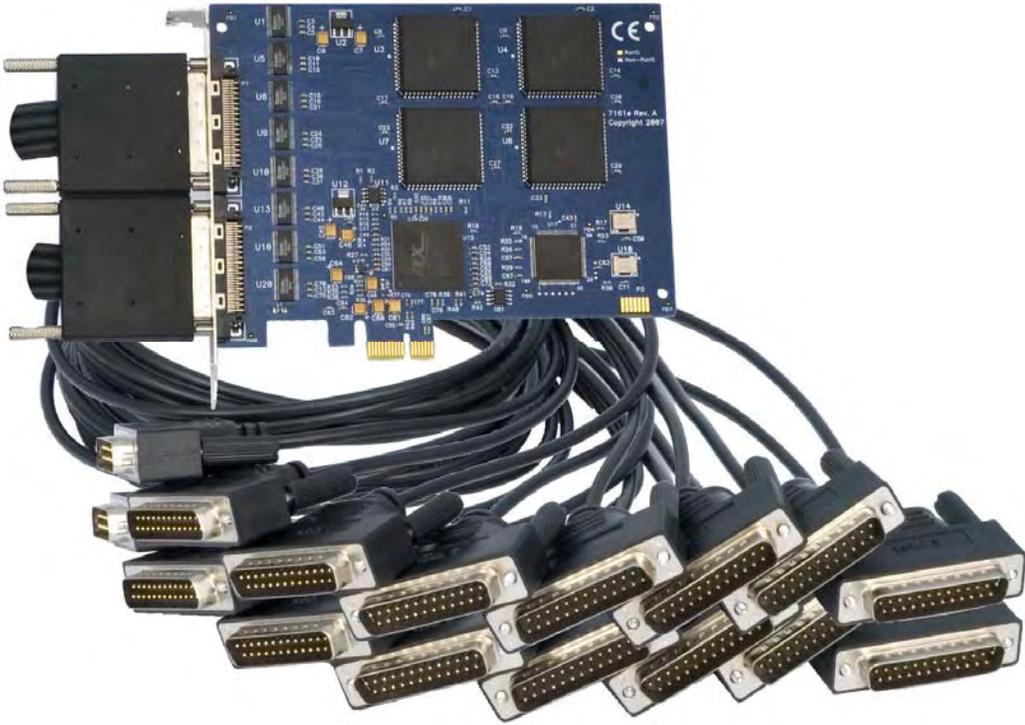


COMM+ 16.PCIe User Manual



Part Number 7161e



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Introduction

The COMM+16.PCIe provides sixteen RS-232 asynchronous serial ports capable of data rates to 460.8K bps. Each RS-232 port implements all modem control signals for maximum compatibility with a wide range of peripherals. The board is PCI Express X1 compliant and can be used in any x1, x2, x4, x8, or x16 PCI Express slot. The board utilizes 16C854 UARTs to provide 128-byte Tx/Rx FIFOs for maximum reliability in data intensive applications. Standard operating temperature range is 0°C to 70°C and extended temperature range (-40°C to +85°C) versions are available.

The board ships with two 36" 'spider' cables that terminate to a total of sixteen DB-25M connectors (Item# 7161e) or sixteen DB-9M connectors (Item# 7161e-DB9). Additional ordering options allow the choice of UARTs for custom baud rates and 9-bit protocols.

The COMM+16.PCIe is designed to be used with a variety of operating systems including Microsoft Windows and Linux. Sealevel's SeaCOM software uses the standard Windows WIN32 API and eliminates proprietary DLL files. This allows Sealevel SeaCOM software to maintain 100% compatibility with Microsoft Windows applications. SeaCOM software also includes sample code and utilities to simplify application development.

Other Sealevel Serial I/O Products

Sealevel serial I/O products offer the widest choice of I/O connectivity available for RS-232, RS-422 and RS-485 interfaces. In addition to PCI Express boards, Sealevel offers serial I/O solutions for multiple platforms including PCI Bus, Low Profile & Universal Bus PCI, Ethernet, USB, PC/104, PCMCIA, Compact PCI and serial interface converters. Sealevel's SeaCOM software and a variety of test/debug utilities are included to simplify installation and application development. Product information can be found on the Sealevel website at www.sealevel.com.

Before You Get Started

What's Included

Depending on cable option, the COMM+16.PCIe is shipped with the following items. If any of these items is missing or damaged please contact Sealevel for replacement.

