BECKHOFF New Automation Technology

Documentation | EN

PS1061-2405-0000

Power supply 24 V DC, 5 A, 1 phase, AC 200-240 V

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1 Overview

PS1061-2405-0000 | Power supply 24 V, 5 A, 1-phase

- AC 200-240 V input
- Width only 39 mm
- Efficiency 90.5 %
- Low idling losses
- Full power between -10 °C and +55 °C
- Including DC-OK relay contact

The PS1061-2405-0000 is a 1-phase 24 V power supply with an output current of 5 A and an output power of 120 W.

The device has an input with an input voltage range of AC 200 - 240 V and input inrush current limitation.

The output operates according to the UI characteristic curve and switches to the safe hiccup mode in case of overload/short-circuit

The power supply is part of the PS1000 family and has a width of 39 mm. A DC-OK LED and a potential-free relay contact monitor the status of the output voltage.

Overview of technical data *)

Overview of technical data	PS1061-2405-0000
Output voltage	24 V DC
Adjustment range	24 - 28 V (24.1 V preset)
Output current	5.0 - 4.3 A at 24 - 28 V, ambient temperature <55 °C 3.1 - 2.7 A at 24 - 28 V, ambient temperature <70 °C linear derating between +55 °C and +70 °C
Output power	120 W (ambient temperature < 55 °C) 75 W (ambient temperature < 70 °C)
Input voltage AC	AC 200-240 V (±10%)
Mains frequency	50 - 60 Hz ±6%
Input current AC	1.06 A at 230 Vac
Power factor	0.54 at 230 Vac
Efficiency	90.5 % at 230 Vac
Temperature range	-10 °C to +70 °C (in operation)
Hold-up time	33 ms at 230 Vac
Dimensions (W x H x D)	39 mm x 124 mm x 124 mm (without DIN rail)
Weight	350 g
Approvals/ markings	CE, cULus, EAC
*) All values typical for 24 V, 5 A, 230 Vac, 50 Hz, +25 °C ambient temperature and after a warm-up time of five minutes, unless otherwise stated.	

2 Foreword

2.1 Notes on the documentation

Intended audience

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with the applicable national standards.
It is essential that the documentation and the following notes and explanations are followed when installing and commissioning these components.
The qualified personnel is obliged to always use the currently valid documentation.

The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

Disclaimer

The documentation has been prepared with care. The products described are, however, constantly under development.

We reserve the right to revise and change the documentation at any time and without prior announcement.

No claims for the modification of products that have already been supplied may be made on the basis of the data, diagrams and descriptions in this documentation.

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2.2 Safety instructions

Safety regulations

Please note the following safety instructions and explanations!
Product-specific safety instructions can be found on following pages or in the areas mounting, wiring, commissioning etc.

Exclusion of liability

All the components are supplied in particular hardware and software configurations appropriate for the application. Modifications to hardware or software configurations other than those described in the documentation are not permitted, and nullify the liability of Beckhoff Automation GmbH & Co. KG.

Personnel qualification

This description is only intended for trained specialists in control, automation and drive engineering who are familiar with the applicable national standards.

Signal words

The signal words used in the documentation are classified below. In order to prevent injury and damage to persons and property, read and follow the safety and warning notices.

Personal injury warnings

⚠ DANGER
Hazard with high risk of death or serious injury.

⚠ WARNING
Hazard with medium risk of death or serious injury.

⚠ CAUTION
There is a low-risk hazard that could result in medium or minor injury.

Warning of damage to property or environment

NOTICE
The environment, equipment, or data may be damaged.

Information on handling the product

This information includes, for example:
recommendations for action, assistance or further information on the product.

2.3 Intended use

This device is designed for installation in a housing and is intended for general professional use, for example in industrial control systems or office, communication and measuring equipment.

Do not use this power supply in installations where a malfunction could cause serious injury or danger to human life.

2.4 Safety instructions, installation requirements PS1061-2405-0000

Safety instructions and installation requirements for the PS1061-2405-0000 power supply

⚠ DANGER

Danger of electric shock, fire, injuries, injuries resulting in death!

- Do not use the power supply without proper grounding (protective conductor). Use the terminal at the input terminal strip for the earth connection, not one of the screws on the housing.
- Switch off the power supply before working on the device. Provide protection against unintentional reconnection.
- Ensure proper wiring by following all local and national regulations.
- Do not modify or attempt to repair the device.
- Do not open the device, as high voltages are present inside.
- Avoid foreign bodies entering the housing.
- Do not use the device in damp locations or in areas where moisture or condensation is likely to occur.
- Do not touch the device when it is switched on or immediately after it has been switched off. Hot surfaces can cause burns.
- If this device is operated outside the specification, the protection provided by the device may be negatively affected.

Further notes on installation requirements

- If any damage or malfunction occurs during installation or operation, turn off the power supply immediately and return the device to the factory for inspection.
- Mount the device on a DIN rail so that the input terminals are at the bottom of the device.
- Install the device in a housing that provides protection against electrical, mechanical and fire hazards
- Make sure that the wiring is correct by complying with all local and national regulations.

  ⇨ Use suitable copper cables designed for a minimum operating temperature of
  60 °C at ambient temperatures up to +45 °C,
  75 °C at ambient temperatures up to +55 °C and
  90 °C at ambient temperatures up to +70 °C.

  ⇨ Make sure that all individual strands of a wire are inside the terminal connection.

  ⇨ Unused screw terminals should be tightened firmly.
- The maximum temperature of the ambient air is +70 °C. The operating temperature corresponds to the ambient air temperature and is defined 2 cm below the device.
- This device is designed for convection cooling and does not require an external fan. Do not obstruct the air circulation. The ventilation grille must not be covered (e.g. by cable ducts)!
- Maintain the following installation distances:

  ⇨ 40 mm at the top, 20 mm at the bottom and 5 mm on the left and right are recommended if the device continuously runs at more than 50 % of the rated output.

  ⇨ Increase this distance to 15 mm if the adjacent device is a heat source (e.g., another power supply).

  ⇨ The distance can be reduced from 5 mm to zero if the device is permanently loaded with less than 50 %.
- The device is designed, tested and approved for branch circuits up to 20 A without an additional protective device.
  Use an additional protective device for branch circuits with larger current values. If an external input protection device is used, do not use one smaller than a 10 A B or 6 A C characteristic in order to avoid incorrect triggering of the circuit breaker.
- Do not use this device on AC 200 V mains supplies with loads greater than 4.5 A if the application is sensitive to short drops in output voltage during power cuts, even if they are shorter than 20 ms.
- The device is designed as equipment of "Protection Class I" according to IEC 61140.

  ⇨ Do not use the device without a proper PE (Protective Earth) connection!

