

Guide to SolrenView™ Data Monitoring

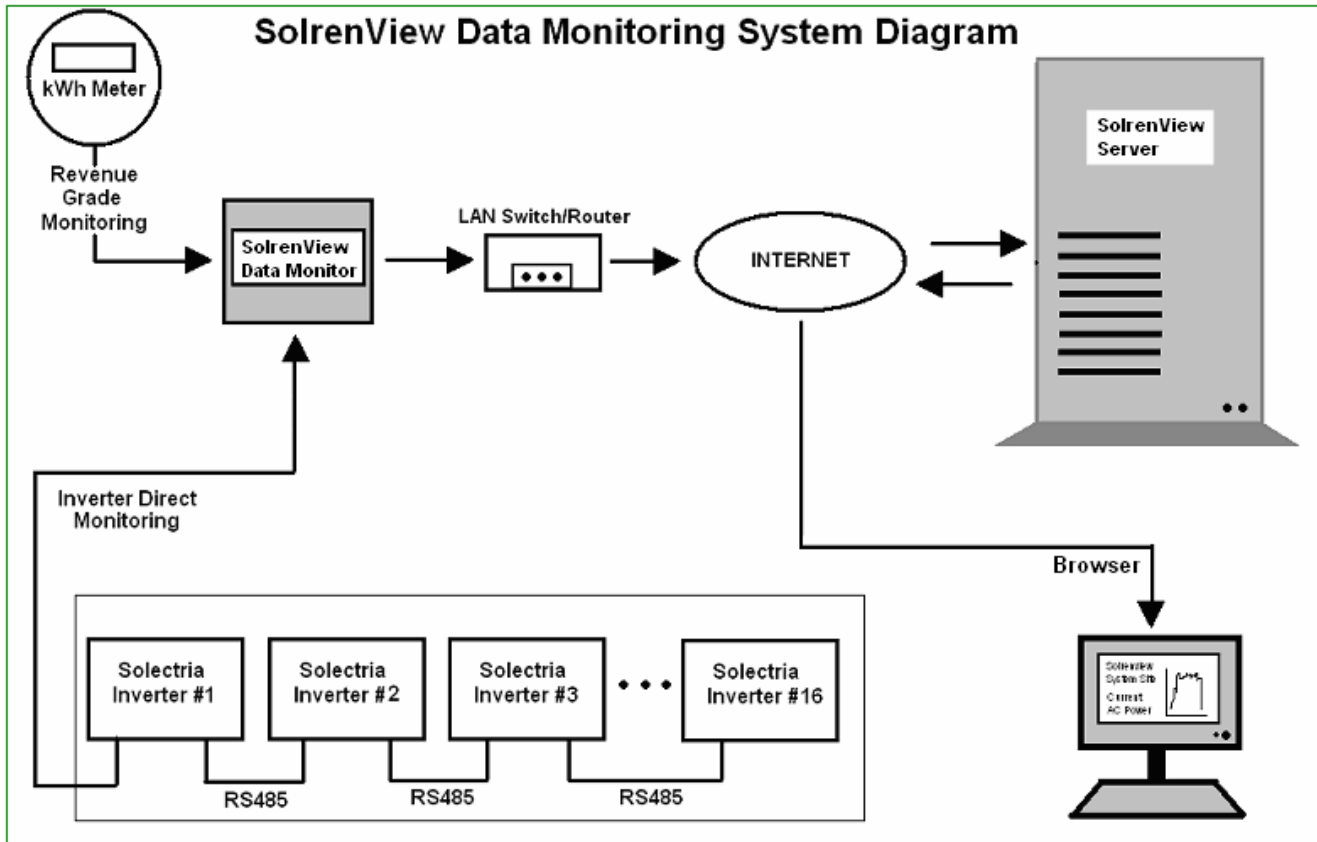
(last revised 2009-04-13)

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1. Data Monitoring System Overview

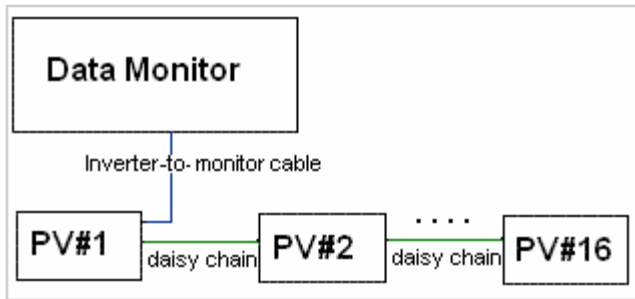
The SolrenView™ data monitor acts as the go-between the SolrenView™ server and the system site, thereby enabling web-view of data collected with the use of a browser (ie Internet Explorer) to access the SolrenView™ web server (<http://www.solrenview.com/>).



