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BRAIN BOARDS
CLASSIC/MISTIC
16-CHANNEL DIGITAL

OPTO 22

DATA SHEET

Form 729-230112

Part Number	Description
B100	16-Channel Digital Brain, Mistic Protocol

Description

** This product is obsolete and no longer available. **

The B100 is a high-performance digital brain board used to control up to 16 channels of remote digital I/O using Opto 22's digital I/O mounting racks and modules. On-board intelligence enables many distributed control features. The B100 and its analog counterpart, the B200, can be used with either an Opto 22 FactoryFloor® controller or a host computer.

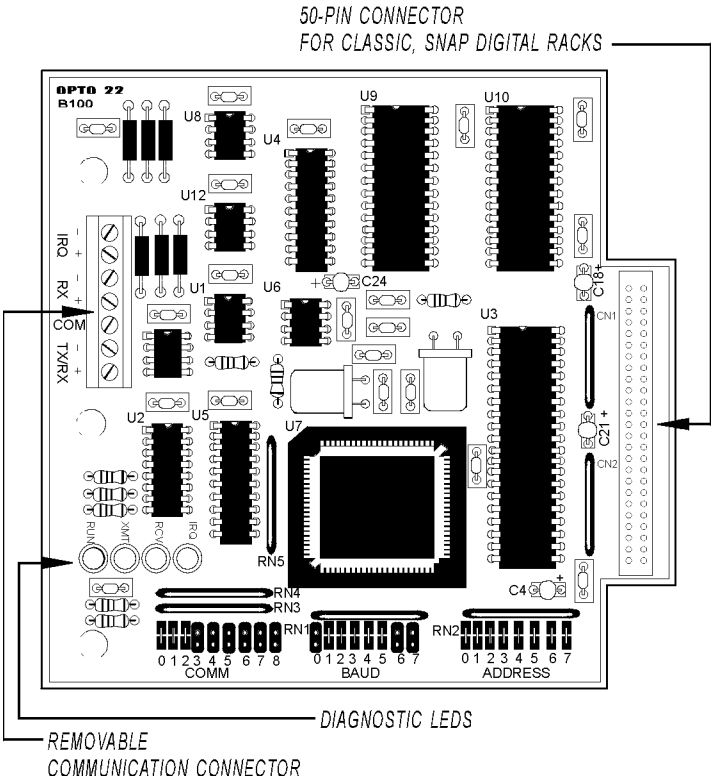
The B100 communicates via RS-485 serial at communication speeds up to 115K baud using the *mistic* protocol. The B100 brain board is physically interchangeable with the older B1 Optomux brain boards for Opto 22 Classic I/O and is plug-compatible with Classic racks. This compatibility makes it possible for a "Classic I/O customer" using Standard, Quad, or G4 I/O to use the *mistic* communications protocol with FactoryFloor software.

Utilizing the *mistic* protocol, fast communication speed is combined with advanced I/O processing to provide performance and power at the I/O level. Time-critical functions such as high-speed counting (20,000 Hz) and pulse width measurement (100 microsecond resolution) can be off-loaded from your host processor to the B100's intelligent I/O processor.

Distributed control functions include event/reactions, latching, pulse train generation, and time delays. Event reactions execute high-speed, deterministic responses to sophisticated control sequences, alarm monitors, or diagnostic conditions.

In addition, the B100 can generate an interrupt signal to an Opto 22 controller or host computer, notifying the controller that an event has occurred.

For systems I/O customers, the B100 can be used with Opto 22's FactoryFloor, the legacy suite of Microsoft® Windows® 32-bit software. FactoryFloor consists of four integrated components:



- OptoControl™, a graphical, flowchart-based development environment for real-time control solutions.
- OptoDisplay™, a graphical, multimedia operator interface package.
- OptoServer™, a robust data server that connects the controller network with the PC-based FactoryFloor network.

