Operation Instruction

"**C**-*TEC* 2408"

NCPA0607G01001

device designation	comments	art. no.	nominal input voltage	nominal output voltage
C-*TEC* 2408-20kJ-001	standard unit, input decoupled	NCPA060601G01001	12V / 24V DC	12V / 24V DC

Adresse:
Helmholtzstrasse 13
D-77652 Offenburg
Postfach 2327
D-77613 Offenburg

Tel. +49/(0)781/206-0
Fax +49/(0)781/25318
www.j-schneider.de
info@j-schneider.de

Geschäftsführer:
Bettina Schneider Dipl.Betriebswirt (BA)
Rolf Anti Dipl.-Wirt.-Ing.(FH)
Amtsgericht Freiburg HRB 470758

Reg.-Nr. 2750

Safety regulations

- The operation instructions must be read carefully before use respectively installation of the unit, the general information must be followed.
  The disregard may cause the loss of all guarantee and warranty claims!
- The installation, start-up and maintenance may only be done by trained personnel!
- The valid VDE-regulations, especially DIN VDE 0100 and EN 60204 are to be respected!
  Supply and outgoing feeder must be calculated and fused in a sufficient way (values look at point 3.1)!
- The unit is a built-in device. The operation is allowed only in dry rooms.
- The allowed environmental temperature range is to be respected!
- The unit may only be opened by qualified personnel
  In case of failure we recommend to send the unit back to the manufacturer.
- Also long time after the release of the **C**-*TEC* strong energy may be stored inside the unit! Before disassembling the unit, the capacitors must be checked. If the capacitors are short-circuited there is danger of heat and firebrands

The disregard of the safety regulations may cause perilous injuries!

1. Short description

The DC buffer power supply in the **C-***TEC* range uses an ultra capacitor as energy storage. This capacitor is charged during normal operation from an external, regulated DC-power supply. In case of interruption of the dc supply the energy of the capacitors is released. The load is supplied by the buffer module until it is discharged. The back-up time depends on the state of charge of the capacitors and on the discharge current

The power supply has the following features:

- maintenance-free because of long-life ultra capacitors
- microcontroller based charging and discharging of the ultra capacitors
- parameterisation by USB-interface possible
- control of operation and state of charge with potential-free contacts and LED's
- compatible with *TEC***Control**-Software

2. Norms and Regulations

terminal voltage	SELV / PELV according to EN 60950 / EN 50178	
emitted interference:	EN 61000-3-2 and EN 61000-3-3 class A EN 55011 class B EN 62040-2	
interference resistance:	EN 62040-2	
EN 61000-6-2	EN61000-4-2 (static discharge ESD)	8kV/6kV
	EN61000-4-3 (electro magnetic fields)	10V/m 27 – 1000MHz 3V/m 1400 - 2700MHz
	EN61000-4-4 (fast transients / burst)	DC IN, DC OUT 2kV others 1kV
	EN61000-4-5 (surge)	DC IN 0.5kV
	EN61000-4-6 (conducted stability)	10V 150kHz – 80MHz
	EN61000-4-11 (voltage drops)	bypass by ultracapacitors
total unit	EN 50178 / EN 60950	

Adresse:
Helmholtzstrasse 13
D-77652 Offenburg
Postfach 2327
D-77613 Offenburg

Tel. +49/(0)781/206-0
Fax +49/(0)781/25318
www.j-schneider.de
info@j-schneider.de

Geschäftsführer:
Bettina Schneider Dipl.Betriebswirt (BA)
Rolf Anti Dipl.-Wirt.-Ing.(FH)
Amtsgericht Freiburg HRB 470758

