

# Communication

## 2-Channel Serial Optical Repeater – 7XV5461 up to 40 km

### Description

The optical repeater 7XV5461 exchanges serial optical signals via 1 singlemode fiber-optic cable only over long distances. It converts serial optical 820 nm signals at port 1 and port 2 in the range of 300 bit/s up to 4.096 Mbps up to 1300/1550 nm for 1 singlemode fiber-optic cable.

Synchronous or asynchronous signals can be connected to port 1/2. In this way, 2 independent, serial 820 nm inputs with ST connectors are available and these can be multiplexed onto port 3. 2 devices with an optical 820 nm interface, such as the line differential protection devices of the SIPROTEC 4/5 series or the 7XV5652 RS232/820 nm converter, can be connected to ports 1 and 2 via multimode fiber-optic cables for distances of up to 1.5 km. These signals are transmitted to port 3 via the single LC connector in the wavelengths of 1300 nm/1550 nm for connection of singlemode fiber-optic cables of up to 40 km.

The device can be connected to DC battery voltages or AC voltage sources. To support commissioning, loops can be activated for port 1/2 so that the input signals are reflected at each port to support commissioning of the optical fiber connections.

### Benefits

- 2 independent multiplexed 820 nm ports 1/2 with ST connectors for max. 1.5 km over 50/125  $\mu\text{m}$  and 62.5/25  $\mu\text{m}$  multimode fiber-optic cables
- Transmission rate of the serial ports 1/2 of 300 bit/s up to 4.096 Mbps. Automatic baud rate matching to synchronous and asynchronous serial signals; no settings necessary
- Powerful 1300 nm/1550 port with single LC plug for distances up to 40 km using a singlemode fiber-optic cable at 9/125  $\mu\text{m}$
- Wide-range power supply of DC 24 V to 250 V and AC 115 V to 230 V with alarm relay
- Display of the data traffic via LED
- Integrated commissioning aids

### Applications

The typical application area for the FO repeater is the protection-interface communication for SIPROTEC 4/5 differential and distance protection devices. Furthermore, serial data of the 7XV5 device series can be transmitted over long distances.

The connection to the protection device is provided interference-proof via a fibre-optic connection. The maximum transmission distance between the protection device and the FO repeater is specified at 1.5 km when using a 62.5/125  $\mu\text{m}$  fiber-optic cable or a 50/125  $\mu\text{m}$  fiber-optic cable.



[ph\_7XV5461\_W3\_1\_...]

**Figure 3.4/1** Optical Repeater with Integrated Multiplexer with 1300 nm/1550 nm Wavelength for 1 Singlemode Fiber-Optic Cable

The FO repeater supports easy commissioning of the entire communication path. For commissioning, loops can be activated for port 1/2 so that the input signals are reflected at the respective port. The FO repeater has a relay contact to issue a “device ok” indication (DOK), and is equipped with a wide-range power supply unit that covers the entire normal DC and AC auxiliary voltage range.

Until now, 2 fiber-optic cables were needed for the bidirectional transmission of protection signals. Using the repeater with integrated wavelength multiplexer, one fiber-optic cable is sufficient.

Substation automation technology, telecontrol engineering, or additional protection data transmissions can be connected via port 2. As a result, the long-distance optical fiber is put to optimal use for 2 separate serial connections to transmit serial data between 300 bit/s and 4.096 Mbps.

