Intel ® Core™ Flexio Fanless Industrial Embedded Computer

User Manual | Intel ® Core™ Flexio Fanless Industrial Embedded Computer



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Introduction

Overview

The **Intel ® Core ™ Flexio Fanless Industrial Embedded Computer:** Flexible, Limitless, Embedded, Xpandable I/O – and a whole lot more. The Flexio Computer, powered by an Intel industrial processor, features (4) RS-232/422/485 software configurable serial ports, (3) USB 3.2 Gen 2 ports Type A, (1) USB 3.2 Gen 2 ports Type C (capable of DisplayPort), (1) Gigabit Ethernet port (1) 2.5 Gigabit Ethernet port, (1) DisplayPort, and (1) HDMI port as a base system with flexible, configurable I/O options to fulfill specific application requirements. With a fanless design, the Flexio has a 0° to 50°C operating temperature range and is compatible with Windows 11, Windows 10 IoT 2021 LTSC, and Ubuntu Linux.

Fueled by an Intel Core processor, the Flexio Fanless Industrial Embedded Computer is intentionally designed to provide power, connectivity, and performance. This combination makes the Flexio an ideal controller for industrial automation, control, point-of-sale, test and measurement, medical, and security applications.

With support for DIN rail or VESA mounting, the Flexio Fanless Industrial Embedded Computer is designed for easy installation in existing frameworks and for new system integrations as well. The Flexio features a solid-state design for an extended lifespan, diminished opportunities for failure, and quiet operation. With a rugged enclosure and carefully defined tolerances through analytics and statistical performance modeling, the Flexio has fully optimized thermal transfer.

With flexible connectivity designed by the leader in I/O engineering, the Flexio Fanless Industrial Embedded Computer combines industrial processing with application-specific I/O to meet requirements. Standard I/O includes (4) RS-232/422/485 software configurable serial ports, (3) USB 3.2 Gen2 ports, (1) USB 3.2 Gen 2 port Type-C (capable of DisplayPort), (1) Gigabit Ethernet port (1) 2.5 Gigabit Ethernet port, (1) DisplayPort, and (1) HDMI port. Flexio computers offer I/O configurations for a variety of USB to serial, USB to digital, and USB to analog-based control systems.

Flexio Fanless Industrial Rugged Computers are fully compatible with the leading SeaI/O data acquisition devices for limitless I/O configuration.

Features

- Up to 0ºC to 50ºC wide operating temperature range
- 9-36VDC input with locking 3-position connector
- (1) Gigabit (10/100/1000BaseT) Ethernet Port
- (1) 2.5 Gigabit Ethernet Port
- (3) USB 3.2 Gen2 Type A , (1) USB 3.2 Gen2 Type C
- (1) HDMI connector
- (1) Video DisplayPort++
- (4) RS-232/422/2-wire and 4-wire RS-485 Ports
- (1) PCIe Gen 4 NVMe Interface
- (1) Mic In / Line Out
- 10.5” (L) x 5.324” (W) x 3.145” (H) dimensions



USB to 2-Port RS-232, RS-422, RS-485
(2) DE9 Ports
Software Selectable Interface



4-Port USB 2.0 Hub
(4) Downstream USB Ports: (1 CDP and 3 SDP)
(1) CDP Supplies Up to 1.5A to a Connected Device
(3) SDP Supply Up to 500mA to Each Connected Device



USB to 4 Optically Isolated Inputs/4 Form C Relay Outputs
(4) Optically Isolated, Dry Contact Inputs
(4) SPDT Form C Relay Outputs



USB to 8 A/D, 2 Optically Isolated Inputs, and 2 Solid-State Relay Outputs
(8) 12-bit Single-Ended, or (4) Differential Inputs
(2) Optically Isolated Inputs
(2) SPST Form A Solid-State Relay Outputs

Before You Get Started

What's Included

The Flexio is shipped with the following items. If any of these items are missing or damaged, please contact Sealevel for replacement.

- **Flexio™ Fanless Industrial Embedded Computer**
- **3-POS terminal block for power input.**
- **Installation instructions including compliance and rating information.**

Advisory Conventions



Warning
The highest level of importance used to stress a condition where damage could result to the product, or the user could suffer serious injury.



Important
The middle level of importance used to highlight information that might not seem obvious or a situation that could cause the product to fail.



Note
The lowest level of importance used to provide background information, additional tips, or other non-critical facts that will not affect the use of the product.

Optional Items

Depending upon your application, you are likely to find one or more of the following items useful with the Flexio Fanless. All items can be purchased from our website (www.sealevel.com) or by calling our sales team at (864) 843-4343.

Cables

CAT5 Patch Cable, 7’ In Length (Part# CA246)	
Standard 7' CAT5 Unshielded Twisted Ethernet Pair Patch Cable (RJ45) with blue jacket.	
CAT5 Patch Cable, 10' In Length (Part# CA247)	
Standard 10’ CAT5 Unshielded Twisted Pair Ethernet Patch Cable (RJ45) with blue jacket. USB 2.0, TYPE A SeaLATCH TO USB 2.0 TYPE B, 6 FT LONG	
USB-C to DisplayPort™ Adapter Cable 4K30Hz- Black, 3ft (0.9m) (Part# CA881)	
The USB-C to DisplayPort Cable allows for a direct connection of a USB-C enabled laptop or device to a DisplayPort input on a projectoror display. This adapter supports up to a 4K (4096 x 2160 at 30Hz) resolution—allowing it to deliver a high quality video image to the connected display.	
USB-C 3.2 (Gen 2) 10Gbps Male to Male Cable (20V 5V), 3.3ft (1m) (Part# CA882)	
This one cable offers high speed data transfer, 4K video support, high bit depth audio, and power delivery. It can deliver up to 10Gbps to or from a USB 3.1 (Gen2) enabled port, stream video and audio with full DisplayPort 2.1 and 'Alt' mode functionality, display up to 4K video.	

Loopback Adapters (accessory for 9540)

DB9 Female Serial Loopback Adapter (Part# LB101)	
The LB101 can be used to test any Sealevel serial device with a DB9 male connector. Only the data pins are looped back.	

Power Supply

85-264VAC to 24VDC @ 5A , Desktop Power Supply (Part# TR176)	
The TR176 is a desktop (brick style) power supply rated for 85-264VAC input and 24VDC output at 5 amps. The cable has tinned leads for use with products that have screw terminals for input power.	
90-264VAC to 24VDC @ 5A , Din Rail Power Supply (Part# TR178)	
The TR178 is a din rail power supply rated for 90-264VAC input and 24VDC output at 5 amps.	

Solid State Drives

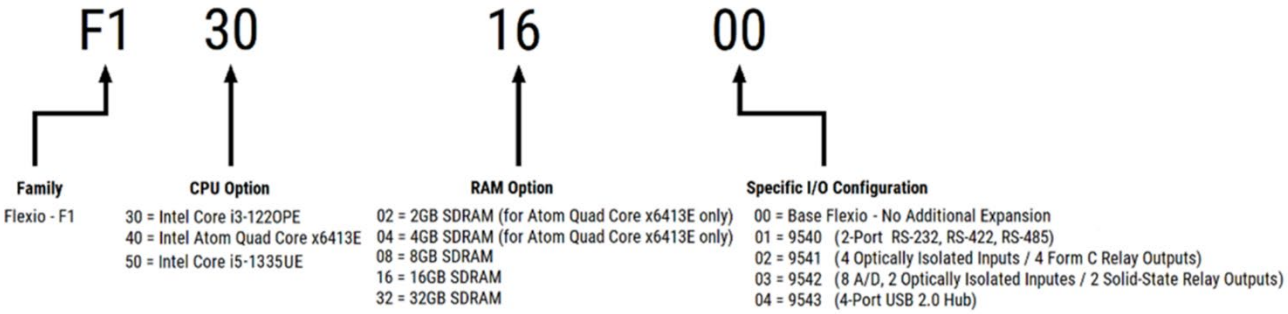
SSD PCIe Gen 4 x 4 2280 M.2 M-Key NVMe TLC W/O DRAM (3D TLC, 0C to 70C)	
The ADATA IM2P41B8 NVMe 1.4 PCIe Gen 4 x 4 M.2 2280 solid state drive utilizes 3D NAND flash and provides superb R/W performance of up to 3400/2800MB per second. Its P/E cycle has been upgraded to 3K and can operate normally in harsh environments from 0C to 70C for excellent endurance, reliability, and stability. It supports RAID Engine and End to End (E2E) Data Protection for data integrity and safety. For enhanced data security, it comes with AES 256-bit encryption (optional) and meets TCG Opal standard (optional). Features: • PCIe Gen4x4 interface/ NVMe 1.4 compliant • 112-layer 3D TLC (BiCS5) NAND flash for higher capacities and endurance • 3K P/E cycle rating for great durability and reliability • AES 256-bit Data Encryption and TCG OPAL 2.0 • LDPC ECC error correction, RAID Engine, and End-to-End Data Path Protection • Thermal Throttling automatically adjusts temperatures for prolonged product lifespan • Complies with ESD (Electrostatic Discharge) IEC/EN 61000-4-2 level 4 standard • Suitable for server, networking, surveillance, and IoT related applications It is available in the following storage capacities: • 256GB (Part #107368) • 512GB (Part #107366) • 1TB (Part #107370)	

Other Options

VESA Mounting Bracket (Part# KT144)	
The KT144 VESA mounting bracket provides an easy solution to mount a F1 Flexio fanless industrial embedded computer to the back of a panel-mount LCD display. This allows you to choose the ideal display for your application and create a rugged Panel PC solution. The bracket includes spacers that provide an air gap between the LCD panel and the bracket to maintain proper passive cooling of the F1 Flexio computer. Once the KT144 is VESA mounted, four metal tabs and screws securely mount the F1 Flexio enclosure to the bracket. The KT134 kit includes the VESA bracket, four M4-10 panhead machine screws, four M4 x 4.2 mm aluminum spacers, and four 4-40 x 5/16 flat head screws.	

Technical Description

Flexio Fanless Part Number Breakdown



Sample of Orderable Flexio Fanless Part Numbers

Part Number	COM Express Module Description	RAM
F1301600	Intel Core i3-1220PE CPU	16GB DDR5 4800
F1301601	Intel Core i3-1220PE CPU with 2-Port RS-232, RS-422, RS-485	16GB DDR5 4800
F1301602	Intel Core i3-1220PE CPU with 4 Optically Isolated Inputs / 4 Form C Relay Outputs	16GB DDR5 4800
F1301603	Intel Core i3-1220PE CPU with 8 A/D, 2 Optically Isolated Inputs, and 2 Solid-State Relay Outputs	16GB DDR5 4800
F1301604	Intel Core i3-1220PE CPU with 4-Port USB 2.0 Hub	16GB DDR5 4800
F1501600	Intel Core i5-1335UE CPU	16GB DDR5 4800
F1501601	Intel Core i5-1335UE CPU with 2-Port RS-232, RS-422, RS-485	16GB DDR5 4800
F1501602	Intel Core i5-1335UE CPU with 4 Optically Isolated Inputs / 4 Form C Relay Outputs	16GB DDR5 4800
F1501603	Intel Core i5-1335UE CPU with 8 A/D, 2 Optically Isolated Inputs, and 2 Solid-State Relay Outputs	16GB DDR5 4800
F1501604	Intel Core i5-1335UE CPU with 4-Port USB 2.0 Hub	16GB DDR5 4800

System Description

The following I/O connectors use industry standard pin outs for maximum compatibility.

