SolarVu™ SnoCam Installation Guide

What is SnoCam?

SolarVu® is an energy portal that enables remote monitoring of renewable energy generation sites over the internet. SnoCam is an option that allows up to 4 IP cameras to be installed on the roof to provide a remote live view of the panels and weather conditions. It is helpful in determining why output is low during winter and assessing storm damage. In addition to a live update, SnoCam saves a daily snapshot at noon for performance analysis. For security and insurance purposes, cameras can be equipped with a 7 day continuous record option for downloading a video after an event. Unlike the 7 day video recording option, the standard still image version is integrated into SolarVu and does not require a static IP address or complex router setup like port forwarding.

SnoCam Installation

Mount the SnoCam to a pole or wall on the roof in a location with a clear view of the solar panels and the sky. Angle the camera down to shed moisture and not cast a shadow on the panels at any time. Beside the camera, mount the SnoCam NEMA3 junction box vertically with the rubber weather gasket on the bottom, close enough so the camera cables reach inside. Run a single length of outdoor CMX grade cat5e UTP (4 unshielded twisted pairs) ethernet cable between the roof junction box supplied and the SnoCam terminal board inside the SolarVu enclosure. For distances under 100', the 12V camera power is internally connected to one pair of wires in this cable. For longer distances, a separate pair of #18 wires must also be run to supply the camera power without excessive voltage drop up to a maximum length of 300'. Two alternative methods are provided for connecting the wires. Choose one or the other but not both. The preferred method, used extensively in the telco industry, is to punch down the wires on the 110 punchdown blocks. This is more reliable and faster because wires do not need to be stripped; however, a 110 punchdown tool is required. Alternatively connect each wire using conventional screw terminals. Pay close attention to matching the correct colours at both ends as shown in fig 2.

SnoCam Installation

① Mount SnoCam and connect junction box on the roof
② Connect cable to SolarVu enclosure
③ Test connections then power on SnoCam
④ Access SolarVu online. Aim SnoCam
⑤ Automatically records hourly snapshot

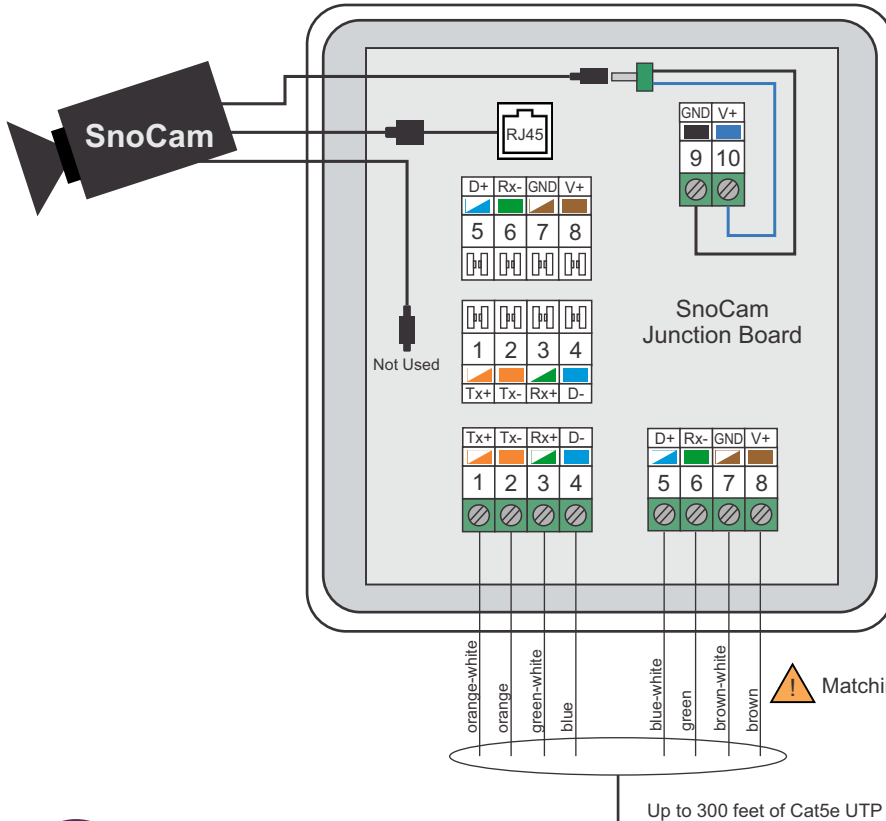*Fig 1 Internet Connection*
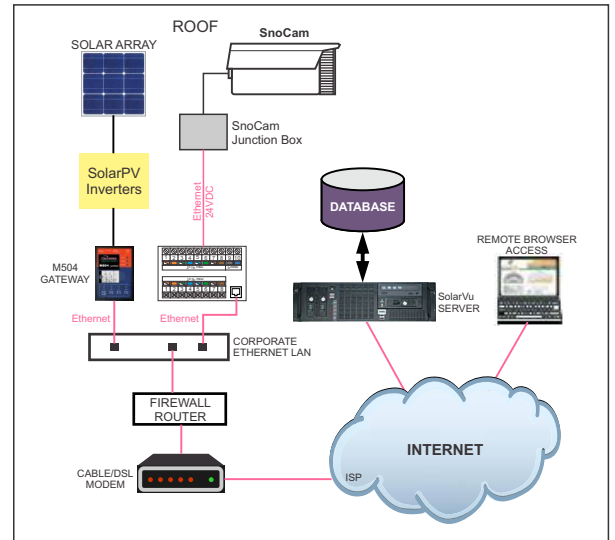
GE864
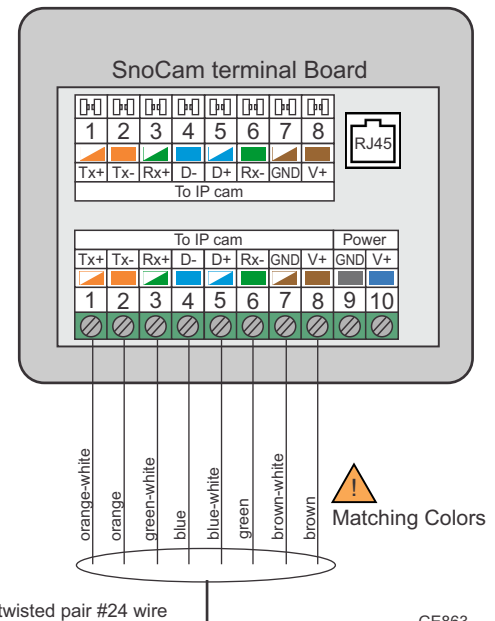
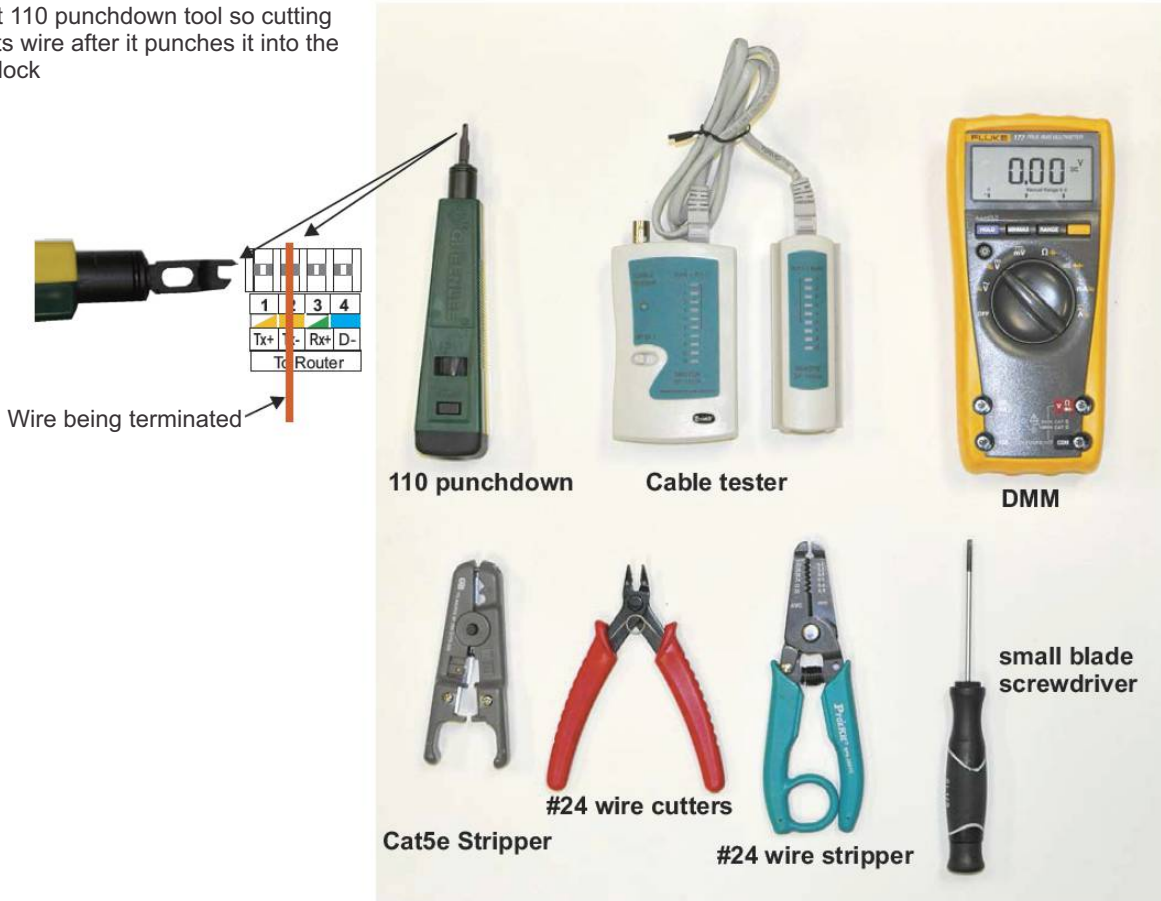*Fig 2 SnoCam punchdown method of wiring from SolarVu terminal board to IP camera junction box*

