

RS-422/485 Communication Board

User Manual

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Safety Information

1. Keep this User's Manual for future reference.
2. Always read the safety information carefully.
3. Keep this equipment away from direct sunlight, or in humid or damp places.
4. Do not place this equipment in an unstable position, or on vibrating surface before setting it up.
5. Do not use or place this equipment near magnetic fields, televisions, or radios to avoid electronic interface that affects device performance.

Regulatory Compliance

FCC Conditions

This equipment has been tested and found to comply with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This equipment may not cause harmful interference
- (2) This equipment must accept any interference received, including interference that may cause undesired operation.

Important! Changes or modifications not expressly approved by the manufacturer responsible for compliance could void the user's authority to operate the equipment. Use an approved phone set.

CE

This equipment is in compliance with the requirements of the following regulations: EN 55032: CLASS B and EN55035

WEEE Information

For EU (European Union) member users: According to the WEEE (Waste electrical and electronic equipment) Directive, do not dispose of this product as household waste or commercial waste. Waste electrical and electronic equipment should be appropriately collected and recycled as required by practices established for your country. For information on recycling of this product, please contact your local authorities, your household waste disposal service or the shop where you purchased the product.



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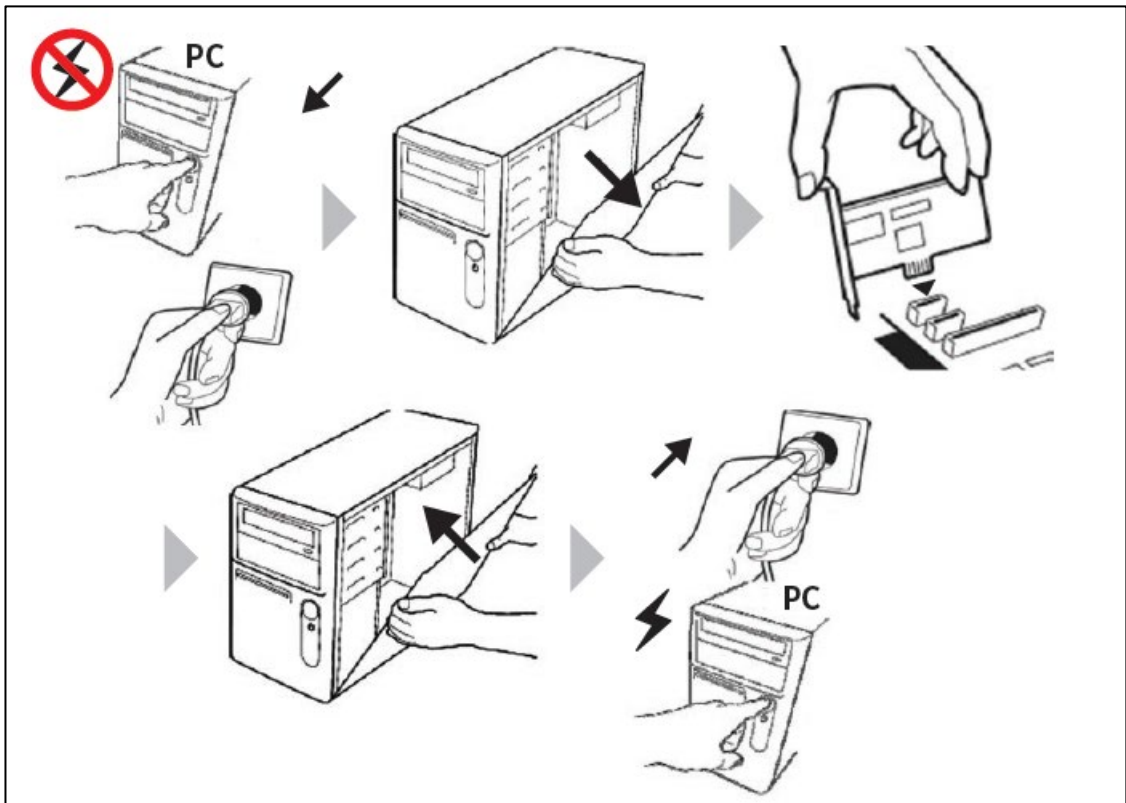
1. Hardware Installation

1-1 PCI Express Serial Card

The hardware installation of PCI Express Industrial I/O Control Board is easy to carry out. Before inserting the card into the PCIe bus, please follow the detailed steps given below to install the board in your computer.

 **SAFETY FIRST** To avoid damaging to the computer, make sure to remove any power connection before card installation.

- Step 1: Turn your PC's power off, and shut off the power to any peripheral.
- Step 2: Remove the power plug from the plug socket.
- Step 3: Remove the cover from the computer case.
- Step 4: If fitted. Remove the metal cover plate on the rear of a free PCIe slot.
- Step 5: Insert PCI Express Industrial I/O Control Board into the free PCIe slot and screw it firmly on the bracket side.
- Step 6: Place the cover back onto the computer.
- Step 7: Insert the plug into the plug socket.



1-2 M.2 PCIe Serial Card

The hardware installation of M.2 PCI Express Industrial I/O Control Board is easy to carry out. Before inserting the card into M.2 slot, please follow the detailed steps given below to install the boards in your computer.



SAFETY FIRST

To avoid damaging to the computer, make sure to remove any power connection before card installation.

Step 1: Remove the screw attached to the motherboard.

