

# INSTALLATION INSTRUCTION

## LDT960 Series DIN Rail Power Supply



<b>LDT960-24</b>	<b>INPUT:</b> 400 – 500 VAC, 2.4 – 2.1 A (three phase), 50 - 60 Hz (UL certified) or 520 - 725 VDC, 2.2 – 1.7 A
	<b>OUTPUT:</b> 24 VDC, 40 A
<b>LDT960-48</b>	<b>INPUT:</b> 400 – 500 VAC, 2.4 – 2.1 A (three phase), 50 - 60 Hz (UL certified) or 520 - 725 VDC, 2.2 – 1.7 A
	<b>OUTPUT:</b> 48 VDC, 20 A
<b>LDT960-72</b>	<b>INPUT:</b> 400 – 500 VAC, 2.4 – 2.1 A (three phase), 50 - 60 Hz (UL certified) or 520 - 725 VDC, 2.2 – 1.7 A
	<b>OUTPUT:</b> 72 VDC, 13.3 A

<b>MAIN FEATURES</b>	• High efficiency	• Constant current or Hiccup mode limitation, user settable
	• Ultra-compact size	• Easy parallelable for power increase
	• Overload 150%	• Low noise thermally regulated 60 mm fan
	• Up to 45°C operating temp. with no derating	

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.</p> <p>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. Défait 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****1) DESCRIPTION**

DIN rail mountable primary switched-mode power supply with 340 – 550 VAC (520 – 725 VDC) suitable for three phase main line and DC line.

**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, we recommend keeping 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 pluggable screw terminals. 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 an 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 not provided with internal fuses, thus an external short circuit/overcurrent protection must be provided by the end user (see Fig.6).

For operation on a three phase system, a protection fuse on each 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 three phase AC line with rated  $V_{in}$  400 – 500 VAC (see Fig.7). Please connect the PE first.

**6) DC INPUT CONNECTION**

Connect L1 terminal to (+) positive pole, L2 terminal to (-) negative pole, L3 do not connect, and  $\oplus$  terminal to GND. Rated voltage 520 – 725 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. Pay attention LDT960-72 is not **SELV**.

$V_{out}$  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 nom. power.

**8) PARALLEL CONNECTION AND REDUNDANCY**

Power supplies can be connected in parallel to increase power. For paralleling for power set the Ilim jumper to C.C. algorithm.

$V_{out}$  must be set uniformly ( $\pm 100$  mV) on each power supply and the wiring must be symmetrical to ensure an equal current distribution.

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 or a constant current (C.C.) mode protection with the following behaviour.

**The Hiccup mode or C.C. mode are selectable with Jumper (see Fig.1)**

**OL behavior in hiccup mode:** max.  $OL = 1.5 \times I_n$  In the output voltage remains constant at nominal voltage for about 5s and after that time the device starts an ON/OFF cycle.

**OL behaviour in CC mode:** max.  $OL = 1.5 \times I_n$  In the output voltage remains constant at nominal voltage for about 5s and after that time the device limits the current at  $I_n$ . If the load resistance is further decreased the output voltage starts to drop. The device never switches OFF.

**SC behaviour in hiccup mode:** the device supplies  $1.5 \times I_n$  for about 5s and after that time the device starts an ON/OFF cycle.

**SC behaviour in CC mode:** the device supplies  $1.5 \times I_n$  and the output voltage drops to a level depending on the impedance of the failed load circuit. After 5s the current is limited to  $I_n$ . The device never switches OFF.

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

$V_{out} \geq V_{nom} \times 1.2 \dots 1.4$ , 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).

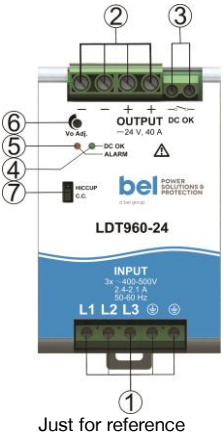
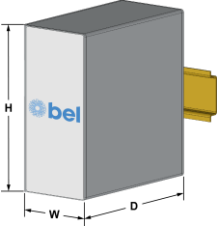
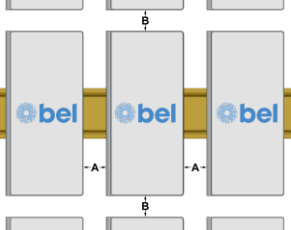
**10) FEEDING DC MOTORS**

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). For these applications the C.C. (Constant Current) mode of current limitation is recommended.