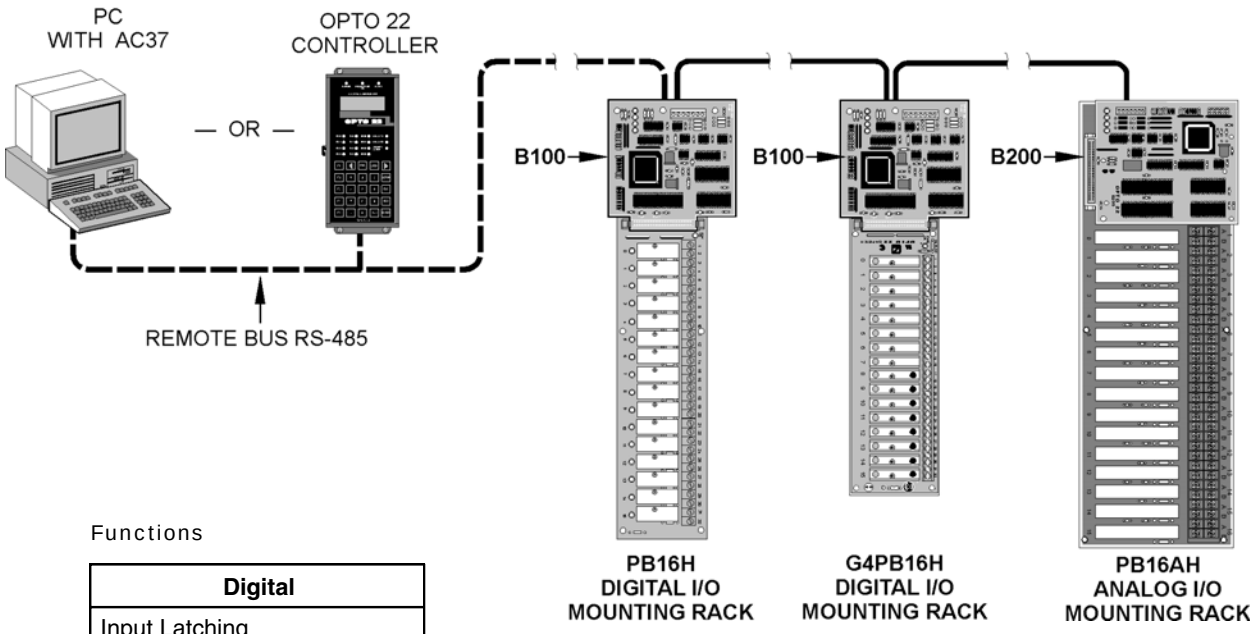
The distributed intelligence of the B100 brain board is an integral part of OptoControl.

This product is obsolete.

Description (Continued)

In keeping with the OptoOpen Integration™ philosophy, Opto 22's OptoDriver Toolkit™ allows you to create custom solutions utilizing the B100. The OptoDriver toolkit includes 32-bit Windows-compatible drivers, Windows 16-bit drivers, and Opto 22's Classic DOS drivers. The kit also provides the files, documentation, and real-world examples needed to write Microsoft® Windows and DOS software applications that can access Opto 22 I/O hardware, using languages such as Microsoft Visual C++™ or Microsoft Visual Basic®. The OptoDriver Toolkit provides programmers with a simple, direct connection to Opto 22's industry-standard *mistic*, Optomux, or Pamux® I/O systems.

B100/B200 System Architecture



Functions

Digital
Input Latching
Pulse Duration Measurement (0.1 msec resolution)
Counting (32 bit @ 20kHz)
On/Off Time Totalization
Output Pulse Generation (0.1 msec resolution)
Time Proportional Output (1 msec resolution)

This product is obsolete.

Specifications [OBSOLETE]

MISTIC Command Set - Digital Functions

Digital Setup/System Commands
IDENTIFY TYPE
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 CONFIGURATION TO EEPROM

Digital Read/Write, Latch Commands
CLEAR OUTPUT (DEACTIVATE OUTPUT)
READ AND OPTIONALLY CLEAR INPUT LATCHES
READ AND OPTIONALLY CLEAR LATCH
READ MODULE STATUS
SET OUTPUT MODULE STATE - GROUP
SET OUTPUTS (ACTIVATE OUTPUT)

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 COUNTER 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

Digital 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 COUNTER/TIMER >=
SET EVENT ON COUNTER/TIMER <=
SET EVENT ON MOMO MATCH
SET EVENT REACTION COMMAND

For detailed information about Mistic Command Set, refer to Mistic Protocol User's Guide (Form #270) or Misticware™ User's Guide (Form #522).

