Operating Instruction
AC C-*TEC* 2403

J. Schneider Elektrotechnik

DC-UPS
*NCPA0724G01****
*NCPA0724G20****

Page

Article.-No.:	Note	Energy	Nominal input voltage	Nominal output voltage
NCPA0724G01001	Standard unit	0,7 kJ	115-230 V AC	24 V DC
NCPA0724G01017	Standard unit	1,5 kJ	115-230 V AC	24 V DC
NCPA0724G20001	Device with unbuffered output	1,0 kJ	115-230 V AC	24 V DC

J. Schneider Elektrotechnik GmbH
Werner-von-Siemens-Straße 12, 77656 Offenburg Tel +49 (0) 781 206 - 0 info@j-schneider.de www.j-schneider.de WEEE- Reg.-Nr: DE 20598717

1. In General

The capacitor buffered DC power supply 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. Commissioning and maintenance may only be carried out by qualified personnel. The disregard may cause loss of all guarantee and warranty claims.

1.1 Safety regulations

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

The unit is developped 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 3.3).
To de-energize the unit at the output, it must be separated from the mains and the internal energy storage must be discharged!

1.2 Short description

The buffered DC power supply of the **AC C**-*TEC* series includes ultra-capacitors as energy storage inside the housing. During normal operation this capacitor is charged from AC-mains. The connected DC consumers are supplied as well from AC mains. In case of an interruption of the AC supply, the energy of the ultra-capacitor is realesed 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 power supply hast he following characteristics:

- Maintenance-free because of long-life ultra-capacitors
- Mikrocontroller based charging and discharging oft he ultra-capacitors
- Control of operation and status of charge with potential-free contacts and LED
- Capacity extension possible with external capacitor extension modules (only **AC C-***TEC* **2403** NCPA0724G01***)
- Additional unbuffered output (only **AC C-***TEC* **2403** NCPA0724G20***)

1.3 Intended Use

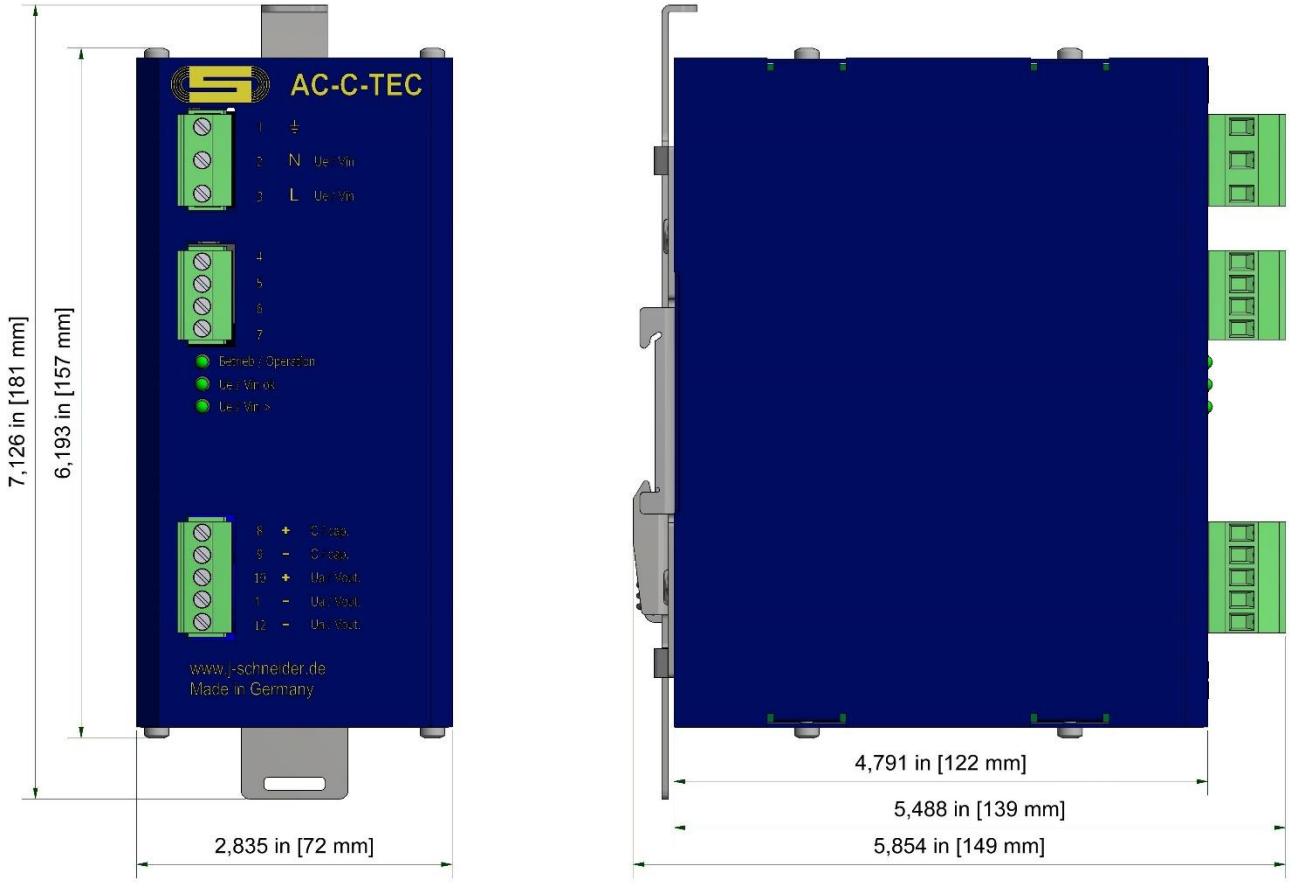
The device is designed and developed for the industrial and plant engineering sector. The installation of the device is to be carried out exclusively by qualified electricians.
If the device is operated outside of its intended use, the protection supported by the device cannot be guaranteed.

