

## *Installation Manual*

# *40KW-100Amp AC NS-Protection - Double Disconnect Board For Grid Tied Solar Inverter Systems*

*Part Number: DDU-100A*



## Introduction.

In accordance with local and international standards, the protection of equipment and people are required to ensure the safe operation and maintenance of electrical products, appliances or devices.

This AC protection is designed for both the protection and safe operation of the Solar inverter it is designed for.



**WARNING:** Installation of this AC Protection board to be by qualified personnel only



**WARNING:** Electricity is dangerous- Please ensure the correct tools and personal protective equipment is used when Installing, Wiring or Operating Electrical Equipment



**WARNING:** All terminations should be checked for any potential loose connections that may have occurred as a result of transport activities and vibration. Loose connection may cause hot connections that could lead to damage and/ or fire



**WARNING:** Although all precautionary measures are taken into account during manufacturing it is the responsibility of the installer of this product to ensure that it is installed in accordance with the relevant bylaws applicable to embedded generation systems and low voltage electrical equipment



WARNING: This Electrical board has an IP65 rating, and is suitable for outdoor mounting.

Installation should where possible be done out of direct sunlight, direct water spray, and rain. If this is not possible, it is recommended the board is to be fitted with a suitable rain and sun canopy to protect from direct sunlight and rain or spray.



WARNING: In accordance with local bylaws and installation and wiring of premises, this board should be installed in such a manner that maintenance and inspection can be carried out without the use of special tools or equipment, such as ladders and scaffolding.

### Description

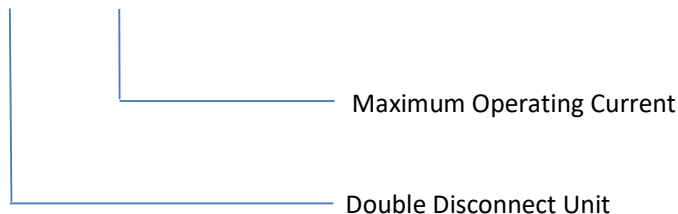
This AC Board is designed for the connection and protection of a single or combiner PV System input not exceeding a total of 100A (40KW)

The connection between the utility grid and the PV Solar system is monitored by an independent grid monitoring relay, configured according to the required Country Grid Code for its intended use. A secure grid disconnection is required by series connection of two independently switched contactors. The contactor switching control is obtained from the Grid Monitoring Relay installed in this enclosure

This board is supplied pre-wired with the installer only required to connect the combined output from the PV system, and the Utility side of the installation.

Ordering Code:

## DDU-100A



**Mounting:**

The board is designed to be Wall mounted. Please ensure that the chosen surface is suitable in order to support the weight of the board, for example brick wall.

It is recommended that the board is mounted vertically.

Please ensure enough clearance area below the board to facilitate the incoming and outgoing cables. Cables must be installed in such a way to maintain the cable manufacturers recommended bending radius. See Fig 1.