Tools

Having the recommended tools will save time at the site and ensure reliable connections. In addition to standard electrician hand tools, source from an electronics or CCTV supplier: 110 impact punchdown tool, Cat5e jacket stripper, LAN cable tester, meter. Use a 110 punchdown tool with a spring loaded mechanism for best results. Blades come with a cutting edge as shown in fig 3 for punch and trim in one operation or with no cutting edge requiring use of wire cutters after punchdown. If using the cutting blade, hold the tip so the cutting edge is on the side of the wire to be trimmed. The cat5e cable stripper needs the cut depth to be adjusted for the cable being used. Practice stripping off the jacket with a single turn to slice through the jacket turning the adjusting screw until there are no nicks on the wire inside the jacket after stripping. Cat5e wire is usually solid #24 gage. Wire strippers if used for the screw terminal connection should have a 24 gage slot to ensure the wire is not nicked during stripping. After installing the wiring, it is a good idea to verify connections with a cable tester and to check that the correct supply voltage is available with a DMM.

Fig 3 The right tools will speed up installation

Orient 110 punchdown tool so cutting tip cuts wire after it punches it into the IDE block

Wire being terminated

1	2	3	4
Tx+	T-	Rx+	D-
	To Router		

110 punchdown   **Cable tester**   **DMM**

Cat5e Stripper   **#24 wire cutters**   **#24 wire stripper**   **small blade screwdriver**
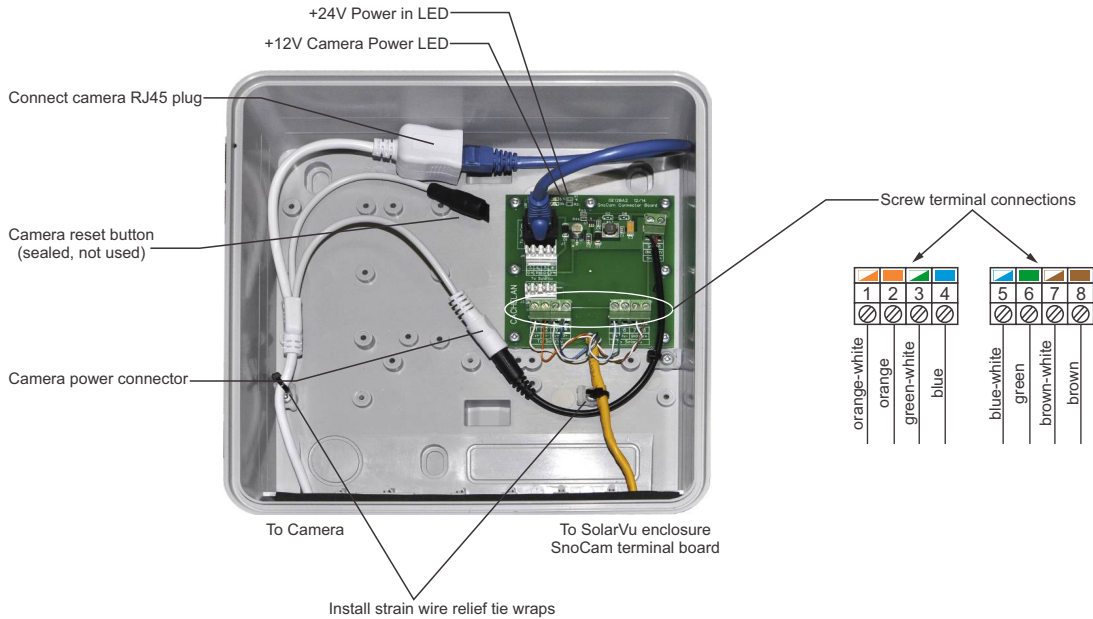
Wiring - SnoCam Junction Box

Choose either the punch down or screw terminal method for connection, not both.