- **Item# 7161e – RS-232 Serial Interface with DB-25M Connectors**
 - COMM+16.PCIe – PCI Express 16-Port RS-232 Board
 - (2) Item# CA202 – 36” ‘Spider’ Cable with 8 DB-25M Connectors
- **Item# 7161e-DB9 – RS-232 Serial Interface with DB-9M Connectors**
 - COMM+16.PCIe – PCI Express 16-Port RS-232 Board
 - (2) Item# CA231 – 36” ‘Spider’ Cable with 8 DB-9M Connectors
- **Sealevel SeaCOM Software CD**

Optional Items

Depending upon your application, you are likely to find one or more of the following items useful for interfacing the COMM+16.PCIe. All items can be purchased from our website (<http://www.sealevel.com>) or by calling 864-843-4343.

- **DB25 Male to DB25 Female Extension Cable (Item# CA104)**

A 72” serial extension cable with one DB25 male connector and one DB25 female connector, pinned one-to-one.
- **DB9 Male to DB9 Female Extension Cable (Item# CA127)**

A 72” serial extension cable with one DB9 male connector and one DB9 female connector, pinned one-to-one.
- **DB9 Female to DB25 Male RS-232 Modem Cable (Item# CA177)**

A 72” standard RS-232 modem cable that connects to a DB9 male serial port and provides a convenient connection to serial peripherals with DB25 connectors.
- **DB25 Female to RJ45 Modular Adapter (Item# RJ25S8)**

The RJ25S8 converts a standard DB25 connector to an RJ45 connection, which allows the use of standard twisted pair cabling. The RJ25S8 ships unassembled and can be configured for virtually any pin out.
- **DB9 Female to RJ45 Modular Adapter (Item# RJ9S8)**

The RJ9S8 converts a standard DB9 connector to an RJ45 connection, which allows the use of standard twisted pair cabling. The RJ9S8 ships unassembled and can be configured for virtually any pin out.
- **DB25 Female to DB9 Male RS-232 Converter (Item# CA140)**

A small molded adapter that converts an RS-232 DB25 male connector to an RS-232 DB9 male connector.

Software Installation Instructions

Windows 98/ME/NT/2000/XP Operating Systems

Do not install the board until the software has been fully 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 Software'.
5. Select the Part Number for your device from the listing.
6. The setup file will automatically detect the operating environment and install the proper components. Follow the information presented on the installation 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, you 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 included to remove the driver and all registry/INI file entries from your system.
9. Proceed with the physical installation of your serial adapter.

Linux Installation

Refer to the subdirectory **D:\Software\SeaCOM\Other\Linux** (replace "D:" with your actual CD drive letter) found on the Sealevel Software CD. This folder contains valuable information on installing your serial adapter in the various Linux releases. Also included is a series of files explaining proper Linux syntax and typical Linux serial implementations.

3rd Party Software Support

Third party software support for many HMI/MMI and other process control software is included on the product installation CD. For the most up to date information on third party software support, please visit <http://www.sealevel.com/thirdpartysoftware.asp>.

Physical Installation

The COMM+16.PCIe can be installed in any available x1, x2, x4, x8, or x16 PCI Express slot.

Do not install the board until the software has been fully installed.

1. To avoid accidental damage, be sure to follow proper ESD procedures by grounding yourself and the serial adapter.
2. Turn off PC power and disconnect the power cord.
3. Remove the PC case cover.
4. Locate an available PCI Express slot and remove the blank metal slot cover.
5. Gently insert the PCI Express serial adapter into the slot making sure the adapter is seated properly.
6. Replace the screw (or spring clip) to secure the card in the PC case. This step is required to ensure FCC Part 15 compliance.
7. Replace the PC cover and connect the power cord.
8. Turn on the PC and login as a user with Administrator privileges, if applicable.
9. The software drivers installed during setup will automatically recognize and configure the serial adapter.
10. You should see two or more “Found New Hardware Wizard” dialog boxes, indicating the actual COM ports are being created.
11. **Note:** The installation will repeat once for each COM port created (a total of 17 times on the COMM+16.PCIe). This is a limitation in the way Windows installs serial devices.
12. Next, view your system’s Device Manager.
13. You should have new COM: ports in the Ports (COM & LPT) Device Class indicating the installation was successful.
14. You can access your new COM: port by using the assigned COM: identifier. This assignment will vary from system to system.
15. To verify operation use Sealevel Systems supplied WinSSD diagnostic utility. WinSSD can be found in the Start menu, under All Programs, and then under the Sealevel SeaCOM programs group.

