

# Communication

## Cables – USB-RS485 Converter Cable

### 7XV5710

#### Description

The USB converter cable 7XV5710 with its special pin assignment, enables the temporary connection of up to 31 Siemens protection devices with an electrical RS485 interface to a PC with a USB interface for direct or central control using DIGSI 4.

The converter is connected directly to the PC via the standard USB connector (type A). The RS485 connector (9-pole D-sub male) can be connected directly to SIPROTEC 4 devices with RS485 interface modules. To connect individual compact devices with the RS485 interface to terminals, the adaptor 7XV5103-2AA00 or -3AA00 is needed. The converter can also be connected to the bus system 7XV5103 using the included gender changer (Bu-Bu) enabling communication with all devices connected to the bus. As the cable has a switchable bus termination, it can be connected at one of the ends or even in the middle of the bus. The converter is supplied with power via the USB interface of the PC.

#### Benefits

- Compact connector housing
- USB 2.0/1.1 interface type A
- RS485 interface 9-pole D-sub
- Max. bus length: 800 m
- Load resistors, connectible
- Baud rates: 300 Bd to 115 kBd
- Data Transfer Display (Data LED)
- Protocol transparency (not for PROFIBUS)
- Power supply via the USB connector (no galvanic separation)
- Compatible with the 7XV5103 bus system (with the 9-pole Bu/Bu gender changer)

#### Data Transfer

Before using the converter cable for the first time, a USB driver must be installed from the included CD. The driver creates a new virtual COM port that can then be selected in the application used, for example, DIGSI 4. The converter works on the master/slave principle in the half-duplex process.

In the idle state, the USB interface is inactive and the RS485 interface is set to receive. For communication, the PC, operating as the master, sends its data to the USB interface which, in turn, sends the data from the converter to the RS485 interface to the protection device (slave). After this, the RS485 interface is again set to receive. Data coming from the protection are now transferred by the converter in the other direction to the USB interface and to the PC. A data LED indicates when data transmission is active.



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Figure 3.1/4 USB RS485 Converter Cable 7XV5710

#### Connection of the Compact Devices using Terminals (without the Bus Cable 7XV5103)

A shielded and twisted cable (STP) is to be used for the RS485 bus. The conductor cross-section must be suitable for terminating with ring-type lugs or D-SUB connectors. The protection devices are connected to the bus in series (not in star or ring topology). The individual wires protruding from the screen should be kept as short as possible.

The screen is to be connected at both ends to the housing ground. A 220-ohm load resistor is connected to the last protection device between the data circuits A and B.

#### Connecting the RS485 Bus

The RS485 bus is a two-conductor bus (half-duplex) and up to 32 devices (participants) can exchange their data on the bus according to the master/slave principle. All devices are connected to the bus in series (not in the star or ring topology). A 220-ohm load resistor is connected to the first and last device between Pin 3 (A) and Pin 8 (B), regardless of whether this is a master or slave device.

The SIPROTEC protection devices are preferably connected to the bus has slave devices downstream of a master, for example, RS484 converter 7XV5710 or 7XV5650/51. With these converters (1st device), the load resistor can be implemented using DIL switches (S1, S2) via additional pull-up/pull-down resistors. The low-resistance pull-up/pull-down resistors are absolutely necessary in various SIPROTEC bus applications, that is, the use of other converters might cause problems.

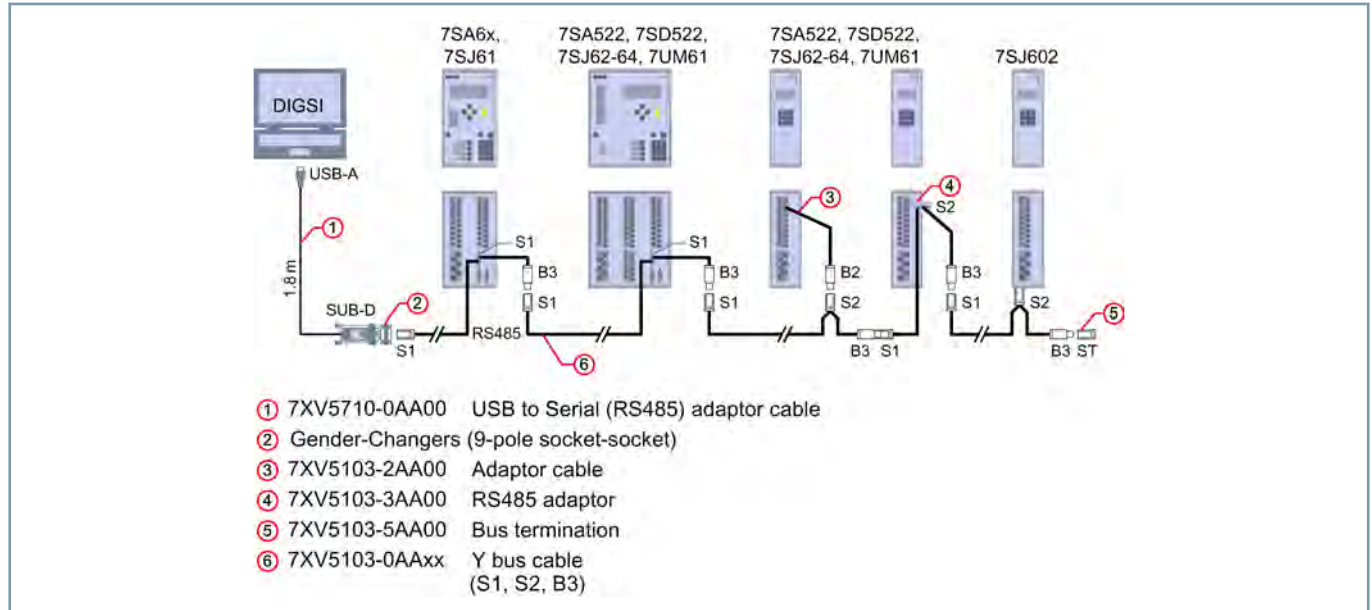
In the protection devices, the load resistor may only be activated in the last device on the bus and, to do this, the specially provided jumpers are to be used. If this is not possible in the device, an external load resistor, for example, 7XV5103-5AA00, is to be inserted after the last device (see [Figure 3.1/6](#)).

