SUNIX | RS-422/485 Control Card
Quick Installation Guide (Universal)   Ver.1

Please visit https://www.sunix.com with product model for detail and latest manual/driver update

Introduction

SUNIX RS-422/485 Serial Card allows users to expand RS-422/485 ports on PC-based system. The RS-422/458 COM ports can be attached to a housing or slot bracket. Each serial port achieves data rates up to 921.6 Kbps and utilizes 16C950 UART with an on-chip 128-bytes hardware FIFO buffer for reliable, high-speed serial I/O. With SUNIX patented Auto-Switching RS-422/485 and RS-485 AHDC™ technology, user can easily manage different serial interfaces selection and RS-485 signal direction control. We provided with 2KV IEC6100-4-5 Level 3 Surge Suppressor and ±15KV IEC61000-4-2 ESD Discharge Transceiver. Besides, board supports a wide variety of operating systems, including Windows, Linux, DOS, and UNIX. It is the best serial communicating solution for industrial and harsh environment applications.

1. Hardware Installation

⚠️ **SAFETY FIRST**
To avoid damages, please make sure to remove any power connection before card installation, and follow the detailed steps given below before inserting the card into your computer.

1-1 PCI Express Card

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.
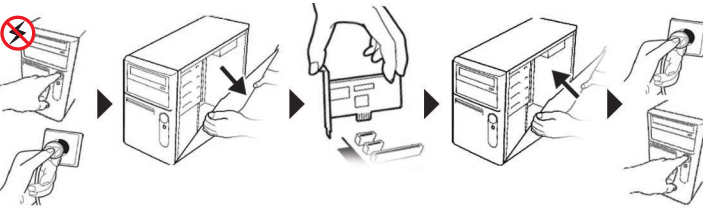
1-2 M.2 PCIe Card

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 between M.2 card and extension board.
**Step 6**: Secure the extension board to PC chassis.
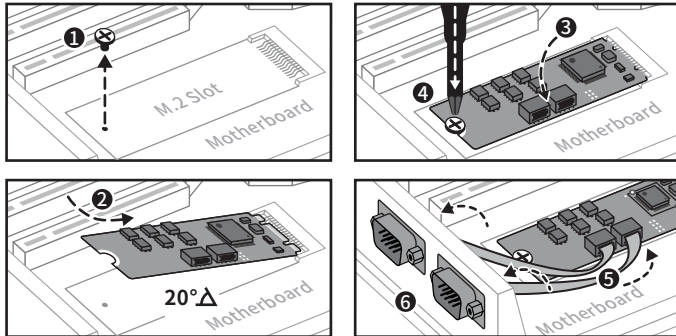
1-3 Mini PCIe Card

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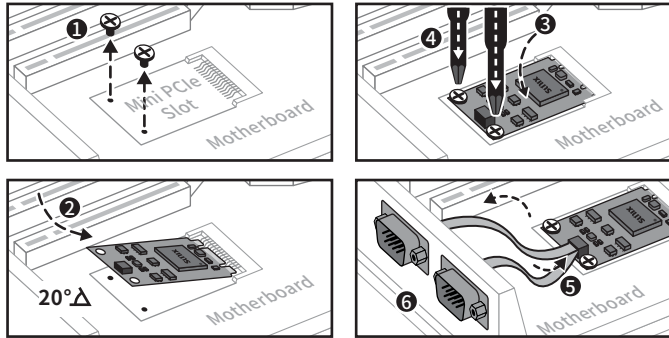
2. Pin Assignment

D-Sub 9-pin male with nuts on cable

	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

DB9M / Pin Header(Pitch 1.0mm) / DB25M diagrams
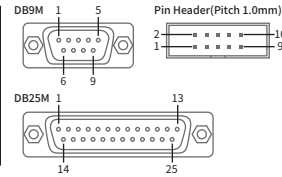
SUNIX 4 ports DB44 Female Pin Assignment

	PIN	1	2	3	4
RS-422 or 4-Wire RS-485	Tx+	32	36	40	44
	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

1	2	3	4	5	6	7	8
32	2	36	6	40	10	44	14
17	18	22	34	26	38	30	42
3	31	7	35	11	39	15	43
1	16	5	20	9	24	13	28
GND	GND	GND	GND	GND	GND	GND	GND
32	2	36	6	40	10	44	14
17	18	22	34	26	38	30	42
GND	GND	GND	GND	GND	GND	GND	GND
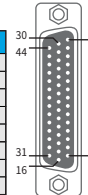
SUNIX 16 ports DB78 Female Pin Assignment

	PIN	1	2	3	4	5	6	7	8
RS-422 or 4-Wire RS-485	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
	PIN	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	PIN	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
	PIN	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.

