

Installation and Operating instructions for

C9900-P223 and C9900-P224

Power Supply Units

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BECKHOFF

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Foreword

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.

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.

Liability Conditions

The documentation has been prepared with care. The products described are, however, constantly under development. For that reason the documentation is not in every case checked for consistency with performance data, standards or other characteristics. 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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State at Delivery






All the components are supplied in particular hardware and software configurations appropriate for the application. Modifications to hardware or software configurations other than those described in the documentation are not permitted, and nullify the liability of Beckhoff Automation GmbH.

Delivery conditions




In addition, the general delivery conditions of the company Beckhoff Automation GmbH apply.

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	Acute risk of injury!! If you do not adhere the safety advise adjoining this symbol, there is immediate danger to life and health of individuals!
 WARNING	Risk of injury! If you do not adhere the safety advise adjoining this symbol, there is danger to life and health of individuals!
 CAUTION	Hazard to individuals! If you do not adhere the safety advise adjoining this symbol, there is obvious hazard to individuals!
 Attention	Hazard to devices and environment If you do not adhere the notice adjoining this symbol, there is obvious hazard to materials and environment.
 Note	Note or pointer This symbol indicates information that contributes to better understanding.

Basic safety measures

	<p>Use only with Beckhoff Industrial PCs</p>
<p>Note</p>	<p>The power supply unit must only be used in conjunction with Beckhoff Industrial PCs!</p>
	<p>Switch off the power supply of the system during installation!</p>
<p>Attention</p>	<p>During assembly, removal and electrical wiring of the power supply unit, the power supply of the system must be switched off in order to prevent damage on the power supply unit and the Industrial PC. Items of equipment that have been switched off must be secured against being switched on again.</p>
	<p>Do not open the power supply unit while voltage is applied!</p>
<p>WARNING</p>	<p>The supply voltage must be switched off before the power supply unit housing is opened.</p>

Operator's obligation to exercise diligence


	<p>Only appropriately trained staff may install the power supply unit!</p>
<p>CAUTION</p>	<p>The operator must ensure that only appropriately trained electricians deal with installation and wiring of the power supply unit.</p>

Product Description

Appropriate Use

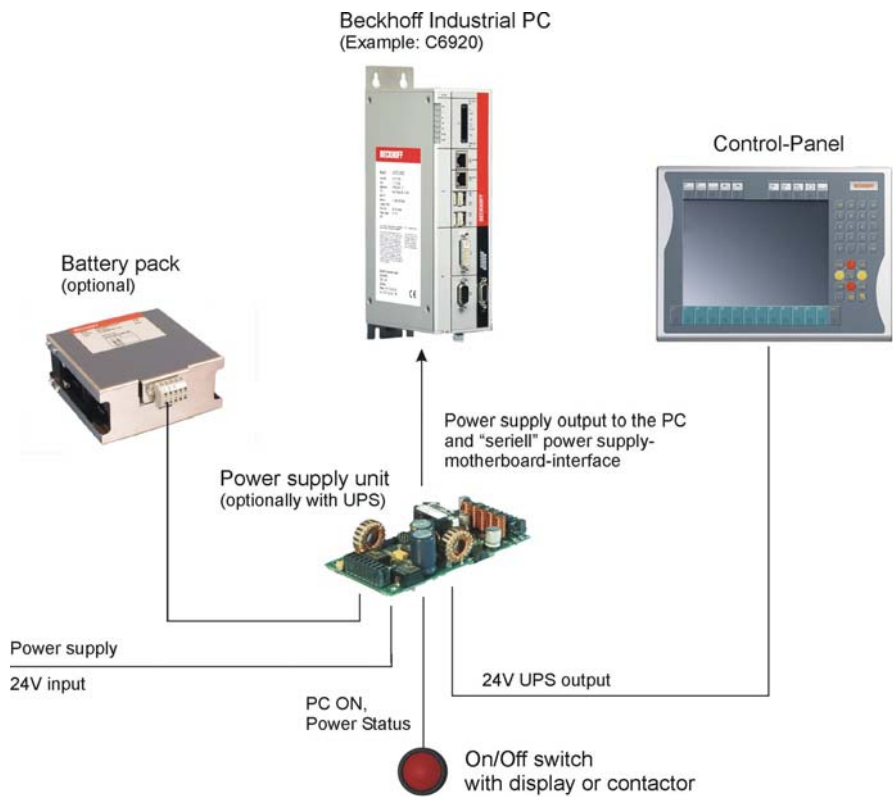
The C9900-P223 and C9900-P224 power supply unit provide the power supply for Beckhoff Industrial PCs.