Function	Connector Type
Digital Video Output	(1) DP++ (1) HDMI (1) DisplayPort over Type C
10/100/1000 (Gigabit Ethernet) Network Connections	(1) RJ45
2.5 GB Gigabit Ethernet Network	(1) RJ45
RS-232 Serial Ports	(4) DB9 Terminal Block
USB 3.0 Device	(3) Type A (1) Type C

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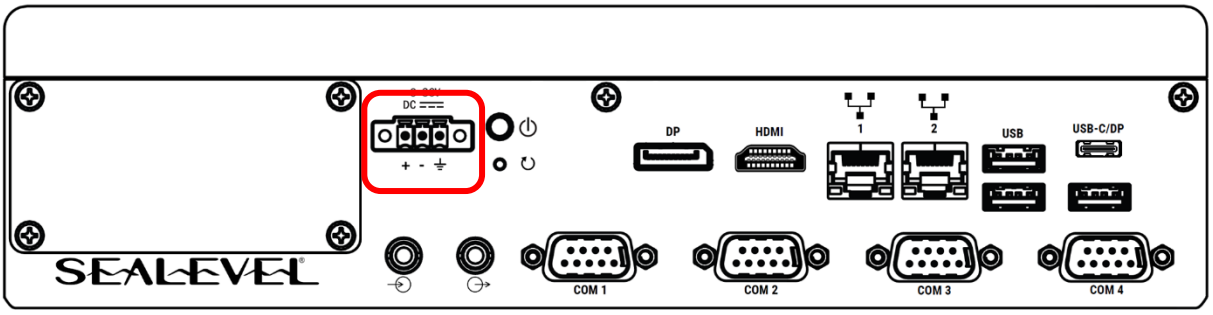
RAM Configuration Options

The Flexio Fanless Industrial Embedded Computer is available in a variety of configurations, see the Sealevel website for all configurations:

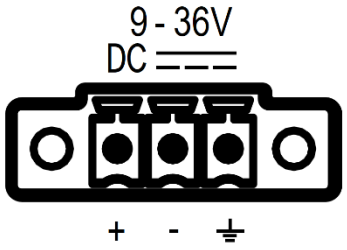
Flexio™ Fanless Industrial Embedded Computers

Power Input

The system is designed to operate from 9VDC up to 36VDC. The current draw varies across this range; it is heavily dependent on the COM Express module, peripheral devices and installed software. The main power input is via a 3-pos 3.81mm pluggable, locking connector (SL#106237). The power source must be suitable for the maximum ambient temperature at the installation.



CKT #	Signal	Name
1	+	Positive DC Power
2	-	Negative DC Power (GND)
3	⏚	Chassis Ground

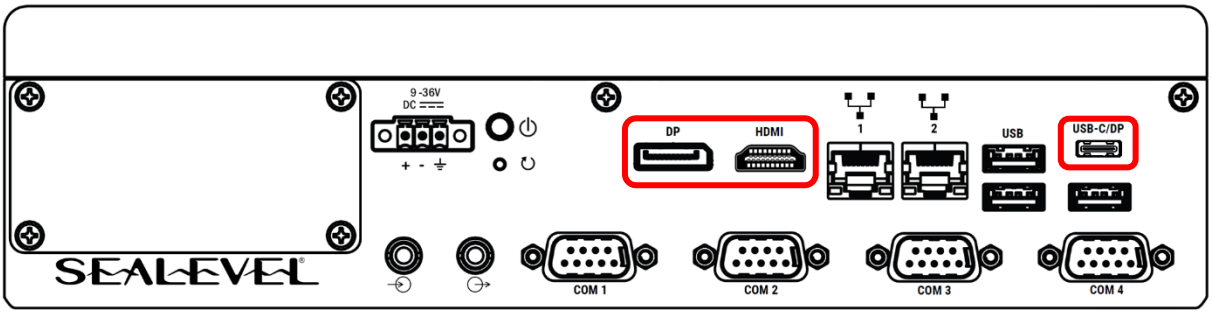


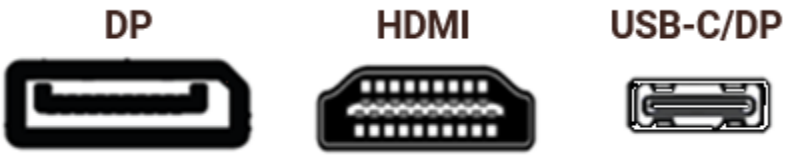
9-36VDC Input Power

If you are providing your own power supply, ensure it can provide adequate power across your ambient operating environment including temperature derating.

Digital Video Output

The system has three video outputs: (1) DP++ , (1) HDMI, and (1) USB Type C.



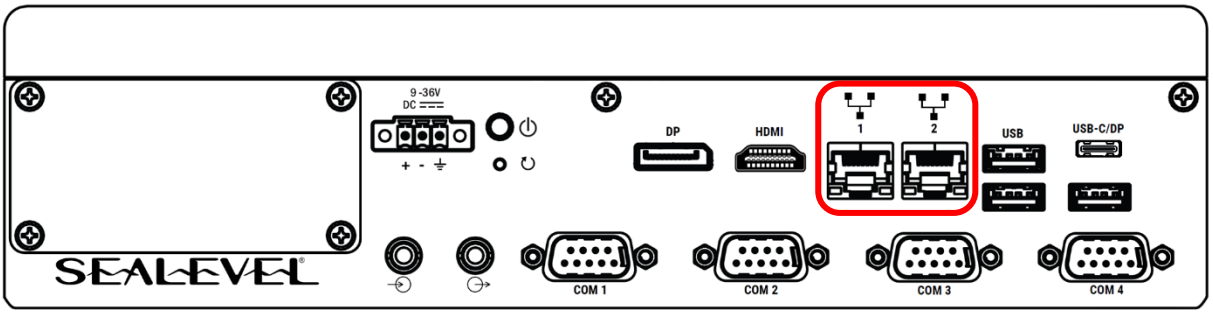


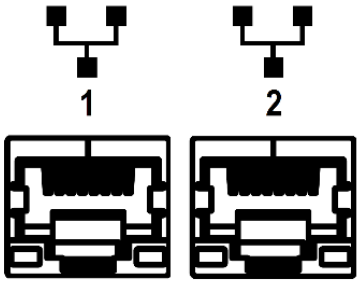
DP++, HDMI, and USC-C/DP Ports

DP++ (Dual Mode DisplayPort) supports HDMI and DVI signals in addition to the standard DisplayPort signals. This allows the use of passive adapters to single-link HDMI or DVI connectors.

Ethernet

The system has one 10/100/1000 (Gigabit Ethernet) Network port and one 10/100/1000/2500 (2.5 Gigabit Ethernet).





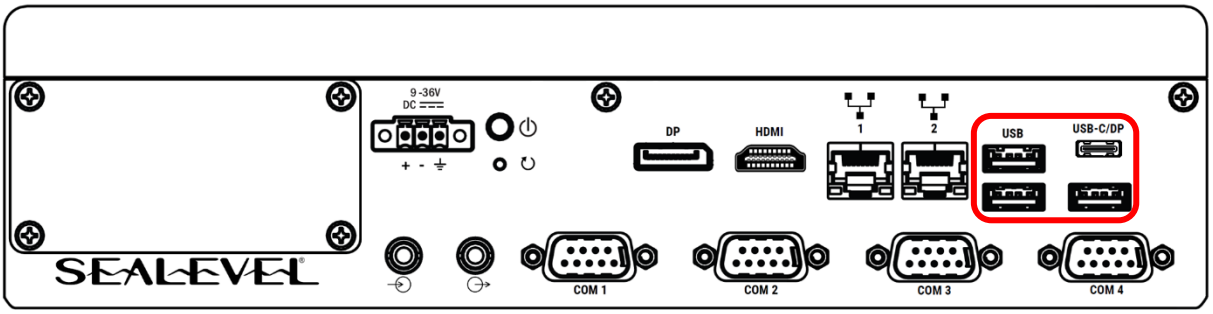
Port 1 – 1 Gbe

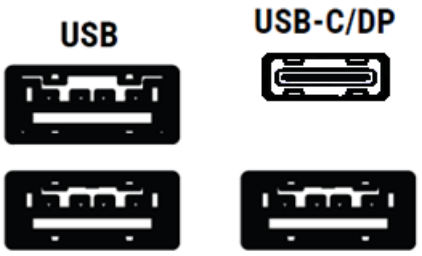
Port 2 – 2.5 GBe

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USB

The Flexio Fanless Industrial Embedded Computer provides 3 USB 3.2 Gen2 Type A ports and 1 USB 3.2 Gen2 Type C port.



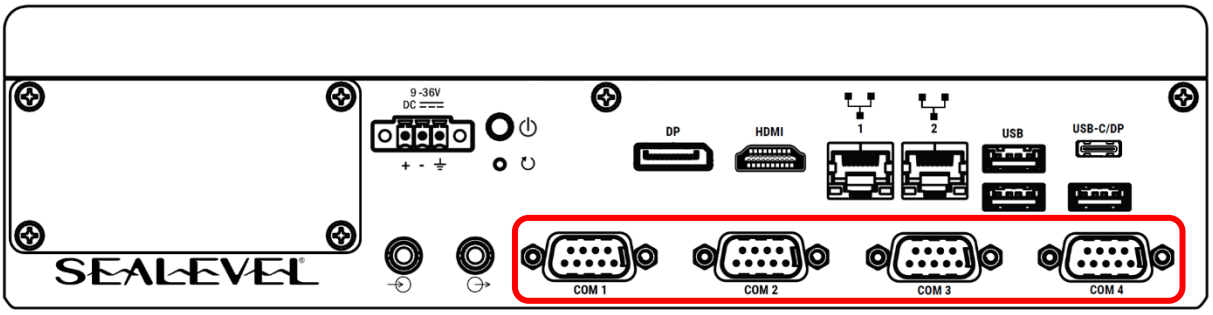


3 USB 3.2 Gen2 Type A Ports

(1) USB 3.2 Gen2 Type C Port

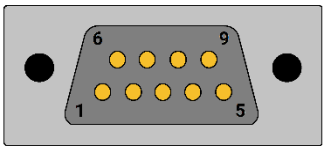
Serial Communications – Base/Common

You can connect to a variety of serial peripherals via the Flexio Flanless serial ports. To start with, there are four configurable serial ports which are provided on 4 RS232/422/485 DB9 connectors, supporting baud rates up to 115,200 baud in each of those modes. The serial ports are BIOS software configurable to add termination across each data pair.





DB9 connectors



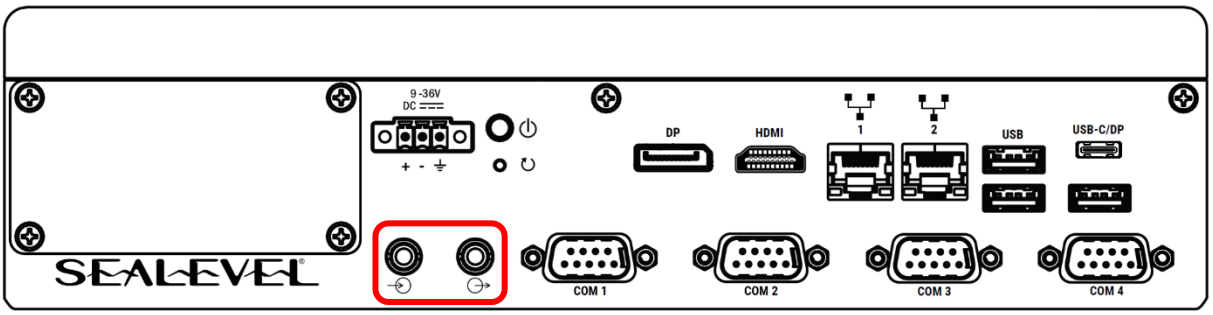
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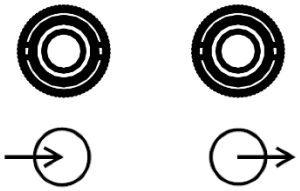
Base Pinout Table - RS232/422/485 (DB9 Male)

Pin #	RS232 Signal	RS232 Name	RS232 Mode	RS422/485 Signal (4 Wire)	RS422 Name	R422/485 Mode (4 Wire)	RS485 Signal (2 Wire)	RS485 Name	R485 Mode (2 Wire)
1	DCD	Data Carrier Detect	I	TX-	Transmit Negative	O	DATA-	Data Negative	I/O
2	RX	Receive	I	TX+	Transmit Positive	O	DATA+	Data Positive	I/O
3	TX	Transmit	O	RX+	Receive Positive	I	N/C	Not Connected	N/A
4	DTR	Data Terminal Ready	O	RX-	Receive Negative	I	N/C	Not Connected	N/A
5	GND	Ground	N/A	GND	Ground	N/A	GND	Ground	N/A
6	DSR	Data Set Ready	I	N/C	Not Connected	N/A	N/C	Not Connected	N/A
7	RTS	Request to Send	O	N/C	Not Connected	N/A	N/C	Not Connected	N/A
8	CTS	Clear to Send	I	N/C	Not Connected	N/A	N/C	Not Connected	N/A
9	RI/+5V/ +12V	Ring Indicator	I/PWR	N/C	Not Connected	N/A	N/C	Not Connected	N/A

Audio Interfaces

The Flexio Fanless Industrial computer provides both a Microphone In port and a Line Out port.





