

Operating Instruction

AC C-TEC 2410



DC-UPS

NCPA1430G01001

(AC C-TEC 2410)

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Operating Instruction

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1. In General

1.1 General Safety Instructions

	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!
	WARNING Only specialised electricians are authorized to commission and maintain the unit. Improper handling with voltage procedures or lead accumulators can lead to electric shock and severe burns.
	DANGER All work on the unit may only be performed in de-energised state! The five safety rules must be observed. Input and output lines must be sufficiently dimensioned and fused! 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!
	REFERENCE The valid VDE-regulations must be observed especially DIN VDE 0100 and EN 60204!
	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 **AC C-TEC 2410** includes ultra-capacitors as energy storage inside the housing. During normal operation the capacitors are charged from an internal charger, which is supplied by an internal, regulated AC-DC power supply. In case of an interruption of the AC supply, the energy of the ultra-capacitors is released regulated (23,5 V DC $\pm$ 5%). The load is supplied by the back-up module up to 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
- Parameterizable via USB interface
- Control of operation and status of charge with potential-free contacts and LED
- Big temperature range -20 C up to 50 C

1.3 Intended Use

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

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

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2 Transportation and Storage

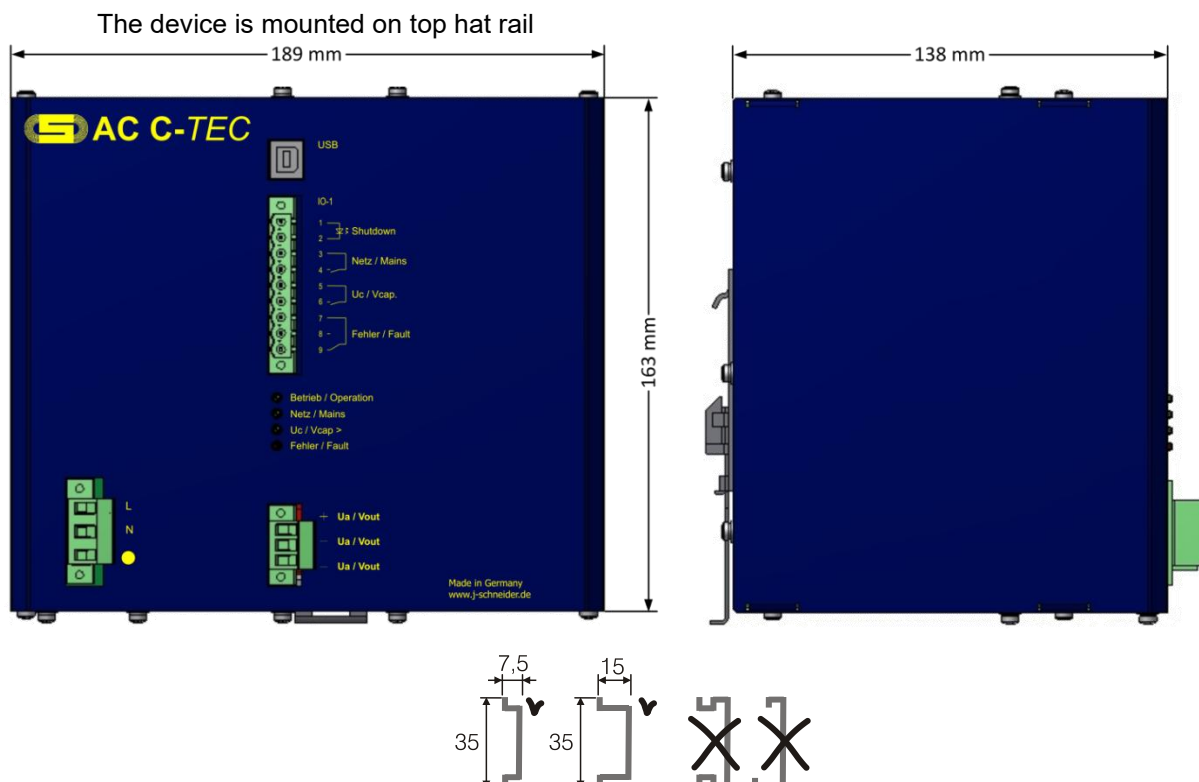
The transportation of the devices may only be done in original packaging. During transportation and storage the compliance with the environmental conditions must be observed. (see item 10 Technical Data). The device must be protected against humidity and direct sunlight.

