

INSTALLATION INSTRUCTION

LDT2400 Series

2400 W 3-Phase Multipurpose Digital DIN Rail Power Supply



LDT2400-24

INPUT: 400 – 500 VAC, 4.5 – 3.5 A (three phase), 50 - 60 Hz (UL certified)
or 520 - 725 VDC, 5.2 – 3.8 A
OUTPUT: 24 VDC, 100 A

LDT2400-48

INPUT: 400 – 500 VAC, 4.5 – 3.5 A (three phase), 50 - 60 Hz (UL certified)
or 520 - 725 VDC, 5.2 – 3.8 A
OUTPUT: 48 VDC, 50 A

LDT2400-72

INPUT: 400 – 500 VAC, 4.5 – 3.5 A (three phase), 50 - 60 Hz (UL certified)
or 520 - 725 VDC, 5.2 – 3.8 A
OUTPUT: 72 VDC, 33 A

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	AVERTISSEMENT
<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**

Digital 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

LDT2400 is NOT equipped with an internal protection fuse. Use external breaking and protection devices as circuit breakers rated 10 A and characteristic C, properly rated for the operating voltage and with a minimum breaking power of 1.5 kA. Over-current protection must be provided on each phase. (see Fig.6).

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 LDT2400-72 is not **SELV**.

Vout can be adjusted with a potentiometer to a wide range (see Fig.1)

Check Vout 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

1. Increase power (max. 4 units). The maximum total output current will be $0.9 \cdot I_{out} \cdot N$, where N is the number of connected units. The maximum power is thus limited to $0.9 \cdot N \cdot P_{nom} < 8.7$ kW. To obtain the system's best performance SHARE+/SHARE- signals must be daisy chain connected on all power supplies.
2. Increase the system reliability (redundancy). The maximum power sunk by the load must be $< P_{nom}$. The SHARE+/SHARE- signals should NOT be connected.

Notes: When more units are operated in parallel they must be set to "constant current limit (CC)" mode; Overboost and battery charger operations are not allowed.

Do not connect anything to the auxiliary connector SENSE+/SENSE- when using the SHARE+/SHARE connection! Wrong connection to these signals may damage the devices and the connected load. Do not use the Battery Charger operating mode when more units are connected in parallel. Respect the polarity of the SHARE+/SHARE-connections!

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.

Three user selectable modes are available:

1. **Overboost (OB):** A temporary power boost up to 150% (3600 W) of its rated power for a maximum of 5 s. As soon as the output current becomes $> I_{nom}$ a timer is started; when the timer elapses (5 s) the output is shut OFF and kept OFF for 10 seconds (hiccup cycle – 5 s ON/10 s OFF). In case of a "dead short circuit" on the output ($V_{out} < 0.1 \cdot V_{nom}$) the maximum current is still limited at $1.5 \cdot I_{nom}$, but the output shuts off after about 100 ms entering a hiccup cycle.
2. **Constant current limit (CC):** The max. output current can be set between $0.1 \cdot I_{nom}$ and I_{nom} . It will never exceed the programmed value independently on the load behavior. In case of a "dead short circuit" on the output ($V_{out} < 0.1 \cdot V_{nom}$) I_{max} is still limited at I_{nom} , but the output shuts OFF after about 100 ms, entering a hiccup cycle.
3. **Battery charger mode (BC):** Allows operating the device as a high performance battery charger for lead-acid, lithium iron phosphate (LiFePO4) and NiCd/NiMH batteries. 12 V, 24 V, 48 V, 60 V and 72 V batteries can be charged up to a capacity of 1000 Ah.
 - a) **normal charge method** - the charge current is limited to $0.1C$ (C/10) for lead acid or $0.17C$ (C/6) for LiFePO4 and this charging method takes approximately 12h to be completed.
 - b) **fast charge method** - the charge current is limited to $0.2C$ (C/5) for lead acid or $0.33C$ (C/3) for LiFePO4 and the charging time is approximately 8h. C is the current value in Ampere equal to the battery nominal capacity expressed in Ah (100Ah $1C = 100A$).

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: The over temperature alarm starts at transformer temperature $> 115^\circ\text{C}$ (239°F). The OT error is activated when the transformer temperature $> 125^\circ\text{C}$ (257°F). Then the device trips to thermal shutdown. 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).

Note: The Battery charger OT is logged when battery ambient temperature $< 50^\circ\text{C}$.

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. For these applications, the Constant Current mode of current limitation is recommended.

