

Manual

Fiber Optic Interfaces



Model	81210, 81211 61210, 61211 65210, 65211 41210
Release	1.9

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Subject to error and alteration:

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Glass fiber optic transmission lines are the solution of choice when you need to implement absolutely noise-free serial data transmission over long distances and/or in noisy environments.

Whereas the attenuation with plastic fiber optics places a limit of maximum 100 meters on the attainable cable length, the distances achievable with glass fiber optics are significantly greater and at a comparable cable cost.

Wiesemann & Theis offers an entire family of various fiber optic interfaces that allow you to convert the critical serial ports into an optical port for connecting glass fiber optic cable.

This interface family is described on the following pages along with the corresponding technical data and including connection examples.

For up-to-date information on new developments, see our Internet site at www.WuT.de or check the e-mail short notices at the W&T Interface Club, which you can also subscribe to from the W&T Homepage.

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Common properties

Function

All W&T Fiber Optic Interfaces convert the data lines of serial ports (RS232, RS485, RS422, Profibus, 20mA) into a port for glass fiber optic cable. In addition, Interface #81211 provides a conversion for RS232 that supports not only the data lines but also two hardware handshake lines. ST connectors are used for connecting the glass fiber optic cable, whereas the serial interface is configured as a 9-pin SUB-D connector.

The light used for data transmission has a wavelength of 820 nm. Commonly available Multimode duplex glass fiber optic cable in 50/125 μm or 62.5/125 μm is used as the transmission medium, which due to its wide application in networking is easily available and cost-effective. This means that even already existing glass fiber optic lines intended for use in networks can easily be used for transmitting serial data. Depending on the attenuation of the glass fiber optic cable used, data can be transmitted over a distance of maximum 3800 meters.

Supply voltage

The supply voltage for the Interfaces is provided through an integrated switching regulator. This regulator has a variable input voltage range and allows the Interface to be powered by a suitable W&T power supply or by any AC or DC voltage between 12 and 24 volts.

The power supply must in any case ensure reliable isolation of the low-voltage side from the mains in accordance with EN60950.



The supply voltage is polarity reversal protected and can be connected on the underside of the Interface either through the built-in jack socket or the included plug-in screw terminal.

Galvanic isolation and ESD protection

The serial ports for all Interfaces are galvanically isolated from the supply voltage through a DC/DC converter with an isolation voltage of 1 KV.

All signal lines for the serial interface are protected by ESD-immune interface chips against static discharge for voltages up to 15 kV corresponding to IEC 801-2, Level 4.

Display elements

The Interfaces feature two LED's, with the *Power* LED indicating correct supply voltage and the *Data* LED data communication in both directions.

Housing

The W&T Fiber Optic Interfaces are contained in a plastic housing for mounting on standard rails according to DIN EN 50022-35.

To configure the RS485 / RS422 Interfaces, the enclosure must be opened to set the mode type/termination DIL switches on the interface module.



For this purpose we recommend threading a SUB-D connector with connector body onto the Interface and use the threaded-on connector to assist in removing the housing cover from the housing body.

Common technical data

Data format:	any data format
Isolation:	min. 1 kV between serial interface and power supply
Power supply:	12..24 V DC/AC
Current consumption:	max. 150 mA at 12 V input voltage
Serial connector:	9-pin SUB-D adapter
FO cable connector:	ST plug adapter SMA plug adapter on request
Fiber-optic medium:	Duplex multimode fiber-optic cable
Max. distance:	50/125 μ m: typ. 3200m, min. 1400m @3dB/km 62.5/125 μ m: typ. 3800m, min. 2200m @3.5dB/km
Optical budget:	50/125 μ m: typically 9.6dB, min. 4.2dB 62.5/125 μ m: typically 13.4dB, min. 8.0dB
Ambient temperature:	Storage: -40..+70°C Operation: 0..+60°C at external 24V supply voltage
Housing:	Small plastic housing for top hat rail mounting
Weight:	approx. 120 g incl. power adapter

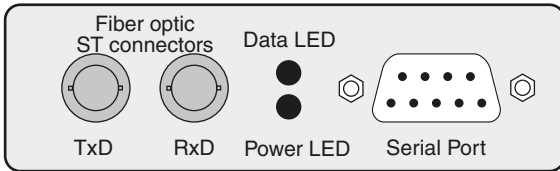
Interface FO <> RS232 without handshake, #81210

Function

The W&T Interface 81210 allows bi-directional conversion of an RS232 interface into a fiber optic interface with a transmission speed of up to 230.000 bps. The interface works independently of the data format used and converts one data line in each direction.