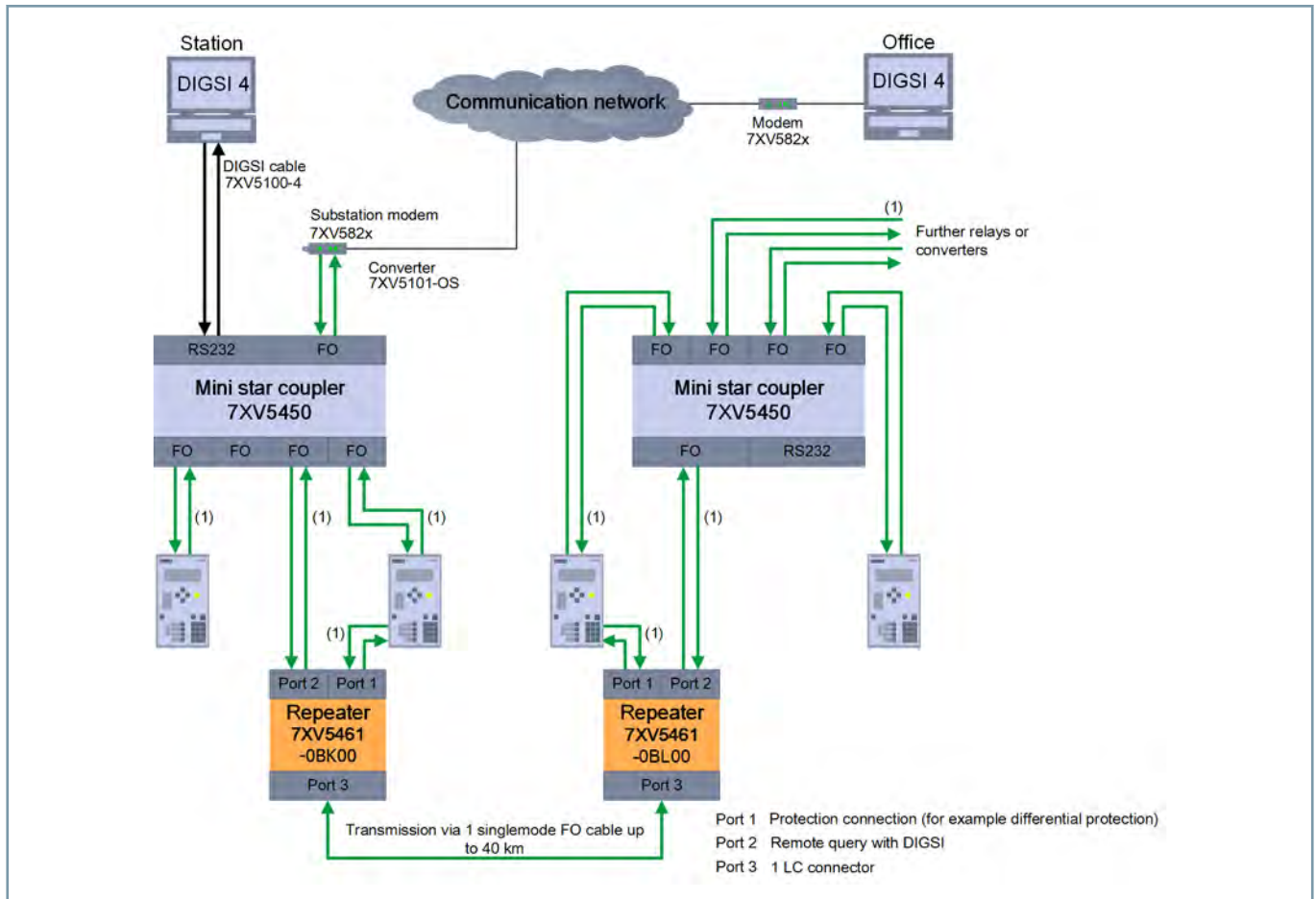
### Application Example with SIPROTEC 5 and DIGSI 5

*Figure 3.4/2* shows the interference-free data exchange of SIPROTEC 5 protection devices, e.g. differential protection 7SD8 or distance protection 7SL8, is via single mono-mode Fiber Optic cable up to a max. distance of 40 km and the DIGSI 5 access via Ethernet.



# Communication

## 2-Channel Serial Optical Repeater – 7XV5461 up to 40 km



[dw\_prof-data transm\_and\_integration\_fiber-optic-cable\_3\_en\_US]

**Figure 3.4/3** Protection Data Transmission and Remote Control/Integration Using One Singlemode Fiber-Optic Cable (Note: The 7XV5461-0BK00 and 7XV5461-0BL00 Devices must be used in Pairs.)

3.4 (1) Multimode fiber-optic cable with ST connectors (6XV8100)

### Technical Data

Connections	
Ports 1 / 2	ST connectors for 820 nm, for 50/125 µm and for 62.5/125 µm multimode fiber-optic cable
Port 3	Single LC connector for 1300 nm/ 1550 nm, for 9/125 µm single-mode fiber-optic cable
Screw terminals	2-pole screw terminals for auxiliary voltage 3-pole make contact/break contact for an alarm relay

Housing	
Interference-resistant aluminum housing, 188 x 56 x 120 mm for mounting to 35-mm DIN rail according to EN 50032.	
Weight: 0.8 kg. Degree of protection according to EN 60529: IP41	

Power supply	
Wide-range: 24 to 250 VDC or 115 / 230 VAC	

Displays	
4 LEDs	
Green	Power supply
Red	Alarm relay
2 x yellow	Data traffic display

You can find additional technical data in the manual under: [www.siemens.com/accessories](http://www.siemens.com/accessories)