Mic In and Line Out

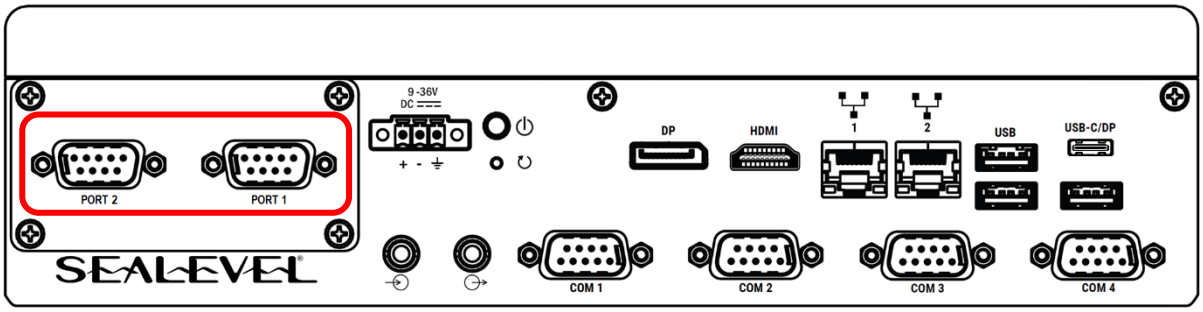
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Flexio I/O Expansion Options

I/O Configuration F1 XX XX 01 (9540, 2-port RS-232/422/485)

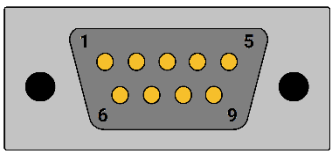
This configuration of the Flexio utilizes a high speed UART with 128-byte Tx FIFOs and 384-byte Rx FIFOs. The chips feature data rates up to 921.6K bps and software selectable serial interface via our PortManager utility.







RS-232 Port 2 and RS-232 Port 1



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Expansion Pinout Table

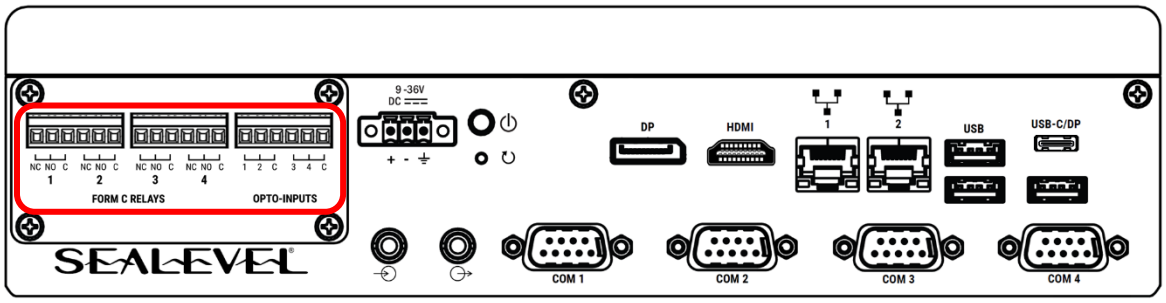
Pin #	RS232 Signal	RS232 Name	RS232 Mode	RS422/485 Signal (4 Wire)	RS422 Name	R422/485 Mode (4 Wire)	RS485 Signal (2 Wire)	RS485 Name	R485 Mode (2 Wire)
1	DCD	Data Carrier Detector	I	RX+	Receive Positive	I	NC	No Connect	N/A
2	RX	Receive	I	RX-	Receive Negative	I	NC	No Connect	N/A
3	TX	Transmit	O	TX-	Transmit Negative	O	DATA-	Data Negative	I/O
4	DTR	Data Terminal Ready	O	TX+	Transmit Positive	O	DATA+	Data Positive	I/O
5	GND	Ground	N/A	GND	Ground	N/A	GND	Ground	N/A
6	DSR	Data Set Ready	I	N/C	Not Connected	N/A	N/C	Not Connected	N/A
7	RTS	Request to Send	O	N/C	Not Connected	N/A	N/C	Not Connected	N/A
8	CTS	Clear to Send	I	N/C	Not Connected	N/A	N/C	Not Connected	N/A
9	RI	Ring Indicator	I	N/C	Not Connected	N/A	N/C	Not Connected	N/A

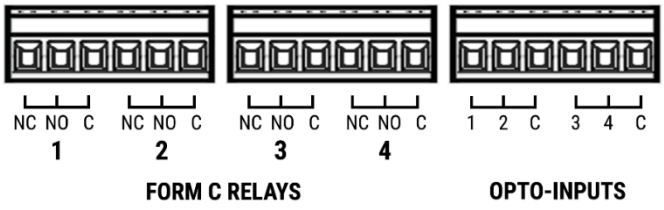
I/O Configuration F1 XX XX 02 (9541, 4 Optically Isolated Inputs/4 Form C Relay Outputs)

You can control 4 Form C relay outputs and monitor up to 4 optically isolated inputs. Each Form C relay has a discrete common (ground) and each pair of inputs share a common. Form C relays can switch up to 60VDC @ 5A (5VDC minimum) or 50VAC @ 6A. The non-polarized input voltage range is 5-30VDC and features 2500VAC RMS / 3500VDC optical isolation to protect the host computer from damaging voltage transients and ground loops commonly found in industrial environments.

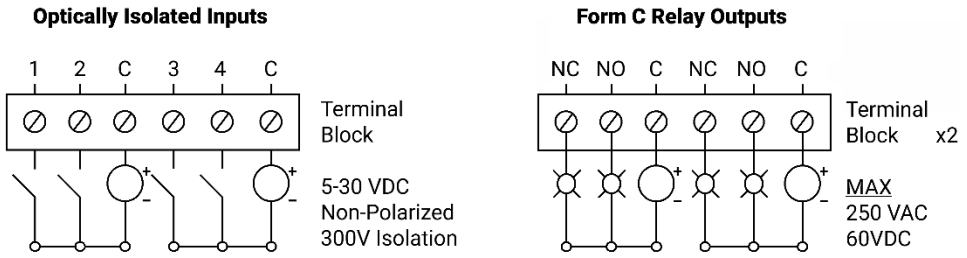
Field wiring is simplified via 3.5mm removable screw terminal blocks with optional spring clamp terminal blocks also available. The removable terminal blocks are compatible with 16-30AWG field wiring.







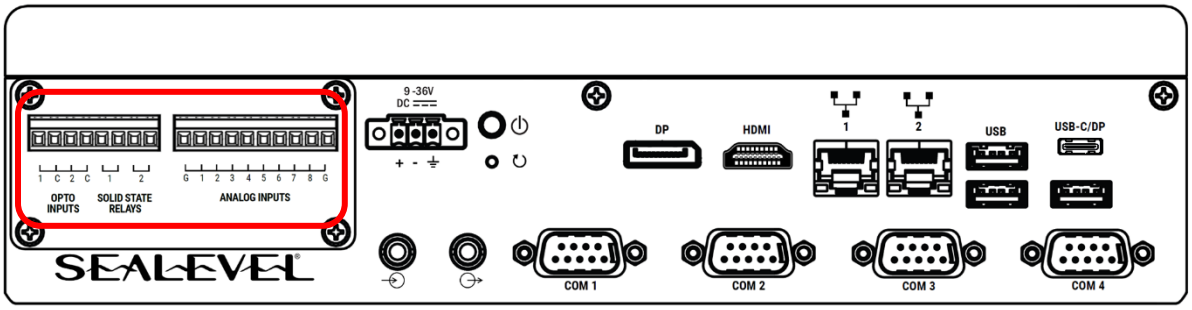
4 Form C Relays Outputs and 4 Optically Isolated Inputs

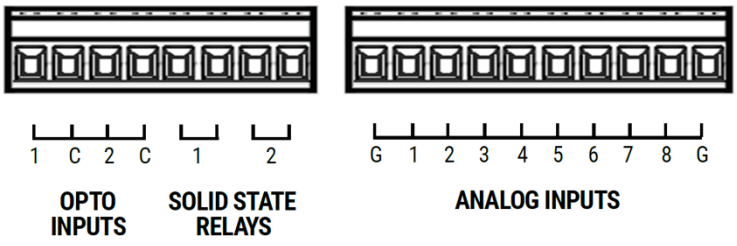


I/O Configuration F1 XX XX 03 (9542, 8 A/D, 2 Optically Isolated Inputs, and 2 Solid-State Relay Outputs)

This configuration of the Flexio provides 8 analog inputs 2 optically isolated digital inputs and 2 SPST Form A solid state relay outputs. Analog inputs can be configured via software as 8 single ended inputs or 4 differential inputs. Voltage ranges are software configurable as 0-5V, 0-10V, -5V to 5V and -10V to 10V to provide optimal accuracy depending on application. Digital inputs are pre-biased internally and current limited so a connection to ground is all that is necessary to activate the input. The inputs also provide 1000V isolation to digital ground. Solid state relays can switch up to 60VDC at 2.5A.





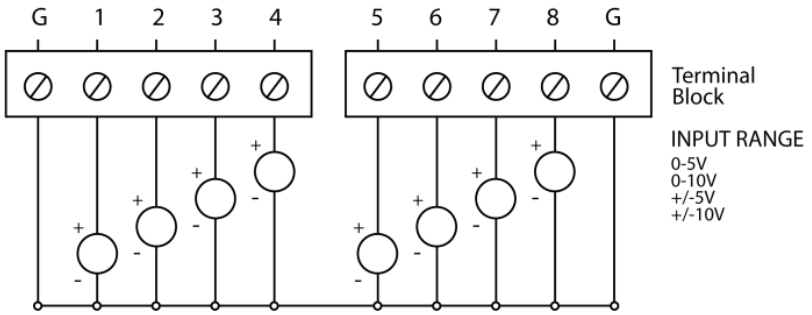


2 Optically Isolated Inputs, 2 Solid-State Relay Outputs and 8 Analog Device Inputs

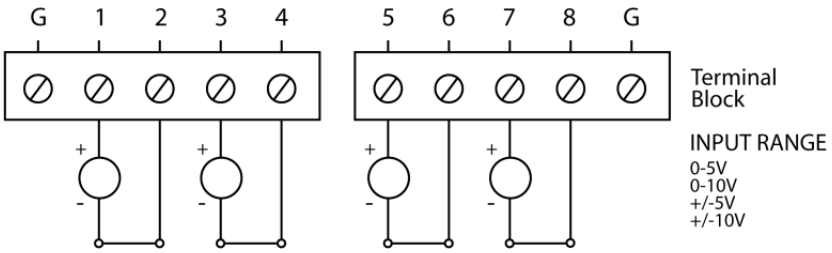
Analog Inputs	
Mode	8 single ended or 4 differential
Voltage Range	0V-5V, 0V-10V, -5V-5V, -10V-10V
Resolution	12bit
Input Impedance	100kΩ

The analog inputs can operate as 8 single ended inputs or 4 differential inputs. See wiring diagrams below for terminal numbering and channel pairing.

Eight 12-Bit Single-Ended A/D Inputs

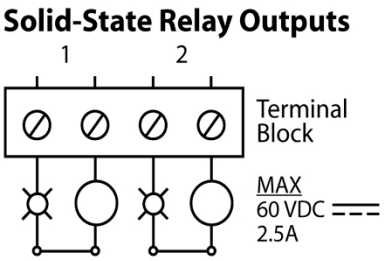


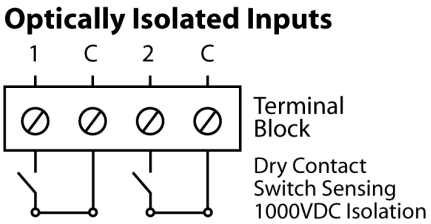
Four 12-Bit Differential A/D Inputs



© Sealevel Systems, Inc.

