

Operating Instruction

AC C-TEC 2403-1-400



DC-UPS

NCPA0724G01020

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Device designation	Note	Article number:	Nominal input voltage	Nominal output voltage
AC C-TEC 2403-1-400	Standard unit	NCPA0724G01020	400 V AC	24 V DC

Operating Instruction

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1. General

The **AC C-TEC** ensures the secure DC supply in case of mains failure. Do not use the device for any other purpose!

Before installation respectively use of the power supply, the operation instructions must be read carefully. The general information must be followed. The disregard may cause loss of all guarantee and warranty claims.

1.1 Safety regulations



REFERENCE

Before installation respectively use of the device, the operation instructions must be read carefully. The general information must be followed. The disregard may cause loss of all guarantee and warranty claims! Keep the operational instruction for later look-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.



WARNING

Even a long time after the release of the device 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!



DANGER

All work on the device may only be performed in de-energized state!
The five safety rules must be observed.
Input and output lines must be dimensioned and fused sufficiently!
Never open the housing! Repairs may only be done by the manufacturer.
Non-observance can lead to fatal electric shocks.



WARNING

Only for use in climatically controlled environment, for further details see section *10 Technical Data*.



NOTICE

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

The device is developed for protective class I and has protective system IP20. The operation is only permissible in dry rooms and closed cabinets. The unit is designed for pollution degree 2. The valid VDE regulations must be respected, especially VDE 0100 and EN60204. Supply and output lines must be dimensioned and fused sufficiently. The permissible environmental temperature range must be respected.

The DC output circuit must be fused externally to avoid the overload (see section 3.1).

To de-energize the device at the output, it must be separated from the mains and the internal energy storage must be discharged!

1.2 Short description

The **AC C-TEC** is a buffered DC power supply series and includes ultra-capacitors as energy storage inside the housing. During normal operation this capacitor is charged from the mains voltage. The connected DC consumers are supplied as well from mains voltage. In case of an interruption of the mains voltage, the energy of the ultra-capacitor is released regulated. With a DC-DC-converter the load is supplied from the capacitor until it is discharged. The backup time depends on the state of charge of the capacitor and the discharge current.

The **AC C-TEC** 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 LEDs
- Capacity extension possible with external capacitor extension modules

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.

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 chapter *10 Technical Data*). The devices must be protected against humidity and direct sunlight.

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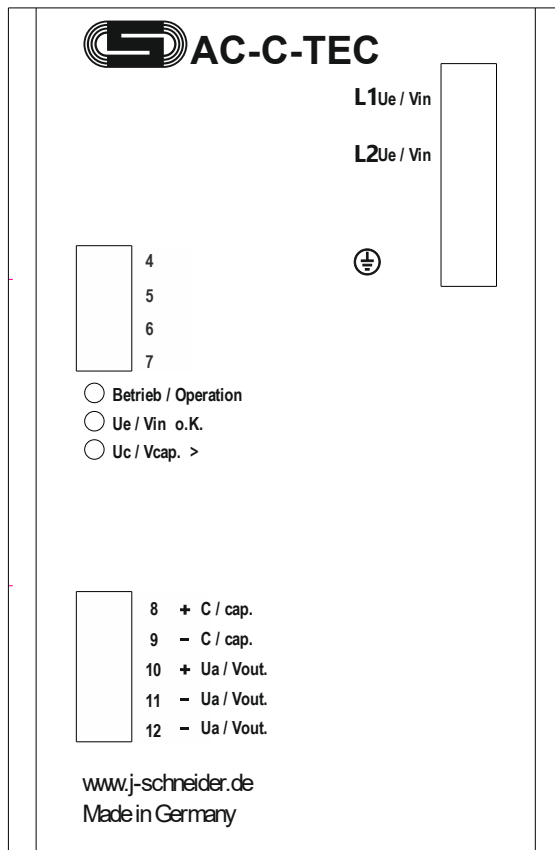
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3 Installation and connection

The **AC C-TEC** must be installed in the way, that sufficient air cooling is guaranteed. A minimum distance in the area of fair in- and outlets to neighbouring devices of at least 40mm must be observed.

