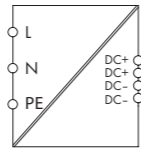


Bitte aufbewahren!

EPSITRON®-ECO-Power 787-712 Primär getaktete Gleichstromversorgung



Abb. 1: Primär getaktete Gleichstromversorgung 787-712



5.1 Demontage

Durch Ziehen an der unten angebrachten Lasche wird die Entriegelung der Tragschienenhalterung betätigt. Durch Kippen der Stromversorgung nach vorne kann diese dann aus der Tragschiene ausgehängt werden (vgl. Abb. 2b).

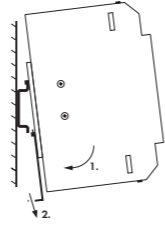


Abb. 2a: Montage

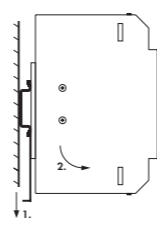


Abb. 2b: Demontage

6. Anschlüsse

Überprüfen Sie vor Anschluss des Betriebsmittels die zugehörige Betriebsspannung (siehe Typenschild).

6.1 Anschlussklemmen

Der Anschluss der Versorgungsleitungen erfolgt auf der Primär- u. Sekundärseite über fest eingelötete WAGO-Klemmleisten Serie 745 mit CAGE CLAMP®-Anschlussstechnik. Primärseitig sind die schwarzen Klemmstellen für die Anschlüsse L, N u. PE vorgesehen. Sekundärseitig sind je zwei blaue Klemmstellen für + und - vorhanden (vgl. Abb. 1).

6.2 Verbindungsleitungen

Die WAGO-Klemmleisten Serie 745 mit CAGE CLAMP®-Anschlussstechnik sind für Einzeladern bis zu 4 mm² (ein- oder feindrähtig) geeignet. Beachten Sie bei der Dimensionierung der Leiterquerschnitte den möglichen Ausgangsstrom mit ca. 1,5 x I_{out,nom}.

7. LED

Eine grüne LED [DC OK] dient als Ausgangsspannungsindikator, eine rote LED [Overload] signalisiert eine Überlast / Kurzschluss am Ausgang (vgl. Abb. 1).

8. Einstellen der Ausgangsspannung

Mit dem frontseitigen Trimpotentiometer [Adjust] kann von außen die Ausgangsspannung im Bereich DC 22 V ... 28 V eingestellt werden (vgl. Abb. 1).

9. Parallelschaltbarkeit (ausgangsseitig)

Stellen Sie beim Parallelbetrieb die Ausgangsspannung der parallel zu schaltenden Geräte möglichst exakt auf den gleichen Wert ein. Die Widerstände der Leitungen zw. Netzgeräten und Last müssen nahezu gleich sein. Bitte nur Geräte gleichen Typs parallel schalten.

Hinweise:

Bitte verwenden Sie zur Parallelschaltung externe Reihenklemmen. Eine Parallelschaltung direkt auf den sekundärseitigen Anschlussklemmen des Gerätes ist nicht zulässig. Zur Entkopplung der Ausgänge im Parallelbetrieb wird empfohlen, Dioden in den Pluspfad einzusetzen. Diese Dioden müssen für den max. Ausgangsstrom des Gerätes ausgelegt sein.

10. Einschaltstrom

Werden mehrere Geräte eingangsseitig über den gleichen Stromkreis versorgt, kann es zu hohen Einschaltströmen kommen. In diesem Fall empfiehlt sich die Verwendung von Hilfsrelais, die eine zeitliche Verzögerung des Einschaltens bewirken (vgl. Abb. 3). Die Anzahl der parallel an einem Stromkreis betriebenen Geräte ergibt sich aus der Summe der Ableitströme. Diese soll max. 3,5 mA gem. EN 62368-1 nicht überschreiten.