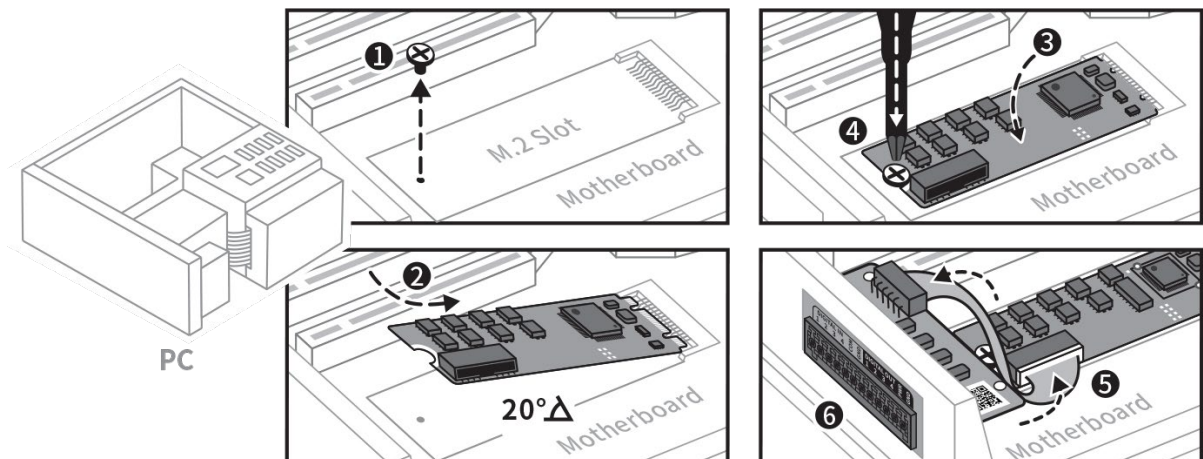
Step 2: Insert M.2 Card tightly into the M.2 slot with 20° angle. (SUNIX M.2 Card supports Key-M and Key-B slot)

Step 3: Push the M.2 card down to the screw hole.

Step 4: Lock screw on M.2 card that you remove from motherboard in step1.

Step 5: Connect ribbon cable

Step 6: Secure the extension board to PC chassis.



1-3 Mini PCIe Serial Card

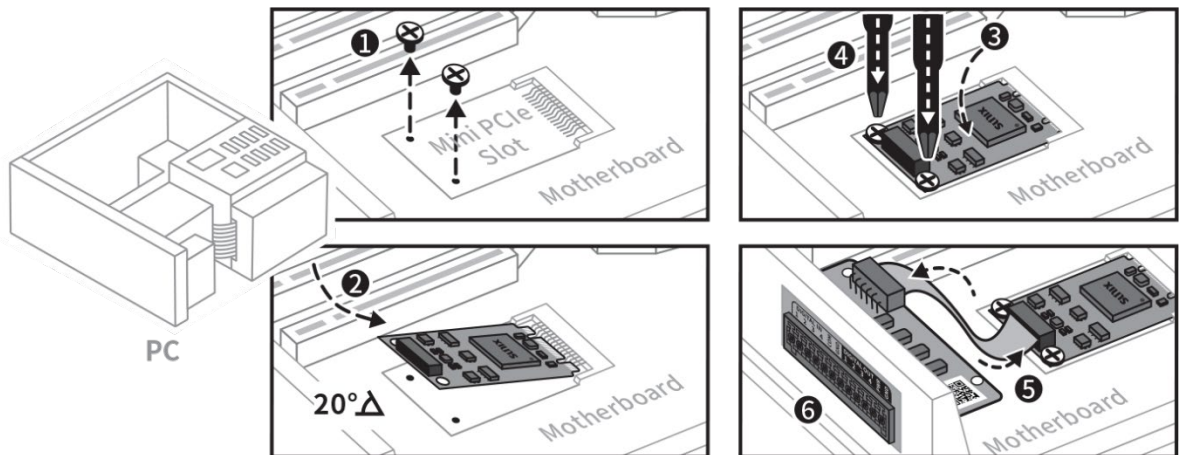
The hardware installation of Mini PCI Express Industrial I/O Control Board is easy to carry out. Before inserting the card into Mini PCI-E slot, please follow the detailed steps given below to install the boards in your computer.



SAFETY FIRST

To avoid damaging to the computer, make sure to remove any power connection before card installation.

- Step 1: Remove the screw attached to the motherboard.
- Step 2: Insert Mini PCI-E Card tightly into the Mini PCI-E slot.
- Step 3: Push the Mini PCI-E card down to the screw hole.
- Step 4: Lock screw on Mini PCI-E card that you remove from motherboard in step1.
- Step 5: Connect ribbon cable
- Step 6: Secure the extension board to PC chassis.



2. Pin Assignment

DB25M

DB9M

Pin Header
(Pitch 2.0mm)

	PIN	DB9M	DB25M	Pin Header
RS-422 or 4-Wire RS-485	Tx+	2	3	3
	Tx-	1	8	1
	Rx+	3	2	5
	Rx-	4	20	7
	GND	5	7	9
2-Wire RS-485	Data+	2	3	3
	Data-	1	8	1
	GND	5	7	9

SUNIX 4 ports DB44 Female Pin Assignment

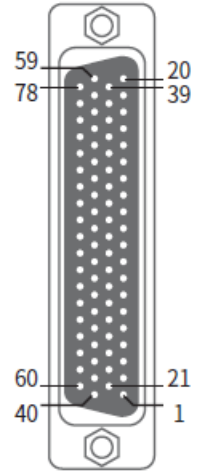
	Signal \ Port	1	2	3	4
		RS-422 or 4-Wire RS-485	Tx+	32	36
Tx-	17		22	26	30
Rx+	3		7	11	15
Rx-	1		5	9	13
GND	GND		GND	GND	GND
2-Wire RS-485	Data+	32	36	40	44
	Data-	17	22	26	30
	GND	GND	GND	GND	GND

