SeaLINK PIO-96 User Manual

Part Number 8205

SEALEVEL®
SYSTEMS INCORPORATED

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Introduction

The SeaLINK PIO-96, part number 8205, provides an easy method for interfacing common digital I/O circuitry via any computer's USB port. Typical applications include control/monitoring of TTL devices (e.g. LEDs, small solenoids, small relays) and interfacing to solid-state relay racks (SSRs) for high-power AC or DC loads.

The SeaLINK PIO-96's 96 digital I/O channels are accessed via four 50-pin header connectors with industry-standard pin out. Each header provides 24 bits of digital I/O divided into three eight-bit groups. Each eight-bit group may be individually configured via software command as input or output to best match your particular application requirements.

The SeaLINK PIO-96 is designed to be used under Windows 98/ME/2000/XP. The SeaI/O API (Application Programmer Interface) included on CD with the SeaLINK PIO-96 provides a variety of useful high-level function calls implemented in a Windows dynamic link library (DLL). This API gives access to the SeaLINK PIO-96's I/O from Windows-based platforms such as Visual C++. In addition to the API, SeaI/O includes an ActiveX control along with sample code and utilities to simplify software development.

Other Sealevel SeaLINK USB to Digital I/O Products

SeaLINK PIO-48   (P/N 8203)   - 48 TTL Inputs/Outputs

SeaLINK PLC-16 (P/N 8206)   - 8 Form C Outputs/ 8 Opto-isolated Inputs

SeaLINK REL-16 (P/N 8207)   - 16 Reed Relay Outputs

SeaLINK ISO-16   (P/N 8208)   - 16 Opto-isolated Inputs

SeaLINK DIO-16 (P/N 8209)   - 8 Reed Outputs/8 Opto-isolated Inputs

Before You Get Started

What's Included

The SeaLINK PIO-96 is shipped with the following items. If any of these items is missing or damaged please contact Sealevel for replacement.
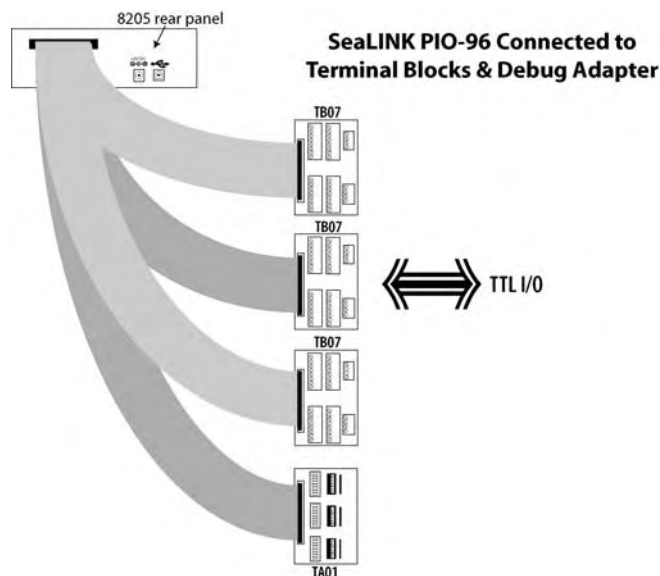
- **SeaLINK PIO-96 Module**
- **Sealevel SeaI/O Software CD**
- **5V Power Supply**
- **USB Cable for Connecting SeaLINK PIO-96 to Host**

Optional Items

Depending upon your application, you are likely to find one or more of the following items useful for interfacing the SeaLINK PIO-96 to real-world signals. All items can be purchased from our website (http://www.sealevel.com) or by calling 864-843-4343.

For TTL applications:

- **Terminal Block Kit - (Part Number KT107)**
  - Kit includes the TB07 screw terminal block and CA167 ribbon cable for connecting one of the SeaLINK PIO-96's 50-pin header connectors to your I/O. 6" Snap track and DIN rail clips are included for DIN rail mounting.

- **IDC 50 to IDC 50 Pin 40" Ribbon Cable (Part Number CA167)**
  - Interfaces each of the SeaLINK PIO-96's 50-pin header connectors.

- **Simulation/debug module (Part Number TA01)**
  - Module allows monitoring status of output pins and controlling state of input pins. An LED corresponding to each port bit illuminates to indicate state. Eight position DIP-switches are used to generate input status changes.

