

Solveil System Installation Guide

A step-by-step installation guide for the MicroPower Solveil™
Solar Powered, Wireless Surveillance System

SLV-C30S-1040-IR, SLV-C30S-1040, SLV-C306-1011-IR, SLV-C30S-1011 and SLV-H20HA

Version: 1.0



MICROPOWER
CHANGING YOUR PERSPECTIVE

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How To Use This Guide

This guide is setup in the same sequential order as a camera installation would occur. This will cover in detail all aspects of the installation and configuration of a MicroPower camera system. We highly recommend watching our series of on-line training videos. These videos will provide a strong foundation and understanding of how the system works, and ultimately making this information easier to understand.

Product Training

Experienced MicroPower installers can install cameras and equipment quickly and efficiently, however due to the highly efficient nature of the camera system, the MicroPower equipment setup differs from conventional IP surveillance devices. To quickly help System Integrator / Installers familiarize themselves with the MicroPower product line best practices and troubleshooting, MicroPower offers a variety of training options. The quickest and easiest are the short series of training videos that may be viewed on-line through the website “Partner Portal”. For more information on the training resources available, please call the customer support line or visit our website.

Contacting MicroPower Customer Support

MicroPower’s customer support strategy is through a network of best-in-class business partners including OEMs, systems integrators and systems resellers. 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
Toll Free Phone Support Worldwide:	+1-877-536-0128 +1-858-914-5198 Press option 2 for Customer Support
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 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.
- Protect your warranty. A product that has been damaged through misuse, abuse or misapplication may be determined to be out of warranty.

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Package Contents

Solveil Hub

(SLV-H20HA)

- Solveil Hub, Including power supply, mounting hardware, antenna cable, connection adapters and 15' long antenna cable (longer cables may be purchased from MicroPower)
- One Directional Antenna (2.4GHz), Including bracket with washers, etc.

Solveil Solar Powered Camera

SLV-C30S-1040-IR, SLV-C30S-1040, SLV-C306-1011-IR, SLV-C30S-1011

- Solar Wireless Video Camera/ IP66 Enclosure
(Includes (2) Phillips screws for attaching the bracket to the camera housing)
- Camera Mounting Arm
(Including attachment and bracket screw utilized to adjust the camera position and angle)
- One Directional Antenna (2.4GHz)
(Includes bracket with washers and screws and antenna cable)
- One External Solar Panel (Includes bracket and mounting screws) Solar panel size will vary depending on the geographic region the camera is installed.
- Antenna Bracket Assembly
- Installer should supply additional screws or stainless steel worm drive bands "hose clamps" in appropriate size(s) for mounting the various camera system components to a pole.

Installer Provided Parts and Infrastructure

The installer will need to provide the parts required to physically mount the solar panel, camera, and antenna assembly to the desired mounting surface. This may include screws, stainless steel hose clamps / straps, masts, wire ties, etc. As needed for a given installation situation.

The installer will also need to have a means to access the desired mounting location, as well as the tools as needed to complete the installation job. Such as a 10mm & 8mm socket, battery powered drill, screw driver, zip ties, 2 sets of pliers, ladder / powered lift, etc.

The hub will require reliable 110V AC power, a climate controlled (or semi-climate controlled) dry environment to mount or place the receiver, and a means for the antenna cable to access the outside of the structure such that clear line of sight can be established between the hub antenna(s) and the camera antenna(s). The hub will also require an IP network connection (Ethernet) in order for the video streams to be accessible. The hub may also be powered by a 12VDC source, or via a PoE (803.3at) splitter capable of supplying at least 15W of power.

Default Hub IP Address: 192.168.0.100

Default Hub Login: kevin

Default Hub Pass: kevin

MicroPower System Overview

How It Works

MicroPower Technologies has developed an extreme, low power, camera and radio architecture that has been designed from the ground up to be solar powered. When combined with the MicroPower Trust Linx™ wireless protocol, reliable long-range digital CCTV video can be transmitted while consuming less than 10% of the electrical power that most conventional wireless IP cameras consume. Utilizing this patented technology, the MicroPower wireless video cameras can remain transmitting and fully operational for up to five days in complete darkness, relying on only the internal rechargeable batteries. Overcoming most weather conditions without any performance loss or need for maintenance. Additionally, the TrustLinx radio technology reliably coexists with other wireless technologies such as traditional Wi-Fi (802.11b/g/a/n), while reliably transmitting high-quality digital video to distances up to 1/2 mile with the standard antennas.

