

Communication

Converters – Communication Converter

7XV5662-0AA

Description

The communication converter for interfacing to a communication network is a peripheral device connected to the protection device via optical fiber. This peripheral device enables serial data exchange between 2 protection devices. This exchange takes place via a digital communication network. The electrical interfaces for the access of the communication converter to the communication device are optionally X.21 (64 Kbps, 128 Kbps, 256 Kbps or 512 Kbps) or G.703.1 (64 Kbps). The data is converted at the partner by a second communication converter, such that they can be read by the second device. Using the communication converters, 2 protection devices can communicate synchronously with each other and, while doing so, exchange a large amount of data over long distances. Typical applications are serial protection interfaces of differential protection and of distance protection in the SIPROTEC 4 devices 7SD52/53, 7SD61, 7SA52, 7SA6, and all SIPROTEC 5 devices such as the 7SD8, 7SA8, and 7SL8, where 7XV5662-0AA00 must be used.

If asynchronous serial data of the differential protection 7SD51 or the 7XV5653/7XV5673 binary signal transducer are to be transmitted, the 7XV5662-0AA00 device is to be used (asynchronous, from 300 bit/s to 115.2 Kbps, depending on the baud rate of the X.21 or G.703.1 interface).

The protection device is connected in an interference-free manner via a multimode fiber-optic cable pre-assembled at the communication converter with ST connectors. The maximum optical transmission distance is 1.5 km. The 7XV5662-0AA00 is to be mounted or installed near the communication device or data circuit terminating equipment in the same cabinet or at least in the same room. The maximum electrical transmission distance should be kept as short as possible, a few meters are favorable.

The data transfer between the protection devices represents a point-to-point connection that is bit-transparent. The data exchange must take place via reserved communication channels in the same communications system.

Benefits

- Optical interface with ST connector for connection to the protection device
- Radius: 1.5 km at 62.5/125 μm and 50/125 μm multimode fiber-optic cable between the communication converter and protection device/serial device
- Electrical interface to the communication device via D-sub connector plugs (X.21, 15-pole, automatic setting to 64, 128, 256 or 512 Kbps or G.703.1, 9-pole, 64 Kbps)
- Synchronous and asynchronous data exchange mode can be selected in one device by push-button
- Synchronous data exchange with the SIPROTEC 4 devices 7SD52/53, 7SD61, 7SA52, 7SA6, and all SIPROTEC 5 devices such as the 7SD8, 7SA8, and 7SL8



[ph_7XV5662-0AA00, 1, ...]

Figure 3.5/9 Communication Converter 7XV5662-0AA00 for X.21/RS422 and G.703.1

- Asynchronous data exchange for the protection device 7SD51, binary signal transducer, 7XV5653/7XV5673 or other devices with an asynchronous interface
- Monitoring of:
 - Auxiliary voltage,
 - X21: Clock signal of the communication network;
 - G703.1: Receive data is present and corresponds to the standard pulse mask
 - and internal logic
- Alarm relay (1 change-over contact, SIPROTEC standard)
- Loop test can be selected via push-button
- Wide-range power supply unit of DC 24 V to 250 V and AC 115 V to 230 V with alarm relay

Functions

The protection device is optically connected to the communication converter, which enables interference-free data transmission between the communication converter and the protection device. The communication converter is located close to the communication device. It matches the optical active interface of the protection device to the electrical data of the communication network interface. The interface types – optionally X.21/RS422 or G.703.1 – can be set with a push-button on the enclosure cover.

The device detects the necessary transmission rate automatically.

The data between the protection devices is transmitted on the basis of a point-to-point connection; in addition, a synchronous, bit-transparent transmission is possible via the communication network.

Applications

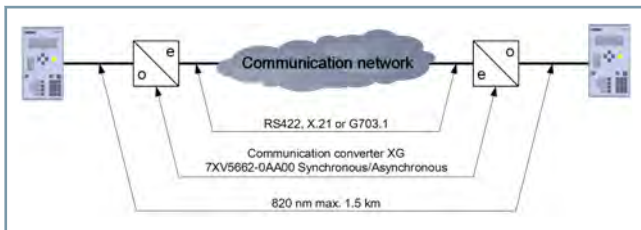
Synchronous serial data exchange between two devices of the same type:

- SIPROTEC 4: Distance protection with a binary permissive overreach transfer trip scheme and differential protection (7SA52/6, 7SD52/53/61); devices must be equipped with the optical module LWL5.
- SIPROTEC 5: All device types are possible (such as 7SD8/A8/L8); devices must be equipped with the optical module USART-AD-1FO or USART-AE-2FO.

