

# ADAM-4542+

## Fiber Optic to RS-232/422/485 Converter

### Overview

Fiber optic transmission offers the benefits of wide bandwidth, immunity to EMI/RFI interference, and secure data transmission. The ADAM-4542+ can be used as an RS-232/422/485 point-to-point or point-to-multipoint connection for transmitting and converting full/half-duplex signals and their equivalents within a fiber optic environment. Fiber optics are the perfect solution for applications where the transmission medium must be protected from electrical exposure, lighting, atmospheric conditions or chemical corrosion.

The ADAM-4542+ is specially designed to link various machinery equipped with RS-232/422/485 communication ports (such as computer systems or manufacturing machines). Using standard SC connectors, the module's fiber optic port can accommodate a wide range of fiber optic cable. ADAM-4542+ also supports the redundancy requirement. You can use two pairs of ADAM-4542+ for a redundant architecture. This special design offers higher reliability.

### Packing List

Before you begin installing your module, please make sure that the following materials have been shipped:

1 x ADAM-4542+ Module with DIN-rail mounting bracket

1 x ADAM-4542+ User Manual

1 x Panel Mounting Bracket

1 x Cable for DB-9 to 3-wired

If any of these items are missing/damaged, contact your distributor or sales representative immediately.

### Notes

For more information on this and other Advantech products, please visit our websites at:

<http://www.advantech.com>

<http://www.advantech.com/eAutomation>

For technical support and service:

<http://www.advantech.com.tw/eservice>

This startup manual is for the ADAM-4542+

Part No: 2004542002

4th Edition

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### Features

- Direct plug-and-play
- Easily mounted on a DIN-rail, panel, or piggybacked
- Transmission speeds of up to 921.6 kbps (RS422/485)
- Optical fibers enable transmission of up to 15 km
- Half/Full-duplex, bidirectional transmission mode
- Support for ring-mode
- Avoid lightning strikes and EMI/RFI
- Prevents damage from electrostatic discharge
- Stable and error-free data transmission
- Automatic internal RS-485 bus supervision
- No external flow control signals required for RS-485
- Transient suppression and over-current protection on RS-232/422/485 data lines
- LED for power and data flow indication

### Specifications

- **Fiber Optic** : Single Mode
- **Wavelength** : 1310 nm
- **Transmission Distance** : 15 km
- **Optical Power Budget (attenuation)** : -15 ~ -8 dBm
- **Casing** : ABS with captive mounting hardware
- **Communication Mode** : Asynchronous
- **Connector** : Plug-in screw terminal
- **Fiber port** : SC
- **Transmission Mode** : Full/Half-duplex, bidirectional
- **Transmission Rate** : Up to 921.6 kbps
- **Power Requirement** : Unregulated +10 ~ +30 V<sub>DC</sub>
- **Operating Temperature** : -10 ~ 70°C (14 ~ 158°F)
- **Operating Humidity** : 5 ~ 95% (non-condensing)
- **Accessories** : DIN-rail mounting adapter, panel mounting bracket

### Two Year Warranty

Advantech warrants to you, the original purchaser, that this product will be free from defects in materials and workmanship for two years from the date of purchase. This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

If your product is defective, it will be repaired or replaced at no charge during the warranty period. package and ship it prepaid to your dealer.

## Switch and Jumper Settings

ADAM-4542+ provides three DIP switches that users can configure the settings for their applications. SW1 and SW2 set the data format and baud rate of serial communication. SW3 sets the Primary/Secondary mode for the redundant application.

Set SW2			
Operation Mode	RS-232	RS-422	RS-485
Normal	No	No	Yes
Ring	Yes	Yes	Yes

### SW1

Switch 1 controls the data format. Data can be 9, 10, 11 or 12 bits. The factory default is 10 bits : one start bit, eight data bits, one stop bit and no parity bit.