### Selection and Ordering Data

Description	Order No.												
	1	2	3	4	5	6	7	8	9	10	11	12	
Optical repeater for asynchronous and synchronous coupling	7	X	V	5	4	6	1	-	0	B	□	0	0
											▲		
											I		
1550 nm/LC single connector/permissible attenuation: 25 dB (0.45 dB/km) for radii up to 40 km via a fiber-optic cable											K		
1300 nm/LC single connector/permissible attenuation: 25 dB (0.45 dB/km) for radii up to 40 km via a fiber-optic cable											L		
For converting/amplifying multimode optical fiber, 50/125 µm or 62.5/125 µm (820 nm), to singlemode optical fiber, 9/125 µm, for serial data from 300 bit/s to 4.096 Mbps 2 independent serial optical input channels with ST connectors for 820 nm and multimode optical fiber 1 optical output at 1300 nm or 1550 nm with an LC connector for singlemode optical fiber Permissible path attenuation of the 820 nm multimode connection is 8 dB (approx. 1.5 km). Permissible path attenuation of the 1300 nm or 1550 nm singlemode connection: see order option Wide-range voltage supply/auxiliary voltage: 24 to 250 VDC or 115/230 VAC 1 fault signaling contact for auxiliary voltage faults or loss of data connection LEDs for display of data transmission Data transmission in 2 directions from 2 optical ports using singlemode optical fiber													



#### NOTE

The -OBK00 and -OBL00 versions must be used in pairs.

# Communication

## 2-Channel Serial Optical Repeater – 7XV5461 up to 170 km

### Description

The optical repeater 7XV5461 using a duplex singlemode fiber-optic cable transmits serial optical signals over long distances. It converts serial optical 820 nm signals at port 1 and port 2 in the range of 300 bit/s up to 4.096 Mbps. Synchronous and asynchronous signals can be connected. In this way, 2 independent, serial 820 nm inputs with ST connectors are available and these can be multiplexed onto port 3. 2 devices with an optical 820 nm interface, such as the line differential protection devices of the SIPROTEC 4/5 series or the 7XV5652 RS232/820 nm converter, can be connected to ports 1 and 2 via duplex multimode optical fiber for distances of up to 1.5 km. These signals are transmitted to port 3 via the single duplex LC plug in wavelengths of 1300 nm/1550 nm for the connection of a duplex singlemode fiber-optic cable. Using port 3, there are 3 options for max. 25 km (1300 nm)/60 km (1300 nm) and 100 km/170 km (1550 nm) optical fiber lengths. The device can be connected to all battery voltages and AC voltage sources. To support commissioning, loops can be activated for port 1/2 so that the input signals are reflected at the respective port.

### Benefits

- 2 independent multiplexed 820 nm ports with ST connectors for max. 1.5 km via 50/125  $\mu\text{m}$  and 62.5/125  $\mu\text{m}$  duplex multimode fiber-optic cables
- Transmission rate of the serial ports 1/2 of 300 bit/s up to 4.096 Mbps. Automatic baud rate matching to synchronous and asynchronous serial signals; no settings necessary
- Powerful 1300 nm/1550 nm port with duplex LC plug for distances up to 24 km/60 km/100 km/170 km using a duplex singlemode fiber-optic cable at 9/125  $\mu\text{m}$
- Wide-range power supply of DC 24 V to 250 V and AC 115 V to 230 V with alarm relay
- Display of the data traffic via LED
- Integrated commissioning aids

### Applications

The typical application area for the FO repeater is protection-interface communication for SIPROTEC 4/5 differential and distance protection. Furthermore, serial data from the 7XV5 device series can be transmitted over long distances.

The connection to the protection device is provided interference-proof with a fibre-optic connection. The maximum trans-



[ph\_7XV5461\_W3\_1\_...]