SUNIX 8 ports DB44 Female Pin Assignment

	Signal \ Port	1	2	3	4	5	6	7	8
		RS-422 or 4-Wire RS-485	Tx+	32	2	36	6	40	10
Tx-	17		18	22	34	26	38	30	42
Rx+	3		31	7	35	11	39	15	43
Rx-	1		16	5	20	9	24	13	28
GND	GND		GND	GND	GND	GND	GND	GND	GND
2-Wire RS-485	Data+	32	2	36	6	40	10	44	14
	Data-	17	18	22	34	26	38	30	42
	GND	GND	GND	GND	GND	GND	GND	GND	GND

SUNIX 16 ports DB78 Female Pin Assignment

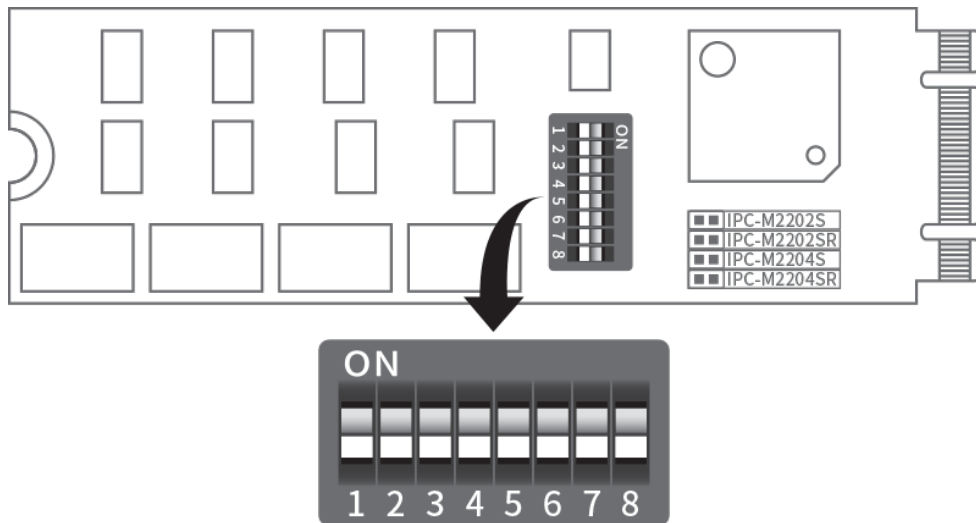
RS-422 or 4-Wire RS-485	Signal \ Port	1	2	3	4	5	6	7	8
	Tx+	60	21	43	4	65	26	48	9
	Tx-	40	1	62	23	45	6	67	28
	Rx+	61	22	44	5	66	27	49	10
	Rx-	41	2	63	24	46	7	68	29
	GND	GND	GND	GND	GND	GND	GND	GND	GND
	Signal \ Port	9	10	11	12	13	14	15	16
	Tx+	70	31	53	14	75	36	58	19
	Tx-	50	11	72	33	55	16	77	38
	Rx+	71	32	54	15	76	37	59	20
Rx-	51	12	73	34	56	17	78	39	
GND	GND	GND	GND	GND	GND	GND	GND	GND	
2-Wire RS-485	Signal \ Port	1	2	3	4	5	6	7	8
	Data+	60	21	43	4	65	26	48	9
	Data-	40	1	62	23	45	6	67	28
	GND	GND	GND	GND	GND	GND	GND	GND	GND
	Signal \ Port	9	10	11	12	13	14	15	16
	Data+	70	31	53	14	75	36	58	19
	Data-	50	11	72	33	55	16	77	38
GND	GND	GND	GND	GND	GND	GND	GND	GND	



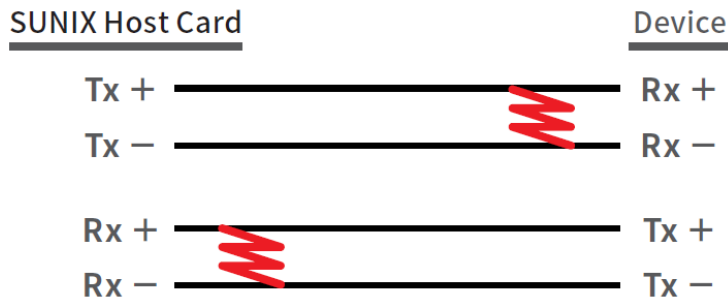
3. Jumper Settings

For RS-422/485 serial communications, when an electrical signal travels through two different resistance junctions in a transmission line, the impedance mismatch will sometimes cause signal reflection. Signal reflection causes signal distortion, which in turn will contribute communication errors. The solution to this problem is to establish the same impedance at the end of the lines by terminating them with resistors.

Ideally, the two ends of the cable will have a termination resistor connected across the two wires. Without termination resistors, reflections of fast driver edges can cause multiple data edges that can cause data corruption. Termination resistors also reduce electrical noise sensitivity due to the lower impedance, and bias resistors (120 ohms for twisted pairs) are required. The value of each termination resistor should be equal to the cable impedance.



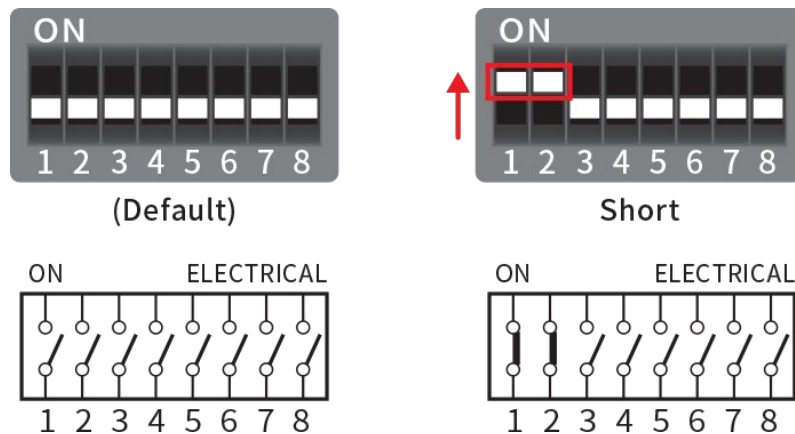
RS-422 or 4-Wire RS-485 working model with termination resistor:



2-Wire RS-485 working model with termination resistor:








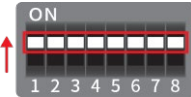
SUNIX M.2 PCI Express RS-422/485 Serial board equips independent TX and RX termination resistors for each serial COM port. User can modify the dip switch setting to avoid impedance mismatched problem when operate under Multi-drop transmission. Resistors should be added near the receiving side. Note: Termination resistor near the receiving side.