This product is obsolete.

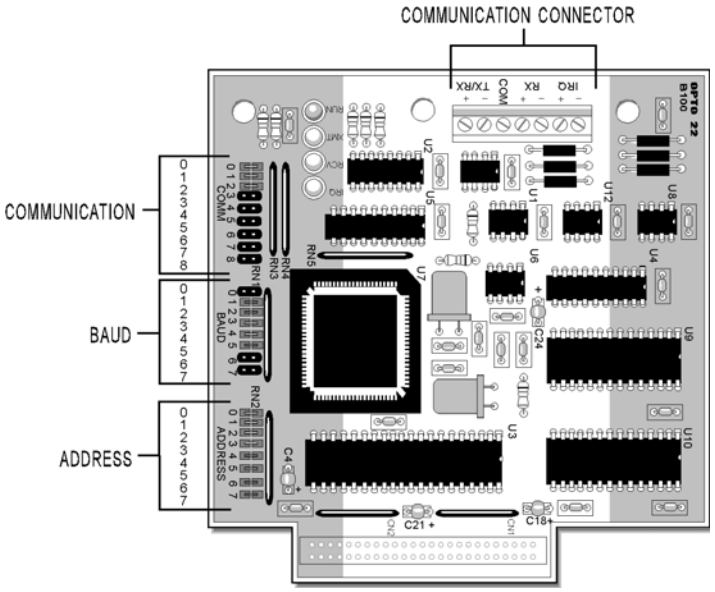
Specifications [OBSOLETE]

General

Operating Specifications

Power Requirements	5.0 VDC ± 0.1 VDC @ 600 mA max.
Operating Temperature	0° to 70°C, 95% humidity, non-condensing
CPU	16-bit Intel 80C196 I/O processor
Communications Interface	RS-485 twisted pair with shield, 2-wire or 4-wire (if using interrupts)
Data Rates	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 76800, and 115200 baud
Range: Multidrop	Unlimited. (Up to 3,000 feet or 32 stations maximum between repeaters)
Counter and Frequency Measurement	Maximum Rate: 20 kHz Minimum Pulse Width: 10 ms
Output Pulse	Maximum Rate: 500 Hz Minimum Pulse Width: 1 ms
LED Indicators	RUN (Power On), RCV (Receive), XMT (Transmit), and (IRQ) Interrupt
Options: Jumper Selectable	Address, communication, baud rate, CRC/Checksum, Binary/ASCII

Location of Connectors and Jumpers

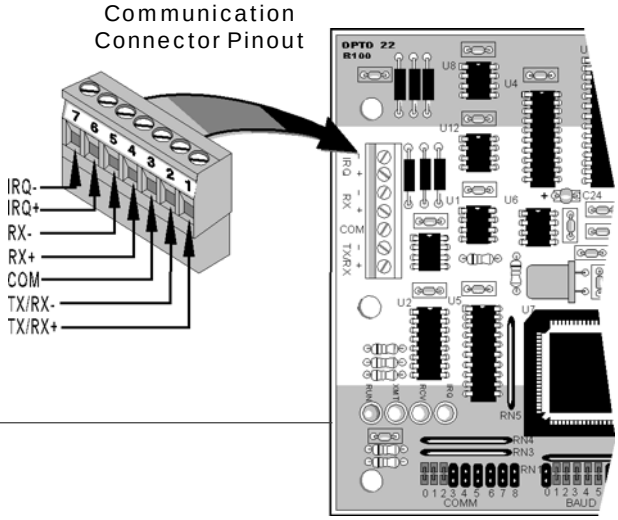


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Specifications [OBSOLETE]