Further notes on operation

- This device contains no parts that require maintenance. If an internal fuse trips, this is due to an internal defect.
- The device is designed for areas with a degree of pollution 2 in controlled environments. No condensation or frost is allowed.
- The device housing offers IP20 protection. The housing offers no protection against spilled liquids.
- The device is designed for operation in the relative humidity range between 5 % and 95 %.
- The device is designed for overvoltage category II zones. Below an altitude of 2000 m the device is tested for surge voltages up to 4 kV, which corresponds to the OVC III according to IEC 60664-1.
- The device is suitable for supply from TN, TT or IT networks. The continuous voltage between the input terminal and the PE potential must not exceed 300 Vac.
- The device is designed for altitudes up to 5000 m. A reduction of the output current is required above 2000 m.

2.5 Terminology and abbreviations

PE and the earthing symbol	PE is the abbreviation for "protective earth" and has the same meaning as the earthing symbol
Earth, ground	This document uses the term “earth” which is the same as the U.S. term “ground”.
T.b.d.	Still to be defined, value or description will follow in due course.
AC 230 V	A value preceded by "AC" or "DC" represents a nominal voltage or a nominal voltage range. The nominal voltage or the nominal voltage range may be provided with tolerances. (e.g., AC 230 V ±10%). The calculated total range then indicates the working range of the device. Example: DC 12 V refers to a 12 V battery, regardless of whether it is fully charged (13.7 Vdc) or discharged (10 Vdc).
230 Vac	A value followed by the unit Vac or Vdc is an instantaneous value that does not contain any additional tolerances.
50 Hz vs. 60 Hz	Unless otherwise specified, AC 230 V parameters are valid at a mains frequency of 50 Hz.
may	A keyword indicating a choice without implied preference.
shall	A keyword indicating a mandatory requirement.
should	A keyword indicating a choice with a clearly preferred method of implementation.

3 Technical data, mounting, wiring

3.1 AC input

AC input			
AC input	Nom.	AC 200 - 240 V	Suitable for TN, TT and IT networks
AC input range	Min.	180 - 264 Vac	Continuous operation
	Min.	264 - 300 Vac	For up to 500 ms max.
Permissible voltage L or N to earth	Max.	300 Vac	Continuous according to IEC 60664-1
Input frequency	Nom.	50 - 60 Hz	±6 %
Turn-on voltage	Typ.	162 Vac	Static, see Fig. *Input voltage range; switch-on behavior definitions*
Shut-down voltage	Typ.	100 Vac	At 24 V, 0 A, static, see fig. *Input voltage range; switch-on behavior definitions*
	Typ.	130 Vac	At 24 V, 5 A, static, see fig. *Input voltage range; switch-on behavior definitions*
External input protection	see recommendations in chapter "Notes on installation requirements [▶ 8]"		
Input current	Typ.	1.06 A	At 24 V, 5 A, 230 Vac, see fig. *Input to output current; power factor to output current*
Power factor*)	Typ.	0.54	At 24 V, 5 A, 230 Vac, see fig. *Input to output current; power factor to output current*
Peak factor**)	Typ.	4	At 24 V, 5 A, 230 Vac
Start-up delay	Typ.	75 ms	See Fig. *Input voltage range; switch-on behavior definitions*
Rise time	Typ.	30 ms	At 24 V, 5 A constant current load, 0 mF load capacity, see *Fig. Input voltage range; switch-on behavior definitions*
	Typ.	90 ms	At 24 V, 5 A constant current load, 5 mF load capacity, see Fig. *Input voltage range; switch-on behavior definitions*
Turn-on overshoot	Max.	200 mV	Ohmic load, See fig. *Input voltage range; switch-on behavior definitions*
*) The power factor is the ratio of real (or active) power to apparent power in an AC circuit.			
**) The peak factor is the mathematical ratio of the peak value to the RMS value of the input current waveform.			

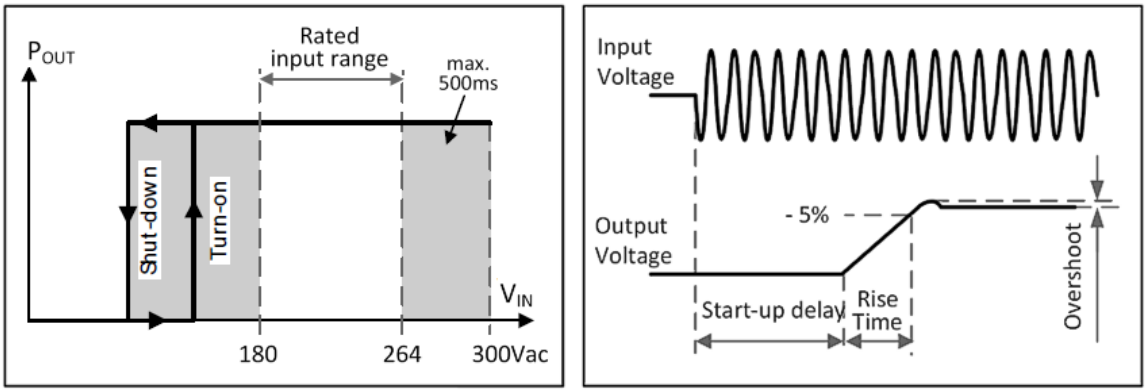

Fig. 1: Input voltage range; switch-on behavior definitions

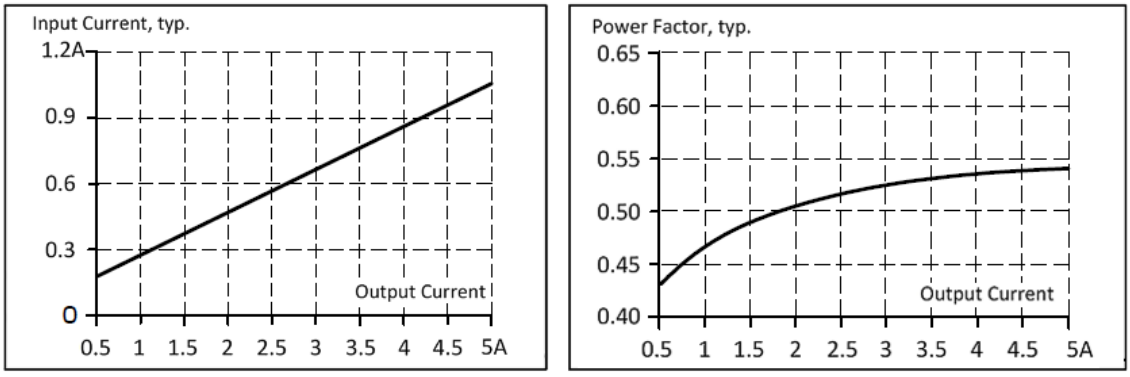

Fig. 2: Input current over output current; power factor over output current

3.2 DC input

Do not use the power supply unit with DC input voltages!