Punchdown: Strip 1.5" of the jacket off the cat5e cable and route it through the strain relief clamp in the junction box supplied. For punchdown, untwist enough wire to lay each one in the matching colour slot. Use the punchdown tool with the cutting edge of the blade on edge of the slot where the wire is to be cut as shown in fig 4.

Screw Terminals: Strip 2" of the jacket off the cat5e cable and route it through the strain relief clamp in the junction box supplied. Strip 1/4" off the end of each wire. Fully back out the terminal box lug opening by rotating the screw counter clockwise multiple times before inserting the wire. Otherwise the wire can get inserted below the box lug opening and not get clamped. Gently pull on each wire after screwing it in the terminal block to ensure it is properly clamped. Before connecting the camera, test the cable connections and the camera voltage as described in the Testing section.

Fig 4 Connecting the junction box and SnoCam - Terminal wiring or Punchdown methods

SnoCam Junction Box - Screw Terminal Connections

SnoCam Junction Box - Punchdown Connections
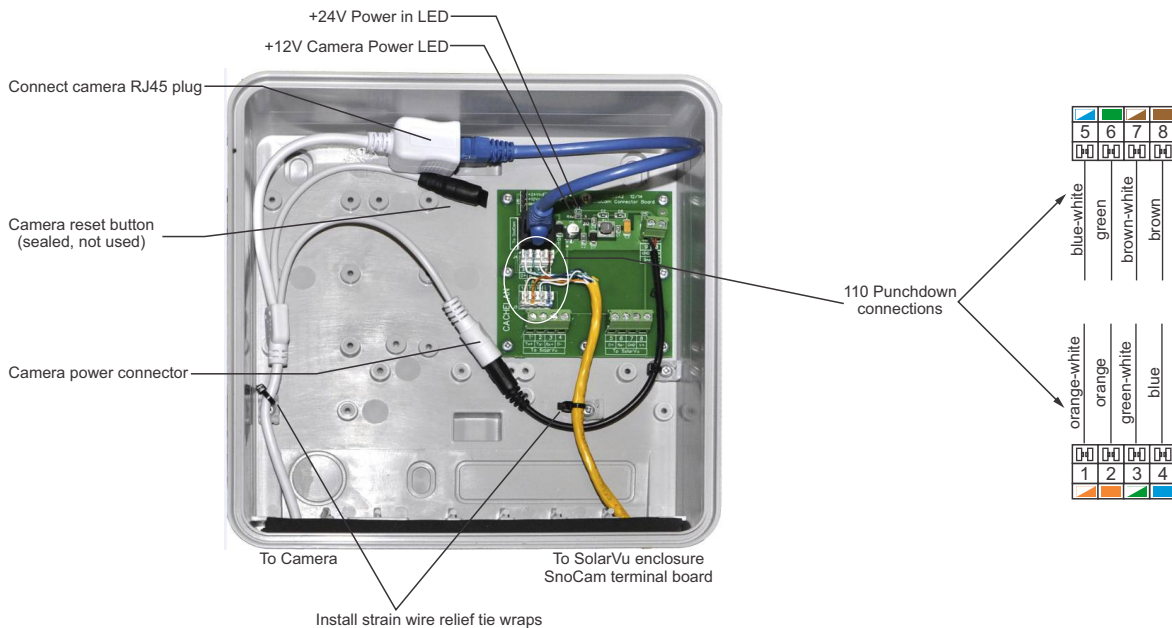
Wiring - Terminal Board

Locate the SnoCam terminal board inside the SolarVu enclosure. Cut a hole in the SolarVu enclosure to accommodate conduit or a gland for the Cat5e cable run to the roof and bring the wire into the enclosure. Choose either the punch down or screw terminal method for connection, not both. Observe wire colours very carefully and match them to correct terminal numbers. They must match at both ends or the camera will not work.

The power supply and patch cable to the router should already be installed in the SolarVu enclosure. It this is a retrofit, a standard cat5e patch cable must be connected from the RJ45 jack to a LAN jack on the router in SolarVu. Connect the power supply wires from terminal 9 - GND and terminal 10 V+ to a 12V 10W DC supply mounted on the DIN rail and powered by 120VAC. If the polarity is correct, the V+ indicator LED on the termination board will illuminate when power is applied.

Punchdown: Strip 1.5" of the jacket off the cat5e cable and tie wrap the cable to the left side of the terminal board for strain relief as shown in Fig 5. Untwist enough wire to reach its slot. Do not strip the wire. Lay each wire in the matching colour slot then use the punchdown tool with the cutting edge of the blade on side of the slot where the wire is to be cut as shown in Fig 3. After punch down the insulation is displaced, making a reliable connection. The wire should be firmly locked in the slot. Remove the excess wire protruding past the slot which should have been automatically cut by the punchdown tool.

Screw Terminals: Strip 2" of the jacket off the cat5e cable and tie wrap the cable to the left side of the terminal board for strain relief as shown in Fig 5. Strip 1/4" off the end of each of the 8 wires. Fully back out the terminal box lug opening by rotating the screw counter clockwise multiple times before inserting the wire. Otherwise the wire can get inserted below the box lug opening and not get clamped. Gently pull on each wire after screwing it in the terminal block to ensure it is properly clamped. Before connecting the camera, test the cable connections and the camera voltage as described in the Testing section.