Reg.-Nr. 2750

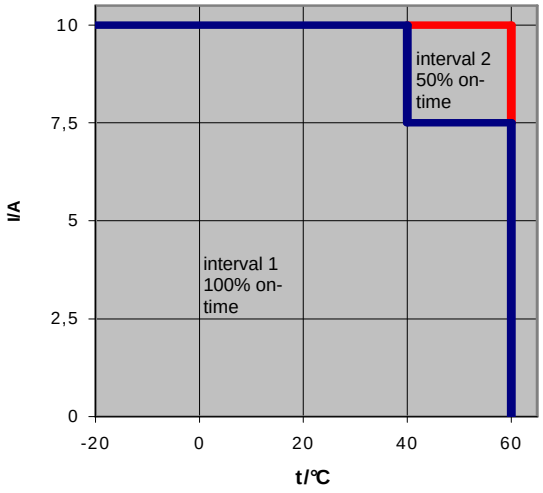
3.1. Technical Data

nominal input voltage	12V / 24V DC
input voltage range	10,5V - 27V DC 12V – 12,5% - 24V + 12,5%
nominal input current	10,0 A
max. inrush current	35A / 2ms
output voltage in buffer operation system voltage 12V system voltage 24V	 11,7V DC ±4% 23,5V DC±2%
nominal output current	8A DC
control of limiting current	8,3A DC ±0,1A
shut down if the limiting current is exceeded	after 1,5 Sek.
current limitation	1,05...1,2 x I_{ANom}
efficiency Ua=23,5V DC, Ia= I_{ANom}	>90%
max. power loss 'worst-case'	20W

fusing input	15A (FK2) (internal)
fusing DC- output circuit	15A (FK2) (internal) 10A T (external)
fusing capacitor circuit	25A (FK2) (internal)
type of connection input 'U_E'	spring type terminal max. 2,5mm²
type of connection output 'U_A'	spring type terminal max. 2,5mm²
type of connection messages 'I/O'	spring type terminal max. 1mm²
type of connection USB	USB-B Buchse
protective system	IP 20 u. EN 60529
weight	2,1kg
storage temperature	-20...60℃
environmental temperature	-20 - 60℃
dimensions	165 x 130 x 145mm (h x w x d)

3.2. On-time

on-time depending on load current and environmental temperature



For the duration of on-time only the charge and discharge cycles are relevant. If the buffer-module is charged and works in the standby-mode there is no heating of the unit. From the thermal point of view this can be compared with a switched-off unit.

interval 1: 100% on-time
Un-interrupted charge and discharge operation permissible.
interval 2: 50% on-time
five charge- and discharge-cycles in direct series

Adresse:
Helmholtzstrasse 13
D-77652 Offenburg
Postfach 2327
D-77613 Offenburg

Tel. +49/(0)781/206-0
Fax +49/(0)781/25318
www.j-schneider.de
info@j-schneider.de

Geschäftsführer:
Bettina Schneider Dipl.Betriebswirt (BA)
Rolf Anti Dipl.-Wirt.-Ing.(FH)
Amtsgericht Freiburg HRB 470758

Reg.-Nr. 2750

3.3 Calculation of the back-up time

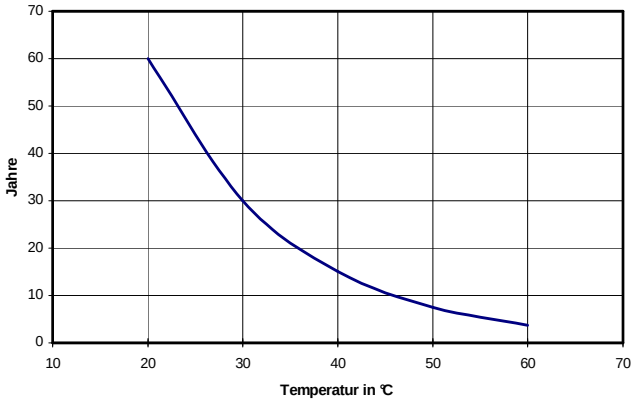
The possible back-up time can be calculated with the following principle:

$$\text{back-up time in sec.} = \frac{\text{energy of the capacitor in J} \times \eta}{\text{output current} \times \text{output voltage}}$$

example:

$$91 \text{ Sec.} = \frac{12000 \text{ J} \times 0{,}9}{5\text{A} \times 23{,}5\text{V}}$$

3.4 Life duration of the capacitors



The life duration of the capacitors depends on the temperature!
The end of the life duration is reached, when the capacity drops below 70% of the nominal capacity.