The COMM+16.PCIe is now ready for use.

Technical Description

The Sealevel Systems COMM+16.PCIE provides a PCI Express 1.0a compliant interface adapter with 16 RS-232 asynchronous serial ports for industrial automation and control applications. The COMM+16.PCIE utilizes 16C854 UARTs which feature programmable baud rates, data format, interrupt control and industry leading 128 byte transmit and receive FIFOs.

7161e Connector Pin Assignments (DB-25M)

The 7161e includes two 'spider' cables (Item# CA202), each with eight DB25 connectors. The pin out of each connector is shown in the table below.

Name	Pin #	Mode
TD Transmit Data	2	Output
RD Receive Data	3	Input
RTS Request To Send	4	Output
CTS Clear To Send	5	Input
DSR Data Set Ready	6	Input
GND Ground	7	
DCD Data Carrier Detect	8	Input
DTR Data Terminal Ready	20	Output
RI Ring Indicator	22	Input

Note: Please terminate any control signals that are not going to be used. The most common way to do this is to connect RTS to CTS and RI. Also, connect DCD to DTR and DSR. Terminating these pins, if not used, will help ensure you get the best performance from your adapter.

7161e-DB9 Connector Pin Assignments (DB-9M)

The 7161e-DB9 includes two 'spider' cables (Item# CA231), each with eight DB9 connectors. The pin out of each connector is shown in the table below.

Name	Pin #	Mode
DCD Data Carrier Detect	1	Input
RD Receive Data	2	Input
TD Transmit Data	3	Output
DTR Data Terminal Ready	4	Output
GND Ground	5	
DSR Data Set Ready	6	Input
RTS Ready To Send	7	Input
CTS Clear To Send	8	Input
RI Ring Indicator	9	Input

Note: Please terminate any control signals that are not going to be used. The most common way to do this is to connect RTS to CTS and RI. Also, connect DCD to DTR and DSR. Terminating these pins, if not used, will help ensure you get the best performance from your adapter.

DB-68 Connector Pin Assignments (Micro MDB-68F)

The COMM+16.PCIe board includes two Micro MDB68 female connectors for connecting the 'spider' cables explained on the previous page. The pin out for each connector is shown in the tables below.

Port #	1	2	3	4	5	6	7	8
TD	1	9	19	27	35	43	53	61
RI	2	10	20	28	36	44	54	62
DCD	3	11	21	29	37	45	55	63
DTR	4	12	22	30	38	46	56	64
RTS	5	13	23	31	39	47	57	65
DSR	6	14	24	32	40	48	58	66
RD	7	15	25	33	41	49	59	67
CTS	8	16	26	34	42	50	60	68
GND	17	17	18	18	51	51	52	52

Port #	9	10	11	12	13	14	15	16
TD	1	9	19	27	35	43	53	61
RI	2	10	20	28	36	44	54	62
DCD	3	11	21	29	37	45	55	63
DTR	4	12	22	30	38	46	56	64
RTS	5	13	23	31	39	47	57	65
DSR	6	14	24	32	40	48	58	66
RD	7	15	25	33	41	49	59	67
CTS	8	16	26	34	42	50	60	68
GND	17	17	18	18	51	51	52	52

Note: Both 'spider' cables are interchangeable and can be used on either connector. The connector on the left supports Ports 1-8 and the connector on the right supports Ports 9-16.



Electrical Characteristics

Features

- PCI Express 1.0a compliant via x1 connector
- Integrates 16C854 buffered UARTs with 128-byte FIFOs
- Supports data rates to 460.8K bps
- All modem control signals implemented
- Available with DB25 or DB9 cable connectors

Specifications

Temperature Range

- Operating: $-0^{\circ} - +70^{\circ}\text{C}$
- Storage: $-50^{\circ} - +105^{\circ}\text{C}$

Humidity Range

- 10 - 90% R.H. (Non-Condensing)

Power Requirements

- +12VDC @ 79mA (0.95W)
- +3.3VDC @ 575mA (1.9W)

Physical Dimensions

Length	Width
5.5"	4.4"
14.0 cm	11.1 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.

Appendix A - Troubleshooting

Sealevel utility test software is supplied with the Sealevel Systems adapter and may be used in the troubleshooting procedures. Using this software and following these simple steps can eliminate most common problems without the need to call Technical Support.