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

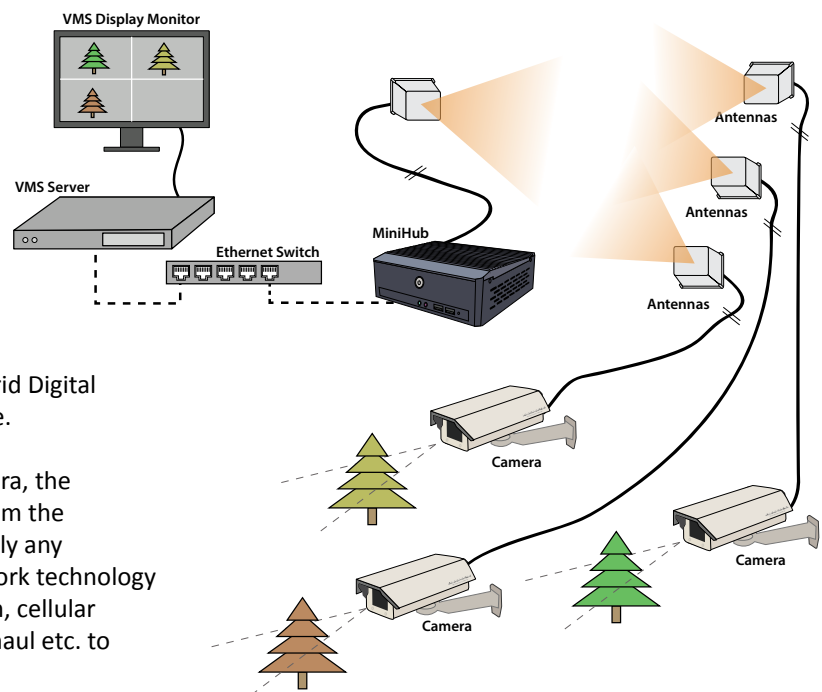
A maximum of (4) wireless cameras may be simultaneously linked to a single hub (Cameras must be within range, and have good Line of Sight between the antennas). A total of 30fps are available to be shared between all the cameras connected to a given hub.

The Solveil Hub acts as the only data connection point to which a Video Management System (VMS), Network Video Recorder (NVR) or Hybrid Digital Video Recorder (DVR) can communicate.

Just like any conventional IP CCTV camera, the standard Ethernet TCP/IP video data from the hub may be transmitted through virtually any conventional broadband or wired network technology such as LAN, DSL modem, cable modem, cellular modem, mesh network, wireless back-haul etc. to reach your chosen VMS solution.

The standard h.264 video streams generated by the hub are available to the VMS via RTSP.

The MicroPower Solveil System operates on 2.4GHz, but is not using conventional WiFi communications (though it does use the same frequencies, and channel number designations). The camera system uses two bands within a selected 2.4GHz channel. First is the "Payload Band" also referred to as "Wide Band". It will occupy channels 2, 6, or 11 on the 2.4GHz spectrum. The wide band communication is used to deliver the video payload one-way, from the camera to the hub. Next, the hub specifies a "Narrow Band" or "Command Band", which is a small subdivision of the channel used for the wide band communications. This is where the command level communications occur between the hub and the camera(s). These terms "Wide Band" and "Narrow Band" are used throughout this document.



