FOURSTAR PROFIBUS Optic Link Module

FS-OLM-M

User Manual

Contents

Preface

Thank you for using field-bus optic link series products of Deyang FOURSTAR Electronic Technology Co., Ltd.

Please read this manual carefully before use, so that you shall understand its perfect function and simple operating method.

The manual describes operating method for FOURSTAR PROFIBUS Optic Link Module FS-OLM-M (multimode) or FS-OLM-S (single mode) in detail. The multimode and the single mode only differ in optical fiber, but they are totally the same in function. FS is the abbreviation of registered trademark of Deyang FOURSTAR Electronic Technology Co., Ltd.

The product is mainly applicable to field-bus network of PROFIBUS, MPI and PPI, which shall transform RS485 electrical signal to optical signal to have optical fiber transmission, so as to achieve high-speed and remote transmission of PROFIBUS, solving the bottleneck problem of short-distance transmission by coaxial cable during PROFIBUS high-speed communication, what is more, thanks to isolating nature of optical fiber, network shall be of excellent electrical isolation and anti-interference function.

Users shall operate the product in accordance with technical specification and performance parameter in the user manual, and our company shall not assume any responsibilities for property loss or personal injury caused by improper operation by users.

The company has the right to change any contents and product functions on the user manual based on requirement of technical progress before the statement is made.

Copyright Statement

Version Information

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Packaging List

1. One FS-OLM-M

2. One CD (including user manual, etc, the product does not need any software or driver)

I. Overview

Currently, PROFIBUS is the most widely used field-bus, which shows its advantages during high-speed communication. As physical layer of PROFIBUS field-bus adopts interfacing technology based on RS485, only the short RS485 cable can be used for high-speed communication, when speed reaches 3～12Mbps, maximum length of the cable is only 100 meters.

For optical fiber, transmission distance does not influence rate, therefore, It is transformation of electrical signal of PROFIBUS to optical signal, namely, adopting optical fiber to transmit, that shall solve bottleneck problem of short-distance of coaxial cable during PROFIBUS high-speed communication, meanwhile, taking optical fiber as medium of telecommunication transmission shall completely work out problems of electromagnetic interference, ground wire loop interference, and undermining of the thunderbolt, etc.

Currently, the product has been applied to various sectors including industrial automation, distributive data collection, intelligent transportation, electric power, waterpower, and bank, etc, developing into top priority of telecommunication transmission.

As a converter module of industrial PROFIBUS-DP to optic link by FOURSTAR，FS-OLM-M can replace Siemens OLM optic link Module to achieve optically transparent transmission for PROFIBUS-DP signal without changing any original communication protocol and software. It is a product of plug-and-play, which can directly replace cooper conductor to transmit without any settings. FS-OLM-M transmits data in binary bit in transparent manner; therefore, it is also applicable to any communication protocol with physical interface of RS485.

II. Main Applications and Features of FOURSTAR PROFIBUS Optic Link Module

Main Applications of PROFIBUS Optic Link Module is as follows:

1. Increase transmission distance of PROFIBUS, under all rates of PROFIBUS （4.8Kbps～12Mbps），optical fiber transmission can extend a distance to 4km (multimode optical fiber) or 12km (single mode

optical fiber), what is more, it has no relation with communication rate.

2. Fundamentally work out engineering problems including electromagnetic interference, ground wire loop interference, and undermining of the thunderbolt, etc.

3. Facilitate to achieve large-scaled scattered and complex PROFIBUS network, such as, using cooper cable for short distance, and optical fiber for long distance.

4. Thanks to its safety isolating function, it can be applicable to occasions needing security and explosion prevention, such as mines, electric power as well as oil and gas field, etc.

FOURSTAR PROFIBUS Optic Link Module has the following features:

1. Transparent Transmission of Physical Layer. FOURSTAR PROFIBUS Optic Link Module adopts transparent transmission of bit physical layer, which has no relation with upper layer protocol, therefore, it is applicable to all PROFIBUS protocols based on RS485, including PROFIBUS-DP/V0、V1、V2, and various applicable practices, including PROFIsafe（safety）, Redundancy（redundancy）, Ident Systems（identification system）, etc. FOURSTAR PROFIBUS Optic Link Module supports connecting multi master station communication, such as S7 FUNCTION protocol, secondary master station communication; as well as MPI protocol, PPI protocol and RS485 free-port protocol communication, what is more, it can also be applied to field-bus or network of other RS485 communication technology, such as MODBUS, etc.