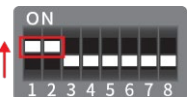
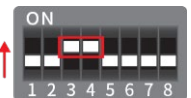
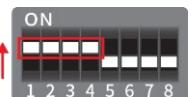
Manufacturer default jumper setting is OPEN (disable 120ohms termination resistors across the two wires)

Please refer to the following table to enable or disable 120ohms termination resistor for each COM (RS-422/485) port. Each COM port is controlled by a pair of DIP Switch.

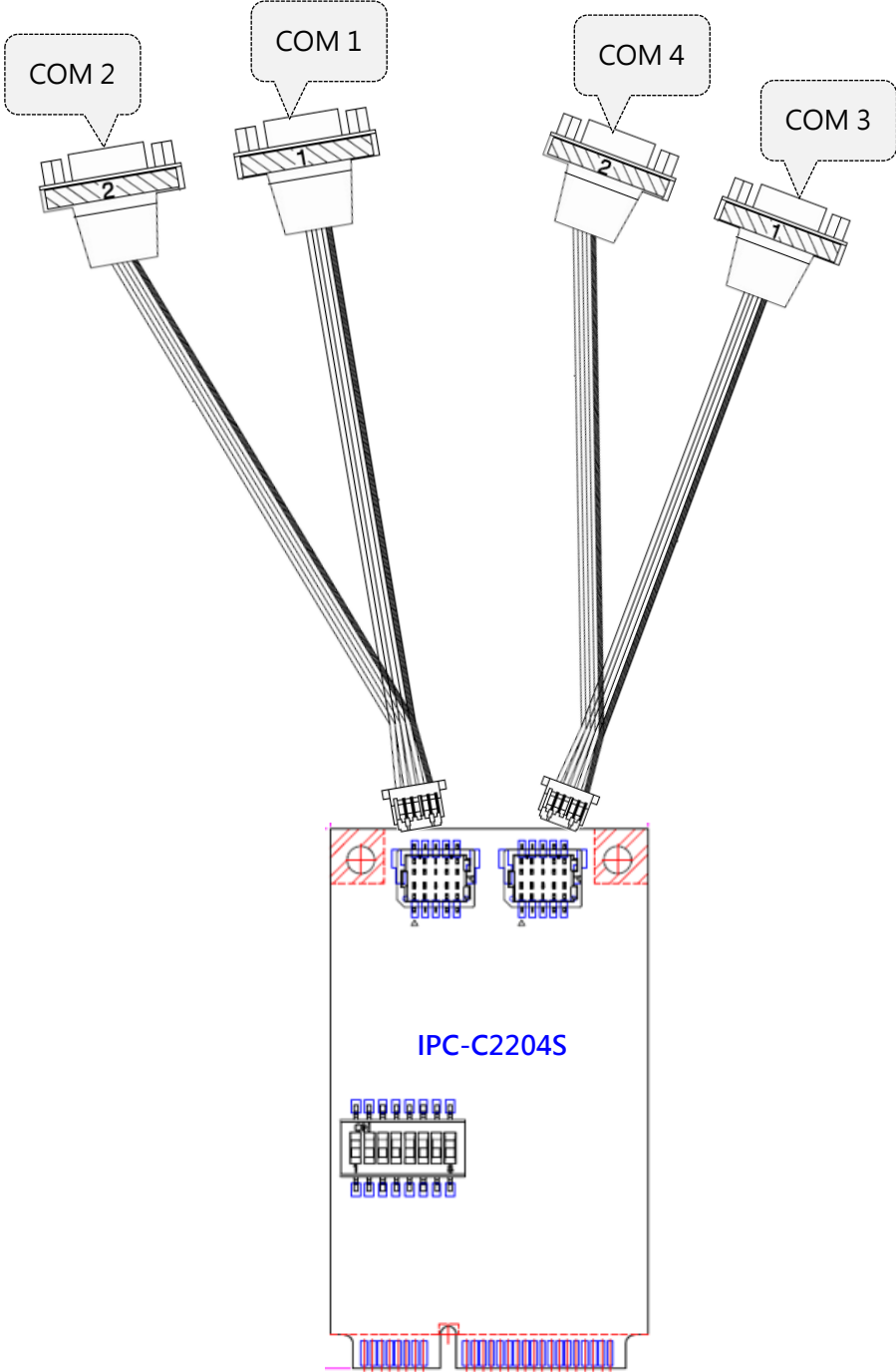
4-port RS-422/485 model termination resistor setting table:

Mode	Function	DIP Switch Settings
1.	Manufacturer default (Disable termination resistor)	
2.	COM1 enables 120 ohms termination resistor	
3.	COM2 enables 120 ohms termination resistor	
4.	COM3 enables 120 ohms termination resistor	
5.	COM4 enables 120 ohms termination resistor	
6.	COM1&2&3&4 enable 120 ohms termination resistor	

2-port RS-422/485 model termination resistor setting table:

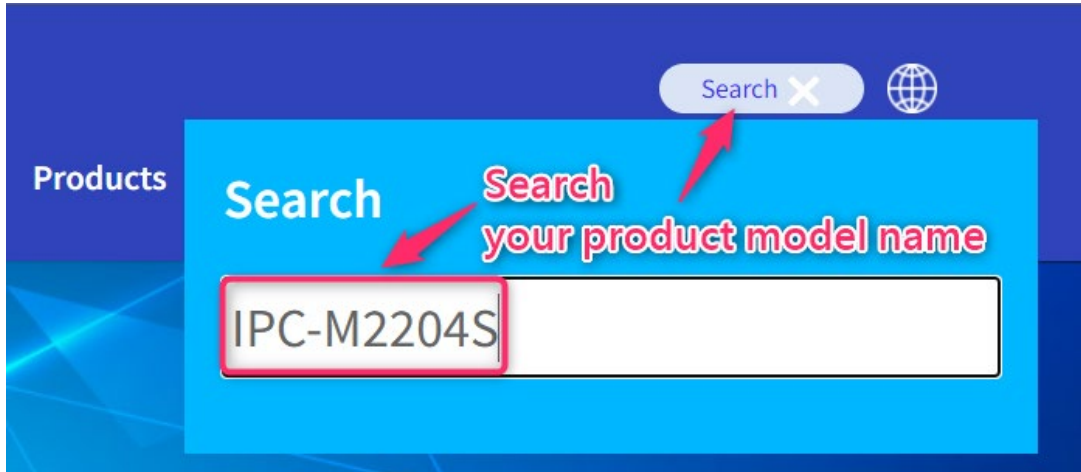
Mode	Function	DIP Switch Settings
1.	Manufacturer default (Disable termination resistor)	
2.	COM1 enables 120 ohms termination resistor	
3.	COM2 enables 120 ohms termination resistor	
4.	COM1&2 enable 120 ohms termination resistor	

Note : IPC-C2204S port number mapping



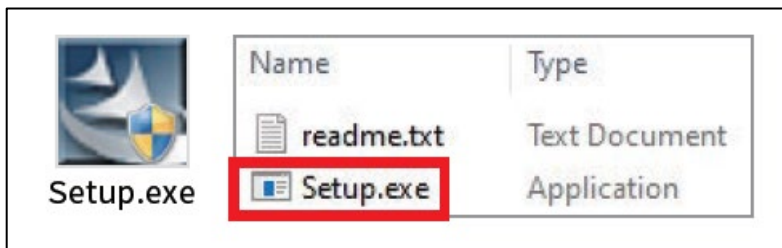
4. Driver Installation

(1) You can download the latest driver from SUNIX official website (<http://www.sunix.com>)



(2) Please execute Setup.exe to install driver. Driver InstallShield Wizard will show up and please wait for driver install procedure running.

Please plug the board in an available I/O slot first, before installing the driver.
Unzip the software file and run setup.exe under Windows operating system.

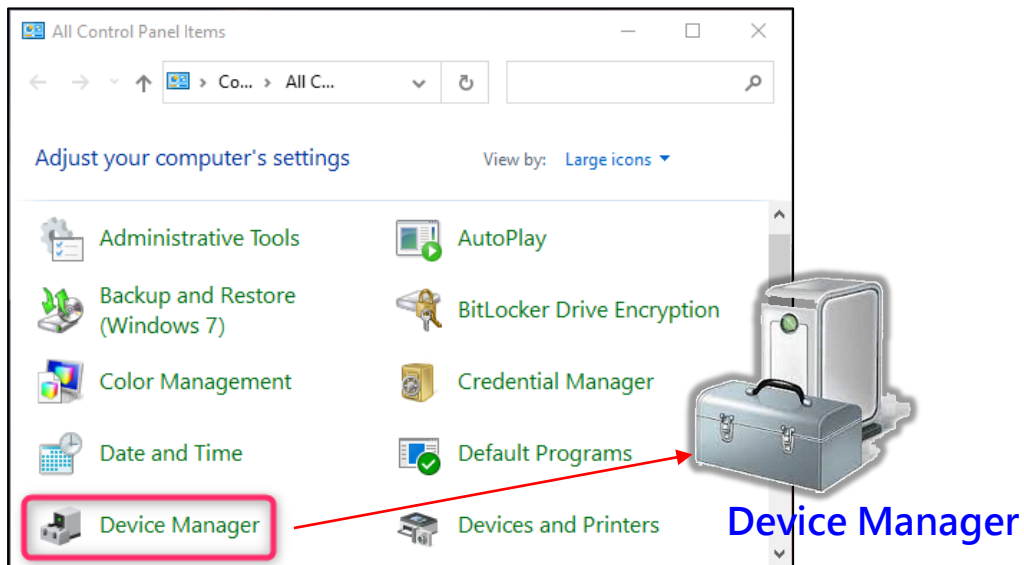


5. Hardware Verification

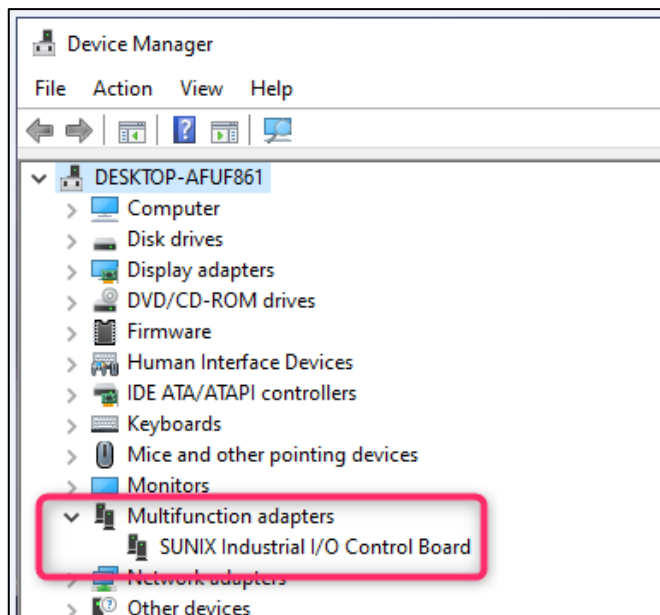
You can use Windows “**Device Manager**” to verify proper installation.

