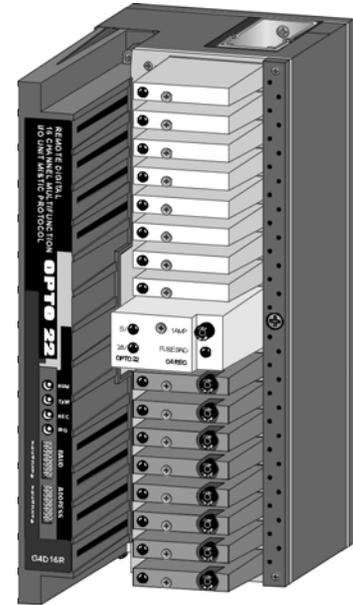


Part Number	Description
G4D16R	Remote Digital 16-Channel Multifunction I/O Unit Mystic Protocol

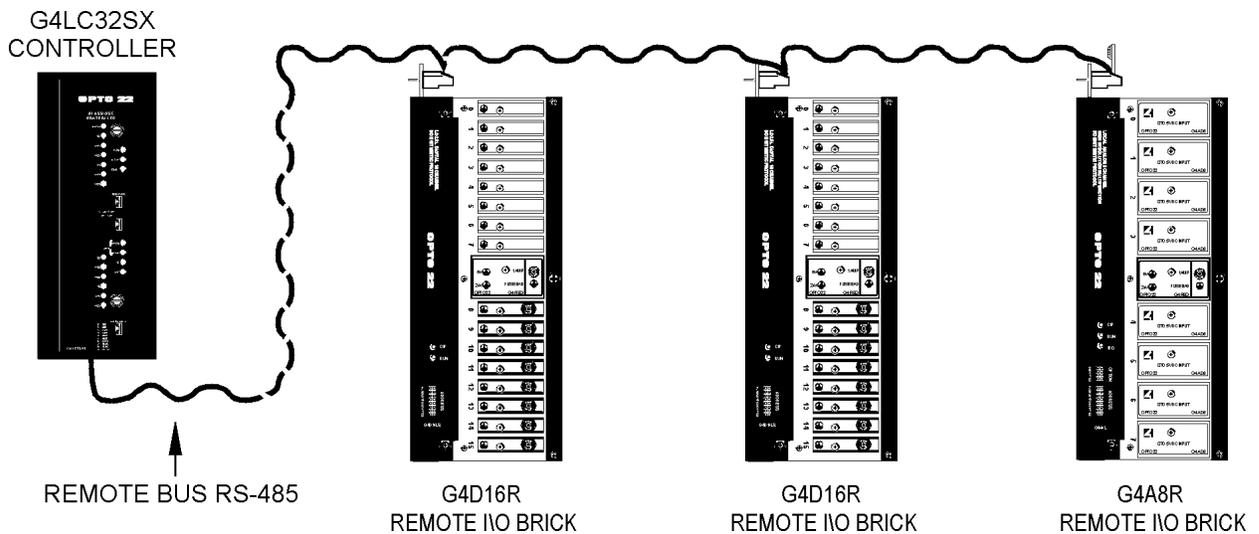
### Description

The G4D16R is a high-performance digital I/O brick for the Opto 22 family of processors and I/O. It provides 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 execute high-speed deterministic responses to sophisticated control sequences, alarm monitors, diagnostics, and host interrupts.

Digital bricks use Opto 22's Mystic protocol and high-speed serial communications. You can program digital bricks using Opto 22's intuitive multitasking, flowchart-based languages OptoControl or Cyrano. For custom software development, use a host computer and Opto 22's Mysticware software driver with the high-level software language of your choice.



