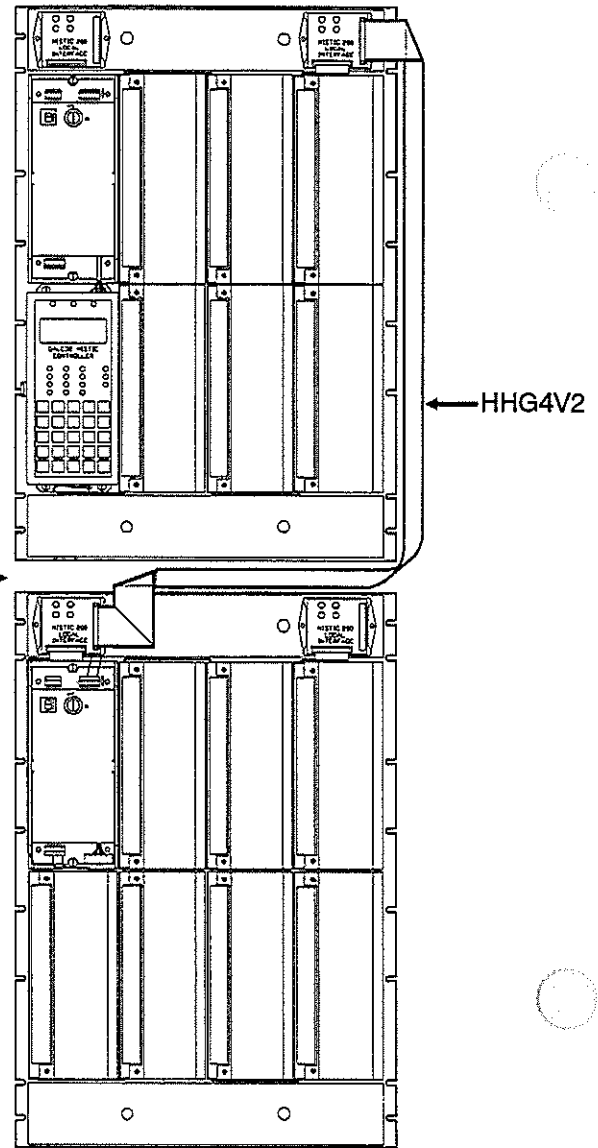
The *mistic* Model 200 I/O communication bus can be continued panel-to-panel by using the HHG4H2 (for panels mounted next to each other) or HHG4V2 (for panels mounted on top of each other). These cables connect to the G4IOL interface units on the G4LPANEL.

FEATURES

- ◆ Tough Abrasion Resistant Jacket
- ◆ Completely Assembled
- ◆ Horizontal Panel Connection
- ◆ Vertical Panel Connection
- ◆ For *mistic* Model 200 Local Panels

**Vertical mounting
example using
HHG4V2**

Panel separation is 1" max.

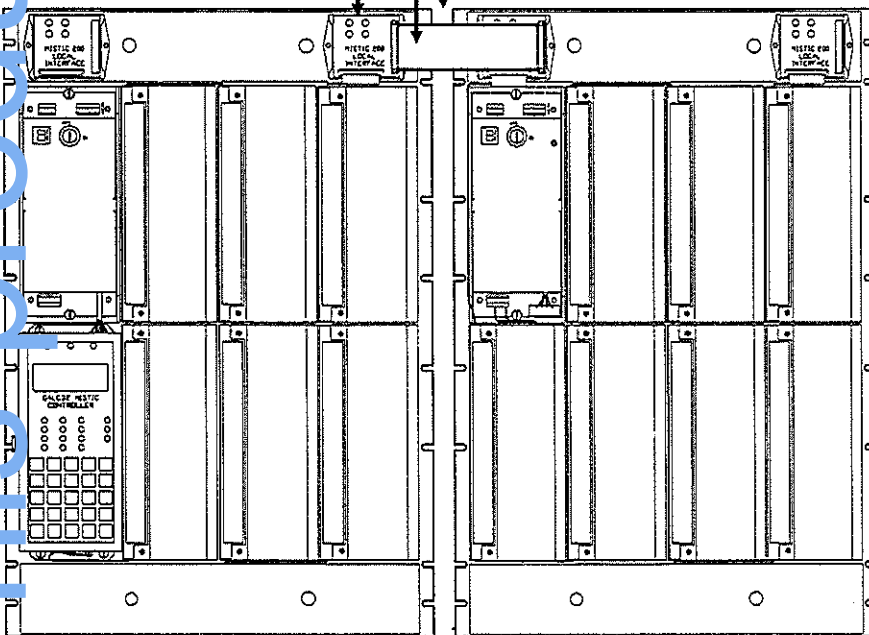


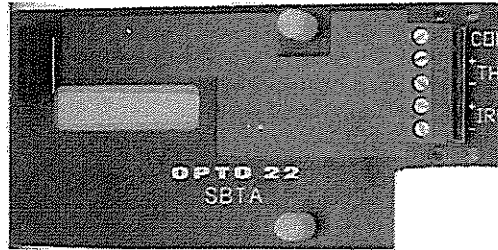
**Horizontal mounting
example using
HHG4H2**

Panel separation is 1" max.

