

Single-channel dual-ring self-healing industrial fiber transceiver Model: MWF501-KG

◆ Brief introduction

MWF501-KG single-channel dual-ring self-healing industrial fiber transceiver is a low-cost, adaptable to the industrial environment, and a serial data fiber transmission communication device with dual-ring self-healing function. It can set up a chain network or a double-ring fiber network to realize a transparent transmission of RS-232/RS-485/RS-422 on the fiber ring network without changing the user agreement. It solves the problems of long communication distance, high communication speed, and self-healing redundancy. It also solves the problems of electromagnetic interference, ground ring interference and lightning damage, and greatly improves the reliability, security and confidentiality of data communication.

- MWF501-S-KG: Single-channel single-mode dual-ring self-healing industrial fiber transceiver

The transmission medium used is 09/125μm single-mode fiber, and the transmission distance of 1310 wavelength is up to 50Km.

The maximum transmission distance of 1550 wavelength is 100Km.

Optical interface can be ST, SC, FC, technical indicators are as below:

Parameter	Unit	Condition	Min.	Typical	Max.
Working wavelength	nm	1310	1260	1310	1360
		1550	1520	1550	1570
Output spectrum width	nm	FP-LD			4
		DFB-LD			1
Output average fiber power	dBm	FP-LD	-15	-7	-2
		DFB-LD	-5	-3	+2
Extinction ratio	dB	EX	10		
Sensitivity	dBm	62.5Mb/s		-38	
Minimum overload point	dBm	BER=1 ×10 ⁻¹⁰		0	

- MWF501-M-KG: Single-channel multi-mode dual-ring self-healing industrial fiber transceiver

The transmission medium is 62.5/125μm or 50/125μm multimode fiber, and the transmission distance is 2~5Km.

Optical interface can be ST, SC, FC, technical indicators are as below:

Parameter	Unit	Condition	Min.	Typical	Max.
Working wavelength	nm	1310	1260	1310	1360
Output spectrum width	nm	FP-LD			4
Output average fiber power	dBm	FP-LD	-16	-8	
Extinction ratio	dB	EX	10		
Sensitivity	dBm	84Mb/s		-35	
Minimum overload point	dBm	BER=1 ×10 ⁻¹⁰		-3	

◆ Features

MWF501-KG single-channel dual-ring self-healing industrial fiber transceiver uses special fiber fusion technology, unique CPLD coding technology, and based on the dual-ring redundancy self-healing principle to realize the self-healing function of ring network fiber transceivers. Its biggest feature is that if any fiber network is damaged, the other fiber network can still maintain loopback to continue communication.

◆ Working principle

The CPLD of the MWF501-KG single-channel dual-ring self-healing industrial fiber transceiver uses Altera's low-power, high-performance, and low-cost MAXII series chips.

The main self-healing criteria: no light reception, frame error

If there is no light reception, it means that the device at the opposite end is powered off, the fiber connector is damaged or the device is damaged, and the device will loop back the data received by the other fiber port to realize the self-healing function and ensure the normal operation of the system; if it is a frame Errors indicate that there is an error in the peer device or the conflict of fiber signals, the device will shield the error frame, and the data of the other fiber port will loop back.

The use of special fiber fusion technology enables the fiber transceiver connected to the double-ring network to have the power-down self-healing function.

◆ Product performance

1. Double-loop self-healing ensures the reliability of network communication
2. Node RS-232/RS-485/422 optional
3. Combination of PCM pulse code modulation technology and digital phase-locked loop clock extraction technology;

4. PDH technology platform, dynamic data storage and forwarding technology;
5. RS-485/422 line 600W/ms anti-lightning and 1500V anti-static protection;
6. RS-232 serial port protection circuit, hot-swappable;
7. It is suitable for a one-master-to-many-slave query communication system. The number of access nodes is theoretically unlimited, and it has the characteristics of convenient networking and flexible interfaces;
8. Using large-scale programmable logic circuits, highly integrated fiber transceiver devices, small size and high reliability;
9. Serial port asynchronous communication rate 300bps to 115.2kbps transparent transmission, rate self-adaptation, RS-485 has no delay in transmission;
10. Smart electrical interface, providing RS-232, RS-485 or RS-422 interface through different pins, no need to dial code settings;
11. Fully transparent communication without delay, users do not need any debugging, plug and play;
12. Anti-electromagnetic interference, ground ring interference and lightning damage;
13. Complete status indication, LED light alarm, easy to maintain and troubleshoot;
14. Industrial-grade design, all surface mount technology, metal shell, DIN-RAIL installation, to ensure the long-term reliability of the product.