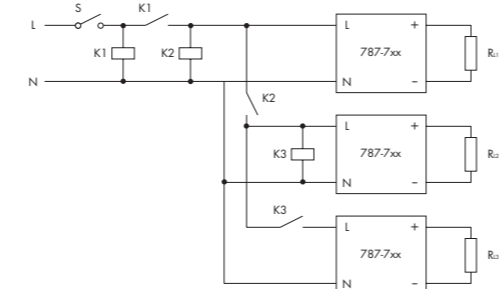


Abb. 3: Zeitversetztes Zuschalten von Netzgeräten

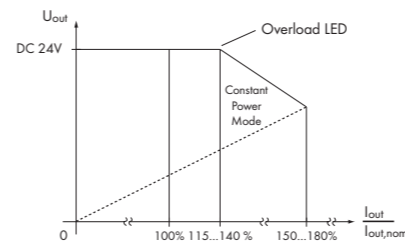


Abb. 4: Ausgangskennlinie

11. Kurzschluss- und Überlastverhalten

Der Ausgang des Betriebsmittels ist elektronisch vor Überlast und Kurzschluss geschützt. Die Ausgangsspannung U_{out} wird reduziert bei einem Ausgangsstrom I_{out} im Bereich 1,15 x I_{out,nom} < I_{out} < 1,4 x I_{out,nom} (vgl. Abb. 4). Die rote LED [Overload] leuchtet dann dauerhaft. Im Falle eines Kurzschlusses (I_{out} > 1,5 x I_{out,nom}), beginnt die rote LED [Overload] zu blinken, und die Ausgangsspannung U_{out} wird abgeschaltet. Durch zyklisches Wiedereinschalten der Ausgangsspannung prüft das Gerät, ob der Kurzschluss noch vorhanden ist. Nach Entfernen der Überlast bzw. des Kurzschlusses liefert das Netzgerät automatisch wieder die eingestellte Ausgangsspannung.

12. Derating

Die maximale Last ist abhängig von der Umgebungstemperatur und der Eingangsspannung. Nachstehend die Leistungsdaten gem. UL: U_{in,nom} AC 110-240V, P_{out,nom} 60W, T_{amb} +50°C. Wenn das Netzgerät außerhalb dieser Leistungsdaten eingesetzt wird, gelten Einschränkungen (Derating), die nachfolgend beschrieben werden.

Ein Derating von -3,3 %/K gilt bei Umgebungstemperaturen T_{amb} > 50°C (vgl. Abb. 5).

Ein Derating von -3%/V gilt bei Eingangsspannungen U_{in} < AC 90 V (vgl. Abb. 6).

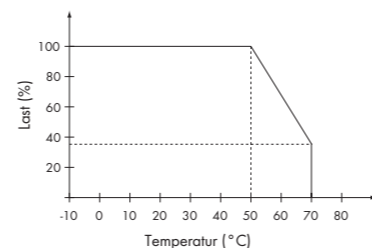


Abb. 5: Temperatur-Last-Kennlinie

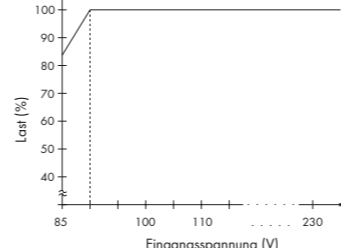


Abb. 6: Eingangsspannungs-Last-Kennlinie

13. Technische Daten

Eingang (AC IN)

Eingangsnennspannung U_{in,nom}:
Eingangsspannungsbereich:

AC 110 V ... 240 V
AC 85 V ... 264 V (vgl. Abb. 6),
DC 90 V ... 373 V
(externe Absicherung bei DC erforderlich)
50 Hz ... 60 Hz
47 Hz ... 63 Hz
0,7 A (bei AC 230 V); 1,2 A (bei AC 115 V)
< 30 A (bei AC 230 V); < 15 A (bei AC 115 V)
< 1 mA
> 0,5 (bei AC 230 V)
> 20 ms (bei AC 230 V)

Frequenz:
Frequenzbereich:
Eingangsstrom lin:
Spitzeneinschaltstrom:
Ableitstrom:
Leistungsfaktor:
Netzausfallüberbrückung:

Ausgang (DC OUT)