Data Format		
SW1	1	2
9 bits	OFF	OFF
10 bits*	ON	OFF
11 bits	OFF	ON
12 bits	ON	ON

\*Default setting

When using the converter in combination with other ADAM modules, do not change the default setting of the converter, since ADAM modules have a fixed data format of ten data bits. The option of changing to 9, 11 or 12 bits is for use with other modules (other than ADAM modules) that have different data formats. Should you change the ADAM module's data format, be aware that you will also have to change the data format on all the other modules in the network.

### SW2

Switch 2 sets the baud rate for RS-485 auto flow control. The options range from 1200 bps to 921.62 kbps. The factory default is 9600 bps. Be aware that when you change the baud rate, you also have to change the baud rate for all of the connected modules accordingly. You can refer to the table below to make sure when you need to set SW2.

Baud Rate									
SW2	1	2	3	4	5	6	7	8	9
1200 bps	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
2400 bps	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
4800 bps	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
9600 bps*	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF
19.2 kbps	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF
38.4 kbps	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF
57.6 kbps	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF
115.2 kbps	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
230.4 kbps	ON	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
460.8 kbps	OFF	ON	OFF	OFF	OFF	OFF	OFF	ON	OFF
921.6 kbps	OFF	OFF	ON	OFF	OFF	OFF	OFF	ON	OFF
RS-232/422	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON

\*Default setting

### SW3

The ADAM-4542+ can support redundancy and ring operation. By setting the DIP3 of SW3, the ADAM-4542+ can be set as "Primary" or "Secondary" mode in the redundant architecture. The "Primary" connection is the major connection line. If any of the ADAM-4542+ modules on the "Primary" line fails, the "Secondary" line will take over the connection automatically. The default setting of ADAM-4542+ is in "Primary". By setting the DIP4 of SW3, the ADAM-4542+ can be set as "Ring" or "Normal" mode. We will introduce more about ring operation in the later chapter.

\*Default setting

Redundancy	
SW3	3
Primary	OFF
Secondary*	ON

\*Default setting

Operation Mode	
SW3	4
Normal Mode*	OFF
Ring Mode	ON

## Ring Operation

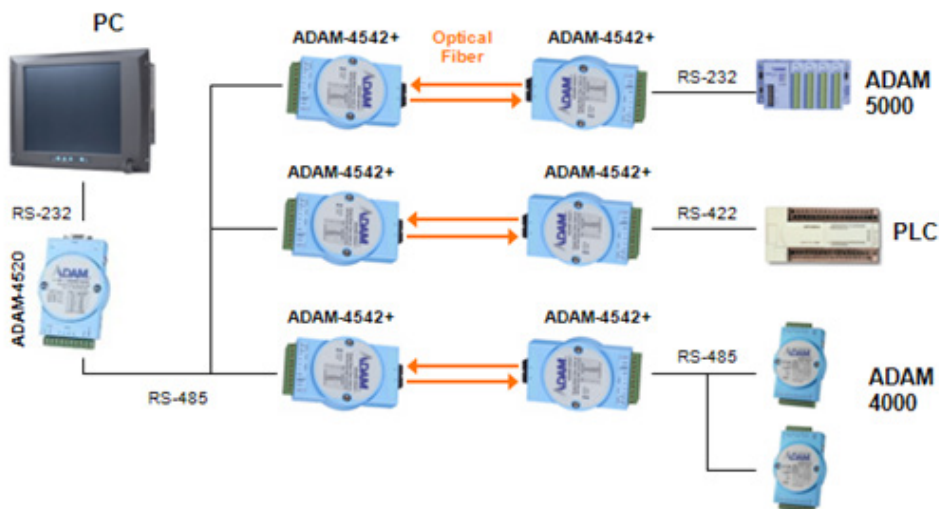
Several ADAM-4542+ modules can be cascaded to form a ring connection. With a circumstance that users plan to use a HMI/SCADA to connect multiple kinds of IO device with ADAM-4542+, users can apply ring architecture to save lots of cost caused from the number of modules and the length of optical fiber. Following diagrams demonstrates the Ring application. Ring Operation mode is set by DIP4 of SW3.