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 agains humidity and direct sunlight.

3 Installation and connection

3.1 Dimensions



3.2 Installation

The device must be installed in the way, that sufficient air cooling is guaranteed. A minimum distance in the area o 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 environmental temperature may not be exceeded. The maximum installation height without load reduction amounts 2000 m above sealevel.

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

☞	**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.

3.3 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.

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Terminals			Connection	
Designation	**Max. tightening torque/Nm**	**Cable cross section/mm²**		
⏚ (1), N Ue / Vin (2), L Ue / Vin (3),	0,4	0,5 – 2,5	Input voltage	
Ue / Vin o.k. (4 = COM, 5 = NO)	0,4	0,1 – 2,5	Message contact Ue / Vin o.K.	Maximum contact load: 30 V DC/0,5 A (potential-free relay contact)
U_C / Vcap. > (6 = COM, 7 = NO)			Message contact U_C / Vcap. >	
+ C/cap. (8), – C/cap. (9)	0,4	0,5 – 2,5	CEM-Module	
+ Ua/Vout. (10), – Ua/Vout. (11, 12)			loads	

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Terminals			Connection	
Designation	**Max. tightening torque/Nm**	**Cable cross section/mm²**		
⏚ (1), N Ue / Uin (2), L Ue / Uin (3),	0,4	0,5 – 2,5	Input voltage	
Ue / Uin OK (4 = COM, 5 = NO)	0,4	0,1 – 2,5	Message contact Ue / Uin OK	Maximum contact load: 30 V DC/0,5 A (potential-free relay contact)
Uk / U_C > (6 = COM, 7 = NO)			Message contact Uk / Uc >	
+ Ua/Uout 2 (8) – Ua/Uout 2 (9)	0,4	0,5 – 2,5	Loads (only in mains operation)	
+ Ua/Uout 1 (10) – Ua/Uout 1 (11, 12)			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.

