



**OPERATING MANUAL
LOW-VOLTAGE DISCONNECT
LVD1U SERIES**

www.unipowerco.com

Manual No. LVD-800-5a

lvd1u-man-rev5a-0615.indd

© 2015 UNIPOWER LLC

All Rights Reserved

CONTENTS

<u>SECTION</u>	<u>TOPIC</u>	<u>PAGE</u>
1.0	Introduction	4
2.0	Features and Options Product	5
3.0	Designation	6
4.0	Safety Warnings	6
5.0	Warranty	7
6.0	Unpacking and Inspection	7
7.0	Specifications	8
8.0	Safety and Industry Standards	9
9.0	Description of Operation Front	10
10.0	Panel Description	11
11.0	Back Panel Power Connections	12
12.0	Form C Relay Contacts	14
13.0	Installation	16
14.0	Setup and Testing	17

ILLUSTRATIONS

<u>FIGURE</u>	<u>TITLE</u>	<u>PAGE</u>
1	LVD1U Low-Voltage Disconnect Panel	4
2	Simplified Diagram of LVD1U	10
3	LVD1U Front Panel Details	11
4	Rear Connections for the LVD1U	12
5	Wire-Wrap Terminal Connections	14

OPERATING MANUAL LOW-VOLTAGE DISCONNECT LVD1U SERIES

1.0 INTRODUCTION

- 1.1 This Operating Manual should be read through carefully before installing and operating the LVD1U Series Low-Voltage Disconnect Panel.
- 1.2 The LVD1U panel provides a disconnect from either the battery or load when the battery voltage drops to a critically low level. The connection for either battery or load disconnect is done by the user. Each LVD1U has separate A and B side disconnect panels. The two sides are completely isolated and can be separately configured for 24 or 48 volts. Positive or negative ground can be used. Each disconnect also has a battery circuit breaker.
- 1.3 There is a red LED alarm for each side; this LED indicates that either the LVD contactor is open or the battery circuit breaker is open. In addition, Form C relay contacts give the same alarm. An option is a bypass switch which bypasses the disconnect contactor.
- 1.4 Figure 1 shows the LVD1U Low-Voltage Disconnect. The unit is only one mounting position high, 1.75 inches, to minimize rack space. It can be mounted in either a 19- or 23-inch relay rack with corresponding brackets; it can be mounted from from the front of the rack with offsets every quarter-inch from front to back to align with existing rack-mounted equipment.



Figure 1. LVD1U Low-Voltage Disconnect Panel

2.0 FEATURES AND OPTIONS

2.1 Features. The following summarizes the standard features for the LVD1U:

- ◆ One Mounting Position High: 1.75"
- ◆ 19- or 23-inch Rack Mounting
- ◆ Single or Dual (A/B) LVDs
- ◆ Current Capacity: 70A per Load
- ◆ Operating Voltage: 24 or 48VDC
- ◆ Positive or Negative Ground
- ◆ Red LED Alarm
- ◆ Form C Relay Contacts
- ◆ LVD in Series with Battery or Load
- ◆ Battery Circuit Breaker
- ◆ Rack Offset Every ¼", Front to Back
- ◆ Optional LVD Bypass Switch

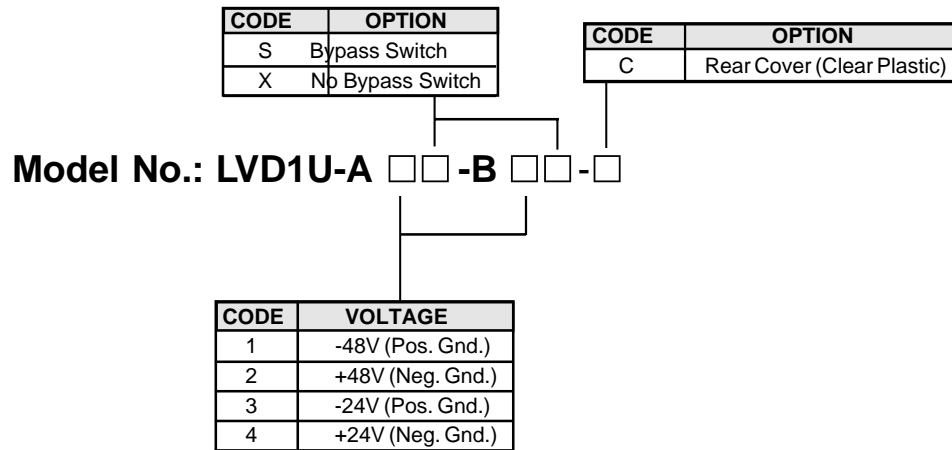
2.2 Options. There are two options available:

- ◆ LVD Bypass Switch. Option S.
- ◆ Clear Plastic Rear Cover (protects wires from damage). Option C.