3.3 Input inrush current

Active inrush current limitation (NTCs) limits inrush current surge after the input voltage is switched on.

The charge current of the interference suppression capacitors during the first few microseconds after switching on is not taken into account.

		AC 230 V	
Input inrush current	Max.	37 A_{peak}	At +40 °C, cold start
	Typ.	28 A_{peak}	At +25 °C, cold start
	Typ.	23 A_{peak}	At +40 °C, cold start
Inrush energy	Max.	1.0 A^2s	At +40 °C, cold start

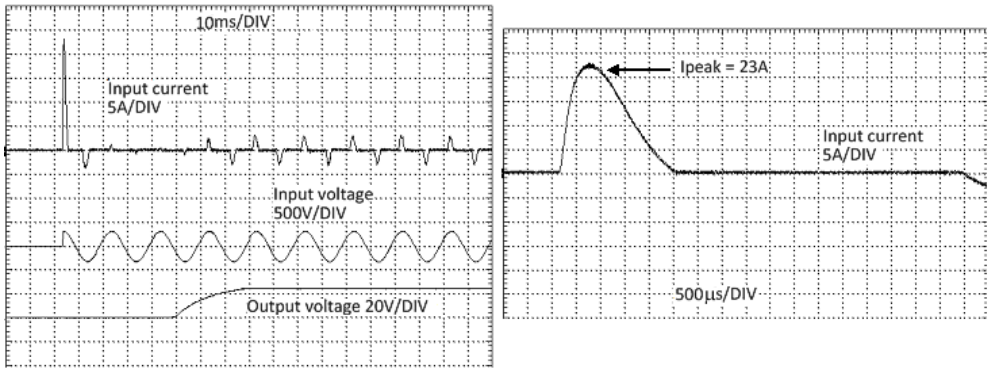

Fig. 3: Input inrush current surge, typical behavior 230 Vac input, 24 V 5 A output, 25 °C ambient temperature;
Input inrush current, zoomed in to the first peak, 230 Vac input, 24 V 5 A output, 25 °C ambient temperature

3.4 Output

The output provides an SELV/PELV nominal voltage that is electrically isolated from the input voltage.

The output is designed to supply any type of load, including capacitive and inductive loads. If extremely large capacitors such as EDLCs (electrical double-layer capacitors or "UltraCaps") with a capacitance > 10 mF and 2.5 A or > 5 mF with 5 A additional current load are connected to the output, the device could charge the capacitor in an intermittent mode.

The output is electronically protected against overload, no-load and short circuit. Noise may be audible in the case of a protective event.

Output voltage	Nom.	DC 24 V	
Adjustment range	Min.	24 - 28 V	Guaranteed value
	Max.	30 V [2]	In end position of the potentiometer, clockwise.
Factory settings	Typ.	24.1 V	±0.2 %, under full load and cold device
Line regulation	Max.	10 mV	180 - 300 Vac
Load regulation	Max.	150 mV	0 A → 5 A, static value, see fig. *Output voltage to output current, typical*
Residual ripple and ripple voltage	Max.	100 mVpp	20 Hz to 20 MHz, 50 Ohm
Output current [3]	Nom.	5 A	At 24 V and ambient temperature below 55 °C
	Nom.	4.3 A	At 28 V and ambient temperature below 55 °C,
	Nom.	3.1 A	At 24 V and ambient temperature below 70 °C
	Nom.	2.7 A	At 28 V and ambient temperature below 70 °C
Overload characteristics	Continuous current		Output voltages > 2... 10 Vdc (depending on the input voltage), see fig. *Output voltage to output current, typical*
	Hiccup mode [1]		Output voltage < 2... 10 Vdc (depending on the input voltage), see fig. *Output voltage to output current*
Short circuit current	Max.	9.8 A	Continuous current, see fig. *Output voltage to output current, typ.*
	Typ.	9.2 A	Peak value of the current in intermittent operation for typically 60 ms Load impedance 50 mOhm, see Fig. *Output voltage over output current, typ.* The discharge current of the output capacitors is not included.
	Max.	3.5 A	RMS value of the current in intermittent operation, load impedance 50 mOhm, see fig. *Output voltage to output current, typ.*
Output capacity	Typ.	2,050 µF	Included in the power supply
Back-feeding loads	Max.	35 V	This power supply is stable and will not malfunction if a load is feeding back voltage to the power supply. It is irrelevant whether the power supply is switched on or off. The absorbent energy can be calculated according to the large built-in output capacitor.

[1] **Hiccup mode**
In case of heavy overload (if the output voltage drops below 2 ... 10 V, depending on the input voltage), the power supply provides output current for 30 ms. The output is then switched off for about 160 ms before a new switch-on attempt is automatically made. This cycle is repeated as long as the overload persists. After the overload has been rectified, the device will operate normally.

[2] This is the maximum output voltage that can occur in the end position of the potentiometer in clockwise direction due to tolerances. It is not a guaranteed value that can be achieved.

[3] Linear derating between +55 °C and 70 °C ambient temperature

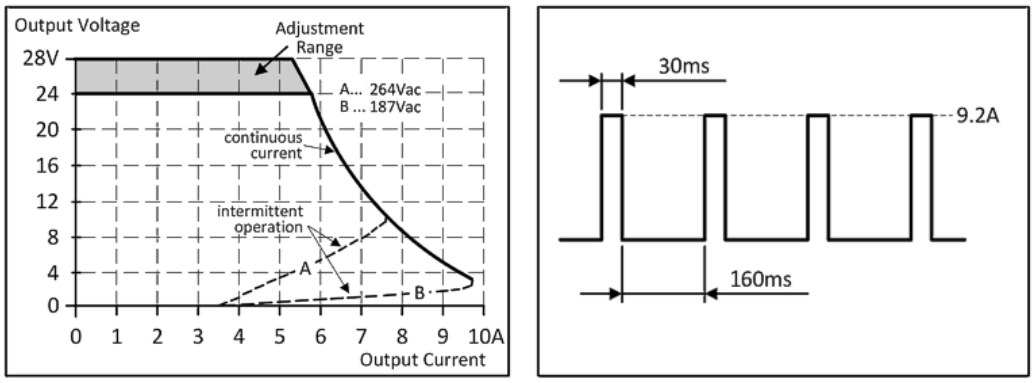

Fig. 4: Output voltage over output current, typ.; intermittent operation, short circuit at output

3.5 Hold-up time

The hold-up time is the time during which the output voltage of a power supply unit remains within the specification after a loss of input power. The hold-up time depends on the output load. Without load the hold-up time can be several seconds. The green DC-OK LED also lights up during this time.

