DIO-32.PCIe User Manual

Part Number 8004e

SEALEVEL®
SYSTEMS INCORPORATED

Table of Contents

Introduction

The DIO-32.PCIe digital I/O interface provides 16 optically isolated inputs and 16 reed relay outputs. The inputs protect the PC and other sensitive equipment from spikes and ground loop current that can be generated in industrial environments, while the outputs provide high quality, long life, low current (10 Watt maximum), dry contact switch closures. Reed relays are well suited for low current applications. The relays are normally open, and close when energized.

The SeaI/O Classic software drivers and utilities are included on the CD and make installation and operation easy using Windows 2000, XP, Vista and Linux operating systems. The SeaI/O API (Application Programmer Interface) provides a variety of useful high-level function calls implemented as a Windows dynamic link library (DLL) and as a Linux kernel module and library. SeaI/O also includes sample code and utilities to simplify software development.

The inputs on the 8004e are rated for 3-13V. The inputs on the 8004He are rated for 10-30V.

Features
- PCI Express X1 compliant
- 16 optically isolated inputs
- Socketed dip resistor allows user configurable input range up to +30V
- 16 Reed relay outputs (SPST)
- Highly reliable 10VA DIP Reed relays
- Power (+5V and +12V) and ground provided on DB78 board connector
- Includes 72" cable with DB78 Male connector to DB37 Male and DB37 Female connectors (Item# CA165)
- SeaI/O Classic software supports Windows 2000, XP and Vista operating systems
- Software support for Linux available

Before You Get Started

What's Included

The DIO-32.PCIe is shipped with the following items. If any of these items is missing or damaged please contact Sealevel for replacement.

- **Item# 8004e –** DIO-32.PCIe Digital I/O Adapter
  - **8004e –** Board with 3-13V inputs
  - **8004He –** Board with 10-30V inputs
- **Item# CA165 –** DB78 Male to DB37 Male and DB37 Female V-cable
- **Sealevel Software CD –** SeaI/O Classic software and user manual

Optional Items

Depending upon your application, you are likely to find one or more of the following items useful for interfacing the DIO-32.PCIe to real-world signals. All items can be purchased from our website (http://www.sealevel.com) or by calling (864) 843-4343.

Cables

DB37 Male to DB37 Female Extension Cable (Item# CA112)

This cable provides a 6' extension to the CA165. It has one DB37 Male connector and one DB37 Female connector.

DB78 Male to DB78 Female Extension Cable (CA233)

This cable provides a 6' extension to the DB78 board connector on the 8004e. It has one DB78 Male connector and one DB78 Female connector.

DB78M to DB37 Female and DB37 Male, for 3093 (Item# CA378)

The CA378 is designed specifically for customers using the 3093 ISA digital I/O board that need to upgrade to the 8004e PCIe board while preserving existing infrastructure wiring. The CA378 connects to the 8004e and provides an identical pin out to the 3093.

Terminal Blocks

DB37 Terminal Block (Item# TB02)

Break out serial and digital connectors to screw terminals for easy field connection. The TB02 terminal block is designed with both DB37 male and female connectors for interfacing the inputs or outputs.

Software Installation

Windows 2000/XP/Vista™ Installation

> ⚠️ Do not install the PCI Express board until the software has been successfully installed.

1. Start Windows.

2. Insert the Sealevel Software CD in to your CD drive.

3. If 'Auto-Start' is enabled, the installation window will automatically appear. Otherwise, navigate to the root directory of your CD drive and double-click the 'autorun.exe' application to launch the installation window.

4. Select 'Install' to locate the software and manual for your device.

5. Type in the part number for your device (Item# 8004e) or select it from the list in the drop box.

6. Click the 'Install Drivers' button to launch the Installation Wizard.

7. When the 'SeaI/O - InstallShield Wizard' window appears, click the 'Next' button to initiate the software installation.
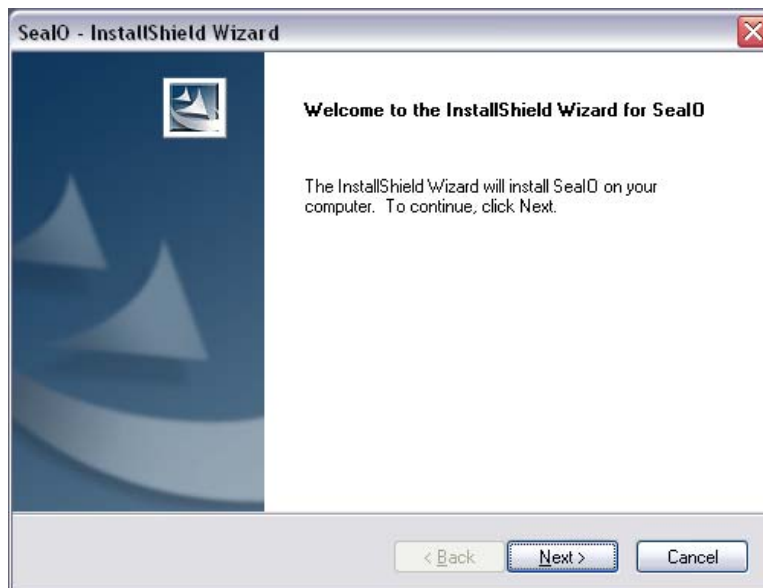
Software Installation, continued