Figure 3.4/4 Optical Repeater with Wide-range Power Supply Unit

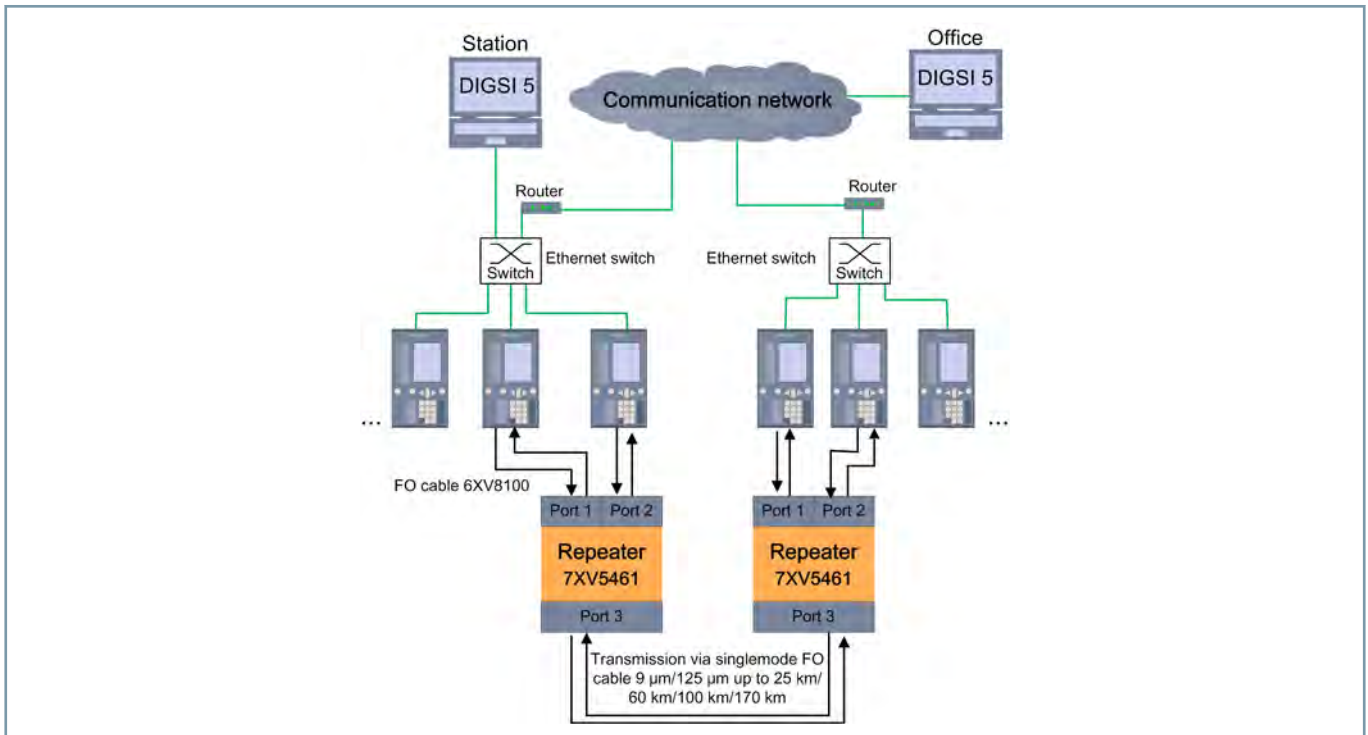
mission distance between the protection device and the FO repeater is specified at 1.5 km when using a 62.5/125  $\mu\text{m}$  fiber-optic cable or a 50/125  $\mu\text{m}$  fiber-optic cable.

The FO repeater supports easy commissioning of the entire communication path. For commissioning, loops can be activated for port 1/2 so that the input signals are reflected at the respective port. The FO repeater has a relay contact to issue a "device ok" indication (DOK), and is equipped with a wide-ranging power supply unit that covers the entire normal DC and AC auxiliary voltage range.

Power system control or additional protection-data transmissions can be connected via port 2. As a result, the long-distance optical fiber is put to optimal use for 2 separate serial connections to transmit data between 300 bit/s and 4.096 Mbps.

### Application Example with SIPROTEC 5 and DIGSI 5

Figure 3.4/5 shows the interference-free data exchange of SIPROTEC 5 protection devices, e.g. line differential protection 7SD8 or distance protection 7SL8, via duplex mono-mode Fiber Optic cable up to a distance of 170 km and the DIGSI 5 access via Ethernet.



[dw\_SIP5\_prot-data transm\_170km\_2\_en\_US]

**Figure 3.4/5** Transfer of Protection Data Signals of SIPROTEC 5 Devices via Duplex-Mono-Mode FO Cable and DIGSI 5 Access via Ethernet

### Application Example with SIPROTEC 4 and DIGSI 4

The protection devices (for example, differential protection 7SD5/7SD6 or distance protection 7SA52/7SA6) exchange information via port 1. Data is exchanged interference-free using an duplex mono mode fiber-optic cable covering a distance of 170 km. A protection remote control with DIGSI 4 is connected to port 2 of the repeater using a mini star coupler 7XV5450. A

