



Installation and Operating instructions for

## **DVI/USB extension**

### **C9900-A172/ -A173/ -A174**

**for CP68xx and CP78xx Control Panels**

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**BECKHOFF**

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# General Notes

## Notes on the documentation

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with the applicable national standards. It is essential that the following notes and explanations are followed when installing and commissioning these components.

## Liability conditions

The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

The documentation has been prepared with care. The products described are, however, constantly under development. For this reason, the documentation may not always have been fully checked for consistency with the performance data, standards or other characteristics described. None of the statements in this manual represent a guarantee for as set out in § 443 of the German Civil Code or a statement about the assumed use according to the contract as set out in § 434 para. 1 clause 1 no. 1 of the German Civil Code. In the event that it contains technical or editorial errors, we retain the right to make alterations at any time and without warning. No claims for the modification of products that have already been supplied may be made on the basis of the data, diagrams and descriptions in this documentation.

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## Description of safety symbols

The following safety symbols are used in this operating manual. They are intended to alert the reader to the associated safety instructions.



**Danger**

This symbol is intended to highlight risks for the life or health of personnel.



**Warning**

This symbol is intended to highlight risks for equipment, materials or the environment.



**Note**

This symbol indicates information that contributes to better understanding.

## Basic safety measures

*Only switch the PC off after closing the software*

**Before the Industrial PC is switched off, software that is running must be properly closed.**

Otherwise it is possible that data on the hard disk is lost. Please refer to the notes in the instruction manual for the Industrial PC.



**Warning**

**Switch off all parts of the equipment, then uncouple the fieldbus!**

Switch off all system components and uncouple the Industrial PC from the system before opening the PC case and whenever the PC is not used for control purposes, e.g. during installation of the PCI bus transmitter card.

Pulling out the fieldbus connection plug uncouples the PC (optional).

Items of equipment that have been switched off must be secured against being switched on again.



**Warning**

**Uncouple the supply voltage before opening Industrial PC, Control Panel or DVI/USB extension module cases!**



**Note**

**Do not exchange any parts when under power!**

When components are being fitted or removed, the supply voltage must be switched off.

Assembly work can cause damage:

- If metal objects such as screws or tools fall onto operating circuit boards.
- If internal connection cables are unplugged or plugged in during operation.
- If plug-in cards are removed or inserted when the PC is switched on.

## Operator's obligation to exercise diligence

The operator must ensure that

- the DVI/USB extension is used appropriately (see also Section [Product Description](#)).
- the Industrial PC, Control Panel and DVI/USB extension are only operated in sound, operational condition;
- the instruction manual is always available on site complete and in legible condition;
- only adequately qualified and authorized staff operate the components;
- the personnel is instructed regularly about relevant occupational safety and environmental protection aspects, and is familiar with the operating manual and in particular the safety notes contained herein.
- no safety and warning notes are removed, and all notes remain legible.

*National regulations depending on the machine type*

Depending on the type of machine and plant in which the DVI/ USB-extension is being used, there will be national regulations for the control of such machines and plant that the operator must observe. These regulations cover, amongst other things, the intervals between inspections of the controller.

The operator must initiate such inspections in good time.

*Procedure in the event of a fault*

In the event of a fault with the DVI/USB extension please refer to the list in Section [Fault correction](#) for appropriate measures.

## Operator requirements

*Read the operating instructions*

All users of the DVI/USB extension must read this instruction manual.

