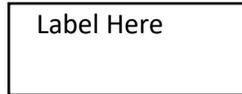## Thermal-Grid DL3 Installation Guide
(Solar Wave Enhancement of the Resol DL3 v.2.1.0)

Label Here

Included:

- DL3 Data Logger
- Power Supply
- VBUS cable
- Ethernet cable (1 meter)
- Mounting Hardware
- RESOL Service Center Software and discovery tool software
- Service Center Quick Start Documentation
- Solar Wave Enhanced DL3 Installation Guide(this guide)
- DL3 Installer Information Form (information to be emailed to support@solarwave.com)

To be provided on-site:

- Flat blade screwdriver with a 1/8 inch (3mm) wide blade to connect Controllers and additional sensors
- #2 Philips blade screwdriver to mount DL3 and remove cover of controller for VBUS cable connection
- Internet Connection: For proper operation the Solar Wave DL3 must be connected to the internet via a 100 Mbps Ethernet based local area network (LAN). For further information view the Internet section of Troubleshooting in this document.

Installation Instructions:

1. Remove DL3 from box. Make note of the MAC ID on the label on DL3. (ex. 001E66######)

Note: MAC ID may also be found on the label on this sheet.

2. Follow the Resol instructions and mount the DL3 in a location close enough that the VBUS cable(s) can reach the Controller(s) to which it will be connected. Cable may be extended if needed.

3. Connect the VBUS cable(s) to the Controller(s). Polarity does NOT matter.

4. Connect an Ethernet cable from the local switch, router, or firewall to the DL3. **100Mbps network only.** DL3 may require a 100Mbps (100/10) if used on a Gigabit network.

5. Find the correct Power Supply attachment and connect it to the Power Supply. Plug in the Power Supply. It is recommended to use a UPS battery backup or surge protector on DL3 and all attached controllers.

The DL3 will take about 1 - 2 minutes to initialize once power is connected.

If the DL3 is properly connected to a controller the VBUS channel indicator on the main screen will be filled.

6. If the DL3 is correctly connected to the network and a controller, it will automatically begin sending data to the Solar Wave servers. Please call or e-mail with the MAC ID of the device from step 1 so that we may Identify which DL3 has been connected, confirm that the connection is fine, and set up a site on which data may be viewed.

7. Please fill out the "DL3 Installer Information Form" attached to this manual and return to Solar Wave. You may also download here: DL3_Installer Sensor Mapping Form (DOC) Or fill out online at https://thermal-grid.com/form.php

How to Tell If a DL3 is Connected:

First step once the DL3 is installed is to login at http://www.thermal-grid.com/ using your email and Password. (If you are not registered please go to http://www.thermal-grid.com/ and request your site be added, or contact your installer)

Once logged in, all available sites will be listed under the Site Portfolio section. This section may only contain one or more sites. The DL3 can be identified by the 'Site' name located on the label on the first page of this manual (ie sw_29###).

To tell if a site is connected click the site name in the site list. Then check to the right of the site name where a timeline should appear. If you see green squares at the bottom of the timeline OR data points, then there is data coming in. If you see red and no data then the site is not connected.
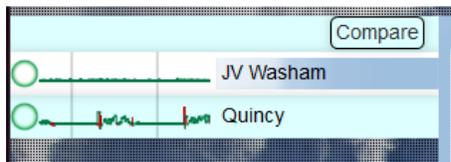
Site List

Timeline

If a site has been selected or there is only one site available, the site name will be highlighted. To the left of the site name is a connection status bar. Green means connected, red means disconnected, and gray means disconnected for more than 2 days.

The System Timeline shows DL3 connection status, data broadcast health status, and alarms. Reports will be created once data and site information is received. Click on the report links to view reports for additional site data and information.

Trouble Shooting:

<u>Power & basics:</u>

The LED should flash red/green while initialization period of 1 – 2 minutes and then remain green. If the LED is dark, test the power outlet to make sure it is supplying power.

<u>Blank Screen</u>

The screen backlight turns off after 1 minute, and the display goes blank after 10 minutes. Push any button to turn on the display

<u>Controller Connection</u>

If the Circular LED is lit, tap one of the 3 buttons to wake up the display (if off). On the display beneath where it says "Vbus", there are numbers 1-6 with boxes above them. If the box is filled in, then the controller is connected correctly. If the box is empty there is no controller connected.