### System Architecture



Form 640-010129

### 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.

**DATA SHEET**

Form 640-010129

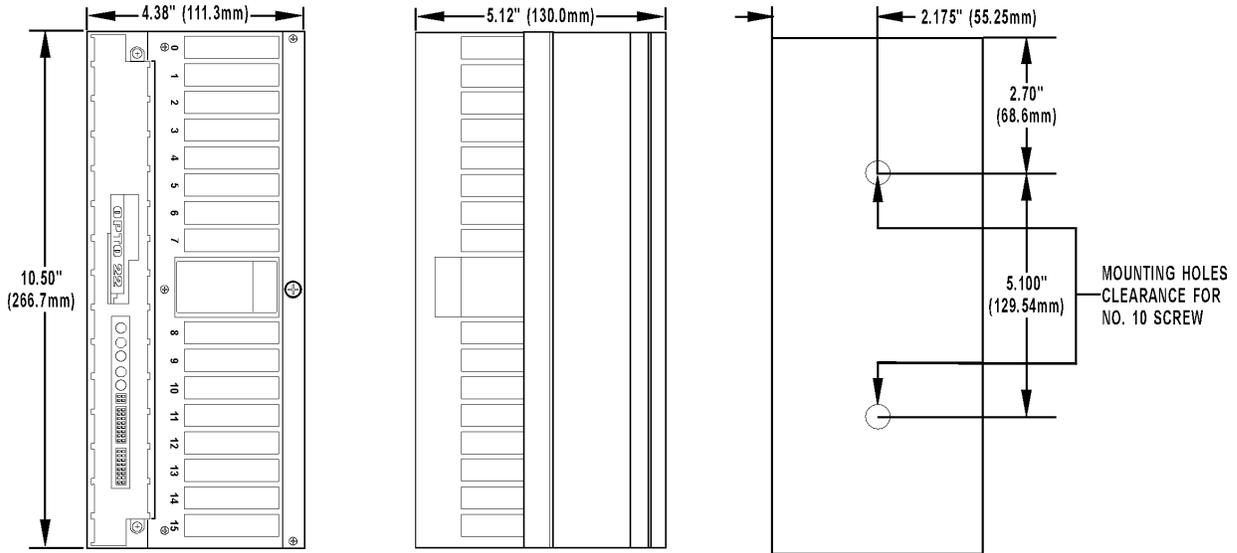
## Specifications

## Multifunction Digital Brick Specifications

CPU CPU clock frequency	16-bit, Intel 80C196 processor 12 MHz processor
Communications Bus speed Cable type  Maximum cable length Mode	300 - 115.2 KBd 3 wire, twisted pair + GND, Interrupt uses 2nd wire pair 3,000 ft (more with repeaters) Binary or ASCII
Typical I/O times (includes communication transfer time) Read 16 channels Write 16 channels	1.76 ms 2.27 ms
Counters (frequency measure) Maximum rate Data size Minimum pulse width ON Minimum pulse width OFF	20 KHz 32 bits 10 $\mu$ s 10 $\mu$ s
Latching (minimum pulse width)	10 $\mu$ s
Output pulse Maximum continuous rate Minimum pulse width ON Minimum pulse width OFF	500 Hz 1 ms 1 ms
Time-proportional output (TPO) minimum period	100 ms
Typical Event/Reaction time ( $\approx$ 16 Event/Reactions)	4 ms
*System power consumption @ 24 VDC $\pm$ 0.1V Terminated (last brick on the bus) Non-terminated (all other bricks)	250 mA 250 mA
Temperature Operating Storage	0°C to 70°C - 40°C to 80°C
Humidity	5% to 95% relative humidity
Software	OptoControl, Cyrano 200 and Misticware

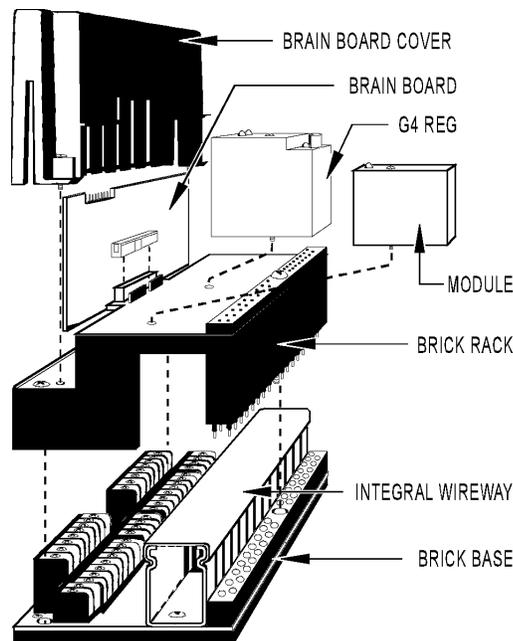
Form 640-010129

### Dimensions



TOLERANCES: .XX +/- .02 (.5) .XXX +/- .010 (.25)