8. When the 'License Agreement' window appears, accept the terms and click 'Next' to continue. You can click the 'Print' button to print out a copy of the agreement for your records. If you do not accept the terms of the agreement, the installation will stop.
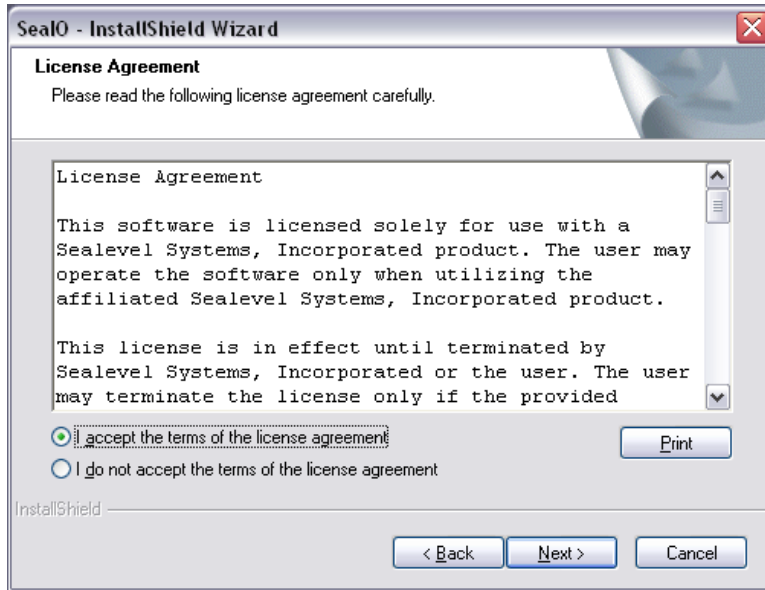
9. When the 'Ready to Install the Program' window appears, click the 'Install' button to install the software onto the hard drive of your computer. The files will be automatically installed into the 'C:\Program Files' folder on your computer.
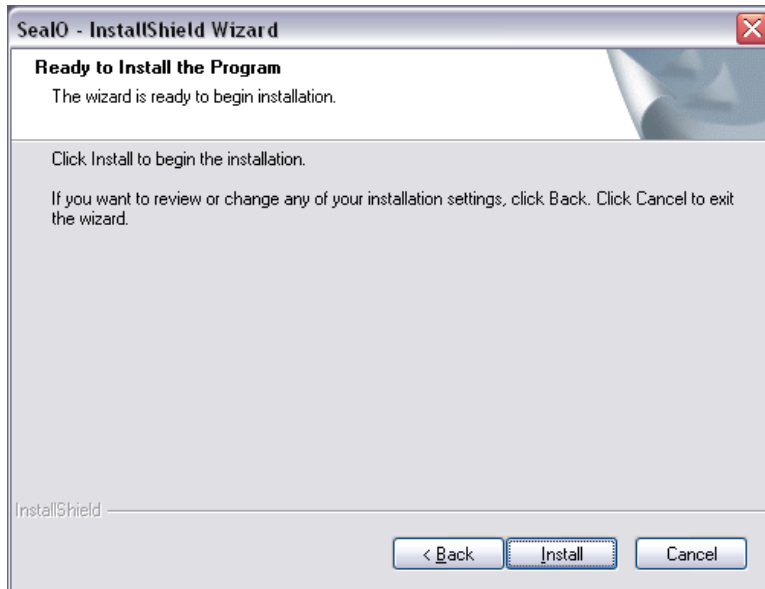
Software Installation, continued

10. The setup file will automatically detect the operating environment and install the proper components. When the 'InstallShield Wizard Complete' window appears, click 'Finish' to close the window and complete the software installation.
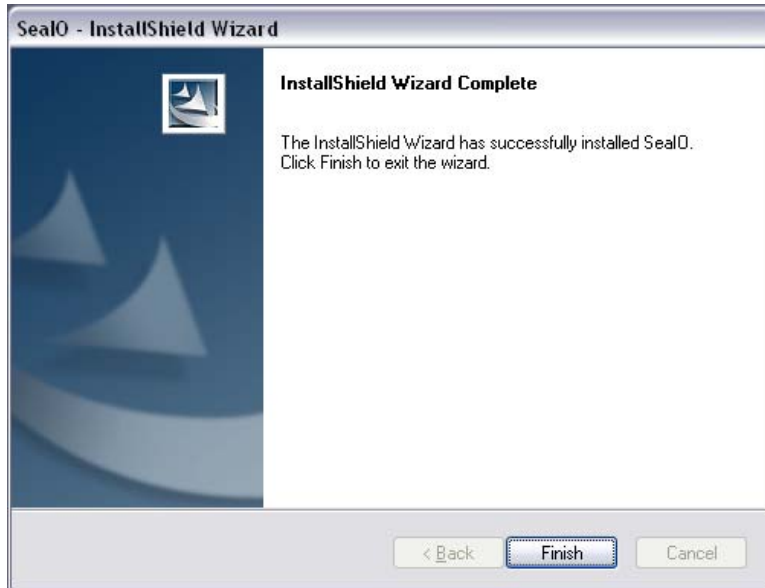
11. Click the 'X' in the top-right corner of the 'Product Finder' screen to close the CD installation window.

12. Proceed with the hardware installation of your PCI Express digital I/O adapter.

Linux Installation

Licensing Information

This package contains two components - a Linux kernel-mode device driver and an Application Programmer's Interface. To provide the most flexible licensing scheme, the driver is released under the GNU General Public License version 3 while the API is released under the GNU Lesser General Public License, also version 3. Copies of each license are located in the dox/ directory.

Modification of the configuration scripts, makefiles, or installation tools contained in this package to support a specific platform does not constitute creating a modified copy or a derived work.

How to Install

This suite of software has been tested on Debian GNU/Linux; if you intend to compile it on other platforms, please check the Makefile parameters described below to ensure our software is installed to the correct locations on your system.

In order to install the SeaIO suite, you need GNU Make (available with most distributions) "http://www.gnu.org/software/make/". You will also need the GCC and G++ compilers. The version is dependent on your kernel version. The README included with your kernel source should recommend a version known to compile properly. The SeaIO suite was developed with GCC-2.95 on the 2.4.X kernel series and GCC-3.33 on the 2.6.X kernel series.

You need to have compiled kernel source in /usr/src/linux, or point the KDIR variable in the Makefile to the location of your kernel source, for the module to compile properly. The process varies from one distribution to another and, you should consult your distribution's particular documentation. All kernel source obtained from http://kernel.org contains a README file detailing the compilation process.

To install everything: simply "make install" as root from the directory where you untarred seaio.tar.gz.

Once the kernel module is installed, running "seaioload" will create the appropriate nodes in /dev (dio0, dio1, etc ...) Note that you will have to rerun the "seaioload" script each time you reboot or you may add the appropriate commands to your startup scripts.

Optional make commands:

"make" or "make subdirs": this option will build all binaries, but will not copy them to the locations described below.

"make objs": this option is similar to "make subdirs", but instead of building executables, only objects will be created.

"make clean": this option removes all the build/executable files in the working SeaIo directory. Installed files remain on your system.

"make uninstall": this option removes files that were previously installed to the locations described below.

"make cleaninstall": removes any previous build files then performs a fresh install. Everything is built from source again.

"make purge": removes installed files and build files in one command. (exactly like performing "make uninstall" then "make clean")

Optional make parameters:

(you may either manually edit them in the Makefile or pass them at run time like so: "make install KDIR=/<PATH_TO_SOURCE>/")

KDIR=   /usr/src/linux

This is the path to configured kernel source.

MODDIR=   /lib/modules/<KERNEL_VERSION>/kernel/drivers/misc

This is the path that the kernel module is installed to. If you modify this, you must also modify the "seaioload" script's MODDIR variable.