LED Descriptions, Communcation Jumpers/Wiring

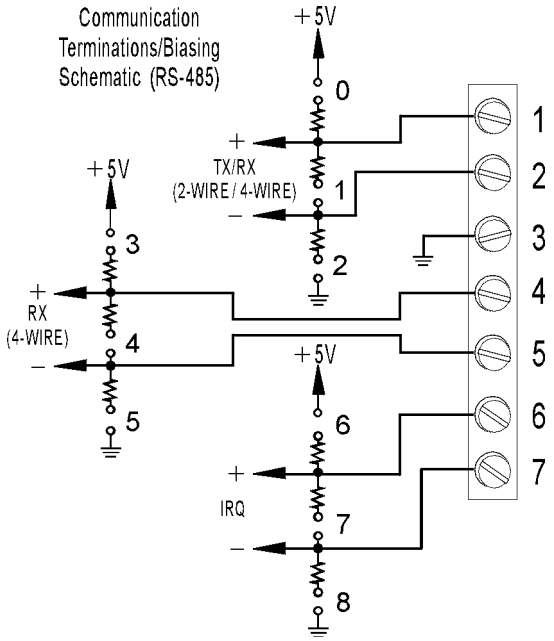
Communication Connector Pinout



LED Description Table

LED	Description
IRQ	Processor interrupt request currently active.
RCV	Processor is currently receiving data on communication line.
XMT	Processor is currently transmitting data on communication line.
RUN	Power on Processor

Communication Terminations/Biasing Schematic (RS-485)



Communication Jumper Descriptions

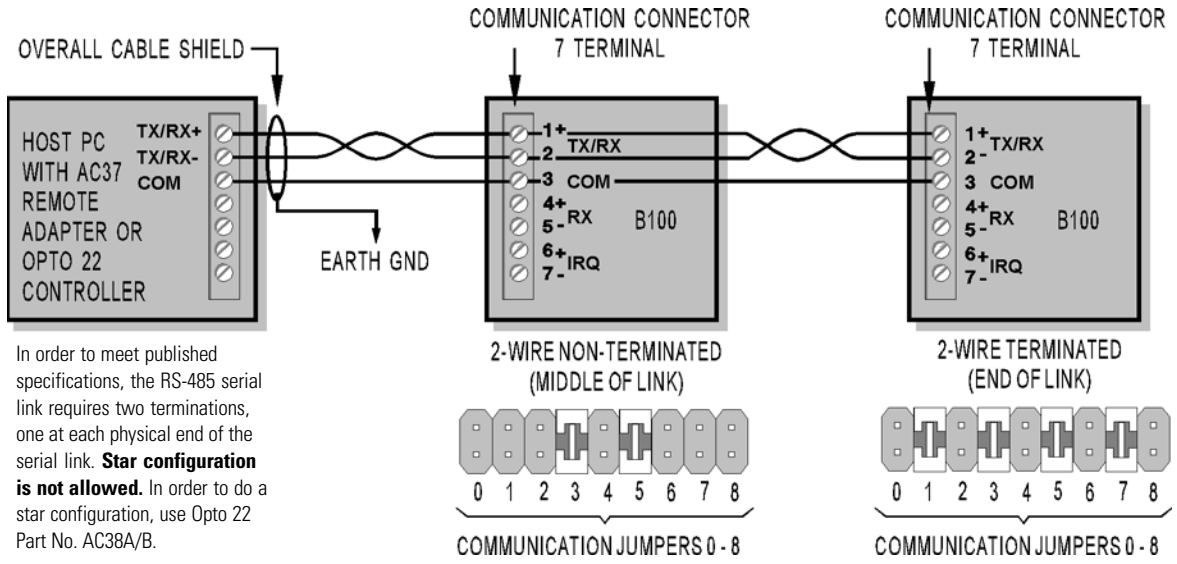
Jumper	Description
0	Pull-up for TX/RX+
1	Terminator for TX/RX lines
2	Pull-down for TX/RX-
3	Pull-up for RX+
4	Terminator for RX lines
5	Pull-down for RX-
6	Pull-up for IRQ+
7	Terminator for IRQ lines
8	Pull-down for IRQ-

This product is obsolete.