		230 Vac	
Mains failure	Typ.	69 ms	At 24 V, 2.5 A, see Fig. *Hold-up time over input voltage*
Hold-up time	Min.	61 ms	At 24 V, 2.5 A, see Fig. *Hold-up time over input voltage*
	Typ.	33 ms	At 24 V, 5 A, see Fig. *Hold-up time over input voltage*
	Min.	29 ms	At 24 V, 5 A, see Fig. *Hold-up time over input voltage*

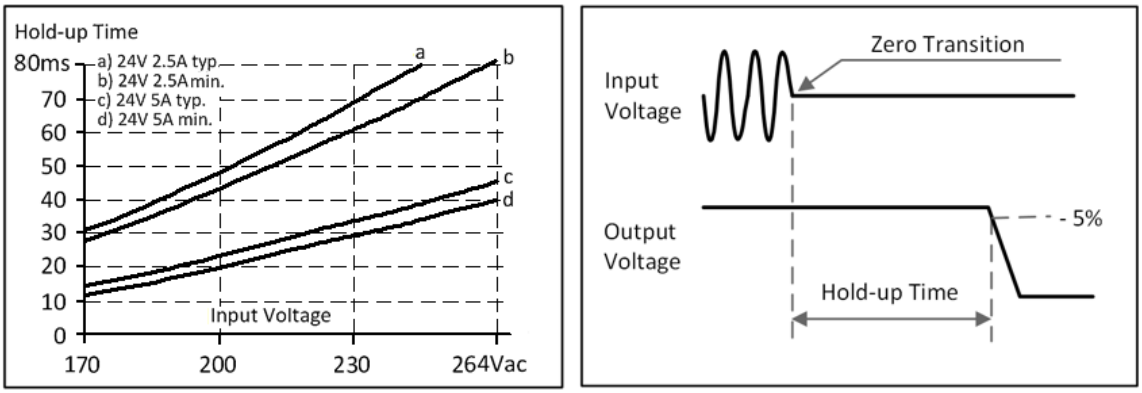

Fig. 5: Hold-up time over input voltage; switch-off behavior, definitions

3.6 DC-OK relay contact

This function monitors the output voltage generated by the power supply itself.

The contact closes	when the output voltage reaches 22 V.
The contact opens	as soon as the output voltage falls below 22 V.
Switching hysteresis	typ. 0.7 V
Contact load capacity	Maximum 60 Vdc 0.3 A, 30 Vdc 1 A, 30 Vac 0.5 A, ohmic load
	Minimum permissible load: 1 mA at 5 Vdc
Insulation voltage	see the table in chapter Dielectric strength [▶ 24]

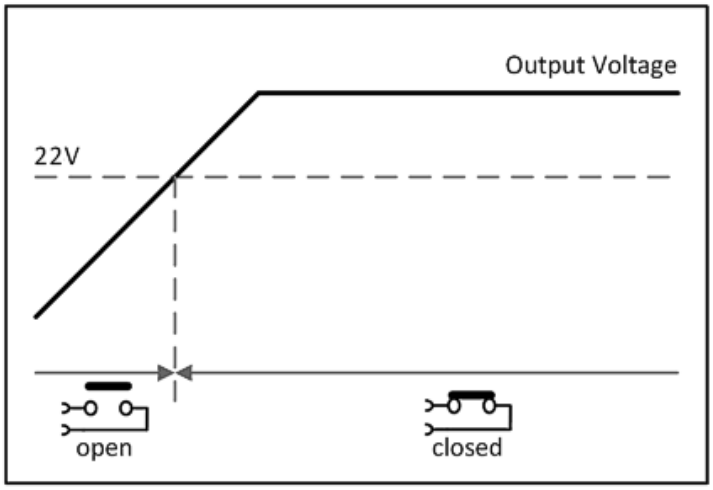

Fig. 6: Behavior of the DC-OK relay contact

3.7 Efficiency and losses

		230 Vac	
Efficiency	Typ.	90.5 %	At 24 V, 5 A
Average efficiency*)	Typ.	89.5 %	25 % at 1.25 A, 25 % at 2.5 A, 25 % at 3.75 A. 25 % at 5 A
Losses	Typ.	0.6 W	At 24 V, 0 A
	Typ.	7.0 W	At 24 V, 2.5 A
	Typ.	12.6 W	At 24 V, 5 A

*) The average efficiency is based on assumptions for a typical application with a power supply load of:
25 % of the nominal load for 25 % of the time,
50 % of the nominal load for a further 25 % of the time,
75 % of the nominal load also for 25 % of the time and
100 % of the nominal load during the remaining time.

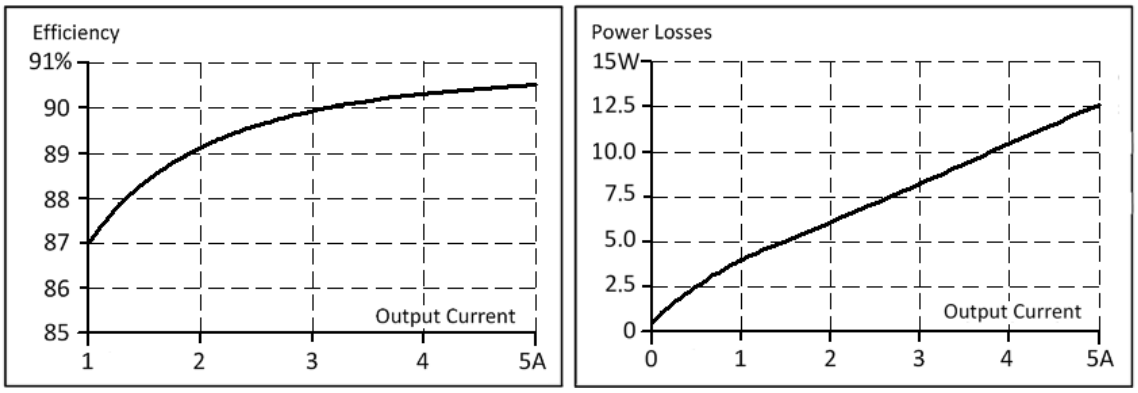

Fig. 7: Efficiency over output current; losses over output current

3.8 Life expectancy

	230 Vac	
Lifetime expectancy[1)]	110,000 h	At 24 V, 2.5 A and +40 °C
	47,000 h	At 24 V, 5 A and +40 °C
	312,000 h	At 24 V, 2.5 A and +25 °C
	133,000 h	At 24 V, 5 A and +25 °C
MTBF[2)] SN 29500, IEC 61709	1,720,000 h	At 24 V, 5 A and +40 °C
	3,223,000 h	At 24 V, 5 A and +25 °C
MTBF[2)] MIL HDBK 217F	1,322,000 h	At 24 V, 5 A and +40 °C; Ground Benign GB40
	1,785,000 h	At 24 V, 5 A and +25 °C; Ground Benign GB25
	385,000 h	At 24 V, 5 A and 40 °C; Ground Fixed GF40
	502,000 h	At 24 V, 5 A and +25 °C; Ground Fixed GF25

[1)] The **calculated lifetime expectancy** shown in the table indicates the minimum number of operating hours (service life) and is determined by the lifetime expectancy of the built-in electrolytic capacitors. The lifetime expectancy is stated in operating hours and is calculated according to the specifications of the capacitor manufacturer. The manufacturer of the electrolytic capacitors only guarantees a maximum life of up to 15 years (131,400 h). Any number exceeding this value represents a calculated theoretical service life which can be used to compare devices.

