

# LDD960-UU

## 960W DIN Rail Combo DC-UPS DC-DC Converter

LDD960-UU is a microprocessor-controlled unit that can perform two functions:

- DC-UPS rated 960 W / 20 A usable in any system 12 – 48 VDC
- DC/DC converter (non-isolated) rated 960 W / 20 A usable in any combination of IN/OUT voltages 12 – 48 VDC

For the UPS function it may use one 12 V battery, independently of the operating load voltage. For any supply voltages (12 – 48 VDC) it may use also multiple battery configuration (10 – 60 VDC).

LDD960-UU monitors the voltage coming from a DC power supply and in case of power failure a backup storage source supplies the energy to the load. In normal condition the battery is kept charged by an integrated battery charger supporting various battery chemistries.

As a DC/DC converter (no battery present), the input voltage is converted to any output voltage as per the set-up (programmable by front keys or communication interfaces).



### Key Features & Benefits

- Digital power regulation, LCD interface
- Integrated battery charger for 12 – 48 V multi-chemistries batteries with a charging current up to 20 A
- Can operate with super capacitors modules
- Battery voltage independent of input and output voltage
- 20 A or 960 W rated load
- Multiple protections
- Remote ON/OFF or other remote control functions possible through INHIBIT input
- Measures voltages and currents on input, output and battery.
- Battery protection against reverse polarity connection and overcurrent
- Battery health monitoring system: measuring battery internal resistance, battery temperature, charge/discharge cycles and Coulomb counter
- User settable maximum backup time
- Auxiliary output with same voltage as battery (5A max.), protected against overcurrent/short-circuit
- Suitable for Powermaster software

### Embedded User Interface

- 4 keys and 1 color graphic TFT LCD display
- Allows online device configuration
- Displays the LDD960-UU status and alarms
- Modbus over RS-485 and USB interfaces for control and monitoring
- Dry contacts for programmable status signals

## 1. INPUT SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITION	SPECIFICATION
Input DC Voltage	Nominal Range	12 - 48 VDC 10 - 60 VDC (UL Certified)
Input DC Current		20 A
Standby Power		< 4 W

## 2. MAIN OUTPUT SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITION	SPECIFICATION
Output Power		960 W
Voltage	Vin for use as UPS; according to set-up for use as DC/DC converter	12 - 48 VDC (Nominal)
Maximum Current / Power		20 A / 960 W
Short-Circuit Current	Constant current limited only in DC-UPS Mode	21 A
Load Regulation		± 1%
Efficiency at Full Load Power Loss	UPS mode with Vin present	> 98% < 7 W
Efficiency at Full Load Power Loss	UPS mode during backup	> 97% < 15 W
Efficiency at Full Load Power Loss	DC-DC mode	> 97% < 15 W

## 3. AUXILIARY OUTPUT SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITION	SPECIFICATION
Voltage	U battery – non-regulated	12 - 48 VDC (Nominal)
Continuous Current		5 A
Overload Limit		6 A

## 4. BATTERY SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITION	SPECIFICATION
Battery Voltage (or to be used as input for DC/DC conversion)	Nominal Range	12 - 48 VDC 10 - 60 VDC
Battery Chemistries	Lead Acid; Nickel; Lithium; Supercap capacitors	
Maximum Battery Charge Current		20 A
Maximum Battery Discharge Current		20 A
Allowed Battery Capacity		up to 400 Ah
Battery Protections	Overcurrent Deep Discharge Reverse Polarity	
Battery Charge Efficiency Power Loss		> 96% < 20 W
Maximum Backup Time	User programmable, up to battery deep discharge threshold	
<b>Battery Health Monitoring</b>		
Battery Internal Resistance Range		1 mΩ – 300 mΩ
Additional Monitoring Functions	Coulomb counter Battery temperature through 10 kΩ NTC sensor (optional WNTC-2MT) Battery operating time since installation Number of cycles	

## 5. USER INTERFACE

PARAMETER	DESCRIPTION / CONDITION
1.5 inch Color Graphic LCD	Used to display the unit's status and to access the configuration menus
4 Keys	Used to program the unit and to access various menus
Red LED	<b>Constantly ON:</b> generic failure on the system, details on the LCD <b>Blinking:</b> battery backup function active
2 Dry Contact Relays (NO, 24 VDC / 1 A)	<b>RL1 / RL2</b> - Configurable <b>RL COM</b> - Common Pin
Other Interfaces	<b>INH</b> - (INHIBIT) Isolated remote ON/OFF input, active for 5 – 30 VDC <b>T SENSE</b> - optional, remote temperature sensor for battery charging (WNTC-2MT) <b>Modbus</b> over <b>USB</b> and <b>RS-485</b> interfaces