Connectors

The fiber optic cables are connected to the converter using ST series connectors, with a DB9 plug for the RS232 connection. The arrangement of the signal connectors on the front panel of the interface can be seen from the following illustration:

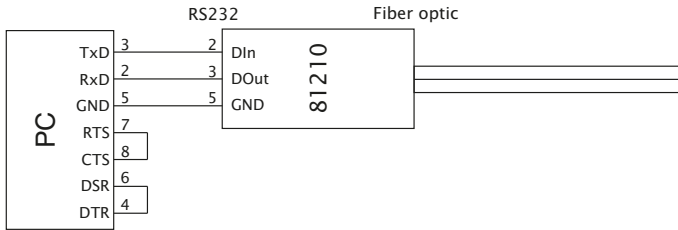


The pin configuration for the serial connector is shown in the following table and may also be found on a sticker attached to the device:

pin#	signal
2	data in
3	data out
4	active level
5	signal GND
7	active level

Applications

RS232 <> Fiber optic interface application with software handshake



Technical data

- Baud rate: 0..230 kbps
- Transmitted signals: RxD, TxD
- Serial connector: 9-pin SUB-D plug with DTE pinout
- Dimensions: 105x75x22mm
- Packing list: 1x Interface Converter
Fiber Optic <> RS232

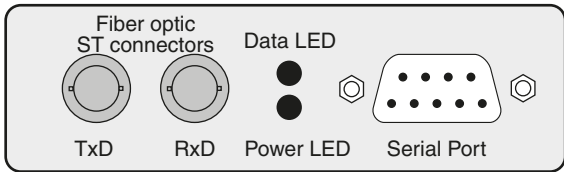
Interface FO <> RS232 with handshake, #81211

Function

The W&T Interface 81211 allows bi-directional conversion of an RS232 interface into a fiber optic interface with a transmission speed of up to 115.200 bps. The interface works independently of the data format used and converts one data line and one hardware handshake line in each direction.

Connectors

The fiber optic cables are connected to the converter using ST series connectors, with a DB9 plug for the RS232 connection. The arrangement of the signal connectors on the front panel of the interface can be seen from the following illustration:

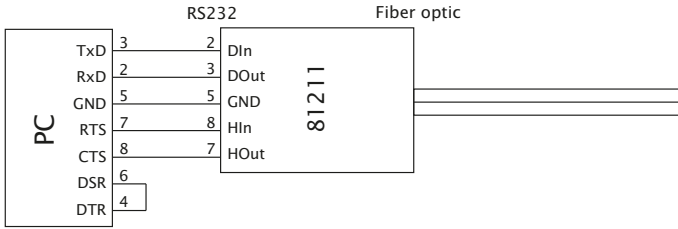


The pin configuration for the serial connector is shown in the following table and may also be found on a sticker attached to the device:

pin#	signal
2	data in
3	data out
4	active level
5	signal GND
7	handshake out
8	handshake in

Applications

RS232 <> Fiber optic interface
application with hardware handshake



Technical data

- Baud rate: 0..115 Kbps
- Transmitted signals: RxD, TxD, RTS, CTS
- Serial connector: 9-pin SUB-D plug with DTE pinout
- Dimensions: 105x75x22mm
- Packing list: 1 x Interface Converter
Fiber Optic <> RS232 with handshake

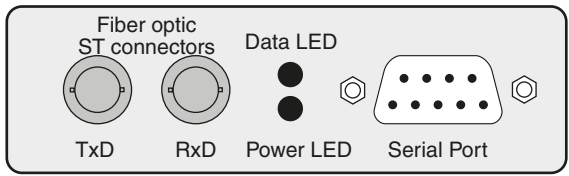
Interface FO <> RS485 / RS422, #61210

Function

The W&T Interface 61210 allows bi-directional conversion of an RS485 or an RS422 interface into a fiber optic interface with a transmission speed of up to 1,5 Mbps. The interface works independently of the data format used and converts one data line and one hardware handshake line in each direction.