[2)] **MTBF** stands for **M**ean **T**ime **B**etween **F**ailure, which is calculated on the basis of statistical equipment failures and indicates the reliability of a device. It is the statistical representation of the probability of failure of a device and does not necessarily represent the service life of a product.
The MTBF number is a statistical representation of the failure probability of a device. For example, an MTBF number of 1,000,000 h means that statistically, if 10,000 devices are installed in the field, one device will fail every 100 hours. However, it is not possible to determine whether the failed device has run for 50,000 hours or only 100 hours.

3.9 Terminals and wiring

The terminals are designed to be finger-safe according to IP20 and are suitable for field or factory wiring.

Technical data	Input	Output	DC-OK signal
Connection cross-section	e*: max. 6 mm² f*: max. 4 mm² a*: max. 4 mm² (d<2.8 mm)	e*: max. 6 mm² f*: max. 4 mm² a*: max 4 mm² (d<2.8 mm)	e*: max. 1.5 mm² f*: max. 1.5 mm² a*: max. 1.5 mm² (d<1.6 mm)
Connection cross section (AWG)	e*: AWG 20-10 f*: AWG 20-10 a* AWG 20-10 (d<2.8 mm)	e*: AWG 20-10 f*: AWG 20-10 a* AWG 20-10 (d<2.8 mm)	e*: AWG 24-16 f*: AWG 24-16 a*: AWG 24-16 (d<1.6 mm)
Strip length	7 mm / 0.28 inch	7 mm / 0.28 inch	7 mm / 0.28 inch

e* = solid wire
f* = stranded wire
a* = with ferrule

Wiring instructions:

- Use suitable copper cables that are designed for at least the following operating temperatures:
  +75 °C, for ambient temperatures up to +55 °C (minimum) and
  +90 °C, for ambient temperatures up to +70 °C (minimum)
- Observe the national installation rules and regulations!
- Do not use the device without PE connection.
- Make sure that all single wires of a strand are connected to the terminal!
- Unused terminals should be tightened firmly.
- Ferrules are permitted.

3.10 Functional wiring diagram

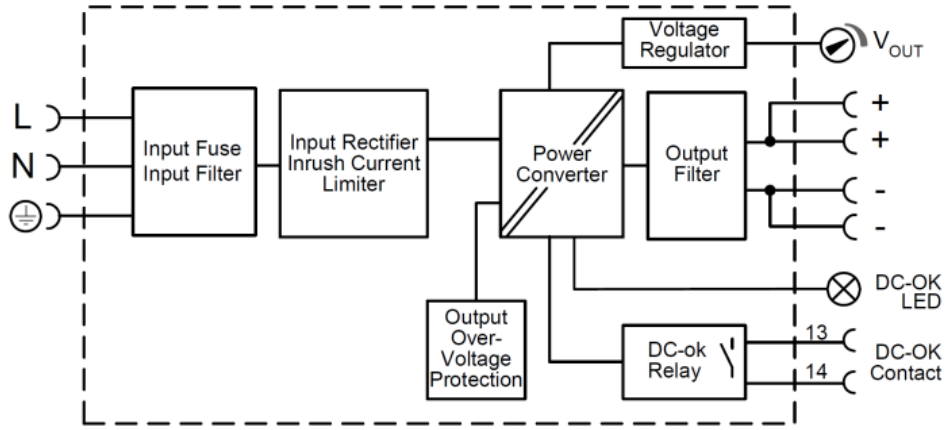

Fig. 8: Functional wiring diagram

3.11 Front side and operating elements

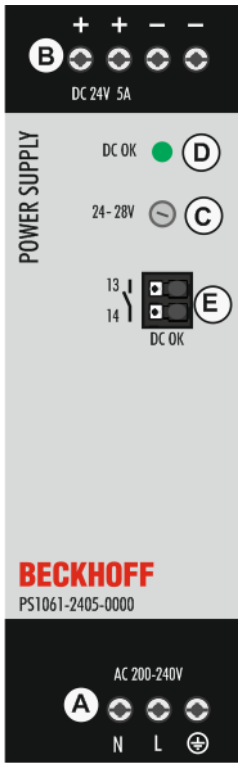

Fig. 9: PS1061-2405-0000, front

Input terminals (screw terminals)

Designation (A)	Description
N	Mains input N
L	Mains input L
⏚	PE input (protective conductor)

Output terminals (screw terminals)

Designation (B)	Description
+	two identical positive poles, positive output
-	two identical negative poles, negative output

Potentiometer for the output voltage

Designation (C)	Description
Potentiometer	Guaranteed adjustment range: 24 V - 28 V. Factory setting: 24.1 V

DC-OK LED

Designation (D)	Description
LED green	On when the voltage at the output terminals is > 18 V.

DC-OK relay contact (quick-connect spring-loaded terminals)

Designation (E)	Description
13 / 14 make contact	See chapter on DC-OK relay contact [▶ 16] for more information.

3.12 EMC

The device allows use in industrial, residential, business and commercial areas as well as in small businesses.

The device was developed in accordance with EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4, EN 61000-3-2 and EN 61000-3-3.

This device complies with the provisions of FCC Part 15. Operation is subject to the following two conditions:

1. This device must not cause harmful interference and
2. this device must accept all interference received, including interference that may cause unwanted operation.

Without additional measures to reduce the cable-bound emission at the output (e.g. using filters), the device is not suitable for supplying a local DC supply network for residential, business and commercial areas or for small businesses.

In industrial areas the device can be used without additional measures to construct a local DC supply network.

The device is unsuitable for AC 200 V mains supplies and more than 4.5 A load current, if a short drop in the output voltage in case of mains interruptions (even with interruptions shorter than 20 ms) is incompatible with the application.

