

**ИСО 9001**



**SERIAL RS-232 / RS-422 / RS-485 FIBER OPTIC MODEM  
RS-FX-MM / RS-FX-SM40**

User's Manual

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This User's Manual is meant to provide information on functioning and operating RS-FX-MM / RS-FX-SM40 Serial RS-232 / RS-422 / RS-485 Fiber Optic Modem.

Only the personnel who have studied this manual are allowed to operation activities. All activities on mounting, start-up, setting, and testing shall be performed in compliance with the requirements of the regulatory documentation in force at the place of operation.

Abbreviations:

**CIE:** Control and Indicating Equipment;

**ISS:** Integrated Security System

# 1 Description and Operation

## 1.1 Product Purpose

RS-FX-MM / RS-FX-SM40 Serial RS-232 / RS-422 / RS-485 Fiber Optic Modem (hereinafter referred to as the modem) is designed to convert a standard RS232 / RS485 / RS422 signal to a fiber optic link to extend the signal up to 40 Km.

The modem provides transmission distance up to 40 Km for signals from Orion ISS intrusion / fire alarm and detection equipment and other equipment that use RS-232, RS-422, RS-485 interfaces.

An **RS-FX-MM** modem is designed to be used with **multi-mode** optical fiber to extend signals up to **2 Km**. For communicating data, **two fibers** are used: one fiber for receiving signals and the other one for transmitting signals.

An **RS-FX-SM40** is designed to be used with **single-mode** optical fiber to extend signals up to **40 Km**. For communicating data, **two fibers** are used: one fiber for receiving and the other one for transmitting signals.

Scope of application: intrusion / fire alarm and detection systems, access control systems, building automation systems.

The modem is intended for round-the-clock operation.

The modem is designed to be operated in residential, commercial, and industrial areas.

The modem is classed as non-repairable and periodically serviced equipment.

## 1.2 Specifications

Table 1.2.1

Parameter	Value
Power input	1
Power supply voltage, V dc	12 through 48
Power rate, W, max	3
Start-up time, s	10
Data rates, bps	300 through 115200
Fiber range: - RS-FX-MM, km - RS-FX-SM40, km	2 40
Fiber optic cable: - RS-FX-MM, $\mu\text{m}$ - RS-FX-SM40, $\mu\text{m}$	Multi-mode 50/125 Single-mode 9/125
Fiber connector	SC/PC
Optic wavelength, nm	1,310
Serial range: - RS-232 m - RS-422, RS-485, m	15 1,000
Orion ISS devices per a single RS-485 interface bus, max	127
Enclosure protection degree as per GOST 14254-2015	IP20
Resistance to mechanical exposure as per OST 25 1099-83	Arrangement Category III
Vibration exposure: - Frequency range, Hz - Max acceleration, g	1-35 0.5

Parameter	Value
Environmental category as per OST 25 1099-83	O3
Operation Temperature, °C	Minus 30 to plus 55
Weight, kg, max	0.3
Overall dimensions, mm	95×70×29
Non-stop operation	24/7
MTBF, h, min	80,000
Survival probability	0.98758
Expected service life, years	10

In terms of immunity to electromagnetic interference, the equipment meets the requirements of Test Severity Level III as per the relevant standards listed in Appendix ‘B’ to GOST R 53325-2012.

The equipment passes the industrial interference standards prescribed for Class ‘B’ equipment as per GOST R 30805.22.

The modems are to be powered from battery backed power supplies RIP-12 / RIP-24 (of series approved by Fire Certificates) that send faults occurred in the power supply line to an alarm loop of control and indicating equipment (such as Signal-10, Signal-20M, Signal-20P) or to the network controller (S2000M control panel or Orion Pro Software Suite).

### 1.3 Scope of Delivery

The modem comes along with the parts shown in Table 1.3.1.

Table 1.3.1

Item	Quantity
RS-FX-MM (RS-FX-SM40)	1 pc.
Accessory Kit:	
Resistor C2-33H-0.25-620 Ohm 5%	3 pcs.
Wall Mount Bracket	1 pc.
Screw	2 pcs.
Wall plug	2 pcs.
Documentation	
RS-FX-MM / RS-FX-SM40 Serial RS-232 / RS-422 / RS-485 Optic Fiber Modem Operations Manual	1pc.