**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) OPERATION WITH BATTERY**

When a battery is connected in parallel to the Output for backup purposes; the LDT960 must be set to C.C. mode to avoid battery over-charging (see accessory device).

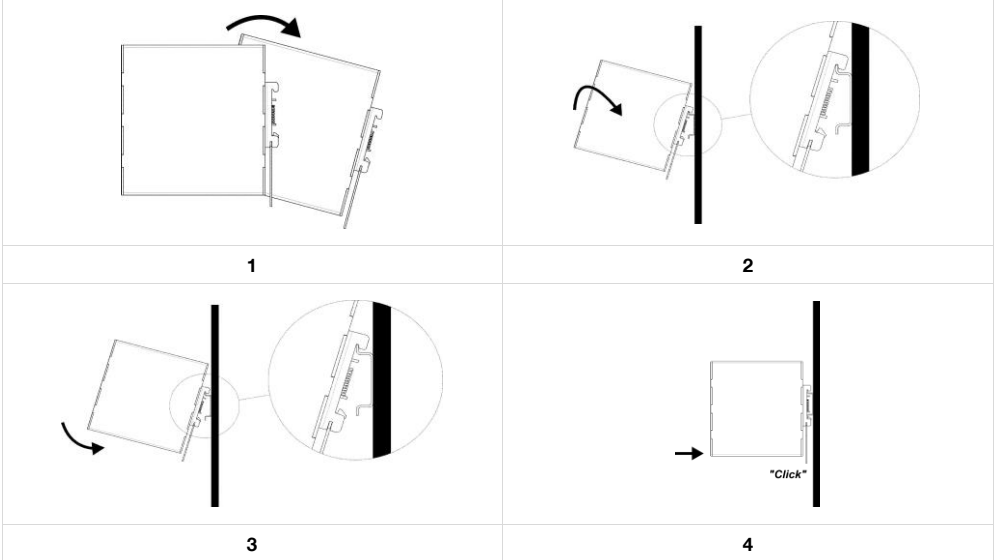
FIG.1 - CONNECTIONS	FIG.2 - DIMENSIONS	FIG.3 - DISTANCES																					
 <p>Just for reference</p>	<p>(1) AC/DC input                  (2) DC output (load)                  (3) Diagnostic Output (dry contact, NC output OK)                  (4) Green LED: Output OK                  (5) Red LED: overload                  (6) Output voltage adjustment                  (7) Selectable limitation mode (Hiccup mode, C.C. mode)</p> <table border="0"> <tr> <td> <b>Input AC Line:</b> <ul style="list-style-type: none"> <li>▪ L1 = Phase 1</li> <li>▪ L2 = Phase 2</li> <li>▪ L3 = Phase 3</li> <li>▪ ⊕ = earth ground</li> </ul> </td> <td> <b>Input DC Line:</b> <ul style="list-style-type: none"> <li>▪ L1 = + Positive DC</li> <li>▪ L2 = - Negative DC</li> <li>▪ L3 = do not connect</li> <li>▪ ⊕ = earth ground</li> </ul> </td> </tr> <tr> <td colspan="2"> <b>Output:</b>                      + = Positive DC / - = Negative DC / Dry contact = NC                 </td> </tr> </table>	<b>Input AC Line:</b> <ul style="list-style-type: none"> <li>▪ L1 = Phase 1</li> <li>▪ L2 = Phase 2</li> <li>▪ L3 = Phase 3</li> <li>▪ ⊕ = earth ground</li> </ul>	<b>Input DC Line:</b> <ul style="list-style-type: none"> <li>▪ L1 = + Positive DC</li> <li>▪ L2 = - Negative DC</li> <li>▪ L3 = do not connect</li> <li>▪ ⊕ = earth ground</li> </ul>	<b>Output:</b> + = Positive DC / - = Negative DC / Dry contact = NC				<table border="1"> <thead> <tr> <th>Dimension</th> <th>mm (inc)</th> </tr> </thead> <tbody> <tr> <td>W</td> <td>80 (3.15)</td> </tr> <tr> <td>D</td> <td>137.5 (5.41)</td> </tr> <tr> <td>H</td> <td>127 (5.00)</td> </tr> </tbody> </table>	Dimension	mm (inc)	W	80 (3.15)	D	137.5 (5.41)	H	127 (5.00)	<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>100 (3.9)</td> </tr> </tbody> </table>	Distance	mm (inc)	A	20 (0.8)	B	100 (3.9)
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## 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.