EMC interference immunity			
Strong transients	VDE 0160	Over the entire load range	750 V, 1.3 ms

EMC interference emission	**According to the generic standards: EN 6100-6-3 and EN6100-6-4**	
Conducted interference emission, input lines	EN 55011, EN 55022, FCC Part 15, CISPR 11, CISPR 22	Class B
Conducted interference emission, output lines [2)]	IEC/CISPR 16-1-2, IEC/CISPR 16-2-1	Limit values for local DC networks not fulfilled
Interfering radiation	EN 55011, EN 55022	Class B
Harmonic input current	EN 61000-3-2	Requirements for Class A devices met
Voltage fluctuations, flicker	EN 61000-3-3	Fulfilled, tested with constant current loads, non-pulsing

Switching frequencies		
Main converter	40 kHz to 120 kHz	Output voltage and load-dependent, min. load 1 A

3.13 Environment

Environment		
Operating temperature[1)]	-10 °C to + 70 °C	Reduction of the output power according to Fig. *Output current over ambient temperature*
Storage temperature	-40 °C to + 85 °C	For storage and transport
Output load reduction	3W/°C	+55 °C to +70 °C
	7.5 W/1000 m or 5 °C/1000 m	Above > 2000 m, see fig. *Output current to installation altitude*
	The output load reduction is not hardware-controlled. Take this into account in order to stay below the nominal current limits so that the device is not overloaded.	
Humidity[2)]	5 % to 95 % r.h.	According to IEC 60068-2-30
Atmospheric pressure	110 kPa - 54 kPa	see fig. *Output current to installation altitude*
Installation altitude	Up to 5000 m	
Vibrations, sinusoidal[3)]	2-17.8 Hz: ±1.6 mm; 17.8-500 Hz: 2 g 2 hours/axis	According to IEC 60068-2-6
Impacts[3)]	30 g 6 ms, 20 g 11 ms 3 impacts/direction, 18 impacts in total	According to IEC 60068-2-27
Overvoltage category	II	According to IEC 60664-1 for altitudes up to 5000 m
Impulse voltages	4 kV (according to overvoltage category III)	Input to PE According to IEC 60664-1 for altitudes up to 2000 m
Degree of pollution	2	According to IEC 60664-1, non-conductive
Acoustic noise	The power supply unit can produce audible noise when idling, overloaded or short circuited.	

[1)] The working temperature is identical to the room temperature or the ambient temperature and is defined as the air temperature 2 cm below the device.

[2)] Do not energize when condensation is present!

[3)] Tested in conjunction with DIN rails according to EN 60715 with a height of 15 mm and a thickness of 1.3 mm and standard installation position.

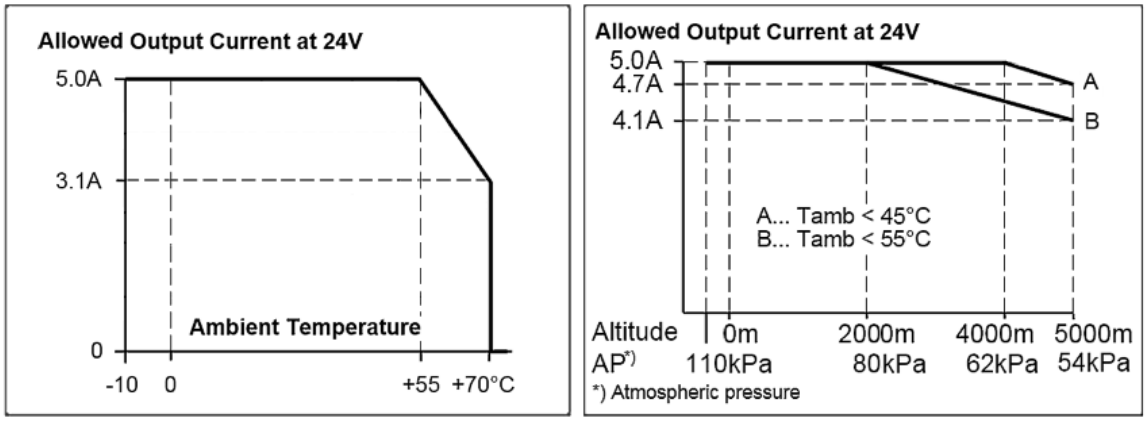

Fig. 10: Output current over ambient temperature; output current over installation altitude

3.14 Protective functions and safety features

Protective functions		
Output overvoltage protection	Typ. 31 Vdc Max. 34 Vdc	In the event of an internal power supply fault, a redundant circuit limits the maximum output voltage. The output switches off in such a case. To attempt to restart, turn off the input power for at least 90 s.
Protection class	IP20	EN/IEC 60529
Overtemperature protection	No	
Protection against input transients	MOV (metal oxide varistor)	For further information see EMC [▶ 21] chapter
Input fuse	included	Slow-blow fuse, not user-replaceable, with high braking power

Safety features		
Insulation resistance	Min. 500 MOhm	In the delivery state between input and output, measured with 500 Vdc
	Min. 500 MOhm	In the delivery state between input and PE (Protective Earth), measured with 500 Vdc
	Min. 500 MOhm	In the delivery state between output and PE, measured with 500 Vdc
	Min. 500 MOhm	In the delivery state between output and DC-OK contacts, measured with 500 Vdc
Protection class	I	According to IEC 61140 PE (protective conductor) connection required
Touch current (leakage current)	Typ. 0.30 mA / 0.75 mA	At 230 Vac, 50 Hz, TN, TT / IT network
	Max. 0.39 mA / 0.94 mA	At 264 Vac, 50 Hz, TN, TT / IT network

3.15 Dielectric strength

The output voltage is potential-free and has no resistive connection to earth.

The output is isolated from the input by double or reinforced insulation.

Type and component tests are carried out by the manufacturer. Field tests can be performed in the field using suitable test equipment that ramps up the voltage with a slow ramp (2 s rising and 2 s falling).

- Connect all input terminals and all output poles to each other before performing the tests.
- During the test, set the cut-off current to the value shown in the table below.
- When checking the input to DC-OK (see the following figure. B*)), make sure that the maximum voltage between DC-OK and the output is not exceeded (see column D in the table below). When performing the test, we recommend connecting the DC OK contact pins and the output contact pins.
- We recommend connecting either the positive pole or the negative pole of the output circuit to the protective conductor system. This avoids situations in which the load starts unexpectedly or cannot be disconnected if an unnoticed earth leakage occurs.