Fig 5 Connecting the SolarVu enclosure terminal board
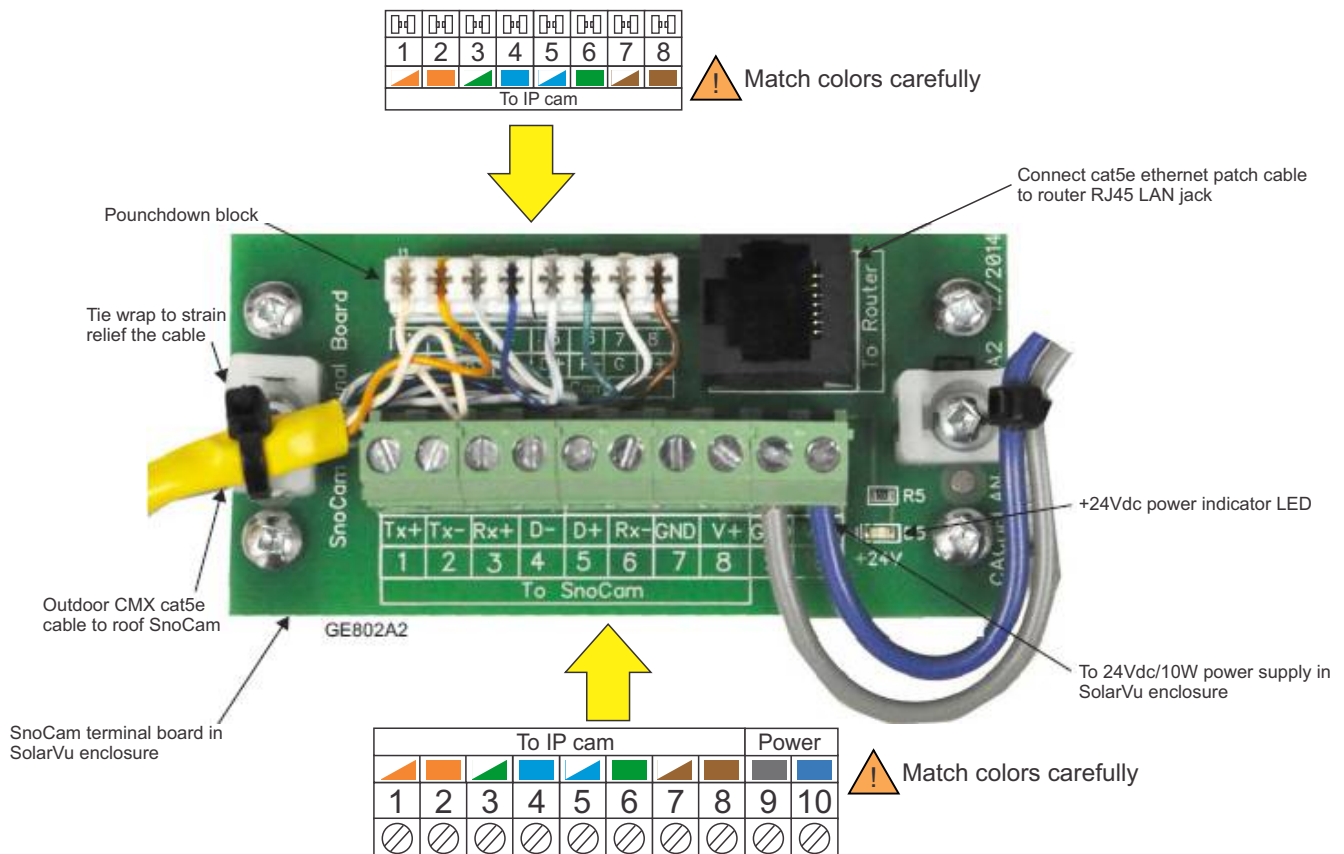
Testing

Once the wiring is complete check for correct connection and voltage before plugging in the SnoCam.

1) Plug in the cable tester

Plug in the short cat5e ethernet patch cable in the roof junction box into the cable tester receiver module. Temporarily unplug the router patch cable from the SnoCam terminal board RJ45 jack in the SolarVu enclosure. Using a short cat5e ethernet patch cable (not supplied) plug the cable tester transmitter module into the now free RJ45 terminal board jack and turn on the cable tester transmitter. Lights 1-6 should alternatively flash to indicate that the 6 wires for terminals 1-6 are correctly connected. Terminals 7 & 8 carry the 24V camera power and are not connected in the RJ45 jack so they do not light up on the cable tester. This is normal. See fig 6. If all lights 1-6 do not light up in sequence, check the cat5e cable connections between the junction box and the terminal board.

2) Check for DC Power

Remove the cable tester cables and plug the router patch cable back in to the SnoCam terminal board. Now apply power to the SolarVu enclosure noting that the 24V LED on the terminal board lights up. In the roof junction box, verify the 24V power LED is also on indicating power is being received from the terminal board. The 12V camera power LED should also be on indicating the power regulator is functioning correctly. You can verify with a DMM that there is 12V at the camera power screw terminals.

3) Plug in the SnoCam

If any tests are not as expected troubleshoot the problem first. Otherwise, plug the short patch cable into the RJ45 SnoCam RJ45 jack, and the power plug into its mating connector. Do not touch the reset switch which should be covered or the SnoCam IP setting will be changed and it will not work in the factory configured setting. Some cameras may have an additional audio cable. Leave it unconnected. Use tie wraps to secure the camera cables in place to ensure the wiring cannot be disturbed by pulling from the outside. Ensure the rubber grommet makes a good seal around the cable in the bottom to prevent insects and debris from entering the enclosure. Leave the door open until testing is complete.
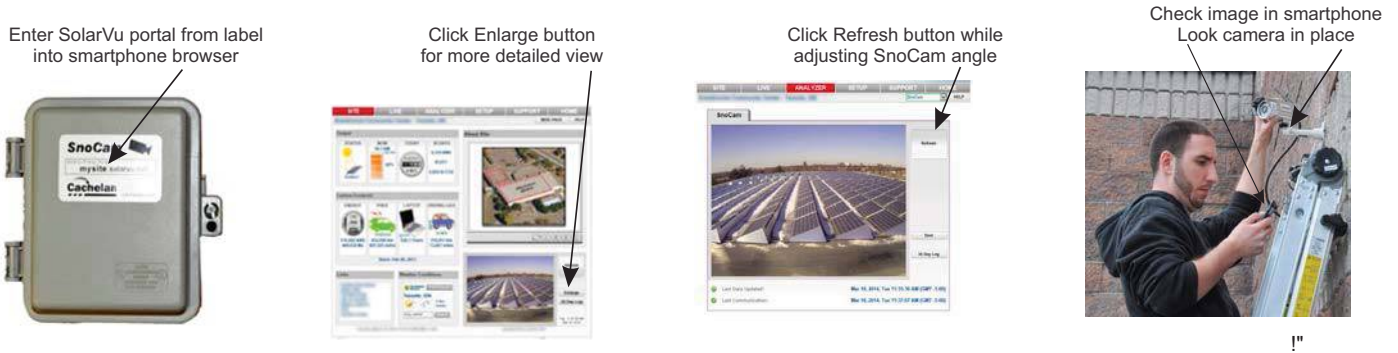
Fig 6 Use a cable tester to check connection before plugging in the camera
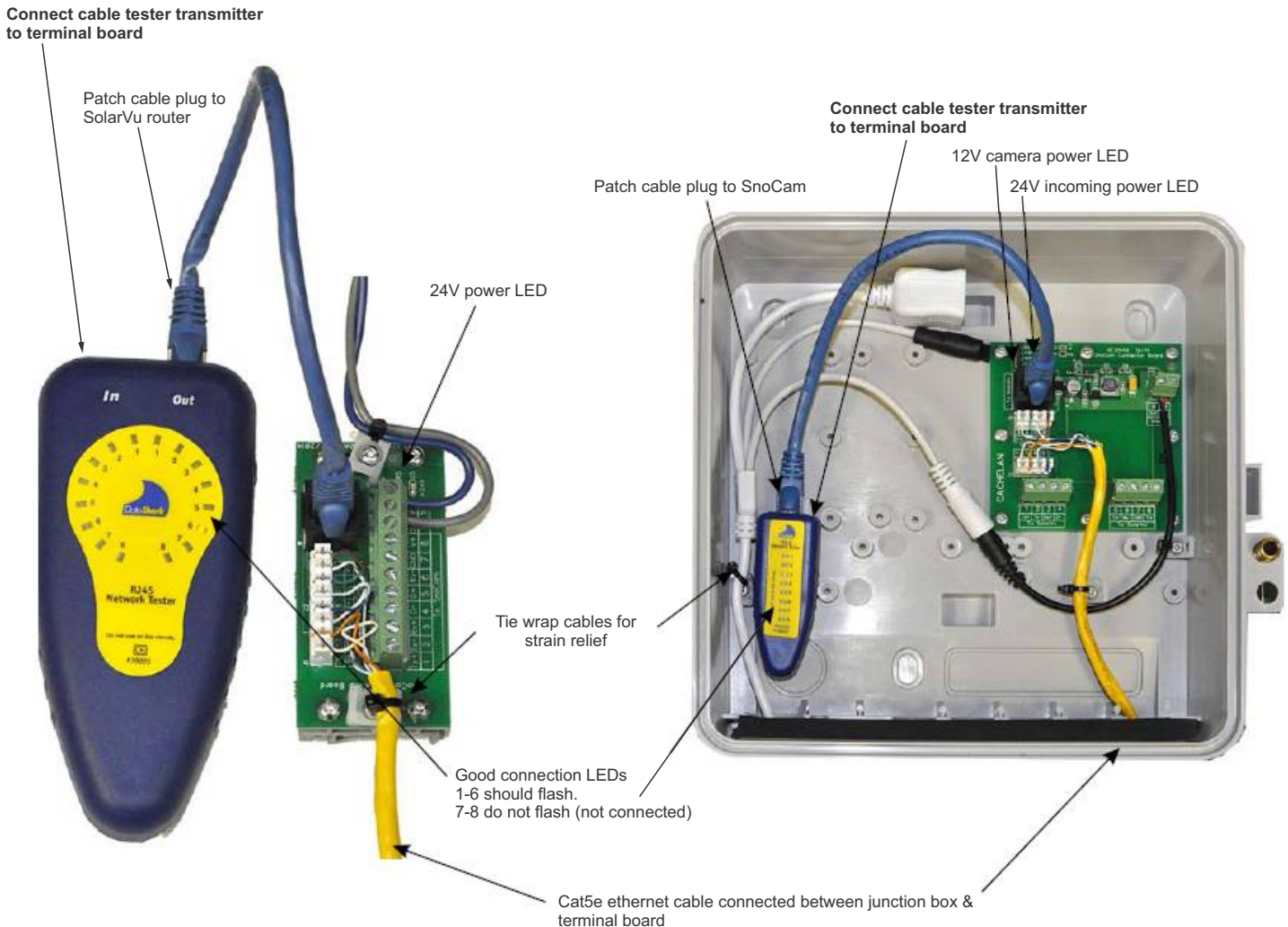
4) Access the camera images online

