

Data sheet LWL-Interface
RS485 PL 1Channel

RS485 1Channel Party-Line

1 General

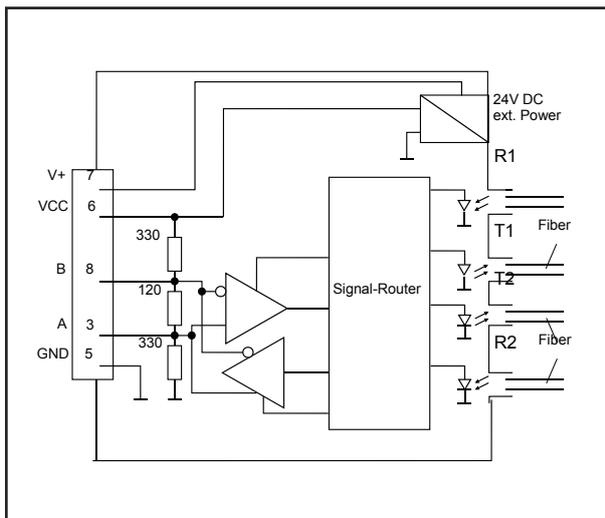
This device is a compact and robust modem for asynchronous data transmission in half-duplex mode over glass or plastic multi-mode fiber. According to the used fiber optic cable, data link length's up to 3000m are possible. The integrated repeater function makes it possible to build up an interference free RS485 fiber optic based bus system.

2 Application

Due to the max. data rate of 1 MBit/s, the max. link length of 3000m between 2 stations and the protocol free operation the modem can be used in many applications

- Interference free extension of existing electrical RS485 Systems over high distances
- Interference-free data transmission in EMI loaded area
- Electrical isolation of RS485 bus systems

3 Block diagramm



Pic. 1 Diagramm



Pic. 1 RS 232 Interface

4 Features

- 1Channel RS485 - Fiber optic Transceiver
- active optical Repeater
- Half-Duplex Party-Line data transmission
- Bidirectional RS485 Interface
- 1 MBit data rate
- full protocoLL transparent
- „Power-Good“ LED
- „Receive-Data“ LED
- 9-way Sub-D female connector RS485 Interface
- F-SMA, F-ST or other standardized optical connectors
- Aluminium case (optional with rail mounting latching element)
- 5V or 9...30V DC power supply

5 Ordering information

Specification	Part number
850 nm / F-SMA	901 RS 485 1K 050
850 nm / F-ST	901 RS 485 1K 046
660 nm / F-SMA	901 RS 485 1K 054
660 nm / F-ST	901 RS 485 1K 052



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6 Options _____

On request the modem can be ordered with following options:

- latching element for rail mounting.
- F-ST, F-SMA or other standardized optical connectors.

7 CE-Declaration of Conformity _____

The RS485 1Channel modem meets the basic requirements according to Article 4 and Appendix III of Directive 89/336/EWG:

Electromagnetic Interference (EMI).

The modem complies with the followings standards:

- EN 55022 bzw. EN 50081-1
- EN 55024 bzw. EN 50082-1
- EN 50082-2 (Industrial use)

8 Operation _____

The RS485 1Channel Modem is a code transparent electro-optical transceiver. Incoming data at the electrical interface is converted into optical signals and transmitted by optical fiber. The optical receiver at the other side recovers the optical signal to the corresponding RS485 format. To avoid data collisions, the media converter does not react 200ns for signals on the RS485 bus line (dead-time) after receiving optical data.

The RS485-FO conversion takes place acc. to following scheme:

$$U_{DIFF3/8} \geq +200mV = \text{'High'} \Rightarrow \text{opt. Out=On}$$

$$U_{DIFF3/8} \leq -200mV = \text{'Low'} \Rightarrow \text{opt. Out=Off}$$

Internal resistive bus termination (see diagramm) avoids an undefined signal level on the bus line if connected applications switch their line drivers to High-Z (idle).

! Please check your application for compatibility against resistor defined line levels. !

In addition to the media conversion the optical signal will be regenerated and transmitted at the opposite fiber optic port of the media converter. Further information about fiber optic party line systems are available under application note AN0003.