Specifications [OBSOLETE]

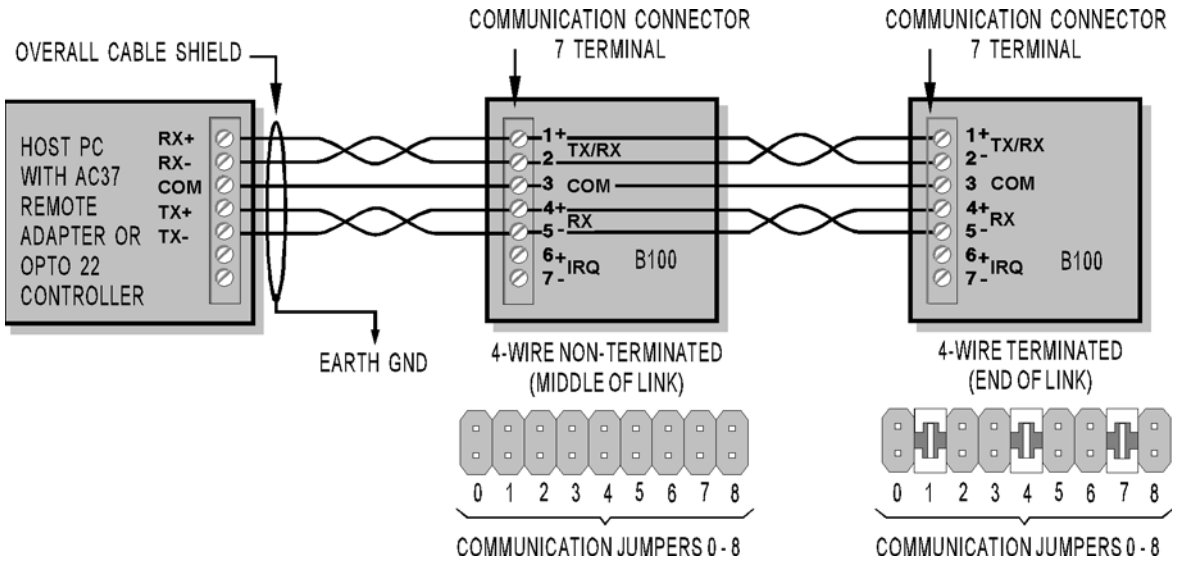
Communication Jumpers/Wiring (Continued)

Standard 2-Wire Configuration



In order to meet published specifications, the RS-485 serial link requires two terminations, one at each physical end of the serial link. **Star configuration is not allowed.** In order to do a star configuration, use Opto 22 Part No. AC38A/B.