1. Identify all I/O adapters currently installed in your system, including onboard serial ports, controller cards, sound cards, etc. The I/O addresses used by these adapters as well as any IRQs (if any) should be identified.
2. Configure your serial adapter so that there is no conflict with currently installed adapters. No two adapters can occupy the same I/O address.
3. Make sure the serial adapter is securely installed in a motherboard slot.
4. Ensure that the Sealevel Systems SeaCOM software has been installed on the machine so that the necessary files are in place to complete the installation.
5. When the COMM+16.PCIe is configured properly, Sealevel's WinSSD utility and a loopback plug can be used to check communications. You can make a simple Loopback in the field by connecting the TX and RX pins. If you decide to test the Modem Control Signals, a full pin loopback plug will be required. Details on loopback plugs are included within WinSSD. Contact Sealevel Systems if you need further assistance.
6. When testing the COMM+16.PCIe in loopback mode, you should see both the TD and RD echoed as data on the screen. The loopback test first transmits a HEX pattern, 55AA, and then an ASCII string of data. If this test passes, then the COMM+16.PCIe is ready for use in your application.
7. Always use the Sealevel Systems diagnostic software when troubleshooting a problem. This will eliminate any software issues and identify hardware conflicts.

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 8:00 AM to 5:00 PM Eastern Time Monday through Friday.

For email support contact support@sealevel.com.

Appendix B - How To Get Assistance

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 maintains a website on the Internet. Our homepage 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. Manuals and software can also be downloaded from the product page for your device.

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

Technical support is available Monday to Friday from 8:00 AM to 5:00 PM eastern time (UTC-6 hours). You can contact Technical Support via:

Phone: (864) 843-4343

Email: support@sealevel.com

Appendix C – Electrical Interface

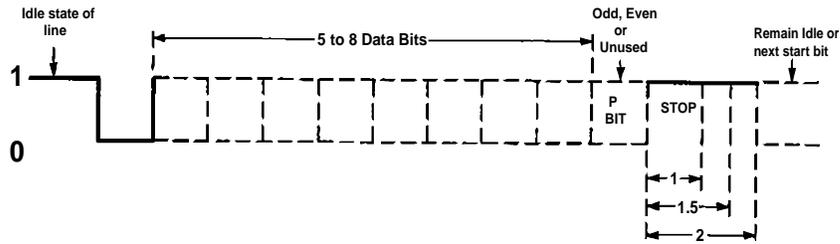
RS-232

Quite possibly the most widely used communication standard is RS-232. This implementation has been defined and revised several times and is often referred to as RS-232 or EIA/TIA-232. The IBM PC computer defined the RS-232 port on a 9 pin D sub connector and subsequently the EIA/TIA approved this implementation as the EIA/TIA-574 standard. This standard is defined as the *9-Position Non-Synchronous Interface between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange*. Both implementations are in wide spread use and will be referred to as RS-232 in this document. RS-232 is capable of operating at data rates up to 20 Kbps at distances less than 50 ft. The absolute maximum data rate may vary due to line conditions and cable lengths. RS-232 is a single ended or unbalanced interface, meaning that a single electrical signal is compared to a common signal (ground) to determine binary logic states. The RS-232 and the EIA/TIA-574 specification define two types of interface circuits, Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE). The COMM+16.PCIe is a DTE device.

