4350 Executive Drive, Ste. 325
San Diego, CA 92121
+1-888-854-3312
www.micropower.com

Helios™
Solar Wireless IP Surveillance System

Installation Guide
Version 5.12

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Contacting MicroPower Customer Support

MicroPower's customer support strategy is through best-in-class business partners including OEMs, distributors, systems integrators and systems vendors. If your MicroPower product was purchased directly from a MicroPower business partner, that partner is the first point of contact for technical support. If the business partner cannot resolve a problem, then the partner will contact MicroPower.

Web Support:	http://www.micropower.com
Email Support:	help@micropower.com
Phone Support Worldwide:	+1-888-854-3312
Fax Support – Worldwide:	+1-858-947-3907

General Safety Precautions

• Follow all cautions, instructions, and warnings as listed on the product and related documentation, including electro-static discharge (ESD) recommendations, physical handling advice and other recommendations or best practices.

• Ensure that the voltage and frequency of your power source match the voltage and frequency required by the equipment. Do not use alternative power supplies without first contacting MicroPower.

• Do not attempt to modify or change the internal batteries. The battery size and voltage are calculated to match the size, voltage, and runtime required by the equipment. Modifying the battery system could result in damage to the equipment and nullification of the product warranty.

• Use only the included antennas and ancillary equipment provided with the product.

• Do not make mechanical or electrical modifications to equipment. MicroPower is not responsible for the safety or regulatory compliance of a modified product.

• Do not omit device components that would interfere with air flow and cooling as designed. Failure to follow these guidelines can cause overheating and affect the reliability of your MicroPower product.

• Protect your warranty. A product which has been damaged, misused, abused or misapplied may be determined to be out of warranty.

Package Contents

The MicroPower Solar Wireless Surveillance System consists of two major devices; the MPT2500 Series Solar Wireless IP Video Camera and the MPT2700 Series Intelligent Video Hub.

Solar Wireless Video Camera (MPT2500 series)

- Solar Wireless Video Camera/ IP66 Enclosure
  (Including 2 Philips screws for attaching the bracket to the camera housing)
- Camera Mounting Arm
    - Wall attachment screws and bracket screws utilized to adjust the camera position and angle
- One Dual Frequency Directional Antenna (900MHz / 2.4GHz)
    - U-Bracket with washers and screws
    - Antenna Cable
- Antenna Arm Bracket Assembly (Installer should supply stainless steel worm drive bands “hose clamps” in appropriate size for mounting pole).

Intelligent Video Hub (MPT2700 series)

- Intelligent Video Hub
    - Power Brick, Mounting Hardware, Documentation
    - Antenna Cable Splitter and SMA Adapters
    - Antenna Cable
- One Dual Frequency Directional Antenna (900MHz / 2.4GHz)
    - U-Bracket with washers and screws
    - Antenna Cable
- Antenna Arm Bracket Assembly (Installer should supply stainless steel worm drive bands “hose clamps” in appropriate size for mounting to the pole).

System Overview

MicroPower Technologies has developed a unique proprietary power and wireless technology called "TrustLinx™", which enables the long-range wireless transmission of digital video while using only 10% of the electrical energy that most common wireless IP cameras consume. With this patented technology, the MicroPower wireless Video cameras can remain fully operational for up to five days in complete darkness, utilizing only the internal rechargeable batteries. This enables the camera to reliably operate 24 hours a day through most weather conditions, without any performance loss or need for maintenance. Additionally, the TrustLinx radio technology does not conflict with other wireless technologies such as traditional Wi-Fi (802.11b/a/c/n), while still retaining the ability to reliably transmit high-quality digital video up to distances of 1/2 mile.

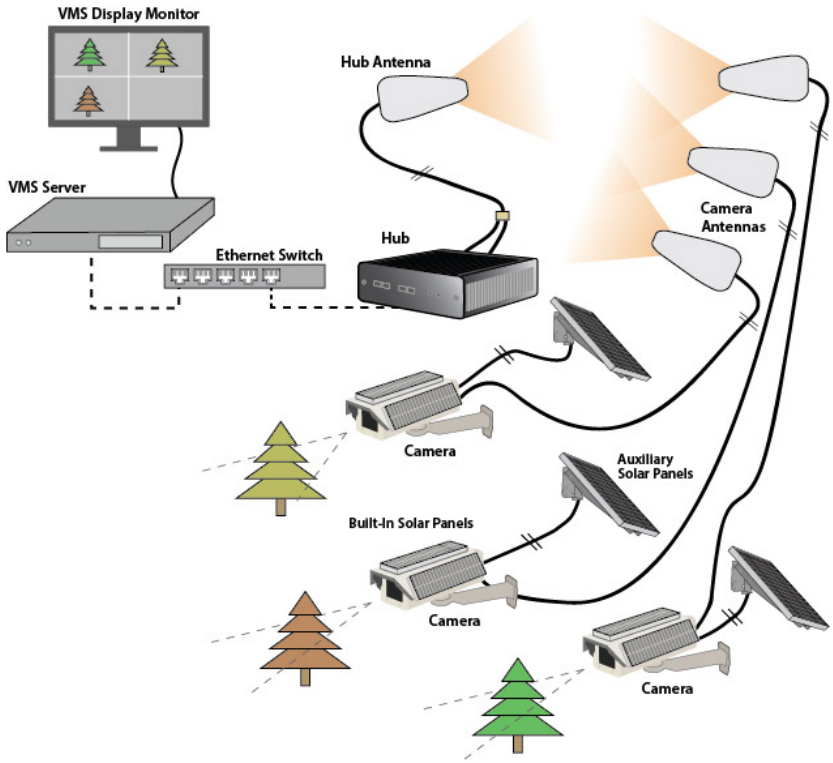
The patented TrustLinx technology eliminates the need for trenching and/or long cable runs to remote outdoor cameras, significantly reducing installation time, labor costs, and allowing cost effective remote video coverage in locations where surveillance was never before possible.

In the 2.4 GHz ISM band, referring to the OSI 7 layer networking model, we use Layer 1 for the physical layer and Layer 2 for the data link layer. We do not use Layer 3 (network layer), Layer 4 (transport layer) or Layers 5-7. Therefore, we utilize the physical radio and the data link that organizes the bits into packets. These packets are not Wi-Fi, TCP/IP or any other topology. The hub receives the packets from the camera and although the packets comply with the 802.11 Layer 2 data link format, the content is proprietary. Because we are receiving camera data it is a one way stream from the camera to the hub. We do not enable the transmit from the hub to the camera using this radio, therefore the normal mode of operation and the only mode that can be activated by the user is receive mode.

The MicroPower designed card is designated the Hub Controller Board, or HCB. It is also a mini PCIe card. The HCB is controlled by an on-board microcontroller. The microcontroller has direct access to a 915MHz radio transceiver. The operating frequency of the radio is derived from a 48MHz crystal, and FSK modulation is employed. The radio is coupled with a power amplifier and LNA to boost output power to approximately 13dBm. Matching and filtering networks are employed to minimize spurious noise and harmonics. One of multiple channels in the 909-921MHz ISM band can be selected for operation. This allows the system to select a channel to avoid interference with other devices operating in the band. The channel selection is determined by software on the host computer and communicated with the HCBs microcontroller using an internal USB interface.

Up to six (6) wireless cameras can be associated to a single video hub. The video hub is the only data connection point to which the Video Management System (VMS) will communicate and obtain the remote video streams. The standard TCP/IP data from the

video hub, may be transmitted via Ethernet through virtually any conventional broadband network technology (LAN, T1, ADSL modem, cable modem, cellular modem, mesh network, etc. to your chosen VMS solution)



Installation Recommendations

There are 5 major steps that are recommended for a successful installation. These are:

1. Site survey
2. System setup
3. Mounting the video hub and wireless camera(s), and solar panels
4. Adjusting the zoom/focus/iris of the camera
5. Configuring the VMS

I. Site Survey

A well-thought out plan for the location of the hub and camera(s) is an important step to ensuring that the entire system will remain operational, and integrate with a new or pre-existing video management system. For a more complete guide on performing a

quality site survey, please refer to the MicroPower documentation titled “Site Survey Guidelines”.