Warning: motors can generate high conducted noise on the DC line and potentially harmful reverse surges. It is strongly discouraged to supply motors on the same DC line. Use their own properly configured motor drivers together with own braking devices such as resistors, clamps or any other specific device.



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11) OPERATION WITH BATTERY

This device is not a UPS nor has to be used in any kind of backup. Operating the device as a backup system can damage the unit and/or create unexpected behaviours. Respect the battery polarity! The device is NOT protected against battery polarity reversal. A connection with wrong battery polarity will damage the device and generate a fire hazard. Battery charger function can be used ONLY in combination with battery. No loads are allowed to be connected to the battery terminals. Operation of the battery charger function can be disturbed. Use of battery charger function is not allowed when more units are connected in series or in parallel.

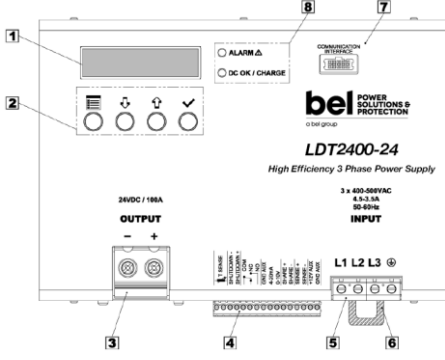
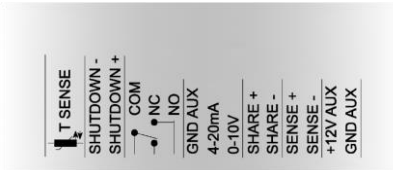
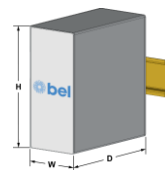
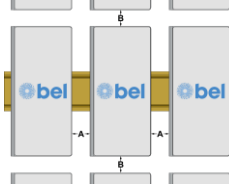
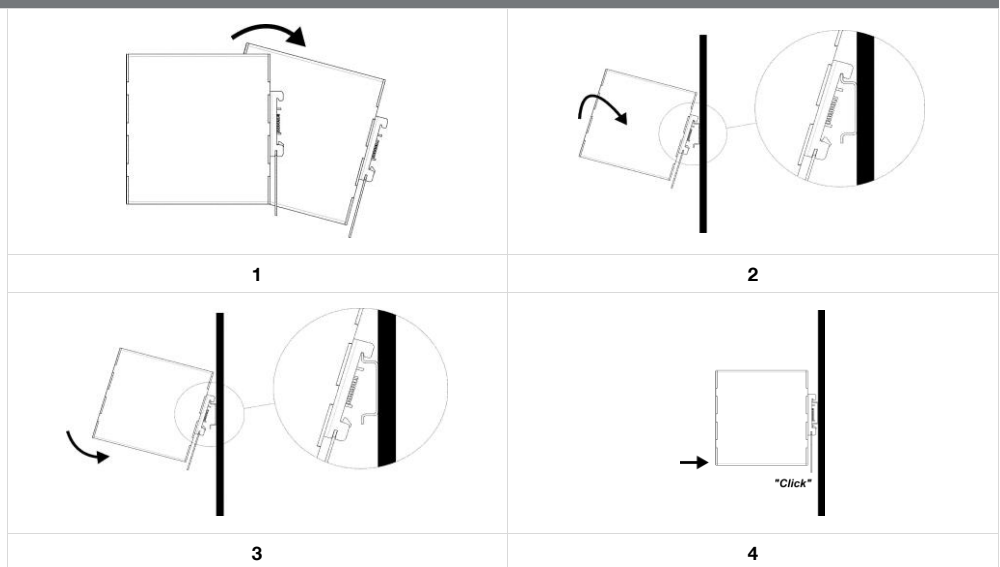
FIG.1 - CONNECTIONS	FIG.2 - DIMENSIONS	FIG.3 - DISTANCES														
 <p>1 Display 2 Control Keys 3 Output Connector 4 Auxiliary Connector 5 Input Connector 6 DIN rail fixing Clamp 7 Communication Interface 8 Status LEDs 9 Buzzer (Internal)</p> <p>INPUT CONNECTION:</p> <p>Three-phase L1 = Phase 1 L2 = Phase 2 L3 = Phase 3 ⊕ = Earth ground</p> <p>DC Input L1 = + Positive DC L2 = - Negative DC L3 = do not connect ⊕ = Earth ground</p> <p>OUTPUT CONNECTION: + = Positive DC / - = Negative DC</p> <p>AUXILIARY CONNECTION: See details below</p> <p>Detail of Auxiliary connector (4):</p> 	 <table border="1"> <thead> <tr> <th>Dimension</th> <th>mm (in)</th> </tr> </thead> <tbody> <tr> <td>W</td> <td>233 (9.17)</td> </tr> <tr> <td>D</td> <td>101 (3.98)</td> </tr> <tr> <td>H</td> <td>160 (6.30)</td> </tr> </tbody> </table>	Dimension	mm (in)	W	233 (9.17)	D	101 (3.98)	H	160 (6.30)	 <table border="1"> <thead> <tr> <th>Distance</th> <th>mm (in)</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>10 (0.4)</td> </tr> <tr> <td>B</td> <td>80 (3.0)</td> </tr> </tbody> </table>	Distance	mm (in)	A	10 (0.4)	B	80 (3.0)
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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.