2. No master station configuration is needed, and no GSD file.

3. No distinctions between interface of master station and slave station, between input interface and output interface and between terminal node and non-terminal node.

4. Self-adaptive baud rate of 0~12Mbps, no switch setting or software configuration is required.

5. The isolating nature among optic link modules fundamentally work out problems including electromagnetic interference, ground wire loop interference, and undermining of the thunderbolt, etc.

6. Various network topological structure, such as point to point connection, bus connection, star connection and hybrid connection, etc.

III. Product Feature and Main Technical Parameter

- Power: 9-40VDC wide voltage power supply, with power reverse connection protection and surge protection, shall not be influenced by power and voltage fluctuation. Inside the product, external power

and internal circuit has been isolated by DC/DC isolating module.

- Consumption：About 1W
- Communication rate：0～12Mbps without delay and self-adaption
- PROFIBUS electrical interface：DB9F（hole）socket，definition of pin signal complies with PROFIBUS standard.
- Under every transmission rate, the maximum communication distance of each cable in electrical interface complies with PROFIBUS standard:

Transmission rate （bit/s）	9.6K	19.2K	45.45K	93.75K	187.5K	500K	1.5M	3M	6M	12M
Maximum cable length (meter)	1200				1000	400	200	100		

- RS485 port of electrical interface is equipped with lightening-proof surge protector, with repeatable surge capacity of Ipp=100A（10/700us，4kV）, complying with standard of ITU-TK20/21,VDE 0433. ±15KV ESD static protection.
- RS485 port of electrical interface is equipped with self-recovery excess current protection, so that it can withstand continuous current caused by voltage of 60V.
- Two pairs of transmitting-receiving optical interface facilitate the forming of bus and hybrid optical networks.
- Applicable optical fiber：Multimode 62.5/125um,50/125um
- Wave length：1310nm
- Power of emitted light：-6dBm
- Receiving sensitivity：-18dBm
- Optical transmission distance：0～4km
- Optical interface：ST joint for standard configuration， SC and FC joints are selective.
- RS485 electrical interface and optical interface are equipped with data receiving light, and optical interface is equipped with fiber-cut indicator light.
- Operating temperature：-40～+85℃ industrial operating temperature
- Outline dimension：93mm×99mm×28mm（length × width × height），Weight：210g
- Installation：Backplane installation，mounting screw 2×M4