Relay Outputs	
Type	2 SPST solid state relays
Power	DC 150W
Contact Voltage	60VDC max
Contact Current (DC)	2.5A max.
Digital Inputs	
Type	2 Dry Contact Sensing
Isolation	1000VDC
Source Current	12mA max



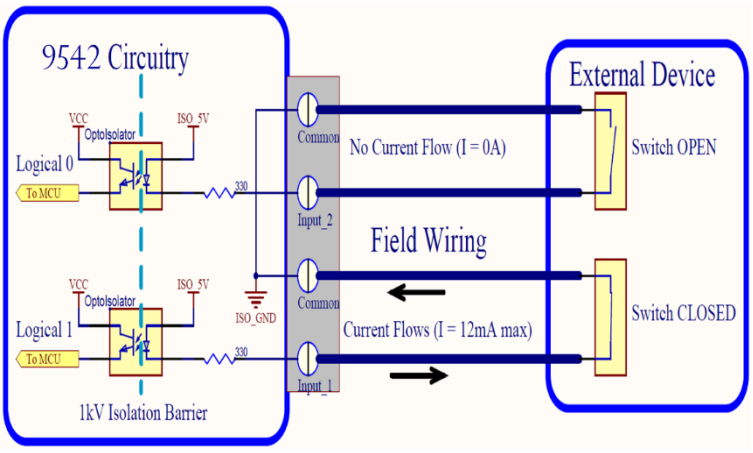


The optically isolated digital inputs featured on the 9542 are designed unlike the opto-inputs found on many other Sealevel products. The 9542 provides a voltage to the opto input, which is current limited with a 330 ohm resistor. Connecting either of the inputs to a common pin will cause current to flow through the opto-isolator, activating the input.

The inputs were designed this way, so the end-user does not need to provide a voltage source. A simple external contact closure is all that is required to trigger the input.

Two common pins are provided with the optically isolated inputs for convenience; however, both common pins of the inputs are electrically equivalent on the board.

The diagram below shows how the inputs are intended to be used.

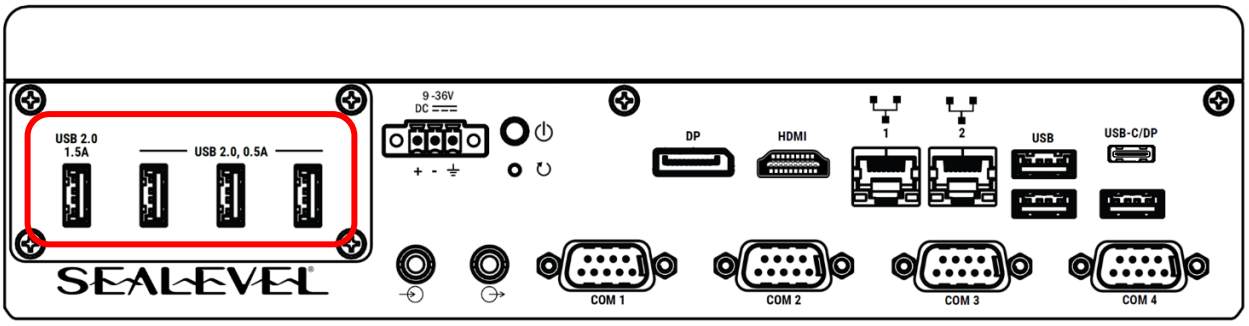


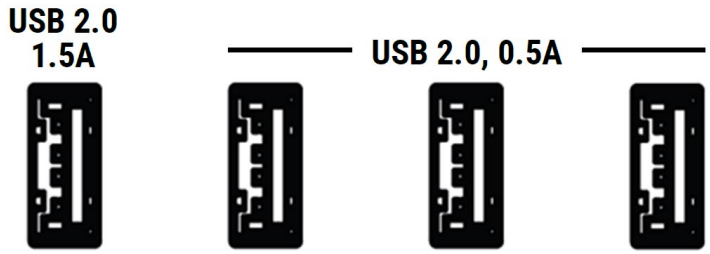
© Sealevel Systems, Inc.

I/O Configuration F1 XX XX 04 (9543, 4-Port USB 2.0 Hub)

There are a total of 4 downstream USB 2.0 Ports. 1 CDP which supplies up to 1.5A to a connected device and 3 SDP which supplies up to 500mA to each connected device.





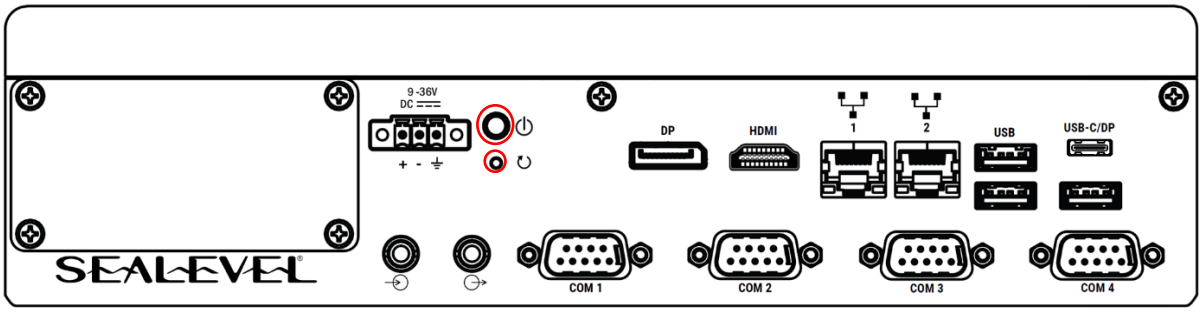


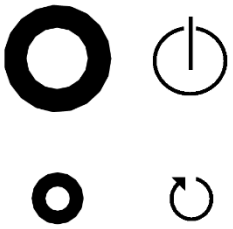
4-Port USB 2.0 Hub

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Power and Reset Buttons

A full system Hardware Reset is provided by a recessed tactile switch. The Processor and peripherals will be issued a reset command when the Reset button is pressed and held for 1 second. Use a blunt non-conductive instrument to depress the reset button. Just like with the Reset button, the Power button needs to be pressed and held for 3 seconds to turn the device on or off.





Power Button (Top) and Reset Button (Bottom)

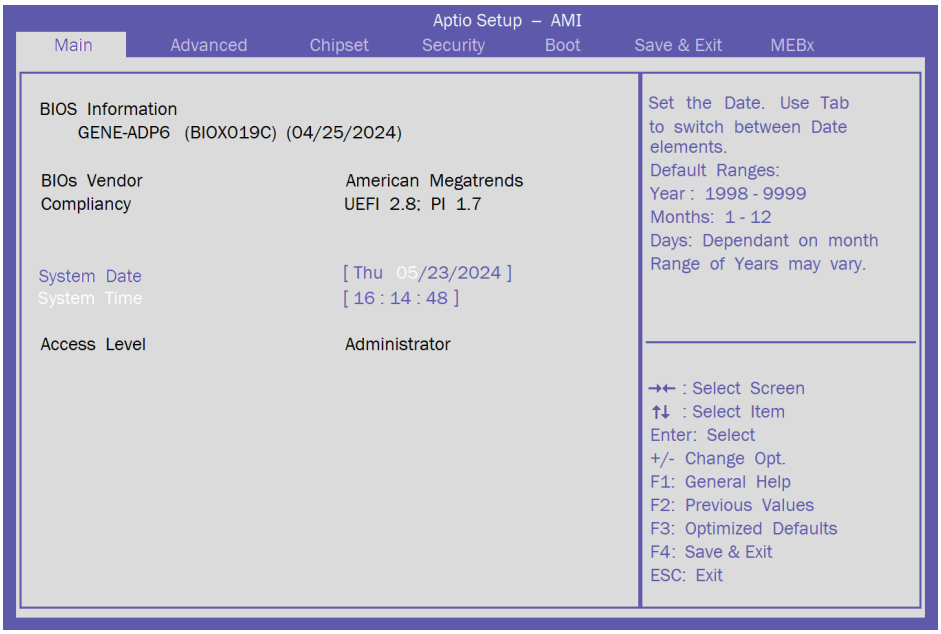
© Sealevel Systems, Inc.

BIOS Configuration

Press **F7** to select the boot device.

Press **Delete** to access the BIOS configuration screen.

Press the **F9** key while in the BIOS to restore to factory default.



Options of potential interest are:

- Advanced->CPU Configuration:
  - Hyper-Threading
  - Turbo Mode (Do Not use in hot environments)
  - C States
- Advanced->SIO Configuration
  - Serial Port 1
    - Electrical Interface Mode
      - RS232
      - RS485
      - RS422

        - Serial Port 2
            - Electrical Interface Mode
                - RS232
                - RS485
                - RS422
        - Serial Port 3
            - Electrical Interface Mode
                - RS232
                - RS485
                - RS422
        - Serial Port 4
            - Electrical Interface Mode
                - RS232
                - RS485
                - RS422
        -
- Boot
    - Change Boot Order

Press F7 at power up and a list of applicable boot devices will pop up.

Press F3 In BIOS to restore the BIOS settings to the default settings.

System Set-Up

The Base Flexio Fanless Industrial Embedded Computer system does not include a solid-state drive or operating system. These are added at the time of purchase and will be installed by Sealevel's experienced technicians. The OS and all necessary software drivers are preinstalled at the factory.

Hardware Installation

For full installation instructions, please refer to the Installation Guide provided with your Flexio Fanless. If you do not have the installation guide readily available, contact our sales team at sales@sealevel.com. They can also provide you with 3D model images, and compliance certifications for the Flexio Fanless.

Installation Considerations

The Flexio Fanless Industrial Embedded Computer system is a fanless, solid state computer that relies on thermal conduction to move heat from internal components to the outside of the enclosure. The lid is designed as a finned heat sink to increase overall surface area. Three main cooling methods can be used to optimize removal of heat from the system.

1. Airflow
2. Thermal conduction through mounting
3. Computer orientation

Airflow over the lid provides the most effective heat removal of these three options. It is optimal to mount the computer in an area that has either natural or forced airflow to constantly remove heat from the enclosure.

Mounting the computer to a large thermally conductive surface (such as an I-Beam, steel cabinet or other large metal surface) allows heat to travel through the enclosure and be dissipated into the large structure.



- Only technically qualified personnel are permitted to install the equipment.
- Do not use the system with visible damage to any part of the unit or cable connection.
- Reduced Air Flow - Installation of the equipment should be such that the natural airflow around the equipment is not compromised.
- Thermal derating – Installation of the system in vertical orientation is preferred for thermal performance. Forced airflow or derating of the maximum operating temperature may need to be considered in horizontal mounting orientation.

Drivers and Module Information

The following table provides the Single Board Computer family for the different models of the Flexio Fanless Industrial Embedded Computers.

Model	Manufacturer	Vendor Website
GENE-ADP6	AAEON	www.aaeon.com

If you need to install the operating system yourself, you will also need to install the applicable drivers. Some drivers apply to the hardware on the COM Express module; some are for devices present on the carrier board. The following table lists the devices that require drivers.

Device	Location	Driver Source
Chipset	Single Board Computer (SBC)	GENE-ADP6 Chipset Driver
Integrated Graphics	Single Board Computer (SBC)	GENE-ADP6 Graphics Driver
Network Connection 1	Single Board Computer (SBC)	GENE-ADP6 LAN Driver
Network Connection 2	Single Board Computer (SBC)	GENE-ADP6 LAN Utility
Serial Ports	Single Board Computer (SBC)	GENE-ADP6 SIO Driver
Audio	Single Board Computer (SBC)	GENE-ADP6 Audio Driver
ME & TXE	Single Board Computer (SBC)	GENE-ADP6 ME & TXE Driver
Peripheral	Single Board Computer (SBC)	Peripheral Driver
F130XX01	Expansion	SeaCOM
F130XX02	Expansion	SeaMAX
F130XX03	Expansion	SeaMAX

Sealevel Software Installation

This section details the installation procedure for the Sealevel Software packages applicable to different models of the Flexio F1. Not all packages are applicable to all models. Refer to the Drivers and Module Information for information on which software packages are applicable.