Connectors

The fiber optic cables are connected to the converter using ST series connectors, with a DB9 plug for the RS485 / RS422 connection. The arrangement of the signal connectors on the front panel of the interface can be seen from the following illustration:



The pin configuration for the serial connector is shown in the following table and may also be found on a sticker attached to the device:

pin#	signal
1	data out A (-)
2	data in A (-)
5	signal GND
6	data out B (+)
7	data in B (+)

Operating mode

The W&T interface 61210 can be set for different operating modes by DIP switch setting on the RS422/RS485 interface module. The selectable operating modes are briefly described here:

RS422, RS485 4-wire bus master application

One data channel and one handshake channel in each direction are available. The RS422/RS485 receivers and transmitters are always active in this operating mode.

RS485 4 wire / RS485 2-wire application with echo

One data channel in each direction is available. The RS485 output driver is activated automatically with each transmission of data, and goes to the high impedance state again after the end of transmission. The RS485 receiving channel is always active in this operating mode.

RS485 2 wire application without echo

One data channel in each direction is available. The RS485 output driver is activated automatically with each transmission of data, and goes to the high impedance state again after the end of transmission. The RS485 receiving channel is deactivated when the driver is on, but is switched on when the driver is in the high impedance state.

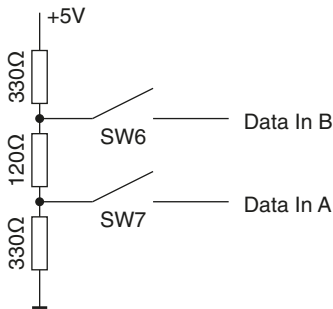
Please see the following table for an explanation of the operating mode DIP switch:

operating mode	SW1	SW2	SW3	SW4	SW5	SW8
RS422, RS485, 4-wire bus master	OFF	OFF	OFF	ON	OFF	OFF
RS485, 4-wire / 2-wire with echo	OFF	ON	OFF	ON	OFF	OFF
RS485, 2-wire bus systems w/o echo	ON	ON	OFF	ON	OFF	OFF

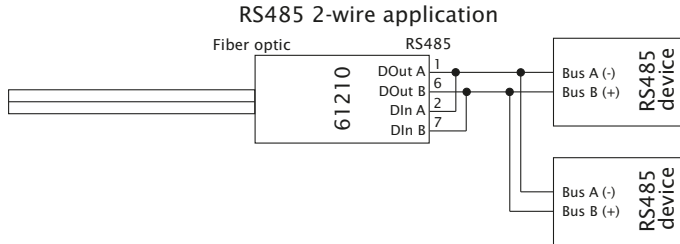
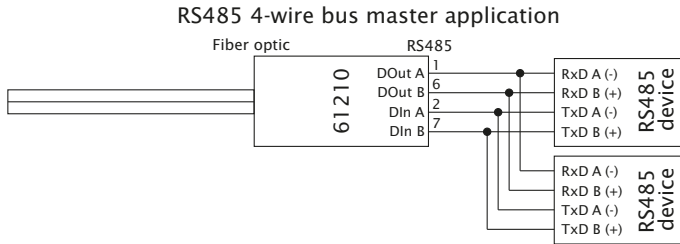
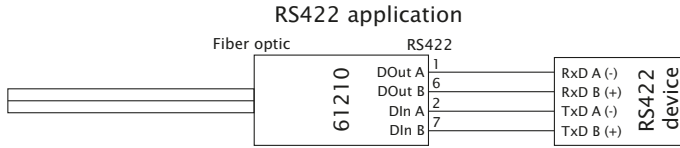
Termination

For all RS485 operating modes it is essential that the bus system be terminated with a termination network which assures a defined rest state in the high-impedance phases of bus operation.