IV. External Structure and Pin Definition

1. External Structure

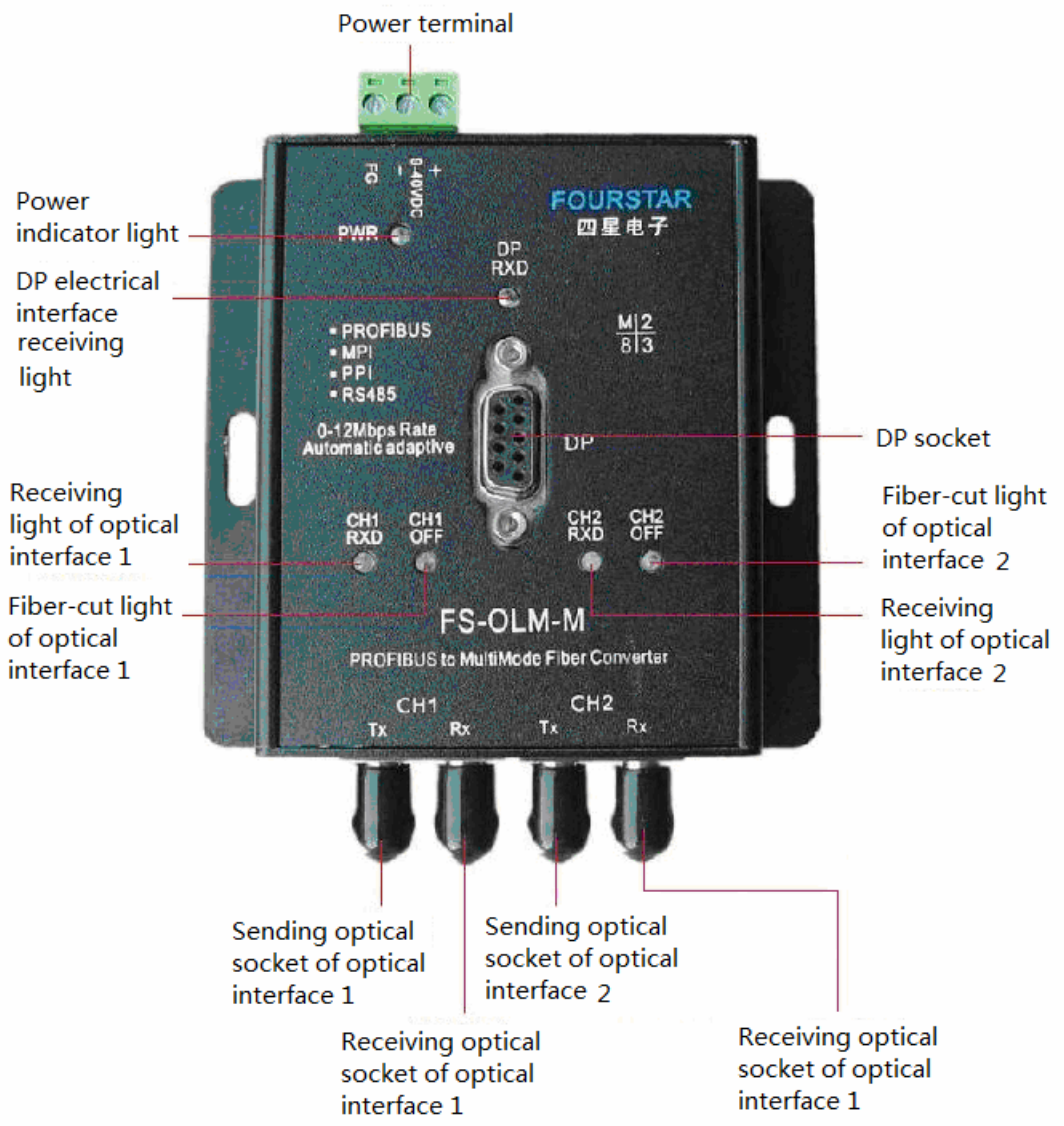


Figure 4-1 External View of FOURSTAR Optic Link Module

2. Mounting dimension:

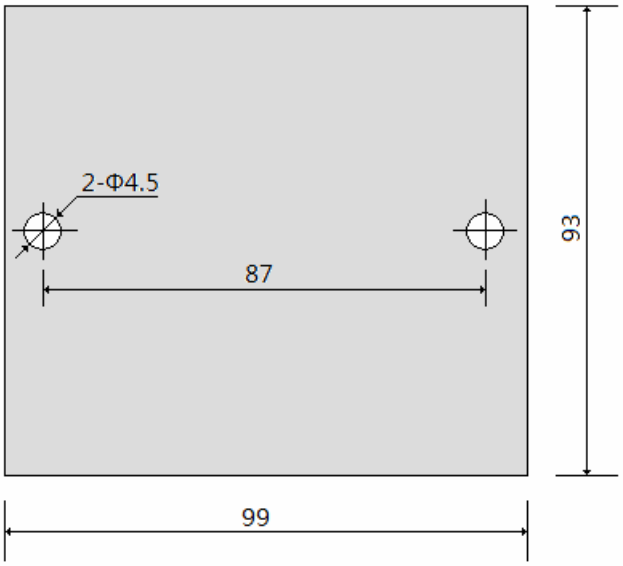
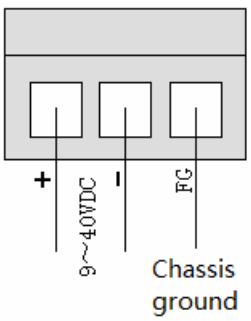


Figure 4-2 Mounting Dimension Drawing of FOURSTAR Optic Link Module

3. Power terminal：It has been equipped with polarity reversed protection and surge protection, with input voltage of any DC voltage between 9 to 40VDC, and consumption of 1W. Inside the product, external power and internal circuit has been isolated by DC/DC isolating module, so that it can be connected to any equipment power supply without taking ground interference into consideration.