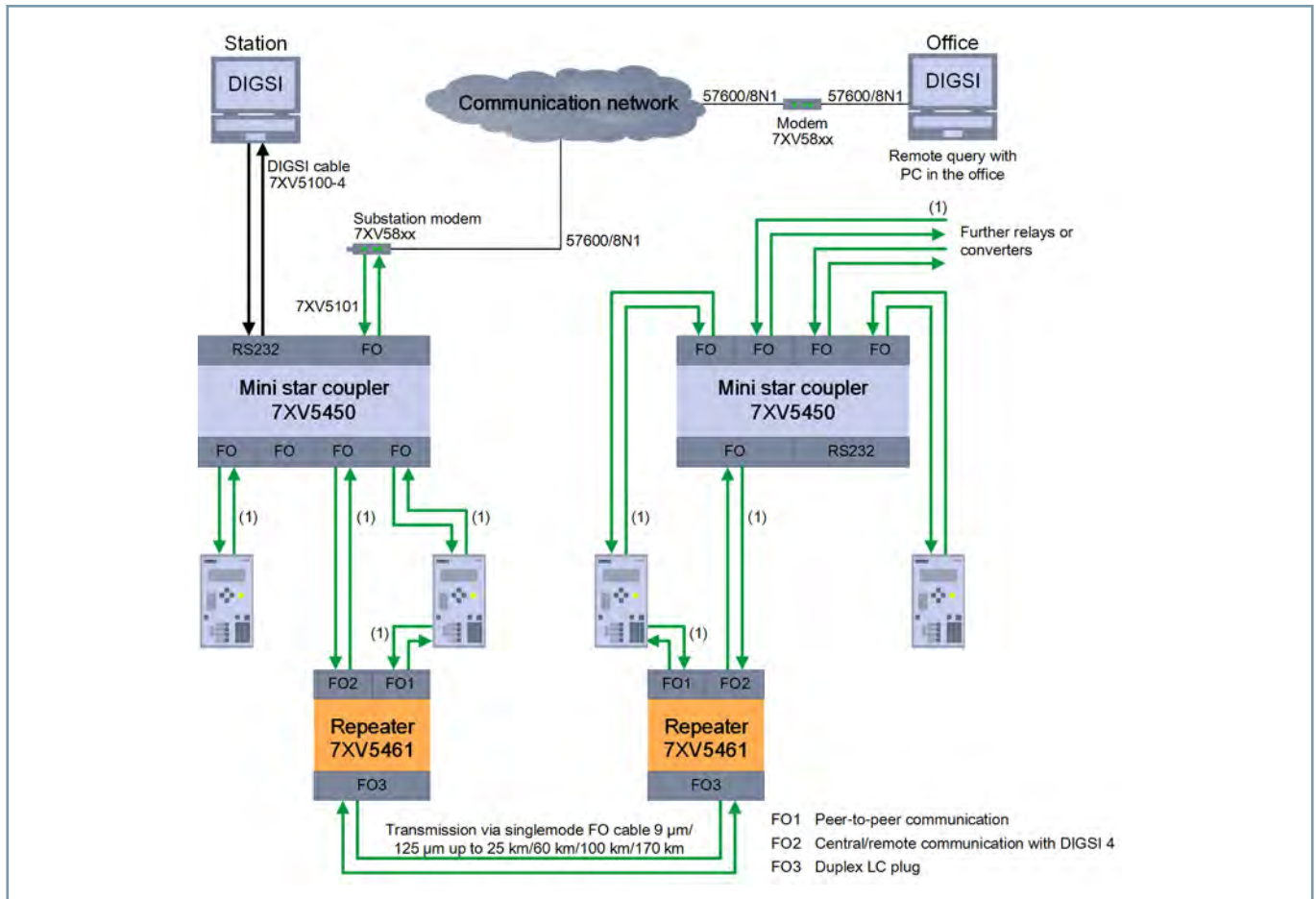
serial connection to other switchgear is established via this port using a PC with DIGSI 4 installed. The protection devices of the remote switchgear can be queried from a distance via port 2. The baud rate is optimally set to 57.6 Kbps so that there are no differences from local control.

When commissioning and during operation, the data of the device can be changed or read from the other switchgear.



# Communication

## 2-Channel Serial Optical Repeater – 7XV5461 up to 170 km



[dw\_prof-data transm\_and\_integration\_optical\_DFU-connection, 3\_en\_US]

**Figure 3.4/6** Protection Data Transmission and Remote Control of Switchgear via an optical dial-up Network Connection

(1) Multimode fiber-optic cable with ST connectors (6XV8100)

3.4

### Technical Data

Connections	
Ports 1/2	ST connectors for 820 nm, for 50/125 μm and for 62.5/125 μm multimode fiber-optic cable
Port 3	Duplex LC plug for 1300 nm, for 50/125 μm/62.5/125 μm multimode fiber-optic cable
Screw terminals	2-pole screw terminals for auxiliary voltage 3-pole make contact/break contact for an alarm relay

Housing	
Aluminum housing, 188 x 56 x 100 mm for mounting to 35-mm DIN rail according to EN 50032.	
Weight: 0.8 kg. Degree of protection according to EN 60529: IP41	

Power supply	
Wide range 24 to 250 VDC, without switch-over 115/230 VAC	

Displays	
4 LEDs	
Green	Power supply
Red	Alarm relay
2 x yellow	Data exchange

You can find additional technical data in the manual under: [www.siemens.com/accessories](http://www.siemens.com/accessories)

### Selection and Ordering Data

Description	Order no.												
	1	2	3	4	5	6	7	8	9	10	11	12	
Optical repeater for singlemode optical fiber	7	X	V	5	4	6	1	-	0	B	□	0	0
											▲		
											I		
1300 nm/for transmission distances up to 24 km											G		
1300 nm/LC connector/for transmission distances up to 60 km											H		
1550 nm/LC connector/for transmission distances up to 100 km											J		
1550 nm/LC connector/for transmission distances up to 170 km											M		
For converting/amplifying multimode optical fiber, 50/125 µm or 62.5/125 µm (820 nm), to singlemode optical fiber, 9/125 µm, for serial data from 300 bit/s to 4.096 Mbps 2 independent serial optical input channels with ST connectors and 820 nm for multimode optical fiber, permissible path attenuation of the 820 nm path is 8 dB (approx. 1.5 km with 62.5/125 µm fiber). Wide-range power supply, DC 24 V to 250 V and AC 115/230 AC 1 fault signaling contact for auxiliary voltage faults or loss of data connection													



#### NOTE

Repeaters can only be used in pairs.