Asynchronous serial data exchange between 2 devices of the same type:

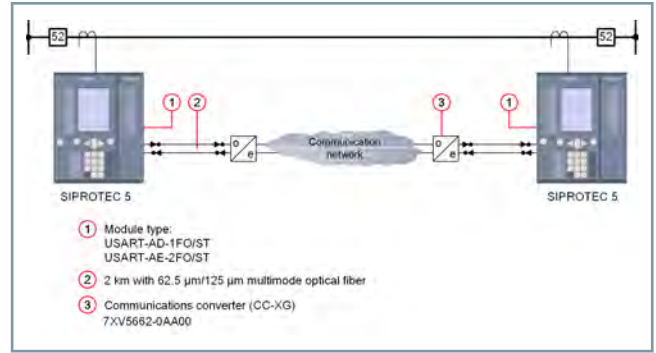
- SIPROTEC 3: Differential protection (7SD51).
- Binary Signal Transducer, SICAM I/O unit (7XV5653, 7XV5673): Point-to-point transmission of binary signals, for example, for serial permissive overreach transfer trip scheme logic in distance protection.

Application Examples



[dw_connec_2-device_via_comm-network_syncr_or_asyncr, 3, en_US]

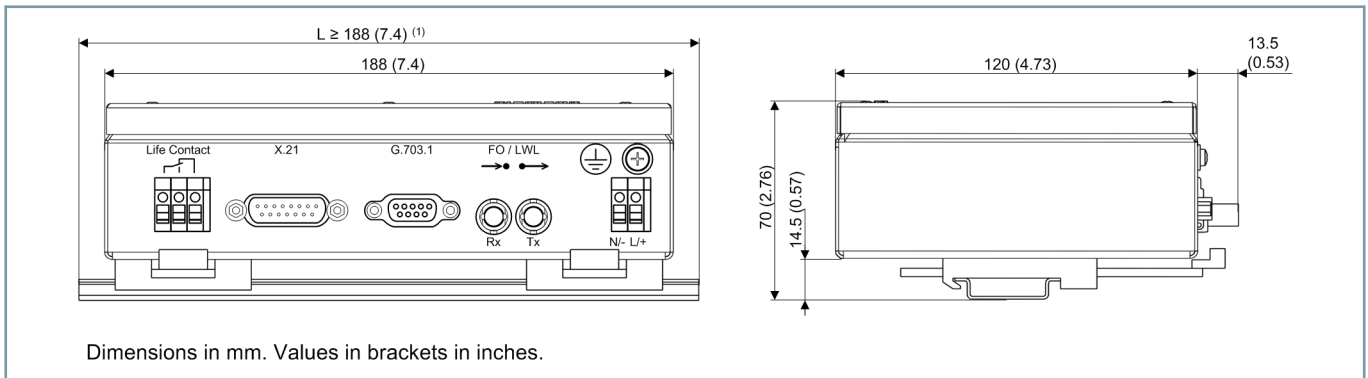
Figure 3.5/10 Connection of Two Protection Devices via a Communication Network linked with 7XV5662-0AA00 in Synchronous or Asynchronous Mode



[dw_Wirkom-IEEE-interface-lwl-anschl, 4, en_US]

Figure 3.5/11 Protection Communication via a Communication Network with X21 or G703.1 (64 kbps / G703.6 (2Mbit)) Interface

Dimensioned Drawing



[dw_Dimensions_7XV5662-0AA00-G6, 1, en_US]

Figure 3.5/12 Dimensions of the Communication Converter, Front and Side View

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Technical Data

Rated auxiliary voltage	
24 to 250 VDC	± 20%
115 V to 230 VAC	± 20%
Consumption	approx. 2.5 W; < 9.5 VA

4 LEDs	
LED 1	Red: Error or loop mode
LED 2	LED 2 "TxD" signals the transmit data coming from the network interfaces and transmitted to the protection device as optical fiber-T. Operation color "green": Device is operating in synchronous mode Operation color "yellow": Device is operating in asynchronous mode
LED 3	LED 3 "RxD" signals the receive data (optical fiber-R) coming from the protection device and to be transmitted to the network interface. Operation color "green": Device is operating in synchronous mode Operation color "yellow": Device is operating in asynchronous mode
LED 4	The "Power On" LED signals that the auxiliary voltage is connected. Operation color "green": The device communicates via the G703 interface. Operation color "yellow": The device communicates via the X21 interface.