# Product Description

## Appropriate Use

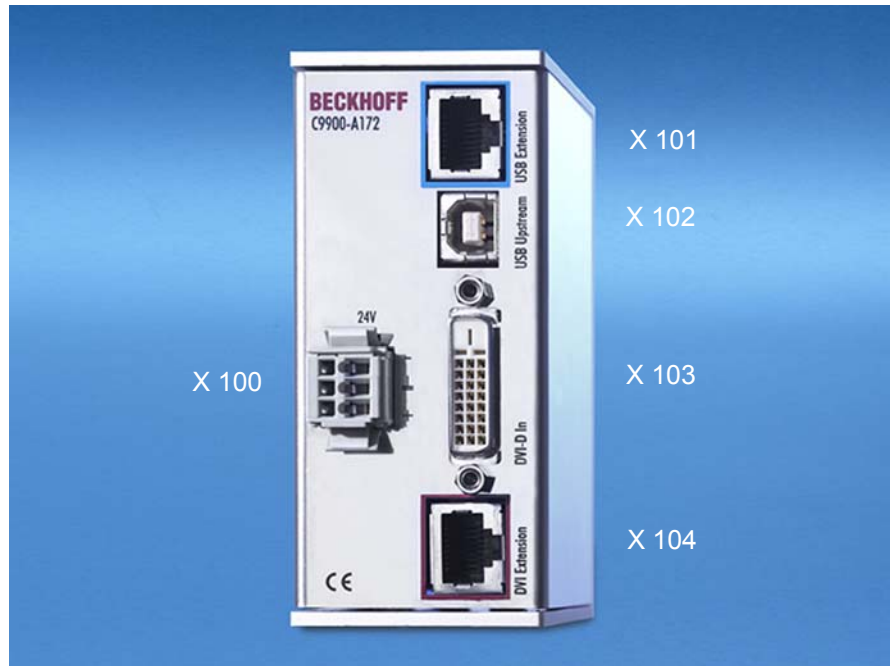
The DVI/USB extension can be used to operate CP68xx and CP78xx series Control Panels up to a distance of 31 meters from the Industrial PC.

*Do not use the modules in potentially explosive atmospheres*

**The modules must not be used in potentially explosive atmospheres.**

## Transmitter modules connections

Connections of the C9900-A172 transmitter module



### Pin assignment

X 100  
power supply



WAGO 734-103/ 037-000

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 1   | 0 V    | 3   | + 24 V |
| 2   | GND    |     |        |

X 101  
USB Extension



RJ-45 connector (Ethernet 10/ 100 Mbit)

| Pin     | Signal | Pin | Signal |
|---------|--------|-----|--------|
| Housing | Screen | 5   | n.c.   |
| 1       | TD +   | 6   | RD -   |
| 2       | TD -   | 7   | n.c.   |
| 3       | RD +   | 8   | n.c.   |
| 4       | n.c.   |     |        |

X 102  
USB Upstream



USB PCB-installation B-Type  
(FCI 61729-0010B USB Receptacle B-Type)

| - | Signal | Pin | Signal |
|---|--------|-----|--------|
| 1 | 5V     | 3   | D +    |
| 2 | D-     | 4   | GND    |

**X 103**  
DVI-D In



DVI-D 3 X 8-pole digital  
(MOLEX 74320-9000 / 74320-9004)

| Pin | Signal  | Pin | Signal   |
|-----|---------|-----|----------|
| 1   | Rx2-    | 13  | Rx3+     |
| 2   | Rx2-    | 14  | + 5V DVI |
| 3   | GND     | 15  | GND      |
| 4   | Rx4-    | 16  | HPD      |
| 5   | Rx4+    | 17  | Rx0-     |
| 6   | DDC CLK | 18  | Rx0+     |
| 7   | DDC DAT | 19  | GND      |
| 8   | AV SYNC | 20  | Rx5-     |
| 9   | Rx1-    | 21  | Rx5+     |
| 10  | Rx1+    | 22  | GND      |
| 11  | GND     | 23  | RxC+     |
| 12  | Rx3-    | 24  | RxC-     |

**X 104**  
DVI Extension



RJ-45 connector (Ethernet 10/ 100 Mbit)

| Pin     | Signal | Pin | Signal |
|---------|--------|-----|--------|
| Housing | Screen | 5   | n.c.   |
| 1       | TD +   | 6   | RD -   |
| 2       | TD -   | 7   | n.c.   |
| 3       | RD +   | 8   | n.c.   |
| 4       | n.c.   |     |        |

## Connector description

### Power supply

*Power supply*

The cage clamp socket (**X 100**) is used to supply power to the DVI/USB extension.