## 6. ENVIRONMENTAL, EMC & SAFETY SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITION	SPECIFICATION	
Operating Temperature <sup>1,2</sup>	UL certified up to 60°C at 12 – 24 VDC or up to 50°C at 48 VDC	- 40 to + 70°C	
Storage Temperature		- 40 to + 80°C	
Temperature and Voltage Derating	(See Figure 1 and 2)		
Humidity	Non-condensing	5 - 95% RH	
Life Time Expectancy	At 25°C ambient, full load	281 904 h (32.2 years)	
MTBF	MIL-HDBK-217F	> 600 000 h at 25°C ambient full load	
Overvoltage Category	EN50178	I	
Pollution Degree	IEC60664-1	2	
Isolation Against Enclosure		0.75 kVDC	
Safety Standards & Approvals	UL508 Certified EN60950 (reference)		
EMC Standards	Emission	EN55022 (CISPR11) EN55011 (CISPR22)	Class B Class B
	Immunity	EN61000-4-2	Level 3
		EN61000-4-3	Level 3
		EN61000-4-4	Level 3
		EN61000-4-5	Level 1
Protection Degree	EN60529	IP20	
Vibration Sinusoidal	IEC 60068-2-6	5 - 17.8 Hz: ±1.6 mm; 17.8 - 500 Hz: 2 g, 2 hours / axis (X, Y, Z)	
Shock	IEC 60068-2-27	30 g 6 ms, 20 g 11 ms; 3 bumps / direction, 18   umps total	

<sup>1</sup> Start-up type tested: - 40°C, possible at nominal voltage with load derating

<sup>2</sup> For temperature ≤ - 20°C the LCD is not operating, for temp. ≥ +60°C the display reduces its life time, but the unit will operate correctly.

### NOTES:

- For more details, performance and descriptions regarding all parameters not indicated in the above table, please refer to the user manual downloadable from [belfuse.com/power-solutions](http://belfuse.com/power-solutions)
- Technical parameters are typical, measured in laboratory environment at 25°C, 24 VDC input and 24 V lead acid battery, at nominal values, after minimum 5 minutes of operation.
- Power rating, losses, efficiency, ripple, thermal behaviour and start-up may change outside of the nominal rated input range. Contact factory for details.