3.0 PRODUCT DESIGNATION

LV DISCONNECT PANELS

MODEL	CONFIGURATIONS
LVD1U-B	SINGLE 70A
LVD1U-A-B	DUAL 70A



Note: If section A is not specified, a blank panel is installed.

4.0 SAFETY WARNINGS

- 4.1 This low-voltage disconnect operates at voltages that could potentially be hazardous. Furthermore, inadvertent short circuiting of the system battery and/or rectifier by misconnection or other error could be harmful. This product should be handled, tested and installed only by qualified technical persons who are trained in the use of power systems and are well aware of the hazards involved.
- 4.2 When operating this LVD1U the chassis ground terminal must be connected to the system frame ground or other proper safety ground for the protection of personnel.
- 4.3 All connections to the LVD1U should be carefully checked for errors before applying power to it.
- 4.4 This equipment is intended only for installation in a "RESTRICTED ACCESS LOCATION".

5.0 WARRANTY

LVD70 Series are warranted for two (2) years from date of shipment against defects in material and workmanship. This warranty does not extend to products which have been opened, altered or repaired by persons other than persons authorized by the manufacturer or to products which become defective due to acts of God, negligence or the failure of customer to fully follow instructions with respect to installation, application or maintenance. This warranty is extended directly by the manufacturer to the buyer and is the sole warranty applicable. EXCEPT FOR THE FOREGOING EXPRESS WARRANTY, THE MANUFACTURER MAKES NO WARRANTY, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. As the sole and exclusive remedy under this warranty, the manufacturer, at its option, may repair or replace the non-conforming product or issue credit, provided the manufacturer's inspection establishes the existence of a defect. To exercise this remedy, the buyer must contact the manufacturer's Customer Service Department to obtain a Return Material Authorization number and shipping instructions. Products returned without prior authorization will be returned to buyer. All products returned for repair must be shipped freight prepaid to UNIPOWER. If the buyer fails to fully comply with the foregoing, the buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property or any other incidental or consequential losses) shall be available to the buyer.

6.0 UNPACKING AND INSPECTION

- 6.1 This low-voltage disconnect was carefully tested, inspected and packaged for shipment from our factory. Upon receipt of the unit it should be carefully unpacked and inspected for any damage in shipment.
- 6.2 If there is evidence of damage, do not attempt to install the unit. The freight carrier should be notified immediately and a claim for the cost of the LVD1U should be filed with the carrier for direct reimbursement. Be sure to include the model and serial number of the damaged unit in all correspondence with the freight carrier. Also save the shipping carton and packing material as evidence of damage for the freight carrier's inspection.
- 6.3 UNIPOWER will cooperate fully in case of any shipping damage investigation.
- 6.4 Always save the packing materials for later use in shipping the unit. Never ship the LV disconnect without proper packing.

7.0 SPECIFICATIONS

INPUT / OUTPUT

LVD Capacity	70A Per Load, 140A Total
Battery Current, Max.	100A
Configuration	Single or Dual LVD
Voltage, ¹ 48V Version	42-59VDC
24V Version	22-29VDC
Polarity	Positive or Negative Ground
LVD Connection	In Series with Battery or Load
LVD Disconnect Voltage ² 48V Version	42.5 VDC
24V Version	21.25 VDC
LVD Reconnect Voltage ² 48V Version	49.0 VDC
24V Version	24.5 VDC

ALARMS

Alarm Indicator	Red LED
LED Status Indication	Red = LVD Contactor Open or Battery Breaker Open Off = Normal
Alarm Connections	Form C Relay Contacts

SAFETY STANDARDS	UL1950, CSA22.2 No.950, EN60-950
-------------------------------	----------------------------------

ENVIRONMENTAL

Operating Temp. Range	-10°C to +70°C
Storage Temp. Range	-40°C to + 85°C
Humidity	0% to 95%, Non-Condensing

PHYSICAL SPECIFICATIONS

Case Material	Steel
Finish	Powder Coat Gray
Dimensions, Inches (mm)	1.75 H x 19.00 W x 9.00 D (44.5 x 483 x 229)
Weight	9.15 lbs. (4.15 kg.)
Rack Mounting Width	19 or 23 Inches

CONNECTIONS

Input, Output, Battery	Crimp Type Lugs or ¼-20 Studs
Chassis Ground Connection	No. 8-32 Stud
Alarm Connections045" sq. Wirewrap Pins

NOTE: 1. See Ordering Guide to specify voltage.
 2. These voltages are adjustable at factory.

