

INSTALLATION INSTRUCTION

LDB120 Series Battery Charger / DC UPS DIN Rail Power Supply



LDB120-12 INPUT: 120 - 240 VAC, 2.0 – 1.1 A, 50 - 60 Hz (UL certified), or 110 - 345 VDC, 1.4 – 0.5 A
OUTPUT: 12 VDC, 7 A

LDB120-24 INPUT: 120 - 240 VAC, 2.0 – 1.1 A, 50 - 60 Hz (UL certified), or 110 - 345 VDC, 1.4 – 0.5 A
OUTPUT: 24 VDC, 5 A

MAIN FEATURES

- Input: 120 – 240 VAC
- Output: 12 or 24 VDC model dependent
- For lead acid batteries, up to 50 Ah
- Efficiency up to 86%
- Economic solution for general purpose applications
- UL508 Certified

| READ THIS CAREFULLY BEFORE INSTALLATION! | VOR DER INSTALLATION BITTE FOLGENDE SICHERHEITSHINWEISE BEACHTEN! | LEGGERE ATTENTAMENTE PRIMA DELL'INSTALLAZIONE! | A LIRE ATTENTIVEMENT AVANT L'INSTALLATION! |
|---|--|---|---|
| <p>Before operating, read this document thoroughly and retain it for future reference. Non-respect of these instructions may reduce performances and safety of the devices and cause danger for people and property. The products must be installed, operated, serviced and maintained by qualified personnel in compliance with applicable standards and regulations. Do not open the device, it does not contain replaceable components, the tripping of the internal fuse (if included) is caused by an internal failure. Do not repair or modify the device, if malfunction or failure should occur during operation, send unit to the factory for inspection. No responsibility is assumed by Bel for any consequences deriving from the use of this material.</p> | <p>Lesen Sie dieses Dokument vor der Inbetriebnahme sorgfältig durch und bewahren Sie es zum späteren Nachschlagen auf. Die Nichtbeachtung dieser Anweisungen kann die Funktion und Sicherheit der Geräte beeinträchtigen und birgt Gefahren für Personen und Eigentum. Die Geräte müssen von qualifiziertem Personal unter Einhaltung der geltenden Normen und Vorschriften installiert, betrieben, gewartet und instand gehalten werden. Öffnen Sie das Gerät nicht, es enthält keine austauschbaren Komponenten, das Auslösen der internen Sicherung (falls vorhanden) ist stets auf tiefergehende Fehler im Schaltkreis zurück zu führen. Reparieren oder modifizieren Sie das Gerät nicht. Sollte während des Betriebs eine Fehlfunktion oder ein Defekt auftreten, schicken Sie das Gerät zur Überprüfung ins Werk. Bel übernimmt keine Haftung für die Folgen, die sich aus dem Einsatz dieses Gerätes ergeben.</p> | <p>Prima dell'installazione, leggere attentamente questo documento istruzioni e conservarle per future consultazioni. L'insosservanza delle presenti istruzioni può compromettere le caratteristiche e la sicurezza dell'apparecchio e causare pericolo per le persone e le cose. Il prodotto deve essere installato, utilizzato e riparato da personale qualificato e nel rispetto delle normative vigenti. Non aprire il prodotto, esso non contiene componenti sostituibili, il guasto del fusibile interno (se previsto) è causato da un guasto interno. Non tentare di riparare o modificare il prodotto, se durante il funzionamento si verificano guasti o anomalie, inviarlo al produttore per il controllo. Bel non si assume nessuna responsabilità per qualunque conseguenza derivante dall'uso di questo materiale.</p> | <p>Lire ces instructions avant l'installation, conserver ce manuel pour référence future. Défaut de se conformer à ces instructions peut affecter les caractéristiques et la sécurité du dispositif, et causer du danger aux personnes ou aux biens. Les produits doivent être installés, exploités et entretenus par du personnel qualifié et en conformité avec les règlements. N'ouvrez pas le produit, il ne contient aucune pièce réparable, le déclenchement du fusible interne (le cas échéant) est causé par un défaut interne. Ne pas essayer de réparer ou modifier le produit ; si des défaillances se produisent pendant le fonctionnement, retourner le produit au fabricant pour inspection. Bel n'assume aucune responsabilité des conséquences éventuelles découlant de l'utilisation des produits.</p> |
| CAUTION | ACHTUNG | ATTENZIONE | AVVERTISSEMENT |