Connections	
Power supply	2-pole screw terminal
Signaling/standby contact	3-pole make contact/break contact
Serial G.703.1 interface	9-pole D-SUB socket for the 4-pole receive and transmission line
X.21 interface	15-pole D-SUB connector plug for the electrical X.21/RS422 interface
Fiber-Optic Cables	820 nm, 2 ST connectors for Tx/D and Rx/D for 62.5/125 µm multimode optical fiber (max. distance to the protection device: 1.5 km)

Housing	
Sheet steel housing	Dimensions: 188×55×120 mm (W×H×D)
Weight	About 0.8 kg

Housing	
Degree of protection	according to EN 60529: IP41
for snap-on mounting	to 35-mm DIN rail according to EN 60715

Operating modes of the communication converter 7XV5662-0AA00		
Synchronous operation with	7SA52/6, 7SD52/53/61; and all SIPROTEC 5 device types such as the 7SD8/A8/L8	
	G.703.1: Interface selectable by push-button	
	Settings in the protection device	Automatic settings in the CC-XG
	64 Kbps per parameter	64 Kbps
	X.21/RS422: Interface selectable by push-button	
	Settings in the protection device	Automatic settings in the CC-XG
	64 Kbps per parameter	64 Kbps
	128 Kbps per parameter	128 Kbps
	256 Kbps per parameter	256 Kbps
	512 Kbps per parameter	512 Kbps
Asynchronous operation with	7SD51, 7XV5653/7XV5673 and devices with asynchronous serial interface (handshake not supported, only serial Tx/D and Rx/D signals are supported)	
	G.703.1: Interface selectable by push-button	
	Settings in the protection device	Automatic settings in the CC-XG
	max. 19.2 Kbps	64 Kbps
	X.21/RS422: Interface selectable by push-button	
	Settings in the protection device	Automatic settings in the CC-XG
	max. 19.2 Kbps asynchronous	64 Kbps
	max. 38.4 Kbps asynchronous	128 Kbps
	max. 57.6 Kbps asynchronous	256 Kbps
	max. 115.2 Kbps asynchronous	512 Kbps

You can find additional technical data in the manual under: www.siemens.com/accessories

Selection and Ordering Data

Description	Order no.												
	1	2	3	4	5	6	7	8	9	10	11	12	
Communication converter for X.21/RS422/G.703.1	7	X	V	5	6	6	2	-	0	A	A	0	0
<p>Converter for synchronous or asynchronous serial coupling of protection devices with optical input</p> <p>Output to communication devices with electrical X.21/RS422 or G.703.1 interface</p> <p>Connection to protection devices via fiber-optic cable at 62.5/125 µm and 820 nm wavelength, max. distance: 1.5 km</p> <p>ST connector, electrical with X.21/RS422 (15-pole D-SUB connector) or G.703.1 (9-pole D-SUB connector)</p> <p>Automatic baud rate detection,</p> <p>Synchronous or asynchronous operation selectable via push-button</p>													
<p>For synchronous operation with 7SA52,7SA6,7SD52/53/61, all SIPROTEC 5 device types possible, like the 7SD8/A8/L8</p> <p>For asynchronous operation with 7SD51, 7XV5653, 7XV5673 and other devices with an asynchronous serial interface</p>													

7XV5662-0AC

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Description

The communication converter, copper (CC-CO) is a peripheral device connected to the protection device, which enables serial data exchange between 2 line differential protection devices. For this, one single pair of copper wires (pilot wires) is used. It can be part of a telecommunication cable or another suitable symmetrical communication cable (not a Pupin cable). The data is converted at the partner by a second communication converter such that they can be read by the second protection device. Using the communication converters (Main Unit/Secondary Unit), 2 protection devices can communicate synchronously with each other and, while doing so, exchange a large amount of data over long distances.

Typical applications are the serial protection interfaces of differential protection and of distance protection in the SIPROTEC 4/5 device series, where 7XV5662-0AC02 must be used (128 kBit/s synchronous connection). If asynchronous serial data of the 7SD5 differential protection or the 7XV5653 binary signal transducer is to be transmitted, the 7XV5662-0AC03 device is to be used (asynchronous, from 300 bit/s to 38.2 kBit/s).