Ausgangsnennspannung U_{out,nom}:
Ausgangsspannungsbereich:
Regelgenauigkeit:
Restwelligkeit:
Nennlast P_{out,nom}:
Ausgangsnennstrom I_{out,nom}:

DC 24 V (Voreinstellung), SELV
DC 22 V ... 28 V; einstellbar
1%
< 100 mVpp
60W
2,5 A (bei DC 24V, vgl. Abb. 4)

Wirkungsgrad/Verlustleistungen

Wirkungsgrad:
Verlustleistung:

typ. 82% (AC 110 V); typ. 86% (AC 230 V)
typ. 18 W

Absicherung

Interne Absicherung:
Empfohlene Vorsicherung:
Transientenüberspannungsschutz:

F 2,5 A / 250 V
Leitungsschutzschalter C10 oder B16
Varistor im Eingangskreis

Anschluss

Anschlussstechnik:
Leiterart:
Querschnitte:
Absolierlängen:
Eingangsseitig:
Ausgangsseitig:

CAGE CLAMP® (WAGO Serie 745)
Voll- oder Litzendraht
0,08 mm² ... 4 mm² / AWG 28-12
8 ... 9 mm / 0,33 in
3-polig, schwarz, für L, N und PE
4-polig, blau, für 2x + und 2x -

Abmessungen und Gewicht

Abmessungen (mm) B x H x T
Gewicht:

50 x 92 x 136 (Höhe H ab Oberkante Tragschiene)
470 g

Umgebungsbedingungen

Lagertemperatur:
Umgebungstemperatur T_u:
Relative Feuchte (ohne Btauung):
Klimaklasse:
Derating:

-25 °C ... +85 °C
-10 °C ... +70 °C
10 % ... 95 %
3K3 (gem. EN 60721)
Nennwerte gem. UL:
U_{in,nom} AC 110-240 V, P_{out,nom} 60 W, T_{amb} +50 °C
Wenn das Netzgerät außerhalb dieser Leistungsdaten eingesetzt wird, gelten nachfolgende Einschränkungen (vgl. Abschnitt 11, Derating) für die Last P_{out}:
-3,3 %/K bei +50 °C < T_{amb} < +70 °C
-3 %/V bei U_{in} < AC 90 V
2 (gem. EN 50178)
+/- 0,03%/K bei 0 °C < T_{amb} < 55 °C
480.000 h (gem. IEC 61709)

Verschmutzungsgrad:
Temperaturkoeffizient:
MTBF:

Kühlung

Im Betrieb können einige Bauteile im Innern mehr als +100 °C heiß werden. Die Gehäuseoberfläche kann wärmer als +70°C werden. Empfohlener Mindestabstand von benachbarten Teilen bei natürlicher Konvektion, horizontaler Einbaulage und Umgebungstemperatur +70 °C:
links/rechts: 15 mm
oben/unten: 70 mm

Sicherheit und Schutz

Schutzklasse:
Schutzart:
Überlastschutz:

vorbereitet für Schutzklasse I
IP20 gem. EN 60529
Reduzierung der Ausgangsspannung im Bereich 1,15 ... 1,4 x I_{out,nom} (vgl. Abschnitt 11)
ja
ja
30V
ja, zur Leistungserhöhung (vgl. Abschnitt 9)
ja, max. zwei Geräte
2 g (gem. EN 60068-2-6)
15 g (gem. EN 60068-2-27)
1,5 kV zw. Eingangsseite u. PE, 3,0 kV zw. Eingangs- und Ausgangsseite
0,5 kV zw. Ausgangsseite und PE
gem. UL 60950

kurzschlussfest:
leerlauffest:
Rückspfeisfestigkeit:
parallelschaltbar:
reihenschaltbar:
Vibrationsbeanspruchung:
Schockbeanspruchung:
Isolationsspannungen:

SELV:

14. Normen und Zulassungen

Die elektrische Sicherheit und EMV (Elektromagnetische Verträglichkeit) ist durch den Geräteaufbau entsprechend den angeführten Normen gegeben. Das Betriebsmittel entspricht den gesetzlichen Anforderungen und Normen zur CE-Konformität und trägt das CE-Zeichen. Sicherheit gem. EN 62368-1: 2014 + A11: 2017
EMV - Störaussendung bzw. Störfestigkeit gem. EN 61204-3: 2000
Anforderungen zum Einsatz in explosionsgefährdeter Atmosphäre gem. EN 60079-0: 2012 + A11: 2013; EN 60079-7: 2015; IEC 60079-0 ed.6; IEC 60079-7 ed. 5



UL 60950
E255815

UL 508
E255817

LISTED
Ind.Cont.Eq.
for Haz. Loc.
22XIM
Class I, Division 2,
Groups A, B, C, and D,
Temperature code T4A.

II 3 G Ex ec IIC T4 Gc
DEMKO 12 ATEX 0931267X
IECEx UL 10.0006X

Please retain!

EPSITRON® ECO Power 787-712 Switch-Mode Power Supply

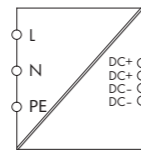


Fig. 1: 787-712 Primary Switched DC Power Supply Unit

1. Safety Information and Application Notes

Congratulations on your purchase of this high-quality product. When used as intended in the described scope of application, it will provide years of reliable service. As with every technical product, however, risk of personal injury or material damage can arise with improper use, inappropriate removal of necessary covers or incorrect installation or operation. Follow these operating instructions and proceed according to the accepted technology standards. All work relating to installation, startup and operation, as well as maintenance, must be performed by qualified specialists (IEC 60364, VDE 0105).

1.1 Packaging

Please inspect the equipment promptly for transport damages such as deformation and loose parts. Please report damages to the transport company immediately, even if the outer packaging is undamaged.

1.2 Storage

Admissible storage temperature: -25 °C to +85 °C
Admissible air humidity: 10% to 95% relative air humidity; no condensation
For long-term storage: Equipment with built-in capacitors must be attached to the system voltage for at least 5 minutes every 2 years.

1.3 Installation and Startup

Protect equipment from inappropriate stress. Particularly during transport and handling, ensure that no parts are bent and that electrical spacing remains constant. Avoid touching the electrical components and contacts. Keep sufficient distance from adjacent parts so as to avoid interfering with the cooling! During operation, the equipment (pursuant to the degree of protection) can have hot surfaces. Never assemble and wire the equipment when the power is connected. Observe the product description and the technical information in our main catalog, as well as the labels on the equipment and on the type plate. Perform the installation according to the local conditions, applicable regulations (e.g., VDE 0100), national accident prevention specifications (e.g., UVV-VBG4 or BGV A2) and accepted technical regulations. This electrical equipment is intended to be installed in electrical systems or machines and fulfills requirements of the low voltage directive (2014/35/EU). When installing in machines, normal operation must not commence until it is determined the machine complies with the requirements of the machinery directive (2006/42/EU); EN 60204 shall be observed. Commencement of normal operation is only allowed under compliance of the EMC directive (2014/30/EU). The manufacturer of the system or machine is responsible to ensure compliance with the limit values required by EMC legislation.

1.4 Maintenance and Assembly

Electrical equipment does not typically require special maintenance; however, depending on the degree of protection, it must be protected from dust accumulation, moisture, radiation and aggressive chemicals. Repairs shall only be undertaken within the scope of the measures outlined in these operating instructions. If an equipment failure does occur, please send the equipment to us to be repaired. Please provide the following information: type of failure, attendant circumstances (operating conditions, wiring), assumptions about the cause of failure, previous uncommon occurrences, etc.

1.5 Disposal

Please observe current regulations and dispose of equipment according to material composition; e.g., electronic scrap (circuit boards), plastic, sheet metal, copper, etc.

1.6 Modifications

The product documentation has been prepared and checked with great care. However, no guarantee can be made regarding completeness and absence of failure. Any transfer of specifications to the respective application should be checked. The technical data describes the product characteristics but does not guarantee them. We reserve the right to make changes that further the technical progress.

