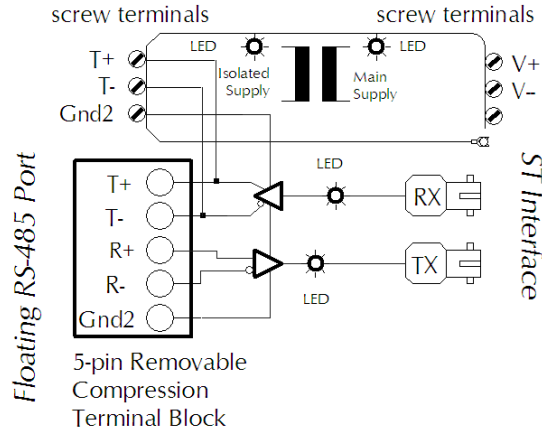


rdc485fos User Manual

Industrial Fiber Optics to RS485 (2 or 4-wire) Serial Converter (Single Mode)

1. Introduction

1.1 Block Diagram



1.2 Product Overview

The rdc485fos is designed specifically for use in industrial panel applications. It provides the following unique combination of features:

Fiber optics provides an intrinsically isolated, noise-free and lightning immune data communication signal. The rdc485fos uses high quality components to communicate up to 13 km at a wavelength of 1310nm over 9/125 um single mode fibers via a ST interface.

The RS-485 port supports both 2 and 4-wire mode and is fully compatible with most EIA/RS422 4-wire links.

The serial port is fitted with a removable 5-way screw compression terminal for industrial-sized field wires.

Optionally, the serial port of the rdc485fos can be isolated (up to 2.5 KV) from the power supply. This is critical with most DC power systems.

For rapid troubleshooting, there are LED indicators for data transmission and power status.

A wide power supply range (9 to 36 Vdc) allows use with 9 V, 12 V, 24 V supplies or direct from 12 V or 24 V battery systems. For 110 Vac or 230 Vac operation, any common 9 or 12 Vdc wall transformer can be used.

1.3 User Interface

The rdc485fos is designed for user-friendly application. Green LED ps lights up when an external power is properly applied. Green LED ps/iso lights when the internal isolating DC-DC converter is working properly. This isolation provides over 10,000,000 ohms of resistance between the power supply ground and serial interface ground to eliminate ground loops. Yellow LED/Rxd lights when any data is received at the fiber interface. Yellow LED/Txd lights when any data is received on the serial interface and transmits out at the fiber end. Red LED/break lights when the RS485 interface is wired wrongly.

2. Internal Jumper Settings

2.1 Selecting 2 or 4-wire operation

The right-most two jumpers (4w & 2w) determine 2 or 4-wire operation. There is only one available jumper to select (short) either the 2w (for 2-wire operation) or 4w (4-wire operation) position. You are not required to externally short T+/R+ and T-/R- for 2-wire operation. By default, we set the operation as 4-wire mode.

2.2 Placing your bus terminal resistors

Each RS-485 wire pair requires one or two 120 ohm terminal resistors (assuming your cable has a characteristic impedance of 120 ohms). The rdc485fos has two internal 120 ohm terminal resistors enabled by the R-Term and T-Term jumpers. For RS-485 2-wire bus or point-to-point link, you must enable a terminal resistor at both ends (total two). For RS485 4-wire bus, you must enable a terminal resistor at the end of each pair (total two for each pair, four for 2 pair). If your cable has a different impedance – in the case where 100-ohm cables are more readily available for example, you can disable the

internal jumpers and install external terminal resistors.

2.3 Placing your bus bias resistors

The rdc485fos only works with a proper bias applied to each pair. These bias resistors prevent an idle (floating) wire pair from picking up noise and is also critical for proper operation of the “auto-line-turnaround”. The rdc485fos has four internal 470-ohm bias resistors. Jumpers RB+ & RB- enable the pull-up/pull-down bias on the receive wire pair R+/R- while jumpers TT+ & TT- enable the pull-up/pull-down bias on the transmit pair T+/T-. Each wire pair must have at least one biasing pair, but not more than two biasing pairs enabled.