### USB data transfer

*USB Extension*

The USB extension connection (**X 101**) is used for transferring the USB signal from the transmitter module to the receiver module.

### USB input

*USB Upstream*

The USB1.1 input (**X 102**) is used to connect the transmitter module with the Industrial PC.  
USB1.1 standard with a maximum data rate of 1.5 or 12 Mbps is supported.

### DVI input (Digital Visual Interface)

*DVI-D In*

The DVI connection (**X 103**) is used for transferring the video signal from the Industrial PC to the transmitter module.  
The purely digital part (DVI-D) is supported.

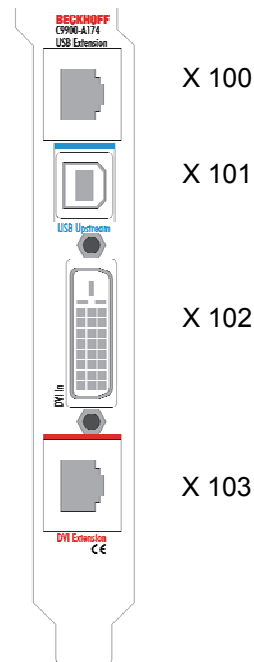
### DVI data transfer

*DVI Extension*

The DVI extension connection (**X 104**) is used for transferring the DVI signal from the transmitter module to the receiver module.

## Transmitter plug-in card connections

Connections for the  
C9900-A174  
PCI bus transmitter plug-in  
card



### Pin assignment

X 100  
USB Extension



RJ-45 connector (Ethernet 10/ 100 Mbit)

| Pin     | Signal | Pin | Signal |
|---------|--------|-----|--------|
| Housing | Screen | 5   | n.c.   |
| 1       | TD +   | 6   | RD -   |
| 2       | TD -   | 7   | n.c.   |
| 3       | RD +   | 8   | n.c.   |
| 4       | n.c.   |     |        |

X 101  
USB Upstream



USB PCB-installation B-Type  
(FCI 61729-0010B USB Receptacle B-Type)

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 1   | 5V     | 3   | D+     |
| 2   | D-     | 4   | GND    |

X 102  
DVI-D In



DVI-D 3 X 8-pole digital  
(MOLEX 74320-9000 / 74320-9004)

| Pin | Signal  | Pin | Signal   |
|-----|---------|-----|----------|
| 1   | Rx2-    | 13  | Rx3+     |
| 2   | Rx2-    | 14  | + 5V DVI |
| 3   | GND     | 15  | GND      |
| 4   | Rx4-    | 16  | HPD      |
| 5   | Rx4+    | 17  | Rx0-     |
| 6   | DDC CLK | 18  | Rx0+     |
| 7   | DDC DAT | 19  | GND      |
| 8   | AV SYNC | 20  | Rx5-     |
| 9   | Rx1-    | 21  | Rx5+     |
| 10  | Rx1+    | 22  | GND      |
| 11  | GND     | 23  | RxC+     |
| 12  | Rx3-    | 24  | RxC-     |

X 103  
DVI Extension



RJ-45 connector (Ethernet 10/ 100 Mbit)

| Pin     | Signal | Pin | Signal |
|---------|--------|-----|--------|
| Housing | Screen | 5   | n.c.   |
| 1       | TD +   | 6   | RD -   |
| 2       | TD -   | 7   | n.c.   |
| 3       | RD +   | 8   | n.c.   |
| 4       | n.c.   |     |        |



## Connector description

### USB data transfer

#### *USB Extension*

The USB extension connection (**X 100**) is used for transferring the USB signal from the transmitter module to the receiver module.