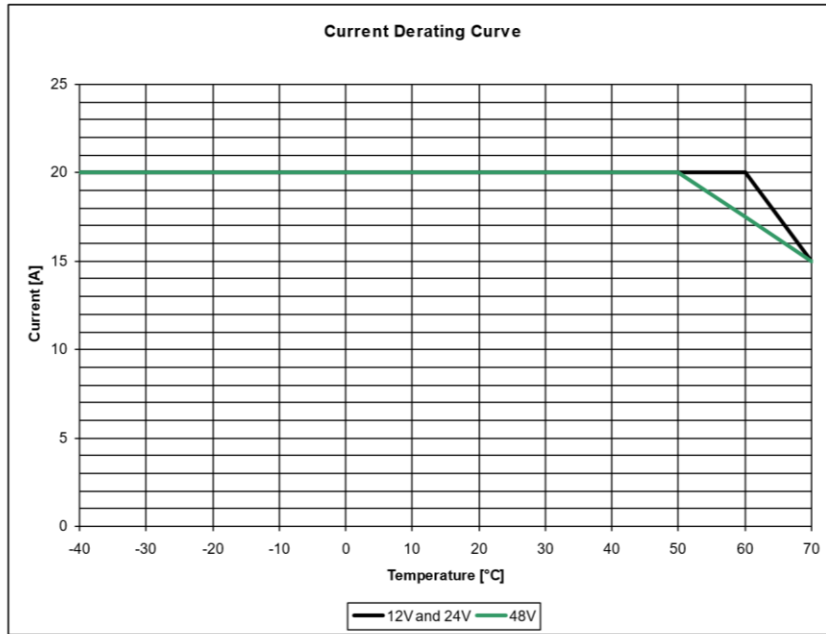


Figure 1. Current Derating Curve

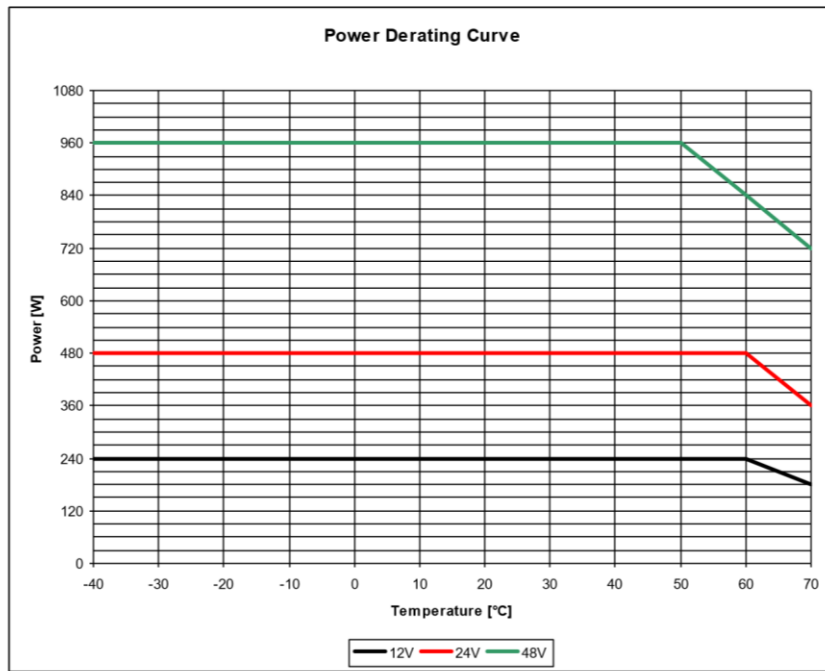


Figure 1. Power Derating Curve

## 7. MECHANICAL SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITION	SPECIFICATION
Weight		500 g
Dimensions		54 x 115 x 110 mm
IN/Battery/OUT Connection Terminals	Screw type, pluggable	2.5 mm <sup>2</sup> (24 – 12 AWG)
Auxiliary Connection Terminals	Spring type, pluggable	Up to 0.75 mm <sup>2</sup> (18 AWG)
Temperature Sensor Connector	Friction lock connector	
Communication Interface Connector	Mini USB-B Type (virtual Com Port) RS-485 through auxiliary connector	
Case Material	Aluminum	

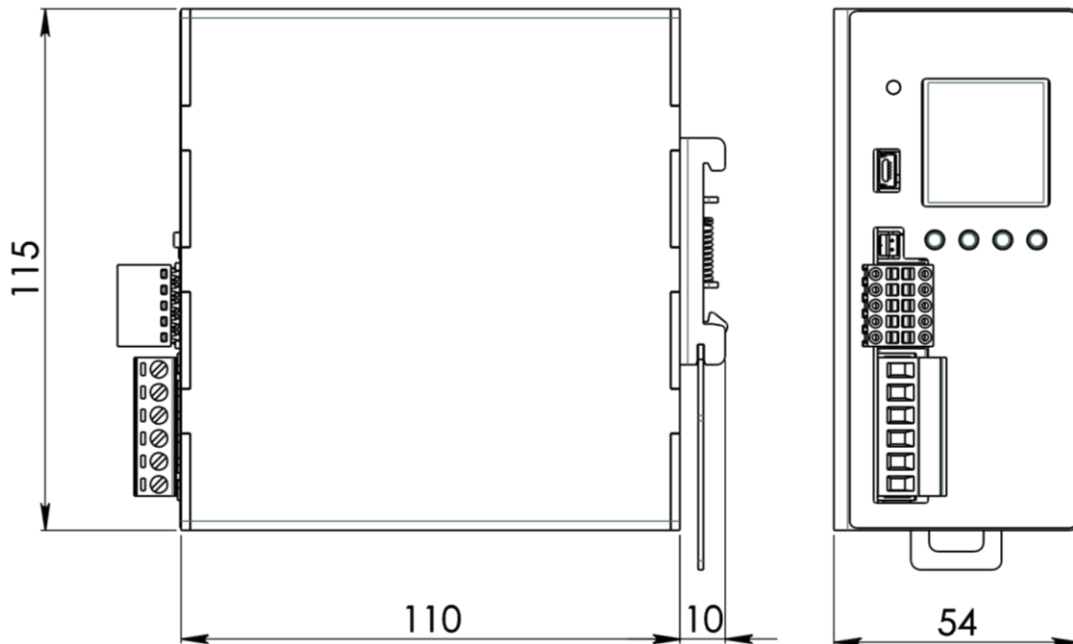
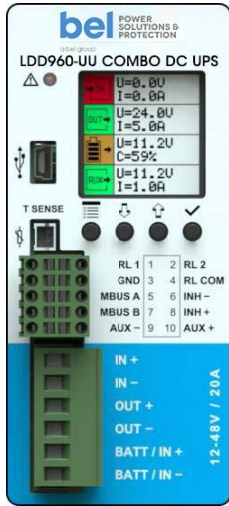


Figure 3. Mechanical Drawing

## 8. PIN LAYOUT & DESCRIPTION



### MAIN CONNECTIONS

**IN:**  
(connect to power supply  
in UPS mode)

+ = Positive DC  
- = Negative DC

**BATT/IN:**  
(connect to battery in UPS  
mode or power supply in  
DC/DC mode)

+ = Positive DC  
- = Negative DC

**OUT:**  
(connect to load)

+ = Positive DC  
- = Negative DC

### AUXILIARY CONNECTIONS

**RL1 / RL2:**  
(programmable dry contact)

RL1 = NO  
RL2 = NO  
RL COM = COM

**Modbus:**  
(over RS-485, 2 wire interface)

MBUS A = RX/TX  
MBUS B = RX/TX  
GND = Common

**INHIBIT:**  
(5 – 30 VDC)

- INH+ = Positive DC
- INH- = Negative DC

**AUX:**  
(12 – 48 VDC not regulated  
5 A Max.)

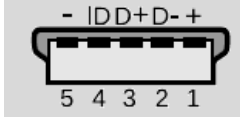
AUX + = Positive DC  
AUX - = Negative DC

**T SENSE:**  
(remote temperature sensor  
for battery charging)

Optional WNTC-2MT

### MINI USB TYPE

1 = VBUS (+5V)  
2 = Data (D-)  
3 = Data (D+)  
4 = Not connected (ID)  
5 = GND



**For more information on these products consult: [tech.support@psbel.com](mailto:tech.support@psbel.com)**

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