(1) Select Device Manager in the in the Windows Control Panel.

Controller Panel > All Control Panel Items > Device Manager



(2) In the Device Manager window, you would read **SUNIX PCI Express Industrial I/O Control Board** under **Multifunction adapters** catalog



6.Port Configuration

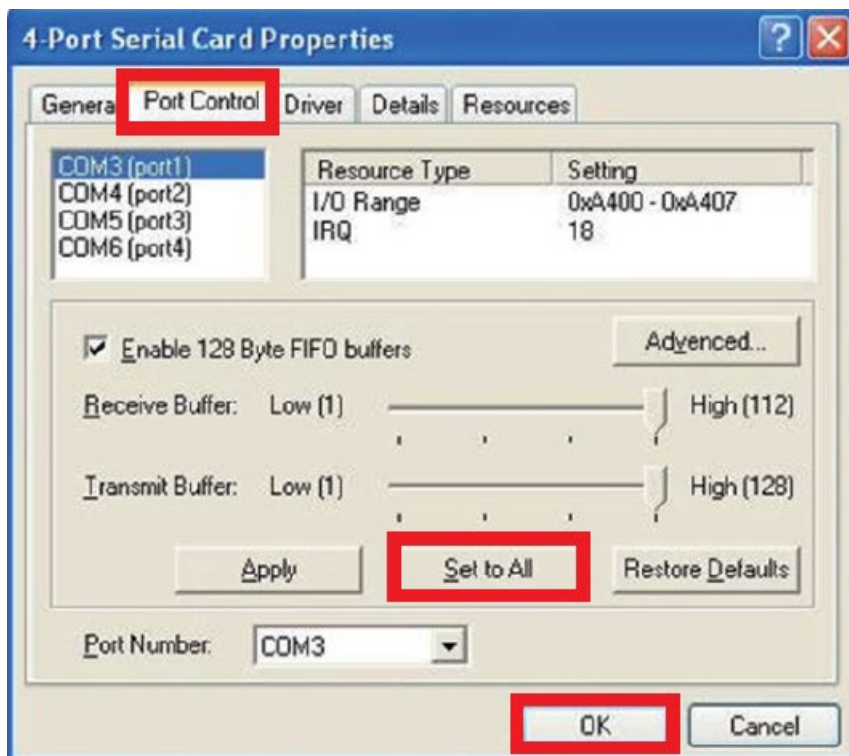
6-1 Configure Serial Port Settings

After the board and serial port drivers are installed, please refer to following instructions to configure Serial COM settings.

- (1) Please launch the “Device Manager”.
- (2) Right click the “SUNIX Serial Card” item from the “Multifunction adapters” sub-tree and click “Properties”.

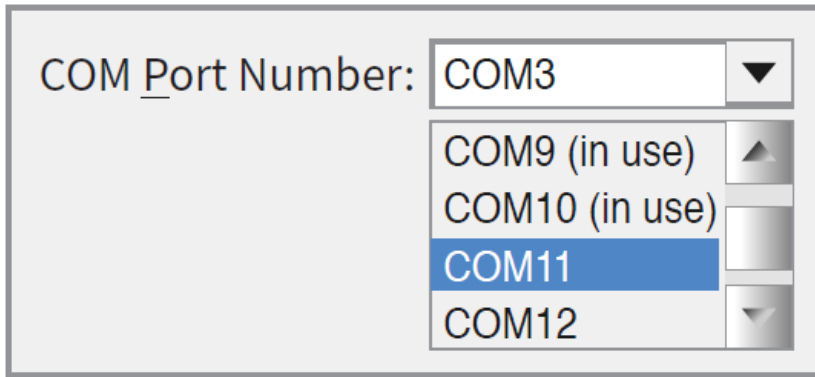


- (3) On the “Port Control” tab, select a port to configure.
 - * Click “OK” to approve the settings for the selected port.
 - * Click “Set to All” to approve the settings for all COM ports.



6-2 COM Port Number Settings

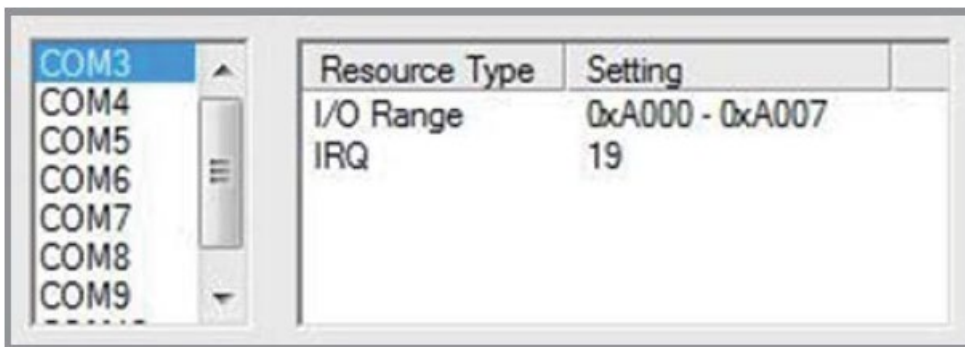
Under Port Number, select a COM number to assign to the serial port. Click “OK” to approve the settings for the selected port.



Note: In order to prevent system resource conflict, do not select “in use” port.

6-3 COM I/O Resource

User can read the COM “IO Range” and “IRQ” located in system by selecting COM port.