### USB input

#### *USB Upstream*

The USB1.1 input (**X 101**) is used to connect the transmitter module with the Industrial PC.  
USB1.1 standard with a maximum data rate of 1.5 or 12 Mbps is supported.

### DVI input (Digital Visual Interface)

#### *DVI-D In*

The DVI connection (**X 102**) is used for transferring the video signal from the Industrial PC to the transmitter module.  
The purely digital part (DVI-D) is supported.

### DVI data transfer

#### *DVI Extension*

The DVI extension connection (**X 103**) is used for transferring the DVI signal from the transmitter module to the receiver module.

## Receiver module connections

Connections of the receiver module  
C9900-A173



### Pin assignment

X 100  
power supply



WAGO 734-103/ 037-000

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 1   | 0 V    | 3   | + 24 V |
| 2   | GND    |     |        |

X 101  
USB Extension



RJ-45 connector (Ethernet 10/ 100 Mbit)

| Pin     | Signal | Pin | Signal |
|---------|--------|-----|--------|
| Housing | Screen | 5   | n.c.   |
| 1       | TD +   | 6   | RD -   |
| 2       | TD -   | 7   | n.c.   |
| 3       | RD +   | 8   | n.c.   |
| 4       | n.c.   |     |        |

X 102  
USB Downstream



USB PCB-installation A-Type  
(FCI 72309-0010B USB Receptacle A-Type)

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 1   | 5V     | 3   | D+     |
| 2   | D-     | 4   | GND    |

X 103  
DVI-D Out



DVI-D 3 X 8-pole digital  
(MOLEX 74320-9000 / 74320-9004)

| Pin | Signal  | Pin | Signal   |
|-----|---------|-----|----------|
| 1   | Rx2-    | 13  | Rx3+     |
| 2   | Rx2-    | 14  | + 5V DVI |
| 3   | GND     | 15  | GND      |
| 4   | Rx4-    | 16  | HPD      |
| 5   | Rx4+    | 17  | Rx0-     |
| 6   | DDC CLK | 18  | Rx0+     |
| 7   | DDC DAT | 19  | GND      |
| 8   | AV SYNC | 20  | Rx5-     |
| 9   | Rx1-    | 21  | Rx5+     |
| 10  | Rx1+    | 22  | GND      |
| 11  | GND     | 23  | RxC+     |
| 12  | Rx3-    | 24  | RxC-     |

*X 104*  
*DVI Extension*



RJ-45 connector (Ethernet 10/ 100 Mbit)

| <i>Pin</i>     | <i>Signal</i> | <i>Pin</i> | <i>Signal</i> |
|----------------|---------------|------------|---------------|
| <b>Housing</b> | Screen        | <b>5</b>   | n.c.          |
| <b>1</b>       | TD +          | <b>6</b>   | RD -          |
| <b>2</b>       | TD -          | <b>7</b>   | n.c.          |
| <b>3</b>       | RD +          | <b>8</b>   | n.c.          |
| <b>4</b>       | n.c.          |            |               |

## Connector description

### Power supply

*Power supply*

The power supply for the Control Panel is established via the Cage clamp socket (**X 100**).

### USB data transfer

*USB Extension*

The USB extension connection (**X 101**) is used for transferring the USB signal from the transmitter module to the receiver module.

### USB output

*USB Downstream*

The USB1.1 input (**X 102**) is used to connect the receiver module with the Control Panel.  
USB1.1 standard **with a maximum data rate of 1.5 or 12 Mbps** is supported.

### DVI output (Digital Visual Interface)

*DVI-D Out*

The DVI connection (**X 103**) is used for transferring the video signal from the receiver module to the Control Panel.  
The purely digital part (DVI-D) is supported.

### DVI data transfer

*DVI Extension*

The DVI extension connection (**X 104**) is used for transferring the DVI signal from the transmitter module to the receiver module.

# Installation Instructions

Please also refer to chapter [General Notes](#).

