






Operating Instruction AC CAPTEC 2401 / 1202

General

Safety regulations

	<p>REFERENCE</p> <p>The operating instructions are intended for qualified electricians. Read the operating instructions before installing or using the device. Adhere to the instructions. Failure to do so may result in the loss of all warranty claims! Keep the operating instructions for future reference.</p>
	<p>WARNING</p> <p>Only specialized electricians are authorized to install, put into operation, maintain or put out of operation the unit. In-proper handling with voltage or capacitors may cause arcs and severe burns.</p>
	<p>DANGER</p> <p>All work on the unit may only be performed in deenergized 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.</p>
	<p>REFERENCE</p> <p>Only for use in climatically controlled environment, for further details see section 10 Technical Data Failure to observe this may result in failure of the unit and damage to property.</p>
	<p>REFERENCE</p> <p>In the event of malfunction or damage, switch off the mains voltage immediately and return the unit to the manufacturer for inspection.</p>

Short Description

The **AC CAPTEC 2401 / 1202** is a regulated power supply unit with ultracapacitors and integrated line protection of the output. In addition to the regulated power supply of the load, the integrated ultracapacitors are charged within a few seconds during mains operation. In the event of a mains failure, the **AC CAPTEC 2401 / 1202** ensures uninterrupted and safe maintenance of the DC voltage within the scope of the stored energy. In mains operation, pulse loads of up to 10 A (120 ms) are permissible with charged ultracapacitors. The pulse current can selectively trigger a circuit breaker, even if several loads are connected.

The **AC CAPTEC 2401 / 1202** has the following characteristics:

- Regulated power supply with safe separation
- Wide input voltage range 80...264 V AC
- Wide temperature range -40 °C...+60 °C
- 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 LED's and signal contacts

Intended Use

The **AC CAPTEC 2401 / 1202** is designed und developed for the industrial and plant engineering sector and in-stallation in sub-distributions and building installations. The installation of the **AC CAPTEC 2401 / 1202** may only be carried out by specialized electricians.

If the **AC CAPTEC 2401 / 1202** is used outside the intended use, the protection, supported by the **AC CAPTEC 2401 / 1202** cannot be guaranteed.

Device Variants

Article number	Notes	Input voltage range	Nominal output voltage
NCPA1906G01001	Standard unit	80...264 V AC (80..100 V AC @ 80 % Last)	24 V DC
NCPA1906G10001	12 V unit	80...264 V AC (80..100 V AC @ 80 % Last)	12 V DC

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Transportation and Storage

The transportation of the **AC CAPTEC 2401 / 1202** may only be done in original packaging. During transportation and storage the compliance with the environmental conditions must be observed. (see section 10 *Technical Data*). The **AC CAPTEC 2401 / 1202** must be protected against humidity and direct sunlight.

Installation and Connection

Dimensions



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Installation

The installation must be done in the way, that sufficient cooling is guaranteed. At the ventilation openings, maintain a minimum distance of 40 mm from adjacent units or assemblies. Ensure the necessary air circulation. There must be no heat sources under the **AC CAPTEC 2401 / 1202**. Observe the specified climatic conditions (see *10 Technical Data*).



WARNING

Energy is stored in the ultracapacitors. Before mounting, make sure that the unit is discharged. Failure to do so may result in severe burns due to electric arcs



REFERENCE

The unit must be covered during installation, if drilling chips may fall onto respectively into the unit. Risk of short-circuit!



REFERENCE

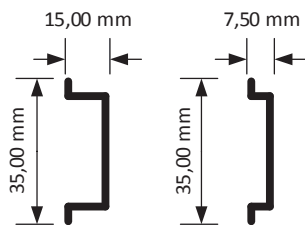
The unit is a built in unit and is designed for pollution degree 2. Operation is only permitted in dry rooms and in closed control cabinets or enclosures. Attention must be paid to fire protection. The control cabinets or enclosures used must comply with the requirements for enclosures according to EN 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" must be affixed to the enclosure. (ASR A1.3 W012) must be affixed to the enclosure.



REFERENCE

The unit has protection class 2.
The connection terminals must not be freely accessible to a layperson.