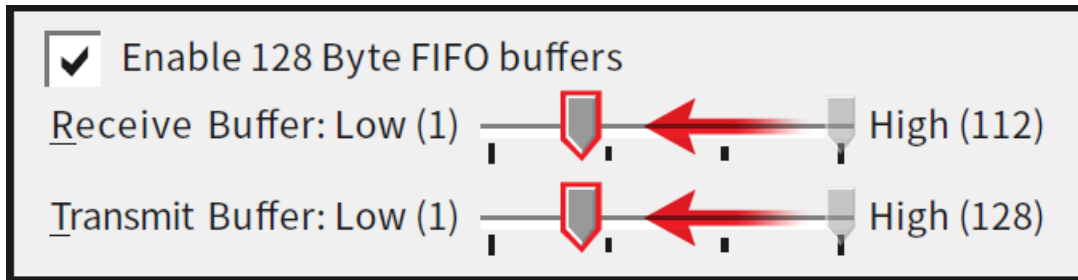


IRQ and I/O address is automatically assigned by the mainboard PCI (PCI Express) BIOS automatically (before COM card driver installing). User can NOT assign legacy ISA address (3F8, 3E8, 2F8, 2E8) for the specific COM port. But for IRQ setting, user can set specific IRQ value for this PCI Express bus slot via mainboard’s BIOS settings (not via SUNIX driver). But all COM ports will share one IRQ value.

6-4 FIFO Settings

Select an Rx FIFO Trigger and Tx FIFO Size.

The default Rx FIFO Trigger is 112 bytes. The default Tx FIFO Size is 128 bytes. Click “Set to All” to change this setting for all serial ports on the board. Then click “OK” to save the settings.



Receive FIFO interrupt trigger level :

When the level of data in the receiver FIFO reaches this value, a receiver data interrupt is triggered.

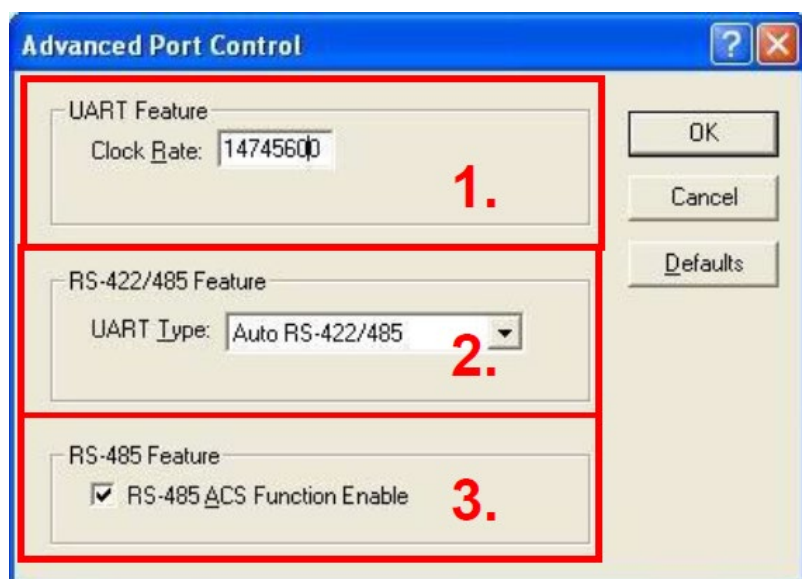
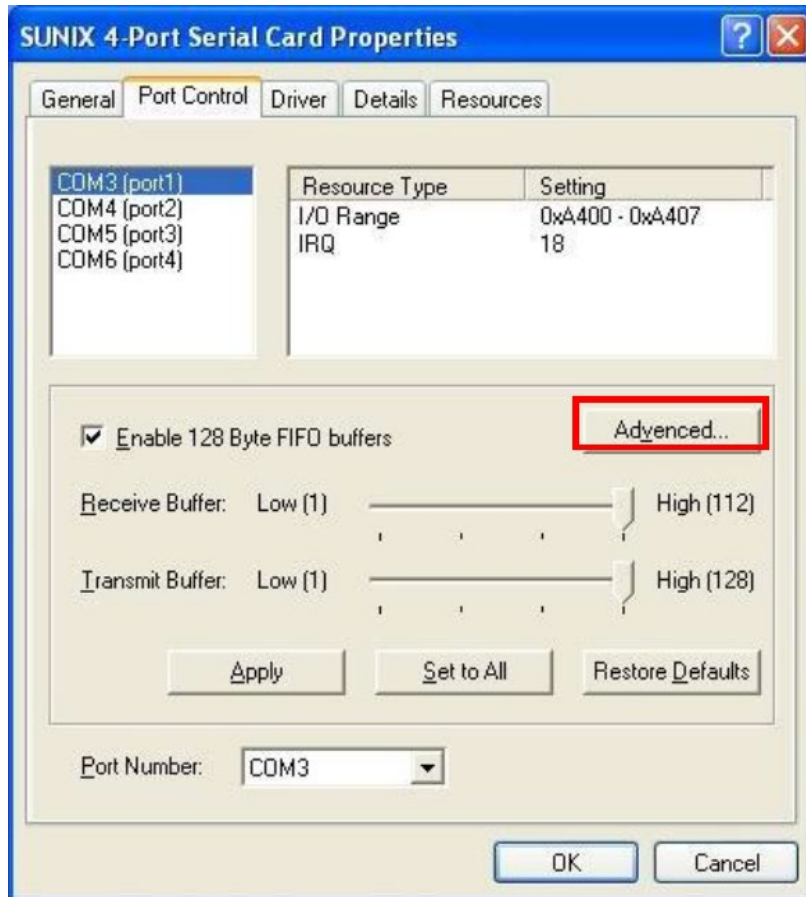
Transmit FIFO interrupt trigger level :

When the level of data in the transmit FIFO falls below this value, a transmitter interrupt is triggered. Setting this value to zero will not trigger an interrupt until the transmitter is completely idle.

The FIFO trigger levels can be fine tuned to gain optimum performance, depending on system performance, baud rate used, levels of serial traffic etc.

6-5 Advanced Settings for RS-422/485 Communication

User can control RS-422/485 communication in Advanced Port Control page through “Advanced” settings.