8.0 SAFETY AND INDUSTRY STANDARDS

8.1 The LVD1U Low-Voltage Disconnect meets the following safety certifications:

STANDARD	AGENCY
UL1950	UL
CSA22.2-950	CUL
EN60950	DEMKO

8.2 The LVD1U is CE marked to indicate conformance to the European Union's Low Voltage Directive.

9.0 DESCRIPTION OF OPERATION

- 9.1 Figure 2 shows a simplified diagram of the LVD1U circuit for both the A or B side.

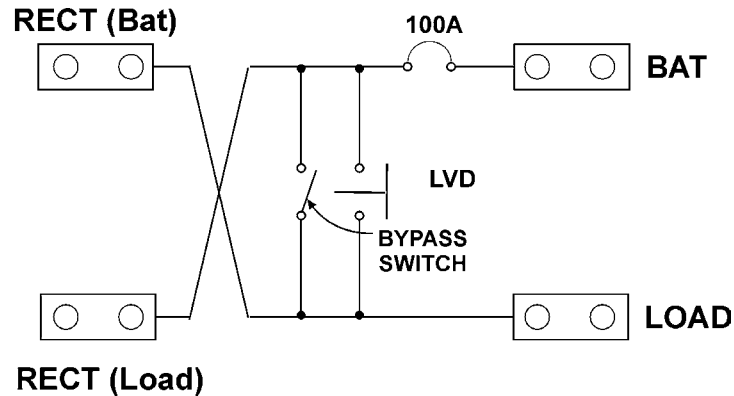


Figure 2. Simplified Diagram of LVD1U

- 9.2 The LVD1U is connected to a rectifier bus, battery and distribution panel. The contactor and bypass switch can be connected either in series with the rectifier and load or the rectifier and battery. If the battery voltage drops to 42.5V for a 48V battery or 21.25V for a 24V battery, the contactor opens, removing the loads from the rectifier and battery or, alternatively, removing the battery from the rectifier and loads. The disconnect contactor is rated at 70 amperes.
- 9.3 If the current into or out of the battery exceeds 100 amperes, the battery circuit breaker will trip. If the contactor opens due to low voltage, it will close again when the battery voltage exceeds 49.0 volts for a 48V battery or 24.5 volts for a 24V battery.
- 9.4 Other circuitry is incorporated into the LVD1U to detect the low battery voltage, turn the red LED on or off and turn the Form C relay on or off.

10.0 FRONT PANEL DESCRIPTION

10.1 The front panel has two identical sections, A and B. Appearance is identical even though the two are independent and may be electrically different (voltage, polarity and bypass switch option). See Figure 3. If only one panel (section B) is ordered, section A will have a blank panel.

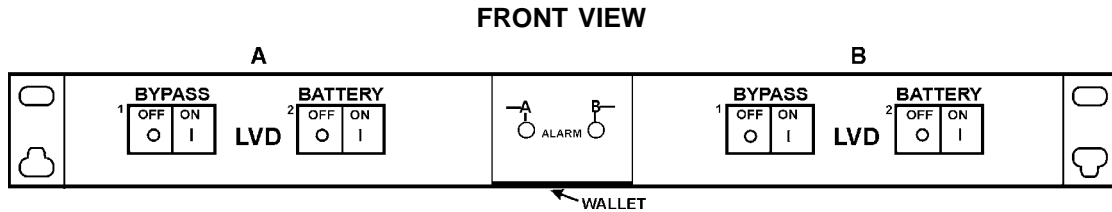
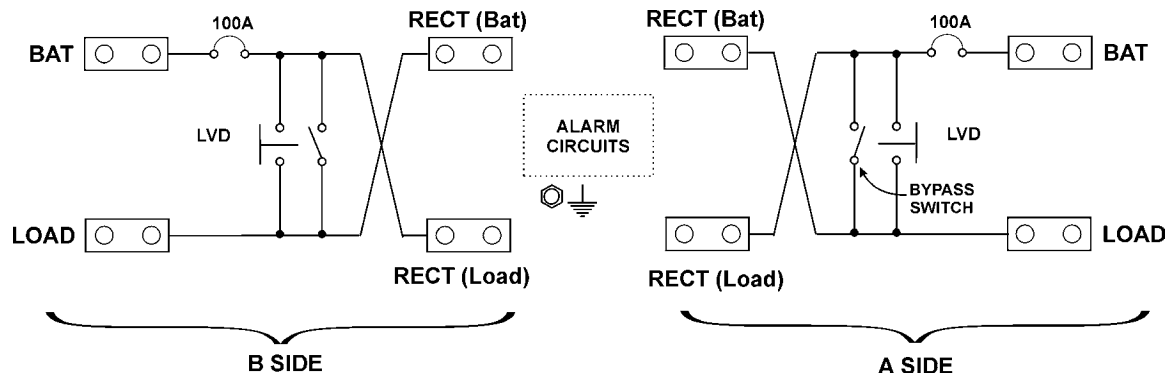