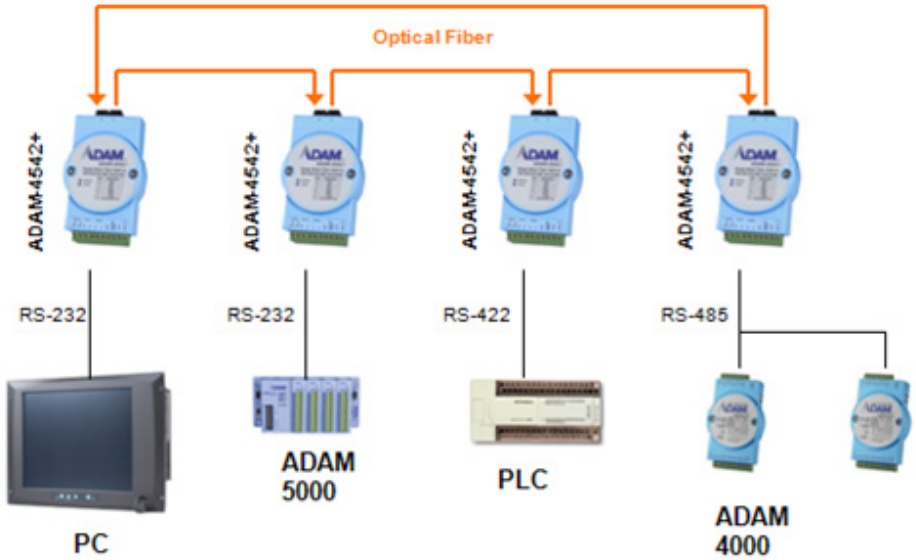
### Limitation

While applying ring operation, please notice the following limitations.

- It only supports the half duplex.
- Up to 100 ADAM-4542+ can be connected over a distance of 1,500 km.
- Redundant mode cannot be used with ring mode
- Under ring operation, RS-232/422/485 all need to set SW2 for baud rate.

### Normal Operation





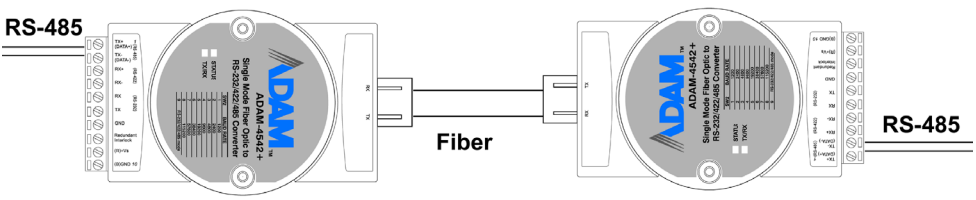
\* Note: if no device is connected at the RS-232 end under ring operation, the communication of the system will be affected or fail.

