

Operating Instruction

C-TEC 2420



DC-USV

NCPA0747G01xxx

(C-TEC 2420)

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Operating Instruction

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1 In General

The intended use of the C-TEC 2420-8 is the supply of a 24 V DC load. Therefore it is charged by an external, regulated DC power supply. In case of mains failure the device works as an uninterruptible power supply (UPS). Do not use the device for any other purpose.

1.1 Safety Regulations



NOTE

The operating instructions must be read prior to installation or use of the unit. The instructions must be observed. All warranty claims could be lost in case of non-observance!
Keep the operating instruction for later looking-up!



WARNING

Only specialized electricians are authorized to commission and maintain the unit. In-proper handling with voltage procedures or capacitors can lead to electric shock and severe burns.

DANGER

All work on the unit may only be performed in de-energized state!
Therefore pay attention to the internal energy storage terminals +C / -C.
The five safety rules must be observed.
Input and output lines must be dimensioned and fused sufficiently! Non-observance can lead to fatal electric shocks.

WARNING

In case of short-circuit of energized capacitors risk of strong heat generation and arcs, which may cause severe burns!

WARNING

Even a long time after the release of the **AC C-TEC** a lot of energy may be stored inside the unit! When the device is de-installed, the capacitors must be discharged in a controlled way!
In case of short-circuit of energized capacitors risk of strong heat generation and arcs, which may cause severe burns!



REFERENCE

The device was developed for protective class I and has protective system IP20.
It is a built in unit, which may only be used in closed cabinets or housings!

REFERENCE

The device must not be used higher than 2000 m above sea level without load reduction. The allowed environmental temperature must be respected.

The device is designed for pollution degree 2.
Attention: For use in a controlled environment. (see UL-Norm).

REFERENCE

At terminal +C / -C only the extension modules which are foreseen from the manufacturer may be connected.

The connection of the extension modules may only be done in de-energized state und with discharged capacitors. Therefore the capacitors in the C-TEC and the capacitors in the extension module must be discharged in a controlled way with a resistance.

REFERENCE

In case of error we recommend to send the unit back to the manufacturer.

1.2 Short Description

The DC-UPS of the series **C-TEC** includes ultra-capacitors as energy storage inside the housing. During normal operation the capacitors are charged by an external regulated DC power supply. In case of an interruption of the DC supply, the energy of the ultra-capacitors is released regulated. The load is supplied by the back-up module until the ultra-capacitors are discharged. The back-up time depends on the state of charge of the capacitors and on the discharge current

The DC-UPS has the following characteristics:

- Maintenance-free because of long-life ultra-capacitors
- Microcontroller based charging and discharging of the ultra-capacitors
- Control of operation and status of charge with potential-free contacts and LED
- Compatible to **TECControl**-Software
- Communication with an IPC via USB or RS232 cable possible
- Parameterizable via USB interface
- Capacity extension possible with external capacitor extension modules
- Cyclic capacitor test during mains operation
- Big temperature range -40° C up to 60° C

1.3 Intended Use

The **C-TEC** is designed and developed for the industrial and plant engineering sector. The installation of the **C-TEC** is to be carried out exclusively by qualified electricians.

If the **C-TEC** is operated outside of its intended use, the protection supported by the **C-TEC** cannot be guaranteed.

2 Transportation and Storage

The transportation of the devices may only be done in original packaging. During transportation and storage the compliance with the environmental conditions must be observed. (see item 10 Technical Data). The devices must be protected against humidity and direct sunlight.

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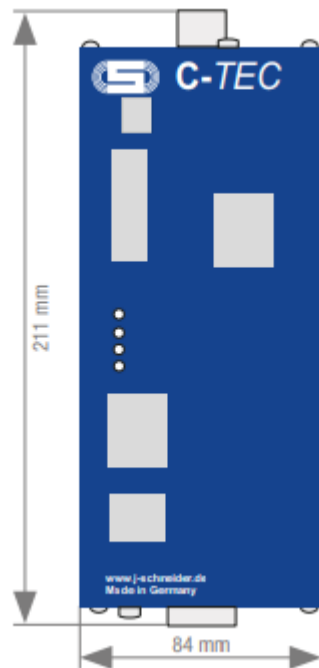
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3 Installation and Connection

3.1 Installation

The assembly must be done in the way, that sufficient cooling is guaranteed. A minimum distance in the area of air in- and outlets to neighbouring devices ≥ 80 mm must be observed. The assembly must always be done in the way that sufficient air flow is guaranteed.

The unit is installed on top hat rail



Mounting depth 193 / 213 mm without / with rising clamps

	REFERENCE The unit must be covered during installation, if drilling chips may fall onto respectively into the unit. Risk of short-circuit!
	REFERENCE The maximum permissible load of the mounting rail must be respected according to EN 60715!
	REFERENCE The device is a built-in unit. Operation is only permissible in closed cabinets or housings. The device is designed for pollution degree 2.

