



10623 Roselle Street, San Diego, CA 92121 • (858) 550-9559 • Fax (858) 550-7322
contactus@accessio.com • www.accessio.com

MODEL USBP-DIO16RO8

DIGITAL INPUT/OUTPUT BOARD w/8 ELECTROMECHANICAL RELAYS

USER MANUAL

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WARNING!!

ALWAYS CONNECT AND DISCONNECT YOUR FIELD CABLING WITH THE COMPUTER POWER OFF. ALWAYS TURN COMPUTER POWER OFF BEFORE INSTALLING A BOARD. CONNECTING AND DISCONNECTING CABLES, OR INSTALLING BOARDS INTO A SYSTEM WITH THE COMPUTER OR FIELD POWER ON MAY CAUSE DAMAGE TO THE I/O BOARD AND WILL VOID ALL WARRANTIES, IMPLIED OR EXPRESSED.

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Prior to shipment, ACCES equipment is thoroughly inspected and tested to applicable specifications. However, should equipment failure occur, ACCES assures its customers that prompt service and support will be available. All equipment originally manufactured by ACCES which is found to be defective will be repaired or replaced subject to the following considerations.

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If a unit is suspected of failure, contact ACCES' Customer Service department. Be prepared to give the unit model number, serial number, and a description of the failure symptom(s). We may suggest some simple tests to confirm the failure. We will assign a Return Material Authorization (RMA) number which must appear on the outer label of the return package. All units/components should be properly packed for handling and returned with freight prepaid to the ACCES designated Service Center, and will be returned to the customer's/user's site freight prepaid and invoiced.

Coverage

First Three Years: Returned unit/part will be repaired and/or replaced at ACCES option with no charge for labor or parts not excluded by warranty. Warranty commences with equipment shipment.

Following Years: Throughout your equipment's lifetime, ACCES stands ready to provide on-site or in-plant service at reasonable rates similar to those of other manufacturers in the industry.

Equipment Not Manufactured by ACCES

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General

Under this Warranty, liability of ACCES is limited to replacing, repairing or issuing credit (at ACCES discretion) for any products which are proved to be defective during the warranty period. In no case is ACCES liable for consequential or special damage arriving from use or misuse of our product. The customer is responsible for all charges caused by modifications or additions to ACCES equipment not approved in writing by ACCES or, if in ACCES opinion the equipment has been subjected to abnormal use. "Abnormal use" for purposes of this warranty is defined as any use to which the equipment is exposed other than that use specified or intended as evidenced by purchase or sales representation. Other than the above, no other warranty, expressed or implied, shall apply to any and all such equipment furnished or sold by ACCES.

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Chapter 1: Introduction

This 24 channel digital I/O board is an ideal solution for adding portable, easy-to-install industrial grade I/O to any computer with a supported USB port. As a USB 2.0 high speed device it offers the fastest speed currently available with the USB bus, while being fully compatible with both USB 1.1 and USB 2.0 ports. The card is plug-and-play allowing for quick connection whenever you need additional I/O on your computer.

Features

- High-speed USB 2.0 device, USB 1.1 compatible
- 16-channel TTL/LVTTL digital I/O
- All 16 I/O lines buffered with 32mA sink/source current capabilities
- 8 Form C electro-mechanical relays switch 1A
- Custom high-speed function driver
- Alternate embedded USB connector
- All required power drawn from USB port, no external power adapter required
- PICO-I/O™ module size (60mm x 72mm) & mounting capability

Functional Description

The USBP-DIO16RO8 is an ideal OEM USB solution for adding embedded, easy-to-install buffered TTL/LVTTL digital I/O and relay output capabilities to any computer with a USB port. The USBP-DIO16RO8 is a USB 2.0 (1.1 compatible) high-speed device, offering the highest speed available with the USB Bus. The unit is hot pluggable allowing quick connect or disconnect whenever you need additional I/O in your system.

The unit can be installed in single or multiple stack configurations. It can also be mounted alone near I/O sensors or devices to be controlled in a star configuration away from the USB ports of its host embedded computer. The module is always connected by USB cable to any computer USB port via its external micro B connector or on-board friction-lock micro-fit connector.

Featuring 8 Form C (SPDT) electro-mechanical relays and 16 TTL/LVTTL buffered digital I/O lines, the unit is the smallest of its kind for digital monitoring and control using USB. The digital I/O lines have 32mA of both sink and source to drive external components and are available via a 34-pin IDC type vertical header. The pinout allows a simple accessory cable to interface to our 50-pin external signal conditioning products. The board can be switched from 5V to 3.3V signaling to match a particular device connected. The 8 relay outputs are de-energized at power-up to prevent an unintended control output signal. Data to the relays is latched. The relay contacts are available via a 26-pin IDC vertical header-keyed box type connector.