In this example, the load resistors of the converter cable are active (factory setting); the load resistors which some of

the protection devices have remain inactive. The bus is terminated after the last device using the bus termination connector

7XV5103-5AA00 or an external resistor (220 ohms). If the last protection device has a load resistor that can be connected, this can also be activated to terminate the bus.

### Application Example



[dw\_central\_operation\_via\_RS485-Bus, 3, en, US]

**Figure 3.1/5** Central Operation via the RS485 Bus

Several SIPROTEC 3 and 4 protection devices can be centrally operated via their interface with DIGSI using the USB converter cable 7XV510. There are corresponding cables and adaptors for SIPROTEC devices for the various connection types. You can find additional information in catalog sheet 7XV5103. SIPROTEC 4 devices with an RS485 interface can be directly connected and operated with DIGSI 4.

To connect individual compact protection devices with the RS485 interface to terminals, the adaptor cable 7XV5103-2AA00 or the adaptor 7XV5103-3AA00 is needed (see [Figure 3.1/5](#)).

The converter cable may only be used temporarily because it lacks galvanic separation. For permanent use, the optical fiber converters 7XV5652 and 7XV5650/51 should be used. The optical fiber conductor provides complete galvanic separation between the PC and the SIPROTEC devices. You will find appropriate applications under: [www.siprotec.com/accessories/7XV56](http://www.siprotec.com/accessories/7XV56)