◆ Technical indicators

Model	MWF501-KG
Communication rate	0~115.2Kbps adaptive
Bit error rate	Very low bit error rate: $\leq 10^{-9}$
Power supply	Standard power supply: DC24V (DC12V, DC48V, AC220V are optional) Power consumption: <5W, can be plugged and unplugged
Interface parameters	Interface channel: industrial grade phoenix terminal, channel RS-232, RS-422, RS-485. Channel rate: 300~115.2kbps
Master and slave settings	Master station: switch 1 to the master station Slave station: switch 1 is not dialed up as a slave station
Physical characteristics	Standard shape: 144mm (length) × 97mm (width) × 33mm (height) Net weight: 438g

Environmental conditions	Working temperature: -20~+75℃ Storage temperature: -40~+85℃ Relative humidity: $\leq 95\%$ (25℃), no condensation
MTBF	>100,000hrs

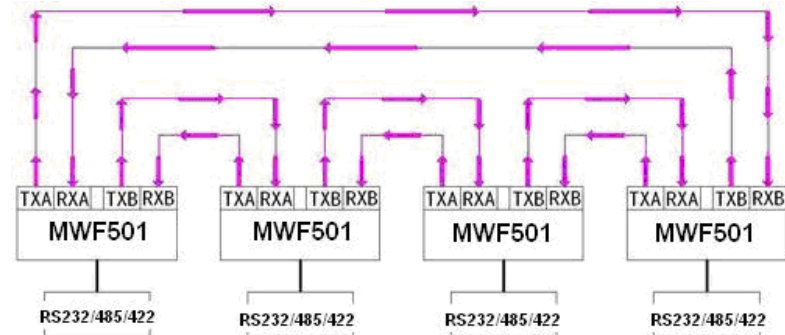
◆ Wiring connection

- Fiber ring network: when multiple MWF501-KGs are networked, there must be one and only one set by dialing 1 to "ON" to be set as the master station, and the other fiber transceivers are the slave stations. The fiber connection mode is A to B, B to A, TX to RX, and RX to TX.

MWF501-KG is used to build a dual-ring network fiber network. The following is a typical connection diagram:



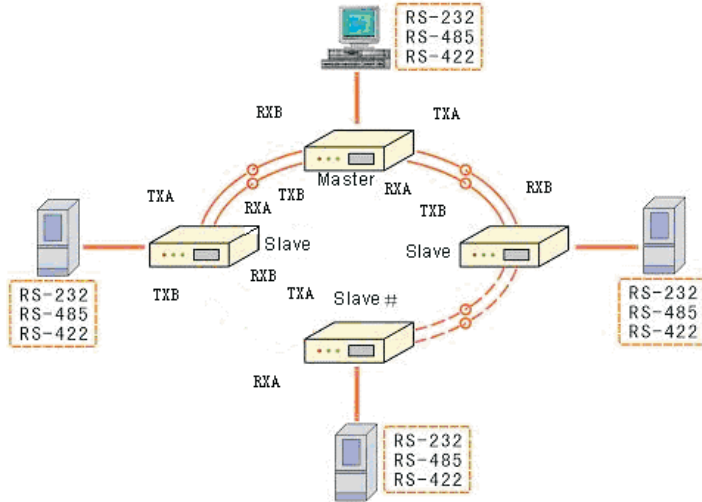
In practical applications, the double-ring network composed of MWF501-KG can be connected to the fiber loop as shown in the figure below when the head and tail span is large.



Ring network connection

In the above two figures, the master station RS-232/485/422 can form a communication system with the slave station through an fiber loop. MWF501-KG single-channel dual-ring self-healing industrial fiber transceiver can theoretically connect 255 slave stations.

MWF501-KG can also form a chain network with multiple units. The following is a typical connection diagram:



- Indicate lights

PWR1	PWR1, red
PWR2	PWR1, red
MAIN	Main station, red
SUB	Slave, green
LOOPA	Optical A port has light receiving, green
LOOPB	Optical B port has light receiving, green
TXA	Optical A port data transmission, green
RXA	Optical A port data receiving, green
TXB	Optical B port data transmission, green
RXB	Optical B port data receiving, green
TXD	Serial port sends data, green
RXD	Serial port to receive data, green

- Dip switch

This machine has a DIP switch. Switch 1 sets the switch for the master station and slave station of this machine. Turn it on as the master station, otherwise it is the slave station.