The USBP-DIO16RO8 draws all required power from the USB port, no external power adapter is required. The small size and easy connection makes the unit an excellent choice for a variety of embedded applications such as mobile, robotics, kiosks, and embedded medical and machine equipment.

The USBP-DIO16RO8 is designed to be used in rugged industrial and mobile environments and is also available in an extended temperature version. The board is tiny PICO-I/O™ sized (60mm by 72mm) making it ideal for the smallest of embedded applications.

OEM USB/PICO™ Form Factor

This standard OEM version is perfect for a variety of embedded applications. What makes the USBP-DIO16RO8 unique is that its PCB size and mounting holes match the PICO-I/O™ form factor (without the SUMIT A connector). This allows our rugged digital board to be added to any PICO-ITXe stack by connecting it to an available USB port, especially if a SUMIT B only express I/O board was already used with the PICO-ITXe embedded CPU. The USBP-DIO16RO8 board can also be installed using standoffs inside other enclosures or systems either stand-alone or in multiple stacks without a CPU in the stack.

Accessories

The USBP-DIO16RO8 is available with optional cable assemblies, screw terminal boards and external signal conditioning boards supporting high current relays, 120/240AC modules and optically isolated inputs.

Ordering Guide

USBP-DIO16RO8	16 digital I/O and 8 relays, USB/PICO™ remote OEM version
CUSB-Micro-B-6	6' USB type A to type Micro B cable

Model Options

-T	Extended temperature version
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Applications

Factory automation, energy management, industrial ON/OFF control, security systems, manufacturing test, and process monitoring.

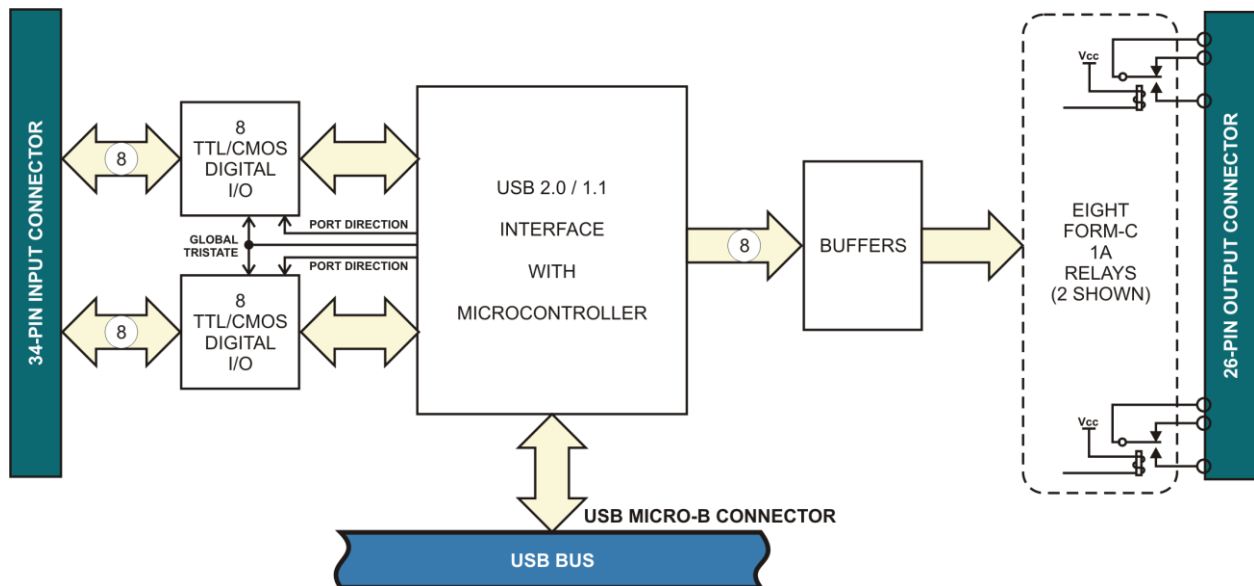


Figure 1-1: Block Diagram

Included with your board

The following components are included with your shipment. Please take time now to ensure that no items are damaged or missing.

1. USB/PICO™ TTL I/O with Electromechanical Relay Output Board
2. Software Master CD (PDF user manual installed with product package)
3. Printed USB I/O Quick-Start Guide

Chapter 2: Installation

Software CD Installation

These paragraphs are intended to detail the software installation steps.

The software provided with this board is contained on one CD and ***must be installed onto your hard disk prior to use.*** To do this, perform the following steps as appropriate for your operating system. Substitute the appropriate drive letter for your drive where you see d: in the examples below.