# Communication

## 2-Channel Serial Optical Repeater – 7XV5461 up to 8 km

### Description

The optical repeater 7XV5461 duplex multimode fiber-optic cable transmits serial optical signals over long distances via a duplex multimode fiber-optic cable. It converts serial optical 820 nm signals at port 1 and port 2 in the range of 300 bit/s up to 1.5 Mbps up to 1300 for duplex multimode fiber-optic cable. Synchronous and asynchronous signals can be connected. In this way, 2 independent, serial 820 nm inputs with ST connectors are available and these can be multiplexed onto port 3. It supports a transmit signal (Tx) and a receive signal (Rx) (no RTS/CTS handshake signals).

2 devices with an optical 820 nm interface, such as the line differential protection device of the SIPROTEC 4/5 series or the 7XV5652 RS232/820 nm converter, can be connected to ports 1 and 2 via multimode fiber-optic cables for distances of up to 1.5 km. These signals are transmitted to port 3 via the single duplex LC plug in wavelengths of 1300 nm for the connection of a duplex multimode fiber-optic cable. There are 2 options for port 3 for fiber-optic cable lengths of a maximum of 4 km (1300 nm) and 8 km (1300 nm). The device can be connected to all battery voltages and AC voltage sources. To support commissioning, loops can be activated for port 1/2 so that the input signals are reflected at the respective port.

### Benefits

- 2 independent multiplexed 820 nm ports with ST connectors for max. 1.5 km via 50/125  $\mu\text{m}$  and 62.5/125  $\mu\text{m}$  duplex multimode fiber-optic cables
- Transmission rate of the serial ports 1/2 of 300 bit/s up to 1.5 Mbps. Automatic baud rate matching to synchronous and asynchronous serial signals; no settings necessary
- Powerful 1300 nm port with duplex LC plug for distances of up to 4 km/8 km using 50/125  $\mu\text{m}$ /61.5/125  $\mu\text{m}$
- Wide-range power supply of DC 24 V to 250 V and AC 115 V to 230 V with alarm relay
- Display of the data traffic via LED
- Integrated commissioning aids with loop test option.

### Applications

The typical application area for the FO repeater is the protection-interface communication for SIPROTEC 4/5 differential and distance protection devices. Furthermore, serial data from the 7XV5 device series can be transmitted over long distances.

The connection to the protection device is provided interference-proof via a fibre-optic connection. The maximum trans-



[ph\_7XV5461\_W3\_1\_1\_1\_1]

**Figure 3.4/7** Optical Repeater with Wide-range Power Supply Unit

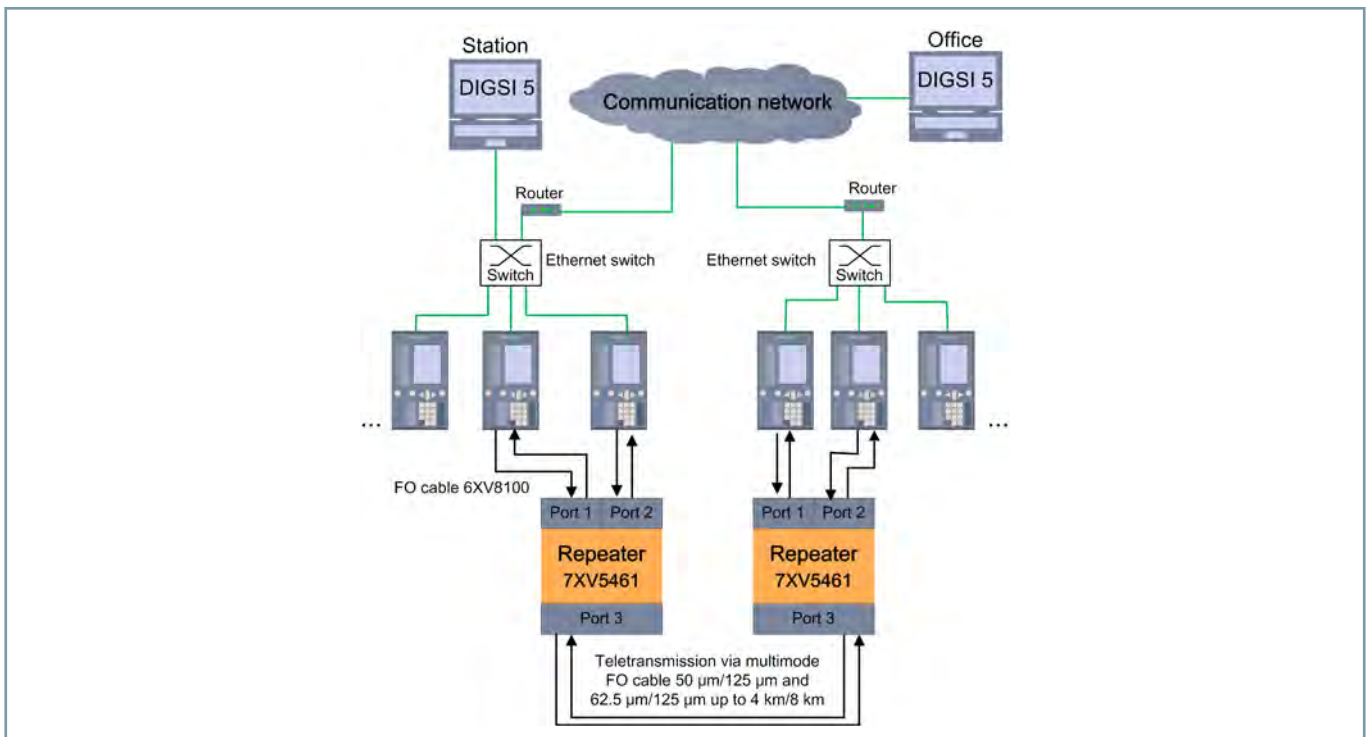
mission distance between the protection device and the FO repeater specified at 1.5 km when using a 62.5/125  $\mu\text{m}$  fiber-optic cable or a 50/125  $\mu\text{m}$  fiber-optic cable.