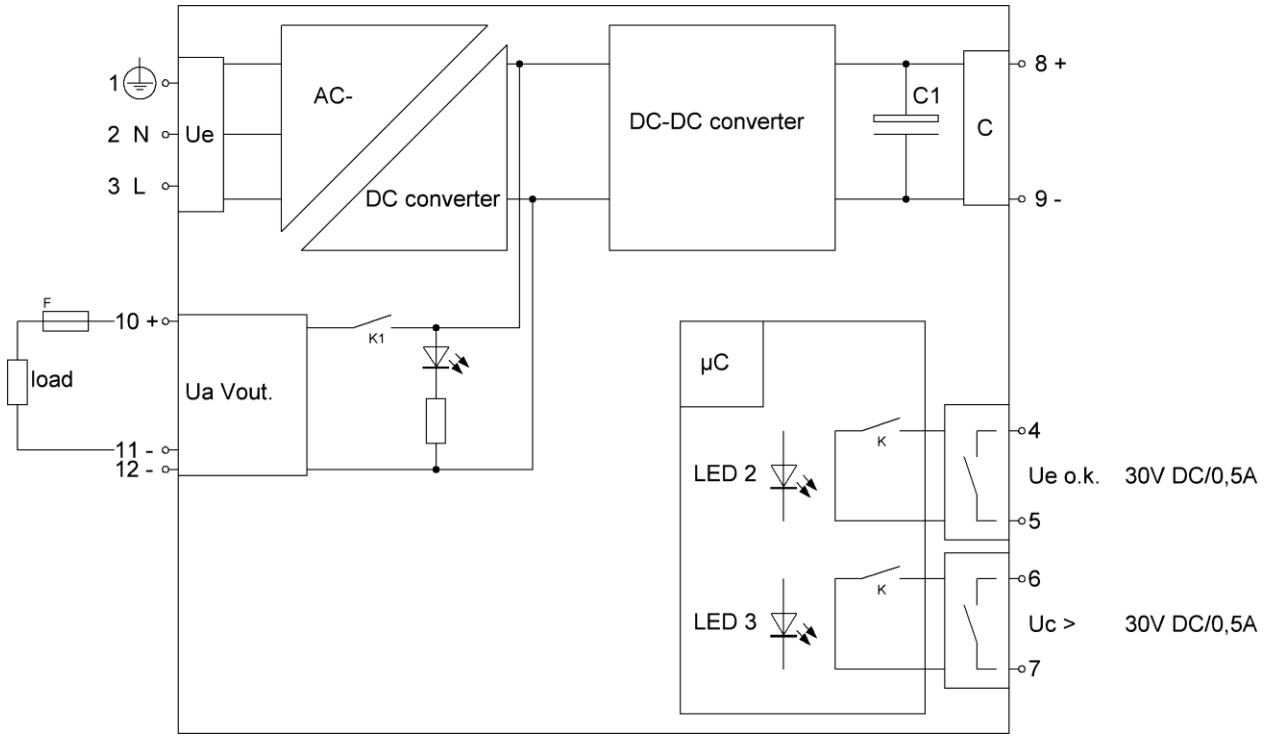
REFERENCE
The external energy supply must be connected to a circuit with an own, specially marked fuse (16A).
From this fusing up to the supply point of the low voltage side of the electrical mains (house connection box) it may be fused only one another time.
It must be excluded, that the circuit tot he external energy supply is interrupted because of the switch off of other means of production.

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!