WIN2000/XP/2003

- a. Place the CD into your CD-ROM drive.
- b. The CD should automatically run the install program. If the install program does not click START | RUN and type `D:\INSTALL`, click OK or press `Enter`.
- c. Follow the on-screen prompts to install the software for this board.

Hardware Installation

The board can be installed in any USB 2.0 or USB 1.1 port. Please refer to the USB I/O Quick Start Guide which can be found on the CD, for specific, quick steps to complete the hardware and software installation.

Chapter 3: Option Selection

Refer to the setup program on the CD provided with the board. Also, refer to the Block Diagram and the Option Selection Map when reading this section of the manual.

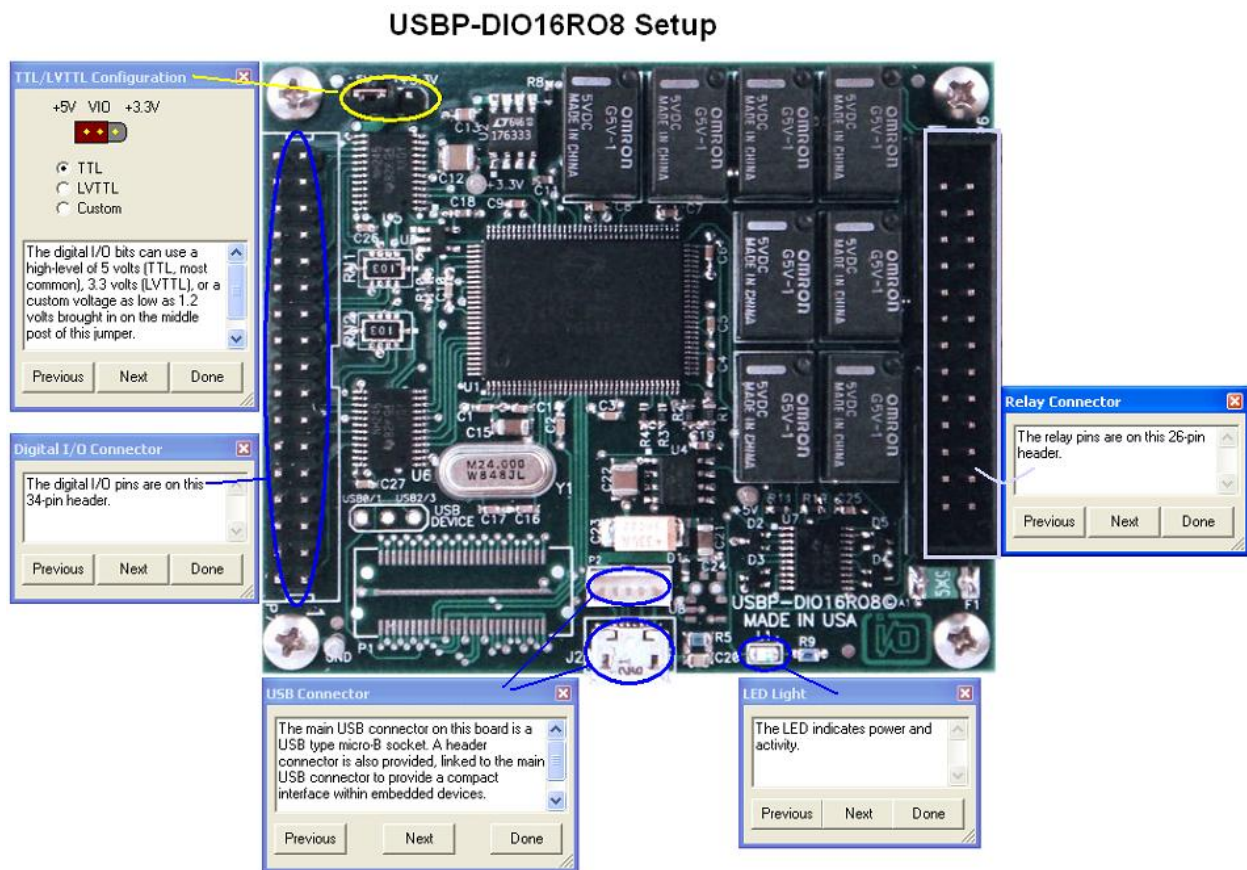


Figure 3-1: Option Selection Map

Chapter 4: USB Address Information

Use the provided driver to access the USB board. This driver will allow you to determine how many supported USB devices are currently installed, and each device's type. This information is returned as a Vendor ID (VID), Product ID (PID) and Device Index.

The board's VID is "0x1605", and its PID is "0x8032".

The Device Index is determined by how many of the device you have in your system, and provides a unique identifier allowing you to access a specific board at will.