For revenue-grade monitoring, the monitor is connected to the pulse output of a KYZ meter (please see [Quick Installation Guide](#)). It keeps count of the meter-triggered pulses, which can then be multiplied by a meter-specific pulse ratio to get the cumulative kWh value.

For inverter-direct monitoring, the monitor is directly connected to the RS485 line of one inverter (refer to [Quick Installation Guide](#)). Additional inverters (up to 16 total, inverter-to-inverter) can be connected to the line with 'daisy-chain' cables.

In the example below, inverter PV#1 is directly connected to the monitor, while subsequent inverters (PV#2 onwards) are connected in series to each other.



For residential inverters, a 6-foot inverter-to-monitor cable will be provided, as well as the inverter-to-inverter ‘daisy chain’ jumper cable to link two neighboring inverters together.

For commercial inverters a twisted unshielded conductor pair of a Cat 5 cable can be used for both inverter-to-monitor and inverter-to-inverter links.

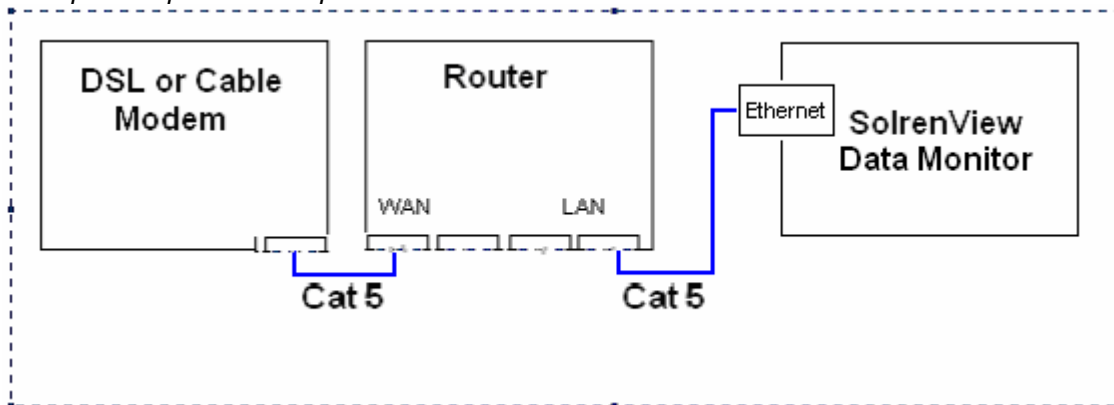
The data monitor collects real-time data samples from inverters and pulse meters connected at a 1-minute interval. The data is then sent over the Internet to the SolrenView™ server as soon as a connection can be established. Data samples received by the server are stored and retrieved by the web server whenever a user queries the information with a browser (see [Viewing Web-Enabled Data](#)).

2. System Requirements

For remote monitoring to be possible, the system must have a reliable Internet connection via an Ethernet port. This usually requires the service of an ISP (Internet Service Provider). Please inquire about ISP services available in your neighborhood if you do not have one already (not included in the SolrenView™ package).

The data monitor requires a physical connection via a Category 5 cable to the LAN (Local Area Network). A common setup is a router/switch to the Internet connection, and a Cat 5 connecting the monitor to one of the router/switch’s ports.

Example: Simple LAN setup



Other remaining requirements include:

- A working Photovoltaic system (inquire installers for setup)
- Filled-out site survey (See [The SolrenView™ Site Survey](#))



- Purchase of Revenue-Grade Monitoring and/or Inverter-Direct monitoring packages from Solectria Renewables. For Inverter-Direct, currently supported inverters include Solectria PVI 1800-2500, PVI 3000-5300, and PVI 13-95 kW.

- When using a non-outdoor-rated data monitor, it must be protected within an encasement (ie indoor or shelter).

Wire/Cable Lengths

The total wiring distance between two final endpoints of a network must not exceed 100 meters (328 ft). This rule applies to both the Ethernet (wire length from data monitor to router/switch/modem) and RS485 (wire length from data monitor to the last inverter of a daisy-chain) networks.

The wires from the KYZ meter pulse outputs to the data monitor must not exceed 100 ft.