## Transport and Unpacking

The specified storage conditions must be observed (see chapter [Technical data](#)).

### Transport

Despite the robust design of the unit, the components are sensitive to strong vibrations and impacts. Therefore please protect the modules or the transmitter card from strong mechanical influences during transport. Therefore, please use the original packaging.



**Warning**

Danger of damage to the unit!

When transporting the devices in cold weather or during strong temperature fluctuations, condensation on or in the devices should be avoided.

Adjust the devices slowly to room temperature before switching them on. If condensation has formed, wait for approx. 12 hours before switching the devices on.

### Unpacking

Unpack the devices as follows:

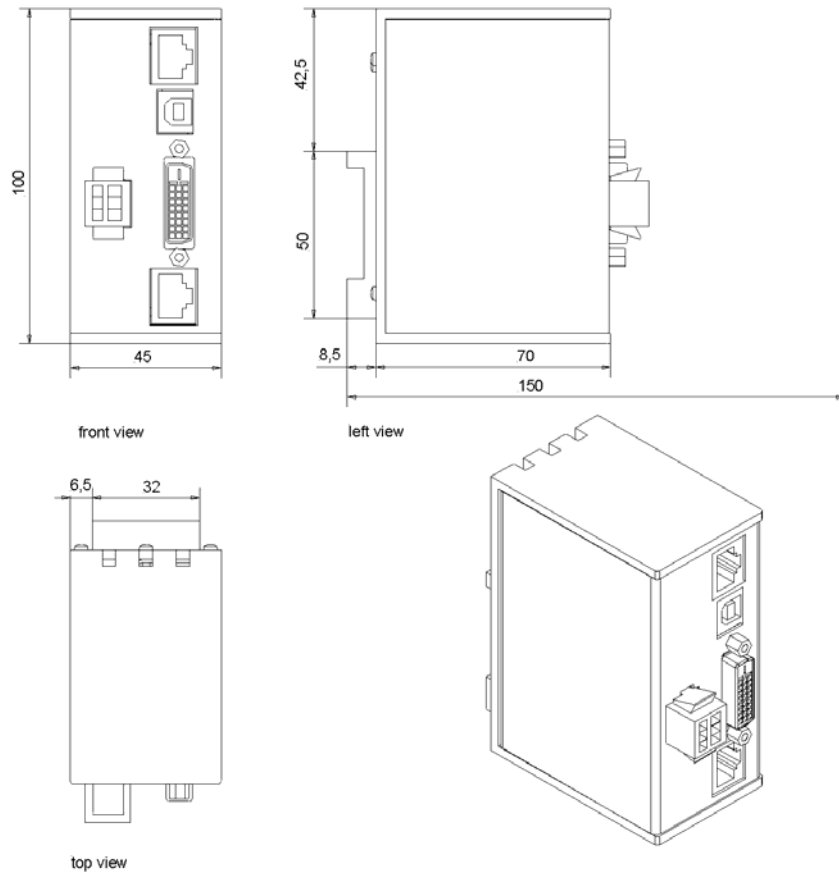
1. Remove packaging.
2. Do not discard the original packaging. Keep it for future relocation.
3. Check the delivery for completeness by comparing it with your order.
4. Please keep the associated paperwork. It contains important information for handling the unit.
5. Check the contents for visible shipping damage.
6. If you notice any shipping damage or inconsistencies between the contents and your order, you should notify Beckhoff Service.