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 ≥ 40 mm must be observed. The assembly must always be done in the way that sufficient air flow is guaranteed. The specific environmental temperature must not be exceeded. The maximum mounting height without load reduction amounts to 2000 above sea level

	REFERENCE The unit must be covered during installation, if drilling chips may fall onto respectively into the unit. Risk of short-circuit!
	REFERENCE The unit is a built-in unit. Operation is only permitted in closed switch cabinets or enclosures. The unit is designed for pollution degree 2. The switch cabinets or enclosures used must meet the requirements for enclosures according to EN 62368-1. Observe the specifications for ventilation openings in the enclosure according to sections 6.4.8.3.3 and 6.4.8.3.4. A warning notice "Warning of electrical voltage" (ASR A1.3 W012) must be affixed to the enclosure.
	REFERENCE Please observe the maximum permissible load of your top hat rail accordingly EN 60715 !



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3.2 Connection

Before connection, check that the values of the DC supply match the values on the type plate. Make the connection according to the designations of the terminals (see the basic circuit diagram and terminal assignment)

Terminals			Connection	
Designation	Max. tightening torque/Nm	Cable cross section/mm²		
L1, N, PE(⊕)	0,4	0,5 – 2,5	Input voltage	
USB	USB-B-socket		USB-interface	
IO-1 (1+, 2-)	0,4	0,1 – 2,5	USV-Switch-Off	24 V DC (6...35 V DC)
IO-1 (3 = COM, 4 = NO)			Message contact Netz / Mains	Maximum contact load: 30 V DC/0,5 A (potential-free relay contact)
IO-1 (5 = COM, 6 = NO)			Message contact U _C / V _{cap.} >	
IO-1 (7 = COM, 8 = NO, 9 = NC)			Message contact Fehler / Fault (general error)	
+ U _a / V _{out.} – U _a / V _{out.}	0,4	1,0 – 2,5	consumer	

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

The status of the external power supply can be transmitted to a higher-level control centre via signalling contacts. The contacts are coupled with the LED indicators of the same name. The lighting of an LED thus causes the corresponding relay to energise.

If the system is installed in accordance with EN 62368-1 and supply lines leave the room (building wiring), observe section 6.5.3 of EN 62368-1.



CAUTION

When connecting the terminals, make sure that the nominal voltage and polarity match. Failure to do so may result in excessive heat generation and arcing, which can cause severe burns.!