The FO repeater supports easy commissioning of the entire communication route. For commissioning, loops can be activated for port 1/2 so that the input signals are reflected at the respective port. The FO repeater has a relay contact to issue a “device ok” indication (DOK), and is equipped with a wide-ranging power supply that covers the entire normal DC and AC auxiliary voltage range.

Power-system control or additional protection data transmissions can be connected via port 2. As a result, the long-distance optical fiber is put to optimal use for 2 separate serial connections to transmit data between 300 bit/s and 4.096 Mbps.

### Application Example with SIPROTEC 5 and DIGSI 5

*Figure 3.4/8* shows the interference-free data exchange of SIPROTEC 5 protection devices, e.g. line differential protection 7SD8 or distance protection 7SL8, via duplex multi-mode Fiber Optic cable up to a distance of 4 km to 8 km and the DIGSI 5 access via Ethernet.



[div\_SIP5\_prot-data transm\_8km\_2\_en\_US]

**Figure 3.4/8** Transfer of Protection Data Signals of SIPROTEC 5 Devices via Duplex-Multi-Mode FO Cable and DIGSI 5 Access via Ethernet

### Application Example with SIPROTEC 4 and DIGSI 4

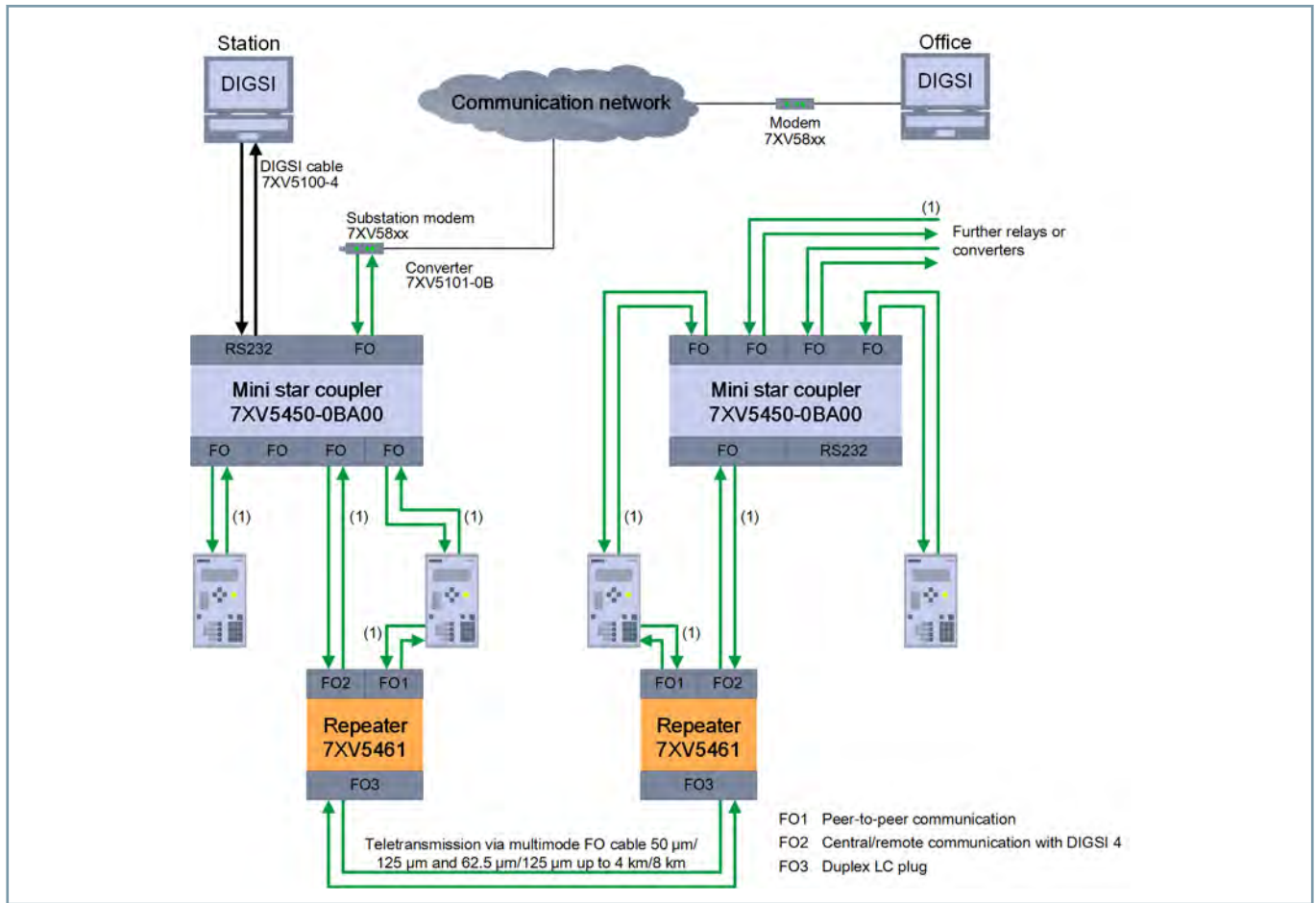
2 protection devices (for example, differential protection 7SD52/7SD610 or distance protection 7SA52/7SA6) exchange information via port 1. Data is exchanged interference-free using an optical duplex multimode fiber-optic cable up to a distance of 4 km to 8 km. A protection remote control with DIGSI 4 is connected to port 2 of the repeater using a mini star coupler 7XV5450. A serial connection to the other switchgear is established via this port using a PC with DIGSI 4 installed. The protection devices of the remote switchgear can be queried

from a distance via port 2. The baud rate is optimally set to 57.6 Kbps so that there are no differences from local control.