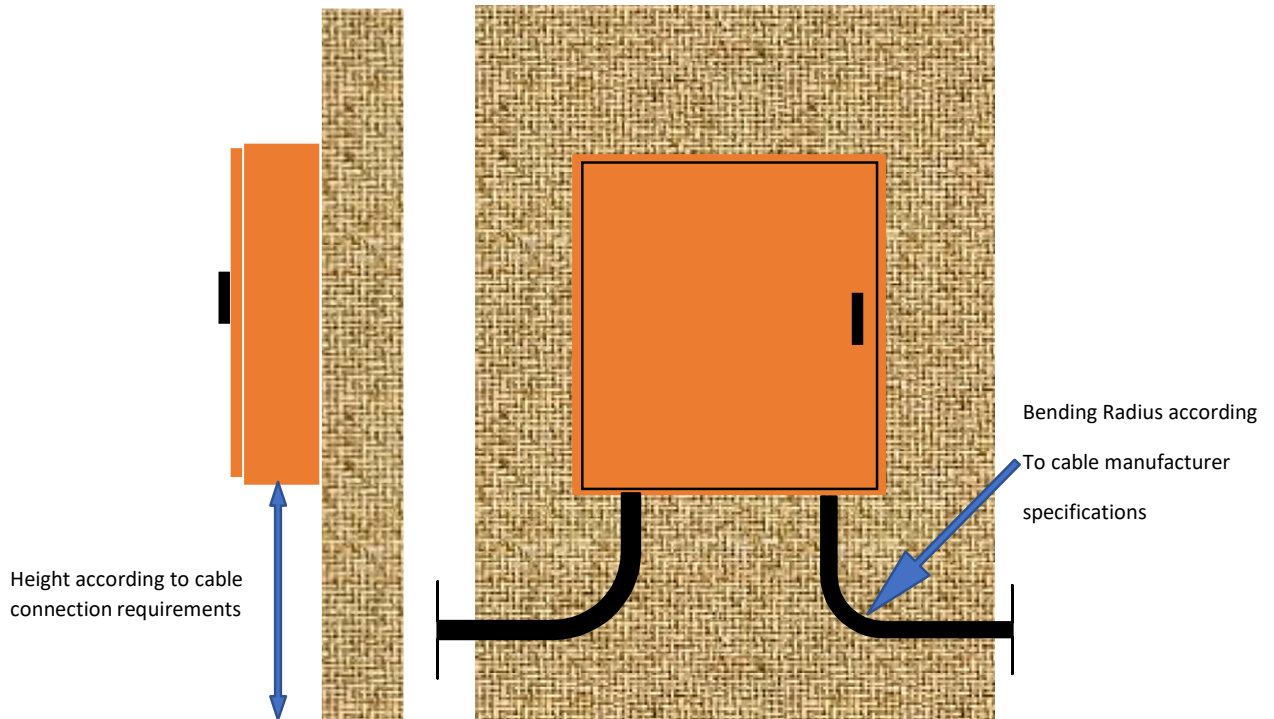


Fig 1.

**Connecting the PV System Combined Output cable to the Input of THE NSDD Board:**

This AC Board is suitable for the connection of the following Inverter: up to 80KW Max output Power: 1 x 40kW Inverter or 2 x 20kW Inverters etc

The Number of Inverters exceeding the quantity of one must first be combined in an AC PV Combiner Board as this Board is designed to accept a single input from the PV System.

Recommended cable entry point is from the bottom of the enclosure. See Fig 2.

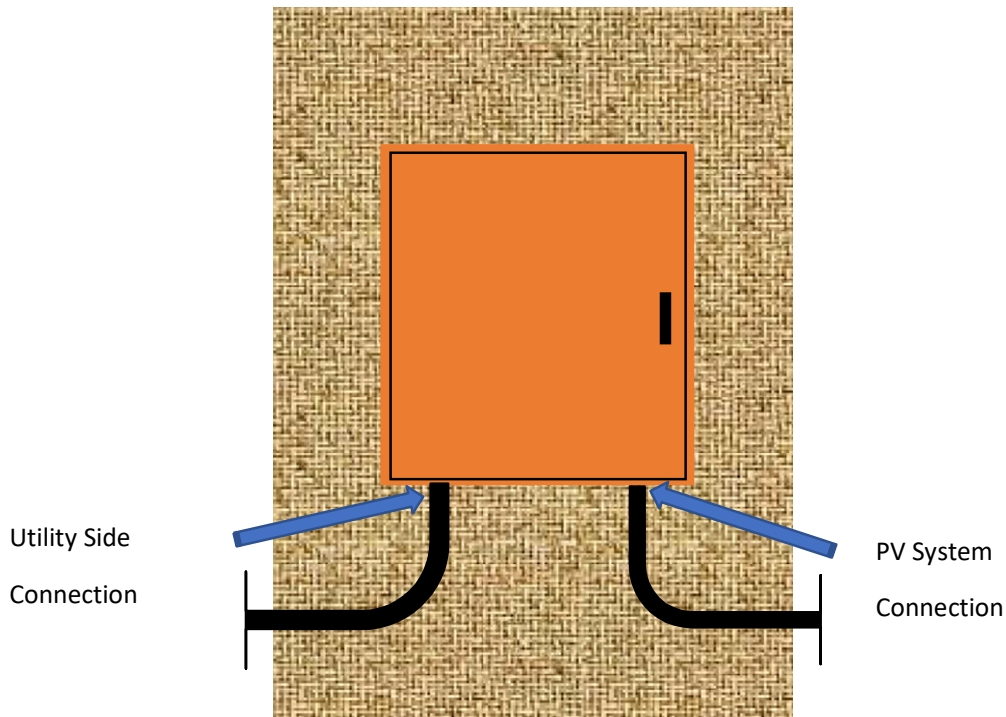


Fig 2.

Note: Please use the appropriate cable gland for the cable type that is used for the installation.

For SWA cable: Steel wire armoured gland with cone

For Flexible cable ie. H07-RNF- suitably selected IP 65 Compression gland

In all instances ensure the use of the matching shroud to protect the gland and assist with ingress protection. See Fig 3,3a, and 4 below.