2. Application Area

This primary switch DC power supply unit is a mounting component used to supply energy to industrial electric and electronic users of information technology (IT), automation, plant construction, process engineering, control engineering and building automation. Without additional measures, the 787 Series shall not be used:

- in places with a high concentration of ionizing radiation
- in places with difficult operating conditions; e.g.:

- dust formation
 - caustic vapors or gases
 - Strong electric or magnetic fields
- in facilities which require special monitoring; e.g.:
 - elevators
 - electrical equipment in particularly dangerous places

An "additional measure" can be installing the 787 Series in a cabinet or a box.

3. Instructions for Installation and Operation

SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUPS A, B, C AND D HAZARDOUS LOCATIONS, OR NONHAZARDOUS LOCATIONS ONLY.

WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS KNOWN TO BE FREE OF IGNITABLE CONCENTRATIONS.

WARNING - EXPLOSION HAZARD - SUBSTITUTION OF ANY COMPONENT MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.

4. Special Conditions for Safe Use

These devices are open-type devices that are to be installed in an enclosure suitable for the environment.

This power supply unit shall only be operated in dry conditions and shall be mounted on a DIN 35 rail (acc. to EN 60715).

The power supply unit is intended to be installed within a tool-accessible, ATEX and IECEx certified IP54 enclosure in accordance with IEC 60529.

Use conductors rated to at least 105°C. A minimum 4mm² earthing conductor must be used.

Refer to derating curves for load and ambient conditions. Ambient temperature range T_{amb} : $-10^{\circ}C \leq T_{amb} \leq +70^{\circ}C$.

The power supply unit shall be used in an environment of not more than pollution degree 2 as defined by IEC 60664-1.

The cooling of this power supply unit shall not be impaired. For consistent heat dissipation, mount horizontally (air inlet below, outlet above). Other mounting positions: At user's risk. We recommend in that case max. 50% power output and max. +45°C ambient temperature T_{amb} .

Depending on the operating mode, audible noise may develop.

5. Assembly

The hook on the reverse side connects the power supply unit to the upper-shank of the DIN 35 rail (see Fig. 2a). The power supply unit then snaps in place by pressing it down in the direction of the rail and by simultaneously pulling the latch on the underside.

5.1 Disassembly

By pulling the latch on the underside, the rail support release is activated. By tilting the power supply unit forward, it can come unhinged from the rail (see Fig. 2b).

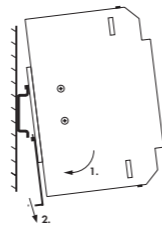


Fig. 2a: Assembly

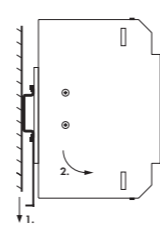


Fig. 2b: Disassembly

6. Connections

Check the appropriate operating voltage before connecting the equipment (see type plate).

6.1 Terminal Strips

Connecting the supply lines is performed on the primary and secondary sides via securely soldered WAGO 745 Series Terminal Strips with CAGE CLAMP® connection technology. On the primary side, the black clamping points are intended for the L, N and PE connections. On the secondary side, four blue clamping points are available: two for "+" and two for "-" (see Fig. 1).

6.2 Connecting Cables

The WAGO 745 Series Terminal Strips with CAGE CLAMP® connection technology are suited for single conductors of up to 4 mm² / AWG 12 (solid or fine-stranded). With respect to conductor cross-section dimensions, note the possible output current with a measurement of approx. $1.5 \times I_{out,nom}$.

7. LED

A green LED [DC OK] serves as an output voltage indicator, a red LED [Overload] signals an overload / short circuit on the output (see Fig. 1).

7. Setting up the output voltage

The frontal trim-pot [Adjust] can be used to externally set up the output voltage of DC 22 V to 28 V (see Fig. 1).

8. Parallel Connection (on the output side)

In parallel operation, set the output voltage of the devices which are to be connected in parallel to precisely the same value, if possible. Additionally, the wire resistance from the power supply unit to the load must be nearly identical. Only devices of the same type shall be used for connecting in parallel.

Notes:

Please use external rail-mounted terminal blocks when connecting in parallel. A parallel connection directly on the secondary side of the terminal strips of the device is not allowed. For decoupling the outputs in parallel mode, the use of diodes in the positive path is recommended. These diodes must be configured for the device's maximum output current.