SUTILDIR=   /usr/local/sbin

This is the location where the "seaioload" and "seaiounload" scripts are installed by default. You must also modify the "seaioload" script's SUTILDIR.

UTILDIR=   /usr/local/bin

This is where any standard utilities are installed.

LIBDIR=   /usr/local/lib

This is where the SeaIO API library is installed. (libseaio.a)

INCLUDDIR=   /usr/local/include

This is where the seaio header files will be installed.

CONFIGDIR=   /etc

seaio.conf will live here. This file is consulted by "seaioload", so if you change this, modify the CONFIGDIR variable in "seaioload".

Installation Steps

Note: You MUST have "root" privileges to install the software and drivers.

1. Login as "root".

2. Mount the CDROM by typing:

   mount -t iso4860 /dev/hdc /cdrom

Note Your cdrom may not be /dev/hdc it could be /dev/hda, /dev/hdb, /dev/hdd, or if you have a SCSI drive /dev/sda, /dev/sdb, /dev/sdc, etc. You may mount the CDROM to any location, the /cdrom is just a common example.

3. Next change to the directory where you mounted the CDROM:

   Ex. cd /cdrom/software/SeaIO/Other/linux

Note: The syntax is case sensitive.

4. Copy SeaIO_*.*.*.tar.gz to your home directory by typing:

   cp SeaIO_*.*.*.tar.gz ~

5. Change to your home directory by typing:

   cd ~

6. Unmount the drive and then Unzip and Untar the drivers and software by typing:

   umount /cdrom

   tar -xvzf SeaIO_*.*.*.tar.gz

7. Change to the seaio directory by typing:

   cd seaio

8. Now compile and prepare the drivers for use (this also installs binaries to default directories):

   make install

9. With the system off and unplugged, install your SeaIO PCI Express card.

10. Plug system back in and boot Linux.

    Login as "root".

11. Load the driver by typing:

    seaioload

The driver has enabled the card and is ready to use, and you now have the option to run a test utility on it. Skip to section "Using the test software" if you wish to do so at this time.

To set up Linux to automatically load the driver, refer to a Linux manual concerning your specific distribution for help. The seaioload and seaiounload scripts are provided as examples in the 'scripts' directory and are a good place to begin when creating startup scripts.

Hardware Installation

> ⚠️ Do not install the PCI Express board until the software has been successfully installed.

The DIO-32.PCIe does not need to be configured prior to installation.

Once you have installed the SeaI/O Classic software, install the board into an available PCI Express slot and boot the computer. The Found New Hardware wizard will appear. The drivers that were installed during the software installation process will automatically be used to configure the adapter.

The following instructions are applicable to the Windows XP operating system and may vary depending on your version of Windows.

1. After the software installation is complete, install the DIO-32.PCIe into an available PCI Express slot and boot the computer.

2. A 'Found New Hardware' alert will appear above the system tray.

3. When the 'Found New Hardware Wizard' appears, choose 'Install the software automatically' and click 'Next' (as shown in the image below).

Hardware Installation, continued

4. The appropriate drivers for your digital I/O device and version of Windows will be installed as shown.
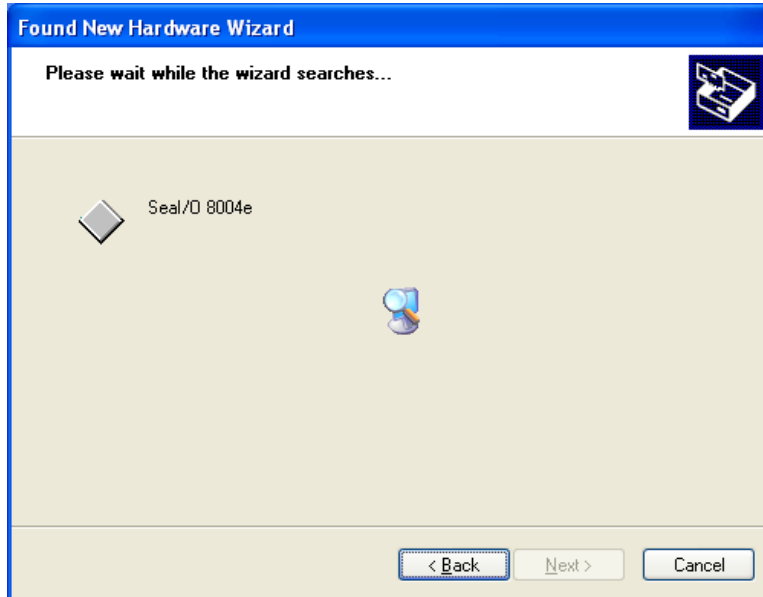
5. Click 'Finish' to complete the installation of your hardware.

6. When the 'Found New Hardware' alert informs you that your hardware is installed and ready to use, you can proceed with verifying the installation to check functionality if necessary.

Verifying Installation

To confirm that the digital I/O card has been successfully installed and recognized by your operating system, look in the Windows Device Manager.

To access Device Manager, follow the steps below:
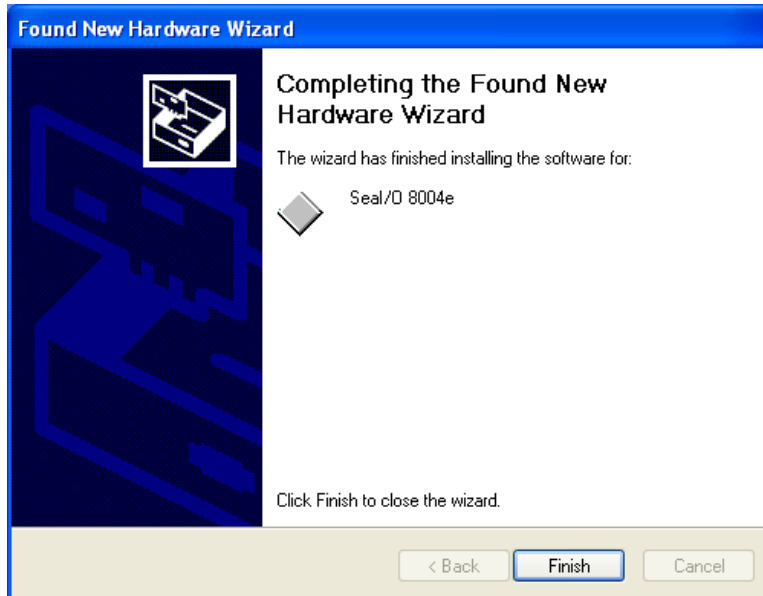
1. Right click on 'My Computer' icon on your desktop or in the Start menu.