CAUTION

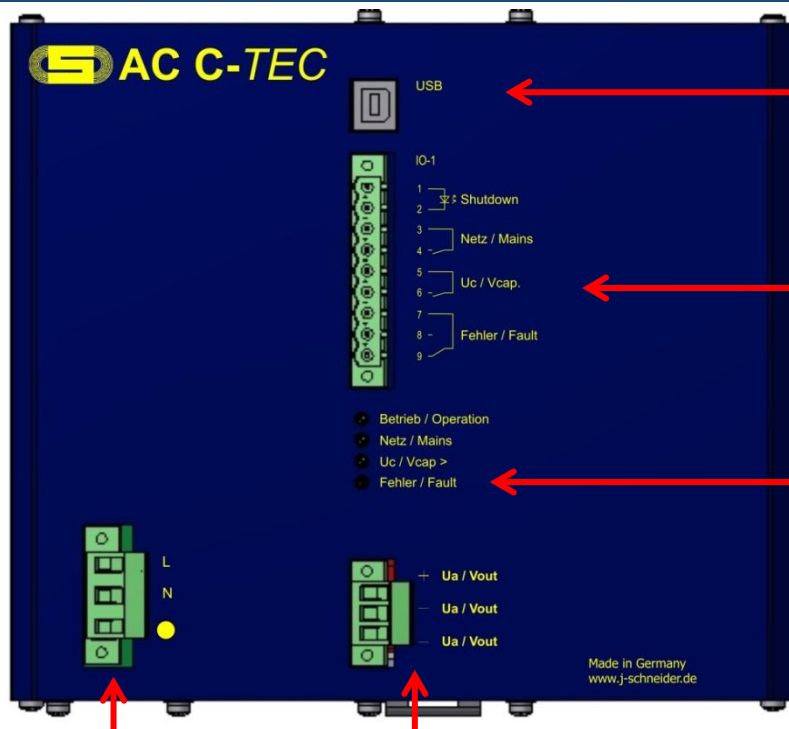
In case of overload, the DC output current is composed of the maximum current of the puffer module and the current of the internal DC power supply. In order to prevent an overload of the DC output circuit, it must be protected by an external fuse!

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communication	
Connection	Function
USB A-Type	Communication

IO-1 message contacts	
terminal IO	Function
1	Shutdown+
2	Shutdown-
3	Netz / Mains
4	Netz / Mains
5	Uc / Vcap.
6	Uc / Vcap.
7	Fehler / Fault
8	Fehler / Fault
9	Fehler / Fault

Messages	
LED	Function
LED1	Betrieb / Operation
LED2	Netz / Mains
LED3	Uc / Vcap.
LED4	Fehler / Fault

Mains input terminal Ue	
Terminal	Function
L	Phase
N	Neutral
PE	Earth

Output terminal Ua	
Terminal	function
+Ua / Vout	24 V DC
-Ua / Vout	0 V DC
-Ua / Vout	0 V DC

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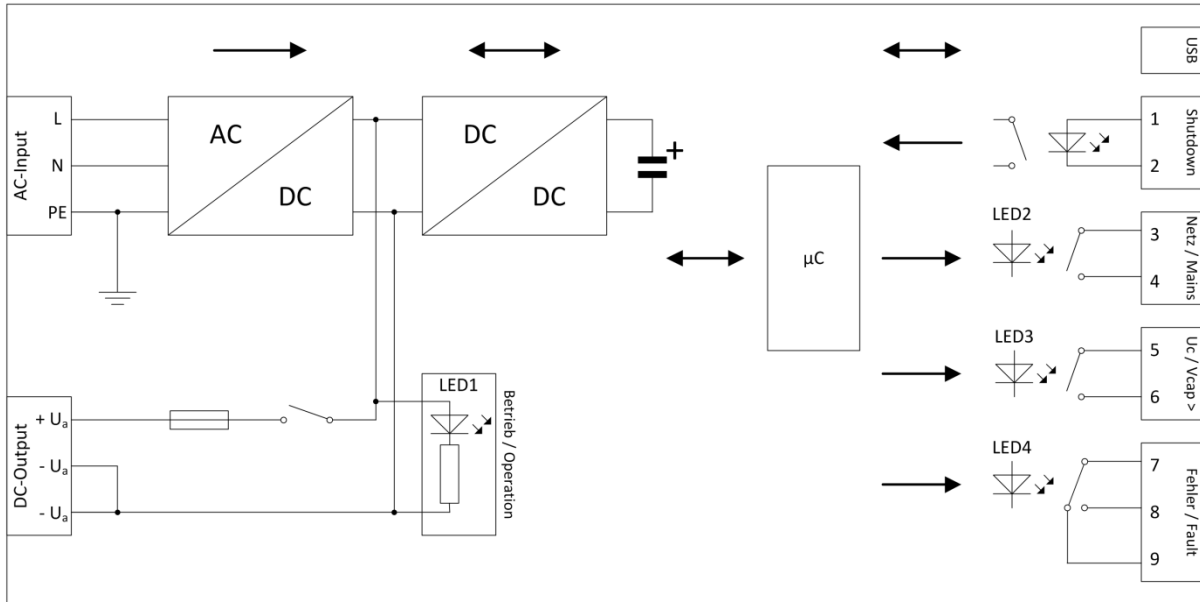
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3.3 Circuit Diagram

In the circuit diagram the energy and signal flow direction are displayed in a simplified way.