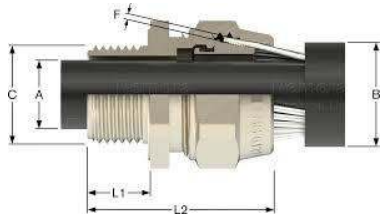


Fig 3



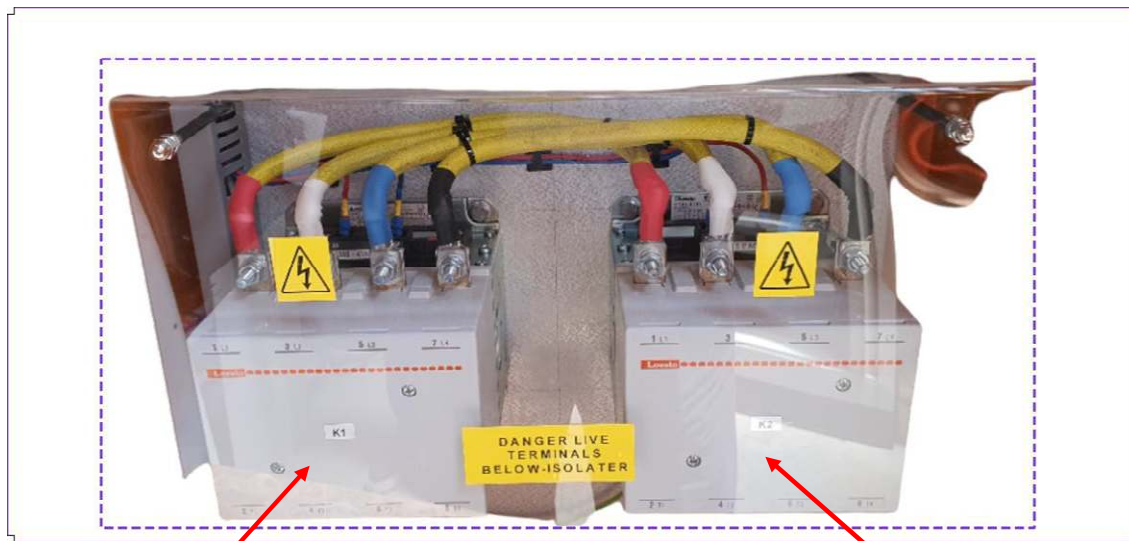
Fig 3a



Fig 4

**PV System AC Connection**

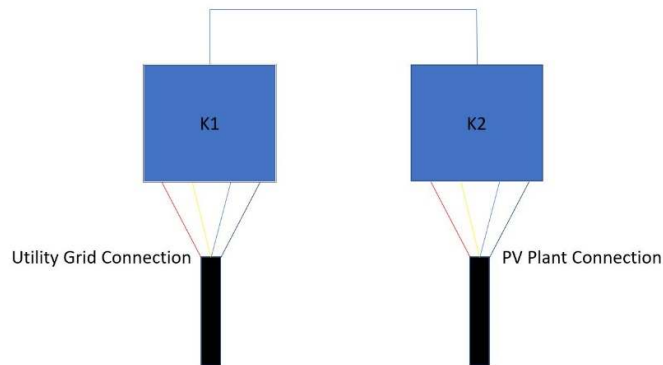
Connect the PV System cable (L1, L2, L3, N) from the AC protection or combiner board to K2 contactor terminals as per Fig 5 below



K1 Contactor – Utility Connection Point

Fig 5

K2 Contactor- PV Systems Connection Point



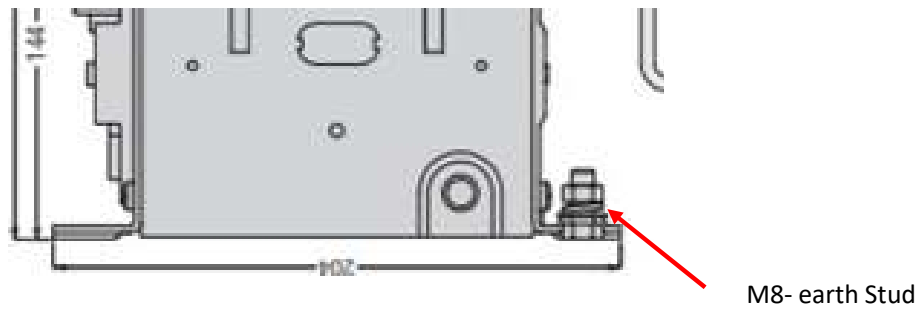
Recommended Cable Size: Main Cable - 70mm<sup>2</sup> x 4C, Earth Conductor – 50mm<sup>2</sup> x 1C

**Earthing:**

All Metallic parts of this assembly must be earthed in accordance with the Low Voltage wiring standard requirements.