2. Click 'Manage' in the fly out menu to launch the 'Computer Management' console window.

3. In the left pane under 'System Tools', click 'Device Manager'.

4. In right pane near the bottom, expand the 'SeaI/O Device' section by clicking the '+' symbol. This shows the parent device is installed correctly.

5. You should see the card assignment listed as 'SeaI/O 8004e' with the card number in parentheses. The card number will increment for each additional SeaI/O device installed.
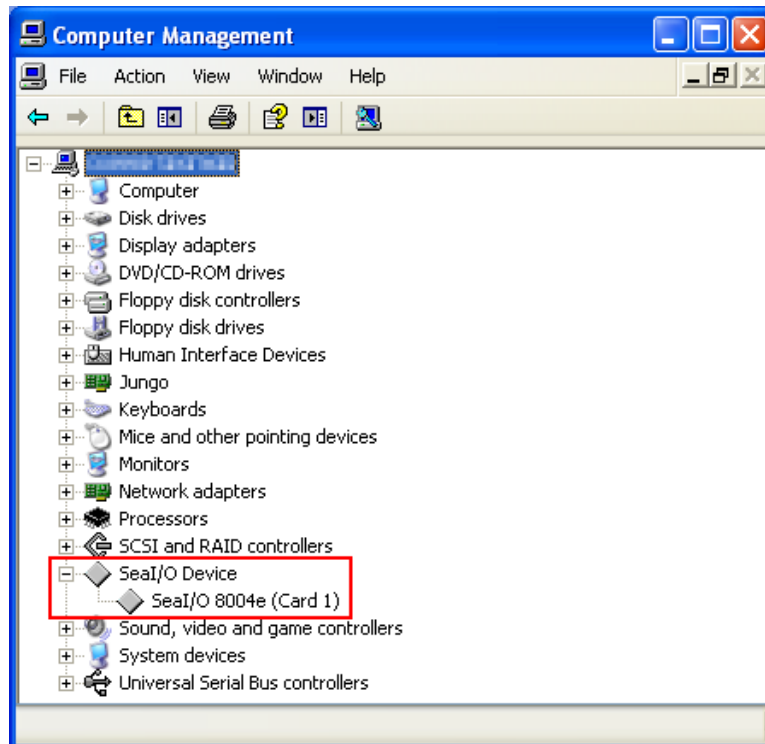
The DIO-32.PCIe is now ready for use.

Programming the DIO-32.PCI

Sealevel's SeaI/O Classic software is provided to assist in the development of reliable applications for the Sealevel Systems family of PCI and PCI Express digital I/O adapters. The SeaI/O Classic software is included on the CD that shipped with the board. The software contains driver functions for use in accessing the I/O as well as helpful samples and utilities.

Programming for Windows

The SeaI/O Classic API (Application Programmer Interface) provides a variety of useful high-level function calls implemented in a Windows dynamic link library (DLL). The API is defined in the help file (Start/Programs/SeaIO/SeaIO Help) under "Application Programmers Interface". This help file also includes detailed information dealing with installation / removal of the software and information about latency, logic states, and device configuration.

For C language programmers we recommend using the API to access the DIO-32.PCI. If you are programming in Visual Basic, using the ActiveX control included with SeaI/O is advised.

Samples and Utilities

A variety of sample programs and utilities (both executable and source code) are included with SeaI/O. Further documentation on these samples can be found by selecting "Start/Programs/SeaIO/Sample Application Description". Information about where the files are physically stored on your disk is also included in this same file.

Programming for Linux

SeaI/O for Linux consists of two major parts: a kernel module and a library. The kernel module is a simple IO pass-through device, allowing the library to handle the more sophisticated functions provided to SeaI/O users. It is provided in a 'tarball' format and can easily be compiled and included in the kernel build.

Digital I/O Interface

The DIO-32.PCIe provides four parallel input/output (I/O) ports. The ports are organized as ports A, B, C, and D. Port A and B are input ports interfaced to optically-isolated inputs, while ports C and D are reed relay output ports. Assuming an I/O address of 300 Hex the following table shows the Port Addresses.

Base Address	Hex	Decimal	Mode
Port A Address	300	768	Optically Isolated Input Port
Port B Address	301	769	
Port C Address	302	770	Reed Relay Output Port
Port D Address	303	771	

Input Ports

Ports A and B are 8 bit input ports connected to optically isolated input sensors. Each sensor can be used to interface a voltage input and then sense whether the voltage is on or off. Each sensor is isolated (with respect to a common ground) from every other sensor, and also isolated with respect to the host PC ground. This means that signals such as low-level AC line voltage, motor servo voltage, and control relay signals can be 'sensed', or read by the PC, without the risk of damage due to ground loops or ground faults.

Each sensor input pair has a current limiting resistor that is used to limit the input current to the opto-isolator. The opto-isolator has two 'back-to-back' diodes internally. This allows AC or DC signals to be sensed, regardless of polarity. When the applied voltage is high enough to cause the led in the opto-isolator to turn-on, the output of the opto-isolator goes low (0 volts) and the signal is read as a low logic level (binary 0) by the PC. When the input signal is too low to turn on the opto-isolator, the output goes high and the port bit is read by the PC as a high logic level (binary 1).

The input impedance of each isolated input is approximately 560 ohms (factory default). The opto-isolator requires approximately 3mA to turn on. The maximum input current is 50mA. There are two things to consider when selecting the input resistor. The first is turn on voltage for the circuit to sense, and second is the maximum input voltage. Maximum input voltage must not provide too much power to the input resistor, and must also not overdrive the opto-isolator input current specification. The following formulas apply:

Turn on Voltage = diode drop + (turn on current) x (resistance) [Ex: 1.1 + (.003) x R]

Input Current = ((input voltage)-1.1V) / (resistor value)

Maximum voltage = 1.1 + square root of (.25(resistor value))

The following table shows common input resistors and the ranges associated with each.

Input Resistor	Turn-On	Input Range	Max Input	Max Current
220Ω	1.8V	1.8 – 7.0V	8.5V	27mA
560Ω	2.8V	2.8 – 10.6V	12.9V	20mA
1KΩ	4.1V	4.1 – 13.8V	16.9V	15mA
2.2KΩ	7.7V	7.7 – 20.0V	24.5V	10mA
3.3KΩ	10.0V	10.0 – 24.0V	30.0V	9mA
4.7KΩ	15.2V	15.2 – 28.0V	35.0V	7mA

Note: The turn-off voltage for all resistors is less than 1V.