3. The SolrenView™ Site Survey

In order to have enough information to customize a web site and enable data monitoring, the site survey must be filled and turned in *before the data monitor is shipped out*. Below are fields expected on the survey, please fill it out to the best of your knowledge. Form may be submitted either through email or fax (see [Contact Information](#)). The site survey may alternately be downloaded here: [SolrenView Site Survey](#)

****Notes: Starting October 2008 the SolrenView-specific fields will be included in the Inverter PO checklists. Customers who fill out the SolrenView section in the checklist will not be required to fill out a separate site survey.**

Email for Event Notifications

Provide email address to send event notifications to. See [Alarm/Event Notifications](#)

Agency Reporting

Agency to report Revenue-Grade data

SolrenView LAN Configuration

DHCP mode may be selected to let the SolrenView data monitor automatically be assigned an IP from the local network **DHCP-enabled** router. If Local Area Network is not DHCP-enabled, a static local IP address must be specified in the survey. In most cases, DHCP mode is appropriate unless a fixed IP is preferred.

Please consult with IT personnel. For more information see [More about DHCP vs Fixed IP mode](#).

Hardware Details

May be left blank if shipment has not arrived.

Installer Contact Information

Company Name, website:

Contact Person (email, phone#):

Email for Event Notifications:

Installation Site Details

Site Title:

Street Address:

City, State, Zip Code:

Time Zone (Atlantic, Eastern, Central, Pacific, etc):

Expected Install Date:

Inverter Direct Monitoring (Y/N):

Revenue Grade Monitoring (Y/N):

Agency Reporting (ie MTC, CSI):

SolrenView LAN Configuration (please consult with local IT personnel. do not leave blank!)

DHCP (Yes/No)

Data Monitor IP (if DHCP=No):

LAN Router/Gateway IP (must be provided if DHCP=No):

IT/Network Administrator Contact:

Hardware Details (if TBD, leave blank for Solectria personnel)

SolrenView Data Monitor MAC address:

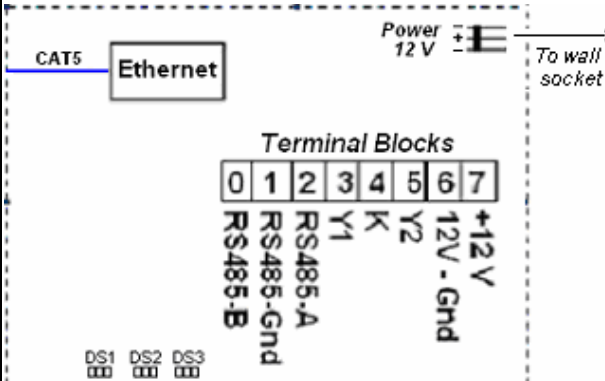
Inverter model & serial numbers, VAC:

Type and # of panel modules:

4. Installing SolrenView™

Refer to diagram below for the **Quick Installation Guide**:

http://www.SolrenView.com



Quick Installation Guide

- ◆ **Connect network communication:**
Plug Cat5 cable to Ethernet port
- ◆ **Enable Inverter Direct Monitoring:**
Wire RS485-A & RS485-B (blocks 0,2) to inverter daisy chain.
- ◆ **Enable Revenue Grade Monitoring:**
Make sure the inverter output is wired to the TOP lugs of the meter base, the building/utility to the BOTTOM lugs.
Connect KYZ pulse leads to blocks 3&4

GE kv2c: Y1(yellow), K(red)
ABB FM2S: Y1(yellow), K(red)
Hawkeye 8053: Y1(PULSE+), K(PULSE-)

◆ **Apply 12V power**
Plug provided power adapter to the wall socket, the small flat connector end to the power supply on the board (top right corner of diagram).

Flat connector end may be plugged in facing either way.

Support#: 978-683-9700

LED Indicators
 DS1: Every minute, it blinks once for every device detected
 DS2: Blinks once when packet is sent to SolrenView server
 DS3: Always on when power is applied.

Enabling Inverter-Direct Monitoring

The slave addresses of the inverters must be unique within the RS485 network. No two inverters connected can share the same address as this will result in address conflict for the data monitor. Please refer to your specific inverter manual for instructions on how to set slave addresses.

Each residential inverter direct monitoring system is provided with a 6-foot inverter-to-monitor cable. On one end of the cable is a modular plug that plugs into the inverter serial port. The other end of the cable will have two conductors, one labeled 'A' (brown), the other 'B' (green). The 'A' conductor is to be inserted into RS485-A screw terminal on the monitor, while the 'B' conductor is to be inserted into RS485-B screw terminal.