With unobstructed line-of-sight between the hub and camera antennas, the system can reliably transmit video up to 1/2 mile in distance. However, obstacles such as trees, buildings, fences, etc. will impact the wireless performance in terms of maximum transmission distance and data rate speeds. Once a video link is established, if obstructions are present, or the distance between the antennas is too great, then the video streams may experience dropouts and/or reduced camera frame rates. A wall or tree may not cause any significant performance impact at short ranges, yet can completely block a signal at long distances. Additionally, for best extremely short range performance, the minimum distance between the video hub antenna and the wireless Camera antenna should be 25 feet (unless signal attenuators are installed).

For further education and guidelines on RF effects, refer to MicroPower document “A Guide to Optimizing Your RF Setup”.

Since the wireless camera is powered by solar energy, the critical impact of sun direction and shadows on the panels cannot be overstated. It is advisable that the camera be positioned in such a way that two or more of the built-in solar panels receive adequate direct sunlight during the peak charging hours from 11 a.m. to 3 p.m.

When selecting a location for the wireless camera that will be installed in the Northern Hemisphere, the auxiliary solar panel must be mounted on the **SOUTH** side of a pole or structure, facing **SOUTH.** With the camera’s built-in solar panels, it is also preferable to mount the camera on the South side of the pole, to minimize shadows created by the pole, and to ensure good light coverage across all of the panels as the sun moves across the sky. For East or West facing cameras, try to mount the camera on the South side of the pole, and point the camera in the desired direction. For optimum solar performance, always try to avoid the North side of the pole.

(In the Southern Hemisphere below the equator, the directional considerations are reversed)

Areas with insufficient direct sunlight will eventually produce camera outages, such areas include, but are not limited to:

- Solar panels shaded under a roof eave
- Underneath a tree canopy or foliage which does not receive adequate sunlight
- Next to a tall building that casts a shadow over the camera during peak charge times. (Particularly during the important mid-day charging period)
- A camera mounted such that the pole that it is attached to, or other area objects (wires, cables, etc.) cast shadows across multiple solar panels during peak charge times.

Keep in mind that the cameras include a powerful battery backup capable of operating the camera over (5) days in complete darkness. If the system is receiving light, but at levels that are below the “break even” point, operation time can potentially be extended for weeks before a camera is finally no longer be able to remain operational 24/7. Thus, it is important to be aware that a camera may appear to operate fine in poor lighting conditions, when in fact it is slowly discharging.

Sufficient daytime lighting is absolutely critical to the long-term successful operation of the system. Additionally, making sure there are no shadows cast on the panel during the day also plays a critical role to success. Solar panels, by their nature, are sensitive to and greatly affected by shadows (even very small ones) on the panel. The most common difficulties we help troubleshoot in the field can usually be attributed directly to solar panel shadowing.

(Note: In the next section, we will detail how to log into the hub and view the charging status of each camera to help determine if lighting levels are sufficient.)

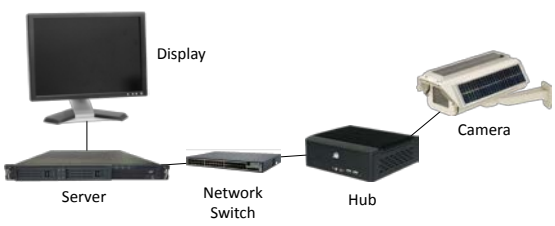
II. System Setup

The following steps are required when performing system setup and installation.

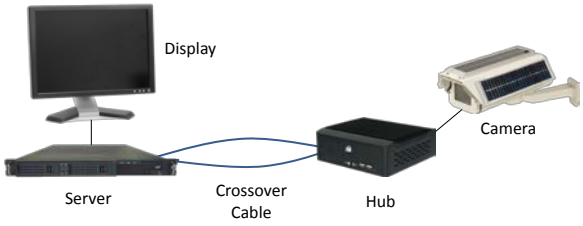
1. Connect the antennae to the video hub
2. Configure video hub to the desired IP address/network settings.
3. Reboot the hub system.
4. Add the camera(s) MAC address through the hub's web interface.
5. Connect the camera antenna and camera power to test the each camera prior to mounting and installation.
6. View the camera connection through the web interface and Live Connection (Perform basic adjustments to camera zoom/focus settings if necessary).
7. Mount the video hub in a secured, climate controlled location, run the hub antenna cable, mount and adjust hub antenna.
8. Begin camera, antenna, and solar panel mounting, and adjust antenna alignment at the final remote installation locations.

A. Accessing the Intelligent Video Hub

Accessing the video hub is similar to setting up a wireless router in your home, in that a web-based display is used to control the device. There are two basic methods for connecting to the video hub, with or without an Ethernet network switch. The most common method for systems which already have a pre-existing network in place is by addressing the video hub through a network switch. It is also possible to communicate with the video hub from a server directly, by using a crossover cable. Below are illustrations of both topologies.



Configuration 1



Configuration 2

B. System Setup via the Video Hub

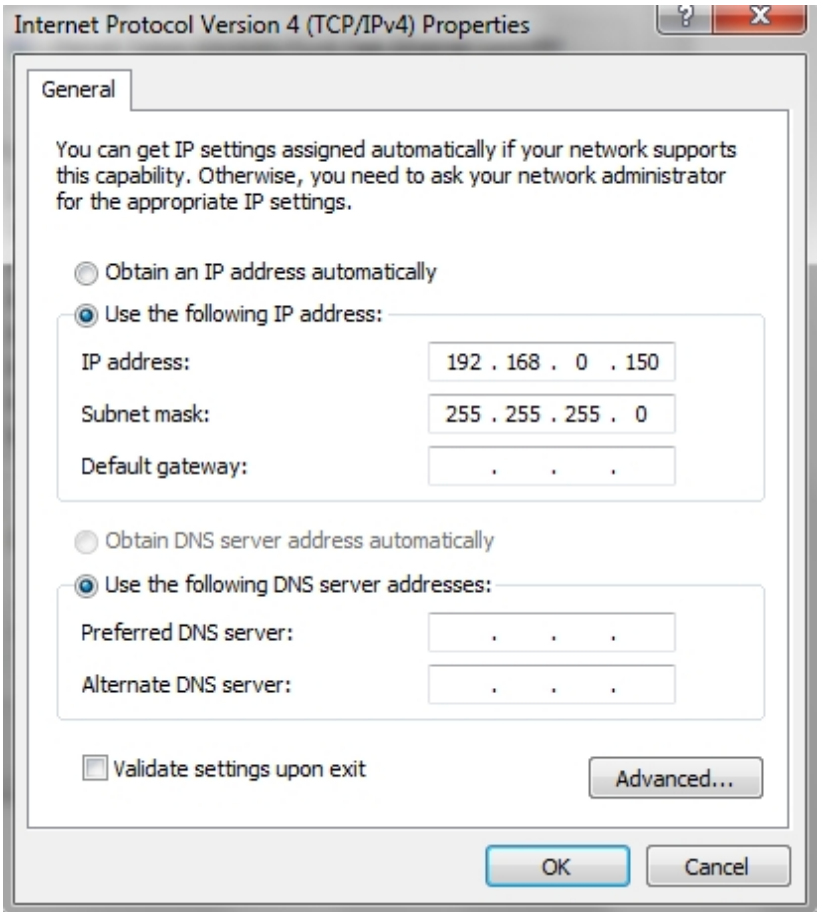
It is important to configure the video hub first, prior to pairing the video hub to the wireless cameras. System setup is performed via a standard web browsing application such as Mozilla Firefox, or Google Chrome, similar to how a wireless router is configured in a home environment. (Internet Explorer is not recommended for system setup).