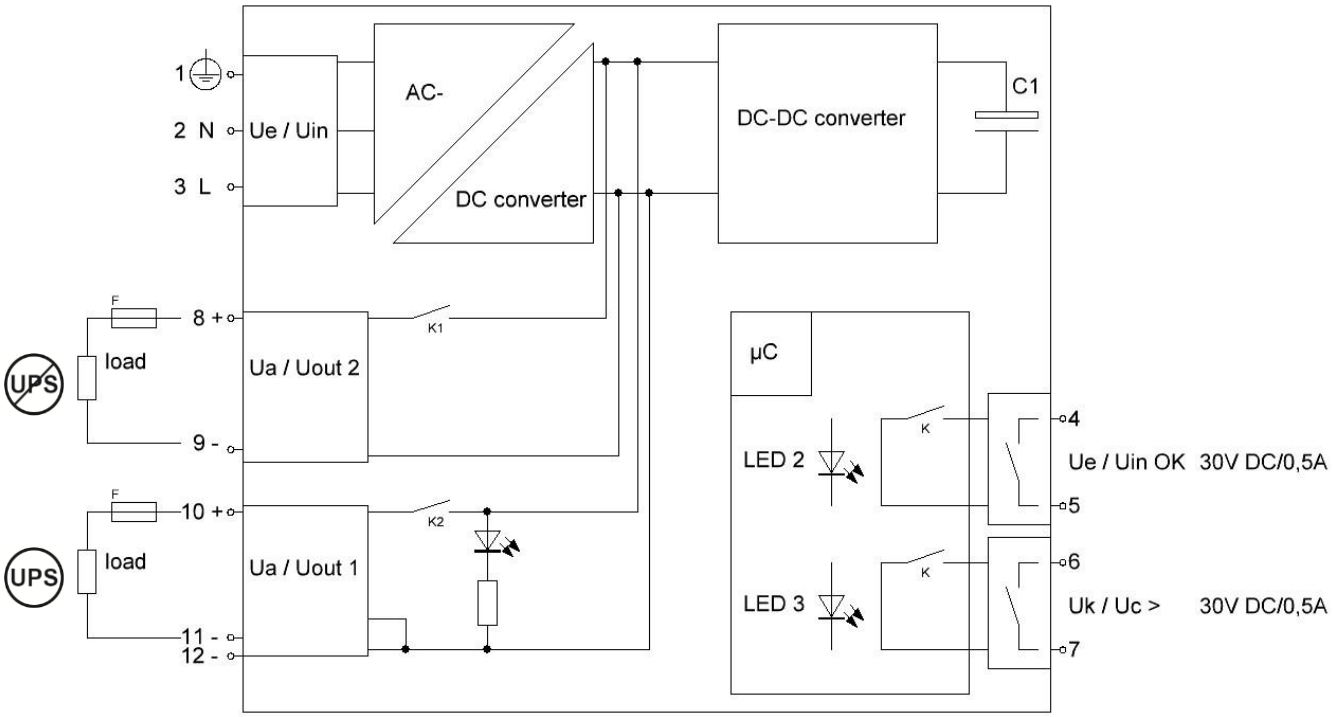
DANGER
The unit is prepared for protective system I (protective earthing). The operational earth must absolutely be connected. In case of non-observance touchable parts could carry voltage in case of error. Danger of fatal electric shock.

3.4 Circuit diagram

3.4.1 AC C-*TEC* 2403 NCPA0724G01***



3.4.2 AC C-*TEC* 2403 NCPA0724G20***



4 Putting into operation

The power supply is switched on by the switch on of the mains voltage (230 V AC). The status-LED „Uin OK“ illuminates.

	**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!.
	**REFERENCE** If the devices are built in systems, in which over volages 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 msut be disconneted during the test.)

4.1 Display and messages

Inside the housing there are four LEDs for status display:

Display	Designation
Operation	LED green illuminates: - if input voltage is present at terminal Ue - as long as the device is supplied internally
Uin OK	LED green illuminates: - if mains operation $U_E > U_{Emin}$
Uc>	LED green: - is blinking slowly (0,8 Hz): In case of charging of the capacitors up to 80 % - illuminates: If the energy in the capacitor is > 80 % Message contact is closed. - goes out: If the energy in the capacitor is < 30 % Message contact is opened. - is blinking fast (3,2 Hz): If the capacitor is nearly discharged, output is switched off (keeps on blinking until it is totally discharged)

(The LED-displays are coupled with corresponding message contacts.)
(The values refer to a standard parameterisation.)

5 Operation

5.1 Mains operation

After the switch on oft he input voltage Ue the internal energy storage is charged.
Mains operation is signalised by the LED **Uin OK**.
The charging is signalised 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 Ua is released. A charging voltage which is to low is signalized by fast blinking of LED **Uc>.**

The **AC C-*TEC* 2403** NCPA0724G20*** has an additional output **Ua/Uout 2**, which is only available in mains operation.
The output **Ua/Uout 2** is switched off in buffer mode.