SeaLINK PIO-96 Connected to Terminal Blocks & Debug Adapter

For high-current, high-voltage applications:

- **IDC 50 to IDC 50 Pin Ribbon Cable (Part Number CA167)**
  - 40" cable connects the SeaLINK PIO-96 to solid-state relay racks equipped with 50-pin header interface.

- **IDC 50 to IDC 50 Pin Ribbon Cable (Part Number CA135)**
  - 40" cable connects the SeaLINK PIO-96 to solid-state relay racks equipped with 50-pin edge connector.

- **Solid-State Relay Racks:**
  - **Quad six position relay rack (Part Number PB24HQ)**
    - Relay rack can accept up to six QSSRs for a total of 24 channels. Features a 50-pin header connector for easy interface via 50-conductor ribbon cables.

  - **Quad four position relay rack (Part Number PB16HQ)**
    - Relay rack can accept up to four QSSRs for a total of 16 channels. Features a 50-pin header connector for easy interface via 50-conductor ribbon cables.

- **Quad Solid-State Relay Modules:**
  - **AC Input (Part Number IA5Q)** - Provides 4 channels of discrete I/O interface to monitor AC inputs up to 140V @ 10mA.
  - **DC Input (Part Number IB5Q)** - Provides 4 channels of discrete I/O interface to monitor DC inputs from 3.3V to 32V.
  - **AC Output (Part Number OA5Q)** - Provides 4 channels of discrete I/O interface to control AC outputs up to 140V @ 3A.
  - **DC Output (Part Number OB5Q)** - Provides 4 channels of discrete I/O interface to control DC outputs up to 60V @ 3A.

- **Simulation/debug module (Part Number TA01)**
  - Module simulates the operation and load characteristics of a standard 24-channel relay rack. An LED corresponding to each port bit illuminates to indicate state. Eight position DIP-switches are used to generate input status changes.
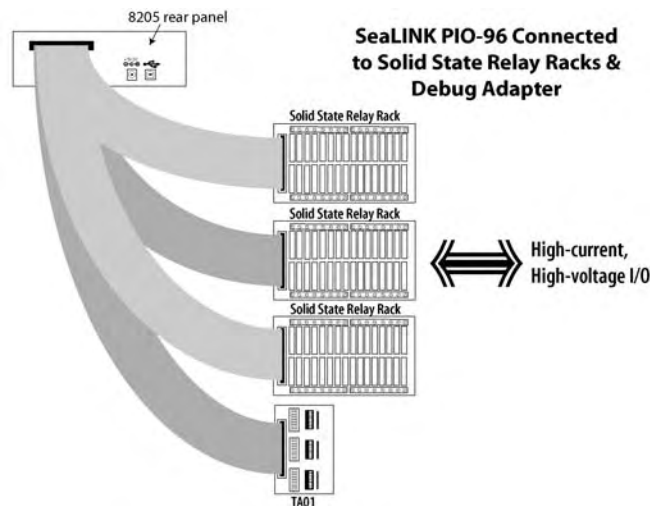
Software Installation

Windows 98/ME/2000/XP Installation

Important: Do not connect the SeaLINK PIO-96 adapter to the host USB device until the software has been fully installed.

1. Start Windows.

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

3. If 'Auto-Start' is enabled for this drive the software will automatically launch. Otherwise, point your browser to the 'Index.htm' on the root directory of the CD

4. Select 'Install Software'.

5. Select the Part Number for your adapter from the listing.

6. Select 'Windows 98/ME/2000/XP'. The setup file will automatically detect the operating environment and install the proper components. Next (depending on your browser) select the 'Run this program from its current location' or 'Open' option. Follow the information presented on the screens that follow.

7. A screen may appear with the declaration: "The publisher cannot be determined due to the problems below: Authenticode signature not found." Please select the 'Yes' button and proceed with the installation. This declaration simply means that the Operating System is not aware of the driver being loaded. It will not cause any harm to your system.

8. During setup the user may specify installation directories and other preferred configurations. This program also adds entries to the system registry that are necessary for specifying the operating parameters for each driver. An uninstall option is also included to remove all registry/INI file entries from the system.

Windows NT Note: Windows NT is not USB aware and thus cannot support the SeaLINK PIO-96.