Clock Rate

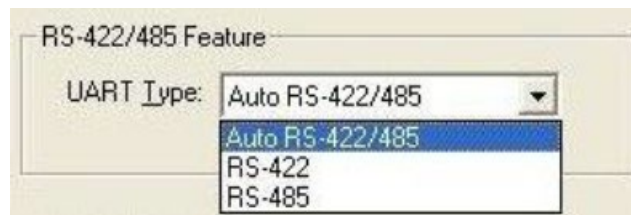
This is the “Data Rate” value for on board crystal frequency of input clock. The baud rate can optionally be adjusted according to the data rate required. The clock pre-divisor is used to divide the input clock prior to baud rate generation.

This parameter must match with the oscillator (crystal) frequency on the board. System default is 14745600 Hz. We do NOT recommend for modification without SUNIX instruction. User can click “Defaults” button back to manufactory settings.



UART Type (Default: Auto RS-422/485)

User can select RS-422 or RS-485 interface for each COM port of this board.



1). Auto RS-422/485

SUNIX developed a unique technology “Auto Detect & Switching RS-422/485, which can automatically detect the state of RS-422 full duplex or RS-485 half duplex and control the data transmitting and receiving wires at the same port without any hardware or software settings.

2). RS-422 (4-Wire RS-485)

This COM port forces to run RS-422 full duplex mode.
(RS-485 ACS function can not open under this mode.)

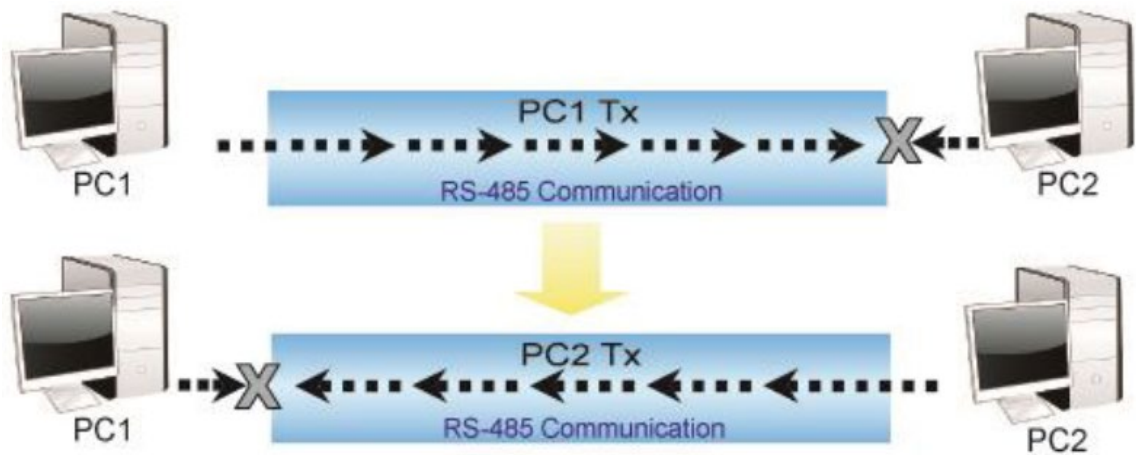
3). RS-485

This COM port forces to run RS-485 half duplex mode.

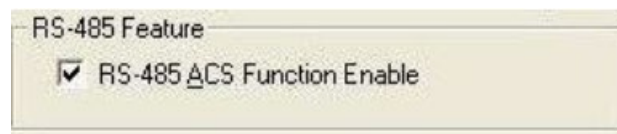


RS-485 ACS™ Technology (Default: Enable)

Auto Carrier Sense (ACS™) technology is the data flow control under RS-485 half duplex (one-way traffic) communicating. It manages data flow between computers or devices or between nodes in a RS-485 network, so that the data can be handled at an efficient pace Auto



Auto Carrier Sense (ACS™) technology will check the status of RS-485 communication bus. If the bus is idle, it starts transmission. If the bus is not idle (some data flows in the bus), then it will postpone the transmission of UART until the bus is idle. Due to the reduction of TX/RX packet conflicting on RS-485 one-way traffic bus, it will enhance better system performance and RS-485 communication ability.



RS-485 AHDC™ Technology

Since RS-485 is bidirectional which means the driver is turned on only when it needs to transmit some data, otherwise it is in floating mode. SUNIX developed a new design to control the direction of driver (On or Off) automatically which is called Auto Hardware Direction Control/Carrier Sense. AHDC/CS™ works on the same principle and only turns on the driver when UART needs to transmit some data; but the advantage is that AHDC/CS™.



Auto Hardware Direction Control (AHDC™) technology makes it easier to manage 2-wire RS-485 half-duplex communications, eliminating the need for software interference. User does not necessary to write extra code for Windows applications to control the half-duplex protocol. Auto Hardware Direction Control (AHDC™) technology is the key feature of SUNIX UART, and this function is default enabling.

7. Troubleshooting

Q 1. System fails to find the Industrial I/O Control Board.

Ans: It may cause by following issue:

- a. The board is not properly plugged into the PCIe (M.2 / Mini PCIe) slot.
- b. Please clean the golden finger.
- c. The M.2 slot is defective. Please try other slots until you find one that works.
- d. The mainboard does not have an available IRQ for the
PCIe (M.2 / Mini PCIe) serial board.

Enter the PC's BIOS and make sure an IRQ setting is available in the PCI/PnP settings.

- e. The board itself might be defective.

You can try another mainboard testing this board working or not.

Q 2. There is a blue screen when I entry operation system.

Ans: It may cause by following issue:

- a. The possible reason is an IRQ or I/O address conflict with other PCIe bus adapters, such as LAN or serial boards, or with the system BIOS.

Refer to the corresponding problem in the previous FAQ for solutions.

- b. Please check driver update from your vendor.