### 1.4 Arrangement and Operation

The modem is intended to convert RS-232 / RS-422 / RS-485 signals to a fiber optic link only. Interconversion between RS-232 and RS-422/RS-485 signals is not provided. However, RS-232 and RS-422/RS-485 signals can be transmitted over a fiber link simultaneously.

### 1.5 Measuring Instruments, Tools, and Accessories

While mounting, commissioning, and maintaining the equipment, please use the instruments, tools, and accessories shown in Table 1.5.1.

Table 1.5.1

Instrument	Specifications
Digital multimeter	AC/DC voltage up to 500 V, current up to 5 A, resistance up to 2M Ohm
Flat head screwdriver	3.0 × 50 mm
Cross slot screwdriver	2 × 100 mm

Instrument	Specifications
Side-cutting pliers	160 mm
Pliers	160 mm

## 1.6 Marking and Sealing

Every modem has a marking applied to its enclosure.

The marking contains the name of the device, its decimal number, factory number, the year and quarter of production, and conformity marks.

## 1.7 Packaging

The device along with its parts and operations manual is packaged in a separate cardboard box.

# 2 Usage Instructions

## 2.1 Operating Restrictions

The design of the modem doesn't provide its operation in aggressive and/or dusty environments as well as in explosion hazardous premises.

Correct performance of the modem cannot be guaranteed if electromagnetic environment does not meet the requirements defined in Section 1.2 of this manual.

## 2.2 Getting Ready

### 2.2.1 Safety Precautions

- The modem meets the requirements of electrical and fire safety including emergency operation in accordance with Russian Standards GOST 12.2.007.0-75 and GOST 12.1.004-91;
- The modem has no circuits under a hazardous voltage;
- Do SHUT OFF power from the equipment before mounting, installing, and maintaining this one;
- Mounting and maintenance shall be carried out by persons with the second or higher accident prevention qualification level.




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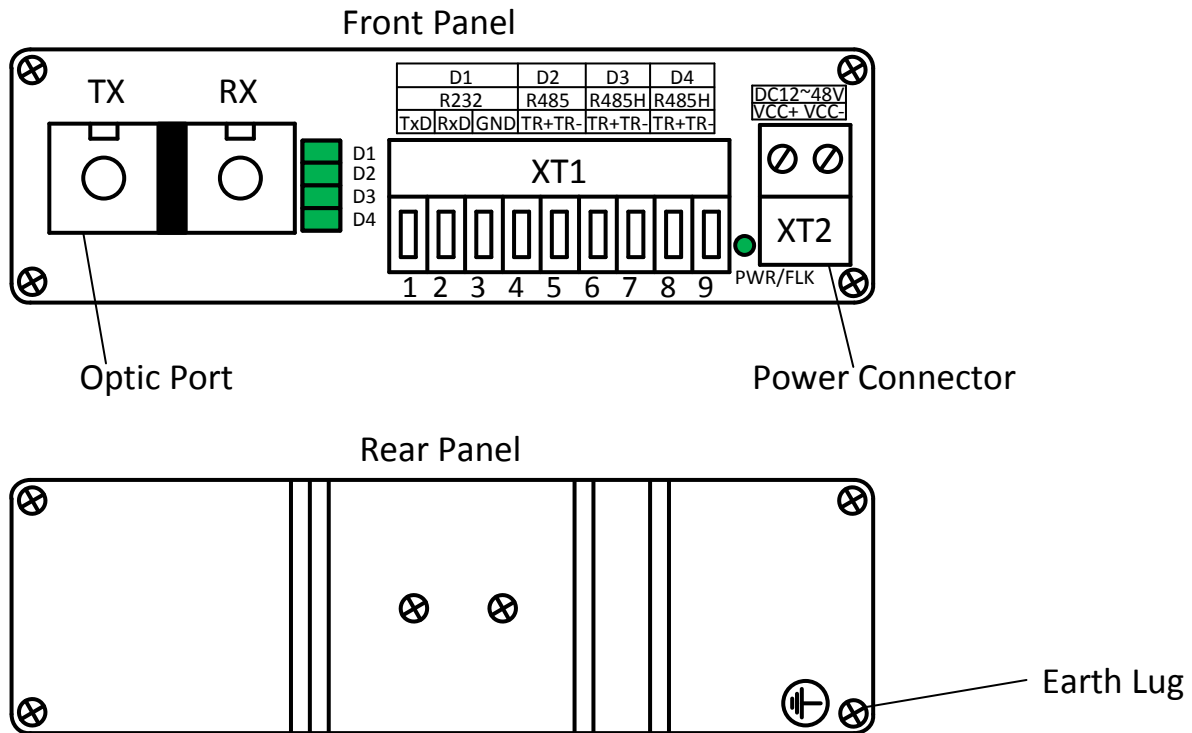
### **Warning!**