The C9900-P224 power supply in conjunction with a C9900-U330 battery pack allows the construction of an uninterruptible power supply (UPS).

 WARNING	<p>Risk of explosion!</p> <p>Risk of explosion if other battery packs are used!</p>
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Beckhoff power supply technology

Schematic diagram of power supply unit wirings



Innovative solution for shutting down Industrial PCs

Industrial PCs equipped with a UPS are in actual use frequently switched off by simply turning off the supply voltage. In this case the PC shuts down via the battery. However, over time this reduces the service life of the battery.

The new Beckhoff power supply technology approach addresses this problem and now offers the user the option of switching the PC off without the need for using the battery, thereby reducing the load on the battery.

In addition to the main switch this innovative solution uses an ON/OFF switch for the machine. Basically, the main switch remains switched on and provides the power supply for the PC during shutdown. Via the PC ON-input of the power supply the PC gets the command to shut down the operating system.

Once the PC has shut down, the PC power supply unit sets the Power Status-output (P-S) to 0, what indicates that the process is complete and that the main voltage can be switched off. This can be done manually via a signal lamp connection or via a contactor. With this solution the main

switch generally only has to be switched off if the control cabinet has to be opened. The battery will only be used in the event of a power failure.

In order to maintain a screen display for the Industrial PC in the event of a power failure, the C9900-P224 power supply unit is equipped with a UPS output 27 V / 1.4 A for connecting a Control Panel with a display dimension up to 19 inches. This enables a power failure to be visualized and displayed to the user. Once the PC has shut down, the UPS output is switched off.

For a detailed functional description please refer to section [External wiring](#).

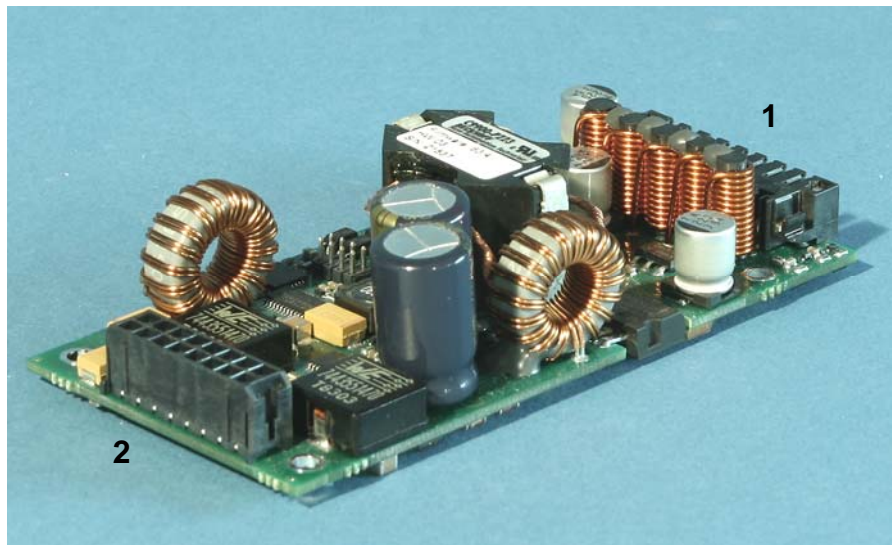
Electrical data

Input voltage:	22–30V DC/ 15A	
Power output:	max. 150W, depending on cooling	
Output voltages:	+ 5V	20A
	+ 12V	5A
	+ 5VSB	1A

Installation Instructions

Configuration and installation

View of the power supply unit

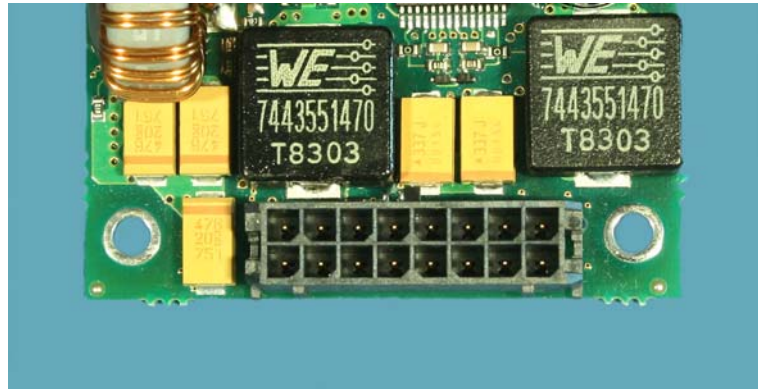


The power supply unit is installed at the prescribed position in the Industrial PC.