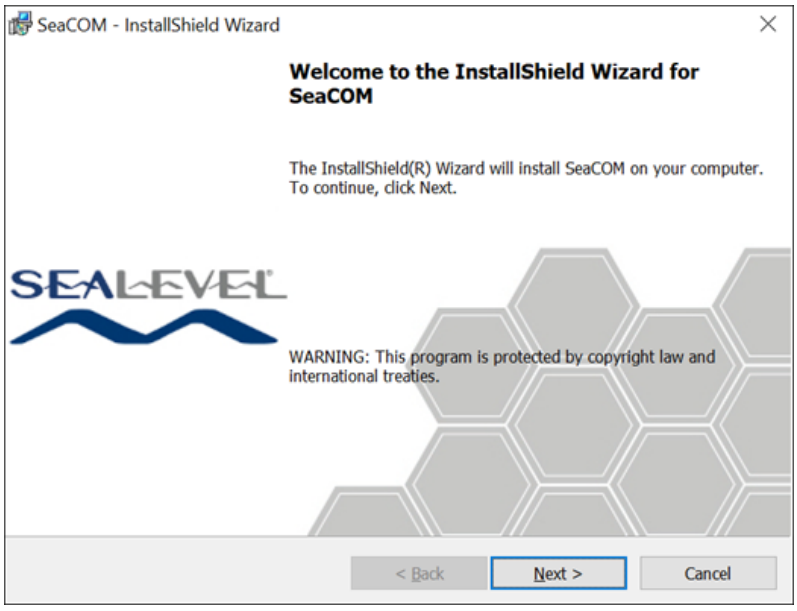
Systems purchased with an OS preinstalled will have all required software preinstalled at the factory.

Sealevel software is not required for models without a Serial or IO expansion.

SeaCOM Software Installation

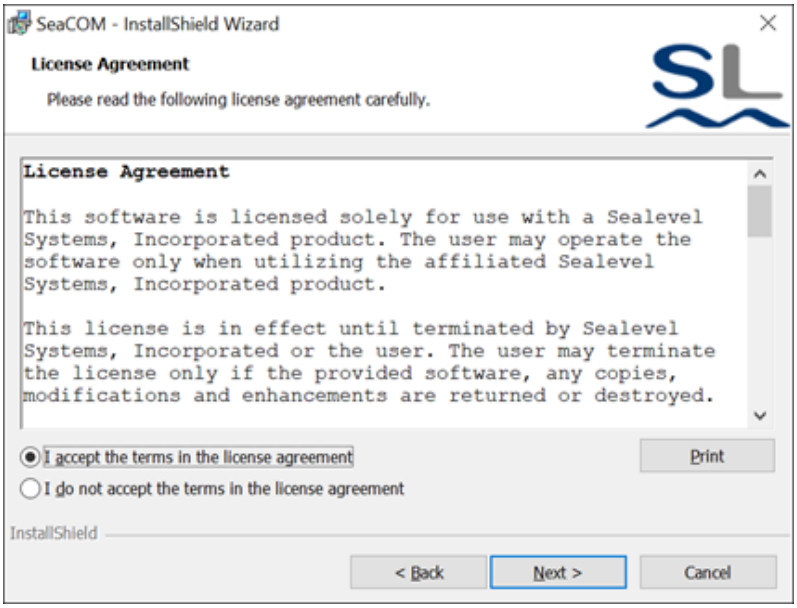
You must log in as an administrator or have administrator privileges to install SeaCOM.

1. To obtain the most current software package from Sealevel's website, download from here:
   a. SeaCOM for Windows
2. Open Windows Explorer and navigate to the downloaded Sealevel software. For example: C:\Downloads\SS030705.exe
3. Double click on the downloaded software
4. Select 'Next' as demonstrated in the image below.

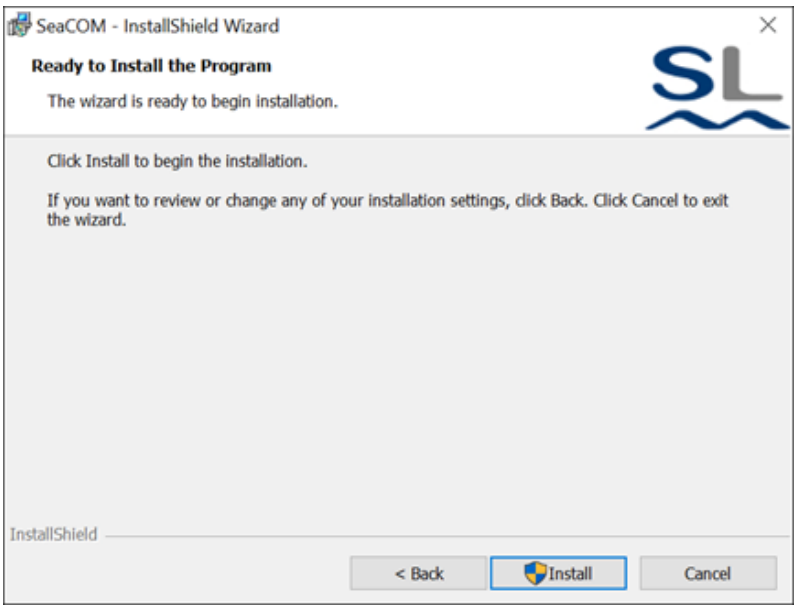


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5. When the ‘License Agreement’ window appears, accept the terms and click ‘Next’ to continue. If you do not accept the terms of the agreement, the wizard will stop.

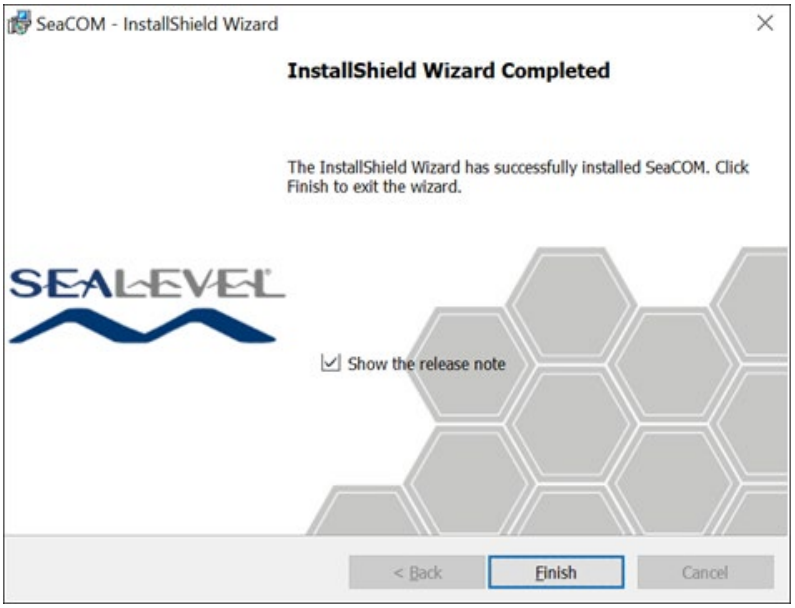


6. When the ‘Ready to Install the Program’ window appears, click the ‘Install’ button to install the software onto the hard drive of your computer. Some versions of Windows will halt the installation and provide you with a dialog box which will ask you for permission for the installer to make changes to your computer. Click on the button to continue installation of your Sealevel software.



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7. Click ‘Finish’ to complete the installation of SeaCOM onto your PC.



8. If prompted, reboot your computer for changes to take effect.

SeaMAX Software Installation

You must log in as an administrator or have administrator privileges to install SeaMAX.

1. To obtain the most current software package from Sealevel’s website, download from here:
    - SeaMAX for Windows

2. Choose the link for the target operating system and click on the ‘Download File’ link to download the current version.
3. Open Windows Explorer and navigate to the downloaded Sealevel software.
4. Double click on the downloaded software.
5. Once opened, follow the instructions in the Setup wizard.

Base Model Serial Configuration

All Flexio models, including the base model, include two serial ports. These serial ports must be configured in the BIOS. This section describes the configuration options available for the base serial ports.

Please see the SeaCOM Application Suite section for information on the Expansion serial ports on applicable models.

Electrical Interface Selection

The electrical interface of Port 1 can be selected from within the BIOS.

1. Press the Delete key to enter BIOS
2. Navigate to Advanced -> NCT5525D Super IO Configuration -> Serial Port 1 Configuration->Electrical Interface Mode
3. Select RS232, RS485, or RS422

Only Port 1 supports multiple interfaces. Port 2 is always RS232.

I/O Expansion Serial Software

This section only applies to the Flexio models with a serial expansion. (Ex. Configuration 01).

SeaCOM Application Suite

This section provides an overview of the features of the SeaCOM application suite. The SeaCOM application suite is only applicable to FlexIO models with a serial Expansion or Sealevel USB serial devices.

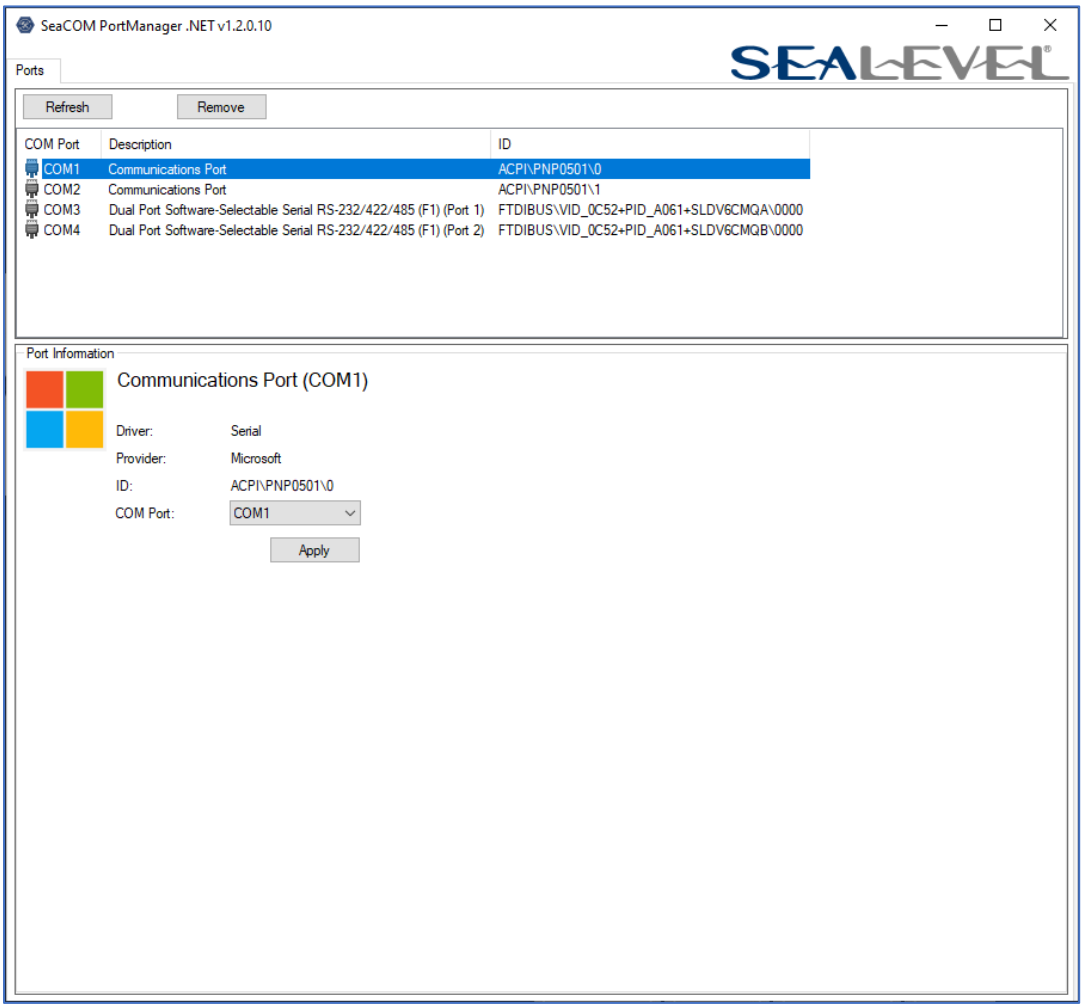
RS485 Auto-Enable Feature

RS-485 is ideal for multi-drop or network environments like that used by SeaI/O modules. RS-485 requires a tristate line driver IC that will allow the electrical presence of the driver to be removed from the line when not transmitting data. The line driver is in a tristate or high impedance condition when this occurs.