Physical Installation

The SeaLINK PIO-96 can be installed in any open USB port.

Do not plug the unit into a USB port until the software has been fully installed.

1. Simply connect the SeaLINK PIO-96 to your USB port with the supplied cable.

2. The software drivers installed during setup will automatically recognize and configure the device.

3. You should see one or more "New Hardware Found" windows, indicating the actual device being created.

4. Next, view your system's Device Manager.

5. You should have a new 'SeaIO 8205' in the SeaI/O Device heading indicating the installation was successful.

The SeaLINK PIO-96 is now ready for use.

Digital I/O Interface

The SeaLINK PIO-96's 96 digital I/O channels are accessed via four industry-standard 50-pin header connectors. Each header provides 24 bits of digital I/O divided into three eight-bit ports. Each port may be individually configured via software command as input or output.

50-pin Header Connectors

You will need to open the SeaLINK PIO-96's enclosure to access the four header connectors P2, P3, P4, and P5 (see Appendix B for connector locations). To open, remove the four screws found on the bottom panel of the unit. Once cables are connected to the headers reassemble the enclosure with the cables exiting the opening on the back panel of the unit.

Each of the four 50-pin connectors has the following pin out which is compatible with a wide variety of solid state relay racks:
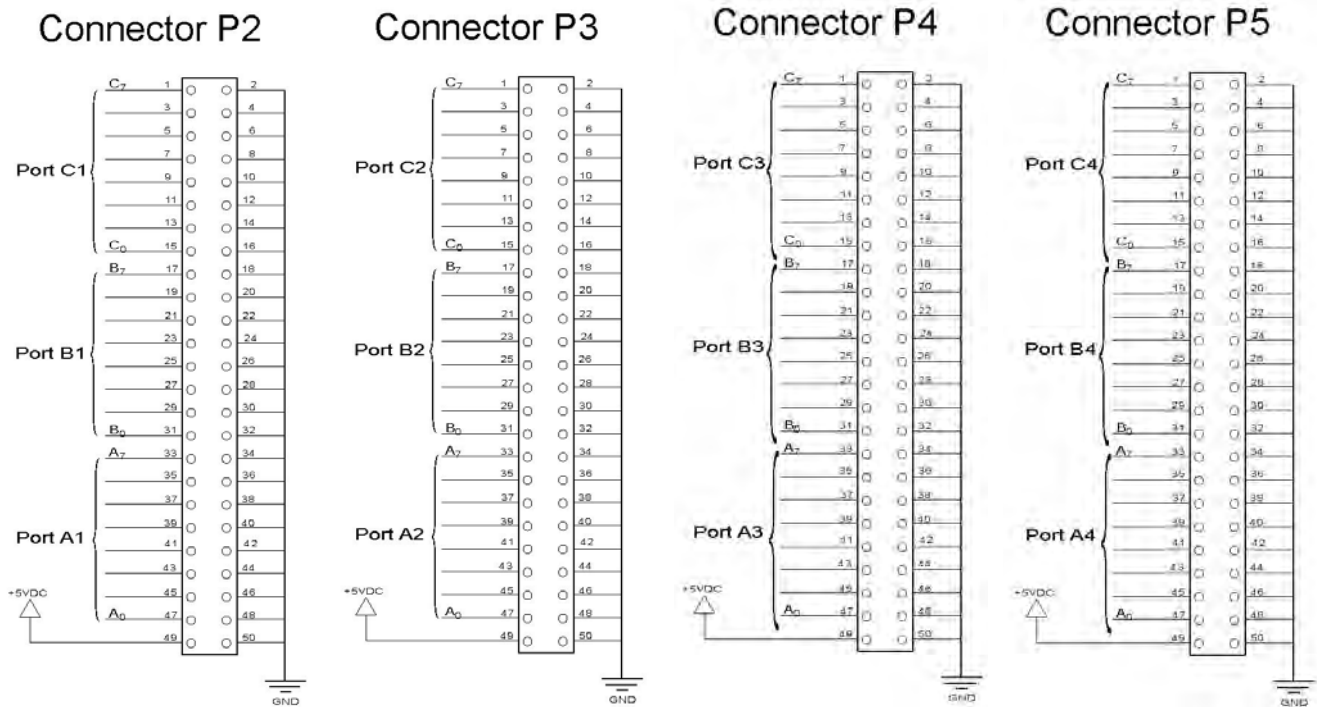
Programming the SeaLINK PIO-96

Sealevel's SeaI/O software is provided to assist in the development of reliable applications for the Sealevel Systems family of digital I/O adapters. Included on the SeaI/O CD are driver functions for use in accessing the I/O as well as helpful samples and utilities.