The bus system can be connected to a termination network by closing switches #6 and #7 on the interface module:



Applications



Technical data

- Operating modes: RS422
RS485 2/4 wire mode with automatic control
- Switchover delay: approx. 10µs from send to receive
for RS485 automatic control
(can be factory changed on request)
- Baud rate: 0..1,5 Mbps
- Transmitted signals: RxD, TxD
- Serial connector: 9-pin SUB-D plug
- Dimensions: 105x75x22mm
- Packing list: 1x Interface Converter
Fiber Optic <> RS485 / RS422

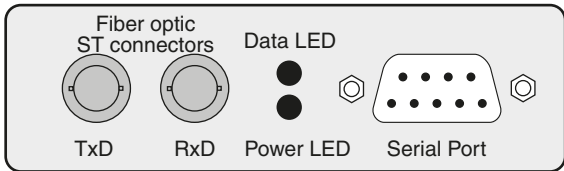
Interface FO <> Profibus, #61211

Function

The W&T Interface 61211 allows bi-directional conversion of an Profibus interface into a fiber optic interface with a transmission speed of up to 1,5 Mbps. The interface operates independent of the data format used and converts the Profibus data into light signals which can be transmitted over a glass fiber optic cable.

Connectors

The fiber optic cables are connected to the converter using ST series connectors, with a DB9 socket for the Profibus connection. The arrangement of the signal connectors on the front panel of the interface can be seen from the following illustration:



The pin configuration for the serial connector is shown in the following table and may also be found on a sticker attached to the device:

pin#	signal	pin#	signal
1	shield	6	VP
2	n.c.	7	n.c.
3	RXD / TXD - P	8	RXD / TXD - N
4	CNTR - P	9	CNTR - N
5	DGND		

Termination

Both ends of a Profibus segment must be terminated with a terminating network which is usually integrated into the Profibus connectors and can be optionally switched. This resistor network has two functions: to ensure reflection-free termination of the line, and to provide a defined rest state on the lines during the high-impedance phases of the bus system.

To supply the termination network, Pin 6 provides 5 V referenced to the ground Pin 5, with a maximum load capacity of 50 mA.

Technical data

Operating mode:	RS485 2 wire mode with automatic control, without echo
Switchover delay:	approx. 1 μ s from send to receive (can be factory changed on request)
Baud rate:	0..1,5 Mbps
Transmitted signals:	RxD, TxD
Serial connector:	9-pin SUB-D socket
Dimensions:	105x75x22mm
Packing list:	1x Interface Converter Fiber Optic <> Profibus

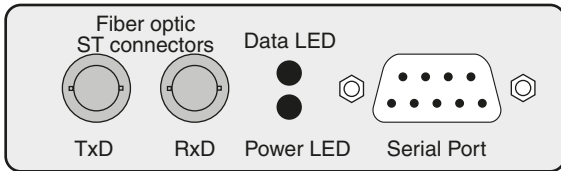
Interface FO <> 20mA #41210

Function

The W&T Interface 41210 allows bi-directional conversion of an 20mA interface into a fiber optic interface with a transmission speed of up to 19.200 bps. The interface works independently of the data format used and converts one data line in each direction.

Connectors

The fiber optic cables are connected to the converter using ST series connectors, with a DB9 plug for the 20mA connection. The arrangement of the signal connectors on the front panel of the interface can be seen from the following illustration:



The pin configuration for the serial connector is shown in the following table and may also be found on a sticker attached to the device:

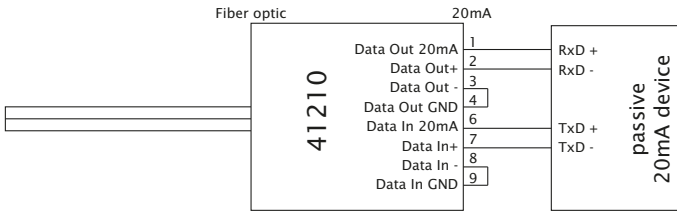
pin#	signal	pin#	signal
1	data out 20mA	6	data in 20mA
2	data out +	7	data in +
3	data out -	8	data in -
4	data out GND	9	data in GND
5	hdx control		

Applications

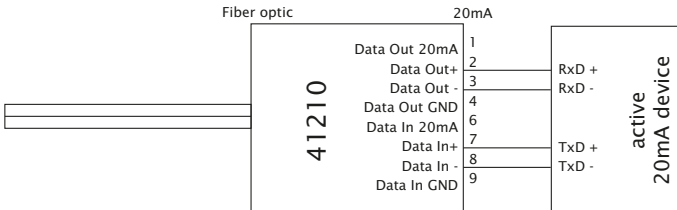
A GND level signal on Pin 5 of the TTY connector will place the 20mA interface of the convertor in half-duplex mode whereby an echo of the sent signals is suppressed.