Note: Though the video hub is a fully operational Linux server, for support and performance purposes, MicroPower requires that hub software installations remain consistent. As such, the installation of additional software to, or modification of the core video hub software will nullify the MicroPower Technologies warranty.

To configure the video hub, you will need to:

1. Connect video hub Antenna
2. Connect the AC power cable to the video hub and plug into a power source.
3. Power on the video hub by briefly pressing the power button on the rear of the unit. If the camera is powered on, make sure the wireless camera and video hub antennas are at least 25 feet away from each other.
4. Connect your computer to the hub via the Ethernet port, and configure your computer network settings so that it can directly address the video hub.

Below is an example screen of modifying the IPv4 IP address properties in Windows to make this change.



Press **OK**.

1. To communicate with the video hub, type the default IP address of the video hub into your web browser as though you were trying to visit a website. (For best results, use Firefox or Chrome).

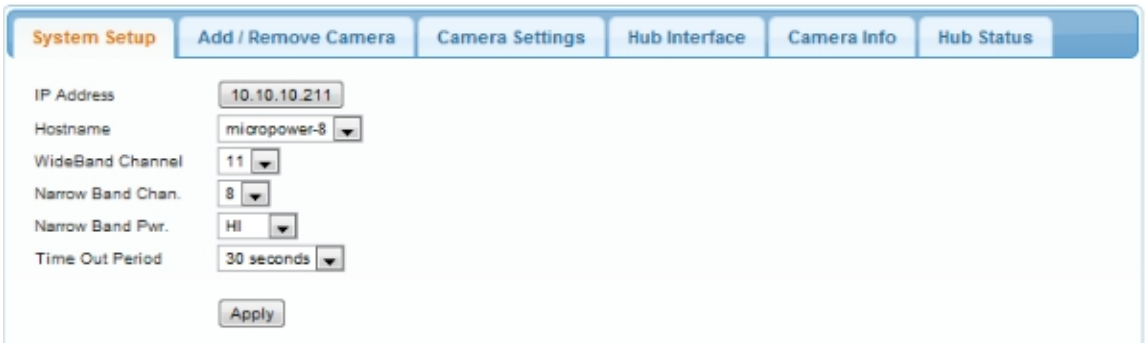
   http://192.168.0.100

   This is a temporary IP address which you will likely need to change via the system setup application.

At this point, a login screen will appear.

Type in **admin** for the username. The password is left blank.

2. Begin configuration of the video hub by selecting the **System Setup** tab.



This is the menu used to specify the final IP address, hostname, wideband channel, wideband bandwidth, narrowband channel number, narrowband channel power and time out period.
The other variables (Wideband Channel, Demod Level, Narrowband Chan, Narrowband Pwr) are selectable, but generally should not need to be changed.

Typically, you will only need to modify the IP address to be compatible with your current network configuration. To configure the IP address, single click the IP address button in the window, you will then be directed to the Configure Hub IP Address menu. (shown below)

This menu allows a user to modify a static IP address, gateway address, and subnet address or, to choose “Use Dynamic” otherwise known as **DHCP**.

Note: Do not forget your IP address, and use caution if you choose “Use Dynamic”. Your VMS system will need to be able to locate the video hub, and if a DHCP server is dynamically assigning different IP addresses to the hub, it can cause the hub to be difficult to find on the network. Only use this setting if your network administrator has told you to, **AND**, can determine and/or control the appropriate IP address issued to the video hub. In most installations, static (non-changing) IP addresses are most common, and the preferred choice for the Hub.

Typically, the new hub IP address should correspond to the IP address within the subnet of your VMS network (the first three sets of numbers match). For example, should some of your network devices be assigned an IP address similar to: 192.168.100.2, 192.168.100.5 or 192.168.100.10, then a viable Hub IP address could be 192.168.100.150 or perhaps 192.168.100.8. This allows other devices within your local network, including the NVR, to communicate with each other.

Input the desired IP address and click **Update**. (if a dialog box warns that you will need to restart the hub, just click ok and continue)

After updating the "Configure Hub IP Address menu", you will be directed to the previous menu, System Setup.

You will then need to click **Apply** here as well to apply the IP address change you previously made. You should then see a dialog alert informing you that a system reboot is required, since the video hub will not be configured for the new IP address until a reboot is complete.

To perform the required reboot, navigate to the **Hub Status** tab, scroll down, and click to restart the hub. (You may need to verify/confirm that setting a second time) Close the HTML browser window, wait approximately 1-2 minutes for the restart process to complete.

3. You can now attempt to access the hub on the newly configured IP address. Note that you will need to change back the IP settings of your computer to match the IP range of the new video hub IP address, before you will be able to access the hub.

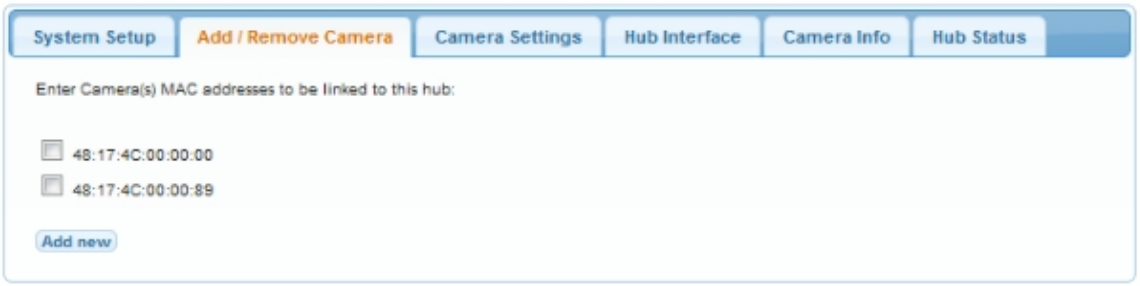
The administration login screen should again appear. If there is a problem, and you are unable to connect to the video hub, then double check that you have changed the IP address settings of your computer to match the range of the video hub's "new" IP address.

If you are still unable to access the hub, it is possible that both the "apply" or the "update" button may not have been clicked during IP address change procedure on the video hub. If this is the case, the IP change process will need to be repeated.

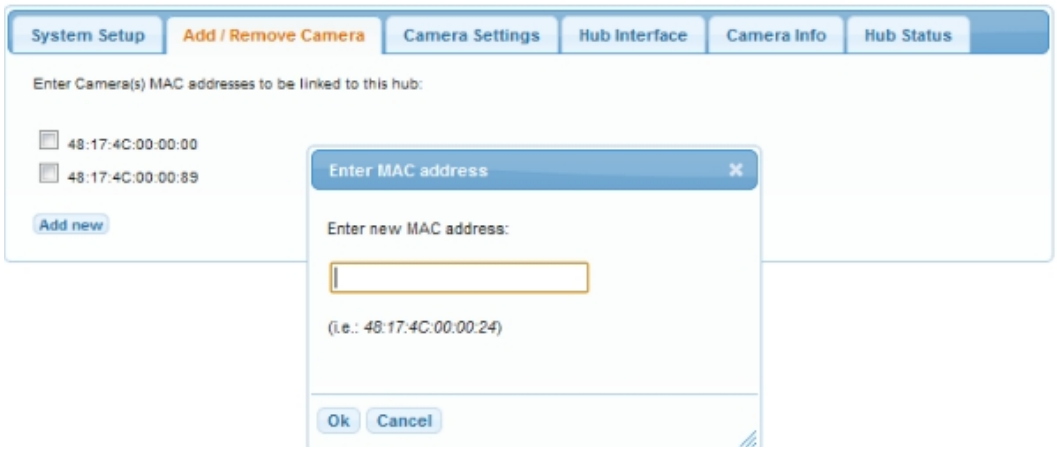
C. Add/Remove Cameras

This is the menu used to add or remove cameras that are associated with the specific hub that is being configured.

1. Select Tab labeled **Add/Remove Camera**.



2. Select option to “Add New”. A pop-up window for the MAC address of the camera is displayed.



Add the MAC Address that is printed on the sticker of the wireless camera. The sticker is located both on the inside and the outside of the camera enclosure.

