

# INSTALLATION INSTRUCTION

## LDX-B20 150 W Buffer Module



### LDX-B20

INPUT: 12 / 24 / 48 / 72 VDC – Auto detection, Max 20 A

OUTPUT: 12 / 24 / 48 / 72 VDC – 1 V, 20 A

### MAIN FEATURES

- Wide voltage range 12 – 85 VDC
- Compact size
- DC BUS voltage self-tracking
- Boost Max peak power of DC supply
- Multiple protections
- Digital regulation
- Reliable topology, based on standard electrolytic capacitors
- > 150Joules energy storage
- Integrates low power step-up (boost) converter to charge the capacitor bank
- Integrates 20A step-down (buck) converter to discharge the capacitor bank at an adjustable output voltage in case of mains failure
- Relays dry contact and an opto-isolated input for inhibit.
- Integrated safety circuit that disconnects the capacitor bank in case of internal failure.
- Parallellable for power and backup time increase

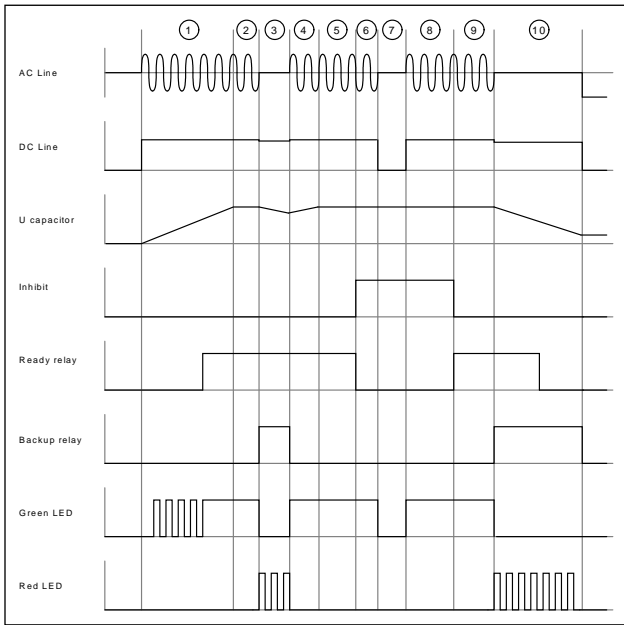
| READ THIS CAREFULLY BEFORE INSTALLATION!  | VOR DER INSTALLATION BITTE FOLGENDE SICHERHEITSHINWEISE BEACHTEN!  | LEGGERE ATTENTAMENTE PRIMA DELL'INSTALLAZIONE!   | A LIRE ATTENTIVEMENT AVANT L'INSTALLATION!  |
|---|--|--|---|
| <p>Before operating, read this document thoroughly and retain it for future 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'inosservanza 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><b>RISK OF BURNS, EXPLOSION, FIRE, ELECTRICAL SHOCK, PERSONAL INJURY.</b> 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><b>GEFAHR VON VERBRENNUNGEN, EXPLOSIONEN, FEUER, STROMSCHLAG, PERSONENSCHÄDEN.</b> 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><b>RISCHIO USTIONI, ESPLOSIONE, INCENDIO, SCOSSA, LESIONI GRAVI.</b> 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><b>RISQUE DE BRULURES, EXPLOSION, INCENDIE, ELECTROCUTION, DOMMAGE AUX PERSONNES.</b> 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 <b>SELV</b> and <b>PELV</b> 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 <b>SELV</b> e <b>PELV</b>, 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 <b>TBTS</b> et <b>TBTP</b> 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**

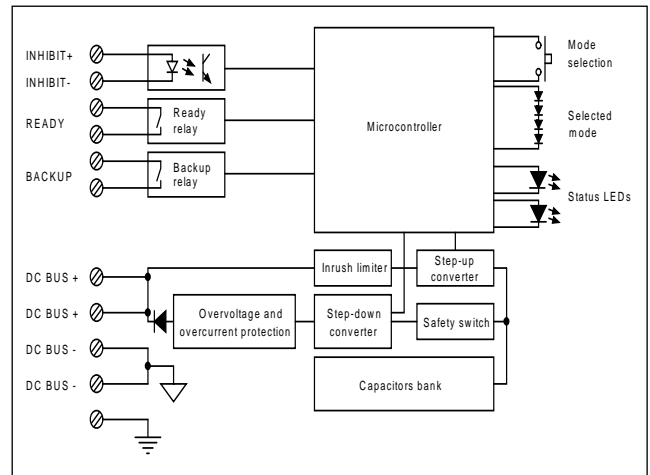
The operating waveforms show the normal operation of the LDX-B20. On the waveform the start-up and old-up time of the power supply is ignored.