In nomal operation 5 charging cycles in direct series are permissible, for special load cases see chapter *5.3 Cyclic charging and discharging operation*.

5.2 Derating

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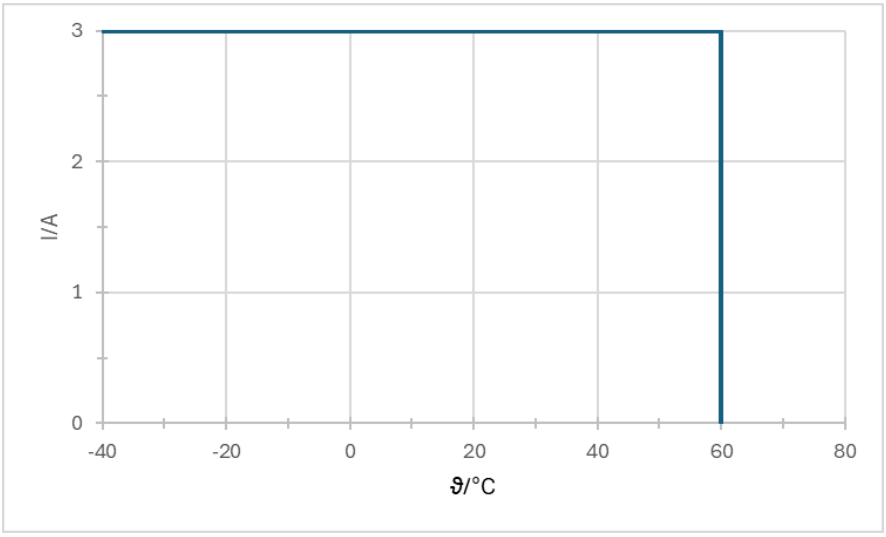
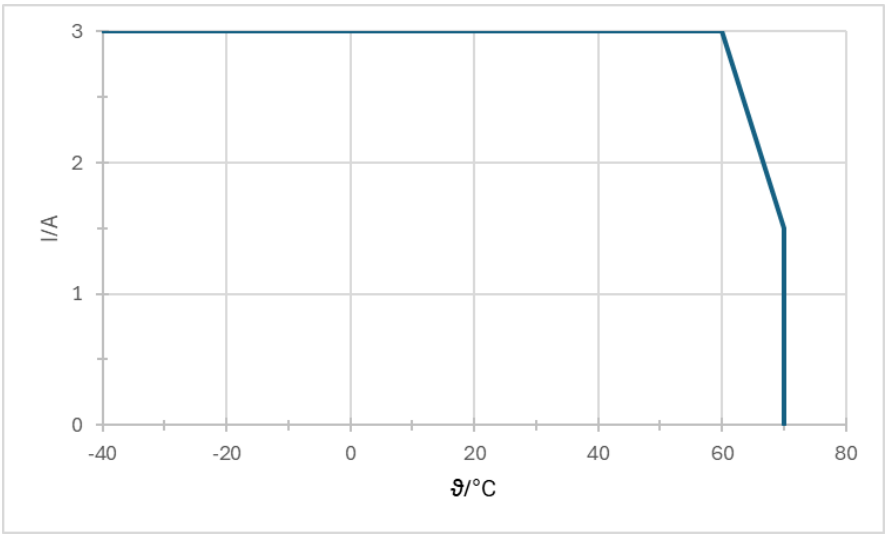


AC C-*TEC* 2403 NCPA0724G20***



5.3 Cyclic charging and discharging operation

For the examination of the on-time 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.