The figure shows the supply connections for the power supply unit (1) and the electrical connections for the motherboard (2).

Connection with the motherboard

Pin strips
on the output side



Connection with the
motherboard

The power supply unit is connected with the motherboard according to the installation instructions of the board.

Pin assignment

Pin assignment of the
output connector

Connector: MOLEX-34045-1613

Pin	Signal	Pin	Signal
1	RX	9	TX
2	PS_ON	10	Powergood
3	ATXSW	11	5 V Standby
4	+ 12V	12	+ 12V
5	GND	13	GND
6	GND	14	GND
7	+ 5V	15	+ 5V
8	+ 5V	16	+ 5V

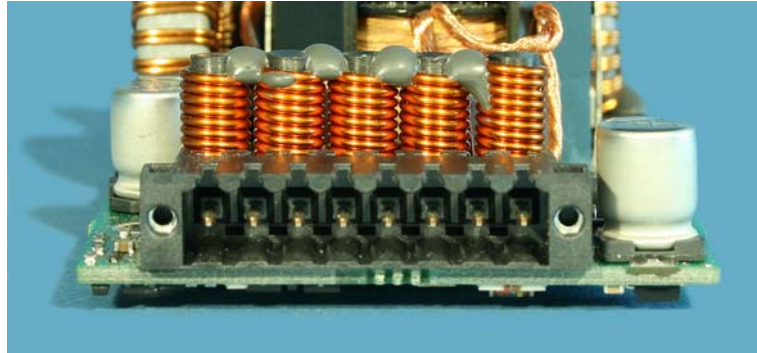
Signal description


Function	Description
RX	TTL-input RS232-interface (view from power supply)
TX	TTL-output RS232- interface (view from power supply)
PS_ON	TTL-input voltage request from motherboard High -> motherboard reports "stand-by" Low -> motherboard reports "connect voltage"
Powergood	TTL-output Low -> voltages at motherboard connector not o.k. High -> voltages at output connector o.k.
ATXSW	TTL-output Enables the Power supply to boot the Industrial PC via the ATX-switch: Low -> motherboard logic shall open the ATX-switch HIGH -> motherboard logic shall close the ATX-switch
GND	ground
VCC	+5V 20A
+12V	+12V 5A
5V-Standby	+5V 1A standby voltage


Connection with the Industrial PC

The pin strip shown on the photograph is mounted on the power supply unit for connecting the unit with the power supply, switch, battery pack (C9900-P224 only) and UPS output (C9900-P224 only).

Pin strips
on the input side



 Note	<p>Uninterruptible power supply (UPS)</p> <p>With the C9900-P224 power supply you can realize an uninterruptible power supply (UPS) using the battery pack C9900-U330.</p>
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 WARNING	<p>Risk of explosion!</p> <p>Risk of explosion if other battery packs are used!</p>
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A Control Panel can be connected to the UPS output of the C9900-P224. The maximum current loading is 1.4 A.

Pin assignment of the connector

The power supply and the external circuit for switching the Industrial PC on and off are connected via the 8-pole plug connector .

Pin assignment for connecting the switch, the power supply and the battery pack (optional)



Pin	Function
1	- Battery Pack
2	+ (only C9900-P224)
3	UPS+ (only C9900-P224)
4	⊕
5	- 24 V DC
6	+ Power Supply
7	PC_ON
8	Power-Status

External wiring

The external wiring consists of the connection of the power supply, the battery pack (only C9900-P224) and the connection of customized components for shutting down the PC.

The external wiring occurs according to the wiring diagram, see chapter [Wiring diagram](#).

Cable Cross Sections

Note cable cross sections, avoid voltage drop!

For the connection of the power supply, wiring with a cable-cross-section of 1.5 mm^2 must be used.

With bigger distances between voltage source and PC, you take the voltage drop as a function of the cable-cross-section as well as voltage fluctuations of your distribution voltage into account, so that is secured that the voltage doesn't fall under 22 V at the power supply.