# Assembly

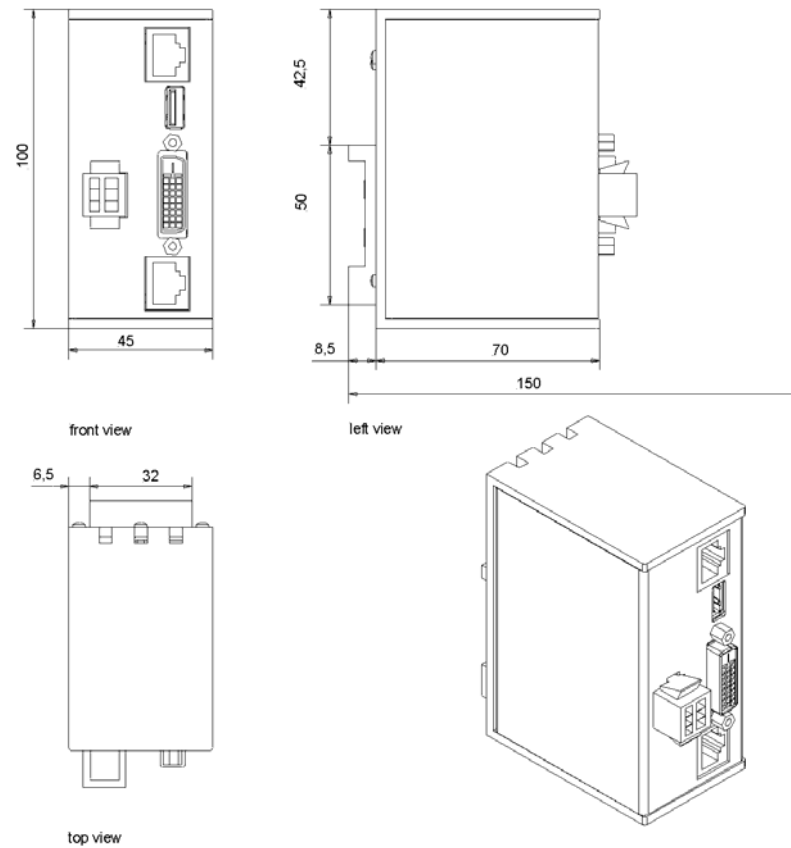
## Assembly dimensions

All dimensional notations in mm.

*Transmitter module  
C9900-A172*



*Receiver module  
C9900-A173*



## Mounting of the modules

The transmitter and receiver modules can be mounted on a top hat rail.

*Mounting of the transmitter and receiver modules*



**Warning**

*Mounting of the PCI bus transmitter card*

## Installation of the transmitter card

The mains plug of the Industrial PCs must be disconnected!

The PCI bus transmitter plug-in card is installed in the Industrial PC.

- Open the Industrial PC according to the instruction manual.
- Remove the cover of a free slot and insert the transmitter card.
- Secure the transmitter plug-in card with the Phillips screw and close the Industrial PC.

## Connecting modules/plug-in card



The connections must never be established or disconnected in potentially explosive atmospheres! Risk of explosion!

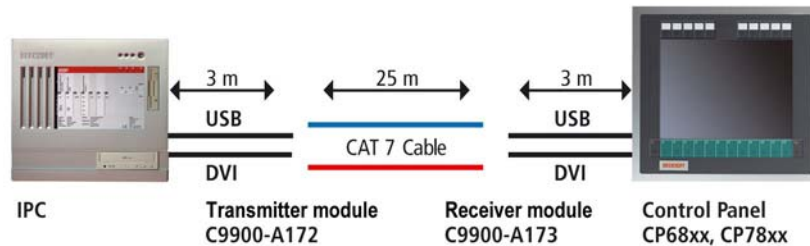
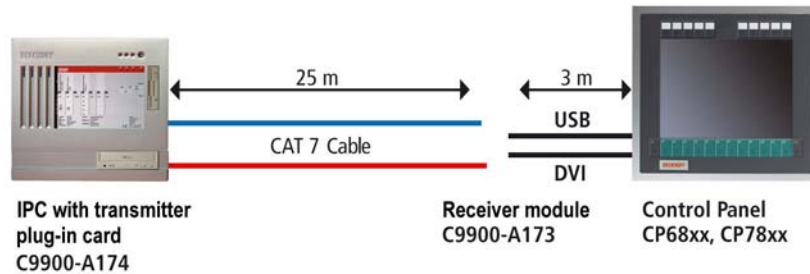
The mains plug of the Industrial PCs must be disconnected!