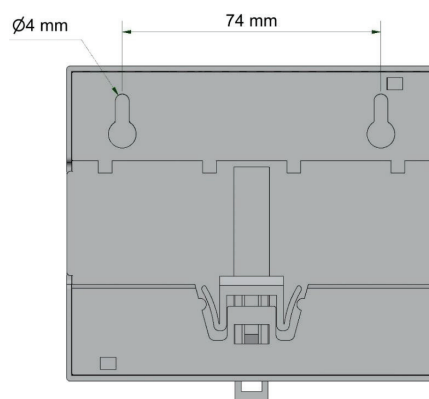
Installation on DIN Rail



Mount the **AC CAPTEC 2401 / 1202** on to DIN-rail according to EN 60715 (see dimensions on the left).

Installation on a mounting plate

The **AC CAPTEC 2401 / 1202** can be mounted directly on a mounting plate of the cabinet.



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Connection

Prior to connection the values of the in and output voltages must be compared with the values on the type plate. The type plate is on the left side of the housing. Connection according to the designations of the connection terminals. Observe the right polarization.



Terminals			Connection	
Designation	Max. tightening torque/ Nm	Cable cross section/ mm ²		
IN (X1.L, X1.N)	Push-in-spring connection	0,5 - 2,5 (1,5 with wire end ferrule)	Input Voltage	
M1 / M2 (X2.1 = NO, X2.2 = COM, X2.3 = NO)	Push-in-spring connection	0,25 - 2,5 (1,5 with wire end ferrule)	M1 message contact mains failure	Maximum contact load: 24 V DC / 60 mA (semi conductor contact)
OUT DC (X2.4 +, X2.5 -)			M2 message contact U _c >	
			Output voltage	

Dimension the cable cross section of the supply and output cables according to EN 62368-1 Table G5, see also table above. Secure supply lines sufficiently.

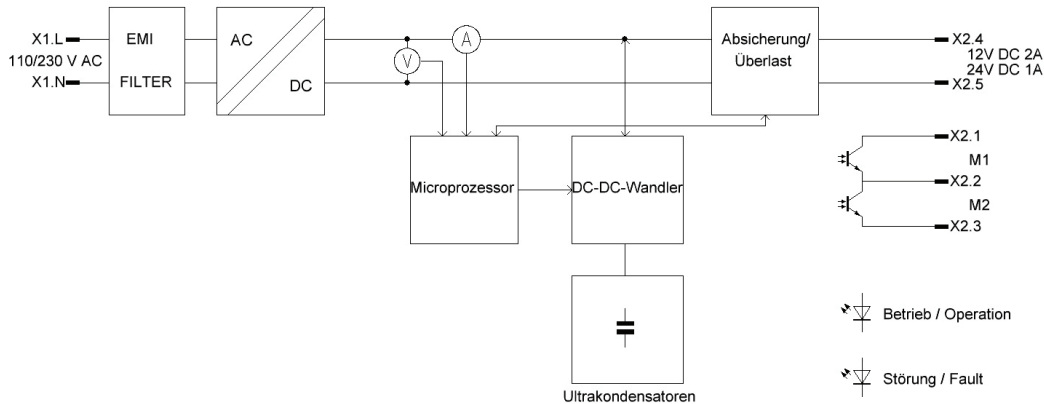
With the message contacts, the operation status of the **AC CAPTEC 2401 / 1202** can be forwarded to a superior unit. Two LED's are integrated for optical signalisation (see *section 4.2 LEDs*).



REFERENCE

The fusing of the output is not necessary because of the internal line protection of the unit.

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Putting into Operation

Switch on the **AC CAPTEC 2401** by connecting the input voltage. After approx. 3 s, the output is enabled. The output current of 1 A is available immediately. At initial start-up, the pulse current and full buffer time are available after approx. 250s.

With the **AC CAPTEC 1202** an output current of 2 A is immediately available to the load. If the output is not stressed, the pulse current and the full buffer time are available after approximately 284s at initial start-up. After mains failure and switch-off, the recharging time is approx. 160 s.

LED	Status	Meaning
Operation	green	<ul style="list-style-type: none"> Unit ready for operation Ultracapacitors charged Buffer operation (mains failure)
	blinking	<ul style="list-style-type: none"> Charging operation
	off	<ul style="list-style-type: none"> Undervoltage Short-circuit at the output (see 5 <i>Overload / Impulse current / Short-circuit in mains operation</i>)
Fault	red	<ul style="list-style-type: none"> Buffer operation (mains failure) Charging operation (output not enabled) Overload at the output short-circuit at the output (see 5 <i>Overload / Impulse current / Short-circuit in mains operation</i>)
	blinking	<ul style="list-style-type: none"> Final discharge voltage reached (Residual energy present) Device ready for restart (see 5 <i>Overload / Impulse current / Short-circuit in mains operation</i>) (Residual energy present)
	off	<ul style="list-style-type: none"> No fault Ultracapacitors discharged

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Message contacts

Message contact	Status	Meaning
M1	open	• Undervoltage at the input
	closed	• Input voltage is present
M2	open	• $U_c > 30\%$ energy
	closed	• $U_c > 90\%$ energy

Backup time (typical)

The back-up time depends on the output current and on the state of charge of the ultracapacitors.