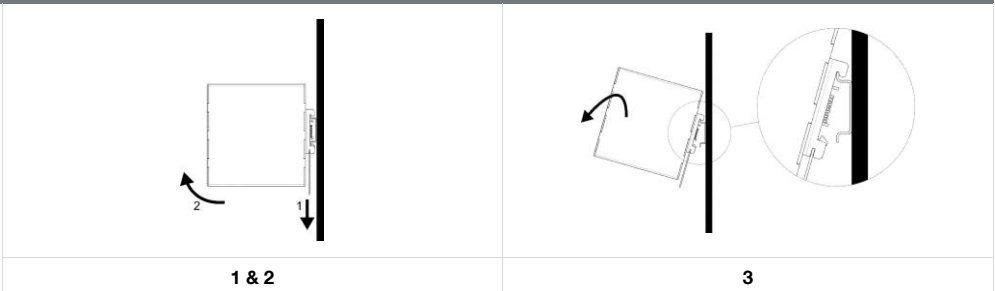
### MOUNTING:

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.

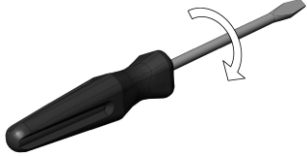
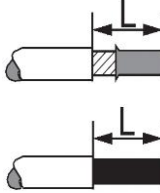


### DISMOUNTING:

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



**FIG.5 - RECOMMENDED CONNECTING CABLE**

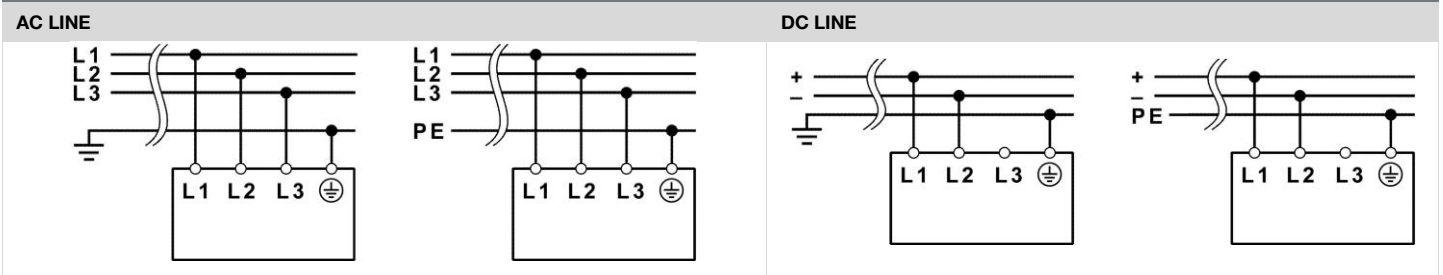
	<p><b>Recommended Tightening torque</b> 0.8 / 1.0 Nm 7.0 / 8.85 lbf in</p> <p><b>Only for LDT960-24 output Header</b> 1.2 / 1.5 Nm 10.62 / 13.28 lbf in</p>		<p>Solid: 6 mm<sub>c</sub> / 10 AWG Stranded: 4 mm<sub>c</sub> / 10 AWG L: 7 - 8 mm / 0.28 - 0.31 in</p> <p><b>Only for LDT960-24 output Header</b> Solid: 16 mm<sub>c</sub> / 6 AWG Stranded: 10 mm<sub>c</sub> / 6 AWG L: 10.5 - 11.5 mm / 0.41 - 0.45 in</p>
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**FIG.6 - INPUT PROTECTION**

Fuses 3x AT 10 A or MCB 10 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**



**FIG.8 - ENVIRONMENT**

**OPERATING TEMPERATURE**

- 40°C to + 70°C  
5 - 95% r.H. non condensing  
UL Certified up to 45°C

**DERATING**

- 15 W / °C over 45°C

**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)

**ACCESSORIES**

- LDX-D20 20 A Active ORing controller
- LDX-D50 50 A Active ORing controller
- LDX-U20 20 A High performance DC UPS
- LDX-B20 150J Buffer Module
- LDX-C120 Battery charger and DC UPS Module
- LDX-L30 Sealed Lead acid Battery pack