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

SUNIX Host Card	Device
Tx +	Rx +
Tx −	Rx −
Rx +	Tx +
Rx −	Tx −

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

SUNIX Host Card	Device
D + (Tx +)	D +
D − (Tx −)	D −

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.

(Default)   Short

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:

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

2-port RS-422/485 model:

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

4. Driver Installation

1) You can download the latest driver from SUNIX official website (https://www.sunix.com)
2) Please plug the card into the available I/O slot
3) Unzip the software file and run setup.exe under Windows operating system.

| Name	Type
readme.txt	Text Document
Setup.exe	Application

Setup.exe
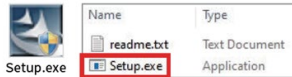
5. Hardware Installation

You can use Windows "**Device Manager**" to verify proper installation.
1) Select Device Manager in the Windows Control Panel.

   Start > Control Panel > Device Manager

* The number of COM ports will depend on what products you bought.

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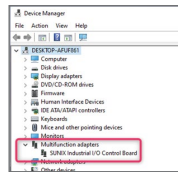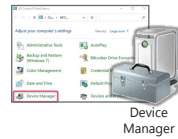
Device Manager

✓ Multifunction adapters
   SUNIX 4-Port Serial Card

6-1. Configure Serial Port Settings

After the board and 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**".

Update Driver Software...
Disable
Uninstall
Scan for hardware changes
Properties

✓ Multifunction adapters
   SUNIX 4-Port Serial Card

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.
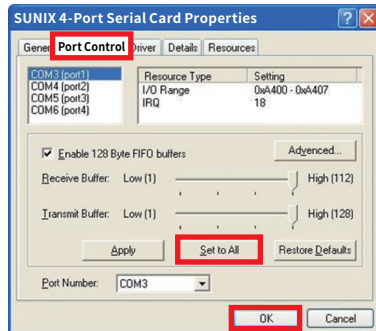
6-2. COM Port Number Settings

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.

COM Port Number: COM3
COM9 (in use)
COM10 (in use)
COM11
COM12
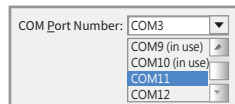
6-3. COM I/O Resource

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

	Resource Type	Setting
COM3	I/O Range	0xA000 - 0xA007
	IRQ	19
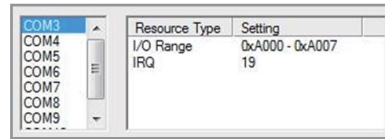
IRQ and I/O address is automatically assigned by the mainboard PCI (PCI Express) BIOS automatically (before COM card driver installing). User can NOT assign legacy ISA address (3F8, 3E8, 2F8, 2E8) for the specific COM port. But for IRQ setting, user can set specific IRQ value for this PCI Express bus slot via mainboard's BIOS settings (not via SUNIX driver). But all COM ports will share one IRQ value.
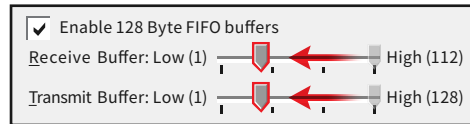
6-4. FIFO Settings

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.

✓ Enable 128 Byte FIFO buffers
Receive Buffer: Low (1) ——————— High (112)
Transmit Buffer: Low (1) ——————— High (128)

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.
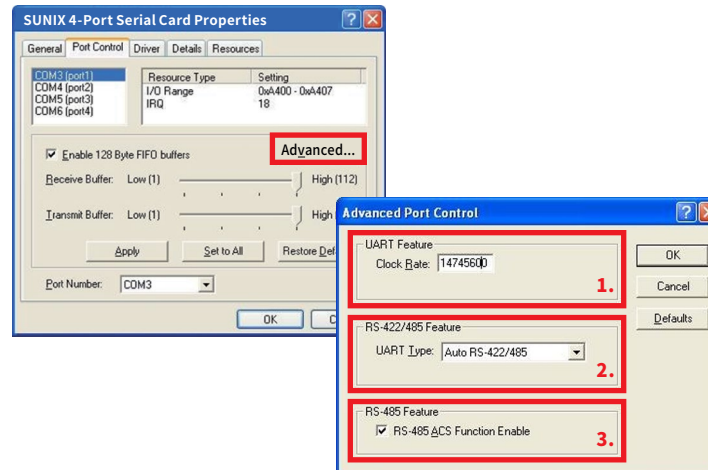
Clock Rate

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 Feature
Clock Rate: 14745600
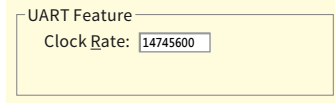
UART Type (Default: Auto RS-422/485)

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

RS-422/485 Feature
UART Type: Auto RS-422/485
Auto RS-422/485
RS-422
RS-485
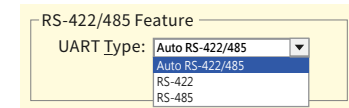
7. Troubleshooting

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) 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.

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