The assembly must always be done in the way that sufficient air flow is guaranteed. Each fixation point must be used for device fixation.

The specific climatic conditions must be considered.



Reference

If drilling chips may fall onto respectively into the unit, it must be covered during installation.

Risk of short-circuit!



Reference

The unit is a built-in unit. The operation is only permissible in closed cabinets of housings. The unit is designed for pollution degree 2. The control cabinets or enclosures used must meet the requirements for enclosures according to EN 62368-1. Observe the specifications for ventilation openings in the enclosure as per 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 attached to the enclosure.

Snap fixation for 35 mm top hat rail
DIN EN 50022 (NS 35 x 15 / 7,5 mm)

Mounting height: 157 mm
Mounting width: 100 mm
Mounting depth: 130 / 139 mm
(without / with terminals)

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3.1 Connection

Prior to connection, the values of the DC supply must be compared with the values on the type plate. Connection according to the designations of the connection terminals. (see terminal allocation). Not used connection screws must be tightened. When connecting the consumers, pay attention to the polarity "+" and "-". The mains voltage must be switched off and secured against being switched on again by third parties. The de-energised mains cable must be connected to the mains terminal provided for this purpose, observing the mains phase. The mains connection is made at terminals "L", "N" and PE (). The operating earth must also be connected.

Terminals			Connection	
Designation	Max. tightening torque/Nm	Cable cross section/mm²		
L, N, PE(⊕)	0,6	0,5 – 2,5	Input voltage	
Ue / Vin o.K. (4 = COM, 5 = NO)	0,6	0,2 – 2,5	Message contact Ue / Vin o.K.	Maximum contact load: 30 V DC/0,5 A (potential-free relay contact)
Uc / Vcap. > (6 = COM, 7 = NO)			Message contact Uc / Vcap. >	
+ C / cap. – C / cap.	0,6	0,5 – 2,5	CEM-Module	
+ Ua / Vout. – Ua / Vout.			loads	

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

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



DANGER

The unit is prepared for protective system I (protective earthing). The operational earth must absolutely be connected. In case of non-observance touchable parts could carry voltage in case of error. Danger of fatal electric shock.



REFERENCE

In case of overload the DC output current is composed of the maximum current of the DC – DC converter as well as of the current of the AC – DC converter. The output circuit must be fused externally to avoid an overload!