4 Putting into operation

The device is put into operation by switching on the AC supply at the mains terminal.



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.)

5 Display and messages

operation	LED green, illuminates at: System voltage is present at terminal Ue resp. Ua	-
U _E -o.k.	LED green, illuminates at: External supply is present, means U _e > U _{SYSTEM}	Potential free closer, max. contact load 30V DC / 0,5A
U _C >	LED green, illuminates at: energy in the capacitor > 80 % LED green, expires at: energy in the capacitor < 30 % (values refer to standard parameterization)	Potential free closer, max. contact load 30V DC / 0,5A
error	LED red, illuminates at: - Overvoltage at internal capacitor - over- or under voltage at terminal 'Ue' - over current at the output	Potential free changer, max. contact load 30 V DC / 0,5 A
Shut-Down	Abort the UPS-Mode	Potential free switching input, Switching level 24 V DC (6 - 35 V)

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6 Operation

The **AC C-TEC 2410** is connected in parallel with the load. The operation of the device is displayed with the 'Betrieb / Operation'. The mains supplies the energy to charging the device. The charging of the capacitors is only possible, if the mains voltage is $\geq 100\text{VAC/DC}$. This is indicated by the illumination of the green LED, 'Netz / Mains' and by the energization of the corresponding message contact. The charging time is extended, if a load current is necessary during charging. This is indicated with the illumination of the green LED, ' $U_c / V_{\text{cap}} >$ ' and with the energization of the message contact. If the external supply is switched off, respectively if the input voltage drops under the minimum input voltage, the **AC C-TEC 2410** switches over to back-up operation and the green LED 'Netz / Mains' expires. A discharge of the capacitors below 30% is indicated with the expiration of the LED ' $U_c / V_{\text{cap}} >$ ' and with the de-energization of the message contact.

6.1 Mains operation

Mains operation is indicated with the illumination of the LED 'Netz / Mains' and the connected contact 3/4.

6.2 Back-up operation

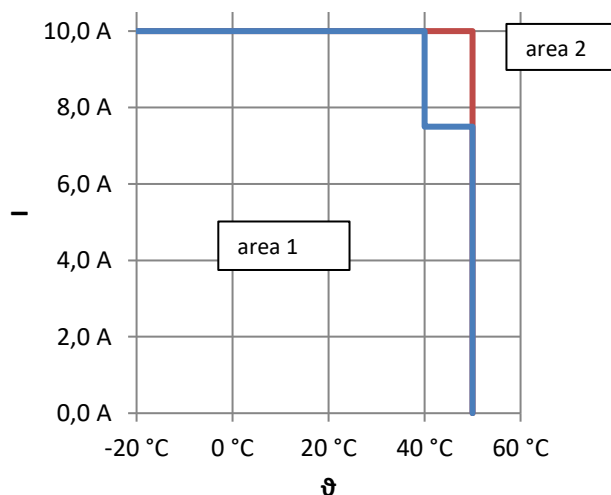
If the power supply fails or falls below the minimum input voltage (100 V AC or 100 V DC), the unit switches to buffer mode. The green LED 'Mains' goes out and the relay drops out. If the load current is low, it takes a certain time until this condition is detected

Back-up time (typical)

Back-up current	Back-up time
0,5 A	1061 s
1 A	564 s
1,5 A	380 s
2 A	288 s
3 A	190 s
5 A	111 s
8 A	65 s
10 A	49 s

6.3 Derating

The derating in back-up operation depends on the environmental temperature and the output current. This does not concern mains operation!