Connection Diagram of Power Terminal

4. Indicator light: Name and function of light-emitting diodes indicator light on panel

Name of indicator light	Status of indicator light		
	Normally on	Blink	Off
PWR	Power working under normal condition	Hardware failure	Power not connected or hardware failure
DP-RXD	Hardware failure	Electrical interface DP receiving data	No data received by electrical interface DP
CH1-RXD	Hardware failure	Electrical interface CH1 receiving data	No data received by electrical interface CH1
CH1-OFF	Fiber-cut in electrical interface CH1	Hardware failure	Optical fiber in optical interface being under normal condition
CH2-RXD	Hardware failure	Electrical interface CH2 receiving data	No data received by electrical interface CH1
CH2-OFF	Fiber-cut in electrical interface CH2	Hardware failure	Optical fiber in optical interface CH2 being under normal condition

Note: When fiber is cut off or remote module is powered off, a fault signal shall appear in DP bus and will occupy the bus for 350ms. Meanwhile, the correspondent fiber-cut light CHI-OFF or CH2-OFF shall be lightened.

5. Signal definition of DB9F socket for PROFIBUS-DP interface:

Signal definition of DB9F (hole seat) for PROFIBUS electrical interface complying with PROFIBUS standard

DB9F Pin No.	Signal Name	Function	Signal Direction
3	DB（+）	RS485 positive signal	Input/Output
8	DA（-）	RS485 negative signal	Input/Output
6	+5VDC	Providing power supply of 5VDC, 60mA for terminal resistance in bus connector plug	Output
5	GND	Signal ground	Output
1,2,4,7,9	Not use	Not use	Not use

6. Optical interface CH1 and CH2: FOUTSTAR PROFIBUS optic link module has been equipped with two pairs of transmitting-receiving optical interface CH1 and CH2, with Tx optical sending interface and Rx optical receiving interface on each pair. They shall be connected with optical interface of remote module in accordance with principle of receiving and sending, as well as of sending and receiving.

V. Internal Functional Block Diagram of PROFIBUS Optic Link Module

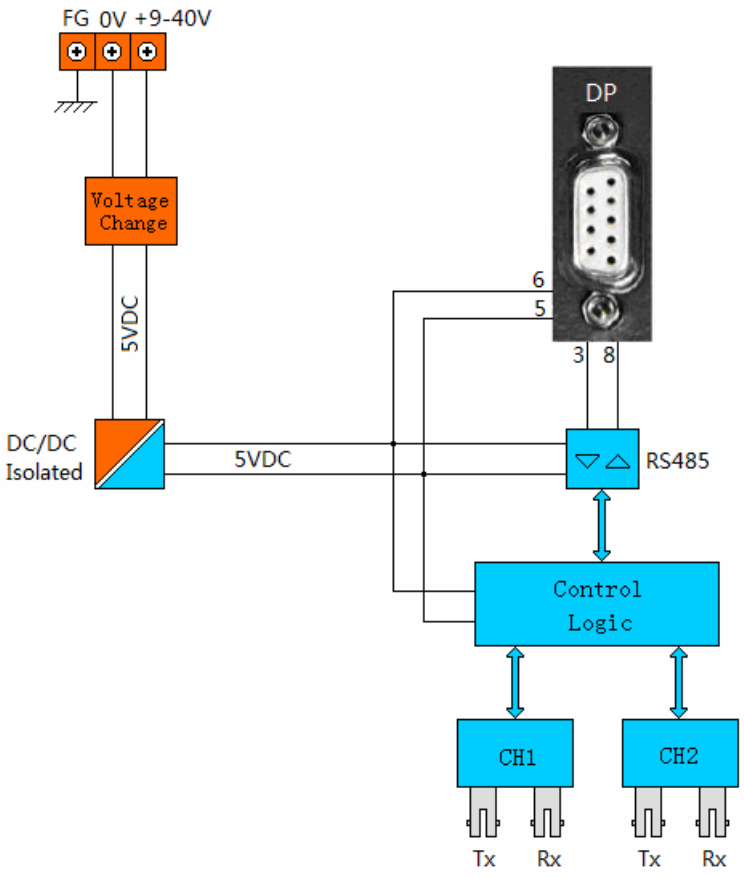


Figure 5-1 Internal Functional Block Diagram of FOURSTAR PROFIBUS Optic Link Module