Press OK when the MAC address is entered.

1. Follow Step 3 again to add additional cameras (maximum of 6)
2. Connect the antenna(s) to the camera(s)
3. Inside the camera enclosure, connect the battery cable to the camera circuit board connector. The camera ships with a fully charged battery pack, however, when the

wireless camera is shipped from the factory, the battery is disconnected from the battery camera to ensure it remains fully charged.

When the battery is connected to the camera, an LED indicator light (on the left side while peering inside the camera) should glow red when the battery is connected.

4. If you wish to do an initial camera focus / zoom adjustment, you can leave the camera open. Otherwise, close the camera housing then lock the safety latch.

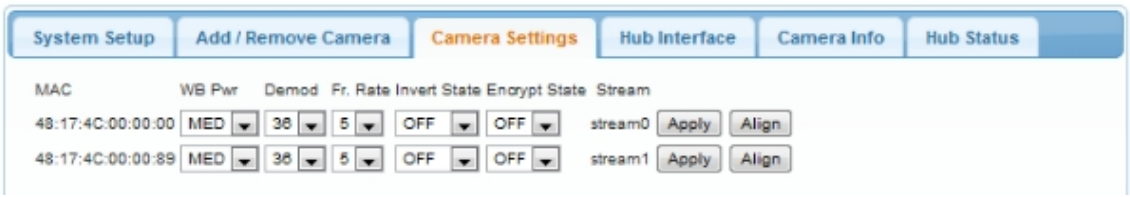
   NOTE: When closing the housing, be careful not to crush any cables in the housing hinges or edge seals, and make sure the various water-tight seals remain in place on the edges of the housing. (particularly at the front of the camera near the hinges)

Helpful Tip: Make a note of the MAC address in your records. (If you ever need to re-set up the hub, it is helpful to have these numbers written down, instead of having to visit each camera after it has been installed)

D. Camera Settings

The tab, “Camera Settings” is used to customize each wireless camera associated with the paired video hub.

1. Select tab labeled **Camera Settings.**



Variables for the **Camera Settings** beyond the MAC address are:

Variable	Description	Valid value for wireless cameras
MAC	Camera MAC Address	Six Hex values
WB Power	Power settings for the Wideband signal	Hi, Med, Lo
Demod	Data bandwidth of the individual cameras	54, 48, 36, 24 Mbps
Fr. Rate	Frame rate desired.	(Fixed at 5fps)
Invert State	Specifies whether the video is an inverted image or not.	Off
Encrypt State	Will allow the encryption of data sent between the wireless and video hub . (Inactive: Future Development Feature)	Off
Stream	Displays the stream # of the camera. (This information is needed to set up most VMS configurations)	StreamX where X can be 0 to 5

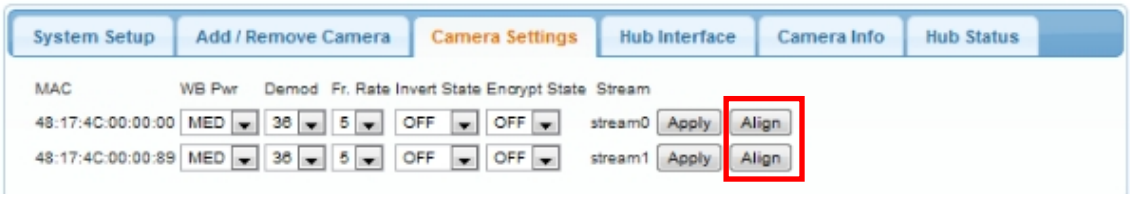
Use the “Apply” button at the end to apply new settings for that specific camera.

Helpful Tip: Make a note of the stream numbers associated with each of your cameras, it is helpful to have when setting up the VMS software.

The “Align” button is used for aligning antennas, and is covered in the next section.

E. Align Mode

The last button, “Align”, is a special function for determining the best antenna alignment and signal quality between the video hub and wireless camera. The web interface allows the user to see the narrowband and wideband wireless performance for each individual camera.



This mode is especially useful while performing the installation, optimizing the camera, video hub, and determining antenna location and adjustment for the best performance for each camera.

By selecting “Align”, the user will be directed into a new menu set that provides gauges, showing radio measurements for the signal power, quality and noise of the 900MHz narrowband (NB Signal) and wideband 2.4GHz (WB Signal) link.

The opening menu will look like the example below.

The meters are defined as you move left to right; top to bottom:

- NB Signal (cam) = (915 MHz) signal strength received by the camera
- NB Signal (hub) = (915 MHz) signal strength received by the video hub
- NB Quality (cam) = (915 MHz) signal quality received by the camera
- NB Quality (hub) (915 MHz) signal quality received by the video hub
- WB Signal = (2.4 GHz) signal strength
- WB Noise = (2.4 GHz) noise level
- WB Quality = (2.4 GHz) signal quality

Note: Most cameras are configured with a single "Dual band" antenna that handles both frequencies that the camera utilizes.

The steps for optimizing the alignment of the camera and video hub are:

1. Click "Start" to begin monitoring the wireless performance for a specific camera
2. Make sure the antenna position maximizes the signal strength (note there is a 4 second delay from an adjustment being made, until the result may be seen on screen)
3. Click "Stop", followed by "back" when finished making adjustments.
4. Wait for the button to change from "resetting" back to "align"

IMPORTANT: BEFORE LEAVING THE ANTENNA ALIGNMENT SCREEN, YOU MUST SELECT STOP. IF STOP IS NOT PERFORMED, THE CAMERA AND VIDEO HUB MAY REMAIN IN "ALIGNMENT MODE" AND NOT OPERATE PROPERLY. (Video may not be sent to the VMS system, and/or hub performance will be greatly reduced)

Signal Strength Expectations

Overall Goal: Adjust the antenna such that the narrowband and wideband signal strength and quality levels are as high as possible.

Narrowband strength acceptable ranges are -15 to -70. -15 is better, higher strength signal than -70 (closer to zero). The values of the NB signal strength received by the camera and video hub are typically expected to be approximately the same value.

Narrowband quality values above 35 should yield an acceptable operation. But this can vary depending on the RF environment.

A Wideband signal strength within the range of -40 to -65 will typically yield very solid performance. Wide Band signal strength should also be as high (closer to zero) as possible. Acceptable ranges vary by environment.

DEMOD Value: A lower Demod value will help permit operation at greater distances, or at weaker signal levels. The trade-off with a lower Demod rate however, is the length of time required to send data packets will be longer, allowing for a greater chance of interference. Depending on the RF environment, this can ultimately result in a lower average frame rate. (dropped frames)

If the Demod value is set to 36 Mbps, then acceptable wideband signal strength values can range from -40 to -65. If the Demod value is set to 24 Mbps, (for a weaker signal strength), then acceptable values are -40 to -70.

IMPORTANT: BEFORE LEAVING THE ANTENNA ALIGNMENT SCREEN, YOU MUST SELECT STOP. IF STOP IS NOT PERFORMED, THE CAMERA AND VIDEO HUB MAY REMAIN IN "ALIGNMENT MODE" AND NOT OPERATE PROPERLY. (Video may not be sent to the VMS system, and/or hub performance will be greatly reduced)

F. Hub Interface

When the video hub is shipped from the factory, the standard default mode hub interface to the VMS system is set to “Native Mode”. The Native mode provides HTTP over TCP as the primary interface to a VMS generic driver. For some VMS systems, it is more appropriate to use the alternate mode called: “emulation mode”. We have guides written to help setup the camera system for most of the major VMS systems. Please refer to the specific VMS setup guide for your particular VMS .