When a controller or WMZ is connected to the DL3 through a VBUS cable the USED MEMORY block on the display will begin blinking. When a USED MEMORY block is full it will become solid red and the next block will begin blinking. The DL3 is in cyclic data logging mode by default. This means that when the memory is full, old data stored on the DL3 will be erased and new data will be logged in its place. All old data is already being archived by Solar Wave.

<u>Master Device</u>

In order for the DL3 to function properly there must be only one master RESOL device connected per VBus input. All controllers are master devices. Also WMZ's with a master board installed, set to Active mode.

<u>Internet</u>

If the DL3 is connected to a router, switch, or firewall then there should be an LED lit and blinking located at the Ethernet port of the DL3, (requires unscrewing the cover) as well as at the LAN port of the router, switch, or firewall indicating that a physical connection has been made. If the LED is not lit, solid or blinking, check the cable and connections. If the cable and connection are both fine then continue through the steps to test the DL3's connection

1. Test if the DL3 can be found locally. The DL3's IP address can be found using the display. Press the up or down arrow until the word "Network" is shown. If there is an IP Address then the DL3 is connected. If you connect to the same network as the DL3 with a computer, then It will be possible to enter the IP address and bring up the DL3 web server.

2. If the internet can be browsed from a laptop and/or desktop that is connected to the internet through the same set of routers, firewalls, and modems as is the DL3 then the DL3 should be able to send data to the Solar Wave servers. To test unplug the Ethernet cable from the DL3, plug into a laptop, and try to browse the internet.

Network Requirements

The DL3 should work with the factory default on most consumer grade (and on many commercial grade) traffic filtering devices such as routers, firewalls, and modems.

The DL3 requires a 100Mbps network connection. If the router or firewall provides higher than this (1000Mbps / Gigabit), then putting a 100Mbps (100/10) Switch between the DL3 and router may create a good network connection. 100Mbps switches are available online or at some electronics stores.

The DL3 does not require any inbound ports to be open, however, it does require that the network ports mentioned below be open for outbound traffic initiation and for any return traffic.

If the DL3 is still not sending data to the Solar Wave servers then log into your router and check the security section for these services. The security section may be located in an advanced section on the router depending on the type. For further explanation of the ports see the NETWORK CONFIGURATION VARIANTS: section of this document

Service	Port	Transport	Provided by	Notes
HTTP	80	TCP	Internet	Required for data transmission to the SolarWave server(s)
SSH	22	TCP	Internet	Required for SolarWave maintainance of the DL3
NTP	123	UDP	Internet or LAN	Needed for accurate data timestamps
DNS	53	TCP and UDP	Internet or LAN	Required for domain name resolution by the DL3
DHCP	N/A	N/A	LAN	Recomended for automatic configuration of networking on the DL3

While Solar Wave recommends this network configuration a number of variants are usable as discussed in the NETWORK CONFIGURATION VARIANTS: section of this document.

NETWORK CONFIGURATION VARIANTS:

While Solar Wave strongly recommends that the DL3 have access to a DHCP server, it is possible to set up its net identity via the DL3's web server (please see the illustration of the web page below). If the web server is used to configure the DL3, the DL3 configuration then becomes the exclusive responsibility of the DL3 owner.

Log in Via Web Server

If the user and the DL3 are connected to the same local LAN then the user may log into the DL3 web server. Type the IP address of the DL3 into the address bar of a web browser. (IP Address can be found using the discovery tool)

User Name: admin   Password: admin

PLEASE CONTACT THE FACTORY BEFORE CHANGING ANY CONFIGURATION SETTINGS ON THE DL3 VIA THE WEB SERVER! DOING SO MAY DISRUPT THE DL3 FUNCTIONALITY.

To set the net identity of the DL3 log in using the DL3's web server. Steps outlined in Web Server section of Troubleshooting.

Then navigate to the Device Config -> Network section of the web browser to set the net identity.