Chapter 5: Programming

The driver software provided with the board uses a 32-bit .dll front end compatible with any Windows programming language. Samples are provided in Borland Delphi, Microsoft Visual Basic, and Microsoft Visual C++ and demonstrate the use of the driver.

API function calls that are provided by the driver in Windows as well as detailed information on each function are detailed in the Software Reference Manual located in the Win32 directory for this board.

These functions will allow you to read or write individual bits, bytes, or the entire board worth of data.

Here are a few examples from the Software Reference Manual:

```
unsigned long GetDevices(void )  
unsigned long QueryDeviceInfo(DeviceIndex, pPID, pName, pDIOBytes, pCounters)  
unsigned long DIO_ReadAll()
```

Chapter 6: Connector Pin Assignments

Electromechanical relay outputs are connected to the board via a 26-pin header type connector named P6, while the TTL I/O is via a 34-pin header named P7. The mating connector is an IDC type with 0.1 inch centers or equivalent.

Pin	Signal		Pin	Signal
1	Relay 7 NC		2	Relay 7 C
3	Relay 7 NO		4	Relay 6 NC
5	Relay 6 C		6	Relay 6 NO
7	Relay 5 NC		8	Relay 5 C
9	Relay 5 NO		10	Relay 4 NC
11	Relay 4 C		12	Relay 4 NO
13	Relay 3 NC		14	Relay 3 C
15	Relay 3 NO		16	Relay 2 NC
17	Relay 2 C		18	Relay 2 NO
19	Relay 1 NC		20	Relay 1 C
21	Relay 1 NO		22	Relay 0 NC
23	Relay 0 C		24	Relay 0 NO
25	+5VDC		26	Ground

Figure 6-1: Relay Output Pin Assignments (P6)

Pin	Signal		Pin	Signal
34	Gnd		33	N/C
32	Gnd		31	PA0
30	Gnd		29	PA1
28	Gnd		27	PA2
26	Gnd		25	PA3
24	Gnd		23	PA4
22	Gnd		21	PA5
20	Gnd		19	PA6
18	Gnd		17	PA7
16	Gnd		15	PB0
14	Gnd		13	PB1
12	Gnd		11	PB2
10	Gnd		9	PB3
8	Gnd		7	PB4
6	Gnd		5	PB5
4	Gnd		3	PB6
2	N/C		1	PB7

Figure 6-2: TTL I/O Pin Assignments (P7)

**Figure 6-1: Relay Output
Pin Assignments (P6)**



Figure 6-2: TTL I/O Pin Assignments (P7)

Figure 6-3: P7 and P6 Arrangement with Pin Numbering shown

Chapter 7: Specification

Digital I/O

Number:	16
Connector:	34-pin vertical IDC header
Signaling:	5V/3.3 signaling selectable
Inputs	5V signaling (TTL Compatible)
Logic High:	2.0 to 5.0 VDC
Logic Low:	-0.5 to +0.8 VDC
Outputs	5V signaling
Logic High:	2.0 VDC minimum, source 32 mA
Logic Low:	0.55 VDC maximum, sink 32 mA

Relay Outputs

Number:	Eight (8) SPDT form C
Connector:	26-pin vertical ID keyed box header
Contact Type:	Single crossbar; Ag with Au clad
AC Load:	0.5A at 125 VAC (62.5 VA max.)
DC Load:	1A at 24 VDC (30 W max.)
Switching Voltage:	125 VAC, 60 VDC max.
Switching Current:	1A max.
Contact Resistance:	100 mOHM max
Contact Life: mech'l:	5 million operations min.
Operating Time:	5 msec max.
Release Time:	5 msec max.

Bus Type

USB 2.0 high-speed, USB 1.1 full-speed compatible

Bus Connectors

Micro B external connector, 5-pin micro-fit connector on-board

Environmental

Operating Temperature:	0° to 70° C (-40° to +85° C extended temperature option)
Storage Temperature:	-40° to +85° C
Humidity:	Maximum 90% RH, without condensation.
Board Dimension:	60mm x 72mm.

Power

+5VDC provided via USB bus up to 500mA**
5V@ 30mA, typical (all relays off, add 30mA per relay)
5V@ 270mA, typical (all relays ON)

**If the application expects to have all relays on, the amount of power available to source any of the 16 digital I/O must be limited to <230mA or ~14mA per channel.

Example: If eight of the channels are being used as inputs, then eight other digital lines could source an average of 28mA on each output.

Customer Comments

If you experience any problems with this manual or just want to give us some feedback, please email us at: ***manuals@acesio.com***. Please detail any errors you find and include your mailing address so that we can send you any manual updates.

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