Ensure power is applied to the SolarVu enclosure and the SnoCam power LED is on in the SnoCam junction box. Using an internet connected smart phone, launch the browser and type in the SolarVu energy portal URL. This is shown on the front of the SolarVu enclosure label and also on the SnoCam door in the format www.mysite.solarvu.net. It takes about 2 minutes after power on for the SnoCam and M504 gateway to boot up. After boot up you should see a time stamped still image in the SITE screen. Click the Enlarge button then the Refresh button and a new picture should appear. Assuming this works, loosen the camera bracket mounting knob (or screws) , move the camera to the desired location and check the image by repeatedly clicking the Refresh button. Try to get a good view of the roof panels and some sky. The camera should be pointed slightly downward to shed water from the top cover. Tighten the swivel knob (or screws) when the camera is pointed in the desired direction.
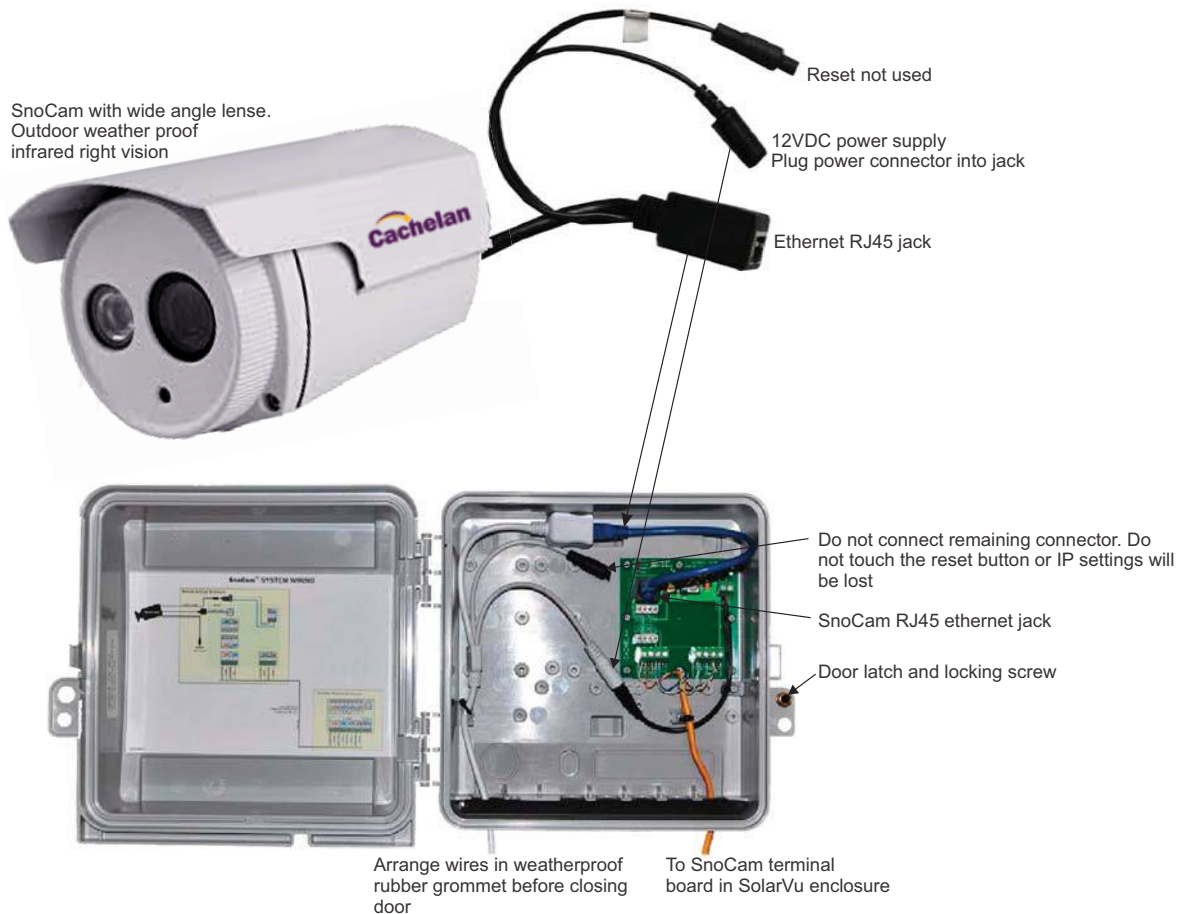
Fig 7 Aiming SnoCam with SolarVu

Enter SolarVu portal from label into smartphone browser

Click Enlarge button for more detailed view

Click Refresh button while adjusting SnoCam angle

Check image in smartphone Look camera in place

!"

