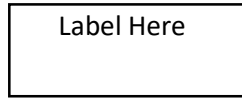## Thermal-Grid DL2 Installation Guide
(Solar Wave Enhancement of the Resol DL2 v.1)

Label Here

Included:

- DL2 Data Logger with power supply and VBUS cable connected
- Ethernet cable (1 meter)
- Mounting Hardware
- VBUS Cable Extender
- RESOL Service Center Software and discovery tool software
- Resol Firmware update documentation. Warning, installing RESOL firmware will erase all Solar Wave firmware.
- Service Center Quick Start Documentation
- Solar Wave Enhanced DL2 Installation Guide(this guide)
- DL2 Installer Information Form (information to be emailed to support@solarwave.com)

To be provided on-site:

Flat blade screwdriver with a 0.10 inch wide blade to connect VBUS cable to Controller

#2 Philips blade screwdriver to mount DL2 and remove cover of controller for VBUS cable connection

Internet Connection: For proper operation the Solar Wave DL2 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 DL2 from box. Make note of the MAC ID on the label on DL2. (ex. 001E66xxxxxx)

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

2. Mount the DL2 in a location near the Controller to which it will be connected.

3. Connect the VBUS cable to the Controller. Polarity does NOT matter. Vbus cable can be extended up to 100m. DL2 comes with a terminal block for easy wire splicing.

4. Connect an Ethernet cable from the local firewall, router, or switch to the DL2.

5. Find the correct Power Supply attachment and connect it to the Power Supply. Plug in the Power Supply. (UPS battery backup or surge protector is recommended)

DL2 will take about 1 - 2 minutes to initialize once powered. Once initialized, the circular

button on the DL2 will be lit an amber color. USED MEMORY LED will begin blinking if the DL2 is connected to a controller. This shows that data is being logged on the DL2.

6. If the DL2 is setup correctly 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 DL2 has been connected, confirm that the connection is fine, and set up a report for viewing data.

7. Fill out the "DL2 Installer Information Form" attached to this manual and return to Solar Wave. You may also download here: DL2_Installer Sensor Mapping Form (DOC) Or fill out online at https://thermal-grid.com/form.php . The Form will help create a more complete report.

How to Tell If a DL2 is Connected:

Once the DL2 is installed, and MAC address has been given to Solar Wave, log in at http://www.thermal-grid.com/ If no registered Email and Password is set up contact your installer or register at http://www.thermal-grid.com/

Once logged in, all available sites will be listed under the Site Portfolio section. This section may only contain one site if the user only has access to one site. The DL2 can be identified by the 'Site' name (sw_xxxxx) located on the label on the DL2 or the first page of this manual.

- ☐ A site with turquoise blue or white around a site name indicates that the site is connected.

- ☐ A site with gray around the site name indicates that the site has not yet connected.
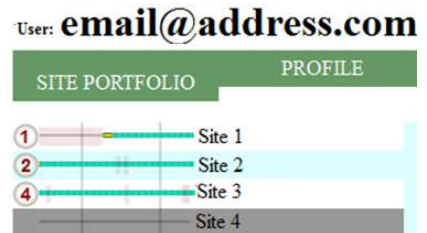
If a site is selected the site name will be highlighted. To the left of the site name is a connection status bar. Green means connected, and red means disconnected or alarm. The number shows the number of alarms in the previous 48 hours.

Use the SITE PORTFOLIO to view the timeline which shows DL2 connection status, data broadcast health status, and alarms. Click on the report link to view the reports. Reports may not be available immediately. They are created once data and site information is received.

Timeline
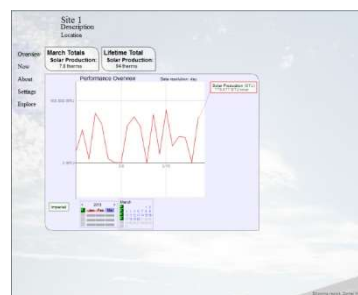
Report

Trouble Shooting:

1. USED MEMORY LED
2. Circular LED

Power

I USED MEMORY LED and Circular LED's will come on after the
initialization period of 1 – 2 minutes. If they do not come on test the
power outlet and any power strip or surge protector to make sure power is being supplied.