Attention

Insert fuse

The power supply must be protected with 16 A.

PC_ON and Power Status functions

- If the **PC_ON** input is connected to 24 V via a switch, the PC shuts down according to the rules. The PC_ON signal is inverted, i.e. the PC shuts down if the 24 V connection is live.
- If the **PC_ON** input is *NOT* connected by the user, the PC can be booted in the familiar way by connecting the supply voltage and shut down via the battery by switching off the supply voltage.



Attention

Service life of the rechargeable battery

This procedure significantly reduces the service life of the rechargeable battery and should therefore not be used.

- Once the PC has shut down, the **Power Status** output is switched from 24 V to 0 V. Via this output a signal lamp can be connected or a contactor for de-energizing the whole system. The maximum load for the **Power Status** output is 0.5 A and a suitable fuse should be provided.

UPS output, C9900-P224 only

In order to maintain a screen display for the PC in the event of a power failure, the C9900-P224 power supply unit is equipped with a **UPS output** for connecting a Control Panel. The maximum load for the output is 1.4 A.

The UPS output is located on the power supply unit adjacent to the mains plug (see also section [Product Description](#)).

UPS output function

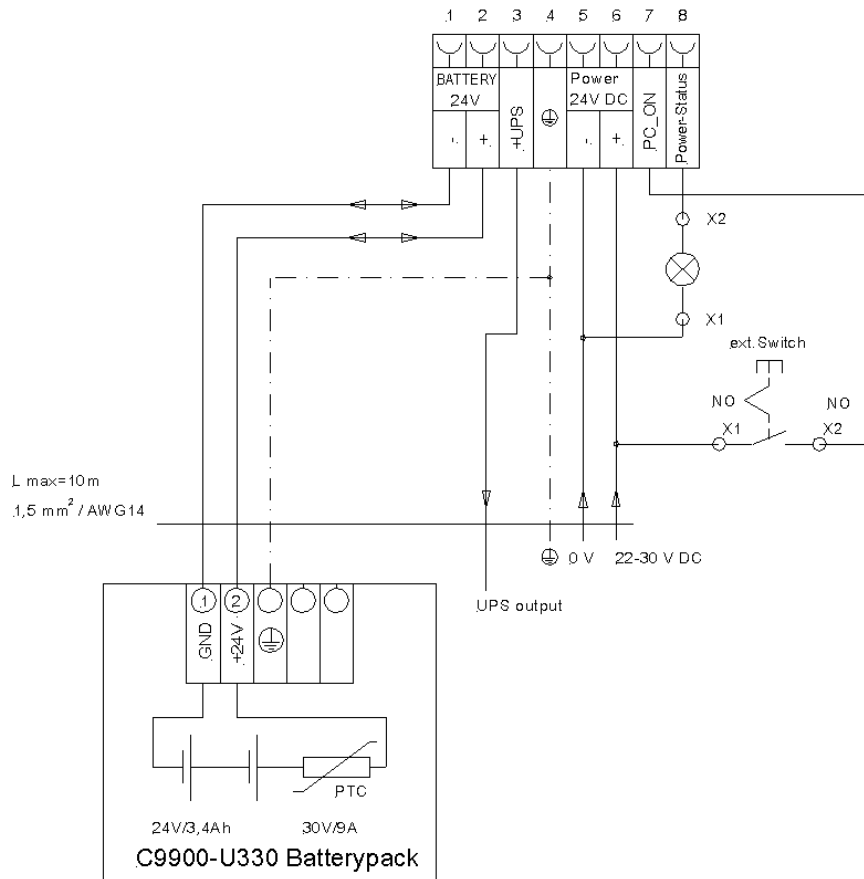
- The 27 V DC connection at the UPS output is live even after a power failure. The maximum load is 1.4 A (C9900-P224 only).
- Once the PC has been de-energized via the UPS software, the **UPS output** is switched to 0 V. Any connected panel is thus switched off, and total discharge of the rechargeable battery is prevented.


Wiring diagram

Wiring according to the wiring diagram.

The circuit of PC_ON and Power-Status is symbolical.