9 Power supply _____

The modem can be powered by three ways:

A) +5V DC $\pm 5\%$ at Pin 6 Sub-D

The screw terminal must be unconnected.

B) +9V...+30V DC (unregulated) at Pin 7 Sub-D

A switching regulator generates the +5V power for the modem.

The screw terminal must be unconnected.

Pin 6 is a +5V output with max. 50mA current load.

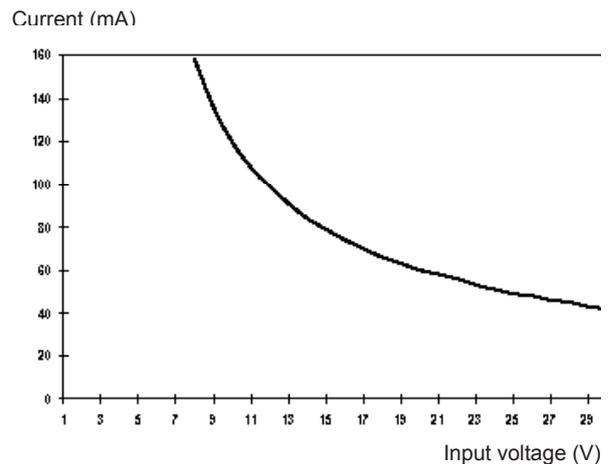
C) +9V...+30V DC (unregulated) at screw terminal

A switching regulator generates the +5V power for the modem.

Pin 7 of the Sub-D must be unconnected.

Pin 6 is a +5V output with max. 50mA current load.

Pic. 3 shows the current consumption subject to input power for case B and C).



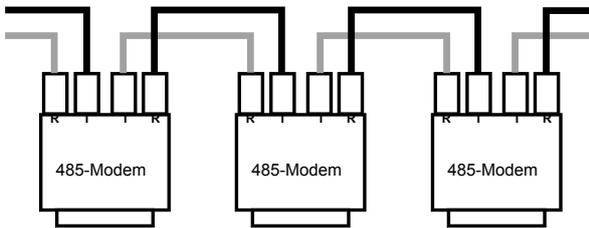
Pic. 3 Curve



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10 Installation

- Place the modem at a suitable location
- Connect the modem to the subscriber interfaces of your application
- Though the modem is hot pluggable, make sure that all equipment is off power to avoid electrical damage during installation
- Connect the FO cable with the Fiber Optic Interface (see Pic.4)
- Check all connections for correct configuration
- Power up your system

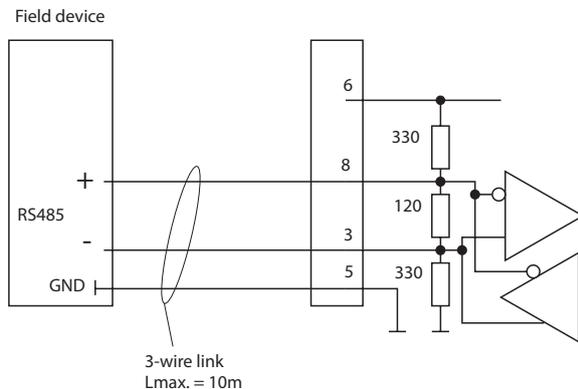


Pic. 4 Fiber optic link

11 RS485 Termination

A RS485 half duplex link between a field device and the media converter is at the bottom line of installation cost a 2-wire balanced (differential) digital transmission line with 120Ω impedance. In cases that the field device and the media converter are powered from different supplies care should be taken for a proper grounding scheme to avoid common-mode voltage exceeding the maximum specified range.

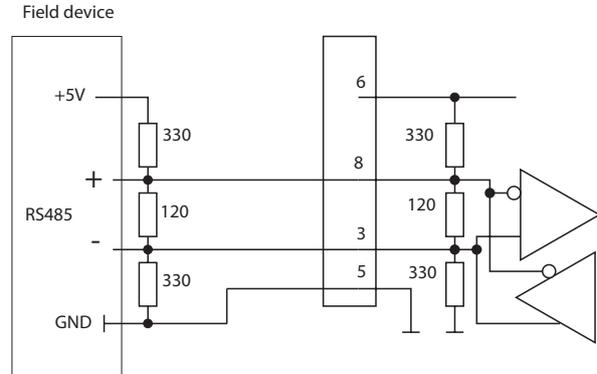
Example 1:



Pic. 5 Termination

Link length greater than 10m should be terminated according Exp. 2.