Controller Connection

If the Circular LED is lit, but the USED MEMORY LED is not blinking, check the connection of
the VBUS cable. Some controllers have small terminals which make connection difficult.

Master Device

There must be only one master RESOL device connected to the DL2 to function properly.
Master devices are controllers, or WMZ's with a master board installed. The USED MEMORY
LED will blink when a master device is connected to the DL2. When a USED MEMORY block is
full it becomes solid red and the next block begins blinking. The DL2 is set to cyclic data
logging mode by default. When the memory is full, old data stored on the DL2 will be
overwritten with new data. All old data is archived on Solar Wave servers.

Internet

The DL2 requires a 100Mbps network connection. If the router or firewall provides higher than
this (1000Mbps / Gigabit), putting a 100Mbps Switch between the DL2 and router will create a
working network connection. 100Mbps switches are available online or at electronics stores.

If the DL2 is connected to a router, switch, or firewall there should be an LED lit or blinking
on the Ethernet port of the DL2, (right side of DL2) as well as at the LAN port of the router,
switch, or firewall, indicating that there is a connection. If the LED is not solid or blinking,
check the cable both at the DL2 and the router. A cable tester is useful to test continuity of
an ethernet cable

If the cable and connections are ok, there are a few ways to test the DL2's connection.

1. Use the Discovery tool. If the DL2 is found with the Discovery Tool, then the local area
network connection to the DL2 is fine. While connected to the same local LAN as the DL2, the
DL2's IP address can be found using the discovery tool. The discovery tool is found on the
included CD or at http://www.resol.de/software/DeviceDiscoveryToolSetup.zip .
(Note: Discovery tool requires latest version of Java)

2. Remove the ethernet cable from the DL2 and plug it into a Laptop. 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 DL2 then the DL2 should be able to send data to the Solar Wave servers.

NETWORK CONFIGURATION

The DL2 works with the factory default on most consumer grade (and on many commercial grade) traffic filtering devices such as firewalls, modems, and routers, and 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.

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 DL2
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 DL2
DHCP	N/A	N/A	LAN	Recomended for automatic configuration of networking on the DL2

If the DL2 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 in an advanced section on the router depending on the model. For further explanation of the ports see the NETWORK CONFIGURATION VARIANTS: section of this document

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

Web Server

If the user and the DL2 are connected to the same local LAN then the user may log into the DL2 web server. Type the IP address of the DL2 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 DL2 VIA THE WEB SERVER! DOING SO MAY DISRUPT THE DL2 FUNCTIONALITY.

NETWORK CONFIGURATION VARIANTS:

While Solar Wave strongly recommends that the DL2 have access to a DHCP server, it is possible to set up its net identity via the DL2's web server (please see the illustration of the web page below). If the web server is used to configure the DL2, the DL2 configuration then becomes the exclusive responsibility of the DL2 owner.

To set the net identity of the DL2 log in using the DL2's web server. Steps outlined in Web Server section of Troubleshooting.

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

Configuration: Network

▼ LAN Configuration

LAN configuration mode	Dynamic (DHCP) ∨
LAN IP address	
LAN netmask	
Gateway	
Nameserver 1	
Nameserver 2	
LAN MTU	1492
HTTPS port	443
Remote Access port	7053
IP Recovery	Yes ∨

Save configuration

Explanation of DL2 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 DL2 and the larger internet. Without this the DL2 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 DL2 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 DL2 fetches time information can be located either on the local area network (LAN) or located somewhere on the larger internet. If the DL2 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 DL2 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 DL2 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 DL2 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.

Fill out as much of the following information as possible so that we may accurately develop monitoring reports for your Device. Attach a schematic if available. If information does not fit into the lines below, add lines or pages as needed.

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: _____

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

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

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

-=-=-=-=-=-

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? _____

Variable Speed Used (Yes / No): If Yes, what is the minimum speed? _____ %

Max Flow through collector loop: (gpm) _____

Solar Storage Tank Make/Model: _____

Storage Tank Capacity: _____ gallons   Number of Tanks: _____

Fuel used for existing heating (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 (None, 1, 2, more)

Notes/Additional Information: (add lines)

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