| <p>RISK OF BURNS, EXPLOSION, FIRE, ELECTRICAL SHOCK, PERSONAL INJURY. Never carry out work on live parts! Danger of fatal injury! The product's enclosure may be hot, allow time for cooling product before touching it. Do not allow liquids or foreign objects to enter into the products. To avoid sparks, do not connect or disconnect the device before having previously turned-off input power and wait for internal capacitors discharge (minimum 1 minute).</p> | <p>GEFAHR VON VERBRENNUNGEN, EXPLOSIONEN, FEUER, STROMSCHLAG, PERSONENSCHÄDEN. Führen Sie niemals Arbeiten an spannungsführenden Teilen durch! Gefahr von tödlichen Verletzungen! Das Gehäuse des Gerätes kann heiß sein, lassen Sie Zeit zum Abkühlen des Gerätes, bevor Sie es berühren. Lassen Sie keine Flüssigkeiten oder Fremdkörper in die Geräte eindringen. Um Überschläge zu vermeiden, schließen Sie das Gerät nicht an oder trennen Sie es nicht ohne vorher die Eingangsspannung abgeschaltet zu haben, und warten Sie die Entladung der internen Kondensatoren ab (mindestens 1 Minute).</p> | <p>RISCHIO USTIONI, ESPLOSIONE, INCENDIO, SCOSSA, LESIONI GRAVI. Non effettuare mai operazioni sulle parti sotto tensione! Pericolo di lesioni letali! Il contenitore può scottare, lasciar quindi raffreddare il dispositivo prima di toccarlo. Non far entrare liquidi o oggetti estranei nel dispositivo. Per evitare scintille, non collegare o scollegare l'apparecchiatura prima di avere tolto tensione di ingresso e prima che sia avvenuta la scarica dei condensatori interni (min. 1 minuto).</p> | <p>RISQUE DE BRULURES, EXPLOSION, INCENDIE, ELECTROCUTION, DOMMAGE AUX PERSONNES. Ne jamais effectuer des opérations sur les parties sous tension! Danger de mort! Le boîtier peut produire des brûlures, le laisser refroidir avant de toucher l'appareil. Ne faire pas pénétrer des liquides ou des corps étrangers dans l'appareil. Pour éviter des étincelles, ne pas connecter ou déconnecter l'équipement jusqu'à ce que la tension d'entrée a été supprimée et avant qu'il n'ait eut lieu la décharge des condensateurs internes (minimum 1 minute).</p> |
| INTENDED USE | BESTIMMUNGSGEMÄßER BETRIEB | USO PREVISTO | UTILISATION |
| <p>These are isolated devices suitable for SELV and PELV circuitry and are designed to be mounted on DIN rail and installed inside a protective enclosure. They are intended for general use such as in industrial control, communication, and instrumentation equipment. Do not use these devices in applications where malfunction may cause injury or death.</p> | <p>Es handelt sich um galvanisch getrennte Geräte, die für SELV- und PELV-Anwendungen geeignet sind und für die Montage auf DIN-Schienen und die Installation in einem Schutzgehäuse konzipiert sind. Sie sind für den allgemeinen Gebrauch wie z.B. in industriellen Steuer-, Kommunikations- und Automatisierung-Anwendungen vorgesehen. Verwenden Sie diese Geräte nicht in Anwendungen, bei denen eine Fehlfunktion zu Verletzungen oder zum Tod führen kann.</p> | <p>I dispositivi sono isolati, adatti per applicazioni SELV e PELV, sono dotati di aggancio per il montaggio su guida DIN all'interno di quadri elettrici o contenitori di protezione, per l'utilizzo con controllori industriali, unità di comunicazione o apparecchi di misura. Non utilizzare in applicazioni in cui un eventuale guasto può comportare rischio di lesioni o di morte.</p> | <p>Les produits sont isolés, appropriés pour les circuits TBTS et TBTP et sont équipés d'un crochet pour montage sur rail DIN dans des armoires ou conteneurs de protection, pour utilisation avec les contrôleurs industriels, des modules de communication ou des unités de mesure. Ne pas utiliser ces dispositifs dans une application où un dysfonctionnement pourrait entraîner le risque des blessures ou de mort.</p> |
| ENVIRONMENTAL CHARACTERISTICS | UMGEBUNGSBEDINGUNGEN | CARATTERISTICHE AMBIENTALI | CARACTÉRISTIQUES ENVIRONNEMENTALES |
| <p>Installation in a Pollution Degree 2 environment. Do not use in wet area or subject to moisture. Carefully recycle the product and related batteries according to local regulations.</p> | <p>Installation in einer Umgebung mit Verschmutzungsgrad 2. Nicht in nassen Bereichen oder unter Feuchtigkeit verwenden. Das Gerät und die zugehörigen Batterien sind entsprechend den lokalen Vorschriften zu recyceln bzw. zu entsorgen.</p> | <p>Usare in ambienti con Grado di Inquinamento 2. Non far funzionare l'apparecchio in un ambiente umido o soggetto a formazione di condensa. Riciclare il prodotto e le batterie collegate, nel rispetto delle normative locali vigenti.</p> | <p>Utiliser les produits dans des environnements avec degré de pollution 2. Ne pas employer l'appareil dans un environnement humide ou soumis à la condensation. Recycler les produits et les batteries, conformément à la réglementation locale.</p> |