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3.2 Connection

Prior to connection the values of the in- and output voltages must be compared with the values on the type plate. Connection according to the designations of the connection terminals (see circuit diagram). Unused connection screws must be tightened.

The supply voltage must be switched off and secured against being switched on again by third parties.

The de-energised cable is to be connected to the terminal block provided for this purpose, ensuring the correct polarity "+" and "-".

Terminals			connection	
Designation	Max. tightening torque /Nm	Cable cross section /mm²		
USB	USB-B-socket		USB-interface	
I/O 1, I/O 2 (1+, 2-)	0,25	0,2 – 1,5	UPS-Switch-Off	24 V DC (6...40 V DC)
I/O 3, I/O 4 (3 = COM, 4 = NO)			Message contact Netz / Mains	Maximum contact load: 30 V DC / 0,5 A (potential-free relaycontact)
I/O 5, I/O 6 (5 = COM, 6 = NO)			Message contact Uc / Vcap.	
I/O 7, I/O 8, I/O 9 (7= COM, 8 = NO, 9 = NC)			Message contact Fehler / Fault	
+ Ue / Vin - Ue / Vin	0,6	2,5 – 4,0	Input voltage	
+ Ua / Vout. – Ua / Vout.	0,6	2,5 – 4,0	load	
+ C / cap. – C / cap.	0,6	2,5 – 4,0	CEM-Module	

Dimension the cable cross section of the supply and output cables according to EN 62368-1 table G.5; see also the table above.

If the system is constructed according to EN 62368-1 and supply cables leave the room (building wiring), observe section 6.5.3 of EN 62368-1

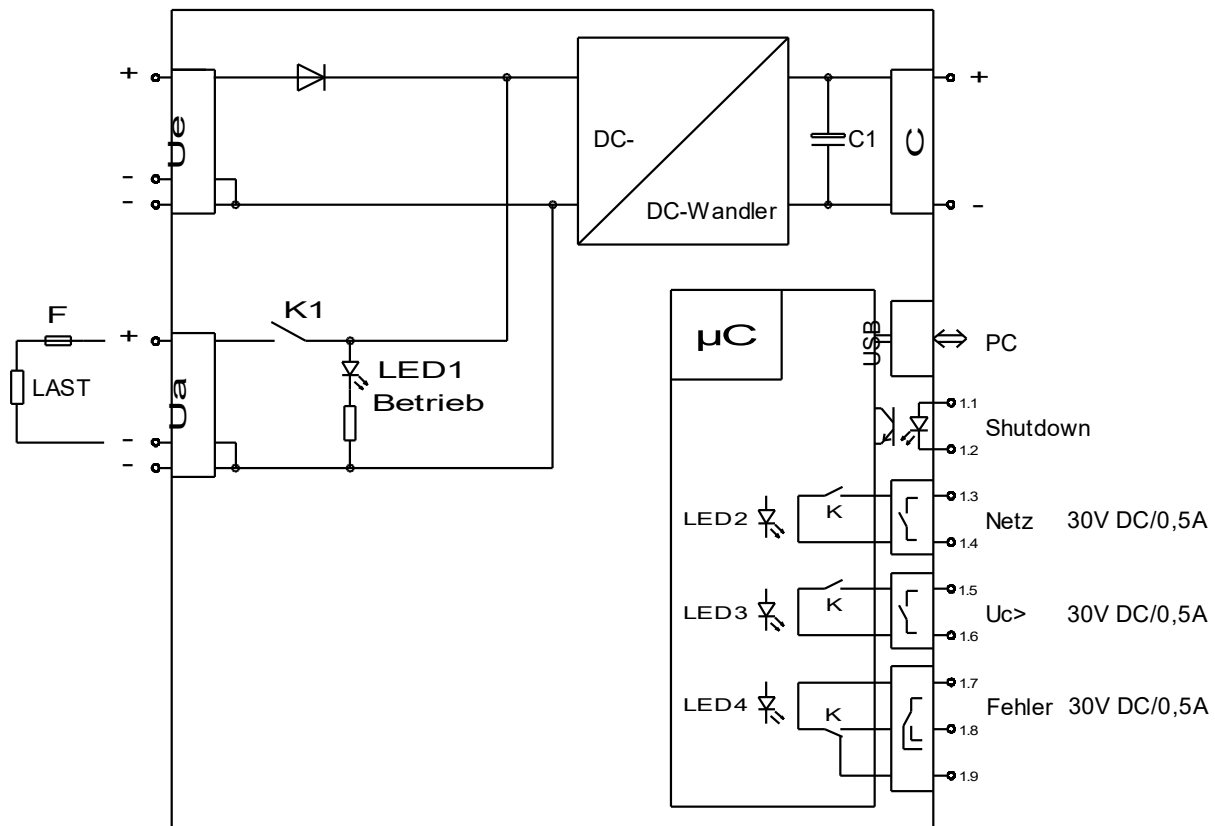
The status of the external power supply can be forwarded to a higher-level control centre via signalling contacts. The contacts are coupled with the LED displays of the same name. The illumination of an LED thus causes the corresponding relay to be energised