The Earth conductor for each individual cable must be connected to Earth Point Provided

See Fig 6 Below



*Fig 6*

- Conduct an insulation test prior to final connection of all connected cables
- NB - Ensure all Cable are properly fastened to avoid loose connections prior to powering system

## **Setting the Grid Monitoring Relay:**

The LMVF 80 Grid monitoring relay is factory pre-set according to the South African National Grid Standard: NRS097-2-1:2017 ED 2.1.

Please consult the local Grid Standards that may be applicable In Particular the following requirements needs to be confirmed:

- Grid Over Voltage Level 1
- Grid Over Voltage Level 1 – Fault Ride Through Time
- Grid Over Voltage Level 2
- Grid Over Voltage Level 2 – Fault Ride Through Time
- Grid Frequency Range – Max Upper Level / Min Lower Level
- ROCOF – Rate of Change of Frequency
- Grid Under Voltage Level 1
- Grid Under Voltage Level 1 – Fault Ride Through Time
- Grid Under Voltage Level 2
- Grid Under Voltage Level 2 – Fault Ride Through Time

\*\*You may need to set these parameters to meet local requirements.

Please note for all parameter settings refer to Lovato PMVF 80 Instruction Manual the note should be as follows

NOTE! In the case of the Lovato PMVF 80 Units not being available at the time of manufacture one of the two other units approved by City Of Cape Town ( COCT ) ABB or ZIEHL will be used and the parameter settings for these units must be followed

Please read carefully to ensure parameters are set correctly and follow the program setting numbers to access the specific setting for the above-mentioned parameters for the specific grid code requirements.

## **Powering Up the System**



**WARNING:** It is of utmost importance that all wiring must be completed and checked for correctness before applying power to the NSDD Board.

During installation it is mandatory to ensure all cabled being connected are free from any potential voltages – Please ensure all sources of power are suitably isolated and locked out prior to starting the connection of external cables to the system



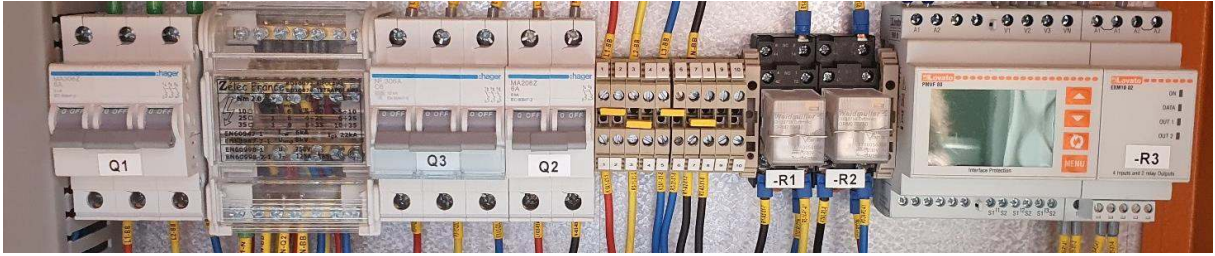


Fig 7.

**Legend: refer Fig 7**

Q1- Main Control System Circuit Breaker

Q2- Auxiliary Power Supply Circuit Breaker for PMVF 80 Meter

Q3- Grid Voltage Reference Circuit Breaker for PMVF 80 Meter

R1- Contactor K1 Control Relay

R2- Contactor K2 Control Relay

R3- PMVF 80 Grid monitoring Relay

**Powering Up Sequence:**

1. Switch on Q1
2. Switch On Q2 – Meter will Power On at this time
3. Switch On Q3 – Meter will then start collecting grid parameters

Once the system is powered up and all circuit breakers are on, the following sequence should follow, providing all parameters are with the pre-set monitoring thresholds as prescribed by the Grid Code.

1. After a few seconds the Out 2 Relay light on the PMVF 80 relay will turn on and Contactor K2 coil will be energised – K2 will now change state to Closed
2. Depending on Grid connection settings- a minimum of 60 Sec will elapse before Out 1 Relay light will turn on and Contactor K1 will be energised – K1 will now change to Closed
3. Providing the system energised normally- both contactors will be in the closed state and will allow voltage to flow to the inverter section of the installation
4. Depending on Grid requirement settings- Inverters should connect to the grid system in approximately 60-70 seconds after K1 closed.

## Warranty:

This system carries a standard 12-month Warranty from date of purchase.

Warranty shall be void if not used within strict compliance with the installation manual, and the user manual of the protection relay.



**WARNING:** Please ensure all connections including factory connections are checked, as it is possible for them to loosen during transport and handling.

The ACDB is supplied with the appropriate marking and rating labels, please ensure any additional warning or rating information is added to the system as may be required due to site specific conditions and location.



**SAFETY FIRST-** Equipment to be inspected and tested by suitably Qualified person