When commissioning and during operation, the data of the device can be changed or read from the other switchgear. As an alternative, substation automation technology or additional protection data transmissions can be connected via port 2. As a result, the long-distance optical fiber is put to optimal use for 2 separate serial connections to transmit data between 300 bit/s and 4.096 Mbps.

# Communication

## 2-Channel Serial Optical Repeater – 7XV5461 up to 8 km



[dw\_prot-data transm\_and\_integration\_optical\_DFU-connection\_8km\_3\_en\_US]

Figure 3.4/9 Protection Data Transmission and Remote Control of Switchgear via an optical dial-up Network Connection

3.4

### Technical Data

Connections	
Ports 1/2	ST connectors for 820 nm, for 50/125 µm and for 62.5/125 µm multimode fiber-optic cable
Port 3	Duplex LC plug for 1300 nm, for 50/125 µm / 62.5/125 µm multimode fiber-optic cable
Screw terminals	2-pole screw terminals for auxiliary voltage 3-pole make contact/break contact for an alarm relay

Housing	
Aluminum housing, 188 x 56 x 100 mm for mounting to 35-mm DIN rail according to EN 50032.	
Weight: 0.8 kg. Degree of protection according to EN 60529: IP41	

Power supply	
Wide range 24 to 250 VDC, without switch-over 115 to 230 VAC	

Displays	
4 LEDs	
Green	Power supply
Red	Alarm relay
2 × yellow	Data traffic display

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### Selection and Ordering Data

Description	Order No.												
	1	2	3	4	5	6	7	8	9	10	11	12	
<b>Optical repeater for multimode optical fiber</b>	7	X	V	5	4	6	1	-	0	B	□	0	0
											▲		
											I		
1300 nm/LC connector/4 km, multimode											F		
1300 nm/LC connector/8 km, multimode											E		
For converting/amplifying multimode optical fiber, 50/125 µm or 62.5/125 µm (820 nm), to multimode optical fiber for serial data from 300 bit/s to 1.5 Mbps 2 independent serial optical input channels with ST connectors and 820 nm for multimode optical fiber, permissible path attenuation of the 820 nm path is 8 dB (approx. 1.5 km with 62.5/125 µm fiber). Wide-range power supply, DC 24 V to 250 V and AC 115/230 V 1 fault signaling contact for auxiliary voltage faults or loss of data connection													