### Assembly

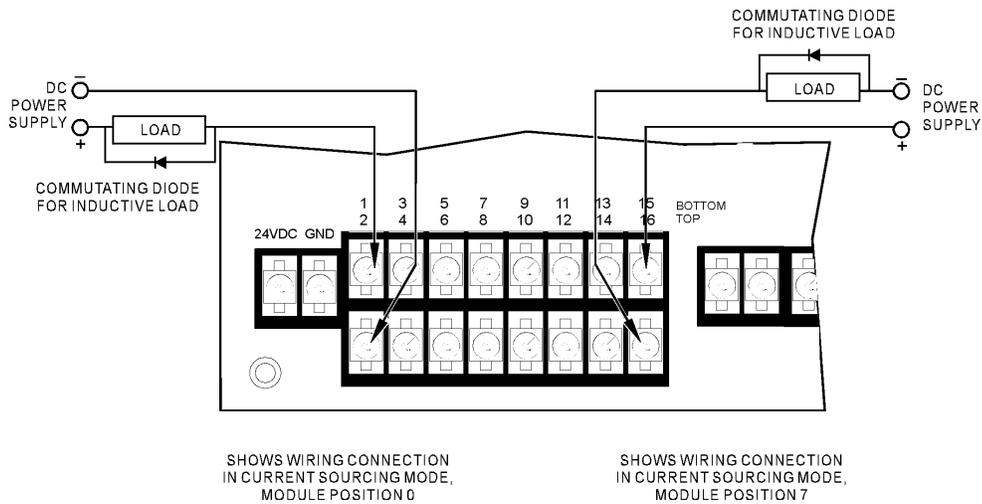


Form 640-010129

### Field Wiring Instructions

#### Digital DC Outputs

**Applies to G40DC5, G40DC5A, G40DC5MA, G40DC5R, G40DC5R5, and G4SWOUT modules**

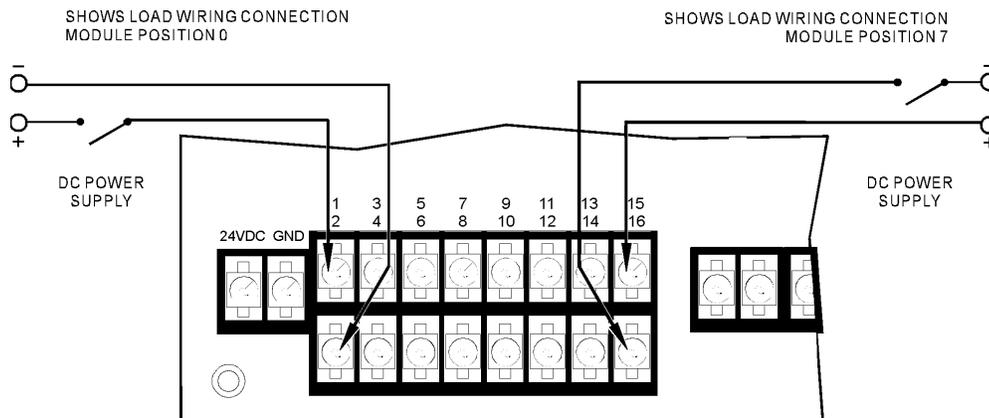


#### Digital DC Inputs

**Applies to G41DC5, G41DC5B, G41DC5D, G41DC5G, G41DC5K, and G41DC5MA modules.**

**Also applies to G41AC5, G41AC5A, and G41AC5MA modules when used with DC field voltages.**

**NOTE: Since the G4SWIN module simulates field devices for testing, this module does not need to be wired on the field side.**