	WARNING Only SELV or PELV voltage sources (according to EN 60204-1) are permitted for supplying the device. Failure to observe this may result in electric shock with fatal consequences
	CAUTION Pay attention to the compliance of nominal voltage and polarization during connection. In case of non-observance risk of strong heat generation and arcs, which may cause severe burns! CAUTION In case of overload the DC output current is composed of the maximum current of the back-up module as well as of the current of the external DC power supply. To avoid an overload of the DC output circuit it must be fused externally!

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3.3 Circuit diagram



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4 Putting into operation

The device is put into operation by switching on the DC supply at terminal 'Ue'.

	REFERENCE If the devices are built in systems, in which over voltages are switched on for testing, (for example according to EN60204-1 / VDE0113 part1 19.4 voltage test), The device must be separated from the test equipment before the switch on of the voltage. (Original text EN60204-1 : parts, which are not designed for the testing voltage must be disconnected during the test.)
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4.1 Display and Messages

Display	Meaning:	Message contact
Operation LED green	- illuminates at: System voltage present at terminal U _E respectively as long as the device is internally supplied with energy.	-
Mains ¹⁾ LED green	- illuminates at: Mains supply is present, means U _E > U _{Emin}	Potential-free relay-contact, closer, max. contact load 30 V DC / 0,5 A
UC> ¹⁾ LED green	- illuminates at: Energy in the capacitor > 80 % - goes out at: energy in the capacitor < 30 % (values refer to standard parameterization. This parameterization can be changed with the paraTEC -Software.)	Potential-free relay-contact, closer, max. contact load 30 V DC / 0,5 A
error ¹⁾ LED red	- illuminates at: - Over-voltage at internal capacitor - Over-voltage at the output - Minimum capacity is underrun	Potential-free relay-contact, changer, max. contact load 30 V DC / 0,5 A
Shutdown	Abort of the UPS-Mode	Potential free switching input, Switching level 24 V DC (6 - 40 V)

¹⁾ The message contact is coupled with a LED. If the LED illuminates, the corresponding relay is activated.

5 Operation

5.1 Mains Operation

Approximately 2 seconds after the switch on of the supply voltage, the output voltage is released and the connected loads are supplied. The charging of the internal capacitors is initiated as well. The operational mode is indicated with the illumination of the green LED 'Betrieb/Operation' as well as with the green LED 'Netz/Mains'. The charging of the capacitors is only possible if the supplying voltage is bigger than the system voltage (voltage in back-up mode).

If the capacitor is nearly charged the green LED 'Uc>' illuminates.

	REFERENCE The charging time increases if during the charge of capacitors a high load current is also necessary!
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5.2 Back-up Operation

In case of failure of the supply respectively if the minimum input voltage is underrun the **C-TEC** switches over to back-up operation. The green LED 'Netz / Mains' goes out.

If the capacitor is nearly discharged the green LED 'Uc>' goes out.

If the capacitor is no longer able to buffer, Ua is switched off, the LED 'Betrieb / Operation' goes out as well.

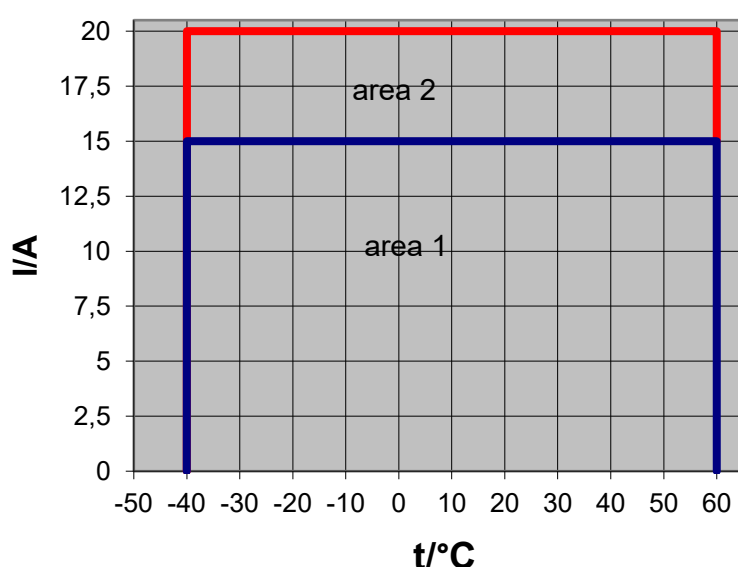
The red LED 'Fehler / Error' has a general error function. The particular error causes are described in item 4.1 Display and Messages.