Programming for Windows

The SeaI/O 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 SeaLINK PIO-96. 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.
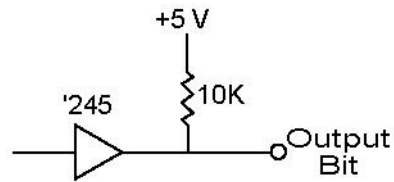
Electrical Characteristics

The SeaLINK PIO-96 uses 74ABT245 octal bi-directional transceivers to provide TTL input/output capabilities. Each bit is pulled to +5V through a 10K ohm pull-up resistor to insure each bit is at a known state when not driven.

Input Circuit Schematic
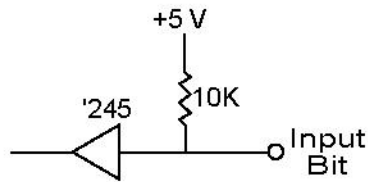
Output Circuit Schematic

Specifications

Inputs

- Logic High: Min 2VDC
- Logic Low: Max 0.8VDC

Outputs

- Logic High: Min 2VDC @ 32 mA
- Logic Low: Max 0.5VDC @ 64 mA

Temperature Range

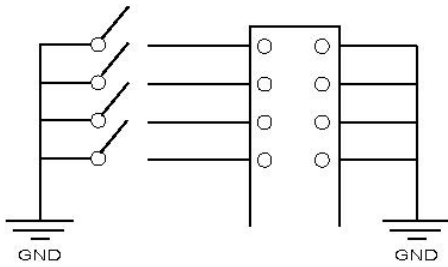- Operating: 0°C – 70°C
- Storage: -50°C – 105°C

Power Requirements
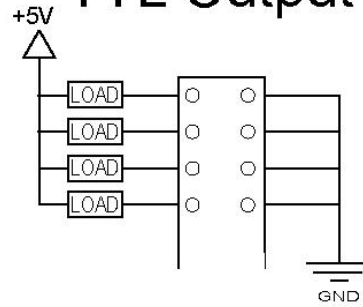
- 5VDC @ 400mA (no load); +5VDC @ 2.4A (Max)

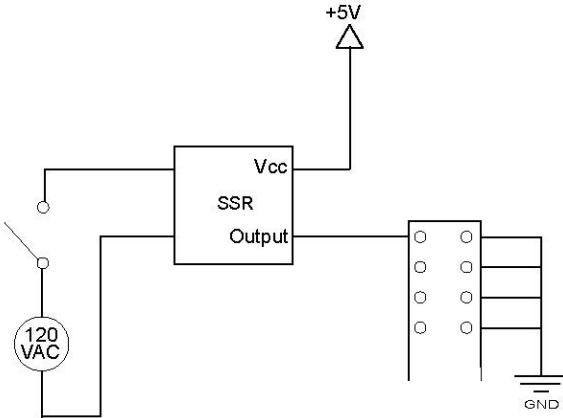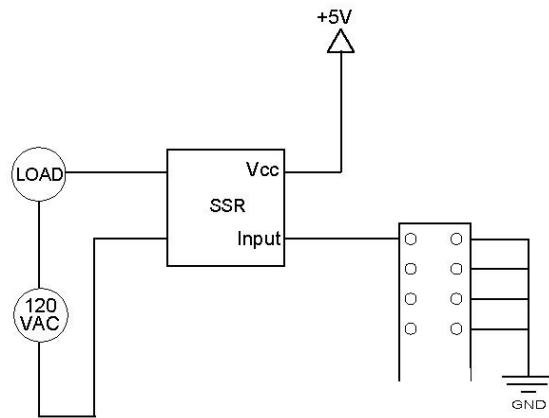# Example Circuits

TTL Input

TTL Output

Solid State Relay Input

Solid State Relay Output

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.