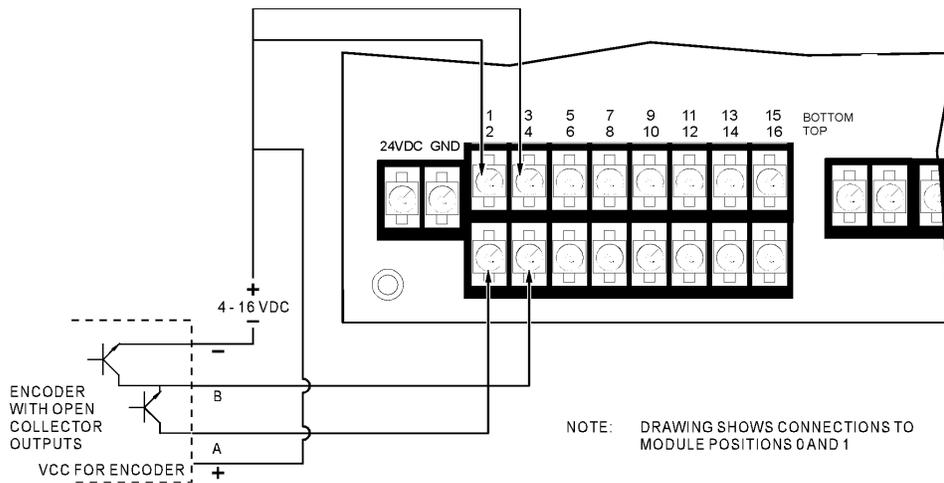


Form 640-010129

### Field Wiring Instructions

#### Digital Quadrature Inputs

**Applies to the G4IDC5Q module**

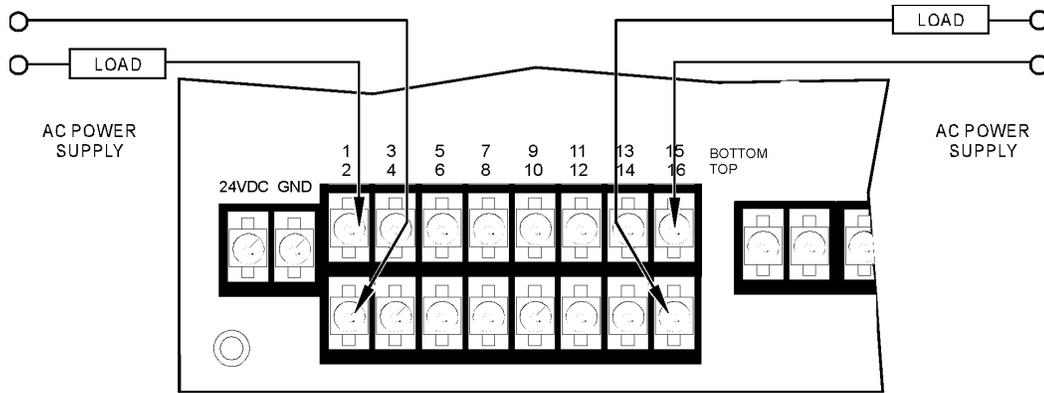


Form 640-010129

### Digital AC Outputs

Applies to G40AC5, G40AC5A, G40AC5A5, and G40AC5MA modules.

Also applies to G40DC5R, G40DC5R5, and G4SWOUT modules when used with AC field voltages.



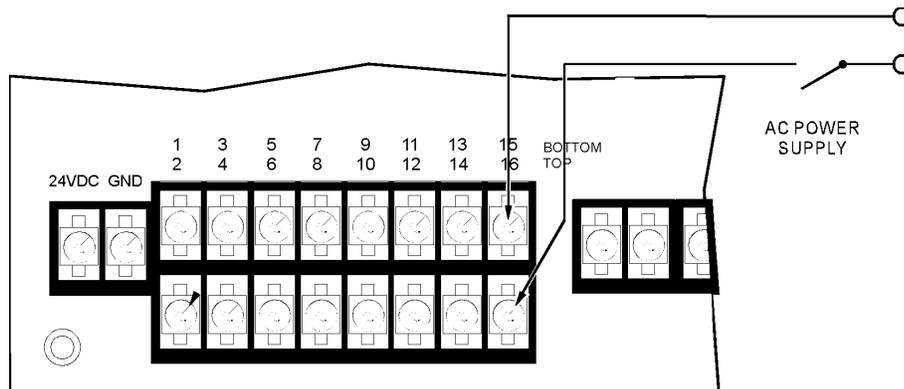
SHOWS LOAD WIRING CONNECTION  
MODULE POSITION 0

SHOWS LOAD WIRING CONNECTION  
MODULE POSITION 7

### Digital AC Inputs

Applies to G4IAC5, G4IAC5A, and G4IAC5MA modules.