To Set Hub Interface to the OPTIONAL “Emulation Mode”
Note: This may be required for some VMS systems, however unless the setup guide for your VMS specifies otherwise, this setting should remain in “Native Mode”

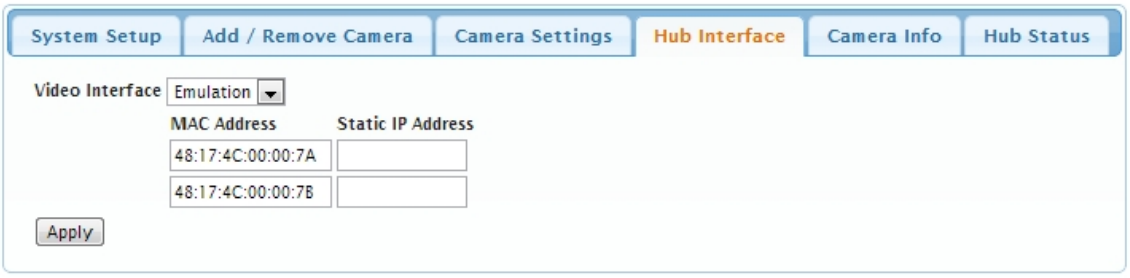
***Note*:** Before adding cameras, the setup requires specifying a collection of IP addresses, one for each camera. Before proceeding, obtain IP addresses from your network administrator that are not assigned to other devices and which conform to the subnet of the network over which the cameras and video hub will be communicating.

1) Point your browser to the IP address you assigned to the video hub and use the updated IP address to log in to the web management interface of the video hub.

2) Select the **Hub Interface** tab in the web management interface. This will display the **Video Interface** options.

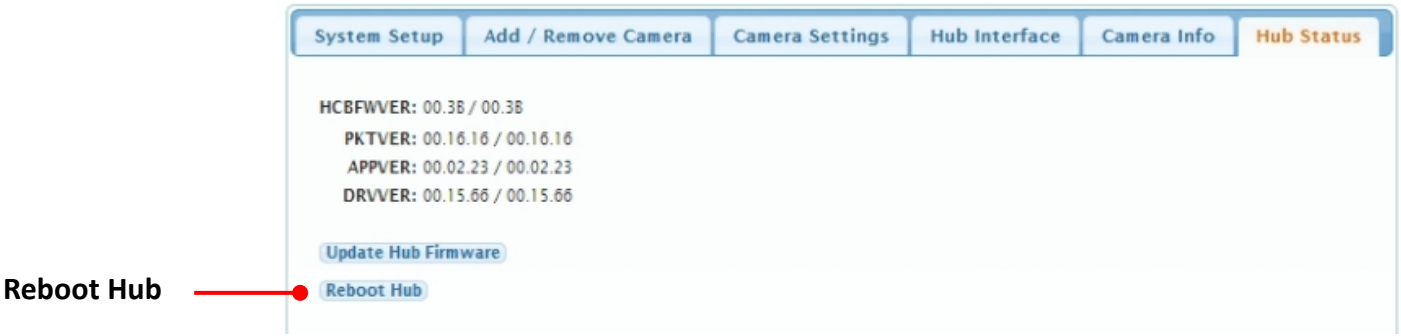
3) **Video Interface** can select either the Native or Emulation mode. Select the **Emulation** Mode via the pull-down menu.

4) Upon selection of the **Emulation** Mode, a table of camera MAC addresses and associated IP Addresses will appear. These are camera MAC addresses that have already been entered using the **Add/Remove** Camera menu. Complete the table by entering static IP address(es) for each camera associated with this specific video hub, as provided by your system administrator. There must be a unique IP address for every camera that is to be added.



5) Once all the IP address(es) have been entered, select **Apply**.

6) Reboot the hub by moving to the **Hub Status** Tab, and selecting the **Reboot Hub** button.

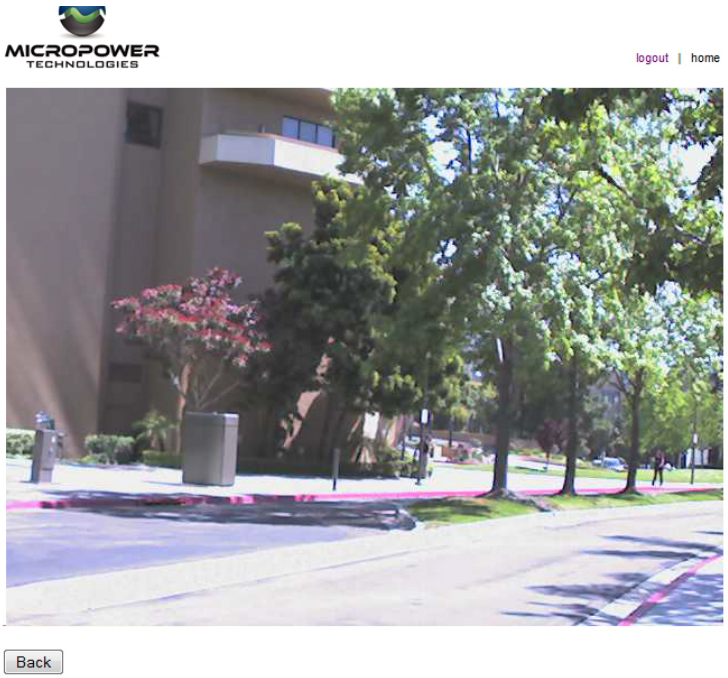


G. Live View

The tab, “Camera Info”, is used as a diagnostic tab for MicroPower technical support and for observing live video to test the connection. In particular, Live View can help determine whether a valid video stream is present, and be used to set the focus and zoom of the camera, even if a VMS is not yet configured. Below is the opening menu for Camera Info.

Selecting the camera of interest will diplay two additional tabs; Camera MAC Address and Live View. The tab, Live View, will initiate a video connection between the video hub and the Camera. Select “Connect”. Yyou may need to approve a small Java app to run, depending on your web browser configuration.

This should display a live video screen of the camera. This display can be used to focus the camera when the camera is mounted in its final position.



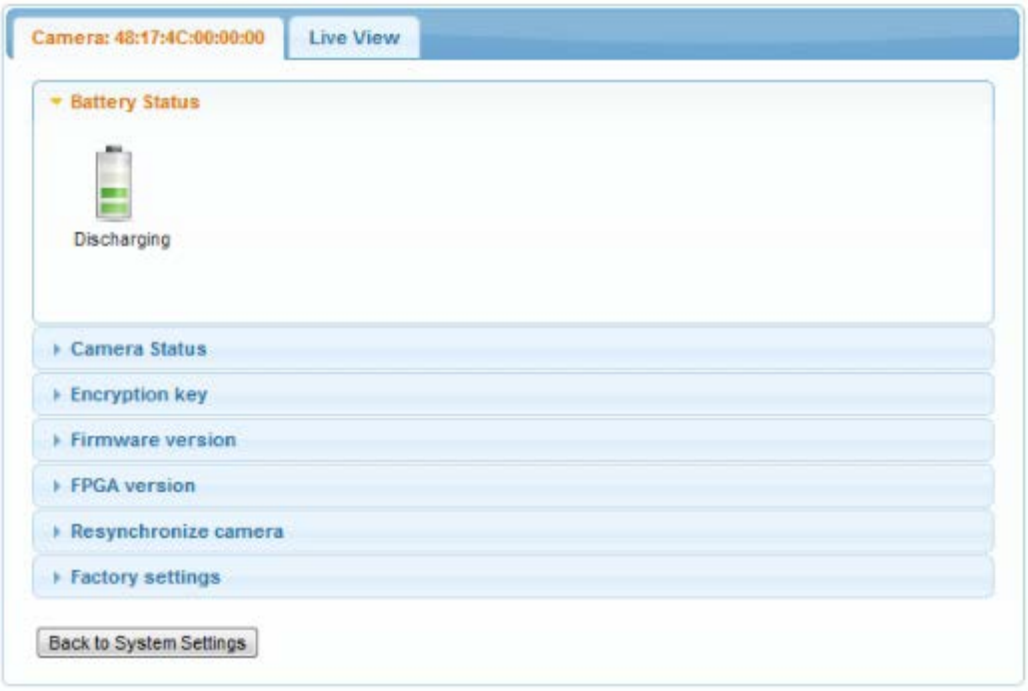
H. Battery Status

Additional Status codes are available in the tab where the camera MAC address is displayed. The two primary status codes are:

- Battery Status
- Camera Status

Battery Status provides an indication whether the solar charging system is charging or discharging. Below is an example screen of when the solar subsystem is discharging.

