Installation and Operating instructions for

DVI/USB extension

C9900-A172/ -A173/ -A174

for CP68xx and CP78xx Control Panels

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 be 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
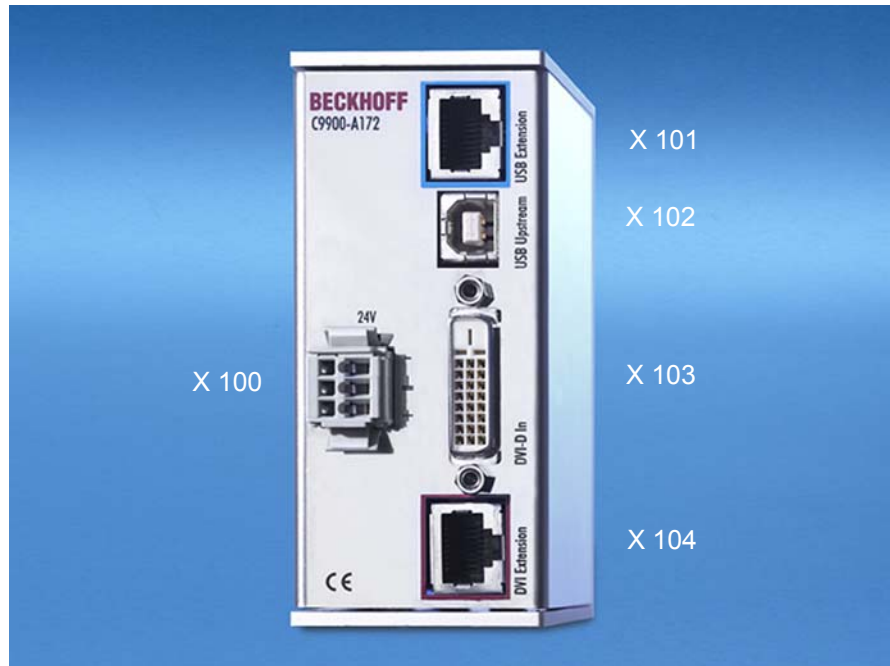
Pin assignment

*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.
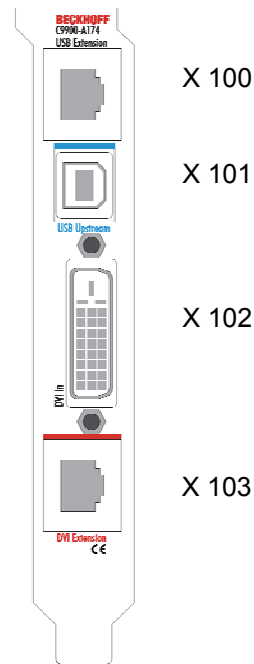The purely digital part (DVI-D) is supported.

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

X 100

X 101

X 102

X 103

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-

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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 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.
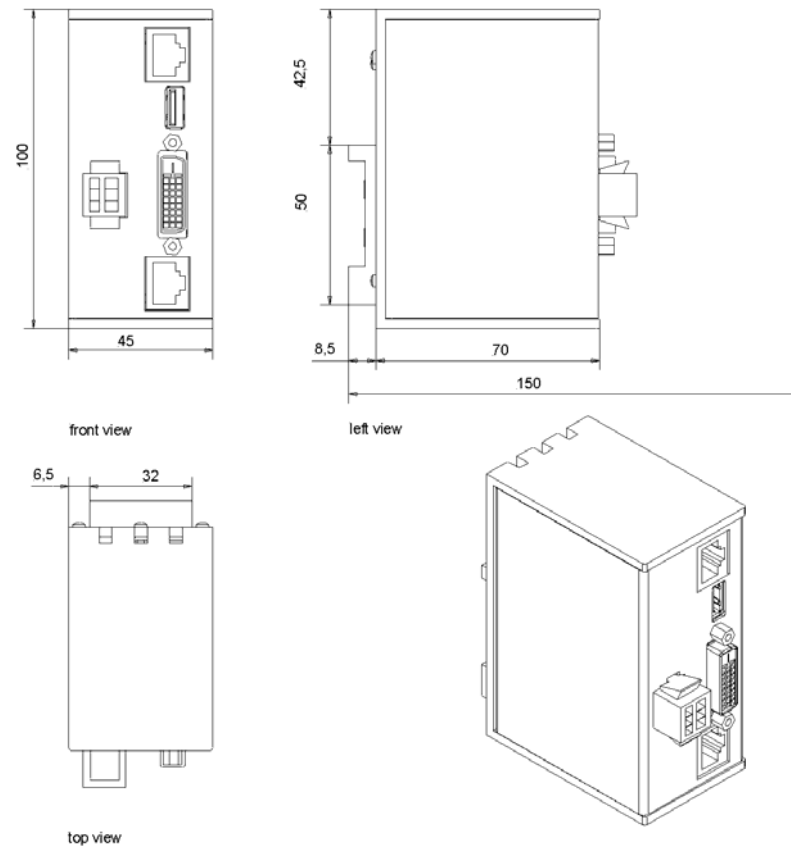
Assembly