For commercial inverter direct monitoring (PVI13kW and higher), the installer has to provide a **twisted** pair of conductors (i.e. CAT5 cable) to be connected between screw terminal blocks of the inverter(s) and the monitor. Test for conductivity between A terminals of the inverter(s) and A terminal of the monitor, then test for conductivity between B terminals of the inverter(s) and B terminal of the monitor, before turning on the inverter(s) or the monitor.

Proceed to [Ethernet Connection](#) if Revenue-Grade Monitoring isn't needed.

Enabling Revenue-Grade Monitoring

When using an ABB FM2S or GE kV2c meter, make sure the inverter is wired to the top lugs of the meter base and the building/utility is wired to the bottom lugs of the meter base to enable correct forward counting. Connect pulse output of KYZ meter to the monitor, pulse leads 'K', 'Y' to terminal blocks marked 'K' and 'Y1', respectively. Extend pulse wires where needed.

Supported KYZ meters: ABB FM2S, GE kV2c, Hawkeye 8053

Proceed to [Ethernet Connection](#) when ready.

Ethernet Connection

Once the wires have been set correctly to the terminal blocks, connect the CAT 5 cable to the Ethernet port of the SolrenView™ data monitor. See [Example LAN Diagram](#).

Apply the power supply to the SolrenView™ data monitor to turn it on.

Once there is network activity, the LED near the Ethernet port on the data monitor will blink green.

****Note: Blinking of the LEDs on the Ethernet port (green, orange) only indicates the existence of a physical connection. This does not guarantee that a successful outbound network connection if the logical IP configuration (DHCP or LAN gateway, etc) has not been configured properly. Please see [IP Configuration](#) for more information and [Quick Installation Guide](#) for the LED indicators.**

5. Viewing Web-Enabled Data

With a web-enabled browser (ie Internet Explorer, Mozilla Firefox) open a page to <http://www.solrenview.com>

Click on 'Live Sites' at the top of the page, and a list of public system sites will be displayed. If your site isn't listed yet, please call to check on the status of your site's availability.

Initial Page Display

Before successful system connection, the site will display its offline status. Web link(s) to Inverter-Direct and/or Revenue-Grade data will also be disabled.

{ System not yet connected } ← Update Status Activity Indicator

System Status, <input :<="" td="" type="text" value="Inverter-Direct"/> <td style="text-align: right;">Offline</td>	Offline
Energy generated today:	0.0 kWh
Lifetime energy generated:	0.0 kWh
Lifetime CO ₂ emission offset:	0 lbs
System AC power now:	0.0 W

[View Inverter Direct](#)

Once the system is internet-enabled, the update status will display its online status. The activity indicator starts displaying the system’s activity status and for Inverter-Direct enabled sites, the link to Inverter-Direct data becomes enabled.

Online [last update: 2008-09-10 00:28:15 EDT]

System Status, Inverter-Direct :	Inactive
Energy generated today:	0.0 kWh
Lifetime energy generated:	0.0 kWh
Lifetime CO ₂ emission offset:	0.0 lbs
System AC power now:	0.0 W

[View Inverter-Direct](#)

When the inverter connection to the SolrenView™ data monitor is established, the status changes from ‘Inactive’ to ‘Active’.

Online [last update: 2008-09-10 00:28:15 EDT]

System Status, Inverter-Direct :	Active
Energy generated today:	0.0 kWh
Lifetime energy generated:	0.0 kWh
Lifetime CO ₂ emission offset:	0.0 lbs
System AC power now:	0.0 W

[View Inverter Direct](#)

Status Indications

- Active** System is active (inverter/meter communicating)
- Asleep** System is not currently active, ie at night or during low sunlight levels
- Inactive** System has been asleep for almost a day
- Offline** System is not currently connected to the SolrenView server

In the case when ‘Offline’ is displayed, it is recommended to check on the Ethernet connection and/or Internet accessibility. The light near the Ethernet port on the data monitor should show green.

If it's not, try recycling the power (ie unplug its power supply and plug it back in again).
 For further network troubleshooting, please see [IP Configuration](#).

Inverter-Direct and Revenue-Grade Displays

On the summary page, if Revenue-Grade Monitoring is supported, the data shown under 'Current System Status' is calculated from the Revenue-Grade meter.