The protection device is connected in an interference-free manner via a multimode fiber-optic cable pre-assembled with ST connectors at the CC-CO end. The maximum optical transmission distance is 1.5 km. The data transfer between the protection devices represents a point-to-point connection that is bit-transparent. The data exchange must operate over reserved pilot wires, not via central offices.

Benefits

- Optical interface with ST connectors for connection to the protection device
- Radius: 1.5 km at 62.5/125 μm , multimode fiber-optic cable between CC-CO and the protection device
- Pilot wire radius: typically: 12 km; cascaded: 12 km + 12 km = 24 km
- Electrical interface to the pilot wire (line) with 2 screw terminals; 5 kV insulated
- Synchronous data exchange with the SIPROTEC 4 devices 7SD52, 7SD53, 7SD61, 7SA52, 7SA6, and all SIPROTEC 5 devices such as the 7SD8, 7SA8, and 7SL8 to pilot wire (CC-CO version -0AC02)
- Asynchronous data exchange for the 7SD51, 7XV5653, or other devices with an asynchronous interface (CC-CO version -0AC03)
- Loop test function can be selected using jumpers in the CC-CO
- Main Unit or Secondary Unit operation of the CC-CO can be selected using a jumper (1 Main Unit and 1 Secondary Unit at the end of the pilot wire required; default setting: Main Unit operation)
- Wide-range power-supply unit with self-monitoring and signaling contact



[ph_7XV5662-0AC00_2_...]

Figure 3.5/13 Communication Converter 7XV5662-0AC02 for Pilot Wires

Functions

The protection device is optically connected to the communication converter, which enables interference-free data transmission between the communication converter and the protection device. The communication converter is located close to the pilot wire. It converts serial data from the protection device into a frequency-modulated signal. This signal is transmitted via a pair of copper wires of a pilot wire/communication line (bidirectional, full duplex).

Using jumpers, one device is defined as the Main Unit and the other device as the Secondary Unit. In a "training" session during commissioning, the electrical properties of the pilot wires are measured by pressing a Reset key and the communication converters are set to these properties.

The measured properties are used as parameters that must be maintained for optimal data transmission. The digital data transmission enables a low degree of insulation on the pilot wires because no high voltages are created on the pilot wires under short-circuit conditions.

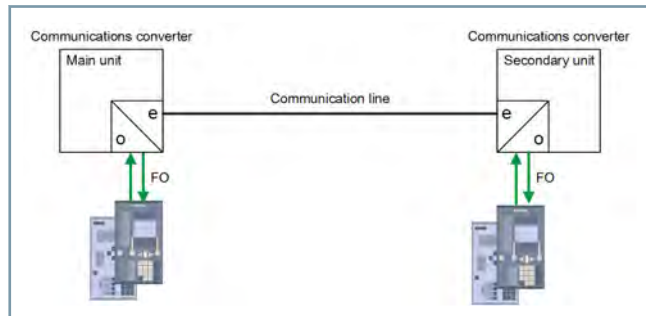
The data between the protection devices is transmitted on the basis of a point-to-point connection; in addition, it is a synchronous, bit-transparent transmission. Thanks to the telegram-buffered data exchange, an operating error cannot occur.

Applications

The communication converter can be used for 2 applications. One application is synchronous, serial data exchange (converter version: 0AC02) between SIPROTEC 4/5 differential protection devices (7SD52, 7SD6, 7SD8, and 7SL8) and/or serial permissive overreach transfer trip scheme logic between SIPROTEC 4/5 distance protection devices (7SA6, 7SA52, and 7SA8). The protection devices must be equipped with an optical 820 nm FO5 plug-in module or USART-AD-1FO or USART-AE-2FO.

Another application is the transmission of asynchronous serial data via pilot wires to the line differential protection device 7SD51 or the binary signal transmitter 7XV5653. Other serial devices can also be used.