Please read the documentation for the external devices prior to connecting them.

During thunderstorms, plug connector must neither be inserted nor removed.

When disconnecting a plug connector, always handle it at the plug. Do not pull the cable!

### Cable lengths



### Cable sets between PC and DVI/USB transmitter

| Order number      | Denomination  |
|-------------------|---|
| <b>C9900-K260</b> | Connection set for C9900-A174 consisting of: DVI cable 0,40 m, USB cable 0,40 m |
| <b>C9900-K261</b> | Connection set for C9900-A172 consisting of: DVI cable 1,00 m, USB cable 1,00 m |
| <b>C9900-K262</b> | Connection set for C9900-A172 consisting of: DVI cable 3,00 m, USB cable 3,00 m |

### Cable sets between transmitter and receiver

| Order number      | Denomination                   |
|-------------------|--------------------------------|
| <b>C9900-K411</b> | Patch cable set RJ45 CAT7 5 m  |
| <b>C9900-K412</b> | Patch cable set RJ45 CAT7 10 m |
| <b>C9900-K413</b> | Patch cable set RJ45 CAT7 15 m |
| <b>C9900-K414</b> | Patch cable set RJ45 CAT7 20 m |
| <b>C9900-K415</b> | Patch cable set RJ45 CAT7 25 m |

## Cable sets between receiver and Control Panel

| Order number | Denomination  |
|--------------|---|
| C9900-K510   | Connection set for CP68xx consisting of:<br>DVI cable 3 m, USB cable 3 m and power supply connector                                       |
| C9900-K514   | Connection set for CP78xx consisting of:<br>DVI cable 3 m, USB cable 3 m and power supply connector; IP-65 connector at the Control Panel |

### Connecting cables

The connections are located at the front of the modules and are documented in Section [Product Description](#).

Please refer to the respective instruction manuals regarding the configuration of the connections at the Industrial PC (if a PCI bus transmitter card is used) and at the Control Panel.

When connecting cables, please adhere to the following order:

- Switch off the Industrial PC
- Disconnect the Industrial PC from the power supply
- Connect all cables at the modules, the Control Panel, and the devices to be connected
- Ensure that all screw connections (if present) between plug connectors and sockets are tight!
- Connect the DVI/USB extension modules with the 24 V power supply. The PCI bus transmitter card is supplied via the Industrial PC.
- Reconnect all devices to the power supply.

*CAT 7 cable with RJ 45 connector*

Two standard CAT 7 cables with RJ 45 connector are used for the connections between transmitter module and receiver module, and transmitter card and receiver module.



# Operation Instructions

## Functional description

*Switching on*

The transmitter and receiver modules have no dedicated mains switch. The modules are ready for operation as soon as the central 24 V power supply has been switched on.

The transmitter plug-in card is switched on via the Industrial PC.

## Servicing and maintenance

Please also refer to chapter [General Notes](#).

### Cleaning of the DVI/USB extension modules

*First switch the Industrial PC off*

Switch off the Industrial PC and all connected devices. Disconnect the modules from the 24 V power supply.

The module cases can be cleaned with a damp, soft cloth. Do not use any aggressive cleaning materials, thinners, scouring material or hard objects that could cause scratches.

### Servicing

The transmitter and receiver modules and the transmitter plug-in card are maintenance-free.

## Emergency procedures

In the event of a fire use powder or nitrogen as extinguishing medium for the modules.

## Shutting down

### Disposal

*Modules should be dismantled*

For disposal the modules should be fully dismantled. The housing can be sent for metal recycling.

*Observe national electronics scrap regulations*

Electronic parts must be disposed of in accordance with national electronics scrap regulations.

# Troubleshooting

Please also refer to chapter [General Notes](#).