VI. Application Solution of PROFIBUS Optic Link Module

FOURSTAR PROFIBUS Optic Link Module features easy and flexible operation, no configurations required, as well as plug and play, which can achieve point to point connection, bus connection, and star connection of optical fiber as well as hybrid network topological structure, but does not support redundancy

optical ring network. See the following various solution figures.

DP sockets for connecting PROFIBUS Optic Link Module and for other station equipment in figures shall use bus connector plug, and terminal resistance shall be correctly set to ensure no power-off at terminal stations.

1.Point to Point Connection:

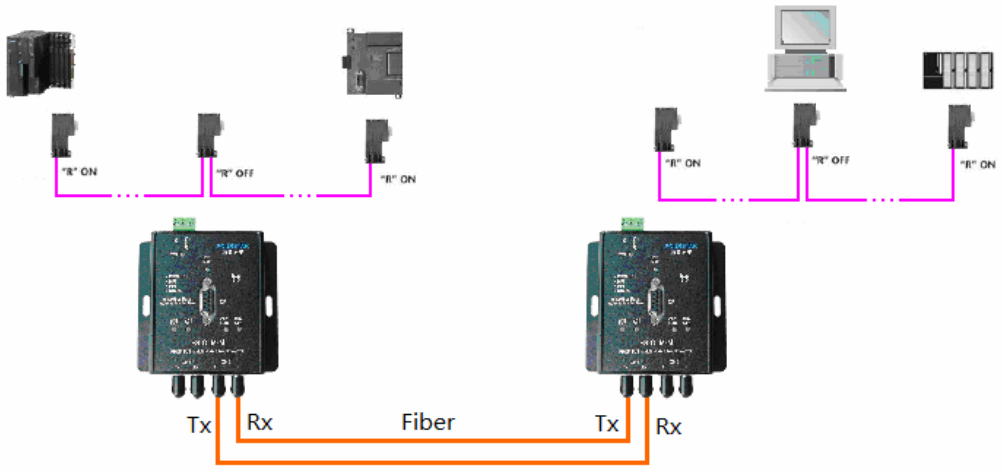


Figure 6-1 Point to Point Connection of Optical Fiber for FOURSTAR PROFIBUS Optic Link Module