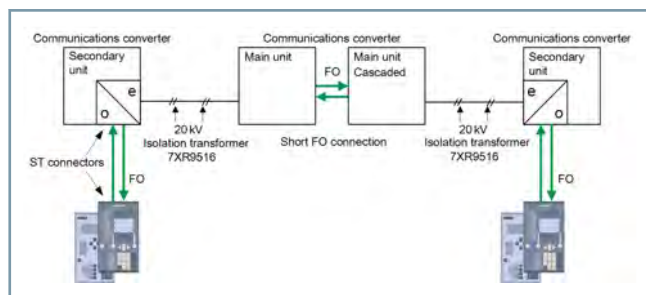
Application Examples



[dw_appl_synchron-serial-data-exchange_3_en_US]

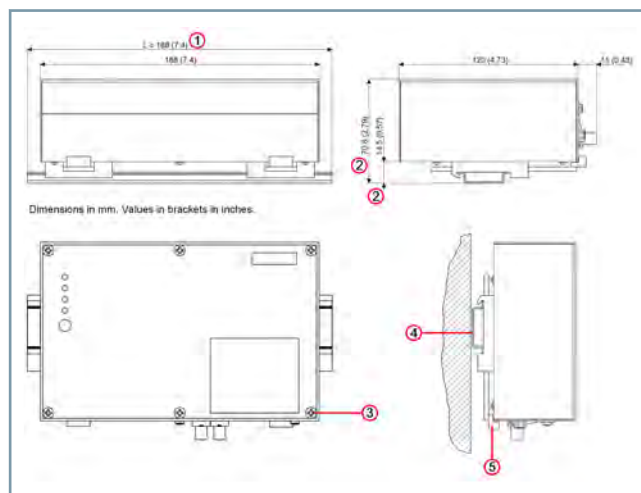
Figure 3.5/14 Application Example 1: Typical Design of a Communication Path

If the maximum distance between protection devices is greater than can be spanned by 2 CC-COs, the converters can be cascaded (see application example 2). A power supply is needed between the 2 Main Unit devices. If the insulation degree is greater than 5 kV (through the pilot wire inputs of the devices), external isolating transformers can be used at both ends. These isolating transformers provide 20 kV of isolation voltage and help to avoid dangerously high voltages at the inputs of the CC-COs that could be caused by a short circuit of a parallel high-power line.



[dw_appl_synchron-serial-data-exchange_01_3_en_US]

Figure 3.5/15 Application Example 2: Cascading of CC-COs



[dw_Dimensions_7XV5662-0AC01_2_en_US]

Figure 3.5/16 Dimensions CC-CO

- (1) Minimum length of the DIN rail
- (2) Applies to the DIN EN 60715 rail; TH 35 x 7.5
- (3) Phillips screw
- (4) A DIN rail mounted on the wall (not included in the scope of supply)
- (5) Release device

Supply Voltage via a Wide-Range Power-Supply Unit

Auxiliary voltage – direct voltage	DC 24 V to 250 V
Permissible voltage range	DC 19 V to 300 V
Power consumption	< 4 W
Permissible AC ripple voltage, Peak-peak	≤ 12 % at the rated voltage, IEC 60255-1
Stored-energy time for outage/short circuit of the auxiliary voltage	≥ 50 ms

Auxiliary voltage – alternating voltage	AC 110 V to 230 V, 50 Hz/60 Hz
Permissible voltage range	AC 99 V to 253 V
Power consumption	< 10 VA
Connection	2-pole screw terminal

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Signal Relay (DOK)(Life Contact)

Contact	1 change-over contact
Switching power	
– ON	1000 W, 1000 VA
– OFF	30 VA; 40 W ohmic
Contact voltage	250 V
Permissible current per contact	5 A continuously, 30 A for 0.5 s

Unsuitable for isolating supply voltages	
Connection	3-pole screw terminal

Terminals for Auxiliary Voltage (DOK)(Life Contact), and Line

Rated line cross-section	0.2 mm ² to 2.5 mm ² solid, 0.25 mm ² to 1.5 mm ² with boot-lace ferrule
Stripped length	9 mm
Tightening torque	0.4 Nm to 0.5 Nm

Internal Fuses

Not interchangeable	T 1.6 A at AC 250 V acc. to IEC 60127
Not interchangeable, secondary	F 2 A at AC 125 V acc. to UL 248-14