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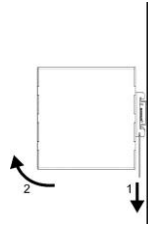
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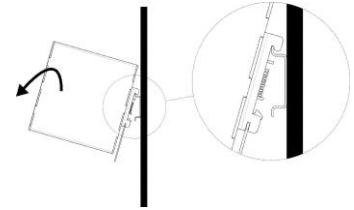
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DISMOUNTING:

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

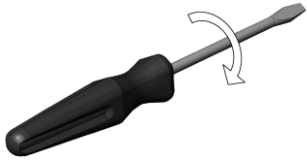


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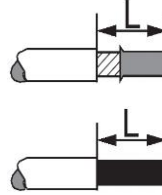
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FIG.5 - RECOMMENDED CONNECTING CABLE



Recommended tightening torque:

- Input connector**
T = 0.5...0.6 Nm, 4.43. 5.31 in-lb,
screw type header
- Output connector**
T = 2.5...4.5 Nm, 22.13. 39.83 in-lb,
screw type header
- Auxiliary connector**
T = 0.25 Nm, 2.21 in-lb,
screw type pluggable 16 pin



Earth (PE) connector wiring:
1.5 mm² / 16 AWG

NOTE: Wire as short as possible!

Input connector wiring:

1.5...4 mm² / 16...11 AWG, L = 8 mm,

Output connector wiring:

min. 6...35 mm² / 9...2 AWG, L = 15 mm

Auxiliary connector wiring:

0.5...1.5 mm² / 20. 16 AWG, L = 5 mm

NOTE: Use only 60/75 Class 1 copper wires.

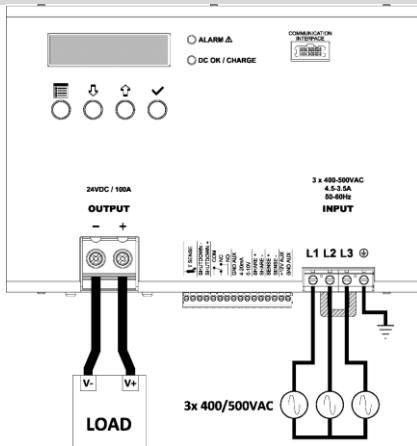
FIG.6 - INPUT PROTECTION

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 - CONNECTIONS

STANDARD CONNECTION



OUTPUT CURRENT REMOTE MEASUREMENT

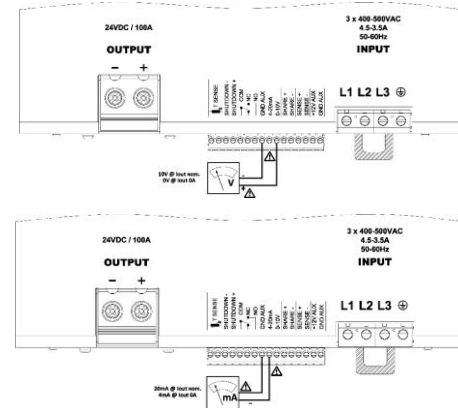


FIG.8 - ENVIRONMENT

OPERATING TEMPERATURE

- 40°C to + 70°C, UL certified up to 50°C
5 - 95% r.H. non condensing

DERATING

- 60 W / °C over 50°C

NOTES:

- Data may change without prior notice in order to improve the product.
- Please refer to the latest version of [LDT2400 Series Datasheet](#) or [LDT2400 Series User Manual](#) on our website belfuse.com/power-solutions



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