5) Close the junction box

Tuck the cables inside the junction box and routed them though the slot in the rubber grommet. Snap the door closed and tighten the locking screw for extra retention. Check one more time on your smart phone that the camera is still responding with refreshed images. If desired, a small amount of silicon sealant can be applied around the rubber grommet for a better seal but as long as the junction box was vertically mounted gravity should be sufficient for weather protection. This completes the testing.

Fig 8 Place SnoCam cables and close enclosure door

SnoCam with wide angle lense. Outdoor weather proof infrared right vision

Reset not used

12VDC power supply Plug power connector into jack

Ethernet RJ45 jack

Do not connect remaining connector. Do not touch the reset button or IP settings will be lost

SnoCam RJ45 ethernet jack

Door latch and locking screw

Arrange wires in weatherproof rubber grommet before closing door

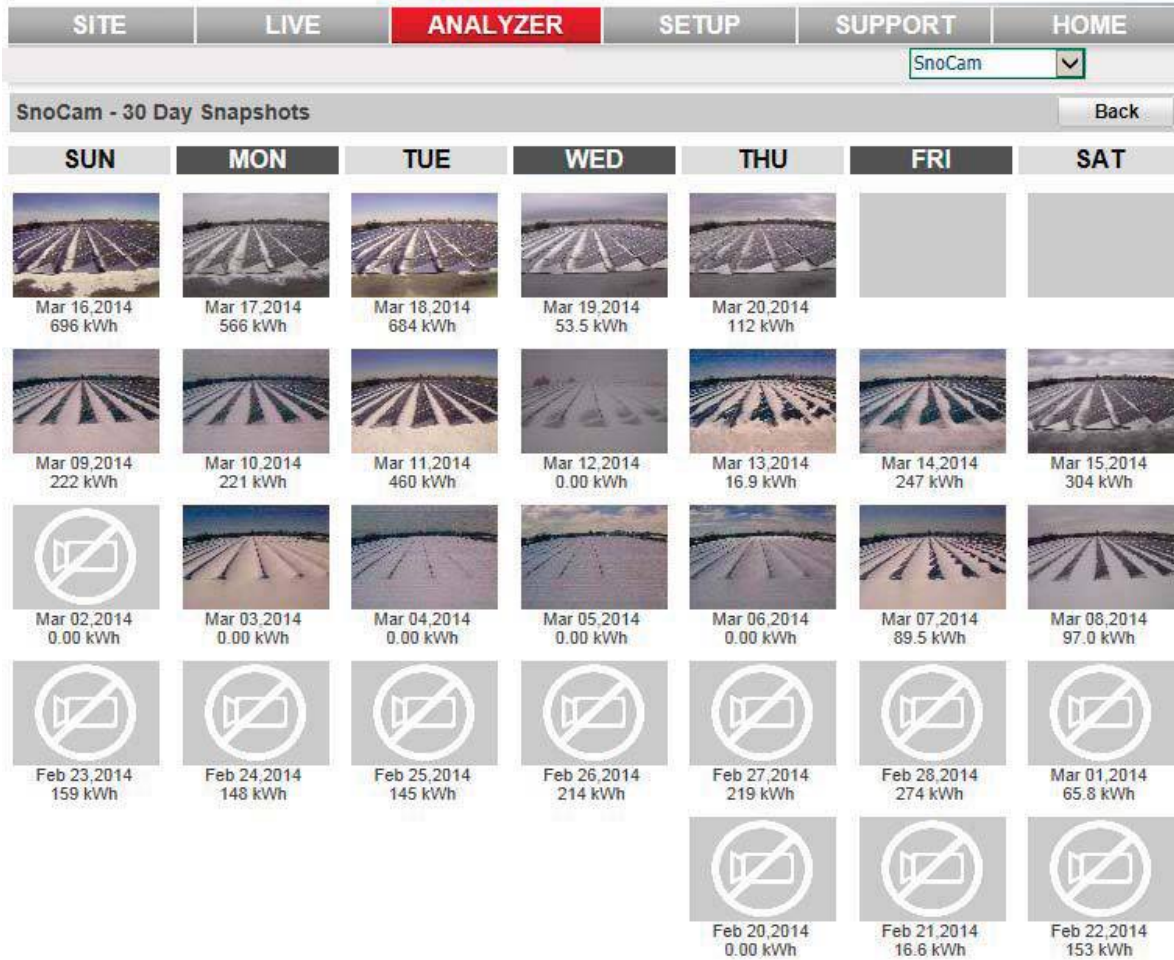To SnoCam terminal board in SolarVu enclosure
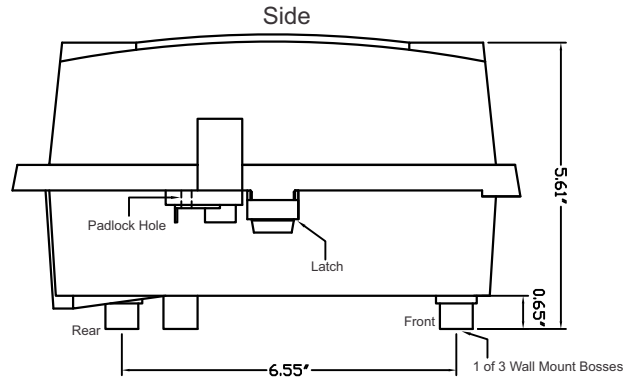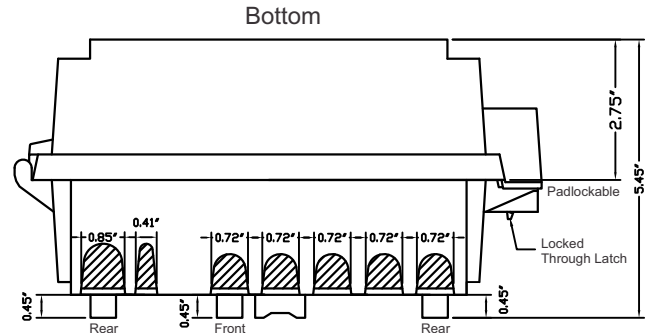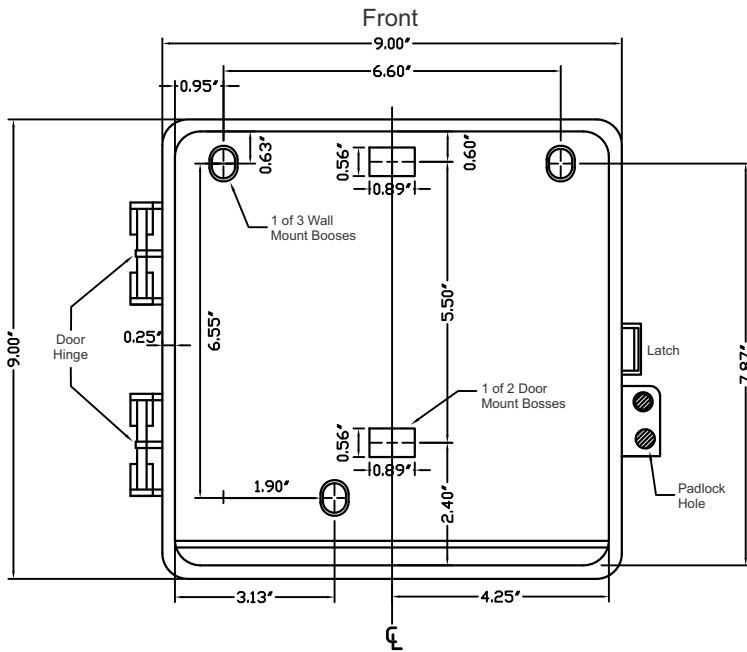
Using SnoCam