Increasing the input resistor accordingly can increase the maximum input voltage. Because socketed DIP resistors are utilized, they can easily be replaced with a different value. Sealevel, if necessary can do this.

Important: The input circuits are not intended for monitoring 120-volt AC circuits. In addition to being too high a voltage for the circuits, it is dangerous to have that high a voltage on the card.

Input Ports Pin Assignments (DB-37 Female)

Inputs are interfaced via the DB-37 female connector on the supplied CA165 cable.

Port A Bit	Port A Pins	Port B Bit	Port B Pins
0	18,37	0	10,29
1	17,36	1	9, 28
2	16,35	2	8,27
3	15,34	3	7,26
4	14,33	4	6,25
5	13,32	5	5,24
6	12,31	6	4,23
7	11,30	7	3,22
Ground	2,20,21		
+12 Volts	1		
+5 Volts	19		

> **NOTE:** The CA165 cable input pin out is not compatible with the 3093 ISA digital I/O board. If you are upgrading from the 3093 and wish to preserve existing infrastructure wiring, order the CA378 cable.

Output Ports (Reed Relay)

Reed relays provide very high quality, long life, low current (10 Watt maximum), dry contact switch closures. Reed relays are not suited for high current applications, and can be destroyed by inductive load switching, where a spark occurs across the contacts internally. The relays are normally open, and close when energized.

Output Ports (Reed Relay) Pin Assignments (DB-37 Male)

Outputs are interfaced via the DB-37 male connector on the supplied CA165 cable.

Port C Bit	Relay	Port C Pins	Port D Bit	Relay	Port D Pins
0	K16	2,20	0	K8	10,28
1	K15	3,21	1	K7	11,29
2	K14	4,22	2	K6	12,30
3	K13	5,23	3	K5	13,31
4	K12	6,24	4	K4	14,32
5	K11	7,25	5	K3	15,33
6	K10	8,26	6	K2	16,34
7	K9	9,27	7	K1	17,35
Ground	18,36,37				
+ 5 Volts	19				
+ 12 Volts	1				

DB-78 Female Pin Assignments (Card Edge Connector)

Bit	Port A Pins	Port B Pins	Port C Pins	Port D Pins
0	55,74	47,66	2,20	10,28
1	54,73	46,65	3,21	11,29
2	53,72	45,64	4,22	12,30
3	52,71	44,63	5,23	13,31
4	51,70	43,62	6,24	14,32
5	50,69	42,61	7,25	15,33
6	49,68	41,60	8,26	16,34
7	48,67	40,59	9,27	17,35
GND	39,57,58		18,36,37	
+12V	38		1	
+5V	56		19	

Direct Hardware Control

In systems where the users program has direct access to the hardware (DOS) the tables that follow give the mapping and functions that the DIO-32.PCIe provides.

Function Available	Port	Address Hex	Port Type
RD	A	Base + 0	Optically Isolated Input Port
RD	B	Base + 1	
RD/WR	C	Base + 2	Reed Relay Output Port
RD/WR	D	Base + 3	

RD = Read, RD/WR = Read or Write

Reading the Inputs

The inputs are active Low. If no voltage is applied across one of the differential inputs it returns a one on that bit. If an AC or DC voltage is applied it returns a zero on that bit.

Reading the Outputs

The relay ports return the ones complement of the value that is currently being used to drive the relays.

Writing the Outputs

The output ports are the only ports that can be written. The relays on a standard DIO-32.PCIe are normally open. To close a relay a one must be written to the appropriate bit.

Register Description

All ports are set to input after reset or power up.

Address		Mode	D7	D6	D5	D4	D3	D2	D1	D0
Base+0	Input Port A	RD	PAD7	PAD6	PAD5	PAD4	PAD3	PAD2	PAD1	PAD0
Base+1	Input Port B	RD	PBD7	PBD6	PBD5	PBD4	PBD3	PBD2	PBD1	PBD0
Base+2	Output Port C	RD/WR	PCD7	PCD6	PCD5	PCD4	PCD3	PCD2	PCD1	PCD0
Base+3	Output Port D	RD/WR	PDD7	PDD6	PDD5	PDD4	PDD3	PDD2	PDD1	PDD0
Base+4		RD	0	0	0	0	0	0	0	0

Optional 3093 Migration Cable (CA378)

On the 3093 ISA digital I/O board, the input pins #1 and #19 are reversed from the standard CA165 cable that ships standard with the 8004. If you are upgrading from a 3093 ISA board to an 8004 PCI board and wish to preserve existing infrastructure wiring, order the CA378 cable and use it in place of the standard CA165 cable.

CA378 Input Pin Assignments (DB-37 Female)

Inputs are interfaced via the DB-37 female connector on the optional CA378 cable.

Port A Bit	Port A Pins	Port B Bit	Port B Pins
0	18,37	0	10,29
1	17,36	1	9, 28
2	16,35	2	8,27
3	15,34	3	7,26
4	14,33	4	6,25
5	13,32	5	5,24
6	12,31	6	4,23
7	11,30	7	3,22
Ground	2,20,21		
+12 Volts	19		
+5 Volts	1		

> **NOTE:** The CA378 cable is designed specifically for customers upgrading from a 3093 ISA board to the 8004 PCI board. If you are not upgrading from the 3093 board, use the standard CA165 cable that ships with the 8004 PCI digital I/O board.

CA378 Output Pin Assignments (DB-37 Male)

Outputs are interfaced via the DB-37 male connector on the optional CA378 cable.