Master station



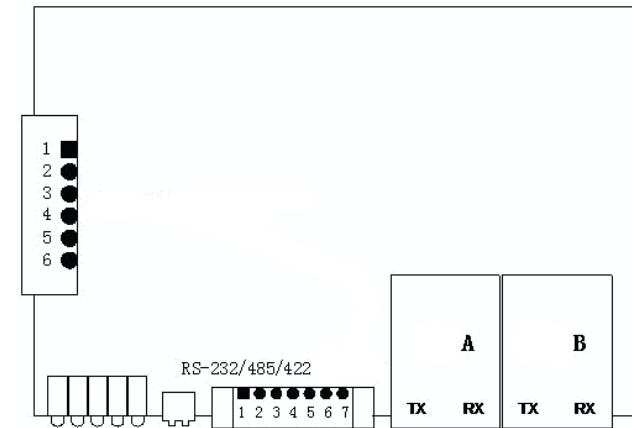
Slave station



120 ohm matched resistance

- Interface

Pin definition of 10-bit Phoenix terminal of MWF501-KG:



Power/Alarm terminals						
PIN	1	2	3	4	5	6
Signal	V+	V-	RX+	RX-	V2+	V2-
Type	DC12V, DC24V, DC48V		Alarm		DC12V, DC24V, DC48V	
	AC85-265V					

RS232/485/422 terminals							
PIN	1	2	3	4	5	6	7
Signal	TX+(A+)	TX-(B-)	RX+	RX-	GND	TXD	RXD
Type	RS485/422		RS422		RS232		

- RS-232 interface connection method:

The local TX is connected to the external device RX, the local RX is connected to the external device TX, and the local GND is connected to the external device GND.

- RS-485 interface connection method:

This device has RS-485, RS-422 adaptive function, no need to dial code control. For RS-485, only connect pins 1 and 2, pin 1 is A+, and pin2 connected to A+ of other RS485 devices is B-..

- RS-422 interface connection method:

When using RS-422, four pins 1, 2, 3, 4 are used, which are TX+, TX-, RX+, RX-. Connect TX+ on MWF501-KG to RTX+ of other RS-422 devices, TX- to RX-, RX+ to TX+ of other RS-422 devices, and RX- to TX-.

Please note: At the beginning and end of the RS-485 bus, a 120 ohm wave impedance matching resistor must be connected to each! During asynchronous communication between R-485 and R-422, R-485 does not add matching resistors, and bit errors will occur during the highest transmission rate.

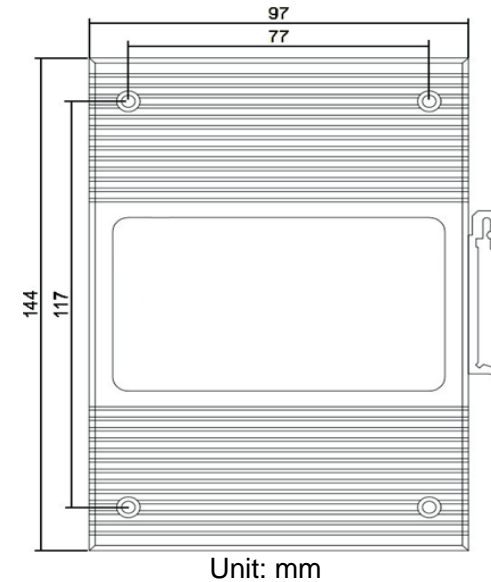
- Fiber interface connection method:

Connect the socket marked TX in the fiber interface to the RX port of the fiber interface of another device through an fiber. Use the fiber of FC, SC, ST connector to connect to the fiber interface. Tighten or clamp it to prevent the connector from falling off. In a typical double-ring network, there must be only one master station, and there can be multiple slave stations.

- Power supply:

Standard power supply: DC24V (DC12V, DC48V, AC220V are optional);
Power consumption: <5W, can be plugged and unplugged under power.
Pay attention to the polarity of the power supply, if the polarity is reversed, the device will be burnt out.

◆ Installation



◆ Matters needing attention

- 1) This product is a precision equipment, so it should be kept away from moisture;
- 2) When the equipment is not connected to the fiber, the fiber port should be equipped with a protective cover.

◆ Quality Assurance

- 1) This product is damaged due to normal use and can be replaced within one year;
- 2) This product provides five-year warranty service;