The interface can be used as an active or passive 20mA component. In the active mode, the interface supplies the current required by the respective 20mA loop, while in the passive mode the loop current must be supplied by the connected device. The operating mode can be selected for both loops separately. Examples of interface switching into active/passive mode are shown in the following drawings:

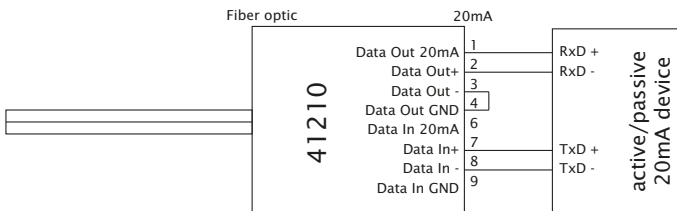
Interface converter Tx and Rx loop active



Interface converter Tx and Rx loop passive



Interface converter Tx loop active, Rx loop passive



Technical data

Baud rate:	0..19.200 bps
Transmitted signals:	RxD, TxD
Operating mode:	active mode passive mode
Serial connector:	9-pin SUB-D plug
Dimensions:	105x75x22mm
Packing list:	1x Interface Converter Fiber Optic <> 20mA

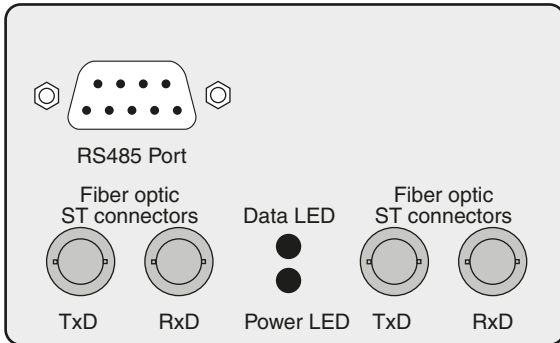
Interface FO Bus <> RS485, #65210

Function

The W&T Interface #65210 allows bi-directional conversion of an RS485 interface into a fiber optic bus interface with a transmission speed of up to 1,5 Mbps. The interface works independently of the data format used and converts one data line in each direction.

Connectors

The fiber optic cables are connected to the converter using ST series connectors, with a DB9 plug for the RS485 connection. The arrangement of the signal connectors on the front panel of the interface can be seen from the following illustration:



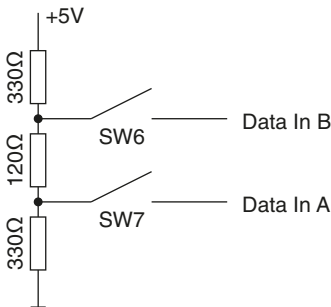
The pin configuration for the serial connector is shown in the following table, and may also be found on a sticker attached to the device:

pin#	signal
1	data out A (-)
2	data in A (-)
5	signal GND
6	data out B (+)
7	data in B (+)

Termination

For all RS485 operating modes it is essential that the bus system be terminated with a termination network which assures a defined rest state in the high-impedance phases of bus operation.

The bus system can be connected to a termination network by closing switches #6 and #7 on the interface module:



Operating mode

The interface #65210 can be set for different operating modes by DIP switch setting on the RS485 interface module. The selectable operating modes are briefly described here:

RS485 4 wire application

One data channel in each direction is available. The RS485 output driver is activated automatically with each transmission of data and goes to the high impedance state again after the end of transmission. The RS485 receiving channel is always active in this operating mode.