Advanced Explanation of DL3 Network Communication Requirements

DHCP, the dynamic host configuration protocol uses UDP on ports 67, 68, and 69. It is used by a host on an I/P based network to acquire its net identity. This service is normally provided on a LAN by one of the following:

1) A cable modem
2) A network router
3) A computer configured to provide DHCP service on the LAN

-        HTTP, the hypertext transport protocol uses TCP port 80 and is the protocol used by virtually all World Wide Web communication. This port MUST be open for outbound traffic (and any resulting inbound traffic for established connections) over the entire pathway between the DL3 and the larger internet. Without this the DL3 will be unable to send any data to the server(s).

-        SSH, the secure shell protocol uses TCP port 22 and is used for secure communication between hosts on the internet. This port MUST be open for outbound traffic (and any resulting inbound traffic for established connections) over the entire pathway between the DL3 and the larger internet. Without this Solar Wave will not be able to provide any firmware upgrades or any diagnostic and/or maintenance service.

-        NTP, the network time protocol, uses UDP port 123 and is used to fetch accurate time information from specialized servers. The NTP server from which the DL3 fetches time information can be located either on the local area network (LAN) or located somewhere on the larger internet. If the DL3 cannot fetch accurate time information from an NTP server the utility of the data sent to the Solar Wave server(s) WILL be compromised.

-        DNS, the domain name to internet protocol (I/P) address mapping service, uses TCP AND UDP port 53. The DL3 uses the DNS to find the I/P address of the Solar Wave servers for both data transmission as well as for the initialization of the maintenance channel. If the DNS is not available then the DL3 will not be able to communicate with the Solar Wave server(s).

Furthermore, since no site on the internet can guarantee that its I/P address will never change, any firewall or other traffic filtering device in the path between the DL3 and the Solar Wave server(s) that cannot filter based on domain names will need to be reconfigured in the event that the I/P address of the Solar Wave server(s) changes. Any such reconfiguration is the exclusive responsibility of the filtering device owner.

Please fill out as much of the following information as possible so that we may accurately develop a monitoring page for your site. Attach a schematic if possible. If information does not fit into the lines below, please add lines or pages as needed. If you have multiple systems please create additional pages or write on back of the last two pages.

   You may also fill out online here: https://thermal-grid.com/form.php

Installer Name: _____

Installer E-mail: _____

Installer Phone: (_____) - _____

Site Owner Name: _____

Site Owner E-mail: _____

City and State, or Zip Code of Site: _____

Site Owner Phone: (_____) - _____

Suggested Name of Site: _____

Is this system enrolled in an incentive program that requires data reports?

If yes, what program (registration number)?_____(_____)

Contact who should have access to this site's data:_____

-=-=-=-=-=-=-

System Description

Collectors Make/Model: _____

Number of Collectors: _____   Collector Type (Flat Plate, Tube, etc.): _____

Tilt Angle: _____   Azimuth (Degrees From True South): _____

System type: (Closed loop, Drain-back, Steam Back, other)_____

If P-Glycol Used in Collector Loop, Brand: _____   P-Glycol Percentage: _____

Collector Loop Pump (Make/Model): _____

Multispeed Pump (Yes / No): If Yes, to what speed is the pump set? _____

Max Flow through collector loop: (gpm) _____

Solar Storage Tank Make/Model: _____

Storage Tank Capacity: _____ gallons   Number of Tanks: _____

Type of Backup used (electric, natural gas, oil, etc): _____

Building Type (residential, commercial, other): _____

Controller (Make/Model): _____

Controller System Arrangement: _____

Sensors Used: Enter Location of sensor   Additional Sensors Here

S1: Collector Temp _____   R1: Collector Loop Relay_____

S2: Tank Bottom _____   R2: _____

S3: _____   _____

S4: _____   _____

S5: _____   _____

_____

_____

_____

CS10 Irradiation Sensor: (Yes / No) Choose one.   CS10 Type (A-K): _____

Pulse Flow Meters:

V40 or other: (Yes / No) Meter Location: _____ Liters per pulse: _____

Grundfos Direct Sensors

VFS: (Yes / No) Location: _____ Size (Liter/minute): _____

RPS: (Yes / No) Location: _____ Size: (Bars) _____

How Many Heat Metering Calculations (OHQM/WMZ)   Circle: Enabled (No, 1, 2, more)

Notes/Additional Information: (add lines)

Schematic or system drawing (add line or attachments welcome) :