1. At start-up the units charges the internal capacitor bank up to the maximum voltage. During charging the green LED blinks at 2Hz. Once the capacitors are charged at ½ of their maximal capacity, the green LED goes green and the ready relay activates.
2. The capacitors are fully charged and the unit is ready for buffering.
3. On the first AC power failure the system uses the energy stored on the capacitors to keep the DC line regulated. A small voltage drop is visible on the DC line during buffering; this drop is the forward voltage of the diode placed after the step-down converter. During buffering the backup relay activates and the red LED blinks at 2Hz.
4. When the AC line returns the unit recharges the capacitor up to the maximum voltage.
5. The capacitors are fully charged and the unit is ready for buffering.
6. The inhibit input is activated; the ready relay is deactivated to notify.
7. On the AC power loss the unit doesn't buffer the DC line because the inhibit input is activated. The unit powers off.
8. When the AC line returns the LDX-B20 turns on. The green LED turns on because the capacitors are already charged.
9. The inhibit input is deactivated. The relay ready signal becomes active and the unit is ready for buffering.
10. On AC power loss the unit uses the energy stored on the capacitors to keep the DC line regulated eventually until full discharge.

**OPERATING WAVE FORMS**



**BLOCK DIAGRAM**



**INSTALLATION**

The LDX-B20 is placed in parallel with the DC line to protect see Fig.7 to increase the power and backup time it is allowed to place more than one unit in parallel.

Depending on the application the unit can be configured on 5 different operation modes.

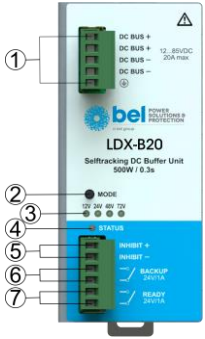
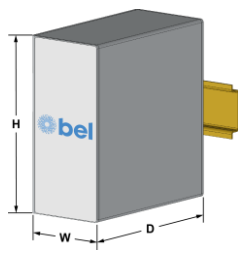
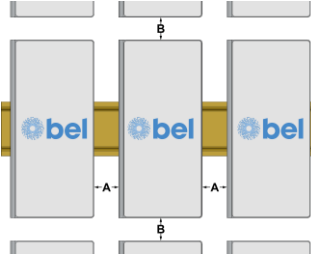
The current setting is shown on the 4 mode LEDs present on the front side.

The mode selects the voltage range of buffering with the voltages shown on the table below.

The following procedure is used to change mode:

1. Hold the button pressed for more than 3s until the current mode LED start blinking at 2Hz and then release the button.
2. Click the button until the LED start blinking on the desired mode.
3. Hold the button pressed for more than 3s until the mode LED stop blinking and then release the button.

| 12V | 24V | 48V | 72V | Umin | Umax |
|-----|-----|-----|-----|------|------|
| ●   | ○   | ○   | ○   | 11V  | 16V  |
| ○   | ●   | ○   | ○   | 21V  | 29V  |
| ○   | ○   | ●   | ○   | 39V  | 57V  |
| ○   | ○   | ○   | ●   | 65V  | 85V  |
| ●   | ●   | ●   | ●   | 11V  | 85V  |