HHG4H2

G4IOL interface unit





OPTO 22

DATA ACQUISITION AND CONTROL

Single Brick
Communication Wiring
Adapter

MODEL SBTA

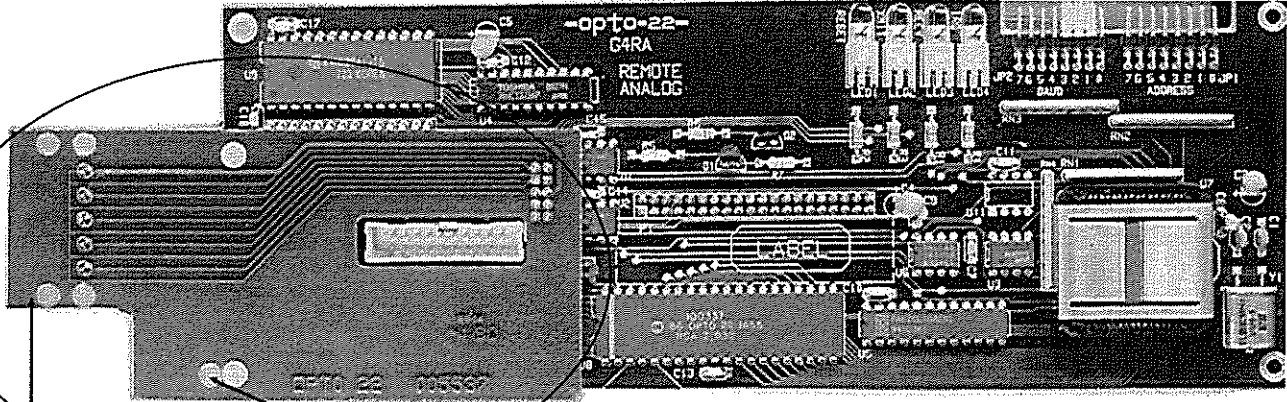
DESCRIPTION

The SBTA is used in remote systems to connect standard twisted pair communications cable to Bricks not mounted on *mistic* panels. The communications connector on the remote brain board is converted into a screw terminal connector for easy connection to standard twisted pair cable. This product is designed for applications using remote Bricks distributed in small clusters where the use of a standard panel is not necessary.

FEATURES

- ◆ Simplifies Communication Wiring
- ◆ Allows Use of Bricks Without Panels
- ◆ Fits Inside Brain Cover
- ◆ Accepts G4TERMR Terminator
- ◆ Mounting Hardware Included
- ◆ Works With *mistic* 200 Remote Analog and Digital Bricks

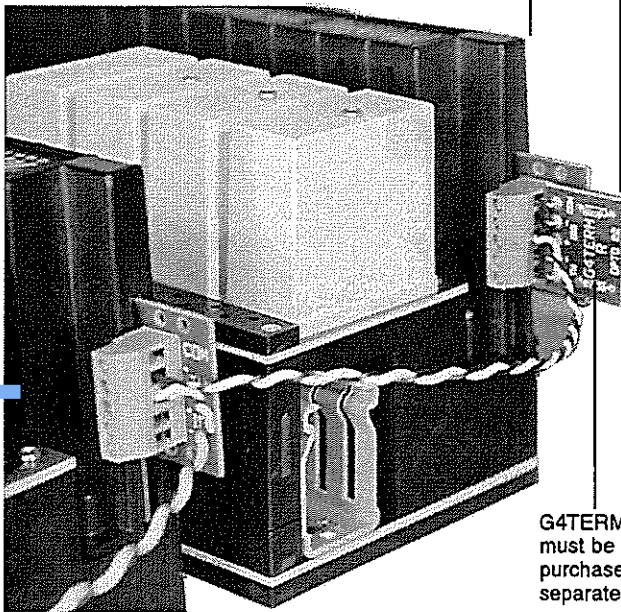
MOUNTING



Use these holes to secure the communication wires with cable tie.

Mounting hardware included.

DIMENSIONS



G4TERM must be purchased separately.

CONNECTION DIAGRAM