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### Applications

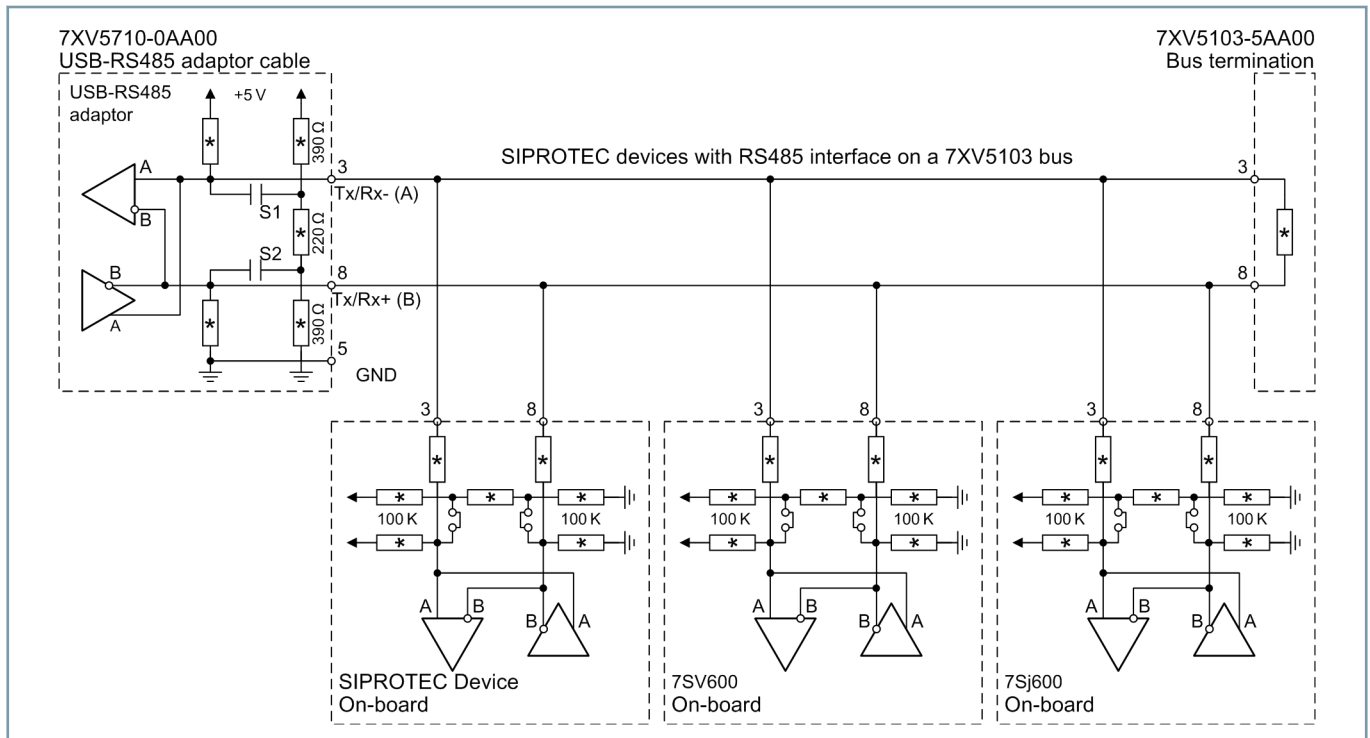


Figure 3.1/6 RS485 Bus with USB Converter Cable 7XV5710 and several SIPROTEC Devices (Block Diagram)

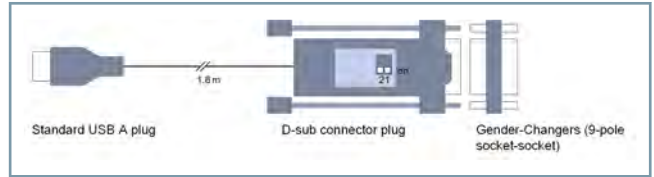
3.1

### Technical Data

Product	USB converter cable 7XV5710-0AA00
Driver	on the included CD or on the Internet under: <a href="http://www.siprotec.com/accessories/7XV5710">www.siprotec.com/accessories/7XV5710</a>
Installation	Plug & Play
Cable length	1.8 m
USB interface	virtual COM port
Connection 1	USB 2.0 (1.1) plug A
Connection 1 Pin-assignment	Connector type A, Pin 1 – Vcc Pin 2 – D- Pin 3 – D+ Pin 4 – GND
Connection 2	D-SUB 9-pole male connector with fastening screws
Connection 2 Pin-assignment	Pin 3 – Tx / Rx (A) Pin 5 – GND Pin 8 – Tx / Rx+ (B) All other pins are not connected (nc)
Load resistor	Selectable (S1, S2 ON = load resistor selected)
	+ 5 V – Pin 3 = 390 Ω Pin 3 – Pin 8 = 220 Ω Pin 8 – Pin 5 = 390 Ω

Product	USB converter cable 7XV5710-0AA00
Connection 2 protection	Receiver: ± 15 kV Human Body Model ± 6 kV IEC 1000-4-2, contact discharge ± 12 kV IEC 1000-4-2, air discharge
Permitted:	up to 128 receivers on the bus, true fail-safe receiver, -7 V to +12 V common mode operation Temperature protection against an output short circuit
Driver:	± 9 kV Human Body Model rise rate limited for healthy data transmission, -7 V to +12 V common mode operation
	Current limiting Thermal disconnection for driver overload protection
Handshake	No
TX / RX-switchover	automatic
Serial data transmission	half-duplex 2-wire
Power supply	+5 V via the USB (max. 80 mA) The module logs in to the USB at 96 mA max. 38 mA ready (converter on, no data transmission) max. 80 mA full-duplex, 4-wire operation (max. transmission rate)

Product	USB converter cable 7XV5710-0AA00
Serial transmission rates	300, 1200, 2400, 4800, 9600, 19,200, 38,400, 57,600, 115,200 bits/s
Status display	Tx and Rx – 3 mm LED red
Operating temperature	-5 to +70 °C
Driver software	Windows 98, Windows 98 State Estimator, Windows 2000, ME, XP, Vista 32 / 64, Windows 7 32 / 64. No administrator rights required
Approval	CE compliant / RoHS compliant
Application	No permanent installation for SIPROTEC devices



[dw\_7XV5710\_USB-cable\_2\_en\_US]

**Figure 3.1/7** USB Converter Cable with Plug. Factory Setting: S1 + S2 ON = Load Resistor active Dimensions: 75 × 32 × 15 (L × W × H)

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	13	14	15	16
<b>USB – RS485 converter cable</b>	7	X	V	5	7	1	0	-	0	A	A	0	0			
1.8 m (without galvanic separation) for connecting up to 31 SIPROTEC 4 devices with RS485 interface to PC/laptop computer with USB 1.1/2.0 interface, also for SICAM P																