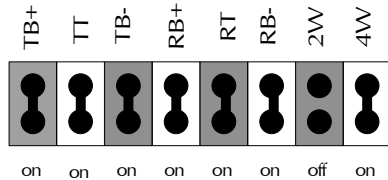


Fig 2. Jumper Setting (default)

3. Installation

3.1 Fiber Optics Connection:

The rdc485fos comes with ST connectors. Note that all fiber optic cables need gentle handling and have a specified minimum bend radius. Please refer to your cable specs for details, but you should plan on providing space to neatly coil a 6 inch or 15 cm loop diameter of extra fiber. The rdc485fos’ transmit (Tx) connector should be connected to the receive (Rx) connector of the remote device and the rdc485fos’ receiver (Rx) connector should be connected to the transmitter (Tx) connector of the remote device.

3.2 RS485 & RS422 Wiring (fully isolated, model : rdc485fos-2p)

For the “2p” model of the rdc485fos, the signal ground (SG) must be connected for proper operation-warranty will be voided if this ground is not properly connected. If a third wire (for ground) is not available, then the SG should be connected to the nearest device’s digital ground.

See RDC application note AN005 for more information on the importance of this ground.

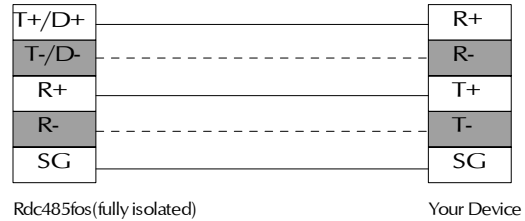


Fig 3. RS485/RS422 4-Wire

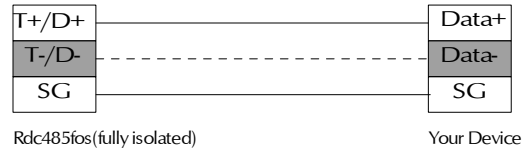


Fig 4. RS485 2-Wire

3.3 RS485 & RS422 Wiring (non-isolated, model: rdc485fos-1p)

For the “1p” model, the signal ground should be left unconnected (per EIA/RS485) or be connected with a 100-ohm 1-watt resistor in series with the device signal ground. Since the signal ground and power supply ground are internally shorted in the non-isolated version of the rdc485fos, this resistor discourages damaging ground surges from damaging either the rdc485fos or your attached device. See RDC application note AN005 for more information on the importance and possible designs for the ground.

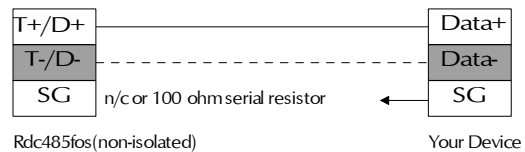


Fig 5. RS485 2-Wire(non-isolated)

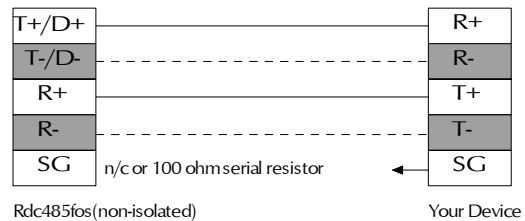


Fig 6. RS485/RS422 4-Wire(non-isolated)

4. Application Examples

4.1 Standard Point-to-Point Connection

Most people use fiber optics modules in a point-to-point connection where the fiber optic transceivers function like a modem or line driver. This example also highlights the mixing of the rdc232fos to support RS-232 on one end with the rdc485fos to support a RS-485 multi-dropping operation at the other end. Of course, two rdc485fos can also be connected in a point-to-point link with 2 or 4-wire

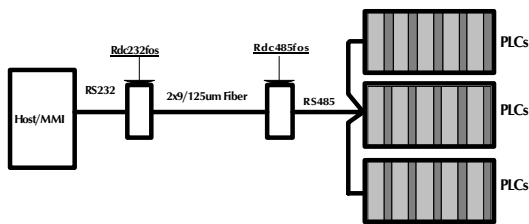


Fig 7. Application example 1

4.2 Robust 'Star' Multi-Drop Design

Multiple rdc485fos are being multi-dropped together with the Master device. This assumes that the Master supports RS-485. If the Master device does not support RS-485, the rdc485ic will make an ideal RS232 to RS485 converter.