*The modem includes a laser emitter working in invisible infrared range. **Do not look directly into the optical port of the modem when it is powered** to avoid harming to your eye retina*

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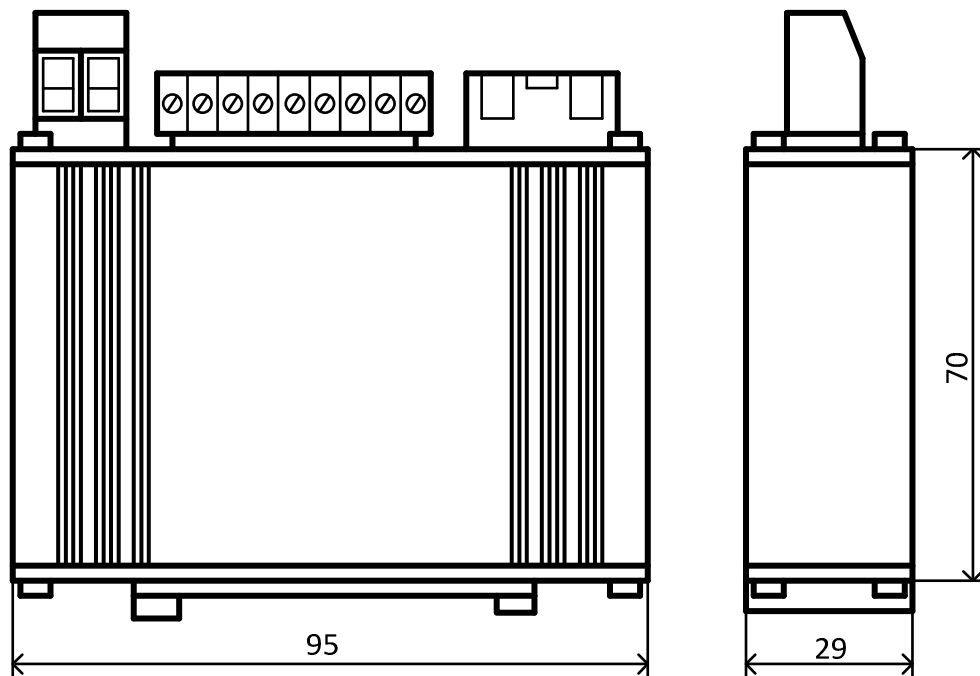
### 2.2.2 Design

The modem appearance is shown in Figure 2.2.1.



**Figure 2.2.1** View

Overall and mounting dimensions of the modem are shown in Figure 2.2.2.



**Figure 2.2.2** Overall Dimensions

### 2.2.3 Mounting

The modem is implied to be mounted on a DIN rail. Also it can be attached to a wall using the bracket provided. To install the bracket, please unscrew the two screws that fix the DIN rail fastener. Then use the same screws to secure the bracket.

To connect to the optical port, please use SC type fiber-optic connectors. To provide the minimum loss of optical signal, UPC polished connectors (SC/UPC) are advised. Also SC/PC and SC/SPC connectors can be in use. **Do not use SC/APC connectors.**

When delivered, the optical port of the modem is protected with a rubber plug to prevent dust. Remove this plug only after installation has been completed, immediately when you are going to connect optical connectors.