Figure 3. LVD1U Front Panel Details

10.2 On the left side of each section is the optional bypass switch; on the right side is the battery circuit breaker. The center section contains the red LED visual alarms for both A and B sections. Below the LEDs is a wallet for recording connection information.

11.0 BACK PANEL POWER CONNECTIONS

11.1 The LVD1U is configured to permit connection for either load or battery disconnect. See Figure 4.



LOAD DISCONNECT:

Connect rectifier bus to RECT (Load) terminal.

BATTERY DISCONNECT:

Connect rectifier bus to RECT (Bat) terminal.

Figure 4. Rear Connections for LVD1U

- 11.2 For load disconnect operation, the rectifier connection is made to the RECT (Load) terminal as shown in Figure 4.
- 11.3 For battery disconnect operation, the rectifier connection is made to the RECT (Bat) terminal as shown in Figure 4.
- 11.4 Note that the battery and loads are always connected to the same terminals. Only the rectifier connection changes depending on whether load disconnect or battery disconnect operation is used.
- 11.5 The above connections to the LVD1U are made by means of crimp-type lugs or direct connection to ¼-20 studs on the copper bus bars on side A or B.
- 11.6 A list of compatible crimp-type lugs is shown in the following table for AWG wire sizes from no. 1 to 8 and one- or two-hole lugs. These lugs can be ordered directly from the manufacturer, Panduit Corp., using the part numbers shown in the table. A standard kit of four two-hole crimp type lugs for no. 6 AWG copper wire is available from UNIPOWER. Order kit no. 775-1434-0000. Recommended torque on the nuts securing the lugs is 40 inch-pounds.

TABLE 11-1 CRIMP-TYPE LUGS

WIRE AWG	.25DIA. HOLES	PANDUIT CORP. PART NO.	UNIPOWER PART NO.
8	1	LCA8-14-L	625-1665-0010
	2	LCD8-14A-L	625-1665-0110
6	1	LCA6-14-L	625-1665-0020
	2	LCD6-14A-L	625-1665-0120
4	1	LCA4-14-L	625-1665-0030
	2	LCD4-14A-L	625-1665-0130
2	1	LCA2-14-Q	625-1665-0040
	2	LCD2-14A-Q	625-1665-0140
1	1	LCA1-14-E	625-1665-0050
	2	LCD1-14A-E	625-1665-0150

12.0 FORM C RELAY CONTACTS

12.1 The center of the back panel has connections to the Form C relay contacts for connection to external audible or visual alarm circuits. See Figure 5.

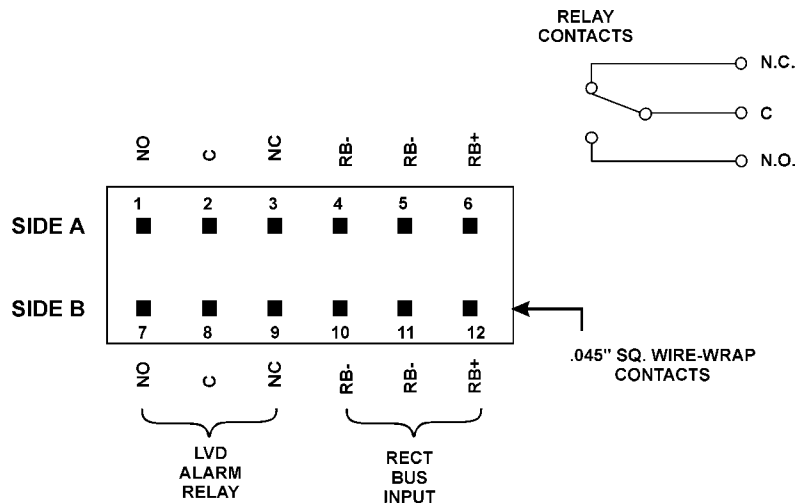


Figure 5. Wire-Wrap Terminal Connections

12.2 For each side of the LVD1U, A or B, there is one set of Form C relay contacts and three rectifier bus input connections. The top row of contacts (as shown) is for side A and the bottom row for side B. Each row has six contacts, three Form C and three rectifier bus inputs. Pins 1, 2 and 3 are N.O., C, and N.C. connections respectively; pins 4 and 5 are - rectifier bus and pin 6 is + rectifier bus. The same scheme applies to pins 7-12 for the B side.