2. Bus connection

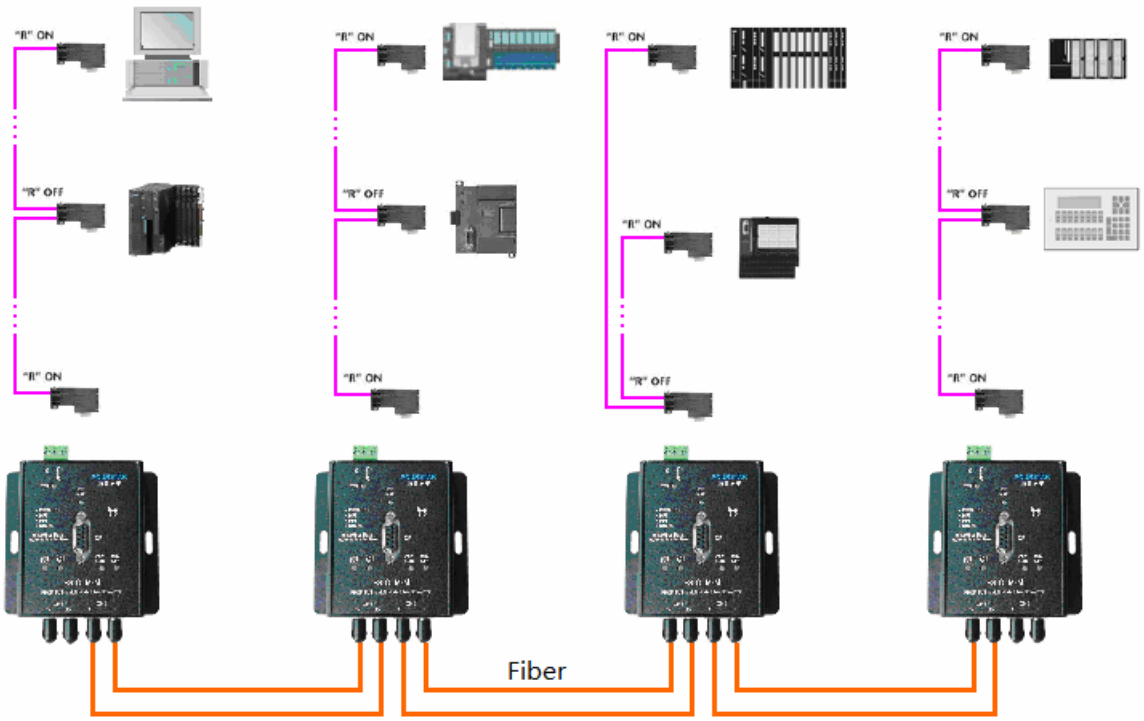


Figure 6-2 Bus Connection of Optical Fiber for FOURSTAR PROFIBUS Optic Link Module