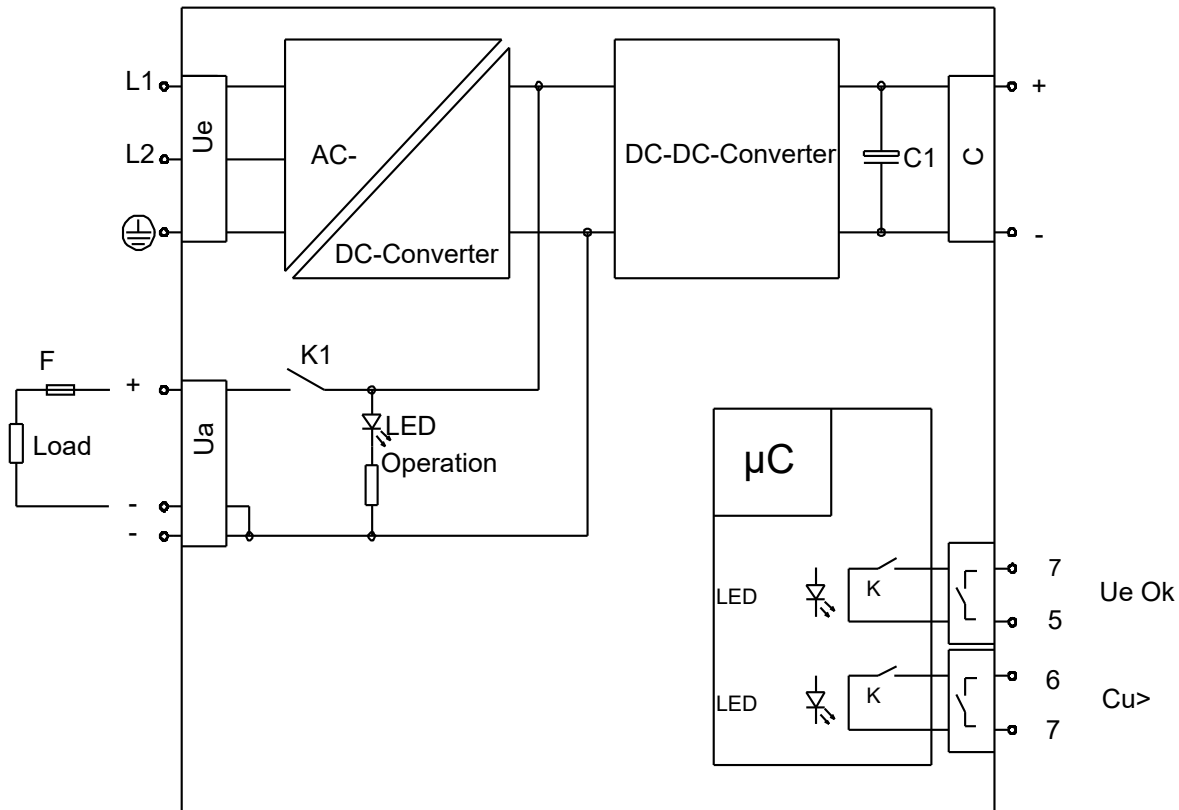
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3.2 Circuit diagram



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4 Commissioning

The **AC C-TEC** is switched on by the switch on of the mains voltage. The LED **Ue Ok** lights up.

	DANGER Prior to the first switch on check the connections. The electrical connections must only be done in voltage-free status. The non-observance may cause a touch of energized parts. Risk of fatal electric shock!
	NOTICE 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.)

4.1 Display and messages

Inside the housing there are four LEDs for status display:

LED	Designation
Operation	lights green: input voltage is present at terminal U _e
U _e Ok	lights green: in mains operation $U_E > U_{Emin}$
U _c >	blinking green (slowly 0,8 Hz): charging of the capacitors up to 80 % lights green: energy in the capacitor is > 80 %, Message contact is closed goes off: energy in the capacitor is < 30 %, Message contact is opened. blinking green (fast 3,2 Hz): capacitor is nearly discharged, output is switched off (keeps on blinking until it is totally discharged)

(The values refer to a standard parameterisation.)

5 Operation

5.1 Mains operation

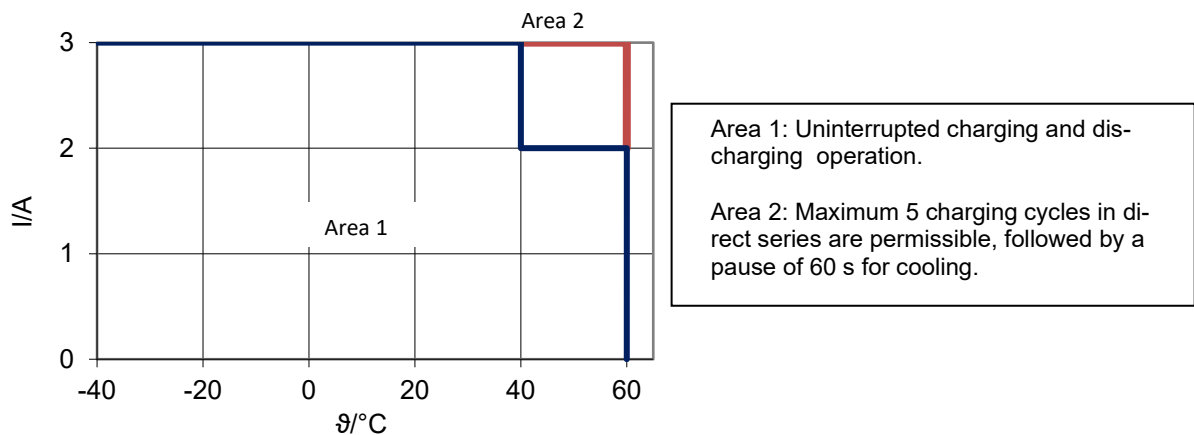
After the switch on of the mains voltage U_e the internal energy storage is charged.