Under Windows, configuring the port for RS-485 also configures our auto-enable feature, transparently controlling the state of the transceiver. This allows the software to utilize RS-485 without any special changes.

This feature works by asserting RTS transmission and de-asserting RTS at the end of the transmission. Asserting RTS causes the RS-485 transmitter to leave tristate, allowing it to transmit data. De-asserting RTS causes the transmitter to return to tri-state , allowing others to transmit on the serial bus.

PortManager - Serial Configuration Utility

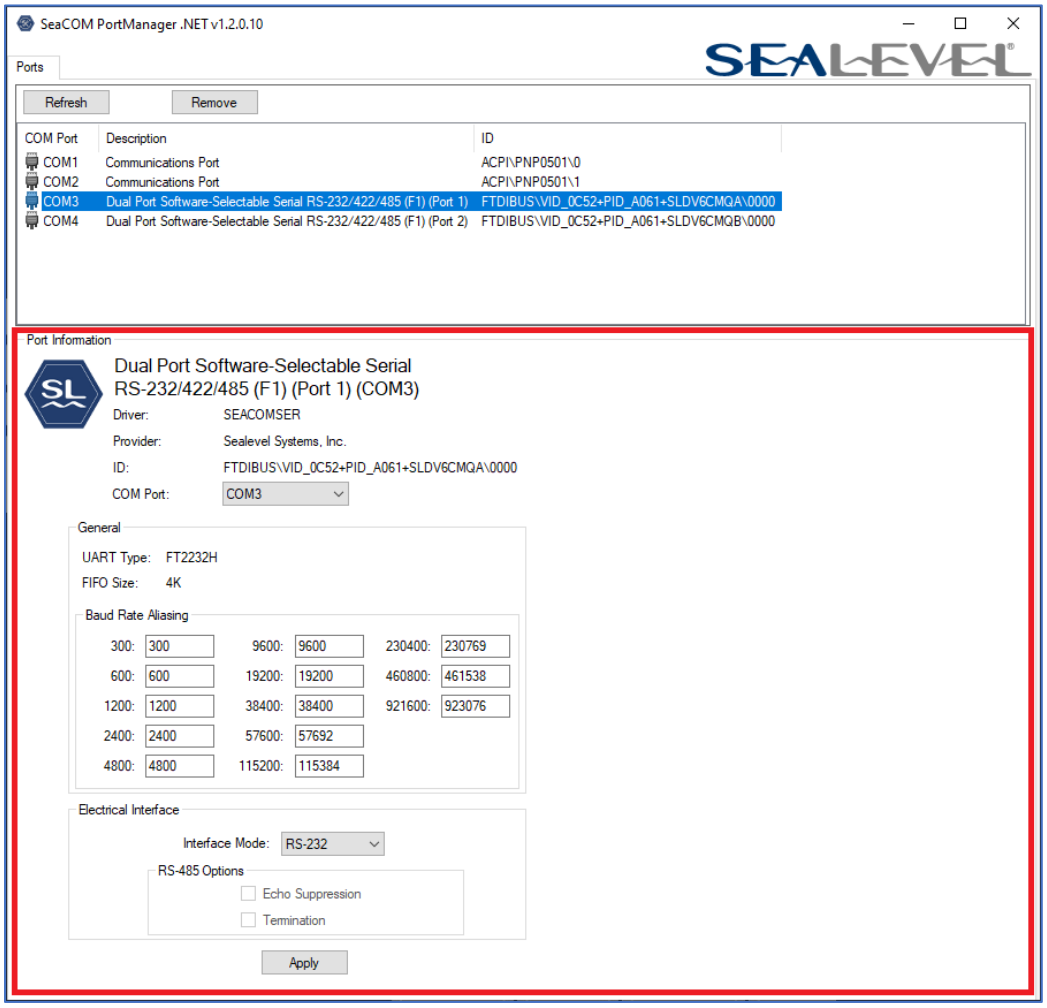


*Initial Start **Screen for PortManager***

COM Port Configuration

The right-side window of the PortManager is the configuration box. The COM Port to be configured is selected by clicking on the desired COM Port option in the left side window. This will display the current COM Port Electrical Interface settings. The first time the PortManager is used the configuration will be RS-232, all other boxes unchecked, and RS-485 Auto-Enable set to 0. The settings are stored when applied and persist across system reboots.

The changed settings will be activated when the Apply button at the bottom of the configuration box is clicked. This also closes the port, allowing other applications to open it.



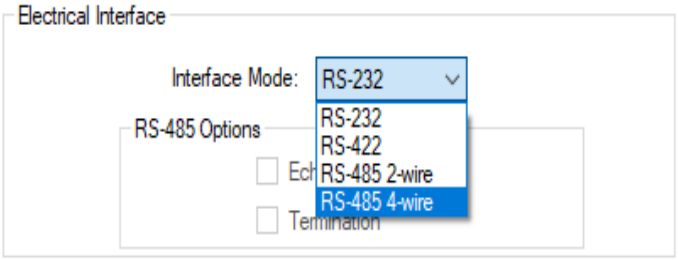
COM3 Configuration example

Ensure the COM port is not open in any other application. If the port is open, PortManager will be unable to properly read the port configuration or reconfigure the port.

Electrical Interface Selection (RS232/422/485)

The Interface Mode option is used to set the protocol for COM Port selected. The choices are:

- RS-232 Single ended signaling, point-to-point serial communication mode
- RS-422 Full-Duplex, differential, twisted pair, point-to-point serial communication mode
- RS-485 2-wire Half-Duplex, differential, twisted pair, multidrop serial communication
- RS-485 4-wire Full-Duplex, differential, twisted pair, multidrop serial communication



Interface Options section

WinSSD - Serial Diagnostic Utility

WinSSD is a full-featured synchronous/asynchronous diagnostic utility for Microsoft Windows operating systems. For asynchronous serial devices, WinSSD allows the user to modify the default UART parameters, perform external loopback tests, toggle modem control signals, perform simple BERT tests and includes terminal mode emulation

See WinSSD Software Utility Overview for detailed information.

Expansion I/O Software

SeaMAX Application Suite

This section only applies to the Flexio models with an I/O expansion (Ex. configuration 02, 03).

SeaMAX Overview

Sealevel digital and analog I/O modules supported by SeaMAX software are designed to work with third party applications via the SeaMAX API. To help simplify application development, the complete API documentation and code samples are automatically installed with the SeaMAX Suite and can be found in Windows by clicking Start à All Programs à Sealevel SeaMAX à Documentation. This can also be accessed online at SeaMAX API Documentation - Sealevel

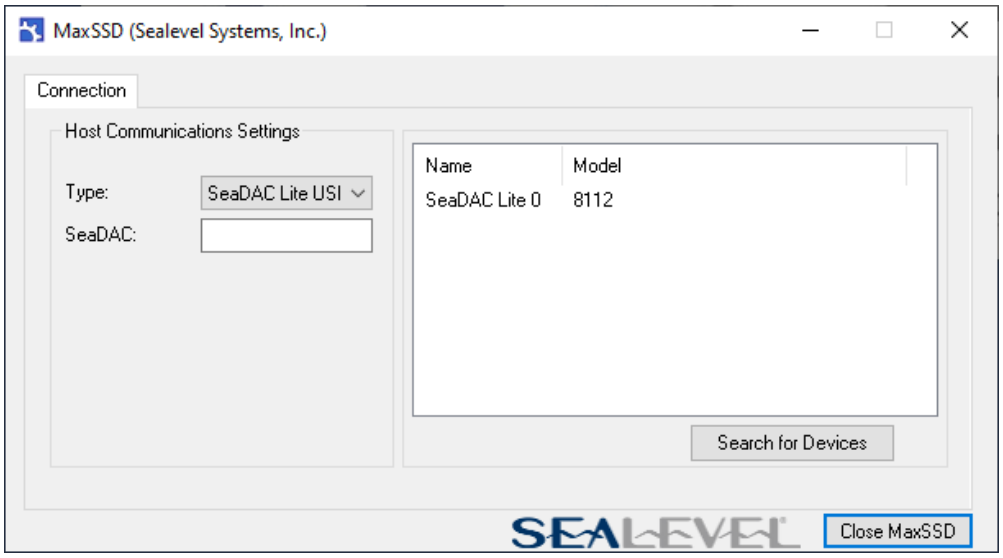
MaxSSD Configuration & Diagnostics Utility

The Sealevel Systems configuration utility, MaxSSD, is designed to simplify the installation, configuration, and diagnostics of Sealevel I/O modules.

Host PC Configuration Tab

The first time you run the MaxSSD utility (Start à All Programs à Sealevel SeaMAX à MaxSSD) it will default to the "Connection" tab. This tab allows the user to choose the initial communication settings for the connected I/O device.

To communicate with the Digital Outputs of the FlexIO, select "SeaDAC Lite USB" from the "Type" dropdown box. MaxSSD will search for the internal SeaDAC Lite. You should see the internal SeaDAC Lite displayed on the right-hand frame. Double click on this unit and a tab will appear. You can use this new tab to test the functionality of the IO.



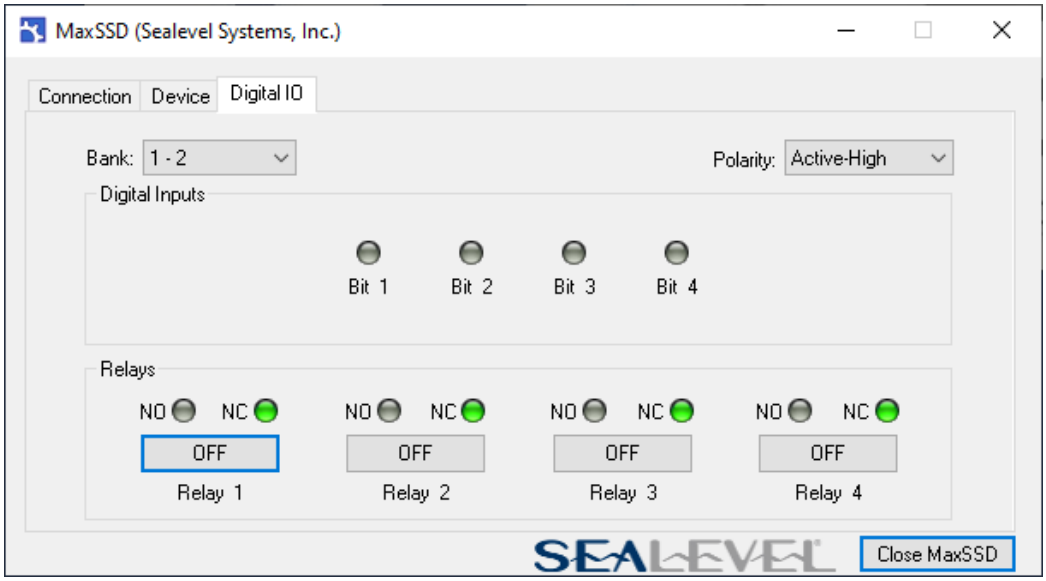
© Sealevel Systems, Inc.

Digital I/O Tab

The “Digital IO” tab of MaxSSD is displayed when using Sealevel I/O devices featuring discrete inputs and outputs. It displays the device’s current input and/or output status in an intuitive and usable manner.

The “Digital IO” tab displays any inputs and outputs of the connected device.