## Fault correction

| Fault   | Cause  | Procedures  |
|---|--|---|
| The control panel shows no function when the Industrial PC has been started | Cable not connected or connected incorrectly<br><br>No power supply<br><br>Fault in the Industrial PC or Control Panel | 1. Correctly connect cable<br>2. Call Beckhoff Service<br><br>Check power supply cable<br><br>Please refer to the troubleshooting sections in the respective operating instructions |

## Service and Support

Beckhoff and their partners around the world offer comprehensive service and support, making available fast and competent assistance with all questions related to Beckhoff products and system solutions.

### Beckhoff's branch offices and representatives

Please contact your Beckhoff branch office or representative for [local support and service](#) on Beckhoff products!

The addresses of Beckhoff's branch offices and representatives round the world can be found on her internet pages:

<http://www.beckhoff.com>

You will also find further [documentation](#) for Beckhoff components there.

### Beckhoff headquarters

Beckhoff Automation GmbH  
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D-33415 Verl  
Germany

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Fax: +49(0)5246/963-198  
e-mail: [info@beckhoff.com](mailto:info@beckhoff.com)

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- world-wide support
- design, programming and commissioning of complex automation systems
- and extensive training program for Beckhoff system components

Hotline: +49(0)5246/963-157  
Fax: +49(0)5246/963-9157  
e-mail: [support@beckhoff.com](mailto:support@beckhoff.com)

### Beckhoff Service

The Beckhoff Service Center supports you in all matters of after-sales service:

- on-site service
- repair service
- spare parts service
- hotline service

Hotline: +49(0)5246/963-460  
Fax: +49(0)5246/963-479  
e-mail: [service@beckhoff.com](mailto:service@beckhoff.com)

*Quote the project number*

If servicing is required, please quote the **project number** of your Industrial PC.

# Appendix

## Technical data

|  |  |
|--|--|
| <i>Dimensions</i>  | <b>Dimensions (W x H x D):</b> see section <a href="#">Assembly dimensions</a>   |
| <i>Operation in areas that are subject to explosion hazard</i> | <b>The modules must not be used in potentially explosive atmospheres.</b>  |
| <i>Environmental conditions</i>                                | <b>The following conditions must be observed during operation:</b><br><b>Ambient temperature:</b> 0 to 55°C<br><b>Atmospheric humidity:</b> Maximum 95%, non-condensing  |
| <i>Shock resistance</i>  | <b>Sinusoidal vibration:</b><br><b>(EN 60068-2-6)</b> 10 to 58 Hz: 0.035 mm<br>58 to 500 Hz: 0.5 G (~ 5 m/ s <sup>2</sup> )<br><b>Impact:</b><br><b>(EN 60068-2-27/ 29)</b> 5 G (~ 50 m/ s <sup>2</sup> ), duration: 30 ms   |
| <i>Protection class</i>  | <b>Modules:</b> IP20   |
| <i>Power supply</i>  | <b>Supply voltage:</b> The modules have an integrated 24 V power supply unit.<br>The PCI bus transmitter plug-in card is supplied via the Industrial PC.<br><br><b>Power consumption:</b> C9900-A172: 0,4 W<br>C9900-A173: 2,0 W   |
| <i>EMC compatibility</i>                                       | <b>Resistance to interference:</b> conforms to EN 61000-6-2<br><b>Emission of interference:</b> conforms to EN 61000-6-4   |
| <i>Transport and storage</i>                                   | The same values for atmospheric humidity and shock resistance are to be observed during transport and storage as in operation. The shock resistance of the modules/transmitter card during transport can be improved through suitable packaging. The ambient temperature during storage and transport must be between -20°C and +65°C. |

## Approvals

### FCC: Federal Communications Commission Radio Frequency Interference Statement

*FCC Approval for USA*

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

### FCC: Canadian Notice

*FCC Approval for Canada*

This equipment does not exceed the Class A limits for radiated emissions as described in the Radio Interference Regulations of the Canadian Department of Communications.