Assembly dimensions

All dimensional notations in mm.

Transmitter module
C9900-A172

front view

left view

top view

Receiver module
C9900-A173

front view

left view

top view
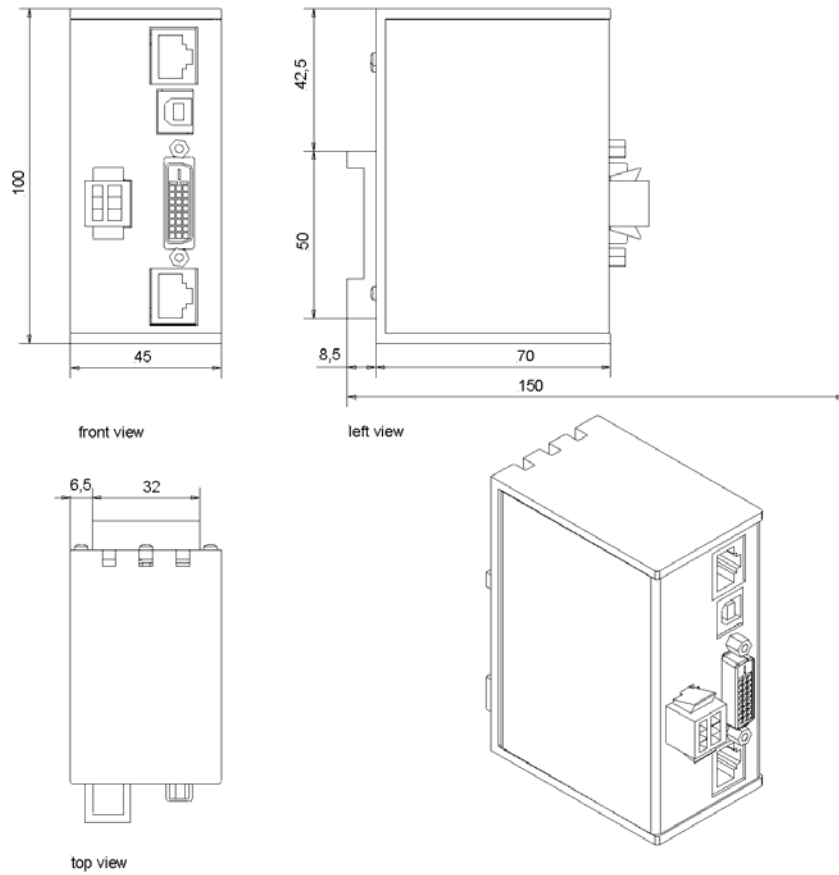
Mounting of the modules

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

Mounting of the transmitter and receiver modules

Installation of the transmitter card

The mains plug of the Industrial PCs must be disconnected!

⚠️ *Warning*

Mounting of the PCI bus transmitter card

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.