For the examination of the derating only charge- and discharge cycles of the capacitors are relevant.

area 1: $T \leq 60^\circ\text{C}$ or $I \leq 10\text{ A}$
Continuous charge-/dis-charge mode admissible.

area 2: $T > 40^\circ\text{C}$ and $I > 7,5\text{ A}$
Three charge-/discharge cycles are admissible in direct sequence. Afterwards pause 60 s for cooling.

6.4 Shutdown

The back-operation can be aborted early by the feed of a +24V DC-control voltage at terminal 1 (+) and 2 (-) of the terminal strip 'I/O-1'. Herewith the connected loads can be switched off in a defined status. In addition a rest energy remains in the capacitor because of the early switch off. A subsequent charging of the capacitors is shortened. After a shutdown the switch on of an output is carried out only in case of mains return.

7 Maintenance

Inside the device there are no parts which should be maintained by the user.
The device must be cleaned regularly depending on the degree of pollution.

8 Decommissioning

The putting out of operation is realized by the switch off of the supply voltage. The terminal 'Ua / Vout ' is energized up to the discharge of the capacitors.



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.

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9 Technical data

Input	
Nominal input voltage	115 V AC -26,1 % / 230 V AC +15 % 115 V DC -21,7 % / 230 V DC +8,7 %
Input voltage range	85 V - 265 V AC 90 V - 250 V DC
Nominal frequency	50 Hz ... 60 Hz $\pm$ 6 %
Max. nominal input current	1,11 A @ 230 V AC 2,35 A @ 110 V AC
Max. inrush current	I_{eff} : 1,8 A / I^2t : 0,5 A ² s
Output	
Nominal output voltage (in mains operation)	24,1 V DC $\pm$ 2 %
Output voltage range (in back-up operation)	23,5 V DC $\pm$ 5 %
Max. nominal output current	10 A
Limited voltage control	10,3 A DC $\pm$ 0,1 A
Switch off in case of exceeded limited current (in back-up operation)	after 1,5 s
effeciency	> 90 %
energy	13,4 kJ
Back-up time	564 sec @ 1 A 49 sec @ 10 A
Derating	At mains operation no derating. At back-up-/charging operation @ $T > 40^\circ\text{C}$ and $I_a > 7.5\text{ A}$ output current three charging/ discharging cycles in se- quence are admissible. Afterwards pause 60 s for cooling.
Residual ripple	< 50 mV eff
General information	
Internal device protection (input)	6,3 A (T)
Internal device protection (output)	15 A (FK2)
Internal device protection (capacitor circuit)	25 A (FK2)
Parallel operation	no
Serial operation	no
Max. load control input 1; 2 (Shutdown)	24 V DC (6 V bis 35 V DC)
Max. load message contact 3; 4 (Netz / Mains)	30 V DC max. 0,5 A
Max. load message contact 5; 6 (U_c / $V_{cap.}$)	30 V DC max. 0,5 A
Max. load message contact 7; 8; 9 (Fehler / Fault)	30 V DC max. 0,5 A
Protective system	IP 20
Operational temperature	-20 $^\circ\text{C}$... 50 $^\circ\text{C}$
Storage temperature	-20 $^\circ\text{C}$... 60 $^\circ\text{C}$
Relative humidity	95 % condensation not admissible
Max. mounting heighth (without load reduction)	2000 m above sea level
Dimensions (H x W x D)	163 mm x 189 mm x 138 mm
weight	3,0 kg

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10 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

11 Norms and regulations

Total unit	EN 50178 EN 61010-1 / EN 61010-2-201 EN 62368-1
Interference emission EN 61000-6-4	EN61000-6-4 EN55011
Noise immunity EN 61000-6-2	EN61000-4-2 EN61000-4-3 EN61000-4-4 EN61000-4-5 EN61000-4-6