Mains operation is signalled by the LED **Ue Ok**.

The charging is signalled by a slow blinking of the LED **Uc>**. If the capacitor is nearly charged, the LED **Uc>** is permanently illuminating, the corresponding relay is activated and U_a is released. A charging voltage which is too low is signalled by fast blinking of LED **Uc>**.

5.2 Derating / turn-on duration

For the examination of the turn-on only the charging and discharging cycles of the capacitors are relevant. If the back-up module is charged and works in standby mode, no warming of the energy storage occurs.



5.3 Back-up operation

By switching off of the input voltage respectively with the underrun of the minimum input voltage, the **AC C-TEC** switches over in back-up operation. The green LED **Ue Ok** goes off.

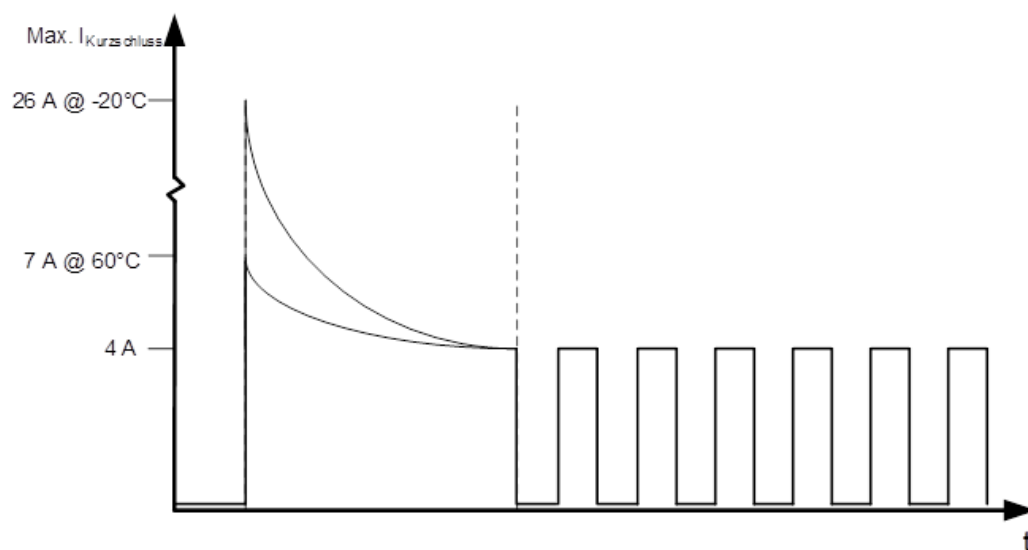
If the energy in the capacitor is $<30\%$ LED **Uc>** goes off.

If the capacitor is no longer able to buffer, the output terminal U_a is switched off.

Until the internal voltage supply breaks down, the LED **Operation** and the LED **Uc>** are blinking fast.

In case of long back-up times the self consumption of approximately 50 mA must be respected.

5.4 Short-Circuit



The unit limits the short-circuit current. The maximum short-circuit current depends on the ambient conditions and the operating state.

The unit then cyclically checks whether there is still a short circuit.