Each time you visit the SITE screen in SolarVu the SnoCam image will automatically update showing the current time stamp. Click the Refresh button to capture a new image. Each image uses about 30KB of data allowing the SnoCam feature to be used with cellular internet connections without excessive bandwidth consumption. Click the Enlarge button for a more detailed view. To keep a visual record, when viewing from a PC, click the Save button and a 640x480 jpeg file will be saved at the location specified in your browser settings. For a smart phone, use the screen capture feature.

Each day at noon a picture is automatically saved for viewing in the 30 day SnoCam log. Viewing is from Analyzer --> SnoCam --> 30 day log button. Beneath each photo is the total energy generated by the system for that day. Click on any photo to enlarge it. The 30 day log is useful for determining why output may not be as high as expected, particularly in winter.
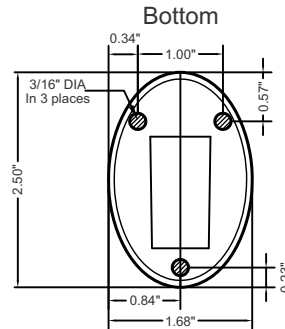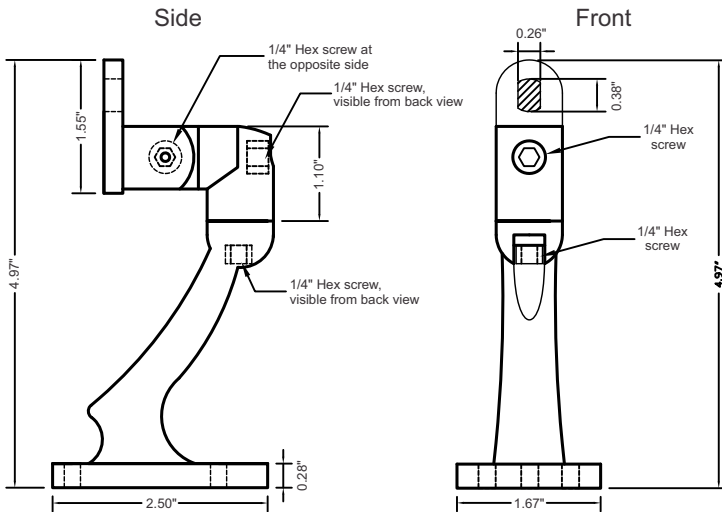
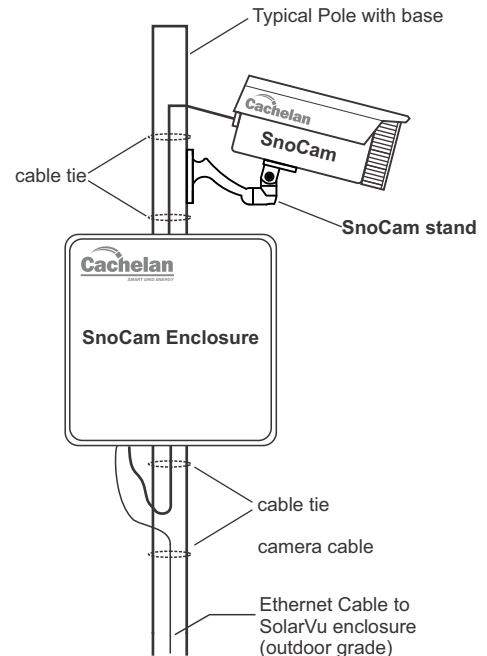*Fig 9 30 day noon image record*

SnoCam Enclosure Dimensions

Front

Bottom

Side

SnoCam Stand Dimension

Side

Front

Bottom

Typical SnoCam Installation

Typical Pole with base

cable tie

SnoCam

SnoCam stand

SnoCam Enclosure

cable tie

camera cable

Ethernet Cable to
SolarVu enclosure
(outdoor grade)

Camera Specification

|	
Image Sensor	High Definition Color CMOS Sensor
Display Resolution	1280*720 Max (1 mega Pixel)
Lens	f: 2.8mm
Aperture	F1.2
Viewing Angle	67 Degree
Ethernet	One 10/100Mbps RJ-45
Wireless Security	N/A
Voltage Supply	DC 12V
Power Consumption	4.2 Watts (Max.)
Operating Temp.	-20°C~40°C
Operating Humidity	20% ~ 85% non-condensing
Storage Temp.	-20°C~40°C (32°~104°F)
Storage Humidity	20% ~ 90% non-condensing
Certificate	CE, FCC, RoHS

SnoCam Video Retrieval from LAN (On-site)

Use this instruction to download videos to a PC at the site for SnoCams ordered with the Video Security feature. When nequipped, each SnoCam will have a 32GB SD card installed which constantly records video. The SnoCam is able to store up to 2 weeks of videos inside the SD card. When the card is full, the oldest video will be overwritten by the new one. Videos must be retrieved within 2 weeks from recording or they are permanently lost. SnoCam records 24 hours of videos as one complete period, divided into 2 video files and stored in one file folder which is named in "YYYYMMDD" (video start date) format. SnoCam videos can only be retrieved at the actual location where the SnoCam is installed. A notebook PC with an Ethernet cable is required. The video file retrieval procedure is described in this guide.