Designation	$t_{\text{Puffer}}/s @ I_{\text{Ausgang}}/A$					
	0,25	0,5	0,75	1	1,5	2
AC CAPTEC 2401	100	55	40	28	-	-
AC CAPTEC 1202	200	110	80	56	38	28



REFERENCE

The data in the table show typical values and refer to the new condition of the unit. As the ultracapacitors age, their storage capacity and thus their energy content decreases.

Life Duration of the Ultracapacitors

The end of the life duration is reached when the capacity of the ultracapacitors has dropped to 70 % of the nominal value or the value of the internal resistance has doubled. The life duration of the ultracapacitors depends on the temperature and the cell voltage. At an ambient temperature of 30 °C, a typical service life of approximately 20 years can be expected.

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Overload / Impulse current / Short-circuit in mains operation

AC CAPTEC 2401

Overload range	Max. duration per impulse t	Comment ¹⁾
1,1...1,3 A	unlimited	<ul style="list-style-type: none"> Charging of the ultracaps is not possible
1,3...2 A	10 s	<ul style="list-style-type: none"> Until the ultracaps are discharged
2...5 A	120 ms	<ul style="list-style-type: none"> Duration per impulse <120 ms: duty cycle = 50 %
5...10 A	120 ms	<ul style="list-style-type: none"> Impulse current one time each 5 s permissible Output voltage drops depending on the load Output voltage < 16 V DC = short-circuit
10...25 A (Short-circuit)	12 ms	<ul style="list-style-type: none"> In 10 s are permissible: <ul style="list-style-type: none"> Impulse currents > 10A at a line resistance of <0,3 Ω - 20 impulse currents ≤ 5 ms or - 10 impulse currents t ≤ 10 ms

If the duration per pulse is longer than described or the number of impulses is exceeded, the load will be disconnected from the output. The **AC CAPTEC 2401** restarts automatically after 10 s.

If the **AC CAPTEC 2401** starts in short-circuit or in overload range, every 3-10 s occurs a starting attempt. At the same time, the ultracaps will be charged. When all ultracaps are charged, the **AC CAPTEC 2401** operates as described in the table above.

If there is a permanent short circuit, the **AC CAPTEC 2401** tries to restart 10 times. The **AC CAPTEC 2401** is then permanently switched off. The **Fault LED** lights up and the **Operation LED** goes out.

A restart takes place after switching off and switching on the input voltage. The **Fault LED** flashes and the **Operation LED** goes out when the **AC CAPTEC 2401** is ready to switch on the input voltage. Signaling can be delayed up to 2 min.



REFERENCE

¹ Pulse currents are only available with fully charged ultracapacitors.

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AC CAPTEC 1202

Overload range	Max. duration per impulse t	Comment ¹⁾
2,1...2,5 A	unlimited	<ul style="list-style-type: none"> Charging of the ultracaps is not possible
2,5...8 A	120 ms	<ul style="list-style-type: none"> Duration per impulse <120 ms: duty cycle = 50 %
8...25 A (Short-circuit)	12 ms	<ul style="list-style-type: none"> Impulse currents > 10A at a line resistance of <0,3 Ω In 10 s are permissible: <ul style="list-style-type: none"> - 20 impulse currents ≤ 5 ms or - 10 impulse currents t ≤ 10 ms

If the duration per pulse is longer than described or the number of impulses is exceeded, the load will be disconnected from the output. The **AC CAPTEC 1202** restarts automatically after 10 s.

If the **AC CAPTEC 1202** starts in short-circuit or in overload range, every 3-10 s occurs a starting attempt. At the same time, the ultracaps will be charged. When all ultracaps are charged, the **AC CAPTEC 1202** operates as described in the table above.

If there is a permanent short circuit, the **AC CAPTEC 1202** tries to restart 10 times. The **AC CAPTEC 1202** is then permanently switched off. The **Fault LED** lights up and the **Operation LED** goes out.