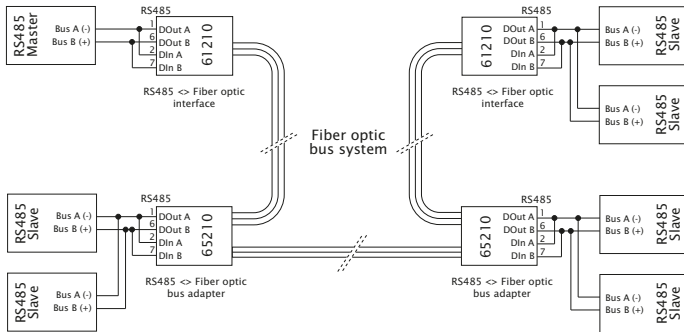
RS485 2 wire application

One data channel in each direction is available. The RS485 output driver is activated automatically with each transmission of data and goes to the high impedance state again after the end of transmission. The RS485 receiving channel is deactivated when the driver is on, but is switched on when the driver is in the high impedance state.

Please see the following table for an explanation of the operating mode DIP switch:

operating mode	SW1	SW2	SW3	SW4	SW5	SW8
RS485, 4-wire bus systems	OFF	ON	OFF	ON	OFF	OFF
RS485, 2-wire bus systems	ON	ON	OFF	ON	OFF	OFF

Applications



Technical data

- Operating modes: RS422
RS485 2/4 wire mode
- Switchover delay: approx. 10µs from send to receive
(can be factory changed on request)
- Baud rate: 0..1,5 Mbps
- Transmitted signals: Rx/D A/B, Tx/D A/B
- Cascadability: 5 Adapter @115Kbps
32 Adapter @19,2Kbps
- Serial connector: 9-pin SUB-D plug
- Dimensions: 105x75x22mm
- Packing list: 1x Interface Converter
Fiber Optic Bus <-> RS485

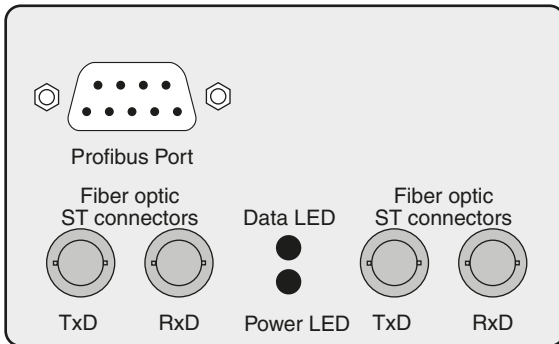
Interface FO Bus <> Profibus, #65211

Function

The W&T Interface #65211 allows bi-directional conversion of an profibus interface into a fiber optic bus interface with a transmission speed of up to 1,5 Mbps. The interface operates independent of the respective data format and converts the Profibus data into light signals which can be transmitted over a glass fiber optic cable.

Connectors

The fiber optic cables are connected to the converter using ST series connectors, with a DB9 socket for the Profibus connection. The arrangement of the signal connectors on the front panel of the interface can be seen from the following illustration:



The pin configuration for the serial connector is shown in the following table, and may also be found on a sticker attached to the device:

pin#	signal	pin#	signal
1	shield	6	VP
2	n.c.	7	n.c.
3	RXD / TXD - P	8	RXD / TXD - N
4	CNTR - P	9	CNTR - N
5	DGND		

Termination

Both ends of a Profibus segment must be terminated with a terminating network which is usually integrated into the Profibus connectors and can be optionally switched. This resistor network has two functions: to ensure reflection-free termination of the line, and to provide a defined rest state on the lines during the high-impedance phases of the bus system.

To supply the termination network, Pin 6 provides 5 V referenced to the ground Pin 5, with a maximum load capacity of 50 mA.

Technical data

Operating mode:	RS485 2 wire mode with automatic control, without echo
Switchover delay:	approx. 1 μ s from send to receive (can be factory changed on request)
Baud rate:	0..1,5 Mbps
Transmitted signals:	RxD/TxD-P, RxD/TxD-N
Cascadability:	5 Adapter @93,75 Kbps 32 Adapter @19,2Kbps
Serial connector:	9-pin SUB-D socket
Dimensions:	105x75x45mm
Packing list:	1x Interface Converter Fiber Optic Bus <> Profibus