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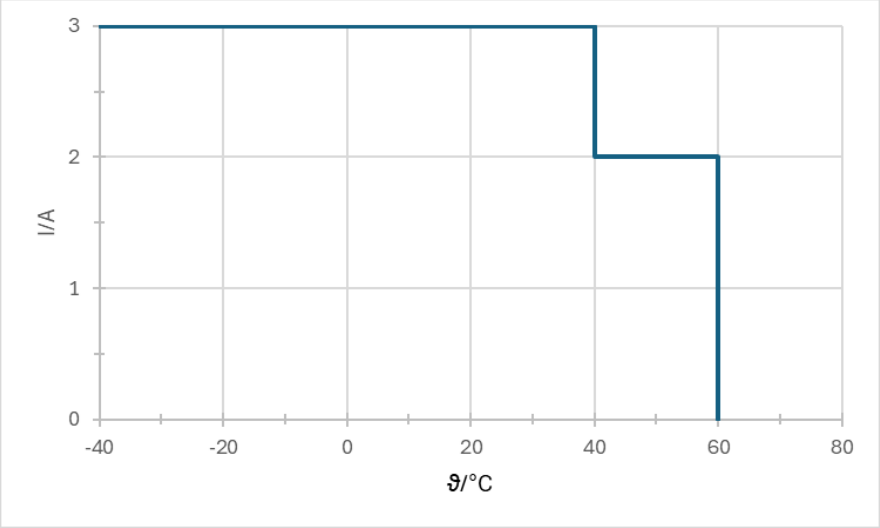

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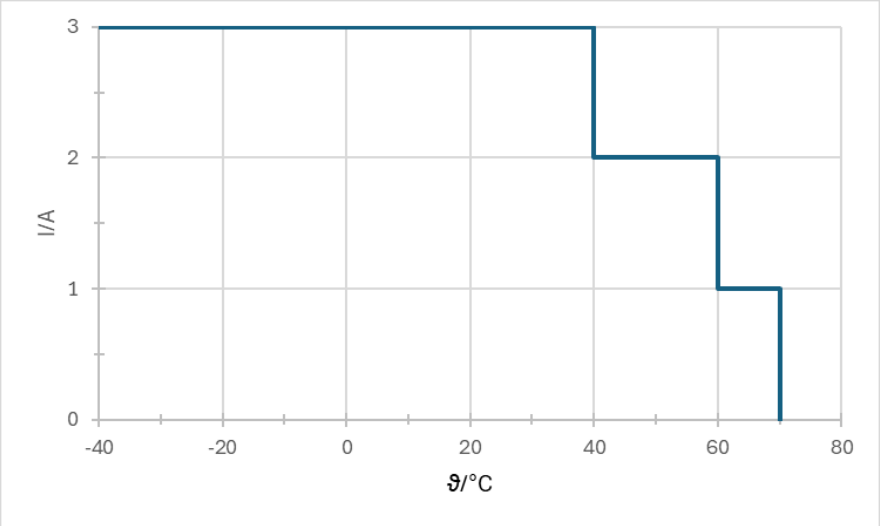