You can find additional technical data in the manual under:

www.siemens.com/accessories

Selection and Ordering Data

Description	Order no.												
	1	2	3	4	5	6	7	8	9	10	11	12	
Communication converter for pilot wires	7	X	V	5	6	6	2	-	0	A	C	0	□
													▲
For synchronous operation with 7SA52,7SA6,7SD52/53/61, all SIPROTEC 5 device types possible, like the 7SD8/A8/L8													2
For asynchronous operation with 7SD51, 7XV5653, 7XV5673 and other devices with an asynchronous serial interface													3
Converter for synchronous or asynchronous serial coupling of protection devices with optical input and ST connectors.													
For conventional two-wire control lines													
5-kV isolation of the devices' analog outputs from the two-wire control lines.													
Connection to the protection device via fiber-optic cable at 62.5/125 μm and 820 nm wavelength													
max. distance: 1.5 km, ST connectors													
synchronous serial transmission rate: 128 Kbps													
Asynchronous serial transmission rate: max. 38.4 Kbps													

7XV5662-0AD

Description

The communication converter CC-2M is used for serial data transmission over long distances via a communication network. It converts synchronous or asynchronous serial signals from an optical 820-nm input to the inputs LWL1 and LWL2 to a network interface and transmits these signals back via the interfaces of the remote terminal unit. LWL1 and LWL2 can have their parameters set independently for either synchronous or asynchronous operation. However, both ends must be set to the same operating mode.

In synchronous operation, the interface should be used only for the exchange of protection data from the SIPROTEC 4/5 differential protection 7SD5/7SD6/7SD8 or from the SIPROTEC 4/5 distance protection 7SA52/7SA6/7SA8/7SL8. Their default setting is for 512 Kbps.

In asynchronous operation, the interface can be used for connecting devices with baud rates between 1.2 and 115.2 Kbps. Another asynchronous electrical RS232 interface is available for a maximum of 115.2 Kbps. It is used to connect a serial PC interface with DIGSI and thus as the operational interface to SIPROTEC devices at the opposite end.

The G.703.6 network interface is designed as a 4-pole screw terminal and can be configured as a 2-Mbps interface according to the European format E1 or as a 1.544-Mbps interface in the American format T1.

All device settings are made using jumpers so that no special PC software is necessary.

Benefits

- Interference-free protection data transmission from 2 independent serial data signals, selectable either in synchronous or asynchronous operation.
- PC interface for device operation at the opposite end



[ph_7XV5662-0AD00, 1, ...]

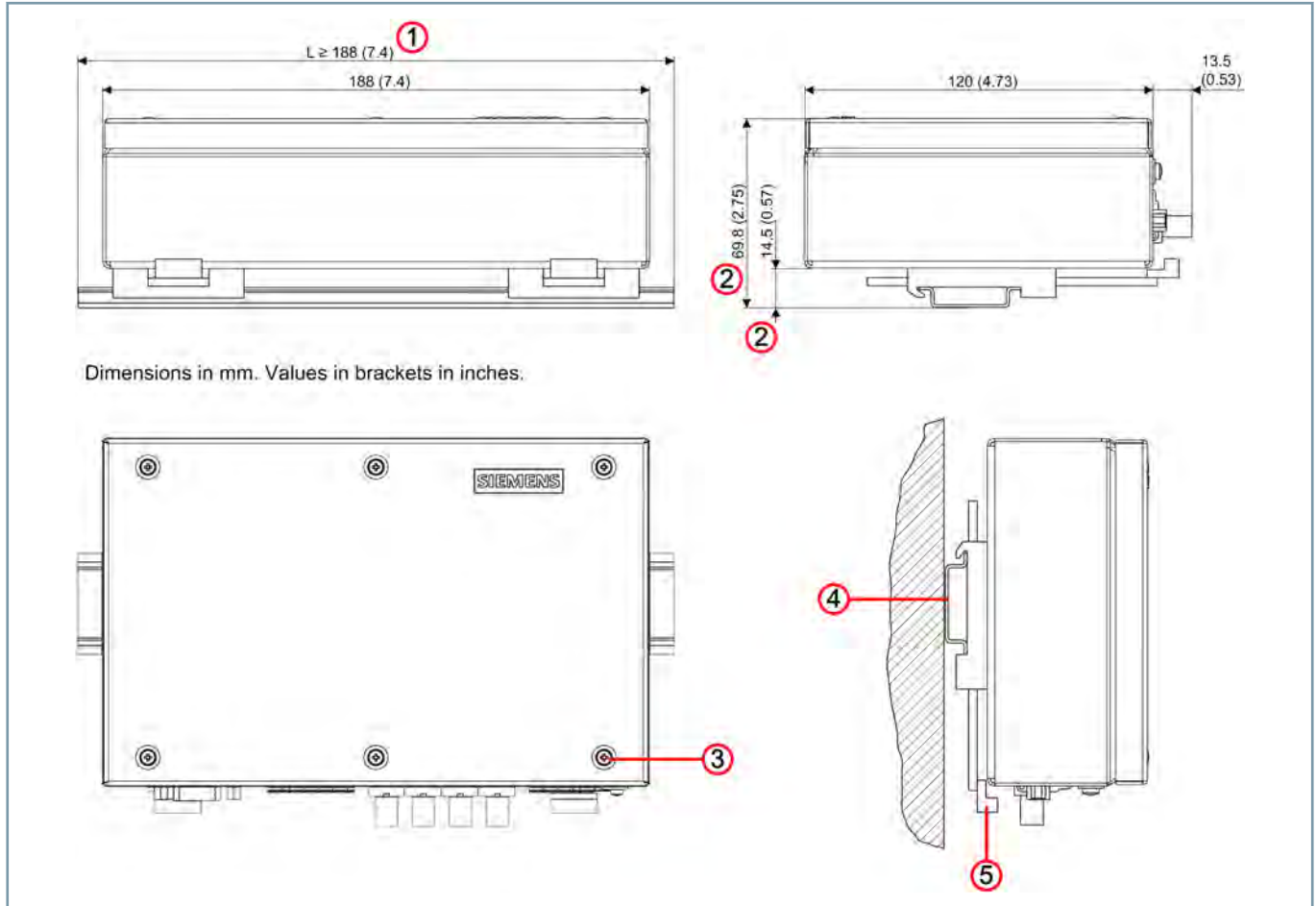
Figure 3.5/17 Communication Converter 7XV5662-0AD00 – G.703.6