5.3 Backup time (typical)

I_{Output}	0,5 A	1,0 A	1,5 A	2 A	3 A	5 A	8 A	10 A	15 A	20 A
Device										
C-TEC 2420	662,8 s	349,5 s	236,1 s	179,2 s	120,3 s	71,4 s	43,4 s	34,0 s	21,6 s	13,9 s

5.4 Derating

The ON-Time depending on the load current and environmental temperature.



area 1: Continuous operation
Uninterrupted charging and discharging operation is permitted

area 2: Five charging and discharging cycles subsequently are permitted.
Afterwards a cooling time of 60 s must be taken.

5.5 Capacitor Test

An cyclic capacitor test during mains operation loads the capacitor. At the same time the voltage is measured. So a conclusion concerning the quality of the capacitors can be drawn. An aged capacitor which does not fulfill the requirements anymore is indicated with the illumination of the LED 'Fehler / Fault' (general error).

5.6 Shutdown

The back-up operation can be aborted in advance by feeding a +24 V control voltage at terminal 1.1 (+) and 1.2 (-) at the terminal strip 'I/O-1'. Hereby the connected loads are switched off in a defined state. Furthermore a rest-energy rests in the capacitor by the advanced switched off. So a subsequent charging of the capacitor is shortened. After a shutdown the switch on of the output is only made when the mains voltage returns.

6 Software

6.1 paraTEC-Software

The **paraTEC** Software is used for pc based parameterization of the device parameters.
A quick start instruction for software-installation and parameterization possibilities is available.
The software is available for all popular Windows operation systems.

6.2 TECControl-Software

The **TECControl** software enables a controlled process stop, the specific shut-down of a PC as well as the restart of the **C-TEC**.

An operational instruction for this software is available.

The software is also available for all popular Windows operation systems.

7 Maintenance

Inside the device there are no parts that should be maintained by the user.

The device must be cleaned regularly depending on the degree of pollution.

8 Putting out of operation

The putting out of operation is realized by the switch off of the supply voltage.

To avoid the subsequent back-up operation and the discharge of the capacitors, the module can be switched off by activating the 'Shutdowns' (see item 5.6 Shutdown). Hereby all LED's must go out.



CAUTION

During operation the disconnection and the connection of electrical lines is forbidden! In case of non-observance there is a risk of arcs, which may cause severe burns.

WARNING

Even after the putting out of operation high energy can be stored in the internal stores of the device.

The voltage of the capacitors is also present at the output terminals +C / -C.

In case of short-circuit of the capacitors risk of strong heat generation and arcs!

9 Disposal



This symbol indicates that the device must not be disposed with the normal domestic waste.
Please dispose the product professionally as electronic scrap. Herewith materials are separated and recycled according to their qualities and you contribute in environmental protection



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10 Norms and Regulations

Total unit	EN 61010-1 / EN 61010-2-201 EN 62368-1 UL 508
EMC	EN 55011 Klasse B EN/ IEC 61000-6-4 Grenzwertklasse B EN 62040-2 Grenzwertklasse C1 IEC 62040-2 EN 61000-6-2 EN 62040-2 Schärfegrad C2
Environmental testing: vibration Shock	EN 60068-2-6 (2 G) EN 60068-2-27 (15 G)

11 Technical Data

Input	
Nominal input voltage	24 V DC -2,5 % +20,8 % SELV/PELV according to EN 60204-1
Input voltage range	23,4 V – 29 V DC
Min nominal input voltage for charging operation	23,4 V DC
Max. nominal input current	20 A DC
Fusing input	FK2 40A
Output	
Nominal output voltage (in mains operation)	Input voltage – 0,5 V
Nominal output voltage (in back-up operation)	23,2 V DC
Max. nominal output current	20 A
Power loss nominal operation	5 W
Max. power loss 'worst-case'	40 W (U _a = 25,0 V DC 100% load)
Efficiency	>90%
Energy	8 kJ
Back-up time	344 s @ 1 A / 12 s @ 20 A
General Information	
Max. load message contact: Mains operation, U _c >, Fault	30 V DC max. 0,5 A
Max. load message contact Shutdown	24 V DC (6 – 40 V DC)
Parallel operation	No
Serial operation	No
Protective system	IP20
Operational temperature	-40 ... 60 °C
Storage temperature	-40 ... 60 °C
Relative humidity	< 95 % condensation not permissible
Max. mounting height (without load reduction)	2000 m above sea level
Dimensions (H x W x D)	211 mm x 84 mm x 193 mm
Weight	2,2 kg