3.4 Display and message outputs

operation	LED green, illuminates at: system voltage present on terminal U_E respectively Uc	-
U_E-o.k. [1)]	LED green, illuminates at: external supply is present: $U_E > U_{SYSTEM}$	potential-free relay-contact, changer, max. contact load 30V DC/ 0,5A
U_C> [1)]	LED green, illuminates at: energy in the capacitor > 80% LED green, expires at: energy in the capacitor < 30% (values refer to standard parameterisation)	potential-free relay-contact, closer, max. contact load 30V DC/ 0,5A
error [1)]	LED red, illuminates at • over voltage at internal capacitor • over- or under voltage at terminal 'U_E' • over current at output	potential-free relay-contact, closer, max. contact load 30V DC/ 0,5A

[1)] The message contact is coupled with the LED-display.
When the LED illuminates the corresponding relays is tightened..

3.5 Message input

Shut-Down	shut down of the UPS-operation	potential free switch input, switch level: 24V DC (6-45 V DC)

Adresse:
Helmholtzstrasse 13
D-77652 Offenburg
Postfach 2327
D-77613 Offenburg

Tel. +49/(0)781/206-0
Fax +49/(0)781/25318
www.j-schneider.de
info@j-schneider.de

Geschäftsführer:
Bettina Schneider Dipl.Betriebswirt (BA)
Rolf Anti Dipl.-Wirt.-Ing.(FH)
Amtsgericht Freiburg HRB 470758

Reg.-Nr. 2750

4. Installation

The power supply must be installed in that way that the necessary cooling is guaranteed. A minimum distance from the cooling vents to neighbouring devices of ≥ 40mm must be observed. The device must be built-in in the way that sufficient air circulation is ensured. The specified environmental temperature must not be exceeded. The max. mounting height without power derating is 1000m above NN. During the installation the unit must be covered if drilling chips may fall on respectively into the unit. (**danger of short-circuit!)**

5. Connection

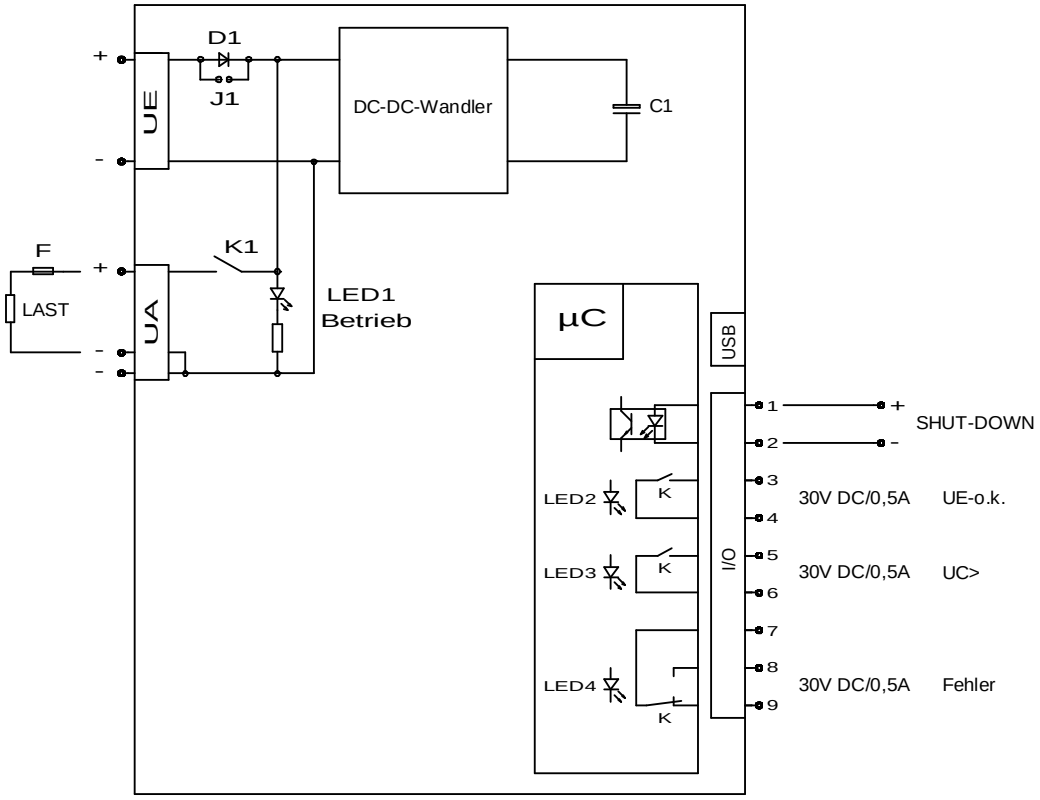
Before the connection the values of the dc supply must be compared with the values on the type plate. Connection according to the designation of the connection terminals. (look at circuit diagram and terminal assignment)