While connecting the fiber-optic link to the modem, please avoid excessive bending of the fiber-optic cable. Overbends (kinking) can cause degradation of the signal or even full loss (back reflection) of it.

It is acceptable to use mounting enclosures (cabinets, boxes, etc.). If the modem and any other unit are arranged adjacently then vertical and horizontal distances between them shall be at least 10 mm each.

### 2.2.4 Wiring

Table 2.2.4.1 describes terminals of the blocks XT1, XT2.

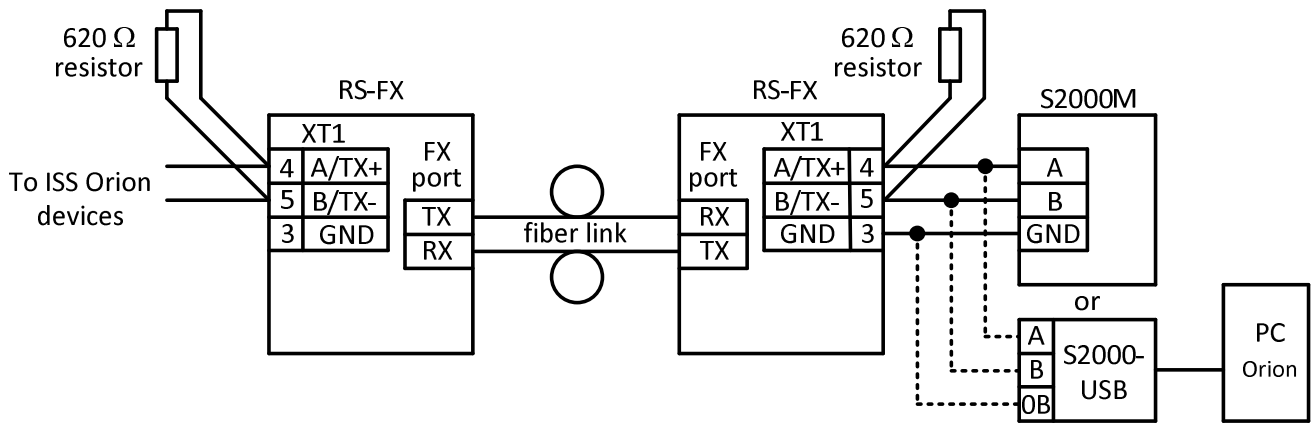
Table 2.2.4.1

Terminal	Marking	Purpose
<b>XT1</b>		
1	RS232 TxD	RS-232 Transmit Data
2	RS232 RxD	RS-232 Receive Data
3	RS232 GND	0V
4	RS485 TR+	RS-485 Line A
5	RS485 TR-	RS-485 Line B
6	RS485H TR+	RS-485 Line A / RS-422 Transmit Data «+»
7	RS485H TR-	RS-485 Line B / RS-422 Transmit Data «-»
8	RS485H TR+	RS-485 Line A / RS-422 Receive Data «+»
9	RS485H TR-	RS-485 Line B / RS-422 Receive Data «-»
<b>XT2</b>		
1	VCC+	Power ”+”
2	VCC-	Power 0V

Terminals 6, 7, 8, 9 of the XT2 block can be used for communication over the RS-422 interface or two RS-485 interface lines.

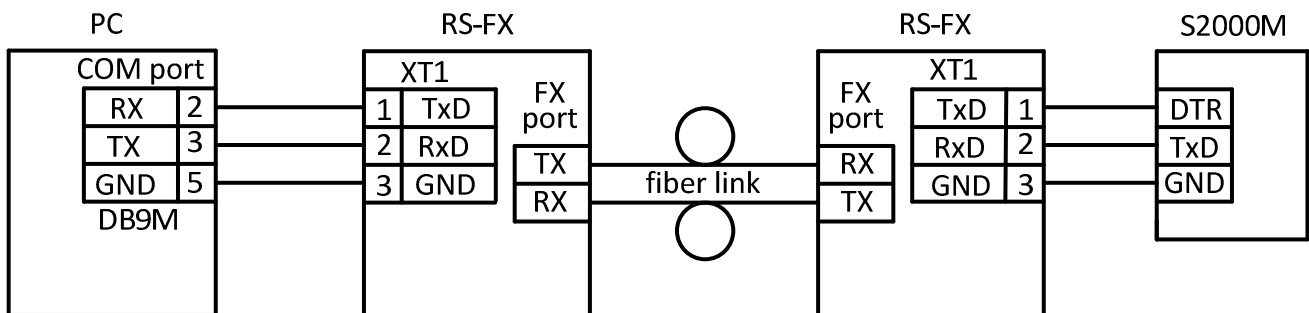
Figure 2.2.3 shows a diagram for using the modems to extend Orion ISS RS-485 interface line. Second and third RS-485 interface lines (terminals 6, 7, 8, 9) are connected similarly to the first interface line (terminals 4, 5).