Wiring diagram external switch and power supply



 Note	<p>Connection of the Battery Pack and UPS Output</p> <p>Connection of the Battery Pack and UPS Output only in combination with C9900-P224 power supply.</p>
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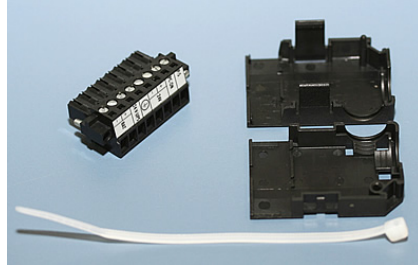
Fitting the cable

Wiring in accordance with wiring diagram

Fit the cables for the power supply of the Industrial PC, the connection of the battery pack as well as the connection of the power-switch in accordance with the wiring diagram, using the included material for assembling the connectors.

Material for assembling the connectors

Material for assembling the connectors



Plug connector 8-pole, Strain relief housing with lacing cord

Assembling the connectors

Conductive cross-section

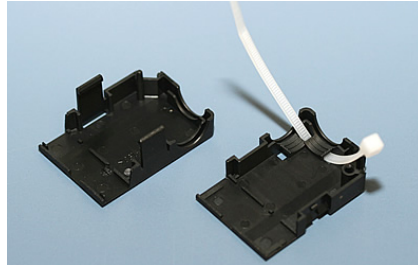
The connector is specified for 16 A and can lift conductive cross-sections until 1.5 mm².

Fitting the connector to the cable

So the connector is fitted to the cable:

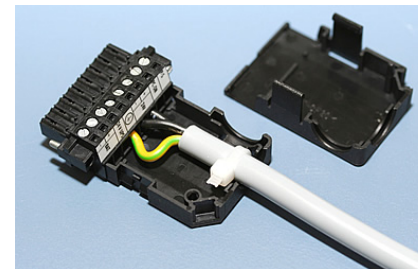
1. Strip insulation from the cable ends (Length of stripped conductor is 8 – 9 mm).
2. Screw together the cable ends in the 8-pole plug connector in accordance with wiring diagram.

Applying the strain relief



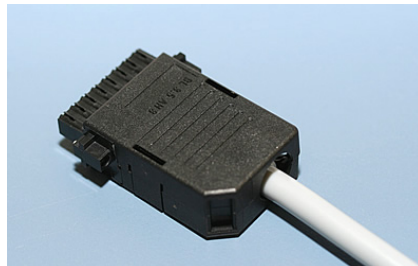
Thread the lacing cord into that lower part of the strain relief housing.

Putting in the plug connector



Put the plug connector into that lower part of the strain relief housing. Tighten the lacing cord and pinch off the plastic strap.

Fixing the upper part of the strain relief housing



Fix the upper part of the strain relief housing by snapping it onto the lower part.

Operating Instructions

UPS Software Components (only C9900-P224)

Installing the UPS driver software

For operating the power supply unit as a UPS, the UPS driver software and the associated UPS driver must be installed on the Industrial PC.

On delivery of the Beckhoff Industrial PC with operating system the software is already installed. Should the software not be installed on your PC, the drivers can be installed from the driver CD provided.

Installation

Installation on the PC

To install the UPS driver software, execute file **Beckhoff_UPS_vx.xx.xx.exe** from the subdirectory of **UPS\...** from the CD provided on the Industrial PC (Driver-archive for the Industrial-PC, C9900-S700-xxxx).

The program is self-extracting and will guide the user through the installation routine.

Beckhoff Information System

Help files

The driver software comes with a detailed help function. The help files can be called up either directly from the configuration register by clicking the Help button, or under via *Start > Programs > Beckhoff > UPS software components*.

Servicing

The power supply unit is maintenance-free.

Shutting down

Dismantling the case

Disposal

The device must be fully dismantled in order to dispose of it. 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

In the event of a fault contact your Beckhoff Service.

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

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e-mail: service@beckhoff.com

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

Appendix

Technical data

Electrical data	Input voltage: 22-30V DC/ 15A Power output: max. 150W , depending on cooling Output voltages: see section Electrical data
Dimensions	Dimensions (W x H x D): 50 x 25 x 104 mm Weight: 120 g
Do not use the power supply unit in areas of explosive hazard	The power supply unit must not be used where there is a risk of explosion.
Environmental conditions	The following conditions must be observed during operation: Ambient temperature: 0 to 55°C Atmospheric humidity: 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/ s ²), duration: 30 ms
EMC compatibility	Resistance to interference: according to EN 61000-6-2 Emission of interference: according 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 during transport can be improved by appropriate packaging of the power supply unit. 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.
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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.
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