Port C Bit	Relay	Port C Pins	Port D Bit	Relay	Port D Pins
0	K16	2,20	0	K8	10,28
1	K15	3,21	1	K7	11,29
2	K14	4,22	2	K6	12,30
3	K13	5,23	3	K5	13,31
4	K12	6,24	4	K4	14,32
5	K11	7,25	5	K3	15,33
6	K10	8,26	6	K2	16,34
7	K9	9,27	7	K1	17,35
Ground	18,36,37				
+ 5 Volts	19				
+ 12 Volts	1				

Electrical Characteristics

Features

- 2 sets SPST relays with each having 8 relays
- 2 eight bit input ports
- DB-37 Male connector for relay outputs
- DB-37 Female connector for optically isolated inputs
- Highly reliable 10 VA DIP reed relays
- Multiple adapters can reside in same computer

Specifications

Input Ports

- Turn On Current: 3mA
- Isolator Diode Drop: 1.1 VDC
- Resistor Power Max: .25 W
- Maximum Input Range: 3 – 13 VDC/VAC
- Maximum Input Current: 50mA

Output Relays

- Contact Max Power Rating: 10 W
- Contact Voltage Maximum: 100 VDC/VAC
- Contact Current Maximum: .5A AC/DC RMS
- Contact Resistance, Initial: .15 Ω
- Rated Life:
  - Low Load: 200 Million Closures
  - Maximum Load: 100 Million Closures
- Contact Speed:
  - Operate: .5 mS
  - Release: .5 mS
  - Bounce: .5 mS
- Maximum Operating Speed: 600 Hz

Temperature Range

- Operating: 0°C – 70°C
- Storage: -50°C – 105°C

Physical Dimensions

- PCB Length: 6.5" (16.5 cm)
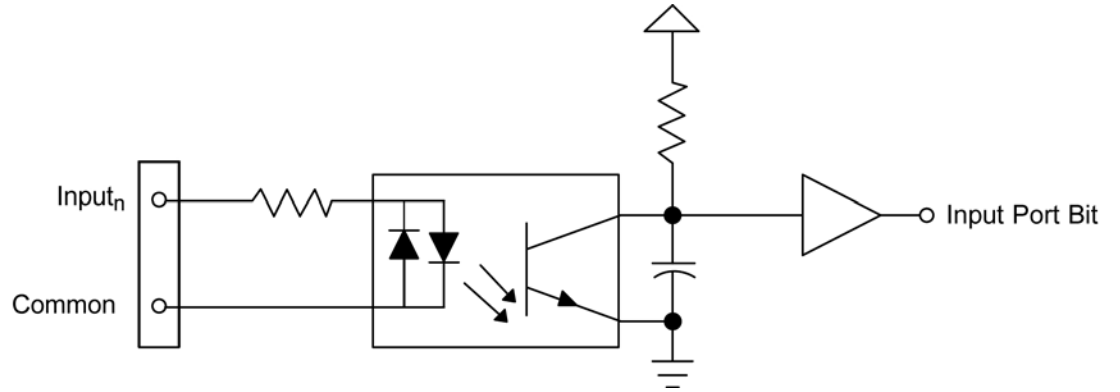- PCB Height: 4.2" (10.7 cm)

Manufacturing

All Sealevel Systems Printed Circuit boards are built to UL 94V0 rating and are 100% electrically tested. These printed circuit boards are solder mask over bare copper or solder mask over tin nickel.
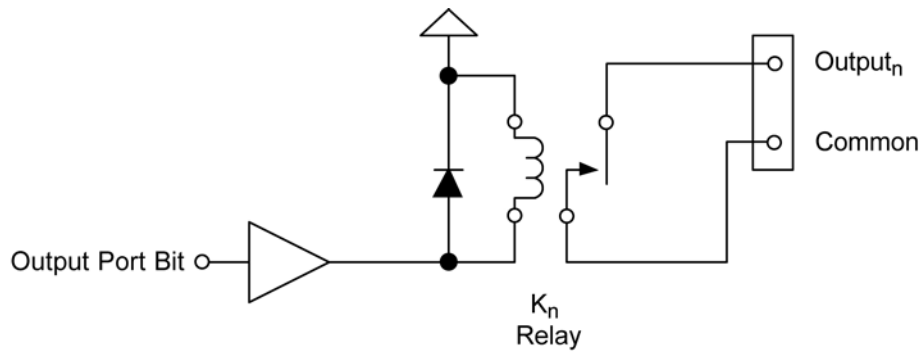
Example Circuits

Input Circuit

Output Circuit

Appendix A - Troubleshooting

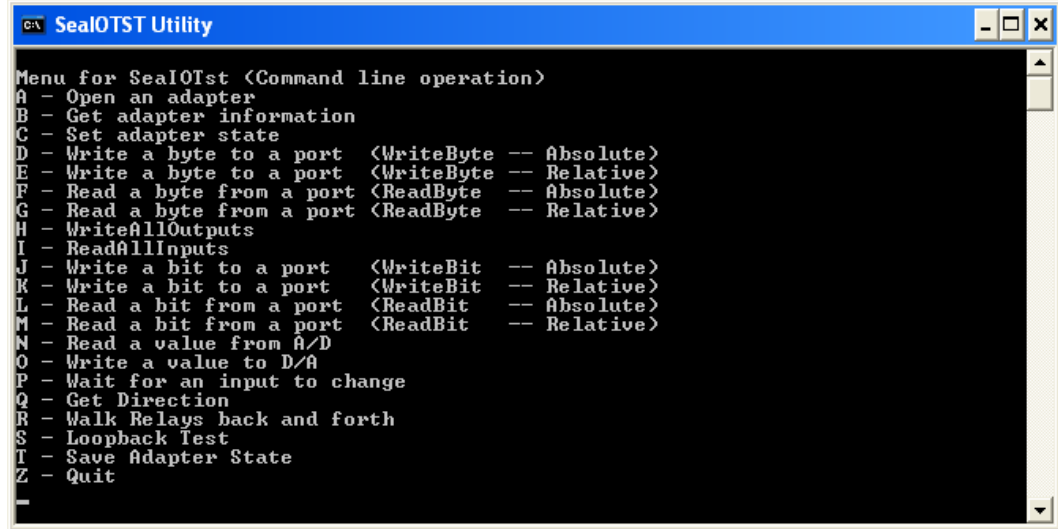Following these simple steps can eliminate most common problems.

1. **Install software first**. After installing the software then proceed to adding the hardware. This places the required installation files in the correct locations.

2. Read this manual thoroughly before attempting to install the adapter in your system.

3. Use Device Manager under Windows to verify proper installation. Refer to the Verifying Hardware section of this manual for instructions.

4. Several utilities with source code are included to verify the functionality of the inputs and outputs and to aid in application development. To test the inputs, you need to supply the turn-on voltage with a minimum of 3mA (maximum input current is 50mA) to trigger an input. Consult the pin out diagrams to test at the card edge connector or at the end of the cable.