Example 2:

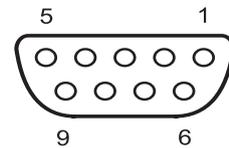


Pic. 6 Termination

This termination method will work up to 120m link length. As the link length increases, the data rate should be reduced for data integrity. Max. data rate versus link length could be calculated with following formula:

$$D_{MAX}(Hz) = L(m) \times (-8E^3) + 1E^6$$

12 Sub-D Pinout



Pic. 7 Sub-D female

PIN	Name	Function
1	NC	not connected
2	NC	not connected
3	Tx/Rx A	Data In/Output positive
4	NC	not connected
5	GND	Ground
6	VCC	+5V DC Input/Output
7	V+	9 .. 30V DC Input
8	Tx/Rx B	Data In/Output inverted
9	NC	not connected

! Non declared pin are without function and should be left open. !



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13 Maximum ratings _____

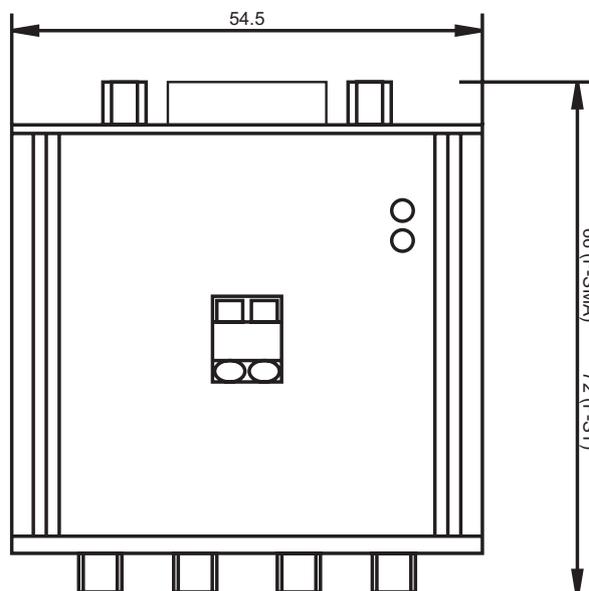
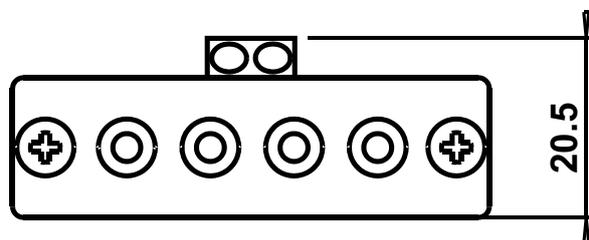
Power supply +V _____ +35V DC
 Power supply 5V DC _____ +5.5V DC
 RS485 output current _____ 70mA
 Common-mode input voltage _____ ±12V
 Storage temperature _____ -55..+125°C
 Operating temperature _____ -40..+85°C

Stresses beyond those listed under 'Maximum Ratings' may cause permanent damage to the modem. These are stress ratings only, and functional operation of the modem at these conditions is not implied. Exposure to maximum rating conditions for extended periods may affect the modem reliability.

14 Technical data _____

Data rate: 0 .. 1 MBit/s
Bit distortion: ± 200ns
max. opt. P_{OUT}: 100µW / 200/230µm
 27µW / 50/125µm
 60µW / 62.5/125µm
 700µW / 980/1000µm
Wavelength: 660nm, 850nm
opt. Interface: F-ST, F-SMA
Data format el.: RS485
el. Interface: 9-way Sub-D female
Operating voltage: +5V DC ±5% via Sub-D
 9..30V DC via Sub-D
 (or 9 .. 30V DC via screw terminal)
Current consumption: 250mA (±10%) / 5V
LED Indicators: green = Vcc
 yellow = RxD (Receive Data)
Case: Aluminium extruded
Dimensions: 72x55x20mm (LxWxH)
Protection class: IP40
Weight: 100g
Temperature range: -40 .. +80°C

15 Technical drawing _____



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