6 Maintenance



NOTICE

Clean the housing depending on its degree of contamination at least once a year, for example with a vacuum cleaner or a cleaning cloth. In particular, the ventilation openings must be free of dirt and other obstacles. Dirt must not get into the housing!

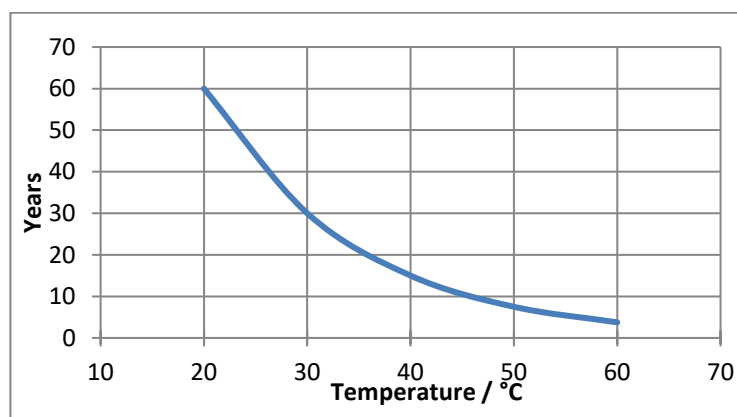


NOTICE

To ensure the back-up capability of the power supply, the units should be tested regularly in intervals of 3 to 6 months on their back-up capability.

6.1 Life duration of the capacitors

The life duration of the capacitors depends on the temperatures. The end of the life duration is reached, if the capacity drops down to 70% of the nominal capacity



6.2 Back-up time (typical)

Output Device	0,5 A	1,0 A	1,5 A	2 A	3 A
AC C-TEC 2403-1 400	118,8 s	60,6 s	38,5 s	28,5 s	18 s

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7 Putting out of operation

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

Subsequently the device buffers the load until the capacitors are discharged. Directly after the discharge the voltage-free output is signaled by the illumination of the LED **Operation** and the fast blinking of the LED **Uc>**.

The LEDs go off when the rest of the energy of the capacitors is used.



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.

8 Disposal



NOTICE

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.

9 Standards and regulations

Terminal voltage	SELV / PELV according to EN 60204-1
Ermitted interference	EN 6100-3-2 EN 6100-3-3 class A EN 55011 class B EN 62040 -2
Noise immunity	EN 61000-6-2 EN 61000-4-2 EN 61000-4-3 EN 61000-4-4 EN 61000-4-5 EN 61000-4-6 EN 61000-4-11 EN 62040-2
Complete device	EN 50178 EN 61010-1 / EN 61010-2-201 EN 62368-1

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10 Technical Data

Input	
Nominal input voltage	400 V AC ($\pm 15\%$)
Input voltage range	340...460 V AC
Nominal frequency	47 Hz ... 63 Hz
Nominal input current	0,2 A @ 400 V AC
Max. inrush current	30 A / 2 ms
Output	
Nominal output current	3 A -13% +9%
Nominal output voltage (in mains operation)	24,3 V DC $\pm 2\%$
Output voltage (in back-up operation)	23,5 V DC $\pm 2\%$
Energy capacity ¹	1,5 kJ (kWs) @ ($U_a = 22,8$ V DC, $I_a = 0,6$ A)
Current limitation	See chapter 5.4 Short-circuit
Max power loss ,worst-case'	12 W
Efficiency	88% @ ($U_e=400$ V AC; $U_a=24,3$ V DC; $I_a=I_{Nenn}$)
Fuse	
Internal device protection	2,5 A (T), 250 V
Fuse DC-output circuit (external)	3,15 A (T)
General	
Environmental temperature	-40 °C ... 60 °C
Storage temperature	-40 °C ... 60 °C
Relative humidity	$\leq 95\%$ condensation not permissible
Max. height above sea level (without power reduction)	2000 m
Dimensions (H x W x D)	157 mm x 100 mm x 130 mm
Weight	2,2 kg