Hub Connection Method

RTSP Streaming

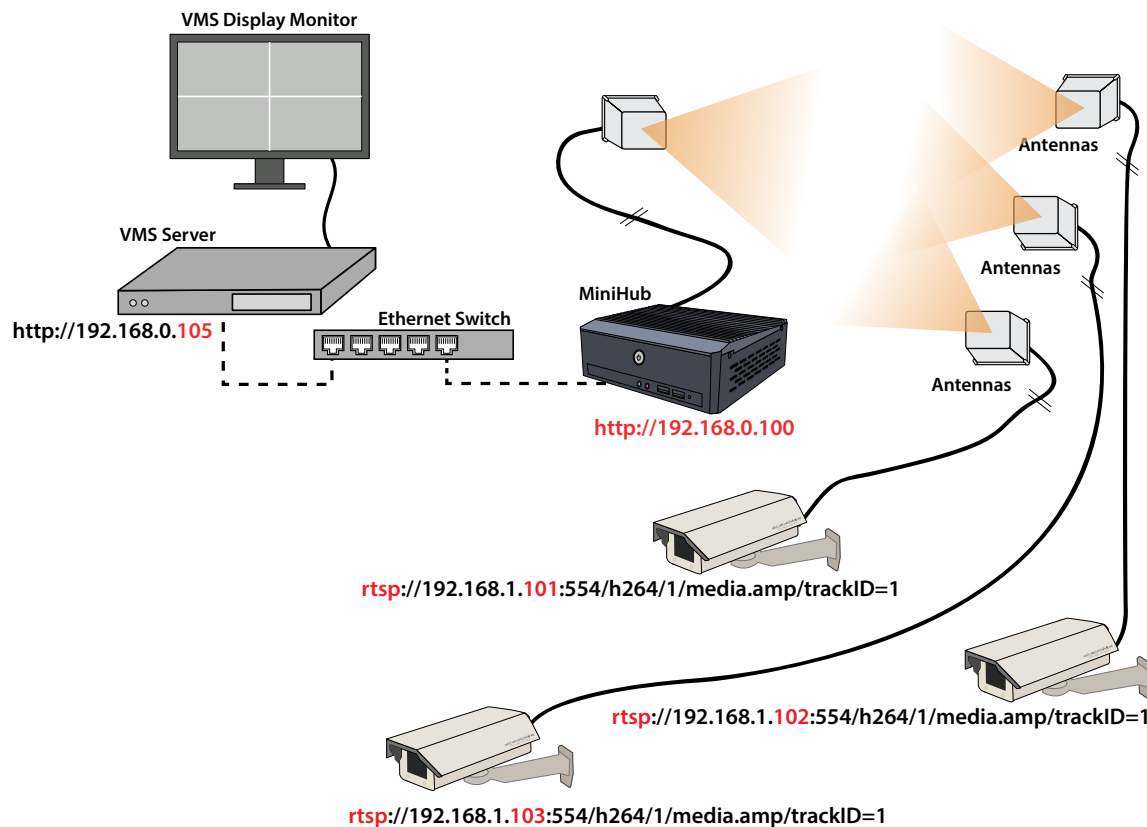
The hub communicates to your VMS using h.264 RTSP streaming. In order to operate correctly, an IP address will be needed for the hub, plus, an additional IP address will be utilized to represent each camera on the hub.

To access the individual video streams, one will use the unique IP of the camera, while the trailing URL remains consistent. (See illustration on right)

In the event of a camera outage, the IP address representing that camera can be disabled after a user defined period of time. This allows a VMS system to detect the camera loss (IP is no longer accessible, and can no longer be pinged) and send the appropriate alerts or scripted actions.

Note that the individual cameras are never actually a part of a given computer network. The IP addresses are operated and maintained 100% inside the hub, and only represent the camera video streams.

NOTE: When setting up a camera, you should enter the IP address of each Solveil camera at that time. Do not leave the field blank or use the same IP address that is assigned to the hub.



Getting Started - First Steps

Site Survey

A well thought out plan for the location of the hub, hub antenna(s) and camera(s) is a crucial step to ensuring that the entire system will provide reliable long-term service, and integrate effectively with a new or preexisting video management system.