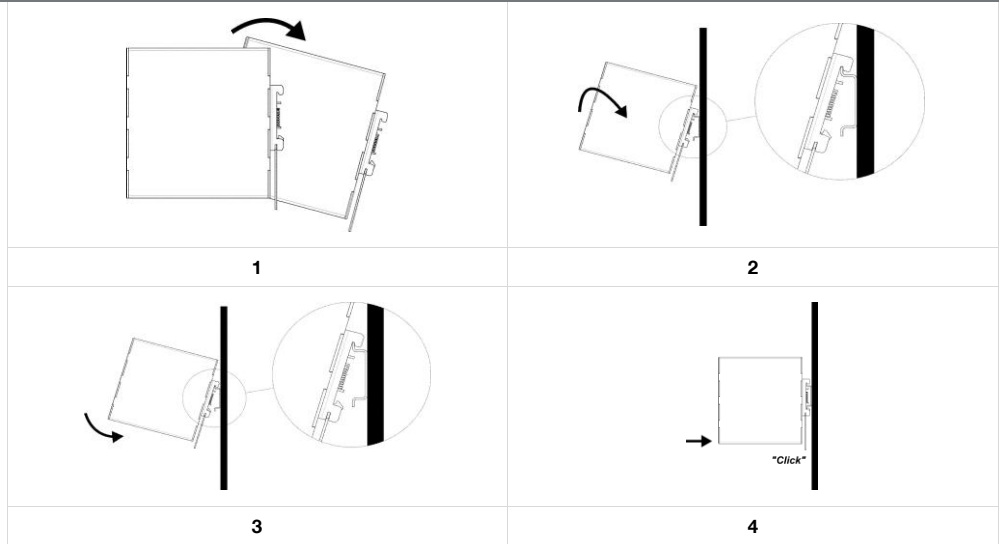
| FIG.1 - CONNECTIONS   | FIG.2 - DIMENSIONS   | FIG.3 - DISTANCES |          |   |      |   |       |   |       |  |          |          |   |    |   |    |
|---|--|-------------------|----------|---|------|---|-------|---|-------|--|----------|----------|---|----|---|----|
|  <p>(1) DC BUS Connection<br/>                 (2) Mode switch button<br/>                 (3) Mode LEDs<br/>                 (4) Status LEDs<br/>                 (5) Inhibit<br/>                 (6) Backup Dry contact<br/>                 (7) Ready Dry contact</p> <p>Input / Output DC BUS:</p> <ul style="list-style-type: none"> <li>DC BUS + = connect to positive DC BUS</li> <li>DC BUS - = connect to negative DC BUSL = Line</li> </ul> |  <table border="1"> <thead> <tr> <th>Dimension</th> <th>mm (inc)</th> </tr> </thead> <tbody> <tr> <td>W</td> <td>63.0</td> </tr> <tr> <td>D</td> <td>117.0</td> </tr> <tr> <td>H</td> <td>140.0</td> </tr> </tbody> </table> | Dimension         | mm (inc) | W | 63.0 | D | 117.0 | H | 140.0 |  <table border="1"> <thead> <tr> <th>Distance</th> <th>mm (inc)</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>20</td> </tr> <tr> <td>B</td> <td>20</td> </tr> </tbody> </table> | Distance | mm (inc) | A | 20 | B | 20 |
| Dimension   | mm (inc)   |                   |          |   |      |   |       |   |       |  |          |          |   |    |   |    |
| W   | 63.0   |                   |          |   |      |   |       |   |       |  |          |          |   |    |   |    |
| D   | 117.0  |                   |          |   |      |   |       |   |       |  |          |          |   |    |   |    |
| H   | 140.0  |                   |          |   |      |   |       |   |       |  |          |          |   |    |   |    |
| Distance  | mm (inc)   |                   |          |   |      |   |       |   |       |  |          |          |   |    |   |    |
| A   | 20   |                   |          |   |      |   |       |   |       |  |          |          |   |    |   |    |
| B   | 20   |                   |          |   |      |   |       |   |       |  |          |          |   |    |   |    |

## FIG.4 - MOUNTING / DISMOUNTING INSTRUCTIONS

For DIN rail fastening according to IEC 60715 TH35-7.5(-15)  
 Mounting as shown in figure, with input terminals on lower side, 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.