10. Inrush Current

If several devices are supplied on the input side using the same electric current, higher inrush currents can result. In this case, the use of auxiliary relays, which cause a time delay in start-up, is recommended (see Fig. 3). The number of devices connected to a circuit using the same electric current arises from the amount of leakage current. Acc. to EN 62368, this shall not exceed a maximum of 3.5 mA.

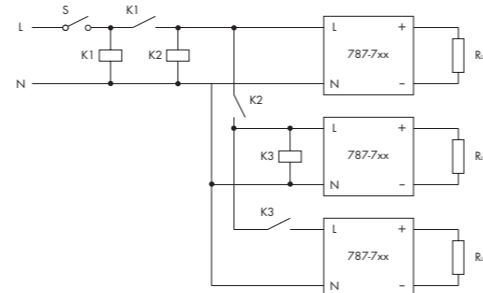


Fig. 3: Time delay in start-up of power supply units

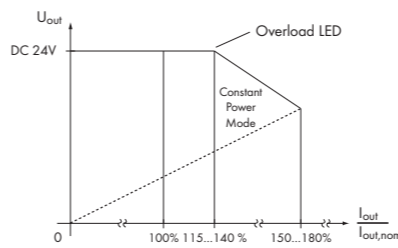


Fig. 4: Output characteristics

11. Short Circuit and Overload

The equipment's output is electronically protected from overload and short circuits. The output voltage U_{out} is reduced for an output current I_{out} in dimensional range $1.15 \times I_{out,nom} < I_{out} < 1.4 \times I_{out,nom}$ (see Fig. 4). The red LED [Overload] will light up. In case of short circuit ($I_{out} > 1.5 \times I_{out,nom}$), the red LED [Overload] will start flashing, and output voltage U_{out} will be turned off. The device will turn on the output voltage periodically and test the output circuit for short circuit. After eliminating the overload or short circuit, the power supply unit automatically supplies the output voltage as indicated.

12. Derating

The maximal load is dependent on the surrounding air temperature and the input voltage.

UL has evaluated this equipment with the following rated values:

$U_{in,nom}$ AC 110-240V, $P_{out,nom}$ 60W, T_{amb} +50°C.

If equipment is used outside these ratings, additional derating has to be considered:

A derating of -3.3 %/K shall be taken into account for surrounding air temperatures $T_{amb} > 50^{\circ}C$ (see Fig. 5).

An additional derating of -3 %/V shall be taken into account for input voltages $U_{in} < AC 90 V$ (see Fig. 6).

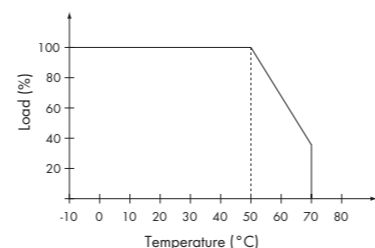


Fig. 5: Temperature derating curve

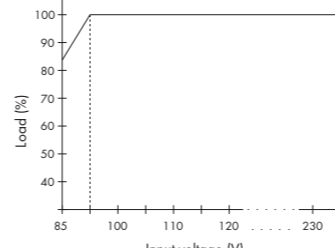


Fig. 6: Input voltage derating curve

13. Technical Data

Input (AC IN)

Rated input voltage $U_{in,nom}$: AC 110 V to 240 V
Input voltage range: AC 85 V to 264 V (see Fig. 6), DC 90 V to 373 V (external fuse necessary for DC supply)
Frequency: 50 Hz to 60 Hz
Frequency range: 47 Hz to 63 Hz
Input current lin: 0.7 A (at AC 230 V); 1.2 A (at AC 115 V)
Peak input current: < 30 A (at AC 230 V); < 15 A (at AC 115 V)
Discharge current: < 1 mA
Power factor: > 0.5 (at AC 230 V)
Mains failure hold-up time: > 20 ms (at AC 230 V)

Output (DC OUT)