USER INSTRUCTIONS

1) DESCRIPTION

DIN rail mountable primary switched-mode power supply with 100 – 264 VAC (110 – 345 VDC) input, suitable for single phase main line and DC line.

Functions:

- **Power supply:** these units can be used as standard power supplies with 12 – 15 V/7A (-12 model) and 24 V/5 A (-24 model) output rating.
- **Battery charger:** for a proper charging the output voltage of the power supply has to be adjusted at ~14 V (-12 model) and at ~27 V (-24 model). The charging current regulator limits the charging current to ~0.8 A.
- **DC UPS function:** in case of the power supply incapacity of supplying the load (mains failure or unit failure) the load will continue to receive power from the battery without ANY interruption, until the mains recovers or the battery reaches the “Deep Discharge Voltage” threshold (10.5 V for -12 Version and 20.5 V for -24 Version).
- **Deep discharge protection:** disconnects the battery from the load when its voltage is lower than 10.5 V (-12 Version) or 20.5 V (-24 Version). The higher the charging current the higher the temperature of the battery, therefore the battery life increases if deep discharge is avoided (the battery life depends also by the numbers of the charge/discharge cycles, their durations and by other various factors).
- **Battery reverse polarity protection:** in case of reverse connection of the battery the resettable fuse will trip and protect all circuitry.
- **Auto-resetting short circuit protection:** connected in series to the line fed by the battery (the power supply output is actively protected against short circuit and overload)
- **Status signals:** a green LED, a red LED and a dry SPST contact displays the working status of the product, indicating “Load on Power Supply” or “Load on Battery”

2) INSTALLATION

Use DIN-rails according to EN60715. Installation should be made vertically (see Fig.4). For better device stability fix the rail to the wall close to the point where the device is to be mounted. In order to guarantee sufficient convection, it is recommended to keep a minimum distance to other modules (see Fig.3).

The device is provided with a thermal protection; a limited air flow can cause the thermal protection tripping.