**Figure 2.2.3** Extension of RS-485 Interface Line

Figure 2.2.4 shows a diagram for using the modems to extend RS-232 interface line.



**Figure 2.2.4** Extension of RS-232 Interface Line

TX and RX optical lines shall be connected **crosswise**, in other words, the TX line of one modem shall be connected to the RX line of another modem.

One RS-485 line cannot include more than 10 RX-FX modems. If a modem is the first or the last one on the RS-485 line, the 620Ohm matching resistor (supplied) must be installed immediately into the XT1 terminal block of the modem between A and B terminals.

To connect the modem to a PC COM port, an S2000M-to-PC cable is recommended.

While connecting RS-232 interface devices to the modem, please connect fiber optic cables crosswise. That is, RX terminal of the modem shall be linked to the TX contact of a device, and the RX terminal of the device shall be linked the TX terminal of the modem, unless otherwise is indicated in the operating documentation for a specific device. The terminal 3 (GND) of the XT1 block of the modem shall **obligatory** be coupled with the terminal GND (0V) of the device that is connected to the modem over RS-232.

The modems do not cause delays while exchanging data over interfaces. So, no additional settings of time parameters in the Orion ISS system are required.

### 2.2.5 Programming

The modems do not require setting prior to operating them and are ready for operation just after wiring and applying power. Baud rate for RS-232, RS-422, RS-485 interfaces is self-adaptive.

### 2.2.6 Indication

The PWR/FLK LED indicates status of the modem. LED's illuminating steadily indicates the power is applied but there is no communication over the optic line. LED's blinking means that communications over the optic line are present.

Indicators of RS-232, RS-485 interface lines (D1 ... D4) indicate receiving (RX) and transmitting (TX) data over the relevant lines. LED's blinking shows receiving / transmitting data over the relevant line, with blink frequency depending on intensity of traffic.

### 2.2.7 Functionality Test

Performance of the modem shall be tested as per para **Ошибка! Источник ссылки не найден.** of this manual.

### 2.2.8 Extreme Situation Actions



**Warning!**

If sparks, fire, smoke, or smell of burning is found at the installation site of the product, the product must be de-energized and sent for repair.

### 2.2.9 Troubleshooting

Table 2.2.9.1

Fault	Probable Cause	Solution
No fiber optic communications, the PWR/FLK is lit steadily	Broken fiber or wrong fiber link connection	Check the fiber optic cable, check whether opposite ends of the cable are connected to RX/TX correctly

## 3 Maintenance

### 3.1 General

The modem shall be maintained in line with the following schedule:

Table 3.1.1

Task Description	Frequency
Visual inspecting	Monthly
Performance monitoring	Three-monthly

### 3.2 Safety Precautions

The modem shall be maintained by personnel qualified for the Electrical Safety of Level II or higher.

### 3.3 Maintenance Procedures

3.3.1 Visual inspecting the equipment implies verifying that it has no mechanical damage and is fastened reliably while conditions of connecting wires and contact joints are good.

3.3.2 Verifying proper operability of the equipment is performed as per para 3.4 of this manual.



**Warning!**

Removing the PC board from the device housing automatically voids the manufacturer's warranty.

### 3.4 Performance Testing

Upon power being on, the PWR/FLK indicator on the modem shall turn on. When communications over the optic line is present, PWR/FLK starts blinking. When the communication starts, the LEDs of corresponding lines (D1 ... D4) shall flash.