Alternate 4-Wire Configuration

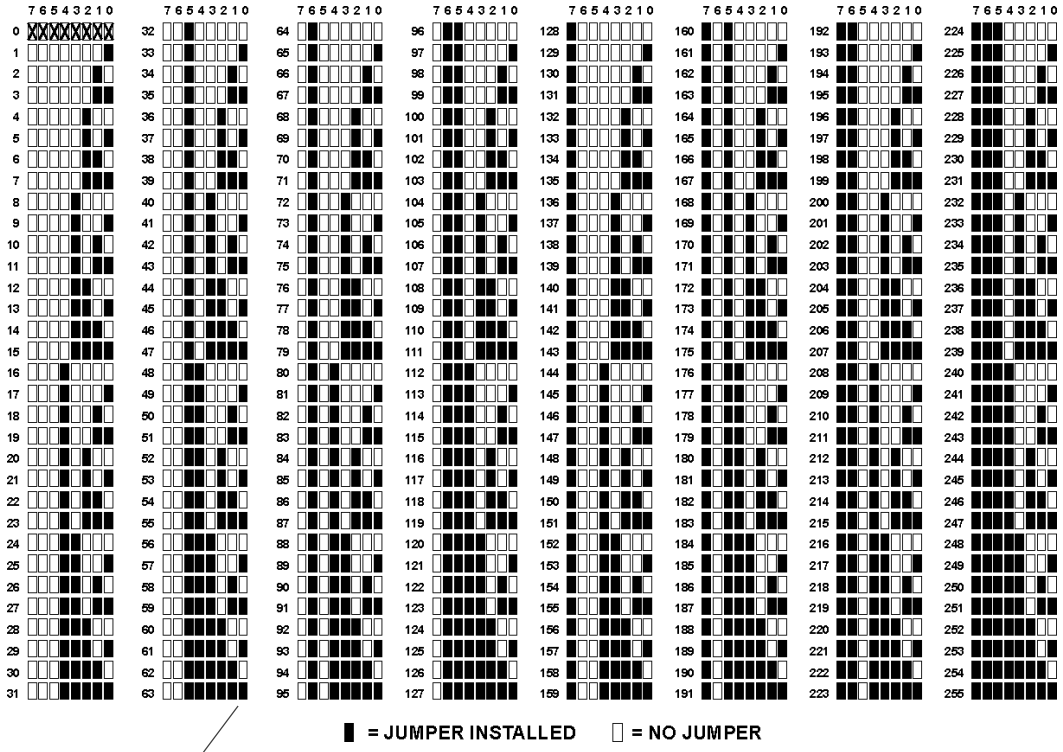


This product is obsolete.

Specifications [OBSOLETE]

Baud/Address Jumpers, LED Descriptions

Address Jumpers (ADDRESS 0-7)
Use these jumpers to select an 8-bit address from 0 to 255 (0 to FF hexadecimal). The factory default is 0 (all jumpers out). The most significant bit is 7 and the least significant bit is 0.



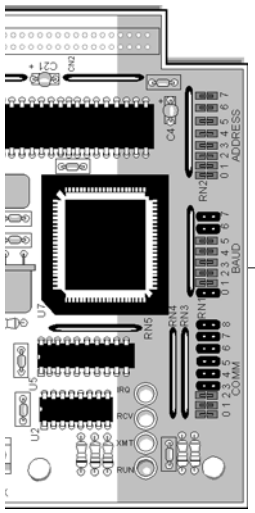


Table 1: Baud Rate Jumpers (0 - 3)

Baud Rate	Jumper Position 0	Jumper Position 1	Jumper Position 2	Jumper Position 3
115.2 KBaud (factory default setting)	Out	In	In	In
76.8 KBaud	In	Out	In	In
57.6 KBaud	Out	Out	In	In
38.4 KBaud	In	In	Out	In
19.2 KBaud	Out	In	Out	In
9600 Baud	In	Out	Out	In
4800 Baud	Out	Out	Out	In
2400 Baud	In	In	In	Out
1200 Baud	Out	In	In	Out
600 Baud	In	Out	In	Out
300 Baud	Out	Out	In	Out

Baud 0 - 3:
Use Table 1 to select appropriate baud rate.

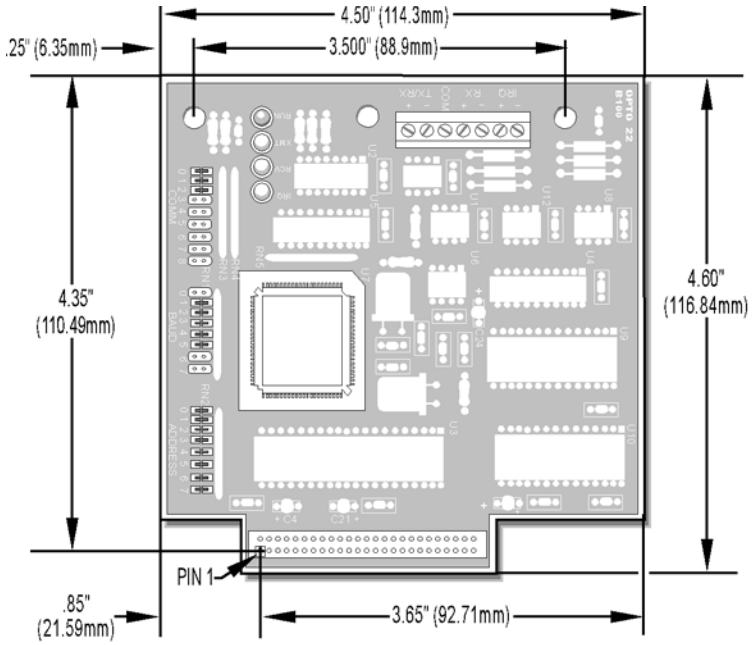
Baud 4: (Mistic mode select jumper):
When using Mistic protocol; used to select either binary mode (jumper in, factory default setting) or ASCII mode (jumper out).