The SMPS automatically restarts after cooling. To get normal operation reduce the temperature of the air surrounding the power supply, increase the ventilation or reduce the load (see Fig.8)

3) CONNECTIONS

The device is equipped with screw terminal blocks. To avoid sparks, do not connect or disconnect the connectors before having previously turned-off input power and waited for internal capacitors discharge (minimum 1 minute)

In order to comply with UL certification, use appropriate copper cables of indicated cross section, designed for operating temperatures of:

60°C for ambient up to 45°C

75°C for ambient up to 60°C

90°C for ambient up to 70°C

Strip the connecting ends of the wires according to the indication and ensure that all strands of a stranded wire enter the terminal connection (see Fig.5)

4) INPUT PROTECTION

The device input is provided with varistors against overvoltage. Input is provided with internal fuses 3.15 AT / 250 VAC, thus an external short circuit/overcurrent protection must be provided by the end user (see Fig.6). For operation on a single-phase system, a protection fuse on the phase must be provided.

Surge protection: it is strongly recommended to provide external surge arresters (SPD) according to local regulations.

5) AC INPUT CONNECTION

The device can be connected to single-phase AC lines with V_{in} 120 – 240 VAC (see Fig.7). Please connect first the PE.

6) DC INPUT CONNECTION

Connect L terminal to (+) positive pole, N terminal to (-) negative pole and \oplus terminal to GND. Rated voltage 110 – 345 VDC.

The device is also suitable for photovoltaic or wind turbine applications (see Fig.7).

7) OUTPUT CONNECTION

The device is suitable for SELV and PELV circuitry. V_{out} can be adjusted with a potentiometer to a wide range (see Fig.1)

Check V_{out} before connecting the power supply to the load. With output voltage set to the max. value, the continuous [current x voltage] must not exceed the nominal power.

8) PARALLEL CONNECTION AND REDUNDANCY

Not recommended. For redundant connection, use an external isolating device must be used (see accessory device).

9) OUTPUT PROTECTION

The device is protected against overload (OL) / short circuit (SC) / overvoltage (OV) / overtemperature (OT).

OL and SC: are controlled by a hiccup mode auto-reset protection with the following behaviour.

OL behaviour: Max. $OL = I_n \times 1.5$ with constant output voltage. If the current is $\geq I_n \times 1.5$ the unit enters the OL protection and starts an ON/OFF cycle (hiccup mode).

SC behaviour: the device supplies the indicated short circuit peak current for 50ms if the output current exceeds $I_n \times 1.5$ the device enters into a controlled ON/OFF cycles (hiccup mode). The output voltage drops to a voltage value depending on the impedance of the failed load circuit.

Output OV circuit protection: the output is protected against potential OV due to internal malfunction or coming from the load for

$V_{out} \geq V_{nom} \times 1.2 - 1.3$, depending on the model.

OT protection: turns off the device if the internal temperature exceeds a safe limit.

The device restarts automatically after cooling down. To recover to normal operation, reduce air temperature surrounding the power supply, increase cooling or reduce load (see Fig.8).

10) FEEDING DC MOTORS

It is possible to feed DC motors considering that when a motor starts-up under effort its consumption is much higher than the nominal current and it can trigger overcurrent protection (see accessory device).

NOTE: motors can generate high conducted noise on the DC line. Therefore, it is not recommended to feed on the same line motors and equipment sensitive to noise.

11) NOTES

- The total current sunk by the load and by the battery during the max. current required by the charging process (0.8 A), must not exceed 7 A (-12 Version), 5 A (-24 Version) continuous, thus the max. continuous load must be 6.2 A (-12 Version) / 4.2 A (-24 Version).
- The charging time of the battery depends on its capacity in Ah, on its charge level, on ambient temperature, on the efficiency status of the battery, its age, on the charging voltage of the device (recommended: 14.4 V for -12 version, 27.5 V for -24 version).
- Normally the charging current of lead batteries must not exceed 10% of rated Ah. Higher charging current reduces battery life, too low charging current leads to a longer charging time and incomplete charge.
- Lead batteries in normal charge conditions and efficiency have a good self-regulating capacity on charging current, independently from the current supplied by the charger.
- To calculate the duration of voltage/current that a battery can supply, refer to the data sheet of the battery. Basically, the Ah that a lead battery can supply depends on its efficiency status, on the charge level and other factors such as $T_{ambient}$ (low ambient temperatures reduces the capacity of the battery) ageing reduces the capacity of the battery.