Note: You may need to disable browser caching, and/or refresh the screen several times for the “Charging / Discharging” graphic to refresh.



Camera Status provides an indication whether the camera state is **associated**, **lost** or **asleep**. When the camera is "asleep", this indicates the voltage on the battery is too low to maintain full time operation. (once the camera has charged enough, full time operation will resume) If the camera indicates "Lost" the hub is unable to communicate with the camera, and it not aware of camera's current status. "Associated" is the standard normal operational status.

III. Mounting the video hub's External Antenna

For professional, reliable installations, the video hub should use the external antenna supplied with the unit. The MicroPower external antenna kit comes complete with a low loss RF cable, 2:1 splitter and a directional antenna. For optimal results, the height of the external antenna should be mounted above any pedestrians, vehicle traffic, trees, or obstacles that may block line-of-sight between the video hub and wireless camera(s).

The directional antenna supplied by MicroPower can transmit and receive in both the 900 MHz and 2.4 GHz frequencies. However, the 900 MHz and 2.4 GHz channels from the video hub must be combined before being connected to the directional antenna. In order to connect the channels together, a 2:1 splitter (included) must be used.

The 2:1 splitter must be connected as shown below. The output of the 2:1 splitter is connected to the low loss RF cable.

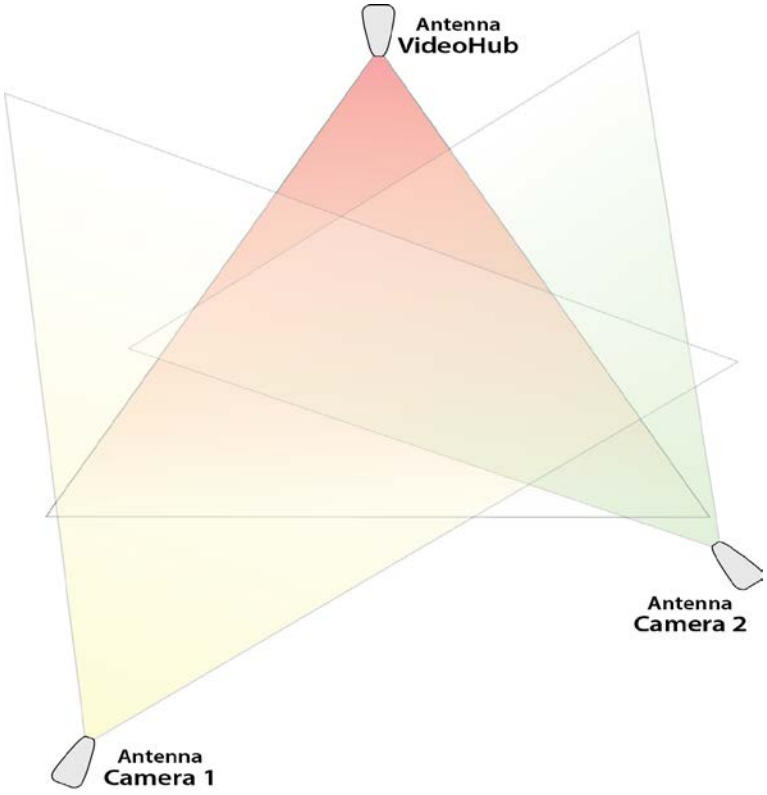
This will generally simplify the installation, by not requiring that the installer mount and configure two separate antenna solutions, and not requiring that two independent antenna cables be used.

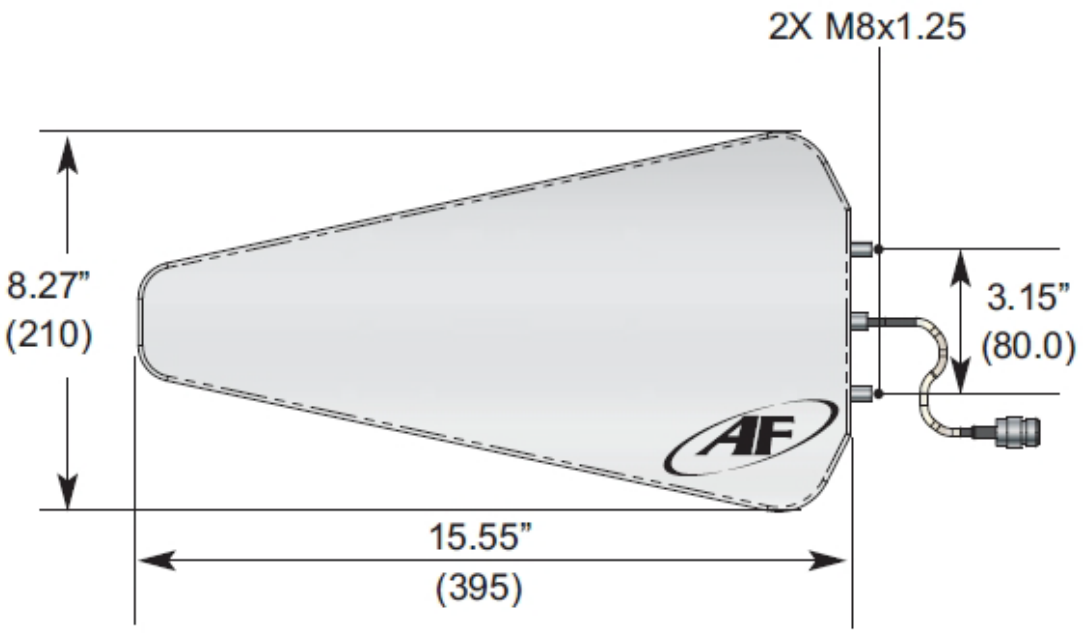
Directional Antenna Specifications

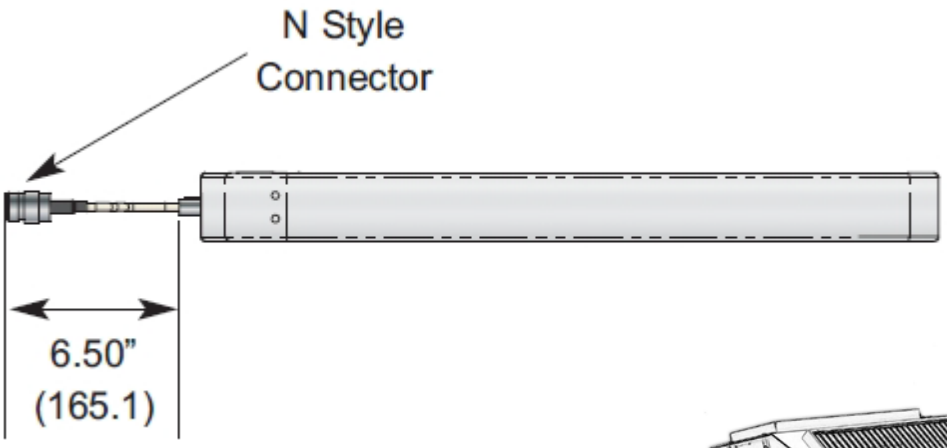
The directional antenna can be mounted vertically, or in a horizontal (flat) position. We find better performance by mounting all the antennas flat, where they are less likely to be moved by the wind. However the antennas are mounted, it is very important that all the antennas be oriented IN THE SAME ORIENTATION. (Either all horizontal, or all vertical) Each antenna should be connected directly to the camera / hub, one antenna per device.