12.3 The Form C relay contacts indicate an alarm condition, i.e., either the LVD contactor is open or the battery circuit breaker is open. “Normally Closed” (N.C.) and “Normally Open” (N.O.) are defined with the LVD1U powered and the contactor and battery circuit breaker both closed; under these “normal” conditions the relay is energized. Table 12-1 summarizes the Form C relay connections.

TABLE 12-1 FORM C RELAY CONTACTS & BATTERY CONNECTIONS

ROW A PIN NO.	ROW B PIN NO.	FUNCTION
1	7	N.O. (normally open)
2	8	C (common)
3	9	N.C. (normally closed)
4	10	- Rect. Bus
5	11	- Rect. Bus
6	12	+ Rect. Bus

- 12.4** The above connections are .045 inch square wire-wrap terminals which can accept wire sizes from no. 18 to 22 AWG. The Form C relay contact ratings are 0.6A at 125VAC or 2A at 30VDC.
- 12.5** Just below the 12 wire-wrap terminals is the chassis ground terminal. This terminal is a no. 8-32 stud with nut.

13.0 INSTALLATION

13.1 Mounting. This low-voltage disconnect can be mounted in either 19- or 23-inch racks by using the appropriate brackets. Mount it from the front of the rack using the correct offsets to align with existing rack-mounted equipment. The bracket offsets are every quarter inch from front to back.

13.2 Connections. Power connections should be made with one- or two-terminal crimp-type lugs using copper wire size from no. 1 to 8 AWG, depending on current and wire length. See Sections 11.5 and 11.6. See Figure 4. The Form C relay contact and rectifier bus connections are made to the wire-wrap terminals. See Sections 12.1 to 12.4. The chassis ground connection is made to the no. 8-32 stud. See Section 12.5. This safety ground connection should be made before operating the panel.

13.3 Checking Connections. Carefully check the polarity and correctness of all connections to the LVD1U before operating the unit. Reverse connections will not harm the LVD1U. Check to make sure that the chassis safety ground connection is made. Make sure that all connections are clean and firm to minimize contact resistance.

14.0 SETUP AND TESTING

- 14.1** It is not necessary to have the LVD1U mounted in a rack for initial testing. This can be done on a bench. It is not necessary to have loads connected to the LVD1U for these tests.
- 14.2** Set an unconnected bench-type DC power supply with digital voltage display to 48VDC if a 48V LVD1U is being set up or to 24VDC if a 24V unit is being set up. Turn the power supply off.
- 14.3** Connect the power supply to Row A of the wire-wrap pins on the back of the LVD. Connect the minus output to pins 4 and 5 and the plus output to pin 6. It is not necessary to make connection to the Battery, Rectifier or Load bus bars terminals for this test. Make sure the battery circuit breaker is “on”. If there is a bypass switch make sure it is “off”.
- 14.4** Turn the power supply on. The LED for side A (left one) should be off. Reduce the power supply output voltage slowly while observing the output voltage. At approximately 42.5V for the 48V version or 21.5V for the 24V version the red LED should turn on. With an ohmmeter, measure the resistance between wire-wrap terminals 2 (C) and 1 (N.O.). It should measure a short.
- 14.5** Increase the power supply output voltage slowly while observing the voltage. At approximately 49.0V for the 48V version or 24.5V for the 24V version the red LED should turn off. With an ohmmeter, measure the resistance between wire-wrap terminals 3 (N.C.) and 2 (C). It should measure a short.
- 14.6** With the red LED off, move the battery circuit breaker to the off position. The red LED should turn back on. With an ohmmeter, measure the resistance between wire-wrap terminals 2 (C) and 1 (N.O.). It should measure a short.
- 14.7** Repeat steps 14.2 through 14.6 for the other side (B) of the LVD to test it . Refer to Table 12-1.
- 14.8** Turn off the power supply and disconnect the LVD1U. It is now ready for operation in the telecom system.

This document is believed to be correct at time of publication and UNIPOWER LLC accepts no responsibility for consequences from printing errors or inaccuracies. Specifications are subject to change without notice.