Also applies to G4IDC5, G4IDC5B, G4IDC5G, and G4IDC5MA modules when used with AC field voltages.



INPUT DEVICE MAY BE IN SERIES WITH  
EITHER LINE. SHOWS WIRING  
CONNECTION FOR MODULE POSITION 7.

### Products

Opto 22 produces a broad array of reliable, flexible hardware and software products for industrial automation, remote monitoring, enterprise data acquisition, and machine-to-machine (M2M) applications.

### SNAP Ethernet Systems

Based on the Internet Protocol (IP), SNAP Ethernet systems offer flexibility in their network connectivity and in the software applications they work with. The physical network may be a wired Ethernet network, a cellular wireless network, or a modem. A wide variety of software applications can exchange data with SNAP Ethernet systems, including:

- Opto 22's own ioProject™ suite of control and HMI software
- Manufacturing resource planning (MRP), enterprise management, and other enterprise systems
- Human-machine interfaces (HMIs)
- Databases
- Email systems
- OPC client software
- Custom applications
- Modbus/TCP software and hardware.

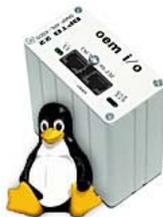


SNAP Ethernet system hardware consists of controllers and I/O units. Controllers provide central control and data distribution. I/O units provide local connection to sensors and equipment.

### SNAP OEM Systems

Opto 22 SNAP OEM I/O systems are highly configurable, programmable processors intended for OEMs, IT professionals, and others who need to use custom software with Opto 22 SNAP I/O modules.

Linux® applications running on these systems can read and write to analog, simple digital, and serial I/O points on SNAP I/O modules using easily implemented file-based operations. Applications can be developed using several common development tools and environments, including C or C++, Java, and shell scripts.



### M2M Systems

Machine-to-machine (M2M) systems connect your business computer systems to the machines, devices, and environments you want to monitor, control, or collect data from. M2M systems often use wireless cellular communications to link remote facilities to central systems over the Internet, or to provide monitoring and control capability via a cellular phone.

Opto 22's Nvio™ systems include everything you need for M2M—interface and communications hardware, data service plan, and Web portal—in one easy-to-use package. Visit [nvio.opto22.com](http://nvio.opto22.com) for more information.

### Opto 22 Software

Opto 22's ioProject and FactoryFloor® software suites provide full-featured and cost-effective control, HMI, and OPC software to power your Opto 22 hardware. These software applications help you develop control automation solutions, build easy-to-use operator interfaces, and expand your manufacturing systems' connectivity.



### Quality

In delivering hardware and software solutions for worldwide device management and control, Opto 22 retains the highest commitment to quality. We do no statistical testing; each product is made in the U.S.A. and is tested twice before leaving our 160,000 square-foot manufacturing facility in Temecula, California. That's why we can guarantee solid-state relays and optically-isolated I/O modules *for life*.

### Product Support

Opto 22's Product Support Group offers comprehensive technical support for Opto 22 products. The staff of support engineers represents years of training and experience, and can assist with a variety of project implementation questions. Product support is available in English and Spanish from Monday through Friday, 7 a.m. to 5 p.m. PST.

### Opto 22 Web Sites

- [www.opto22.com](http://www.opto22.com)
- [nvio.opto22.com](http://nvio.opto22.com)
- [www.internetio.com](http://www.internetio.com) (live Internet I/O demo)

### Other Resources

- OptoInfo CDs
- Custom integration and development
- Hands-on customer training classes.



### About Opto 22

Opto 22 manufactures and develops hardware and software products for industrial automation, remote monitoring, enterprise data acquisition, and machine-to-machine (M2M) applications. Using standard, commercially available Internet, networking, and computer technologies, Opto 22's input/output and control systems allow customers to monitor, control, and acquire data from all of the mechanical, electrical, and electronic assets that are key to their business operations. Opto 22's products and services support automation end users, OEMs, and information technology and operations personnel.

Founded in 1974 and with over 85 million Opto 22-connected devices deployed worldwide, the company has an established reputation for quality and reliability.