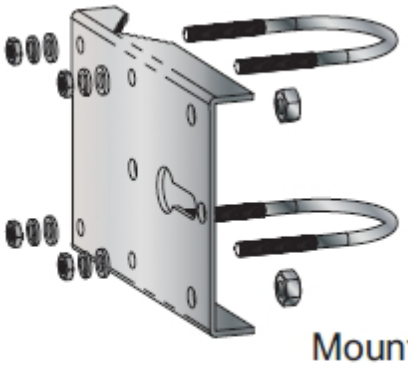
The directional antennas when placed horizontally have an approximate 70 degree field of view, and when placed vertically have a 50 degree field of view. The camera antennas should be positioned pointing toward the hub within the "cone" of the hub's antenna, for the system to properly communicate. (Note that the camera's antennas should point only to the hub antenna, not to each other).

The directional antennas are mounted to the curved pole bracket via the included mounting hardware. The curved bracket will then need to be mounted to the desired location, using hardware supplied by the installer. Most typically this would be done via stainless steel hose clamps, "U" bolts, or some other clamping mechanism.

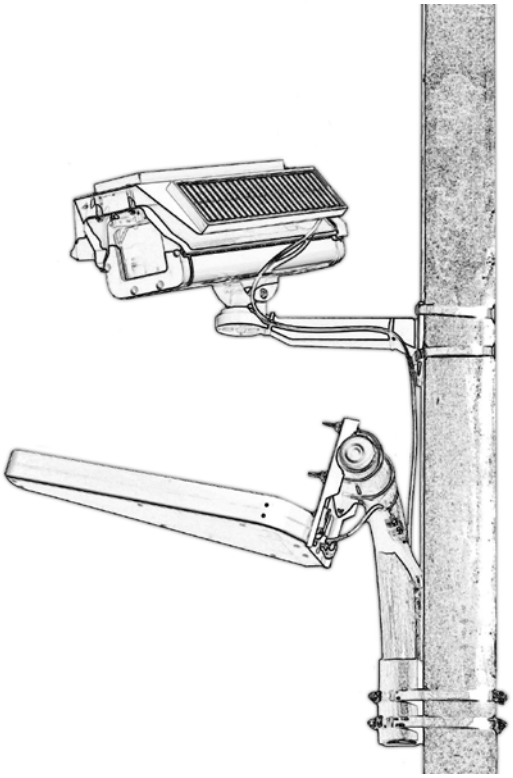




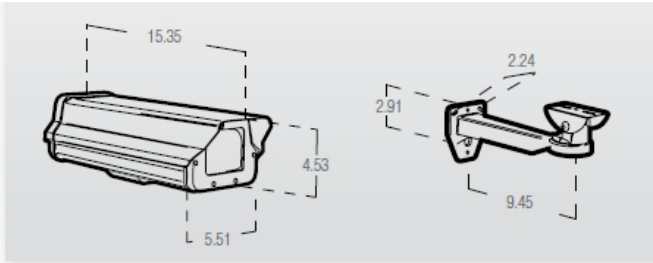




Mounting Hardware
(Included)



IV. Mounting the Camera



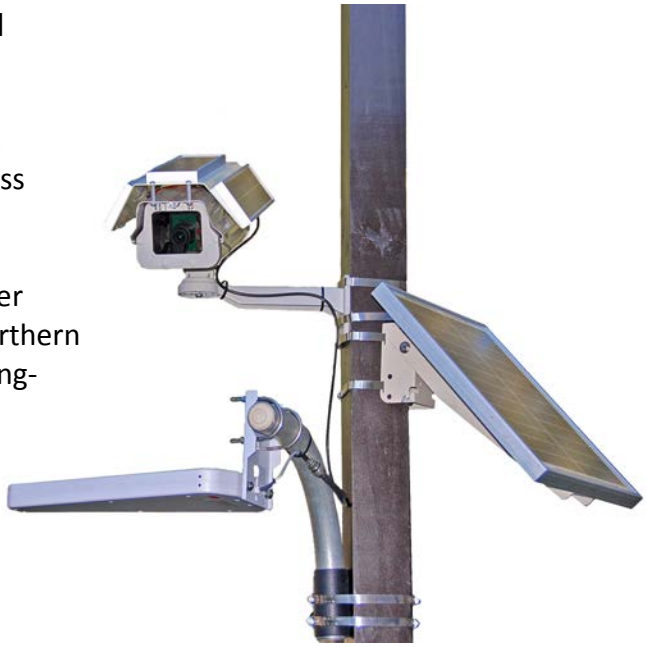
When mounting the camera, it should be placed in an area which receives an adequate amount of direct sunlight throughout the day. Ideally the camera should be placed on the south side of the mounting location, and pointed in the desired direction. Next best choices are mounting to the east or west sides, with a North facing mount orientation considered last. This practice will maximize the benefit of the built-in solar panels. The included auxiliary external solar panel will provide most of the charge, with the built-in panels assisting. **It is critical that the external solar panel be mounted correctly, facing the right direction for the camera to run successfully, long-term**.
(Instructions for mounting the panel are covered in the next section)

For easiest mounting of the camera, we suggest the following steps.

1. Remove the rotating/pivoting camera hinge from the bracket, by removing the single center Phillips screw that holds it in place.
2. Attach the rotating/pivoting bracket to the camera housing, and position it such that the camera is weight balanced and the bracket is tightened.
3. Mount the arm bracket to the desired location. Self-tapping screws, or stainless steel “worm drive hose clamps” work very well for this purpose.
4. Place the camera housing on the secured bracket. If the camera is balanced, and the bracket tightened, it will take very little effort to hold it in place while attaching the center screw that holds the camera in place.
5. Aim the camera and tighten the screw, securing the rotating/pivoting bracket to the camera arm bracket.
6. Make final adjustments to the angle and rotation position of the camera, zoom and focus if required.

After securely tightening the screws, the locking ridges in the mounting bracket will hold the camera securely in position after it is installed.

V. Mounting the Auxiliary Solar Panel

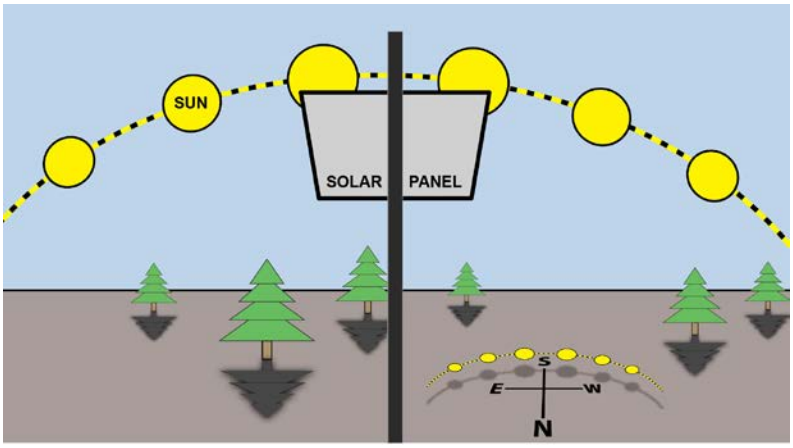


The auxiliary solar panel is included with the camera, and is designed to augment the built-in solar charging system of the MicroPower wireless cameras. It offers greater flexibility with the placement of the camera, and enables reliable operation in install locations that may have lower light levels such as: North facing cameras, or northern climates where snow and ice may impact the long-term operation of solar powered devices. The solar panel connects to the camera very easily, and may be secured to a variety of different surfaces by a very simple, yet extremely versatile mounting bracket.

Where to Mount the Auxiliary Solar Panel:

For mounting locations in the Northern Hemisphere (United States, Mexico, Canada, etc.) **The Solar panel should be mounted with the glass facing SOUTH**, and angled such that it will capture the most winter sun possible during the daylight hours. The farther North the panel is located, the lower in the horizon the panel should be angled.

Climates where snow and ice are a factor will also need to angle the panel more sharply, such that snow will not tend to accumulate on the panel glass.