System Status Now [2009-03-12 14:13:46 EDT]

Online [last update: 2009-03-12 14:13:19 EDT]

System Status, Revenue-Grade :	Active
Energy generated today:	30.4 kWh
Lifetime energy generated:	5407.8 kWh
Lifetime CO ₂ emission offset:	6760 lbs
System AC power now:	7740.0 W

[View Revenue-Grade](#)

If Revenue-Grade data is not available, system summary data is calculated from Inverter-Direct data instead.

System Status Now [2009-03-12 14:14:29 EDT]

Online [last update: 2009-03-12 14:12:35 EDT]

System Status, Inverter-Direct :	Active
Energy generated today:	10.3 kWh
Lifetime energy generated:	535.3 kWh
Lifetime CO ₂ emission offset:	669 lbs
System AC power now:	2717.0 W

[View Inverter-Direct](#)

To view logged data history, click on the 'View Inverter-Direct' or 'View Revenue-Grade' link.

On the top left of the page is the data log navigator.

[Day](#) [Week](#) [Month](#)

<< < > >>

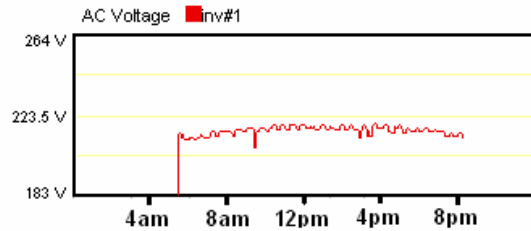
Display mode can be selected either by switching from 'Day' (displays the data for the day) to 'Week' (displays data for the week) or 'Month' (displays data for the month).

On the top right, a list of data values can be selected for viewing.

[AC Energy](#) [AC Power](#) [AC Voltage](#) [AC Current](#) [DC Voltage](#)

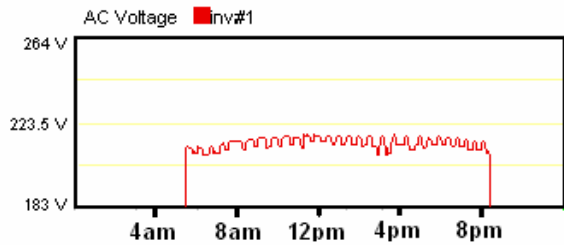
Examples (graphing in progress, before the end of the day):

<u>Inverter</u>	<u>Last Read</u>	<u>Timestamp</u>
inv#1 4HXXXXXXXX1	212.0 V	[20:08:21]

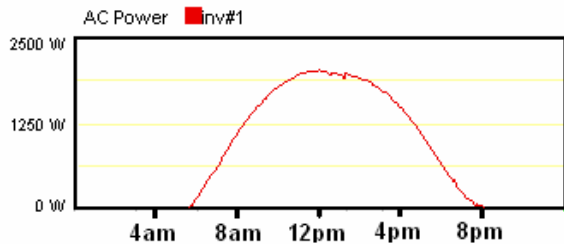


Finished graphs (at the end of the day)

inv#1 4HXXXXXXXX1	210.0 V	[20:10:20]
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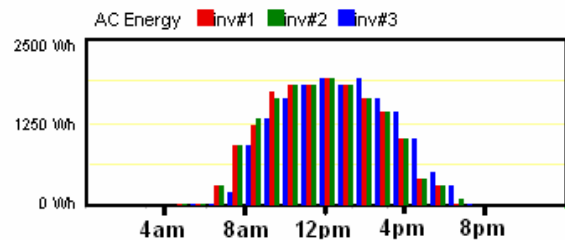
<u>Inverter</u>	<u>Last Read</u>	<u>Timestamp</u>
inv#1 4HXXXXXXXX1	0.0 W	[20:09:21]



Displaying AC Energy bar graphs:

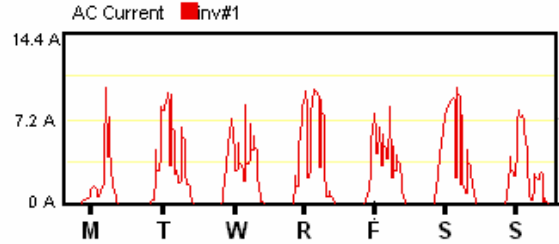
<u>Inverter</u>	<u>96 days ago</u>	<u>Lifetime</u>	<u>Timestamp</u>
inv#1 4HXXXXXXXX1	16.1 kWh	307.3 kWh	[20:08:21]
inv#2 4HXXXXXXXX2	16.2 kWh	311.2 kWh	[20:10:20]
inv#3 4HXXXXXXXX3	16.2 kWh	309.9 kWh	[20:09:21]

** Note: Each colored block represents a 1-hour sample. **



Weekly-View of AC Current:

Inverter Last Read Timestamp
 inv#1 4HXXXXXXX1 0.0 A [2008-06-22 20:16:27]



6. Alarm/Event Notifications

To be notified of system-related events, be sure to specify email address under the site survey/PO checklist.