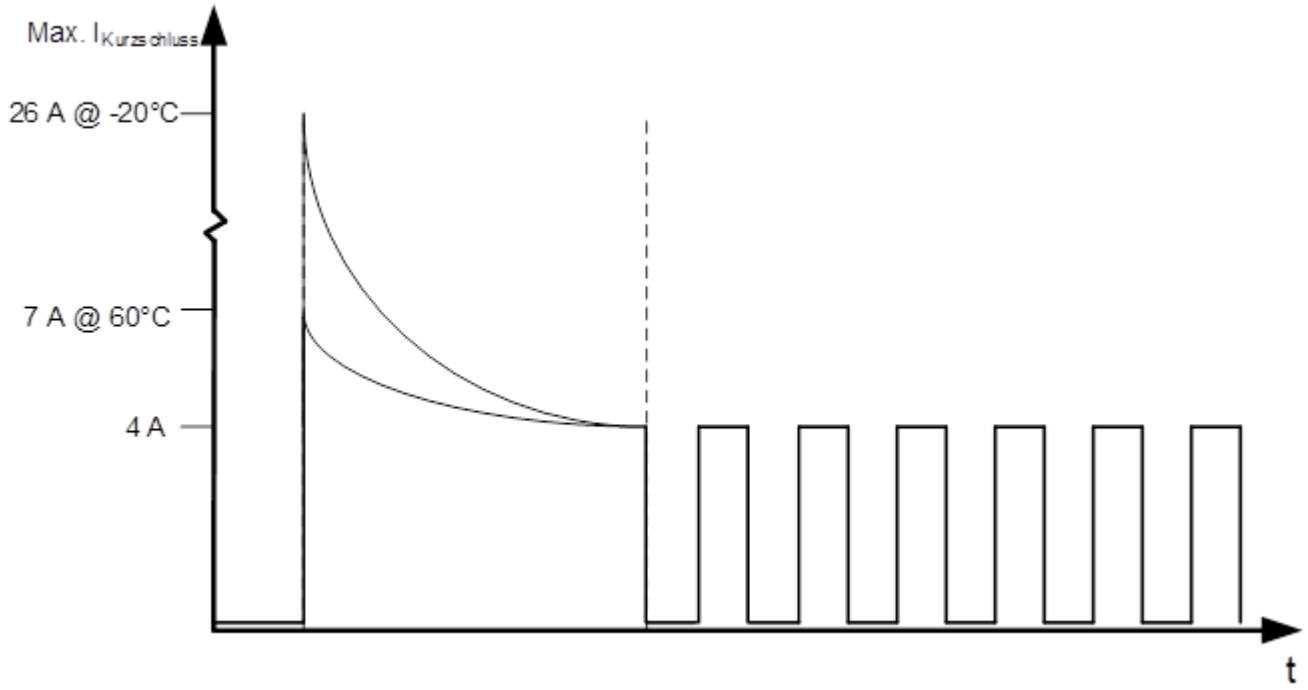
5.4 Back-up operation

With the switch off of the input voltage respectively with the underrun of the minimum input voltage, the C-TEC switches over in back-up operation. The green LED **Uin OK** goes out.
If the energy in the capacitor is <30% **Uc>** goes out.
If the capacitor is no longer able to buffer, the output terminal Ua is switched off.
Until the internal voltage supply breaks down, the LED **Operation** and the LED **Uc>** are blinking fast.

5.5 Back-up time (typical)

I_{output} / Device	0,5 A	1,0 A	1,5 A	2 A	3 A
AC C-*TEC* 2403 NCPA0724G01001	46,8 s	23,0 s	14,6 s	10,2 s	6,2 s
AC C-*TEC* 2403 NCPA0724G01017	118,8 s	60,6 s	38,5 s	28,5 s	18,0 s
AC C-*TEC* 2403 NCPA0724G20001	85,8 s	42,6 s	26,8 s	18,8 s	10,3 s

5.6 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

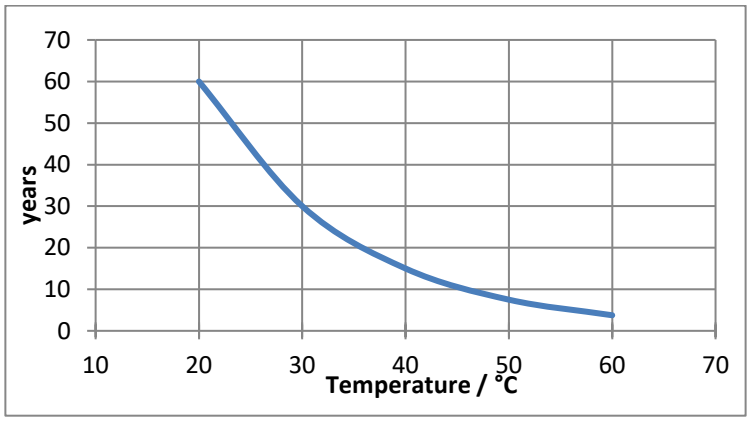
Inside the housing there are no parts, which should be maintained by the user.

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

The housing must be cleaned at least 1 time per year, depending on the degree of pollution.