- Network interface in format E1 or T1 for connection to a multiplexer
- Wide-range power-supply unit of DC 24 V to 250 V and AC 115 V to 230 V with fail-safe relay
- Display of data exchange via an LED
- Integrated commissioning aid (loop test)

Communication

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Dimensional Drawing



[dw_Dimensions_7XV5662-0AD00-DD_2_en_US]

Figure 3.5/18 Dimensions: Communication Converter 7XV5662-0AD

- (1) Minimum DIN-rail length
- (2) The dimensional drawing applies to the DIN EN 60715 DIN rail; TH 35 x 7.5
- (3) Phillips screw
- (4) A DIN rail mounted on the wall (not included in the scope of supply)
- (5) Release device

Technical Data

Connections	
Optical fiber 1/2	ST connector / 820 nm for 50 / 125 μm or 62.5 / 125 μm multimode fiber-optic cable (max. 1.5 km)
RS232	for asynchronous connection from 1.2 to 115.21 Kbps
Power supply	2-pole screw terminal

Connections	
Fail-safe relay	3-pole screw terminal with break contact/ make contact
Network E1/T1	4-pole screw terminal or BNC connector

Housing	
Aluminum housing	188x56x120 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 Power Supply Unit, 24 to 250 VDC and 115/230 VAC, 50/60 Hz	

You can find additional technical data in the manual under:
www.siemens.com/accessories

4 LEDs	
Green	Power supply
Red	Fault display
2 × yellow	Data Transfer

Selection and Ordering Data

Description	Order no.												
	1	2	3	4	5	6	7	8	9	10	11	12	
2-channel serial communication converter	7	X	V	5	6	6	2	-	0	A	D	0	<input type="checkbox"/>
													▲
Connection from the multiplexer to the E1/T1 network interface via 4-pole screw terminal													0
Connection from the multiplexer to the E1/T1 network interface via BNC connector													1
2 independent serial optical input channels with ST connectors for 820 nm, for multimode optical fiber, for max. 512/115.2 Kbps for synchronous/asynchronous data.													
1 electrical serial RS232 interface with max. 115.2 Kbps designed as 9-pole D-SUB socket for connection to DIGSI cable 7XV5100													
Wide-range Power Supply Unit, 24 to 250 VDC and 115/230 VAC													
1 current signaling contact for auxiliary voltage faults or loss of data connection													
LED for data transmission display													
All settings via jumpers in the device (configured for E1) and synchronous serial optical fiber inputs													
For synchronous operation with 7SA52,7SA6,7SD52/53/61, all SIPROTEC 5 device types possible, like the 7SD8/A8/L8													
For asynchronous operation with 7SD51, 7XV5653, 7XV5673 and other devices with an asynchronous serial interface													