In this configuration, a master poll is repeated at the fiber output of all central rdc485fos units. Running RS485 on 4-wire mode at the master is more efficient because the central rdc485fos will not repeat the slave responses back to the other remote slaves - only the master device sees the slave responses. The rdc485fos can be configured for RS485 4-wire if the master device has a RS-422 or RS485 4-wire interface.

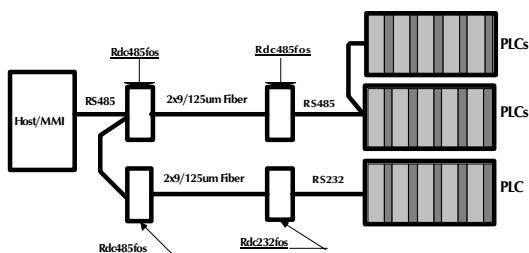


Fig 8. Application example 2

5. Technical Specification

5.1 Port Description

5.1.1 RS485, RS422:
 Working voltage range : +12/-7Vdc
 Max voltage range : +/-15Vdc
 Max surge : +/-25Vdc.

5.1.2 Fiber Optics:
 1310nm over 9/125um fiber
 ST bayonet connectors

5.1.3 Speed:
 Up to 115 Kbps.

5.1.4 Character Setting:
 Transparent. No configuration required.

5.2 Isolation (Per ISO/IEC 9549)

5.2.1 Fiber Optics:
 Intrinsic full isolation

5.2.2 RS485 to Supply:
 model "1p" : none
 model "2p" : 2500V (galvanic, 3Kv test)

5.2.3 Casing:
 Dielectric strength per DIN VDE
 0303/part 2 is 400KV/cm

5.3 Power Supply

5.3.1 rdc485fos-5v:
 Regulated 5 Vdc +/-5%, (nominal 240 mA)

5.3.2 rdc485fos-dv:
 Unregulated 9 to 36 Vdc
 (nominal 50 mA at 24 Vdc)

5.3.3 rdc485fos-hv:
 Unregulated 38 to 58 Vdc
 (nominal 25 mA at 48 Vdc)

5.4 Environmental

5.4.1 Ambient Operating Temp:

-40C to +65C

5.4.2 Ambient Storage Temp:

-40C to +100C

5.4.3 Relative Humidity:

10-90%, non condensing

5.4.4 Casing:

fungus and termite resistant

5.4.5 Casing flame characteristics:

self-extinguishing per UL 94V2

5.5 Mechanical Dimensions

5.5.1 Height, Width, Depth

(See drawing)

5.5.2 Weight:

Approx.: 130g

5.5.3 Terminal Capacity:

2.5mm(12AWG)

5.5.4 Mounting Rail:

DIN EN 50022(35mm sym)

DIN EN50025 (32mm sym)

Note: removal from a DIN EN50025 rail is difficult.

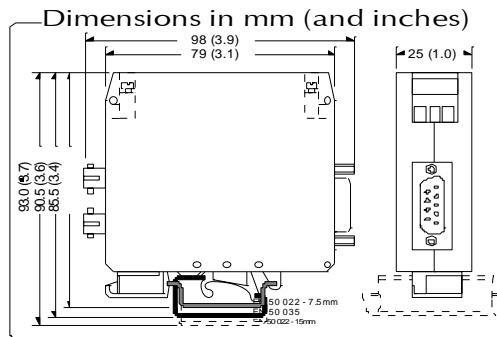


Fig 9 Dimensions