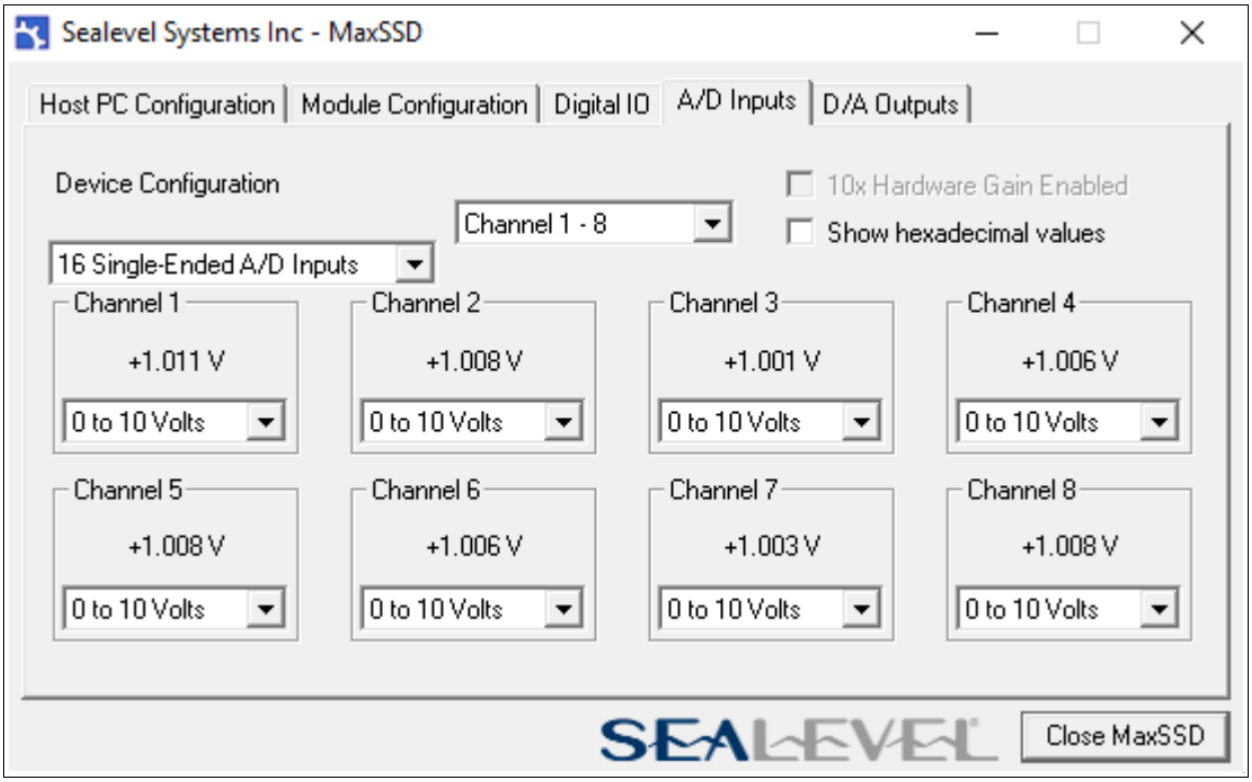
Each Digital Output can be activated or deactivated using the buttons below each output LED. The corresponding status LED in the “Digital IO” window indicates the state of the outputs. A green LED above the digital output indicates the Digital Output is active, a darkened LED indicates it is inactive. The example below shows the 4 Digital Outputs of the F1301602 in an inactive state.



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A/D Inputs Tab

The “A/D Inputs” tab displays the current state of the analog-to-digital channels for Sealevel I/O devices that feature A/D inputs. Settings are provided for both device wide and per-channel configuration.



Troubleshooting - SeaMAX

By using this software and following these simple steps, most common problems can be eliminated without the need to call Technical Support.

1. Uninstall any previous versions of the SeaMAX software before installing any new versions.
2. **Before using the Digital Outputs, verify SeaMAX Software Suite is fully installed**.
3. Confirm that all screw terminal connections are correct and secure. Use the MaxSSD utility to verify proper installation.
4. MaxSSD is designed to simplify the installation, configuration, and diagnostics of Digital Outputs of the HazPAC 10.

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.

Technical Specifications

Environmental Specifications

Specification	Operating	Storage
Temperature Range	0°C to 50°C (32°F to 122° F)	-40° C to 85° C (-40° F to 185° F)
Humidity Range	5 to 90% R.H. Non-Condensing	5 to 90% R.H. Non-Condensing

Mechanical Dimensions

Length	10.5 inches	26.67 cm
Width	5.324 inches	13.52 cm
Height	3.145 inches	7.99 cm
Weight	4.52 lbs / 2.05 kg	Base Model

Power Consumption

Absolute Operating Range:	9-36VDC
Rated Voltage (Without USB Hub):	9-36VDC 4A– 1.5A, respectively
Rated Voltage (With USB Hub):	9-36VDC 4A– 1.5A, respectively
Power Usage (Without USB Hub):	25W nominal [or 15W nominal]
Power Usage (with USB Hub):	40W nominal [or 25W nominal]

MTBF (Telcordia SR-332, Issue 4 calculation prediction method)

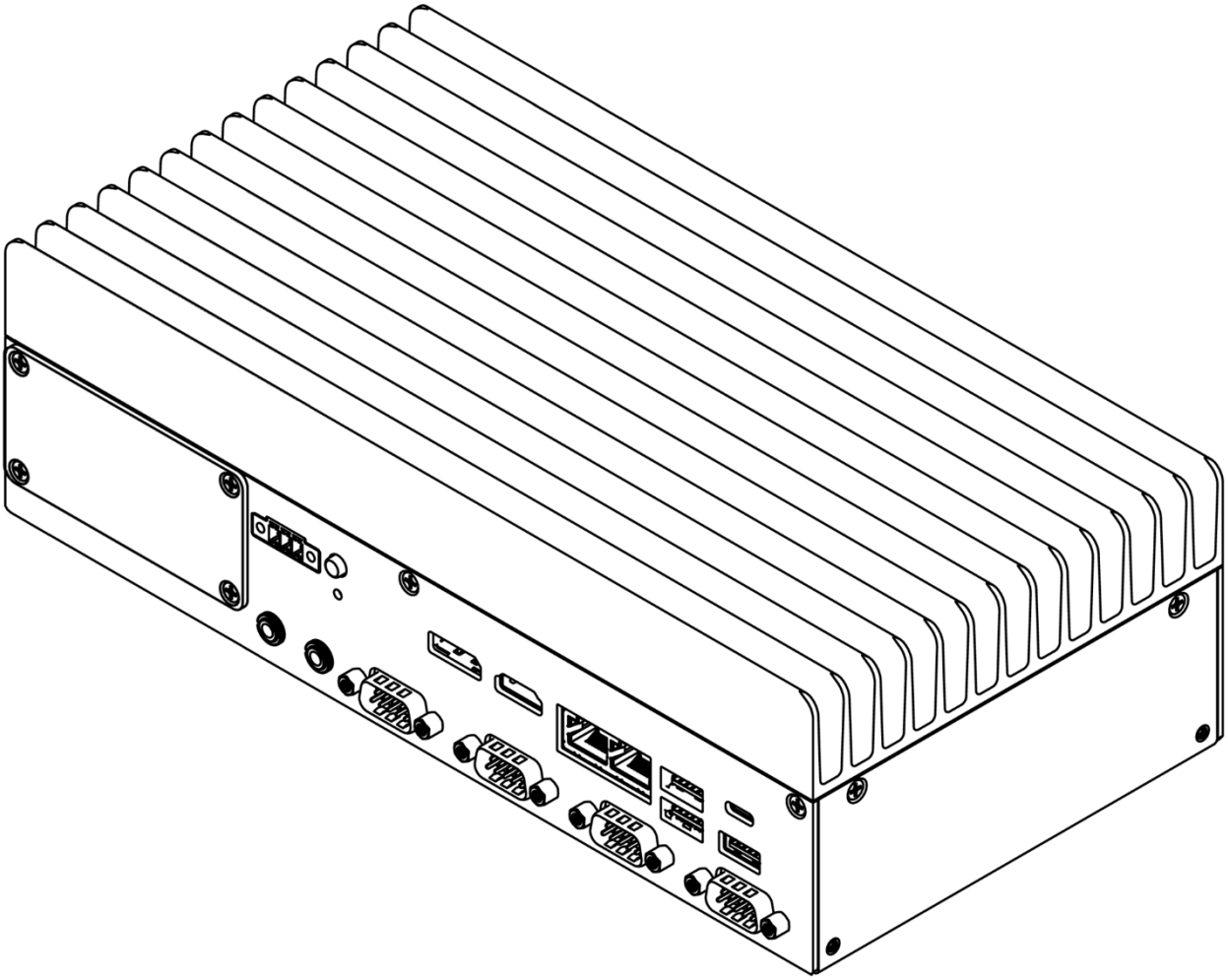
Mean Time Between Failure	Part Number	Hours at 25° C ambient (ground benign)
	F1301600	243,948
	F1301601	235,848
	F1301602	237,563
	F1301603	116.,148
	F1301604	240,668
	F1501600	311,826
	F1501601	298,399
	F1501602	301,216
	F1501603	129,182
	F1501604	306,352

Operating Temperature Range

Part Number	Processor	Operating Temperature Range
F1301600	Core i3-1220PE	0°C to +50 °C
F1301601	Core i3-1220PE	0°C to +50 °C
F1301602	Core i3-1220PE	0°C to +50 °C
F1301603	Core i3-1220PE	0°C to +50 °C
F1301604	Core i3-1220PE	0°C to +50 °C

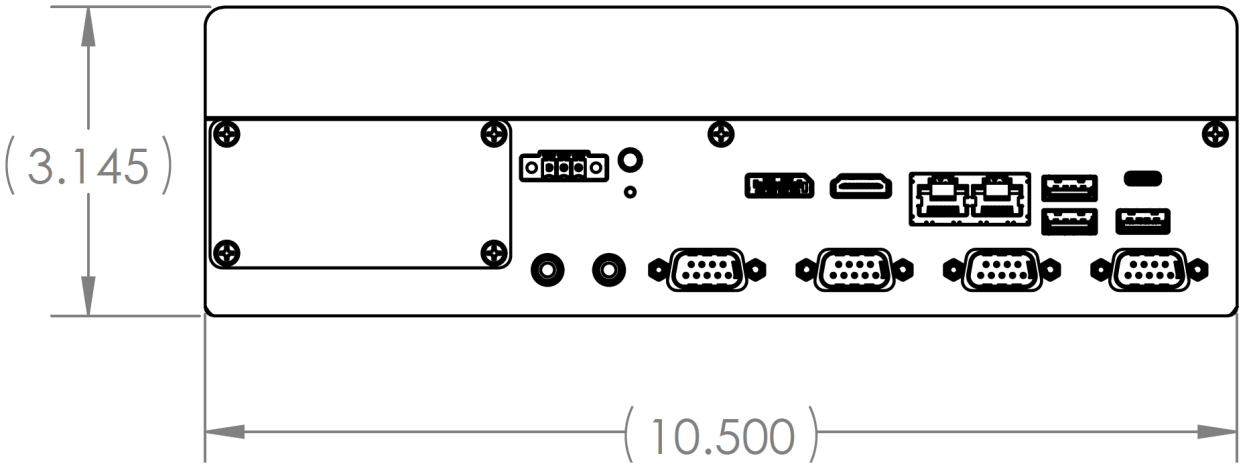
CAD References

Isometric Views

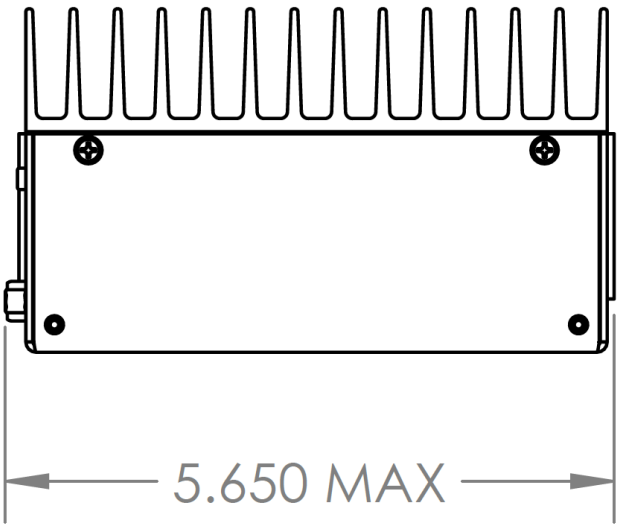


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Front Panel I/O Connectors



Right Side View



© Sealevel Systems, Inc.