## LED Description

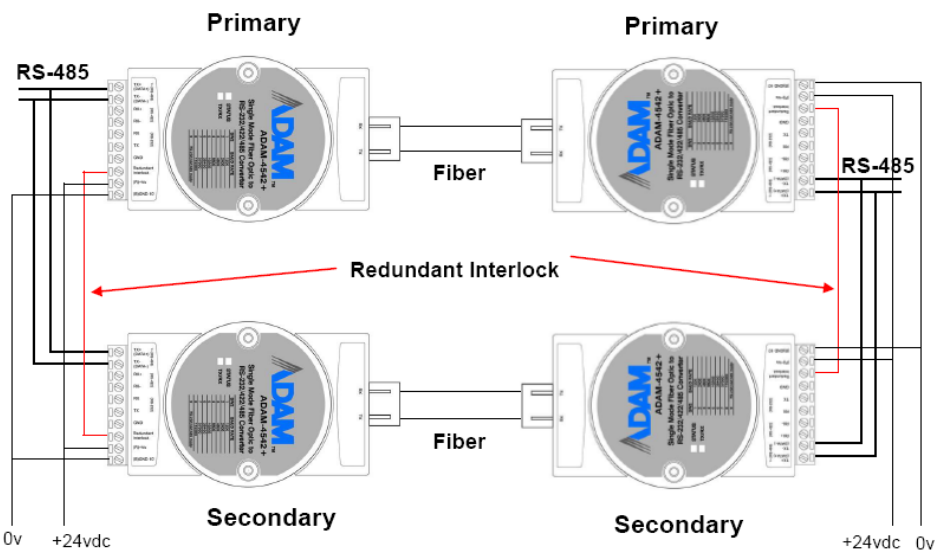
On the face plate of module, there are two sets of LED which are status LED and TX/RX LED. The meaning for LED display method is described as following table.

Description	Status		TX/RX	
	Green	Red	Green	Red
Transmitting Data	ON			
Receiving Data		ON		
Power/Fiber state/Fiber Rx/Redundant Working			ON	
Power/Fiber state/Fiber Rx/ Redundant Failed				ON

Non-Redundant System

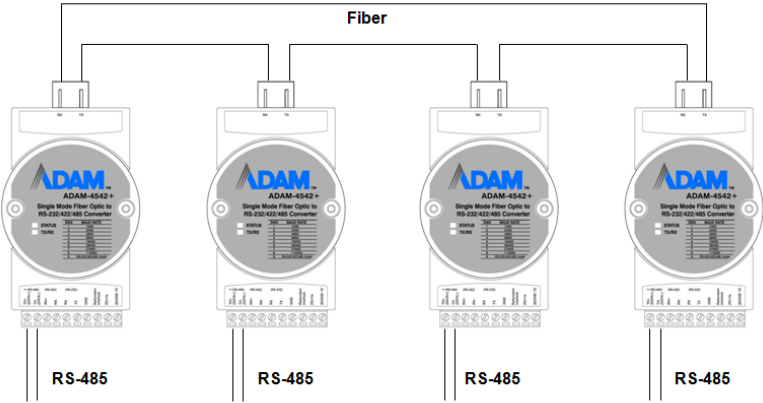


Redundant System



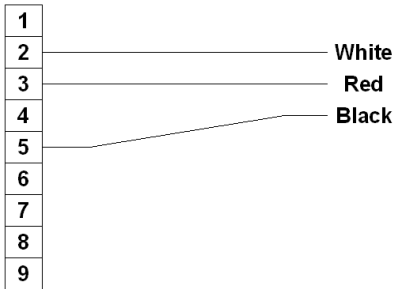
\*Redundant systems can also support RS-422.

\* In a redundant system, the ground of the external power for modules must be connected together.



**Pin Assignment of Cable  
1700090253 (DB-9 to 3 Wires Cable)**

DB-9 Connector                      3 Wires Connection



**Troubleshooting**

Problem	Solution
The TX and RX connections are reversed.	Make sure the fiber connection is made so that the TX of one end is connected to the RX of the other.
Poor connection between the ADAM-4542+ and the communication port in computer.	Make sure the ADAM-4542+ is securely plugged into the communication port.
Attenuation on the fiber causes the signal level to drop below the accepted level.	Reduce attenuation by reducing connector loss, transmission distances, etc.
The connection between the communication ports is neither DTE to DTE nor DCE to DCE connection.	Add a converter to one of the optical modems, so that the pin assignments from the communication port to the modem are from pin 2 to pin3 and from pin 3 to pin 2.

**Damage Test**

If none of the above resolved your problem, your module may be damaged. To test for damage, use the hyper terminal program of MS Windows to perform a loop-back test of the optical modem. This will detect if the module is damaged.