3. Star connection:

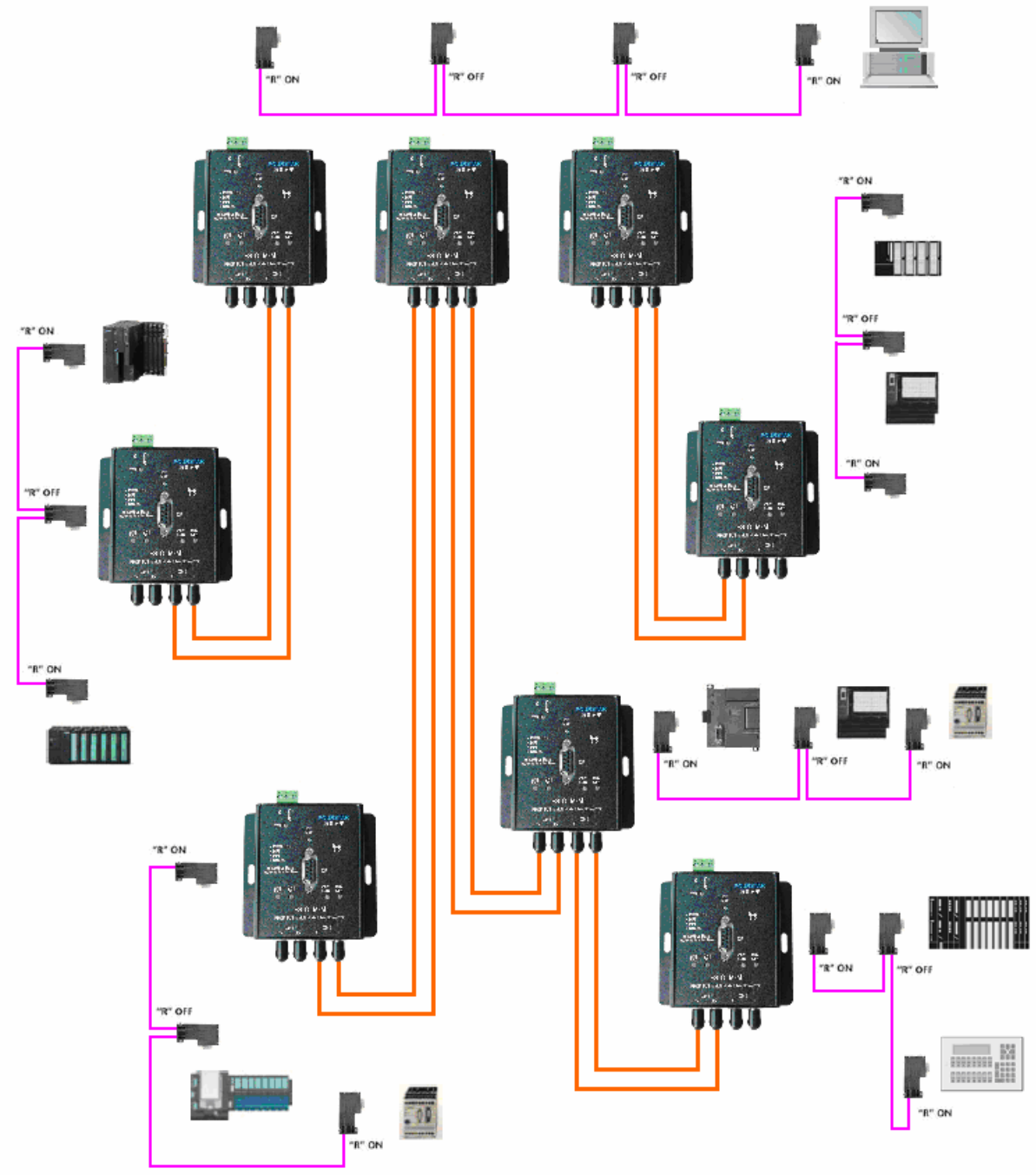


Figure 6-3 Star Connection of Optical Fiber for FOURSTAR PROFIBUS Optic Link Module

VII. FAQ

1. What does FS-OLM-M differ from FS-OLM-S in PROFIBUS Optic Link Module?

FS-OLM-M adopts multi mode optical fiber with maximum optical transmission distance of 4km, while, FS-OLM-S adopts single mode optical fiber with maximum optical transmission distance of 12km, do not use wrong optical fibers, otherwise, no normal communication shall be achieved. Except which, other functions are totally same.

2. What influence does fiber-cut or power-off occurrence on remote optic link module have on whole network communication?

When fiber cut or power-off occurrence on remote optic link module, local module shall not receive optical signal, at this time, a fault signal shall be emerged in DP bus, which holds time of bus for about 350ms, meanwhile, correspondent fiber-cut light CHI-OFF or CH2-OFF shall be lightened, after that, bus shall recover its normal communication.

3. In network section, the station which functions as terminal is not allowed to have a power-off. Why?

Top and bottom of PROFIBUS network section are called as terminals. In order to restrain signal reflex and distortion of RS485 signal, terminal cable shall be connected to A1 and B1 terminals of bus connector, and terminal resistance on bus connector socket of terminal interface shall be set ON, so that, one 220Ω terminal resistance shall be connected to the terminal interface, moreover, one 390Ω up resistor and one 390Ω down resistor is equipped to ensure smooth operation of the network. Both resistors need 6 pins and 5 pins on DP socket to provide 5VDC working power supply. When power-off occurs on terminal station, no 5VDC working power supply can be provided for both up and down resistors, which shall cause abnormal network communication or communication failure.

4. What shall we do if power-off inevitably occurs on terminal station?

If terminal station is required to cut power due to station condition, in order to ensure normal network communication, it is suggested to install active terminal resistance (and ensuring no power-off) to act as terminal for network section. Product number of active terminal resistance of Siemens Company is 6ES7

972-0DA00-0AA0, and model of active terminal resistance of FOURSTAR is PB-TR485.

5. How to confirm whether the whole network is able to achieve maximum communication rate?

Adopting PROFIBUS optic link module may form hybrid network with different length in network section. The maximum communication rate achieved by the whole network depends on maximum cable network section rather than that of optical fiber. Therefore, to increase communication rate, it is suggested to use repeater or concentrator to divide cable network section or use optic link module to have them satisfy your requirement on rate.

6. How to achieve high-speed and remote communication of PROFIBUS?

When PROFIBUS is in high-speed communication, for example, with communication rate over 3Mbps, cable with maximum length of 100 meters only can be used, equipping with several repeaters or concentrators shall lead to increase on signal delay and on cost, as well as power supply trouble, etc. Therefore, optical transmission is the better-value-for-money solution, such as FOURSTAR PROFIBUS optic link module FS-OLM-S and FS-OLM-M.

VIII. Ordering Information

Product name: PROFIBUS Optic Link Module

Product model: FS-OLM-M (multimode) or FS-OLM-S(single mode)

Statement: The file provides guidance for operating FS-OLM-M (multimode) or FS-OLM-S (single mode) PROFIBUS Optic Link Module, however, owing to the boom in new technology, product function shall be subject to change. FOURSTAR Electronic Technology Co., Ltd reserves the right to modify the file without notice.

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