Check the correct parameters charging, discharging, life time and other on the datasheet of the battery used for a proper using.

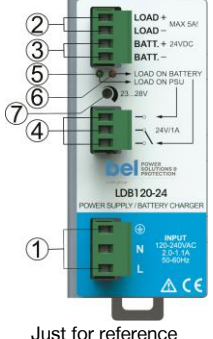
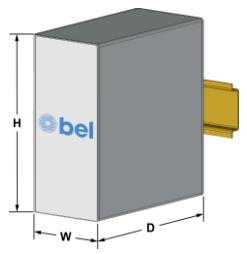
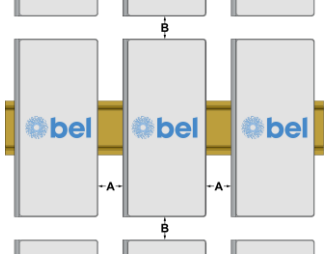
| FIG.1 - CONNECTIONS | | FIG.2 - DIMENSIONS | FIG.3 - DISTANCES | | | | | | | | | | | | | |
|---|---|--|---|--|--|-----------|----------|---|-------------|---|--------------|---|--------------|--|----------|----------|
|  <p>Just for reference</p> | <p>(1) AC/DC input (2) DC output (load) (3) Battery connection (4) Diagnostic Output dry contact NC load supplied by Power S. NO load supplied by Battery (5) Green LED: Output on Power S. (6) Red LED: output on Battery (7) Output voltage adjustment</p> |  |  | | | | | | | | | | | | | |
| | <p>Input AC Line:</p> <ul style="list-style-type: none"> ▪ L = Line ▪ N = Neutral ▪ ⊕ = Earth ground <p>Input DC Line:</p> <ul style="list-style-type: none"> ▪ L = + Positive DC ▪ N = - Negative DC ▪ ⊕ = Earth ground <p>Output:</p> <ul style="list-style-type: none"> ▪ LOAD + = Positive DC ▪ LOAD - = Negative DC ▪ BATT + = Positive DC Battery ▪ BATT - = Negative DC Battery ▪ Dry contact = NC ▪ Dry contact = NO | | | | <table border="1"> <thead> <tr> <th>Dimension</th> <th>mm (inc)</th> </tr> </thead> <tbody> <tr> <td>W</td> <td>54.0 (2.16)</td> </tr> <tr> <td>D</td> <td>110.0 (4.33)</td> </tr> <tr> <td>H</td> <td>115.0 (4.52)</td> </tr> </tbody> </table> | Dimension | mm (inc) | W | 54.0 (2.16) | D | 110.0 (4.33) | H | 115.0 (4.52) | <table border="1"> <thead> <tr> <th>Distance</th> <th>mm (inc)</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>20 (0.8)</td> </tr> <tr> <td>B</td> <td>50 (2.0)</td> </tr> </tbody> </table> | Distance | mm (inc) |
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| H | 115.0 (4.52) | | | | | | | | | | | | | | | |
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| A | 20 (0.8) | | | | | | | | | | | | | | | |
| B | 50 (2.0) | | | | | | | | | | | | | | | |

FIG.4 - MOUNTING / DISMOUNTING INSTRUCTIONS

For DIN rail fastening according to IEC 60715 TH35-7.5(-15)
 Mounting as shown in figure, with suitable cooling and maintaining a proper distance between adjacent devices as specified in the Installation Instruction of each family.

MOUNTING:

1. Tilt the unit slightly backwards.
2. Fit the unit over the top edge of the rail.
3. Slide it downward until it hits the stop.
4. Press against the bottom for locking.