To get notification through SMS, the 10-digit phone number and service provider must be provided. Ie 978-123-1234 (T Mobile)

Table of Supported Events:

Alarm/Event	Data Monitor	PVI1800-2500	PVI2500	PVI3000-5300	PVI13/15kW	PVI60/82/95kW	Description	Clears when	Severity Levels	Action Recommended
System- Offline	x						Data monitor not communicating to server	Network communication resumes	Informative	Check ethernet connection to monitor, power supply
System- Inactive	x						Inverters, meters not communicating to Data Monitor	Devices communicate again	Informative	Check wiring/sunlight levels
Inverter- Inactive		x	x	x	x	x	Inverter not communicating, triggered if 'System-Inactive' isn't	Inverter communicates	Informative	Check wiring/sunlight levels
Inverter- Fan Life reached					x	x	Fan hours>40000; Trigger bit set by inverter	Inverter trigger bit clears	Warning	Replace fan
Inverter- MOV Fault				x	x	x	MOV Fault; Trigger bit set by inverter	Inverter trigger bit clears	Warning	MOV may need replacement
Inverter- AC Voltage Too High		x	x	x	x	x	AC Voltage Too High; Trigger bit set by inverter	Inverter trigger bit clears	Informative	None
Inverter- AC Voltage Too Low		x	x	x	x	x	AC Voltage Too Low; Trigger bit set by inverter	Inverter trigger bit clears	Informative	None
Inverter- AC Frequency Too High		x	x	x	x	x	AC Frequency Too High; Trigger bit set by inverter	Inverter trigger bit clears	Informative	None
Inverter- AC Frequency Too Low		x	x	x	x	x	AC Frequency Too Low; Trigger bit set by inverter	Inverter trigger bit clears	Informative	None
Inverter- Ground Fault		x	x	x	x	x	Ground Fault; Trigger bit set by inverter	Inverter trigger bit clears	Critical	Check system for ground fault
Inverter- DC Voltage Too High		x	x	x	x	x	DC Voltage Too High; Trigger bit set by inverter	Inverter trigger bit clears	Critical	Remove DC voltage from inverter
Inverter- Hardware Error		x	x	x	x	x	Hardware Error; Trigger bit set by inverter	Inverter trigger bit clears	Critical	Contact Solectria Renewables



7. Contact Information

For more help and inquiries, please contact Solectria Renewables

Tel 978-683-9700

Fax 978-683-9702

or email

support@solrenview.com

sales@solrenview.com

8. Appendices

Appendix A: IP Configuration/Troubleshooting of the SolrenView Data Monitor

Reconfiguring the IP settings of the data monitor is only necessary if the data monitor is unable to connect to the SolrenView server, which can be verified by viewing the system's web status page, see [Status Indications](#).

Other reasons may include switching IP mode (DHCP to static IP address mode and vice versa), or any other necessary adjustments to the monitor's network configuration.

In order to configure the monitor's network settings, at the very least its IP address must be determined in order to access its web interface for manual IP configuration.

Step 1) Find the LAN IP address of the SolrenView Data Monitor

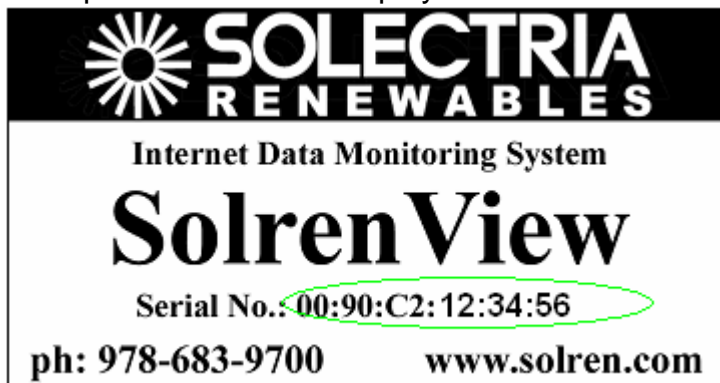
Skip to [Step 2](#) if the monitor's IP address is already determined.