### DISMOUNTING:

1. Pull down the slide clamp lever
2. Tilt the unit upward  
Unhook the unit from the rail

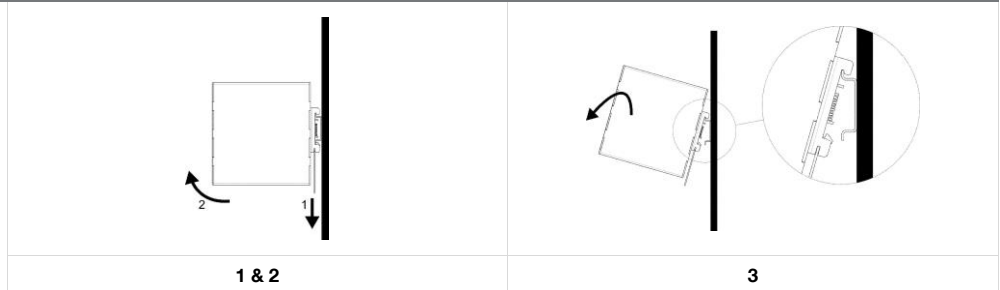
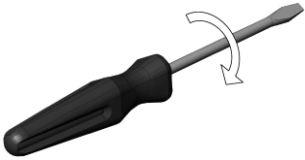
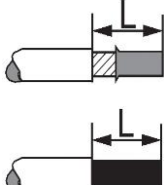


FIG.5 - RECOMMENDED CONNECTING CABLE

|   |   |  |  |
|---|---|--|--|
|  | <p><b>Recommended Tightening torque</b><br/>0.5 - 0.6 Nm<br/>4.42 - 5.30 lbf in</p> |  | <p>Solid: 2.5 mm<sup>2</sup> / 12 AWG<br/>Stranded: 1.5 mm<sup>2</sup> / 12 AWG<br/>L: 6.0 - 7.5 mm / 0.24-0.30 in</p> |
|---|---|--|--|

CONNECTIONS AND USER INTERFACE

- **DC bus:** wired in parallel with the DC line to protect
  - **Mode switch button:** used to select the operating voltage range /mode of the LDX-B20. Selects between 12V, 24V, 48V, 72V or automatic detect 12V to 72V, by sequential press of the key.
  - **Mode LEDs:** shows the current operating voltage range of the LDX-B20. All LEDs lit mean the unit is in automatic voltage detect mode.
  - **Status LED:** bicolour LED (green-red) showing the current status of the unit.
  - **Blinking green:** capacitors are charging.
  - **Static green:** capacitors are charged and the system is ready for buffering.
  - **Blinking red:** unit is buffering.
  - **Inhibit:** opto-coupled input used to disable the buffering function.
  - **Backup relay:** dry contact closed while the device is buffering.
- Ready relay:** dry contact closed when the internal capacitors are charged at ½ of their maximal energy and the inhibit input is inactive.

FIG.6 - INPUT / OUTPUT CONNECTIONS

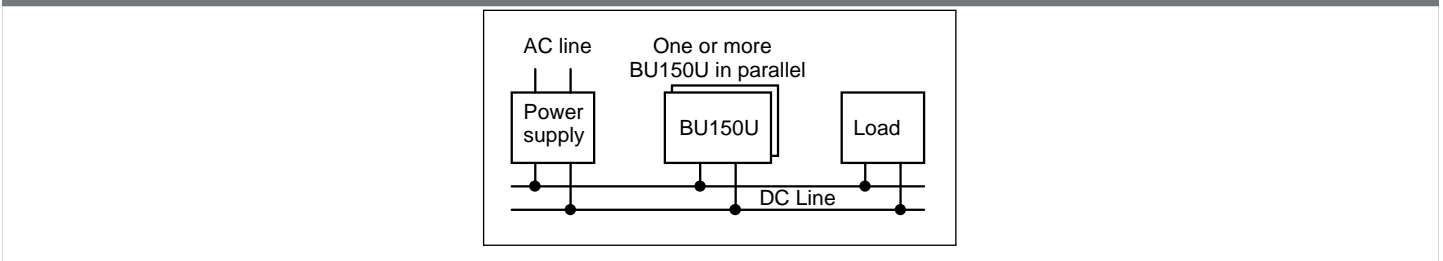


FIG.8 - ENVIRONMENT

| OPERATING TEMPERATURE  | DERATING    |
|--|-------------|
| - 40°C to 70°C<br>5 - 95% r.H. non condensing<br>UL Certified up to 70°C | No derating |

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](http://belfuse.com/power-solutions).

See also the products that can be used in conjunction with LDX-B20 units:

This device can be used in conjunction with every each our power supply that is able to provide a regulated Uout between 12 - 85 VDC