5. Use the VCTest to verify the basic I/O functionality of your digital I/O board. The source code is included to simplify application development in the programming language C.
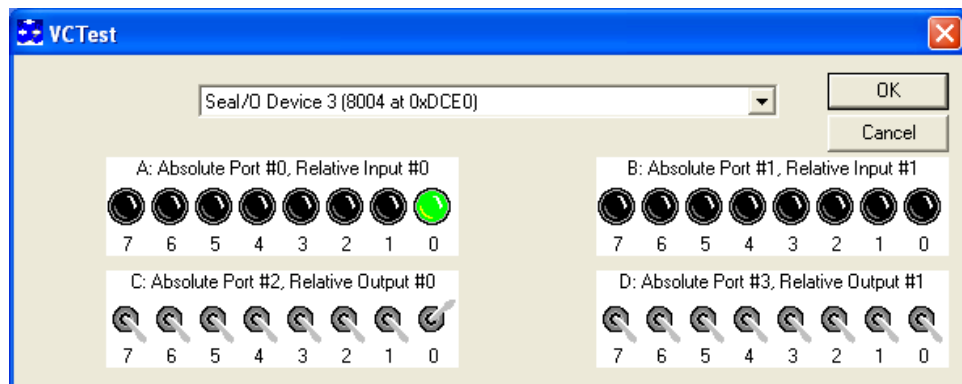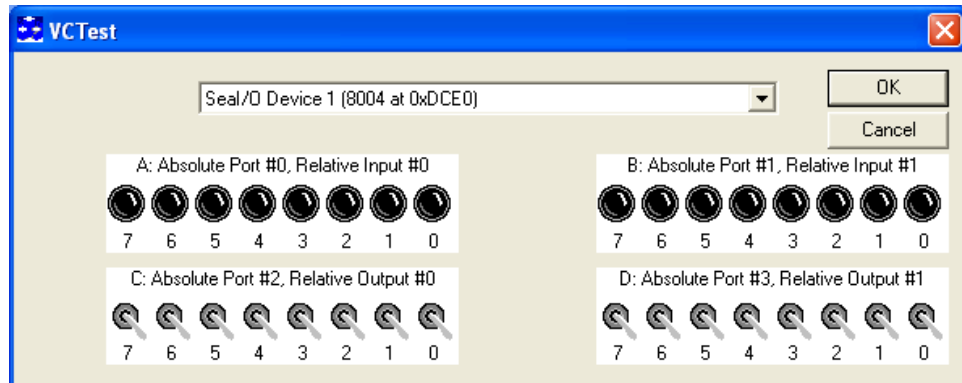
6. VBTest is another utility included with SeaI/O Classic software. The source code is included to aid with Visual Basic application development.
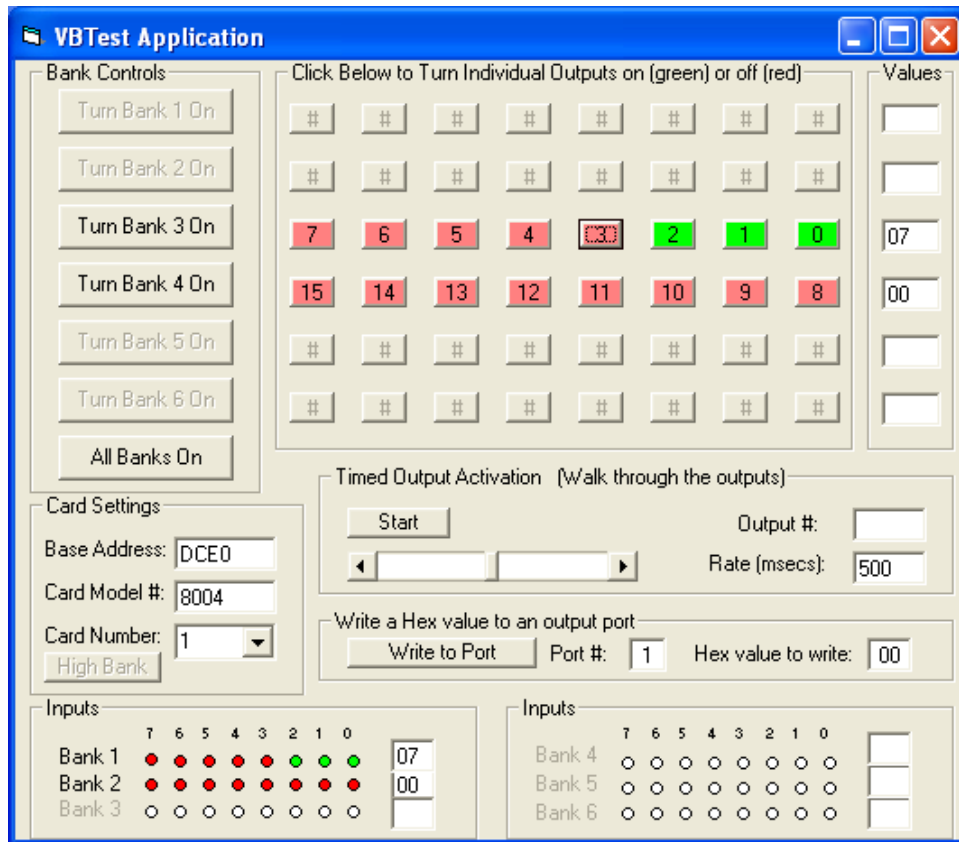
7. SeaIOTST is a command line utility that allows you to test the function calls from the SeaI/O Classic API.

Notes:
The source code for all utilities is located in the following folder:
C:\Program Files\SeaIO\Samples

The API is documented in the SeaIO help file. Start → All Programs → SeaIO → SeaIO Help. Launch the help file and expand the Programmers Interface section.

If these steps do not solve your problem, please call Sealevel Systems' Technical Support, (864) 843-4343. Our technical support is free and available from 8:00AM-5:00PM Eastern Time Monday through Friday. For email support contact support@sealevel.com.

Appendix B - How To Get Assistance

Begin by reading through the Trouble Shooting Guide in Appendix A. If assistance is still needed please see below.

When calling for technical assistance, please have your user manual and current adapter settings. If possible, please have the adapter installed in a computer ready to run diagnostics.

Sealevel Systems provides an FAQ section on its web site. Please refer to this to answer many common questions. This section can be found at http://www.sealevel.com/faq.asp

Sealevel Systems maintains a Home page on the Internet. Our home page address is http://www.sealevel.com. The latest software updates, and newest manuals are available via our FTP site that can be accessed from our home page.

Technical support is available Monday to Friday from 8:00 a.m. to 5:00 p.m. eastern time. Technical support can be reached at (864) 843-4343.

RETURN AUTHORIZATION MUST BE OBTAINED FROM SEALEVEL SYSTEMS BEFORE RETURNED MERCHANDISE WILL BE ACCEPTED. AUTHORIZATION CAN BE OBTAINED BY CALLING SEALEVEL SYSTEMS AND REQUESTING A RETURN MERCHANDISE AUTHORIZATION (RMA) NUMBER.