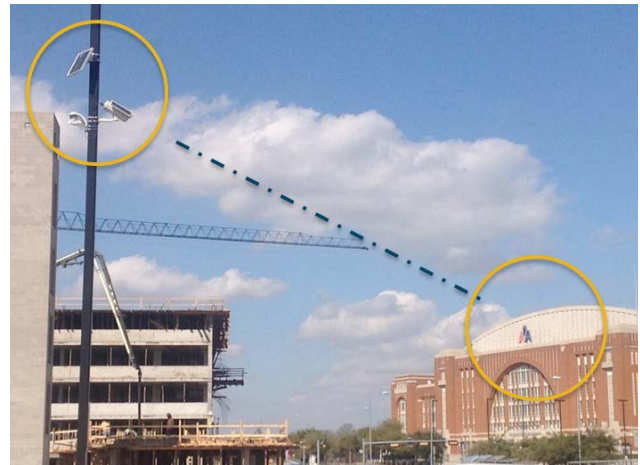
RF Considerations

Radio Frequency Line of Sight (RFLoS) differs from visual line of sight. When dealing with RF, if you imagine a laser beam between the two antennas, this needs to be unobstructed, plus an additional space around the beam. In most situations, the additional clearance needed is “football” shaped, and (at 1/2 mile) will ideally be at least 13 feet in diameter around at the center point between the antennas. (100yds needs about 4.5’ min. clearance) This accommodates the system’s Fresnel Zone requirements.

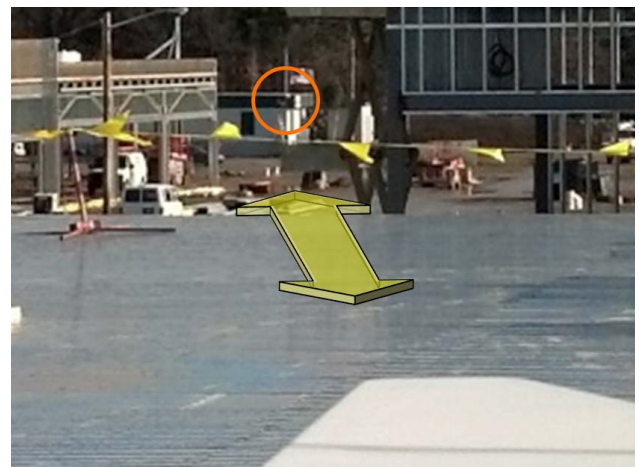
With unobstructed line-of-sight between the hub and camera antennas, the standard Solveil system will reliably transmit video up to 1/2 mile. Obstacles such as trees, buildings, fences, and other objects will greatly impact wireless performance in terms of maximum transmission distance, data rate speeds, and reliability. While a wall or tree may not cause any significant performance impact at very short ranges (under 20yds), it will likely completely block a signal at longer distances. Additionally, for reliable extremely short-range performance, the minimum distance between the hub antenna and the Camera antenna should be 25 feet with the RF output level set to the lowest setting unless signal attenuators are installed.

It is also a good idea whenever possible to have an idea of the ambient RF traffic with regard to the installation location. Whenever possible, congested channels should be avoided in favor of less utilized frequencies. Use of RF scanning tools, such as the MetaGeek “WiSpy” device, are strongly encouraged.

If obstructions are present, the distance between the antennas is too great, or area ambient RF conditions too crowded, then the video streams may fail to establish a link, experience dropouts and/or operate at a reduced frame rate.



Example of good, open RF line of sight.



Example of very challenging / poor RF line of site conditions. Note the metal surface low, and the buildings on the left and right side that can attenuate the RF signal.

Solar Considerations

Since the wireless camera is powered by solar energy, the critical impact of **DIRECT** sun direction and shadows on the solar panel cannot be overstated.