To find the IP address of a DHCP-enabled SolrenView Data Monitor:

-Access and view the DHCP-client list of your local DHCP server. If the DHCP server is your router, open a web page to the router, ie <http://192.168.1.1> to find the DHCP client list. Refer to your network admin and/or router manual for help.

-Find the entry in the client list with the MAC address matching the number displayed on the SolrenView box, with format 00:90:c2:XX-XX-XX.

Example serial number display



The IP address of the data monitor should be displayed in the client entry.

Example DHCP client list

DHCP Active IP Table					Refresh
DHCP Server IP Address: 192.168.1.1					
Client Hostname	IP Address	MAC Address	Interface	Delete	
00:90:c2:12:34:56	192.168.1.100	00-90-c2-12-34-56	Ethernet	<input type="checkbox"/>	
computer1	192.168.1.101	xx-xx-xx-xx-xx-xx	Ethernet	<input type="checkbox"/>	

Step 2) Configuring the data monitor's IP settings

Using a computer connected to the same network the monitor is in, open up a browser with the monitor's determined IP address using [Step 1](#). For example: <http://192.168.1.100>.

If the page does not display, please call 978-683-9700 as older software versions may not support this.

Once the main page displays, navigate to 'Settings'. The IP configurations can now be altered. To disable DHCP, deselect the DHCP box, and enter the intended fixed IP and router/gateway settings.

Use DHCP	<input type="checkbox"/>
IP (Non-DHCP)	<input type="text" value="192.168.1.50"/>
Router/Gateway	<input type="text" value="192.168.1.1"/>
Netmask	<input type="text" value="255.255.255.0"/>

Submit the page or press enter, the data monitor will reboot if DHCP mode is changed. Verify that the new settings have been successfully configured.

For further troubleshooting refer to the following sections below.

When DHCP does not appear to be working:

DHCP configuration on the data monitor is done at startup, so the physical LAN connection must be present during this time. Make sure the Ethernet cable is plugged in *before* powering up the monitor.

To set the IP address of a DHCP-configured data monitor when DHCP is not supported on the LAN:

If available, use a DHCP-enabled router or temporarily enable DHCP on an existing router to find the IP address of the data monitor following the steps described in [Step 1](#). Then set the monitor to a fixed IP as described in [Step 2](#), after which the monitor will become compatible with a non-DHCP network.

DHCP-configured units shipped after December 2008 *without a specified gateway IP* will fallback to the static IP of **192.168.1.11** (subnet mask of 255.255.255.0) in the event that DHCP fails during startup. *(For units which have been provide with a specific gateway/router, the fallback IP will be the 11th address within the subnet of the provided gateway (ie If router/gateway field is configured as 192.168.5.1, fallback will be configured to 192.168.5.11.)* Use a switch, hub, router, and/or crossover cable to connect to this IP address in order to reconfigure its IP settings as described in [Step 2](#). This fallback can be verified in the status box displayed under the 'Settings' page.

In the example below, the monitor fell back to 192.168.1.11 when DHCP failed during startup.

<p>Currently Configured MAC 00:90:c2:xx:xx:xx DHCP Failed, fell back to fixed IP IP 192.168.1.11</p>

Setting the Data Monitor’s Router/Gateway Field:

Starting December 2008 DHCP-configured units that have not been specifically given the router/gateway IP will have router IP field preset to 0.0.0.0. When this value is entered for DHCP-enabled units, the data monitor uses ARP to automatically search for an existing router/gateway.

In the example below, even though the router/gateway setting field was configured as 0.0.0.0, the data monitor was able to detect the existing router (192.168.1.1) and automatically configured the detected router IP as its gateway.

<p>Currently Configured MAC 00:90:c2:xx:xx:xx DHCP On IP 192.168.1.52 Netmask 255.255.255.0 Router/Gateway 192.168.1.1 (auto) Last Update 2008-12-02 13:56:22</p>	<p>Use DHCP <input checked="" type="checkbox"/></p> <p>IP (Non-DHCP) 192.168.1.11</p> <p>Router/Gateway 0.0.0.0</p> <p>Netmask 255.255.255.0</p>
--	--

Auto router detection will only work if the data monitor is in DHCP mode. In static IP mode, the router/gateway field of the data monitor (displayed above) must be set to the correct gateway address.