connection:	**terminal:**
DC-input	terminal 'U_E' +, -
DC-output (load)	terminal 'U_A' +, -
control input Shut-Down	terminal 'I/O' 1 + / 2 -
message 'U_E-o.k.'	'I/O' 3 / 4 (closer)

connection:	**terminal:**
message 'U_C>'	'I/O' 5 / 6 (closer)
message 'error':	'I/O' 7=COM, 8=NO, 9=NC
PC-interface	USB

In the case of overload, the DC output current comprises the maximum current of the buffer module as well as the current of the supplying DC mains. To prevent overload of the DC output circuit, the circuit is to be protected externally ! (Value see Section 3.1)

6. Principle circuit diagramm



Adresse:
Helmholtzstrasse 13
D-77652 Offenburg
Postfach 2327
D-77613 Offenburg

Tel. +49/(0)781/206-0
Fax +49/(0)781/25318
www.j-schneider.de
info@j-schneider.de

Geschäftsführer:
Bettina Schneider Dipl.Betriebswirt (BA)
Rolf Anti Dipl.-Wirt.-Ing.(FH)
Amtsgericht Freiburg HRB 470758

Reg.-Nr. 2750

7. Putting into operation

The unit is put into operation by switching on the DC-supply at terminal ‘Ue’.

If the unit is built into systems, in which over voltages are required for the testing (for example according to EN60204-1 / VDE0113 part1 19.4 voltage control), the unit must be separated from the test assembly before the voltage is switched on.
(Original text EN60204-1 : components, which are not dimensioned for the testing voltage must be separated during the testing.)

Before switching on the unit for the first time, please verify the connections!
Realize electrical connections only when the unit is un-energized!

8. Operation

After switching on the Ui the supply voltage is measured and the corresponding system voltage 12V or 24V is automatically chosen. Approximately 1,5 seconds after switching on, the output voltage is released and the connected consumers are supplied. As well the buffer capacitor is charged. This operation mode is indicated with the illumination of the green LED ‘U_E-o.k.’ By switching off the supply respectively by under run the minimum input voltage the **C**-*TEC* switches over to back-up operation. The green LED ‘U_E-o.k.’ expires. The illumination of a LED effects always the activation of a relay (look at principle circuit diagram point 6).

8.1 Device alternative with decoupled input (x-M01)

The device gets the energy to charge the capacitors und to supply the consumer (terminal U_A) from the input voltage (terminal U_E). Consumers which are connected in parallel to the input terminal are not backed-up because they are decoupled with diode D1 (look at principle circuit diagram). The supplying power supply may also supply consumers which are not backed up. Because of the flow-through voltage of the diode 1 the supply voltage to charge the back-up module should be at least 0,7 V higher than the system voltage.

8.2 Device alternative without decoupled input (x-M02)

The bridge J1 is closed. So consumers which are connected to terminal U_E are also backed-up. The total current of all consumers which are connected to the terminals U_E and U_A must not exceed the maximum output current of the buffer module. In this operation mode the possibility exists to back-up different consumers over different intervals. The consumers which are connected to terminal U_A can be switched off with the time function. The consumers at the terminal U_E are backed-up until the energy in the capacitors is spent.
This device alternative is suitable to substitute a battery because charge and discharge can be realized at terminal U_E . The + and – connections of terminal U_E must be regarded as connection poles of a battery.