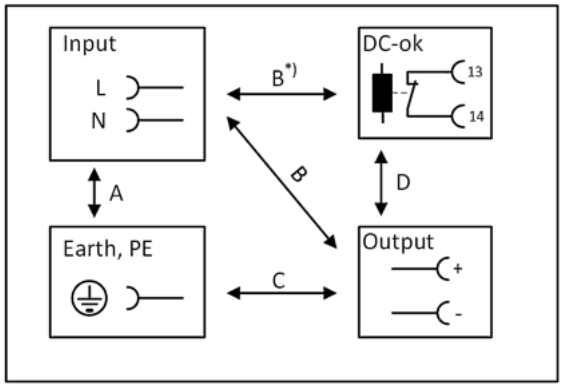

Fig. 11: Dielectric strength

		A	B	C	D
Type test	60 s	2500 Vac	3000 Vac	1000 Vac	500 Vac
Component test	5 s	2500 Vac	2500 Vac	500 Vac	500 Vac
Field test	5 s	2000 Vac	2000 Vac	500 Vac	500 Vac
Cut-off current setting for field testing		> 15 mA	> 15 mA	> 20 mA	> 1 mA

3.16 Declaration of conformity and approvals

CE	EU declaration of conformity
UKCA	UK Declaration of Conformity Trade conformity assessment for England, Scotland and Wales The UKCA mark indicates conformity with the UK Statutory Instruments 2016 No. 1101 (LVD) 2016 No. 1091 (EMC) and 2012 No. 3032 (RoHS)
c UL US LISTED	UL Certificate, UL61010-1/2-201 Applicable for US and Canada

3.17 Dimensions and weight

Dimensions and weight	
Overall width	39 mm
Height	124 mm
Depth	124 mm The height of the DIN rails must be added to the depth of the device to calculate the total installation depth required
DIN rail	Use 35 mm DIN rails according to EN 60715 or EN 50022 with a height of 7.5 or 15 mm.
Weight	350 g
Plastic material of the housing	Flame retardant polycarbonate (PC) - UL94-V0 Vicat softening temperature specified at 149 °C according to ASTM D1525
Installation clearances	See chapter on Safety instructions and installation requirements [▶ 8]
Ingress protection	Small parts such as screws, nuts etc. with a diameter of more than 4 mm

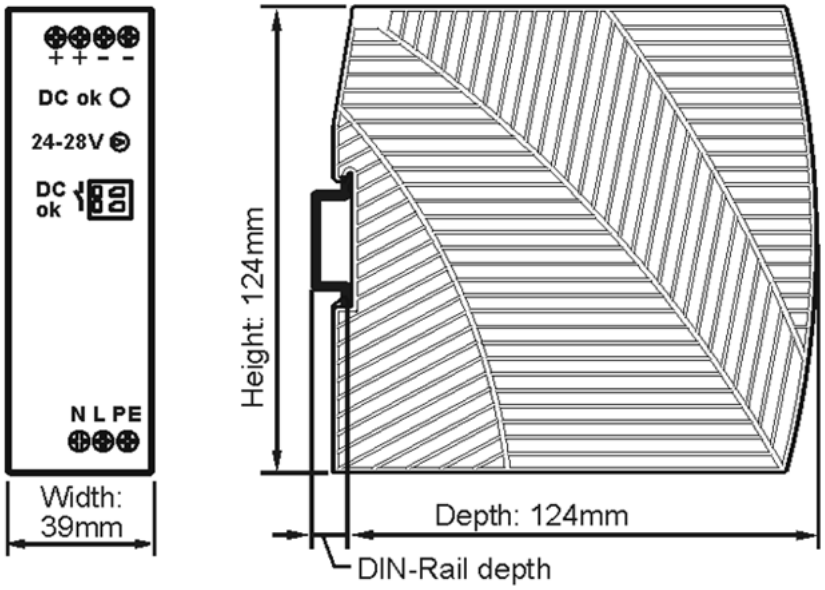

Fig. 12: PS1061-2405-0000 front/side view

4 Application notes

4.1 Charging batteries

Do not use the power supply to charge batteries.

4.2 Series connection

Power supplies of the same type can be connected in series to increase the output voltages. As many devices can be connected in series as necessary, as long as the sum of the output voltages does not exceed 150 Vdc. Voltages with a potential higher than 60 Vdc are no longer regarded as safety extra-low voltage and can be dangerous. Such voltages must be protected with a touch guard.

Grounding of the output is required if the sum of the output voltage is more than 60 Vdc.

Avoid application of return voltage (e.g. from a braking motor or battery) to the output terminals in a series connection.

Restrictions: Keep a mounting distance of 15 mm (left/right) between two power supplies and do not install the power supplies above each other. Power supplies connected in series should only be used in the standard installation position (terminals on the underside of the device).

Remember that leakage current, electromagnetic interference, inrush current and harmonics increase when using multiple power supplies.

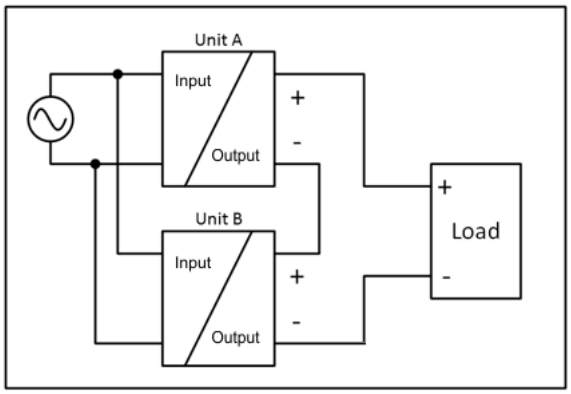

Fig. 13: Series connection

4.3 Parallel use to increase power

The power supply must not be connected in parallel to increase the output power.

4.4 Parallel use for 1+1 redundancy

It is possible to connect power supplies in parallel for redundancy operation in order to achieve better system availability. Redundant systems provide a certain amount of additional power to operate the load when a power supply unit fails. The simplest method is to connect two power supplies in parallel. This is called 1+1 redundancy. If one power supply fails, the other can automatically supply the load current without interruption.

The 1+1 redundancy allows ambient temperatures up to +70°C.

Notes on parallel use for 1+1 redundancy

- Be sure to use a redundancy module in order to decouple devices from one another. This prevents the defective device from becoming a load for the other device and the output voltage no longer being maintainable.
- Note that leakage current, EMI, input inrush current and harmonics increase when using multiple devices.

Recommendations for the construction of redundant power supply systems:

- Power supplies that contain a DC-OK signal contact are best suited for the construction of redundant power supply systems.
  - Use this DC-OK signal contact to monitor the individual power supplies.
- Use separate grids for each power supply whenever possible.
- It is recommended to set the output voltages of all devices to the same value (± 100 mV) or to leave them at the factory setting.