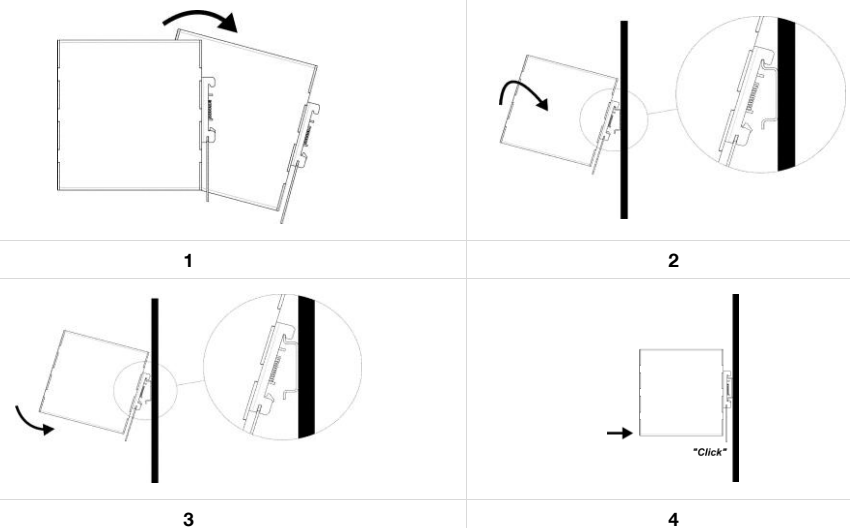


FIG.5 - RECOMMENDED CONNECTING CABLE

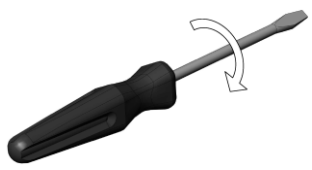
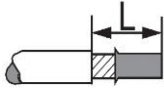
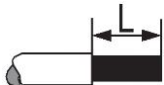
| | | | |
|---|---|--|--|
|  | <p>Recommended Tightening torque 0.5 - 0.6 Nm 4.42 - 5.30 lbf in</p> |  | <p>Solid: 2.5 mm² / 12 AWG Stranded: 1.5 mm² / 12 AWG L: 6.0 - 7.5 mm / 0.24 - 0.30 in</p> |
| | |  | |

FIG.6 - INPUT PROTECTION

In order to be UL compliant use Listed Cartridge nonrenewable (JDDZ) fuse Class CC 4 AT 250 VAC.

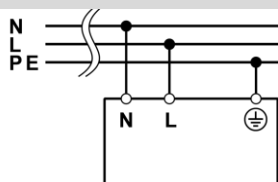
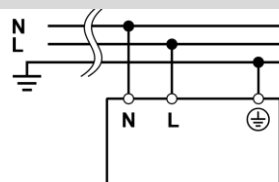
Fuse 4 AT or MCB 4 A C curve.

For USA and Canada, use the fuse type closest to the European equivalent type.

Surge protection: it is strongly recommended to provide external surge arresters (SPD) according to local regulations.

FIG.7 - INPUT CONNECTIONS

AC LINE



DC LINE

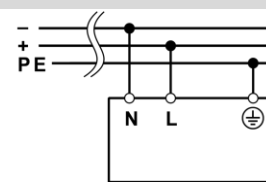
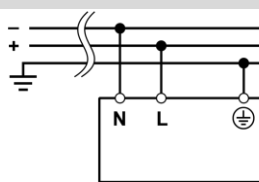


FIG.8 - ENVIRONMENT

OPERATING TEMPERATURE

- 40°C to 70°C
5 - 95% r.H. non condensing
Overtemperature protection
UL Certified up to +50°C

DERATING

- 0.75 W / °C over 50°C for LDB120-12 model
- 1.20 W / °C over 50°C for LDB120-24 model

NOTES:

- Data may change without prior notice in order to improve the product.
- Please refer to the latest version of the Installation Instruction for each product by visiting belfuse.com/power-solutions.

ACCESSORIES

- LDX-D20 20 A Active ORing controller
- LDX-D50 50 A Active ORing controller
- LDX-B20 150J Buffer Module
- LDX-L30 Sealed Lead acid Battery pack