Appendix D - Asynchronous Communications

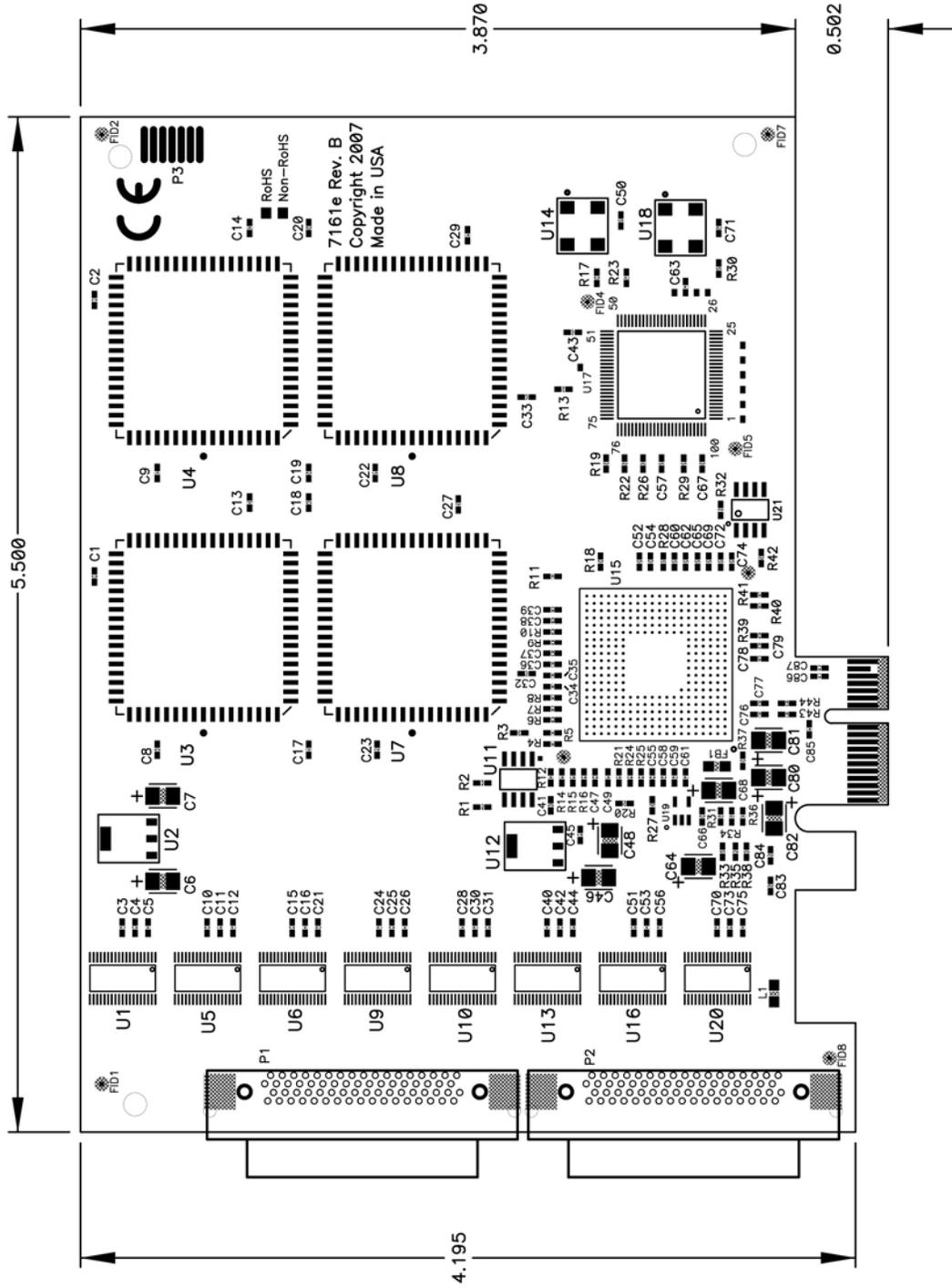
Serial data communications implies that individual bits of a character are transmitted consecutively to a receiver that assembles the bits back into a character. Data rate, error checking, handshaking, and character framing (start/stop bits) are pre-defined and must correspond at both the transmitting and receiving ends.

Asynchronous communications is the standard means of serial data communication for PC compatibles and PS/2 computers. The original PC was equipped with a communication or COM: port that was designed around an 8250 Universal Asynchronous Receiver Transmitter (UART). This device allows asynchronous serial data to be transferred through a simple and straightforward programming interface. A starting bit followed by a pre-defined number of data bits (5, 6, 7, or 8) defines character boundaries for asynchronous communications. The end of the character is defined by the transmission of a pre-defined number of stop bits (usually 1, 1.5 or 2). An extra bit used for error detection is often appended before the stop bits.



This special bit is called the parity bit. Parity is a simple method of determining if a data bit has been lost or corrupted during transmission. There are several methods for implementing a parity check to guard against data corruption. Common methods are called (E)ven Parity or (O)dd Parity. Sometimes parity is not used to detect errors on the data stream. This is referred to as (N)o parity. Because each bit in asynchronous communications is sent consecutively, it is easy to generalize asynchronous communications by stating that each character is wrapped (framed) by pre-defined bits to mark the beginning and end of the serial transmission of the character. The data rate and communication parameters for asynchronous communications have to be the same at both the transmitting and receiving ends. The communication parameters are baud rate, parity, number of data bits per character, and stop bits (i.e. 9600, N, 8, 1).

Appendix E – Silk Screen – 7161e PCB



Appendix F - 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.

 NOTE: 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.
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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.

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Trademarks

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