In the Northern hemisphere, when selecting a location for the wireless camera, **the solar panel must be mounted on the SOUTH side of a pole or structure, and be facing SOUTH.**

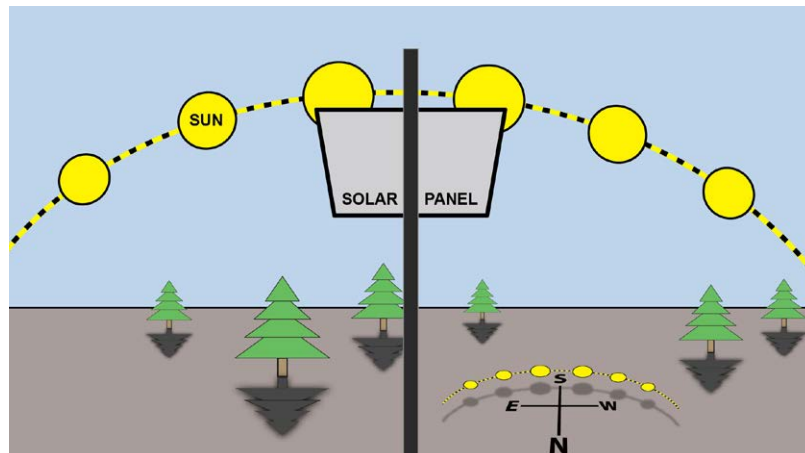
In the Southern Hemisphere (below the equator), the directional considerations will be reversed.

The solar panels should also be installed at an optimum angle to capture the maximum amount of solar energy possible. In general, the Southern US should angle the panel about 35-45 degrees from the pole, Mid US about 25 - 35 degrees from the pole, and with the Northern US / Canada, 10 - 20 degrees from the pole (solar glass almost entirely facing the horizon)

Areas with insufficient direct sunlight will eventually result in camera outages, though it may take from 5 days to several weeks to occur. Examples of such areas might be:

- Multiple solar panels on a pole, spaced too close together, or with other equipment on the pole creating shadows on the solar panel glass
- Panels mounted underneath a tree canopy or foliage which does not receive adequate sunlight
- Installations next to a tall building that cast a shadow over the camera during the day. (Particularly during the most important mid-day charging period)
- Solar panel mounted under a roof or roof edge that does not allow enough direct sunlight

Keep in mind that the cameras include a battery backup system capable of operating the camera 24 hours a day, for over five days in complete darkness. If the system is receiving some light, but at levels that are below the “break even” point, the operation time may be potentially extended for weeks before a camera is finally no longer capable of remaining 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 over a long period of time.



As this is a solar powered camera, 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 negatively impacted by shadows (even very small ones) on the panel, these shadows may also come from other equipment mounted on a pole, such as wiring, other solar panels, or mounting hardware. Some of the most common difficulties that occur in the field can usually be attributed directly to solar panel shadowing.

Note: As an installer, the best way to identify the charging rate, battery levels, and signal performance, is to use our the hub's built-in HTML interface to determine if the system is performing well or not in a given installation.

What You Will Need

Equipment

Computer / Software

- Computer: Windows™ 7 or Windows 8 tablet, or small laptop is helpful for focusing.
- A web browser (Firefox, or Chrome work best)
- Optional: Laptop with wireless internet access (local WiFi or Cellular WiFi) that can be left temporarily connected to the hub for live performance monitoring via a internet enabled smart phone.

Hand Tools

- Battery Powered Screwdriver or Impact Driver
- 1/4" and 10mm socket wrench (easiest if attached to battery powered driver)
- Zip Ties
- Pliers
- Magnetic compass and Protractor (a smart phone with a compass and angle detection will also work)

Means To Access Camera Location and Hub Location

- Ladder / Bucket Truck / Manlift "cherry picker"
- Safety Harness, etc.
- Roof Access to get the hub antenna outside and elevated to achieve LOS (Line of Sight) to the cameras

Method to Mount the Camera and Hub to Desired Location

MicroPower supplies a camera bracket, a solar panel bracket, and an antenna bracket that can be mounted to a pole. Given the variety of mounting possibilities and locations, the hardware to attach these brackets to the desired surfaces are not included. This means the installer will need to supply:

- Screws (optional to attach hub to wall, and/or camera, antenna and solar panel bracket to pole / surface)
- Stainless Steel hose clamps (to attach solar panel and camera to pole)
- Antenna mast or surface to mount/attach the hub antenna to.

Network Access

The hub is an IP device and will require both power and LAN/Network access in order for the video to stream to an NVR and/or remote location. Generally this is done via a house LAN, but may also be some other method of network access such as a back haul radio, cellular device, or other IP Ethernet network technology.