Rated output voltage $U_{out,nom}$: DC 24 V (default setting), SELV
Output voltage range: DC 22 V to 28 V; adjustable
Adjustment accuracy: 1%
Residual ripple: < 100 mVpp
Nominal Load $P_{out,nom}$: 60W
Output current $I_{out,nom}$: 2.5 A (at DC 24V, see Fig. 4)

Efficiency/power losses

Efficiency: typ. 82% (AC 110 V); typ. 86% (AC 230 V)
Power loss: typ. 18 W

Fuse protection

Internal protection: F 2.5 A / 250 V
Recommended backup fusing: Wire breaking C10 or B16
Transient overvoltage protection: Varistor in input circuit

Connection

Connection technology: CAGE CLAMP® (WAGO 745 Series)
Type of wire: Solid or stranded wire
Cross section: 0.08 mm² to 4 mm² / AWG 28-12
Stripped lengths: 8 to 9 mm / 0.33 in
Input side: 3-pole, black, for L, N and PE
Output side: 4-pole, blue, for 2x + und 2x -

Dimensions and weight

ADimensions (mm) W x H x L: 50 x 92 x 136 (Height H from upper-edge of DIN 35 rail)
Weight: 470 g

Environmental requirements

Storage temperature: -25 °C to +85 °C
Surrounding air temperature T_U : -10 °C to +70 °C
Relative humidity (without condensation): 10 % to 95 %
Climatic class: 3K3 (acc. to EN 60721)
Equipment evaluated with the following rated values:
 $U_{in,nom}$ AC 110-240V, $P_{out,nom}$ 60W, T_{amb} +50°C
If equipment is used outside these ratings, additional derating (see chapter 11) has to be considered:
-3.3%/K for $+50^{\circ}C < T_{amb} < +70^{\circ}C$
-3%/V for $U_{in} < AC 90 V$
2 (acc. to EN 50178)
+/- 0.03%/K for $0^{\circ}C < T_{amb} < 55^{\circ}C$
480'000 h (acc. to IEC 61709)

Pollution degree: 2
Temperature coefficient: +/- 0.03%/K for $0^{\circ}C < T_{amb} < 55^{\circ}C$
MTBF: 480'000 h (acc. to IEC 61709)

Cooling

During operation, some inner components can heat up to more than +100°C. The enclosure surface can heat up to more than +70°C. Recommended minimum distance from adjacent parts in case of natural convection and surrounding air temperature +70°C:

left/right: 15 mm
above/below: 70 mm

Safety and protection

Protection class: prepared for protection class I
Degree of protection: IP20 acc. to EN 60529
Overload protection: Reduction of output voltage (see chapter 11) in dimensional range 1.15 to $1.4 \times I_{out,nom}$
Short-circuit protected: yes
Idling-proof: yes
Feedback voltage: max. 30V
Parallel operation: yes, for increased power (see chapter 9)
Serial operation: yes, max. 2 power supply units
Vibration stress: 2 g (acc. to EN 60068-2-6)
Shock stress: 15 g (acc. to EN 60068-2-27)
Isolation voltages: 1.5 kV for input side and PE
3.0 kV for input and output sides
0.5 kV for output side and PE
acc. to UL 60950

SELV:

14. Standards and Approvals

Electrical safety and EMC (electromagnetic compatibility) is provided through the equipment configuration in accordance with the cited standards. The equipment conforms to the legal stipulations and standards for CE conformity and bears the CE sign.

Electrical safety acc. to EN 62368-1: 2014 + A11: 2017

EMC Emission / Immunity of interference acc. to EN 61204-3: 2000

Essential Health and Safety Requirements

acc. to EN 60079-0: 2012 + A11: 2013; EN 60079-7: 2015; IEC 60079-0 ed.6; IEC 60079-7 ed. 5



UL 60950
E255815

UL 508
E255817

LISTED
Ind.Cont.Eq.
for Haz. Loc.
22XM
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12.12.01
E198726

Class I, Division 2,
Groups A, B, C, and D,
Temperature code T4A.

II 3 G Ex ec IIC T4 Gc
DEMKO 12 ATEX 0931267X
IECEx UL 10.0006X