⚠ Danger

⚠ Warning

Connecting modules/plug-in card

The connections must never be established or disconnected in potentially explosive atmospheres! Risk of explosion!
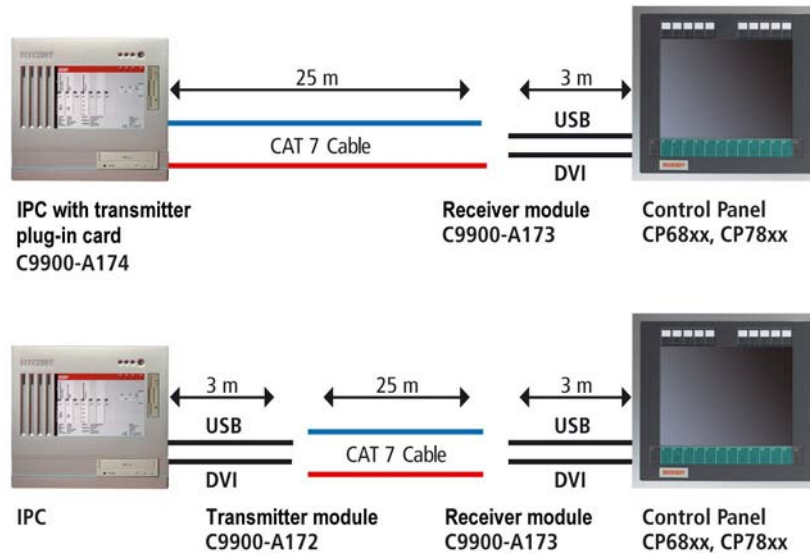
The mains plug of the Industrial PCs must be disconnected!

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

IPC with transmitter plug-in card C9900-A174 — 25 m CAT 7 Cable — Receiver module C9900-A173 — 3 m USB / DVI — Control Panel CP68xx, CP78xx

IPC — 3 m USB / DVI — Transmitter module C9900-A172 — 25 m CAT 7 Cable — Receiver module C9900-A173 — 3 m USB / DVI — Control Panel CP68xx, CP78xx

Cable sets between PC and DVI/USB transmitter

Order number	Denomination
C9900-K260	Connection set for C9900-A174 consisting of: DVI cable 0.40 m, USB cable 0.40 m
C9900-K261	Connection set for C9900-A172 consisting of: DVI cable 1,00 m, USB cable 1,00 m
C9900-K262	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
C9900-K411	Patch cable set RJ45 CAT7 5 m
C9900-K412	Patch cable set RJ45 CAT7 10 m
C9900-K413	Patch cable set RJ45 CAT7 15 m
C9900-K414	Patch cable set RJ45 CAT7 20 m
C9900-K415	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: DVI cable 3 m, USB cable 3 m and power supply connector
C9900-K514	**Connection set for CP78xx** consisting of: 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	1. Correctly connect cable 2. Call Beckhoff Service
	No power supply	Check power supply cable
	Fault in the Industrial PC or Control Panel	Please refer to the troubleshooting sections in the respective operating instructions

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e-mail:	service@beckhoff.com

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

Appendix

Technical data

Dimensions	**Dimensions (W x H x D):**	see section *Assembly dimensions*
Operation in areas that are subject to explosion hazard	**The modules must not be used in potentially explosive atmospheres.**	
Environmental conditions	**The following conditions must be observed during operation:** **Ambient temperature:** **Atmospheric humidity:**	0 to 55°C Maximum 95%, non-condensing
Shock resistance	**Sinusoidal vibration:** **(EN 60068-2-6)**	10 to 58 Hz: 0.035 mm 58 to 500 Hz: 0.5 G (~ 5 m/ s^2)
	Impact: **(EN 60068-2-27/ 29)**	5 G (~ 50 m/ s²), duration: 30 ms
Protection class	**Modules:**	IP20
Power supply	**Supply voltage:**	The modules have an integrated 24 V power supply unit. The PCI bus transmitter plug-in card is supplied via the Industrial PC.
	Power consumption:	C9900-A172: 0,4 W C9900-A173: 2,0 W
EMC compatibility	**Resistance to interference:** conforms to EN 61000-6-2	
	Emission of interference: conforms to EN 61000-6-4	
Transport and storage	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.