VMS (Video Management System)

The hub generally communicates on the LAN to a local NVR (Network Video Recorder) for recording and archiving of video. The NVR will then typically communicate via the Internet or LAN/WAN for remote viewing and monitoring. However the actual network configuration tends to vary greatly from site to site.

The VMS used, needs to be capable of recording a basic RTSP h.264 video streams from the hub in order to be compatible.

A complete list of compatible VMS platforms with integration instructions are available on the MicroPower website.

Hub Installation

At the center of the MicroPower camera system is the Helios Hub. This is the “brain” of the system that communicates with the video cameras, and produces the video data streams that the VMS system will record and display.

Hub Assembly and Installation

Remove the hub and mounting bracket from the box and locate a suitable place to install. This will typically be in a network closet, however any location that is semi-climate controlled with access to Ethernet networking, power, and where the antenna cable can be routed outside, will be suitable. Customers have mounted hubs inside drop tile ceilings, HVAC closets, Air vents, and many other locations depending on the situation.

It is also possible to power the hub via high power PoE (802.3at) however doing so requires the use of an 802.3at PoE splitter kit with a and custom power cable (sold separately).

The mounting bracket will attach to the back of the hub, while the other part will attach to the wall. The hub portion then ‘hangs’ on the wall bracket, and is secured via the locking screws. (Installer provides the hardware to attach to the wall). Note that the hub may also simply be placed on a shelf or flat surface, mounting is not required.

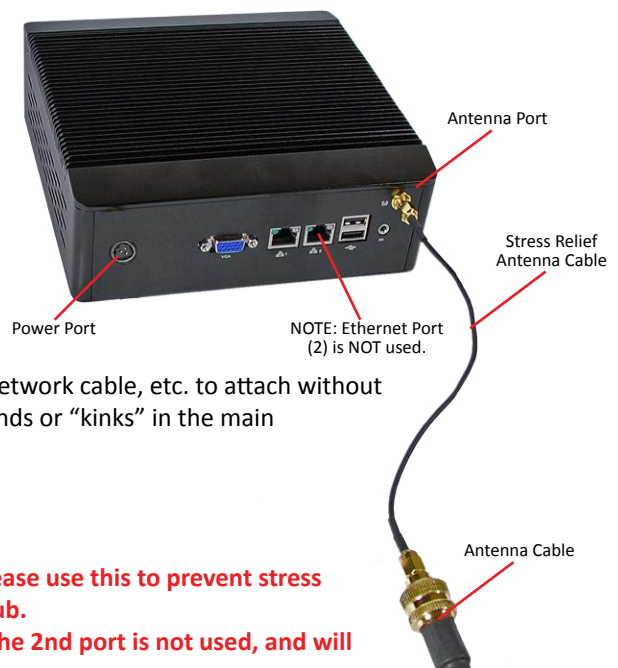
Note: Do not stand on sides or cover the ventilation ports in any way.

The hub location should have clearance for the cabling, power brick, network cable, etc. to attach without making sharp bends. It is particularly important not to make sharp bends or “kinks” in the main antenna cable(s) or it can result in significant RF signal difficulties.

Important:

- **The antenna will connect via a small black strain relief cable. Please use this to prevent stress damage to the antenna cable or the SMA antenna port on the hub.**
- **The Ethernet network port closest to the power plug is active. The 2nd port is not used, and will not function if connected. (This port is usually covered)**
- **Do not stand the hub on the narrow side, or block the ventilation ports in any way.**

Once the hub is mounted the antenna cable is routed to an exterior location on the building, where the antenna may be mounted to achieve line of sight to the camera antennas. To avoid damaging the fragile connection cables between the hub and diplexer, we will normally attach the antenna cable last, after the hub installation process has been completed.



Hub Antenna Assembly and Installation

The antenna assembles into its mounting bracket and may then mount the antenna assembly via straps to a pole, or via screws to a flat surface.