9 Shut-Down

The back-up operation can be cut short by connecting a +24V DC-control voltage at connection 1 (+) and 2 (-) of terminal strip ‘I/O’ . This effects that the connected consumers are switched off in a defined state. Besides a defined rest energy is kept in the capacitor because of the cut short. A subsequent charging of the capacitors is shorter.

10. Putting out of operation

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 Shut-down without back-up operation. (look at point 9) All LED’s must expire..

Never undo electrical connections whilst the unit is in operation!
It also not permitted to make electrical connections whilst the unit is in operation!

11. Maintenance

There are no parts within the unit which should be maintained by the user.
The unit should be cleaned regularly depending on the degree of soiling.

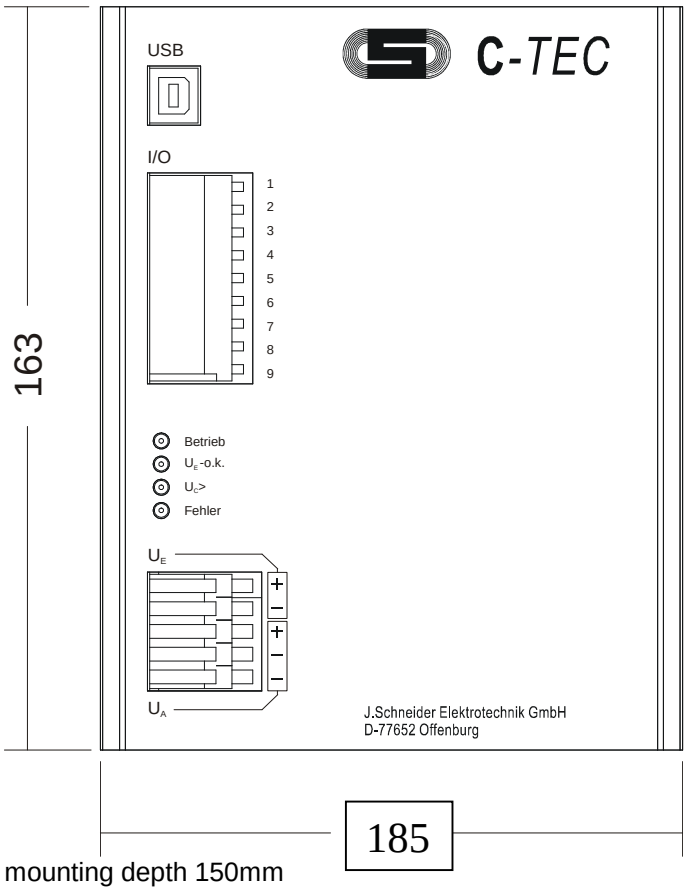
Adresse:
Helmholtzstrasse 13
D-77652 Offenburg
Postfach 2327
D-77613 Offenburg

Tel. +49/(0)781/206-0
Fax +49/(0)781/25318
www.j-schneider.de
info@j-schneider.de

Geschäftsführer:
Bettina Schneider Dipl.Betriebswirt (BA)
Rolf Anti Dipl.-Wirt.-Ing.(FH)
Amtsgericht Freiburg HRB 470758

12. Installation drawings

snap mounting for 35 mm standard profil rail
DIN EN 50022 (NS -35 x 15 / 7,5mm)



mounting depth 150mm

Adresse:
Helmholtzstrasse 13
D-77652 Offenburg
Postfach 2327
D-77613 Offenburg

Tel. +49/(0)781/206-0
Fax +49/(0)781/25318
www.j-schneider.de
info@j-schneider.de

Geschäftsführer:
Bettina Schneider Dipl.Betriebswirt (BA)
Rolf Anti Dipl.-Wirt.-Ing.(FH)
Amtsgericht Freiburg HRB 470758