6.1 Life duration of the capacitors

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



7 Putting out of operation

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

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

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

CAUTION
It is prohibited to disconnect or establish electrical connections during operation! Failure to observe this warning may cause electric arcs on the cables, which may lead to burns.

8 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..

9 Norms and regulations

Terminal voltage	SELV / PELV according to EN 50178
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 62040-2 EN61000-4-2 (Static discharge ESD) EN61000-4-3 (electromagnetic fields) EN61000-4-4 (fast transients / Burst) AC IN 2kV, others 2kV EN61000-4-5 (Surge current loads / Surge) AC IN 2kV/4kV EN61000-4-6 (conducted noise immunity) EN61000-4-11 (voltage interruptions)
Total unit	EN 50178 EN 61010-1 / EN 61010-2-201 EN 62368-1 UL 508 / C22.2

10 Technical Data

10.1 AC C-*TEC* 2403 NCPA0724G01***

Input		
Nominal input voltage		115 V…230 V AC ±15 %
Nominal input voltage range		97,8 V…264,5 V AC ±0 %
Nominal frequency		47 Hz…63 Hz
Nominal input current		1,5 A @ 115 V AC 0,75 A @ 230 V AC
Max. inrush current		30 A / 2 ms
Output		
Nominal output current		3 A -13 % +9 %
Nominal output voltage		24 V DC
Output voltage (in mains operation)		24,3 V DC ±2 %
Output voltage (in back-up operation)		23,5 V DC ±2 %
Energy (typical)	**AC C-*TEC* 2403 NCPA0724G01001** **AC C-*TEC* 2403 NCPA0724G01017**	0,7 kJ @ (U_a = 22,8 V DC, I_a = 0,6 A) 1,5 kJ @ (U_a = 22,8 V DC, I_a = 0,6 A)
Current limitation		See chapter 5.5 Short-circuit
Max. power loss “worst-case”		12 W
Efficiency		88% @ (U_e=230 V AC; U_a=24,3 V DC; I_a=I_{nom})
Fuse		
Internal device protection		2,5 A (T), 250 V
Fusing DC-output circuit (external)		3,15 A (T)
General		
Protective System		IP20
Operational temperature		-40 °C…60 °C
Storage temperature		-40 °C…60 °C
Rel. humidity		≤95% no condensation
Max. installation height (without load reduction)		2000 m above sea level
Dimensions (H x W x D)		157 mm x 72 mm x 139 mm
Weight		0,9 kg

10.2 AC C-*TEC* 2403 NCPA0724G20***

Input	
Nominal input voltage	115 V…230 V AC ±15 %
Nominal input voltage range	97,8 V…264,5 V AC ±0 %
Nominal frequency	47 Hz…63 Hz
Nominal input current	1,5 A @ 115 V AC 0,75 A @ 230 V AC
Max. inrush current	30 A / 2 ms
Output	
Nominal output current Uout1, Uout2	3 A -13 % +9 %
Max. device output current Uout1 + Uout2	3 A -13 % +9 %
Derating max. device output current	-0,15 A / °C >60 °C
Nominal output voltage	24 V DC
Output voltage (in mains operation)	24,3 V DC ±2 %
Output voltage (in back-up operation)	23,5 V DC ±2 %
Energy (typical)	1,0 kJ @ (Ua = 23,2 V DC, Ia = 0,6 A)
Current limitation	See chapter 5.5 Short-circuit
Max. power loss “worst-case”	12 W
Efficiency	88% @ (U_e=230 V AC; U_a=24,3 V DC; I_a=I_{nom})
Fuse	
Internal device protection	2,5 A (T), 250 V
Fusing DC-output circuit (external)	3,15 A (T)
General	
Protective System	IP20
Operational temperature	-40 °C…70 °C
Storage temperature	-40 °C…70 °C
Rel. humidity	≤95% no condensation
Max. installation height (without load reduction)	2000 m above sea level
Dimensions (H x W x D)	157 mm x 72 mm x 139 mm
Weight	0,9 kg