### 3.5 Technical Examination

Technical examination is not applicable for this equipment.

### 3.6 Preservation (Depreservation, Represervation)

Preservation is not applicable for this equipment.

## 4 Repair

Repair of faulty equipment is to be conducted by the manufacturer or in authorized repair centers. The product shall be sent for repair in compliance with Company Standard QMS 8.5.3-2015, which can be found online at our website <https://bolid.ru/support/remont/>.



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#### Attention!

The equipment shall be submitted for repair being assembled and clean and along with all the parts listed in the documentation.

Claims are accepted only if a reclamation report describing the failure in question is applied to the submitted equipment

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A product's failure resulted from consumer's not observing rules of mounting and operation is not a reason for claims and warranty repair.

Claims should be submitted to the following address:

NVP BOLID, #4 Pionerskaya Str., Korolyov, Moscow Region, 141070, Russia

Phone: +7 (495) 775-71-55 E-mail: [info@bolid.ru](mailto:info@bolid.ru)

In case of any issue related to use of the product, please contact the technical support: +7 (495) 775-71-55 or e-mail: [support@bolid.ru](mailto:support@bolid.ru).

## 5 Storage

Storage in a transport container is permitted at ambient temperatures minus 50°C through plus 50°C and relative humidity up to 95% at plus 35°C.

Storage in the consumer package is permitted only in heated premises at temperatures plus 5 through plus 40°C and relative humidity up to 80% at plus 20°C.

## 6 Transporting

The equipment can be transported in a transport container at ambient temperatures minus 50 through plus 50°C and relative humidity up to 95 % at plus 35°C.

## 7 Disposal

The product can be disposed of considering that there are no toxic components in it.

The content of precious materials: doesn't require accountability for storage, retirement, and disposal (Clause 1.2 of GOST 2.608-78).

The content of non-ferrous metals: does not require accountability for retirement and further disposal.

## 8 Manufacturer Warranty

The manufacturer guaranties the equipment meets with technical requirements stated in the manuals if the user follows the instructions for transportation, storage, installation, and usage.

The warranty period is 18 months since putting the product into operation but no more than 24 months from the manufacturer's date of production.

## 9 Certification Information

RS-FX-MM / RS-FX-SM40 Serial RS-232 / RS-422 / RS-485 Fiber Optic Modem meets the requirements of Technical Regulations TR EAEU 043/2017 'On Requirements for Fire Safety and Fire Extinguishing Equipment' and is covered by the conformity certificate No. EAЭC RU C-RU.ПБ68.B.00318/21.

RS-FX-MM / RS-FX-SM40 Serial RS-232 / RS-422 / RS-485 Fiber Optic Modem meets the requirements of Technical Regulations of Custom Union TR CU 020/2011 'Electromagnetic Compatibility of Technical Equipment' and is covered by Conformity Declaration EAЭC № RU Д-RU.PA01.B.64934/21.

RS-FX-MM / RS-FX-SM40 Serial RS-232 / RS-422 / RS-485 Fiber Optic Modem is a part of Intrusion and Panic Alarm System, which is approved by the certificate of conformity of transport safety technical arrangements with their functional properties No. МБД РФ.03.000971.

RS-FX-MM / RS-FX-SM40 Serial RS-232 / RS-422 / RS-485 Fiber Optic Modem is a part of Access Control System, which is approved by the certificate of conformity of transport safety technical arrangements with their functional properties No. МБД РФ.03.000972.

RS-FX-MM / RS-FX-SM40 Serial RS-232 / RS-422 / RS-485 Fiber Optic Modem meets the requirements of GOST R 53325-2012 'Fire techniques. Means of fire automatics. General technical requirements and test methods' and is covered by the conformity certificate ОГН9.RU.1106.B00105.

RS-FX-MM / RS-FX-SM40 Serial RS-232 / RS-422 / RS-485 Fiber Optic Modem is awarded with the Certificate of Conformity GOST R ISO 9001. The Certificate is available on the website <https://bolid.ru> in the section ABOUT.