Top View



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Appendix A – Troubleshooting Serial Communication Issues

Verify Serial Device Installation

1. 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. To confirm installation, click on the Windows 'Start' button and verify that the 'Sealevel Systems – SeaCOM' folder is present in the application list.

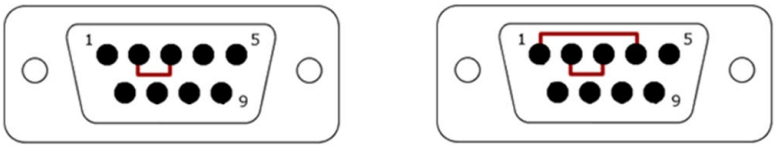
2. Check to make sure that USB support is enabled and functioning properly in the operating system. Right click on the Start Menu, then click on the Device Manager and expand the Ports (COM & LPT) section. You should see 4 COM ports.

Always use the Sealevel Systems diagnostic software (WinSSD) when troubleshooting a problem. This will eliminate any software issues from the equation.

Serial Loopback Test

We recommend performing a BERT loopback test in our WinSSD utility. The steps below show how to perform a loopback test on the RS232, RS422, and RS485 ports of the Flexio F1.

1. Connect the Transmit and Receive pins of your RS232/422/485 ports together, as shown in the images below:

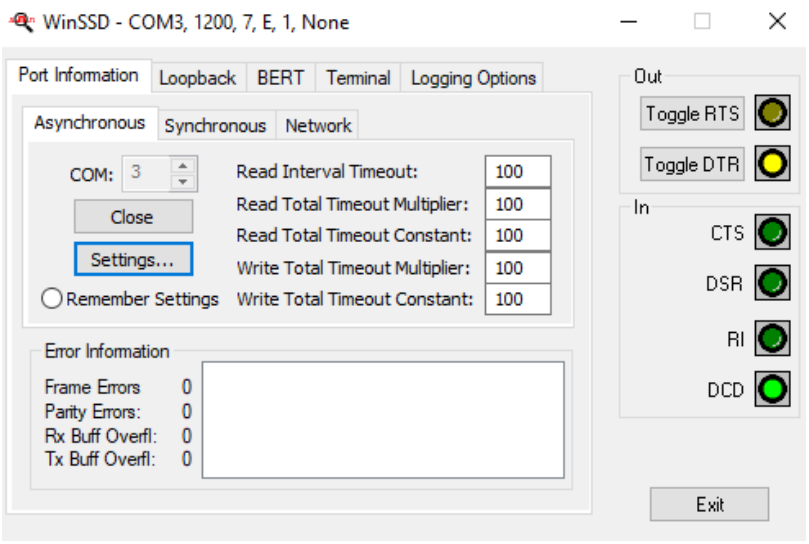


RS232 RS422/RS485

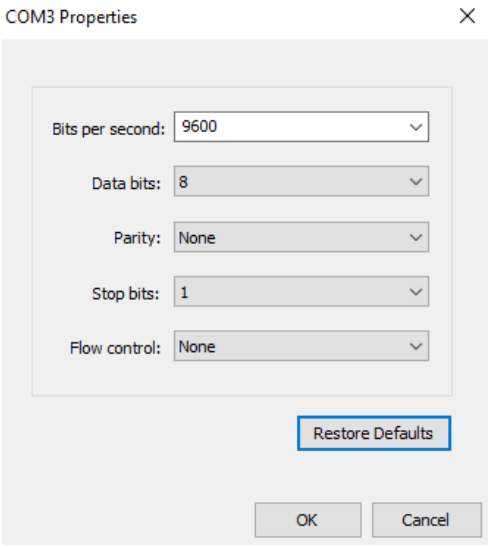
Most ports on the Flexio F1 support multiple interfaces. Ensure the port is configured for the appropriate interface. The embedded ports are configured in the BIOS. The Expansion (9540) ports are configured in PortManager.

2. Launch the WinSSD utility from Sealevel Systems - SeaCOM folder in the Start menu.
3. On the 'Port Information' tab, enter the associated COM port and click the 'Open' button.

4. Click the ‘Settings’ button to open the COM Port Properties dialog box. This will allow the Settings to be altered.



5. Change your parameters to 9600 bits per second, 8 data bits, no parity, 1 stop bit, and no flow control, as pictured below.

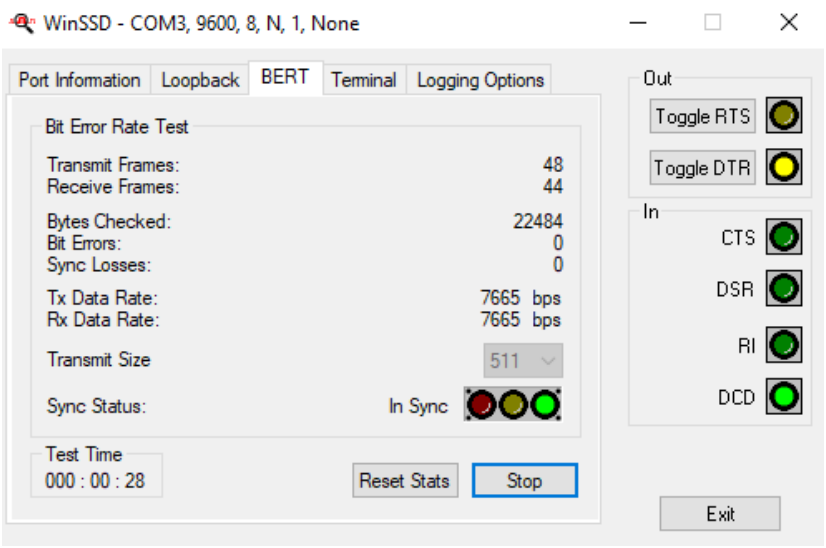


6. Click ‘Apply’ and ‘OK’.

7. In the main WinSSD window, click on the ‘BERT’ tab (Bit Error Rate test).

8. Click on the ‘Start’ button.

9. If the COM port is properly working, the Sync Status green light will glow, and the Transmit Frames and Receive Frames will increase. The Tx and Rx Data Rates will show the calculated data rate.



Passing loopback test

10. This verifies that the port is likely working properly. You can continue testing with different configurations or proceed with testing other ports. Please contact Sealevel Technicial Support if you require additional assistance.

Appendix B – How To Get Assistance

Please refer to: Appendix A -- Troubleshooting Serial Communications Issues prior to calling Technical Support.

Begin by reading the Trouble Shooting Serial Communications Issues 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 web page on the Internet. Our home page address is www.sealevel.com. The latest software updates, and newest manuals are available via our web site.

Technical support is available Monday to Friday from 8:00 AM to 5:00 PM 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 – Compliance Notices

Federal Communications Commission (FCC) Statement



This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

ISED Canada

- **CAN ICES-003(A) / NMB-003(A)**

EMC Directive Statement



This equipment has been evaluated or tested and found in compliance with the requirements of the following directives issued by the European Commission:

- EMC Directive **2014/30/EU**
- RoHS Directive **2011/65/EU + (EU) 2015/863**



CE marking is recognized in the UK as an acceptable method of demonstrating compliance for certain categories of products, including one described in this manual.



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.

Appendix D - Handling Instructions

Electrostatic Discharges (ESD)

A sudden electrostatic discharge can destroy sensitive components. Proper packaging and grounding rules must therefore be observed. Always take the following precautions:

- Transport boards and cards in electrostatically secure containers or bags.
- Keep electrostatically sensitive components in their containers, until they arrive at an electrostatically protected workplace.
- Only touch electrostatically se nsitive components when you are properly grounded.
- Store electrostatically sensitive components in protective packaging or on anti-static mats.

Grounding Methods

The following measures help to avoid electrostatic damages to the device:

- Cover workstations with approved antistatic material. Always wear a wrist strap connected to a properly grounded workplace.
- Use antistatic mats, heel straps, and/or air ionizers for more protection.
- Always handle electrostatically sensitive components by their edge or by their casing.
- Avoid contact with pins, leads, or circuitry.
- Turn off power and input signals before inserting and removing connectors or connecting test equipment.
- Keep work area free of non-conductive materials such as ordinary plastic assembly aids and Styrofoam.
- Use field service tools such as cutters, screwdrivers, and vacuum cleaners that are conductive.

Appendix E – Electrical Interface

RS-232

Quite possibly the most widely used communication standard is RS-232. This implementation has been defined and revised several times. It 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 widespread use and will be referred to as RS-232 in this document.

RS-232 is capable of operating at data rates up to 20K bps 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).

RS-485

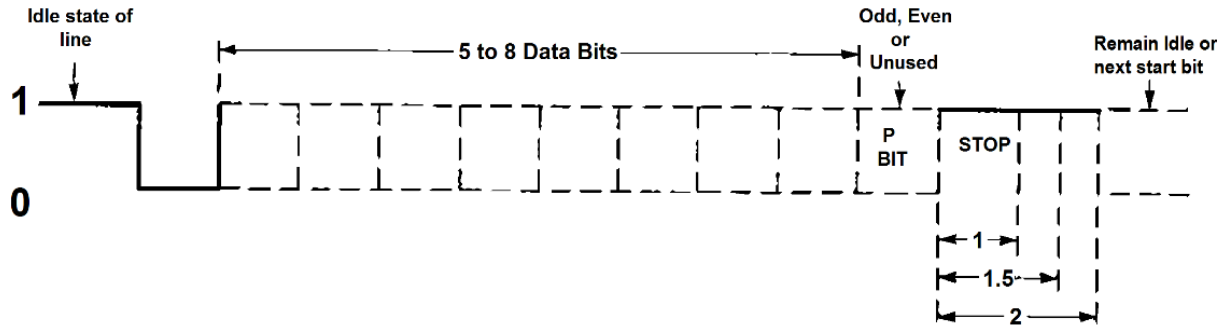
RS-485 is backward compatible with RS-422; however, it is optimized for partyline or multi-drop applications. The output of the RS-485 driver is capable of being Active (enabled) or Tri-State (disabled). This capability allows multiple ports to be connected in a multi-drop bus and selectively polled. RS-485 allows cable lengths up to 4000 feet and data rates up to 10 Megabits per second. The signal levels for RS-485 are the same as those defined by RS-422.

RS-485 has electrical characteristics that allow for 32 drivers and 32 receivers to be connected to one line. This interface is ideal for multi-drop or network environments. RS-485 tri-state driver (not dual-state) will allow the electrical presence of the driver to be removed from the line. Only one driver may be active at a time and the other driver(s) must be tri-stated. RS-485 can be cabled in two ways: two wire and four wire mode. Two wire mode does not allow for full duplex communication and requires that data be transferred in only one direction at a time. For half-duplex operation, the two transmit pins should be connected to the two receive pins (Tx+ to Rx+ and Tx- to Rx-). Four wire mode allows full duplex data transfers. RS-485 does not define a connector pin-out or a set of modem control signals. RS-485 does not define a physical connector.

Appendix F – Asynchronous Communications

Serial data communications imply 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. They must correspond at both the transmitting and receiving ends.

Asynchronous communications are the standard means of serial data communication for PC compatible and PS/2 computers. The original PC was equipped with a communication (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. The diagram below demonstrates asynchronous communication bits.



The parity bit 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).

Warranty

Sealevel's commitment to providing the best I/O solutions is reflected in the Lifetime Warranty that is standard on all Sealevel manufactured I/O 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 achieved ISO-9001:2015 certification in 2018 and AS9100D certification in 2025.

Warranty Policy

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 the warranty period. 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, abuse, accidents, or acts of nature are not covered under this warranty.

Warranty service may be obtained by delivering the Product to Sealevel and providing proof of purchase. Customer agrees to ensure 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.

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

Non-Warranty Repair/Retest

Products returned due to damage or misuse and Products retested with no problem found are subject to repair/retest charges. A purchase order or credit card number and authorization must be provided in order to obtain an RMA (Return Merchandise Authorization) number prior to returning Product.

How to obtain an RMA (Return Merchandise Authorization)

If you need to return a product for warranty or non-warranty repair, you must first obtain an RMA number. Please contact Sealevel Systems, Inc. Technical Support for assistance:

Available	Monday – Friday, 8:00AM to 5:00PM EST
Phone	864-843-4343
Email	support@sealevel.com

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