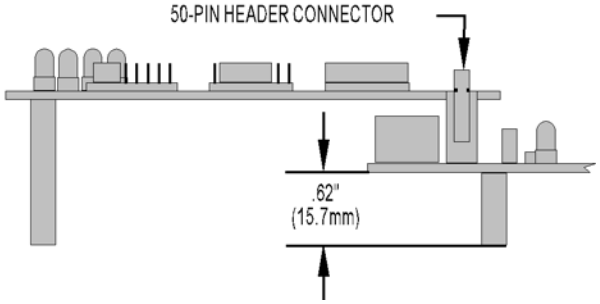
Baud 5: (Data verification jumper):
Used to select whether the type of data verification method used is Checksum Modulo 256 (jumper out) or CRC16 (jumper in, factory default setting).

Baud 6, 7:
Unused.

This product is obsolete.

Dimensional Drawing





This product is obsolete.

Assembly

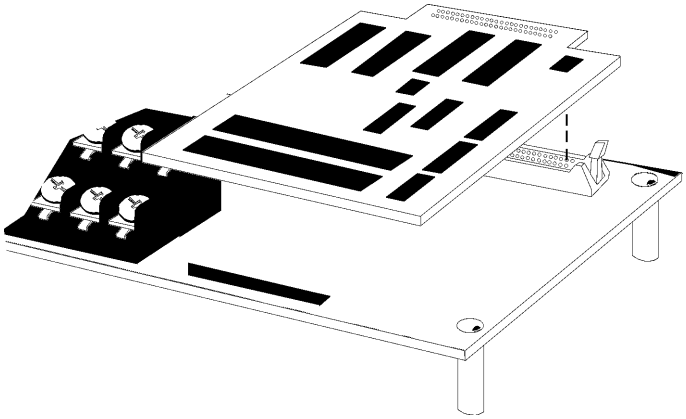
Mounting the B100

Installing a B100 onto a Mounting Rack

1. Align the brain board's header connector with the mounting rack's header connector.

2. Firmly press the header connectors together until the locking tabs clamp down on the brain board as shown in Figure 1.

Figure 1



Installing a B100 onto a G4PB16J/K/L Mounting Rack

1. Attach plastic removable standoff to the brain board as shown in Figure 2.

2. Align the brain board's header connector with the mounting rack's header connector and firmly press the header connectors together until the locking tabs clamp down on the brain board as shown in Figure 3.

Figure 2

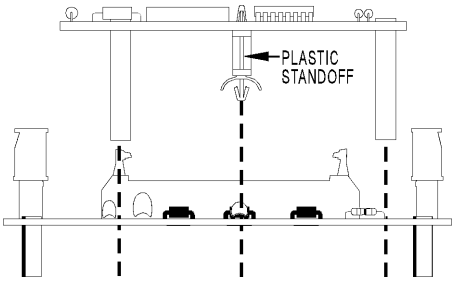
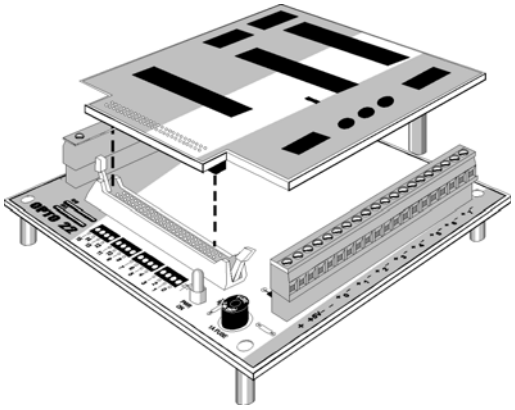