Wiring example:

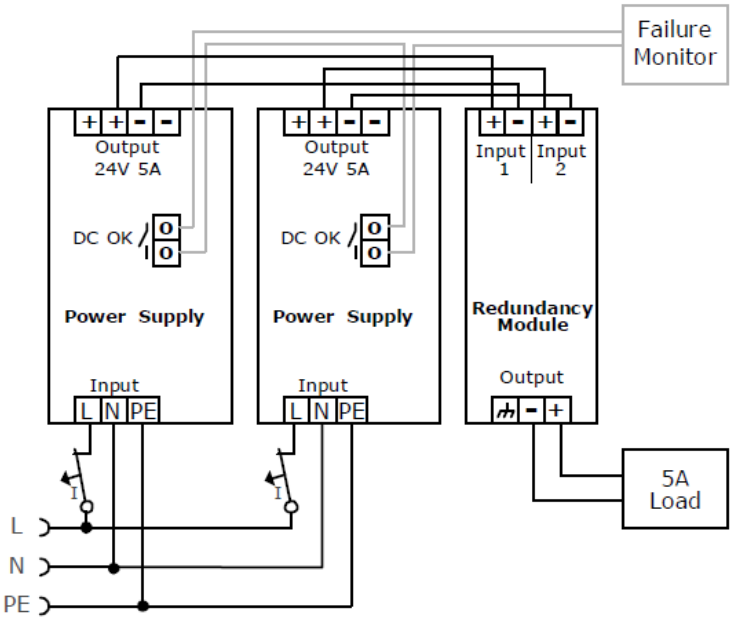

Fig. 14: Wiring for 1+1 redundancy with a PS9401-2420-0000 redundancy module

4.5 Operation on two phases

The power supply can also be used on two phases of a three-phase system. Such a phase-to-phase connection is permissible as long as the supply voltage is below 240 V+10 %.

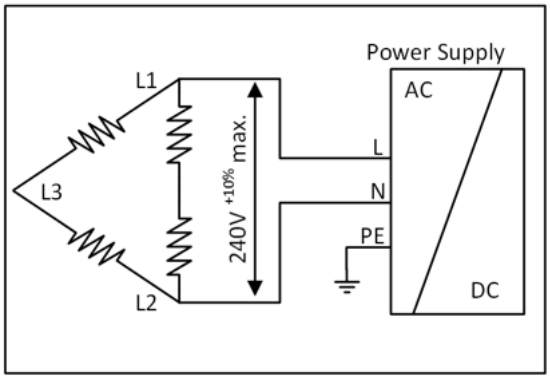

Fig. 15: Operation on two phases

Make sure that the conductor connected to the N terminal is fused appropriately.

The maximum permissible voltage between one phase and the PE must be below 300 Vac.

4.6 Use in a tightly sealed enclosure

When the power supply is installed in a tightly sealed enclosure, the temperature inside the housing is higher than outside. In this case, the temperature inside the housing is considered the ambient temperature for the power supply.

The power supply is positioned at the center of the housing. There are no other heat-generating elements in the housing

The temperature sensor in the housing is positioned at the center on the right side of the power supply with a distance of 1 cm.

The following measurement results can be used as reference for estimating the temperature rise inside the housing.

	Case A	**Case B**
Housing size	110 mm x 180 mm x 165 mm Housing Rittal, protection class IP66 PK 9516 100, plastic	110 mm x 180 mm x 165 mm Housing Rittal, protection class IP66 PK 9516 100, plastic
Input voltage	230 Vac	230 Vac
Load	24 V, 4 A; (=**80 %**)	24 V, 5 A; (=**100 %**)
Temperature inside the housing	40.2 °C	43.7 °C
Temperature outside the housing	21.0 °C	21.0 °C
Temperature increase	19.2 K	22.7 K

5 Disposal

Products marked with a crossed-out wheeled bin shall not be discarded with the normal waste stream. The device is considered as waste electrical and electronic equipment. The national regulations for the disposal of waste electrical and electronic equipment must be observed.

6 Appendix

6.1 Accessories

Power supply	Accessories		
	Redundancy module	Buffer module	UPS component
PS1061-2405-0000	PS9401-2420-0000	PS9011-2420-0001	CU8130-0xxx

PS9401-2420-0000 – Redundancy Module

The PS9401-2420-0000 is a redundancy module that can be used to construct 1+1 and N+1 redundant systems.

It has two input channels, to which power supplies with an output current of up to 12 A can be connected, and an output that can carry nominal currents up to 20 A. The output can also be operated with up to 24 A if the ambient temperature is < +45°C.

The redundancy module uses MOSFET technology instead of diodes for decoupling the two input channels. This reduces the heat development and the voltage drop between input and output. Due to the low power loss, the device is very narrow and requires a width of just 32 mm on the DIN rail.

Large connection terminals enable secure and fast installation. The redundancy module requires no additional auxiliary voltage.

Due to the international approvals package, the device is suitable for virtually every application.

Observe the connection instructions in the chapter "Parallel use for redundancy [▶ 28]"!

PS9011-2420-0001 – Buffer Module

The PS9011-2420-0001 buffer module is an additional device for 24 V DC power supply units. It supplies power to bridge typical mains power failures or extends the hold-up time after switching off the AC voltage.

If the power supply unit supplies sufficient voltage, the buffer module stores energy in the integrated electrolytic capacitors. In the event of a failure of the mains voltage, the stored energy is supplied to the DC bus in a controlled process.

The buffer module can be connected at any point in parallel with the load circuit and does not require any control wiring.

A buffer module can provide 20 A of additional power and can be added in parallel to increase the output current or hold-up time.

The PS9011-2440-0000 buffer module can optionally be used to achieve longer hold-up times.

CU8130-0xxx – UPS component

CU8130-0xxxs are battery-backed, uninterruptible power supplies (UPS). If the external 24 V DC input voltage is lost, the UPS takes over the supply of the devices connected to it thanks to its regulated and buffered 24 V DC output voltage.

The CU81xx UPS series is suitable for all Beckhoff components, particularly Industrial PCs, Embedded PCs, Panels and Panel PCs.

The main features of this UPS are:

- battery module based on NiMH cells
- mounting of the UPS on the DIN rail or on the rear panel of the control cabinet
- protocol-based communication with the Industrial PC either via OCT (**O**ne **C**able **T**echnology) or USB
- digital signals for communication with non-protocol-capable end devices
- TwinCAT PLC function blocks for querying the UPS operation

A special feature of the Beckhoff CU81xx devices is OCT (**O**ne **C**able **T**echnology) as communication technology between UPS and Industrial PC. This means that the two connecting lines (+24 V, 0 V) between Industrial PC and UPS are used not only to supply the Industrial PC, but also for bidirectional data transmission.

If both sides are OCT-capable, no further connection, e.g., via USB, is required.

Further information on UPS components can be found on the Beckhoff homepage.

6.2 Documentation issue status

Version	Comment
1.1.0	• Update chapter “Foreword” • Chapter “Disposal” added • Update structure
1.0	• First public issue
0.1	• Provisional documentation for PS1061-2405-0000

6.3 Support and Service

Beckhoff and their partners around the world offer comprehensive support and service, making available fast and competent assistance with all questions related to Beckhoff products and system solutions.

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