It is very important that care is taken to ensure that objects such as trees, utility poles, buildings, wires, etc. do not create any shadows on any of the solar panels in the system. Additionally, the solar panel should be mounted such that shadows created by the panel do not cover the camera's built-in solar panels, but most importantly, shadows created by the camera (or other objects) do not impact the larger auxiliary solar panel.

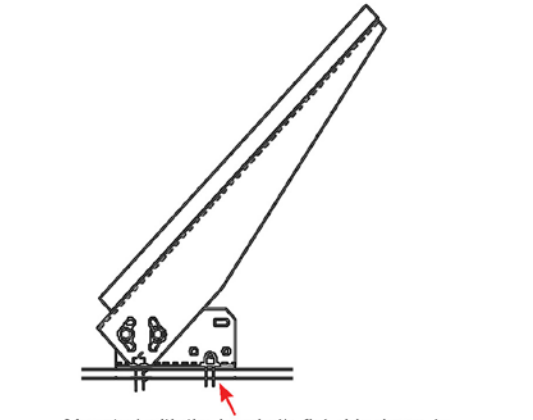
Note: The battery ships from the factory at about 40% capacity. For storage and shipment, the battery remains unplugged from the camera, and will need to be connected to power on the camera. When the camera is stored out of sunlight, the battery should be disconnected.

How to Mount the Auxiliary Solar Panel:

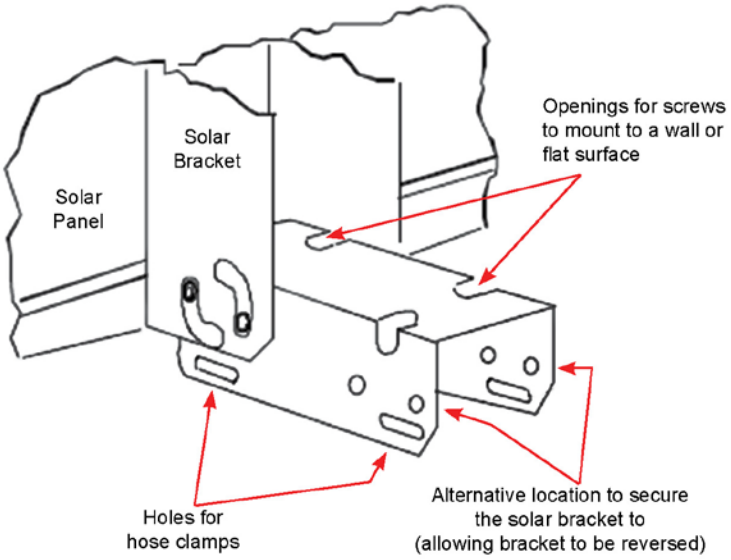
The solar panel mounting bracket is extremely versatile, and is designed to be used with stainless steel hose clamps, “U” bolts, or screws to firmly secure the panel to the desired mounting surface.

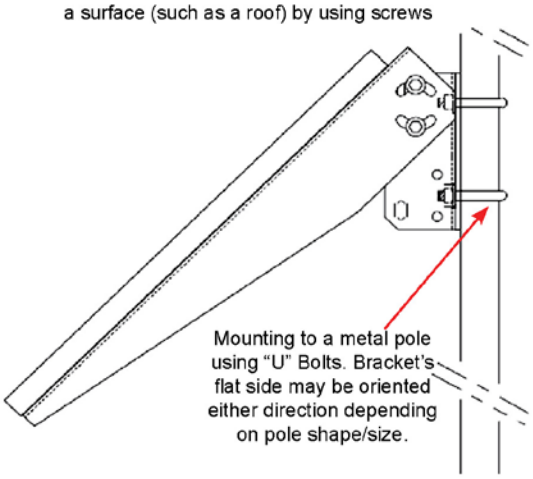
Always be sure that the panel is firmly secured against weather events such as high winds, ice, snow, etc. Depending on your particular configuration, the installer will need to purchase the appropriate hardware to attach the bracket to the desired mounting surface.

The images below illustrate the various mounting configurations that are possible with this bracket.

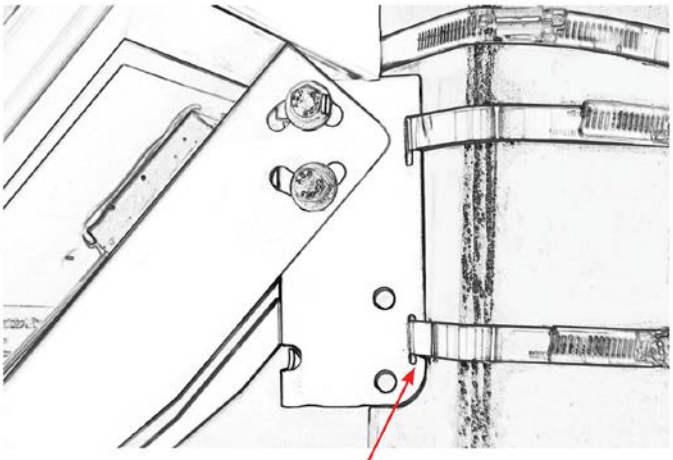


Mounted with the bracket’s flat side down, to a surface (such as a roof) by using screws

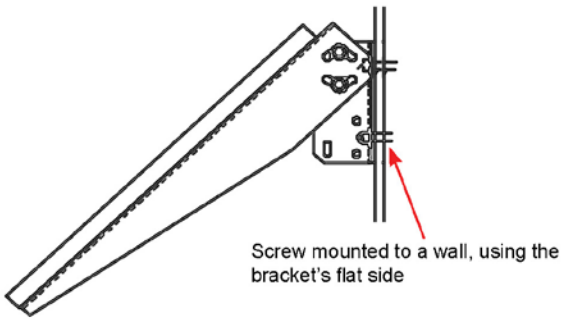




Mounting to a metal pole using “U” Bolts. Bracket’s flat side may be oriented either direction depending on pole shape/size.



Mounting to a pole using stainless steel hose clamps, and the bracket’s flat side facing away.



Screw mounted to a wall, using the bracket’s flat side

VI. Adjusting the Camera Image

Camera Lens Close-up View

1. While viewing the camera image through the Video Management System (VMS) camera image window, adjustments can be made to the camera's zoom, iris or focus.

2. Open the camera housing using the safety latch at the rear of the unit. The camera imager is located just behind the glass housing window.

   2.1 To adjust focal length (zoom), loosen the focal length locking knob counter-clockwise. Rotate the focal length adjustment ring at the rear of the lens (the ring, not the knob) to adjust.

   2.2 To adjust iris, turn the iris lock knob counter-clockwise to release. Slide the iris locking knob to the right or left to set. (The "O" open setting is best for achieving good low light camera performance.)

   2.3 To focus, turn the focus lock knob counter-clockwise to unlock. Rotate the focus adjustment ring at the front of the lens to adjust.

   Typically both focus and zoom will need to be adjusted at the same time to achieve the desired field of view. Lock knobs need only be lightly tightened to hold the lens settings in place.

   2.4 After the imager adjustments have been completed, close the camera housing and lock the latch into place.

After this step, setup is complete and the wireless camera is ready for use.

VII. Configure the Video Management Software (VMS)

MicroPower Technologies has tested the video hub and Solar wireless cameras with most of the various major VMS systems, and has developed communication interfaces to almost all of them using either a RTSP over UDP (unicast), HTTP over TCP/IP interface or the Axis emulation interface. Please refer to our website for the latest list of tested VMS and NVRs that have been tested for interoperability, and to download setup guides written specifically for your VMS system.

Please refer to the website http://www.micropower.com to locate VMS Setup Guides written specifically for each supported VMS.

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This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

RF Exposure Statement
To maintain compliance with the FCC's RF exposure guidelines, this equipment should be installed and operated with a minimum distance of 20cm between the radiator and a human body. Use only the supplied antenna.

This equipment has been tested and found to comply with the limits for Class B Digital Device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

Any changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

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