Figure 3



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OPTO 22

PRODUCTS

Opto 22 develops and manufactures reliable, easy-to-use, open standards-based hardware and software products. Industrial automation, process control, remote monitoring, data acquisition, and industrial internet of things (IIoT) applications worldwide all rely on Opto 22.



groov RIO®

groov RIO edge I/O offers a single, compact, PoE-powered industrial package with web-based configuration and IIoT software built in, support for multiple OT and IT protocols, and security features like a device firewall, data encryption, and user account control.

Standing alone, *groov* RIO connects to sensors, equipment, and legacy systems, collecting and securely publishing data from field to cloud. Choose a universal I/O model with thousands of possible field I/O configurations, with or without Ignition from Inductive Automation®, or a RIO EMU energy monitoring unit that reports 64 energy data values from 3-phase loads up to 600 VAC, Delta or Wye.

You can also use *groov* RIO with a Modbus/TCP master or as remote I/O for a *groov* EPIC system.

groov EPIC® System

Opto 22's *groov* Edge Programmable Industrial Controller (EPIC) system gives you industrially hardened control with a flexible Linux®-based processor with gateway functions, guaranteed-for-life I/O, and software for your automation and IIoT applications.

groov EPIC Processor

The heart of the system is the *groov* EPIC processor. It handles a wide range of digital, analog, and serial functions for data collection, remote monitoring, process control, and discrete and hybrid manufacturing.

In addition, the EPIC provides secure data communications among physical assets, control systems, software applications, and online services, both on premises and in the cloud. No industrial PC needed.

Configuring and troubleshooting I/O and networking is easier with the EPIC's integrated high-resolution color touchscreen. Authorized users can manage the system locally on the touchscreen, on a monitor connected via the HDMI or USB ports, or on a PC or mobile device with a web browser.

groov EPIC I/O

groov I/O connects locally to sensors and equipment. Modules have a spring-clamp terminal strip, integrated wireway, swing-away cover, and LEDs indicating module health and discrete channel status. *groov* I/O is hot swappable, UL Hazardous Locations approved, and ATEX compliant.

groov EPIC Software

The *groov* EPIC processor comes ready to run the software you need:

- Programming: Choose flowchart-based PAC Control, CODESYS Development System for IEC61131-3 compliant programs, or secure shell access (SSH) to the Linux OS for custom applications
- Node-RED for creating simple IIoT logic flows from pre-built nodes
- Efficient MQTT data communications with string or Sparkplug data formats
- Multiple OPC UA server options
- HMI: *groov* View to build your own HMI viewable on touchscreen, PCs, and mobile devices; PAC Display for a Windows HMI; Node-RED dashboard UI
- Ignition or Ignition Edge® from Inductive Automation (requires license purchase) with OPC-UA drivers to Allen-Bradley®, Siemens®, and other control systems, and MQTT communications

Older products

From solid state relays, to world-famous G4 and SNAP I/O, to SNAP PAC controllers, older Opto 22 products are still supported and working hard at thousands of installations worldwide. You can count on us for the reliability and service you expect, now and in the future.

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Founded in 1974, Opto 22 has established a worldwide reputation for high-quality products. All are made in the U.S.A. at our manufacturing facility in Temecula, California.

Because we test each product twice before it leaves our factory rather than testing a sample of each batch, we can afford to guarantee most solid-state relays and optically isolated I/O modules for life.

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Opto 22's California-based Product Support Group offers free technical support for Opto 22 products from engineers with decades of training and experience. Support is available in English and Spanish by phone or email, Monday–Friday, 7 a.m. to 5 p.m. PST.

Support is always available on our website, including free online training at OptoU, how-to videos, user's guides, the Opto 22 KnowledgeBase, and OptoForums.

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