A restart takes place after switching off and switching on the input voltage. The **Fault LED** flashes and the **Operation LED** goes out when the **AC CAPTEC 1202** is ready to switch on the input voltage. Signaling can be delayed up to 2 min.



REFERENCE

¹⁾ Pulse currents are only available with fully charged ultracapacitors.

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Maintenance



REFERENCE

Depending on the degree of pollution, clean the housing at least 1x a year, for example with suction equipment or a cleaning cloth. The ventilation openings in particular must be free of dirt and other obstacles.

Putting Out of Operation

Switch off the input voltage and discharge the capacitors.



WARNING

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

Energy is stored in the ultracapacitors. The unit must not be opened. Failure to do so may result in burns from electric arcs.

Disposal



REFERENCE

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.

Norms and Regulations

Total Unit	2011/65/EU with 2015/863/EU (RoHS) 1907/2006/EG (REACH) 2009/125/EG (Öko-Design) EN 61010-1 / EN 61010-2-201 EN 62368-1 UL 508 / C22.2 No. 107.1
EMI	2014/30/EU (EMV-Regulation) EN 55011+ A1 limiting value class B group 1 EN 61000-6-1 EN 61000-6-3 limiting value class B EN 62040-2 limiting value class C1
Power -HF-transmitter to ensure safe separation primary/secondary	EN 60601-1 2xMOPP (EN 61558-1)

EN 55011 limit value class B: "Class B equipment is equipment suitable for operation in residential areas as well as such areas that are connected directly to a low-voltage supply network that (also) supplies residential buildings". (EN 55011, 5.2 Classification)

EN 55011 group 1: „Group 1 includes all equipment, ... in which RF energy is not intentionally generated in the radio frequency range of 9 kHz to 400 GHz.“ (EN 55011, 5.1 Classification into groups)

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Technical Data

Input		
Nominal input voltage		110 V AC / 230 V AC +15 % /-10 %
Input voltage range		80...264 V AC +0 % /-0 %
Frequency		50 / 60 Hz ±3 Hz
Nominal input current	AC CAPTEC 2401	0,24 A @ Ue = 240 V AC 0,44 A @ Ue = 120 V AC
	AC CAPTEC 1202	0,24 A @ Ue = 240 V AC 0,44 A @ Ue = 120 V AC
Inrush current		25 A @ 115 V AC / 45 A @ 230 V AC
Nominal input power	AC CAPTEC 2401	28 W @ (Ue = 230 V AC, Ua = 24 V DC, Ia = 1 A)
	AC CAPTEC 1202	27 W @ (Ue = 230 V AC, Ua = 12 V DC, Ia = 2 A)
Output		
Nominal output voltage	AC CAPTEC 2401	24 V DC
	AC CAPTEC 1202	12 V DC
Output voltage in buffer operation	AC CAPTEC 2401	23,3 V DC ±2 %
	AC CAPTEC 1202	11,2 V DC ±2 %
Residual ripple	AC CAPTEC 2401	200 mV _{pp}
	AC CAPTEC 1202	120 mV _{pp}
Nominal output current	AC CAPTEC 2401	1 A
	AC CAPTEC 1202	2 A
Current limitation		See
Energy (typical)		600 J (Ws)
Power loss (self consumption)	AC CAPTEC 2401	4 W @ (Ue = 230 V AC, Ua = 24 V DC, Ia = 1 A)
	AC CAPTEC 1202	3 W @ (Ue = 230 V AC, Ua = 12 V DC, Ia = 2 A)
Energy consumption in buffer operation		1 W
Short-circuit proof		See 5 <i>Overload / Impuls current / Short-circuit in mains operation</i>
Fuse		
Fuse output		5 A T
General		
Protective system housing		IP20
Degree of Overvoltage protection		III
Degree of pollution		2
Dimensions (H x W x D)		91 mm x 106 mm x 62 mm
Weight		0,3 kg
Operational temperature / Storage temperature		-40 °C...+60 °C
Operational temperature UL proved		+10 °C...+60 °C
Humidity		≤90 % no condensation
Max. height above sea level (without load reduction)		2000 m

Versions

The following versions can be realised on the existing standard unit with corresponding quantities and a lead time of 3 months.

- **Option setting M1**
- **Option setting life duration optimized**
- **Option setting release**
- **Option setting switch off behavior**