****Note/Caution:**
0.0.0.0 is not a valid IP address. Entering this in the router/gateway field will only trigger auto router detection in units shipped after December 1st 2008. For older units, configuring the router/gateway field to an invalid address will disable the data monitor’s connection to the SolrenView server. It is not recommended to alter the router/gateway field to an invalid address once the gateway/router IP is known and configured properly.

Appendix B: More about DHCP vs Fixed IP mode

Background: In every IP network, each device (computer, printer, router) must have a unique IP address within the particular domain (ie Local Area Network, Internet).

In most simple Local Area Network setups, a router acts as the Internet gateway for a LAN. When DHCP is enabled on the LAN, a DHCP server handles requests from DHCP clients and automatically assigns an IP address to the device. This is especially useful as new network devices can be easily added to the network.

In regards to SolrenView, the data monitor must be configured to either a fixed IP address, or as a DHCP client.

If the data monitor is configured as a DHCP-client:

After bootup it broadcasts a DHCP request to the LAN, and only after a successful exchange of messages with the DHCP server it is assigned an internal address within the network. If the network is NOT DHCP-enabled, the monitor will not be assigned an IP, unless a [fallback IP](#) has been configured. To reconfigure the data monitor's IP settings, see [IP Configuration](#)

If the data monitor is configured to a static IP address:

The address specified in the site survey will be the only address the data monitor binds to. If the subnet of the address does not match the LAN's it may not be reachable.

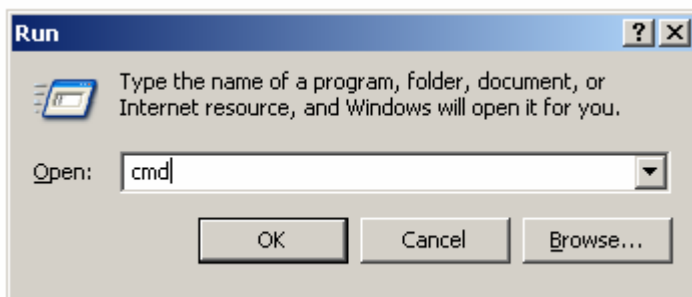
Note: The default gateway/router IP must be specified along with the fixed IP when static IP mode is selected in the site survey. The address specified must not be an occupied IP address in the LAN.

To determine whether a network is DHCP-enabled:

Check/access the router's configuration, please refer to your router's manual. If this is not possible, you can check the IP settings of a local computer within the **same or intended LAN**.

Checking IP configurations of a local computer (Windows only)

Step 1) Open a command prompt, ie Start->Run, type 'cmd' and press enter.



Step 2) Under the command window, type in 'ipconfig /all'. This will print out the IP configuration of the local computer. If the entry for 'Dhcp Enabled' is 'Yes' then the LAN is DHCP-enabled (see line circled in green below).

```
C:\WINDOWS\system32\cmd.exe
C:\>ipconfig /all

Windows IP Configuration

    Host Name . . . . . : xxxx
    Primary Dns Suffix . . . . . :
    Node Type . . . . . : Unknown
    IP Routing Enabled. . . . . : No
    WINS Proxy Enabled. . . . . : No

Ethernet adapter Local Area Connection:

    Connection-specific DNS Suffix . :
    Description . . . . . : Broadcom NetXtreme 57xx Gigabit Controller
    Physical Address. . . . . : xx-xx-xx-xx-xx-xx
    Dhcp Enabled. . . . . : Yes
    Autoconfiguration Enabled . . . . : Yes
    IP Address. . . . . : 192.168.1.100
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.1.1
    DHCP Server . . . . . : 192.168.1.1
    DNS Servers . . . . . : xxx.xxx.xxx.xxx

    Lease Obtained. . . . . : Wednesday, March 25, 2009 8:17:17 AM
    Lease Expires . . . . . : Wednesday, April 08, 2009 8:17:17 AM
```

If DHCP support still cannot be determined, the following are very general guidelines for determining DHCP functionality of a LAN in the event it cannot be verified with LAN router settings or a network administrator.

- Residential homes and smaller companies/organizations without an IT department/network administrator are typically DHCP-enabled. Disabling DHCP on a network necessitates having to manually allocate an IP address each time a network device is added, therefore there's an increased likelihood that there is a network administrator overseeing the IP assignments.
- Higher security networks (ie banks) or companies/organizations with a more extensive network structure are more likely to disable DHCP to prevent unknown devices from accessing its LAN resources.