Appendix C – Silk Screen – 8004e PCB
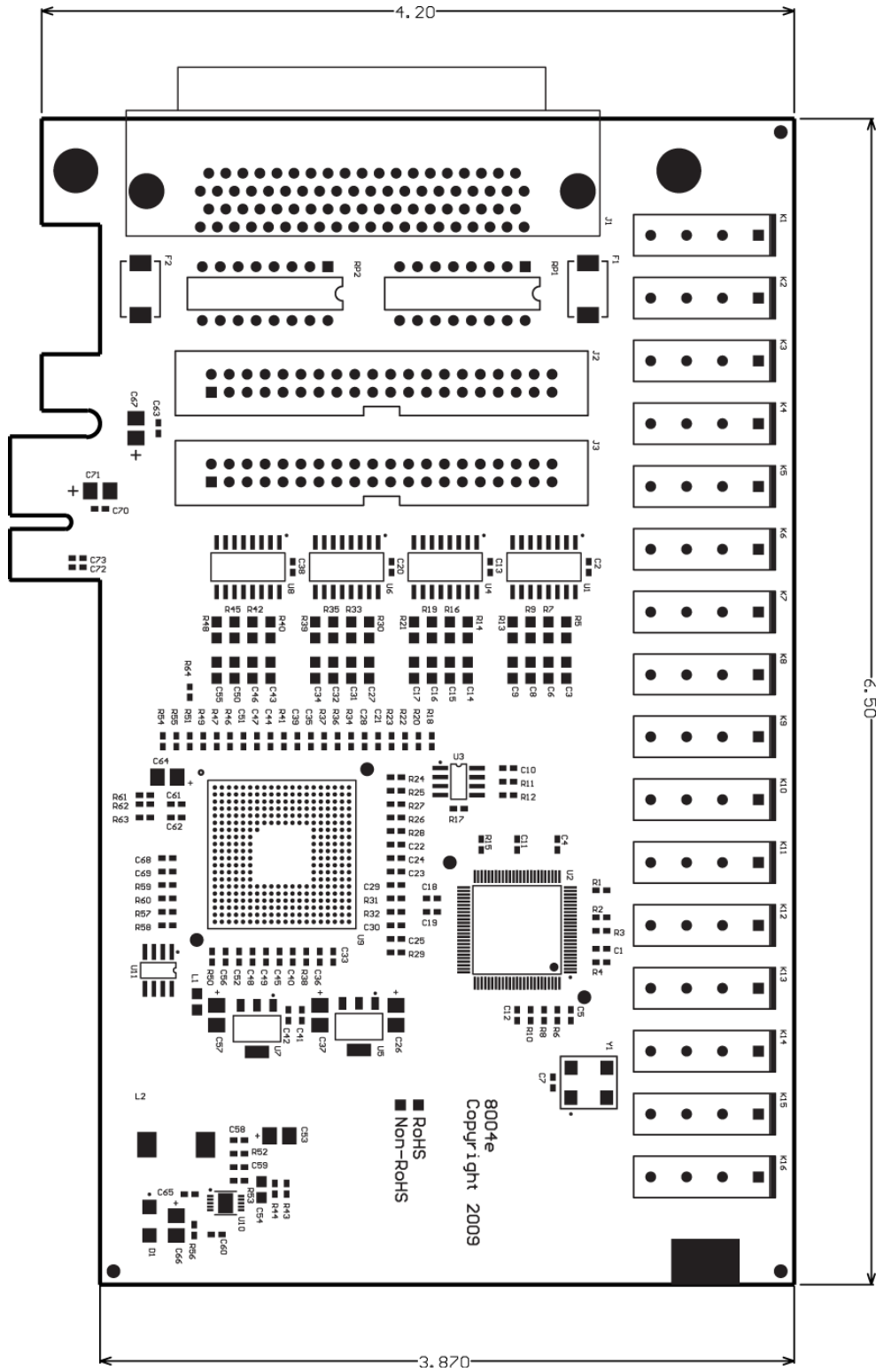
Appendix D - Compliance Notices

Federal Communications Commission Statement

FCC - This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in such case the user will be required to correct the interference at the users expense.

EMC Directive Statement

Products bearing the CE Label fulfill the requirements of the EMC directive (89/336/EEC) and of the low-voltage directive (73/23/EEC) issued by the European Commission.

To obey these directives, the following European standards must be met:

EN55022 Class A - "Limits and methods of measurement of radio interference characteristics of information technology equipment"

EN55024 – "Information technology equipment Immunity characteristics Limits and methods of measurement".

EN60950 (IEC950) - "Safety of information technology equipment, including electrical business equipment"

Warning

This is a Class A Product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures to prevent or correct the interference.

Always use cabling provided with this product if possible. If no cable is provided or if an alternate cable is required, use high quality shielded cabling to maintain compliance with FCC/EMC directives.

Warranty

Sealevel's commitment to providing the best I/O solutions is reflected in the Lifetime Warranty that is standard on all Sealevel manufactured products. We are able to offer this warranty due to our control of manufacturing quality and the historically high reliability of our products in the field. Sealevel products are designed and manufactured at its Liberty, South Carolina facility, allowing direct control over product development, production, burn-in and testing.

Sealevel Systems, Inc. (hereafter "Sealevel") warrants that the Product shall conform to and perform in accordance with published technical specifications and shall be free of defects in materials and workmanship for life. In the event of failure, Sealevel will repair or replace the product at Sealevel's sole discretion. Failures resulting from misapplication or misuse of the Product, failure to adhere to any specifications or instructions, or failure resulting from neglect or abuse are not covered under this warranty.

Warranty service is obtained by delivering the Product to Sealevel and providing proof of purchase. **Return authorization must be obtained from Sealevel Systems before returned merchandise will be accepted. Authorization is obtained by calling Sealevel Systems and requesting a Return Merchandise Authorization (RMA) number.** The Customer agrees to insure the Product or assume the risk of loss or damage in transit, to prepay shipping charges to Sealevel, and to use the original shipping container or equivalent. Warranty is valid only for original purchaser and is not transferable.

Sealevel Systems assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, or inability to use this product. Sealevel Systems will not be liable for any claim made by any other related party.

This warranty applies to Sealevel manufactured Product. Product purchased through Sealevel but manufactured by a third party will retain the original manufacturer's warranty.

> **Sealevel Systems, Incorporated**
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> **www.sealevel.com**
> **email: support@sealevel.com**

Technical Support is available Monday - Friday from 8 a.m. to 5 p.m. Eastern time

Trademarks

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