4. Use the SeaIO Control Panel applet or the Device Manager's property page for card identification and configuration.

5. 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-5PM Eastern Time Monday through Friday. For email support contact mailto: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 – 8205 PCB
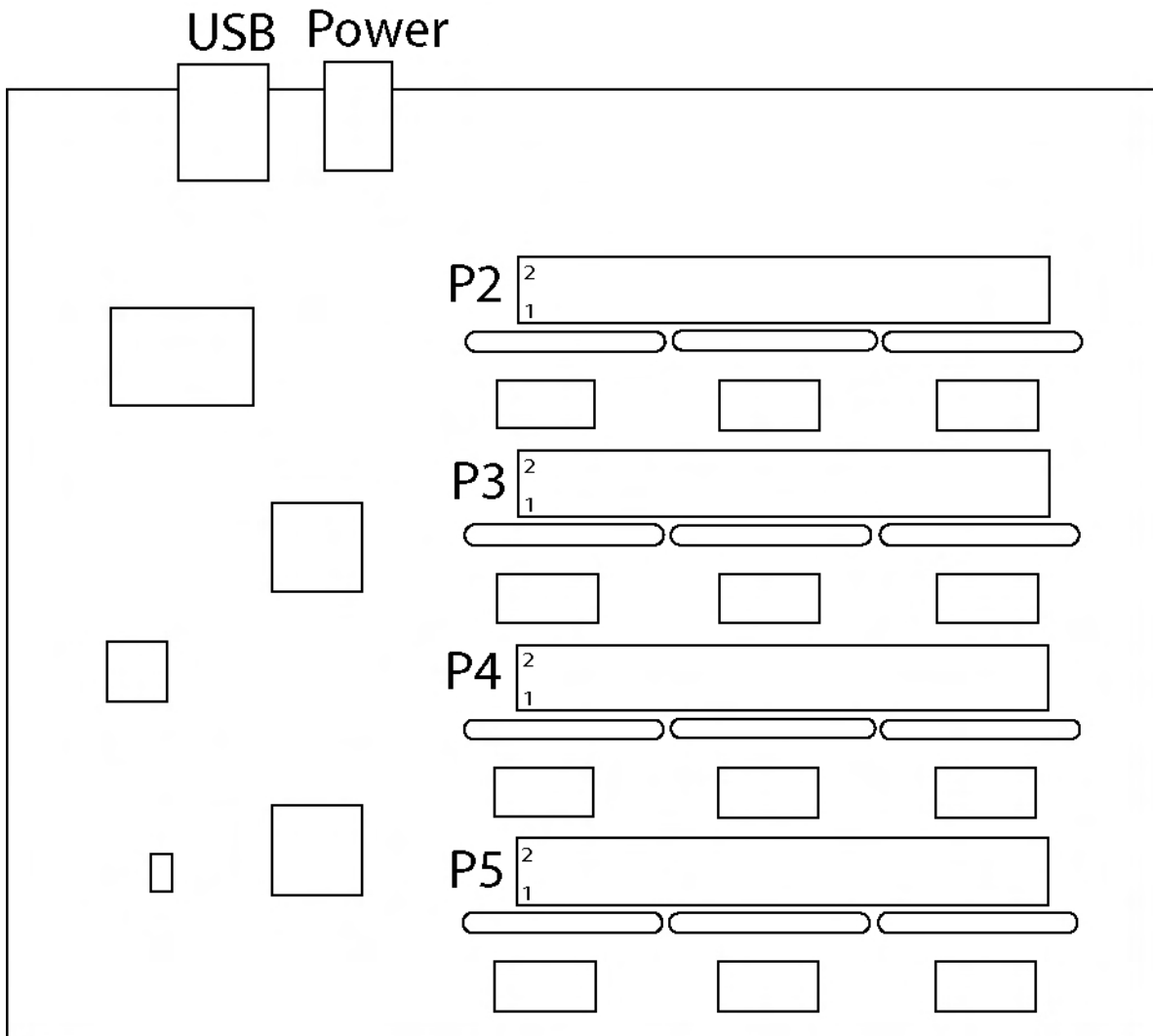
Appendix D - Compliance Notices

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
2779 Greenville Highway
P.O. Box 830
Liberty, SC 29657 USA
(864) 843-4343   FAX: (864) 843-3067
www.sealevel.com
email: support@sealevel.com

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

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