Procedure

Fig 10. SolarVu router type

1. Ensure all equipment is powered on. Open up SolarVu Enclosure and connect an Ethernet cable between the computer to one of the spare RJ45 LAN jacks on the router as shown in Fig 10.

Buffalo N300 Router
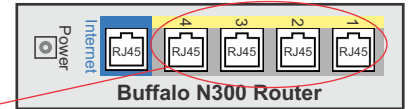
Connect to one of these ports

Alternatively, if WiFi is enabled in the router, you can connect to the SnoCam's network using WiFi instead of an ethernet cable. Look for SSID SolarVu_YOUR_SITE_NAME (this name will appear only WiFi is enabled) and the password is "SolarVuNetwork"

YF405 Cellular Modem
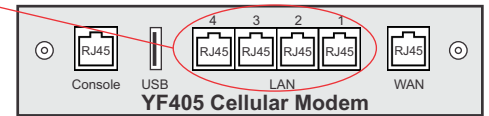
2. Identify the type of router from Fig 10 and obtain the SnoCam IP address from Fig 11.

Fig 11. SnoCam IP Address Table

SnoCam #	Buffalo N300	YF405
1	192.168.11.41	192.168.1.41
2	192.168.11.42	192.168.1.42
3	192.168.11.43	192.168.1.43
4	192.168.11.44	192.168.1.44

3. Click on the start button, then click on "Computer" for Windows 7 ("My PC" in Windows 10), click on the field highlighted in Fig 12, and type in the following: *ftp://IP_ADDRESS_FROM_STEP_2:50021*   then enter.

e.g. for SnoCam #1 from a YF405 type *ftp://192.168.1.41:50021*

Note: It may take a while to connect (approximately 2-20s depending on internet speed)

Fig 12. Entering IP address in Windows

Click on this area

Type in the address obtained from step 2 for example

4. Once connected, it will prompt the login window. Enter the following and click *Log On*.
   User name: *admin*
   Password: *snocam1*

   Note: - If the Windows Firewall window pops up, click *Allow Access*.

       - If no response received within 30 seconds or a error message is received that means the connection to the camera did not go successful. Carefully check steps 1-4
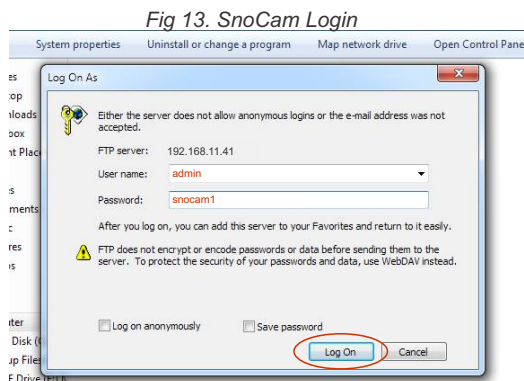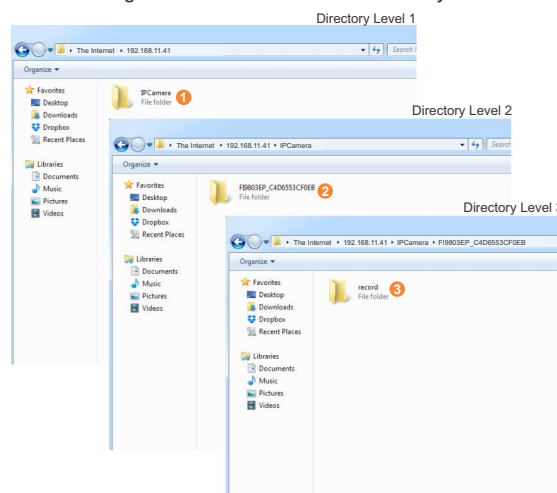

Fig 13. SnoCam Login

5. Once logged in, there will be a file folder called "IPCamera".❶ Double click on this folder to see a folder called "FI9803EP_XXXXXXXXX".❷ Double click on this folder to find a folder named "record".❸ Double click on this folder and go to the next directory.

Figure 14a. SnoCam video directory

6. Each folder has the time format in YYYYMMDD.❹ Pick the desired day and open the folder. The new folder will have name of YYYYMMDD_hhmmss ❺ which is the start date. This folder contains two video recordings in .avi file format.❻ Each file is named with the start date and time with the date/timestamp YYYYMMDD_hhmmss. The total length of the 2 files is 24 hours. Each single video file is approximately 250MB. The "index.dat" file can be ignored since it has no use to the user.


Fig 14b. SnoCam video directory
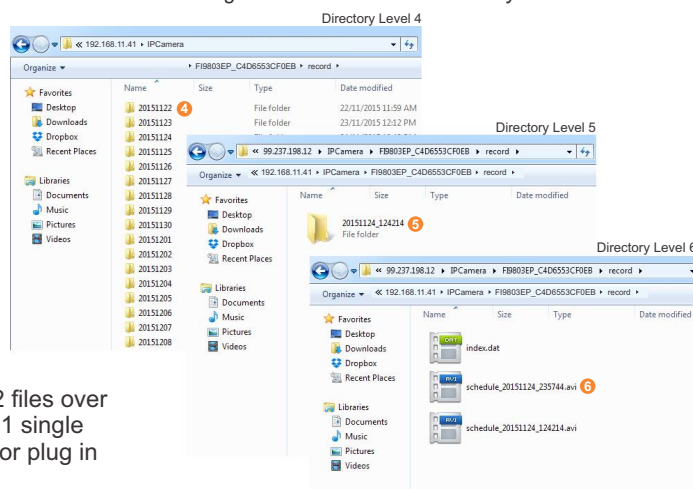
7. Due to the download speed and the size of each video file, only copy 1 to 2 files over to user's local machine at a time. It will take approximately 5 minutes to copy 1 single video file. Select and copy the target video file to a local harddrive on the PC or plug in a USB key and copy to it.

8. Once the video file is copied over, double click on the video file to watch the video. A video player must be installed in the PC that can play .avi format video files. e.g. Windows Media Player as shown in Fig 15. Images are date/time stamped. Use the control bar to scroll to the period of interest.

Fig 15 Windows Media Player
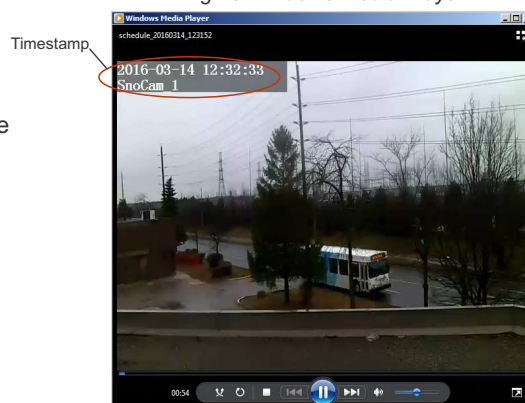
TECHNICAL SUPPORT
For assistance, contact Cachelan technical support at 905-470-8400 ext 224