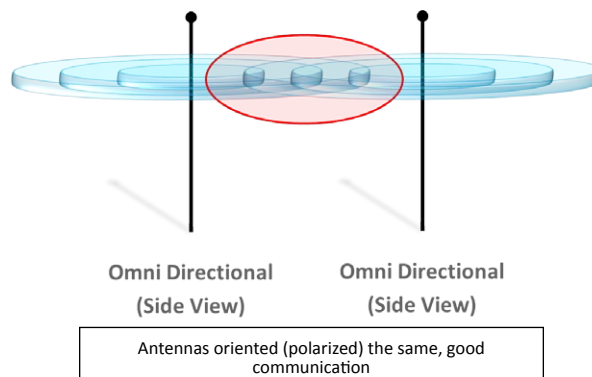
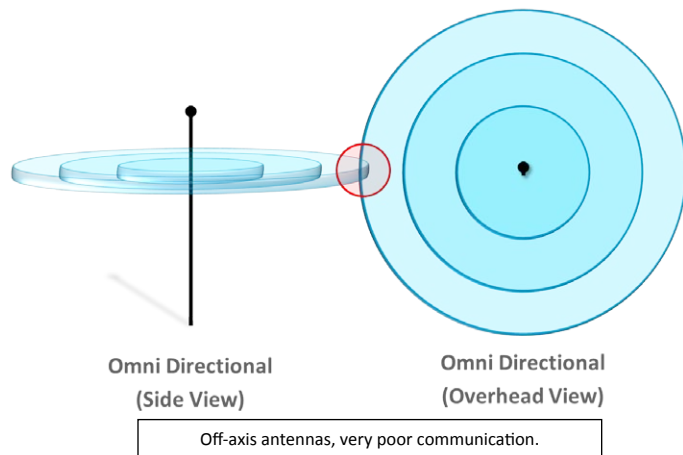
Take care to avoid mounting the antenna directly to a large flat metallic surface (such as corrugated tin walls) as the RF reflections from such surfaces can sometimes be problematic.

The installer will generally need to provide a mast, or appropriate surface to mount the hub antenna. The installer also needs to provide the means of attaching the antenna to the desired mounting surface (screws, stainless steel hose clamps, etc.).

The hub antenna has a field of view of approximately 90° and should be such that all of the remote cameras are within the field of view. If one camera is particularly farther away than the others, sometimes it is helpful to drift the antenna a bit toward the farther target vs. precisely centering between all the cameras.

Regardless of how the antenna is mounted, the following must be observed:

- **Antennas should always be mounted with the drain holes facing down and the front of the antenna facing your target. If the drain holes are facing up, upon the first rainfall the antenna will fill with water and be damaged.**
- **All the antennas that are communicating with each other must be mounted in the same orientation (both hub and cameras). If the antennas are not mounted identically, they will be polarized off-axis, and thus be prevented from effectively communicating with each other.**

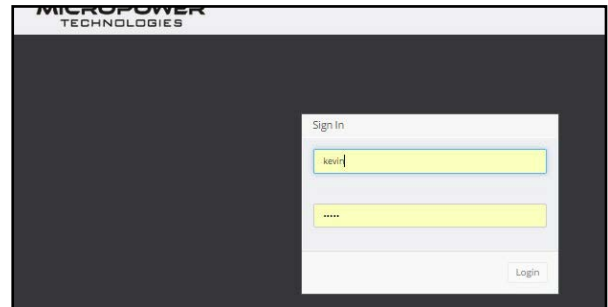


Hub System Setup

Accessing The Hub

Default IP Address

The hub has a default IP address of: **192.168.0.100**. To initially communicate with the hub, connect an Ethernet cable directly from the hub to a laptop or desktop PC. A crossover cable may be required, however most modern computers have auto-sensing Ethernet ports that make this unnecessary. The hub may also be plugged directly into an Ethernet switch that your computer is also connected to. Note that if your network is using 192.168.0.X IP addressing, there may be a device on your network already using the hub's default IP, so the hub may need to be configured off the network first, prior to being connected. As usual with IP based devices, you will need to set your computer to a similar IP address as the hub (such as 192.168.0.99, or 192.168.0.115), before you will be able to initially communicate with it. While the hub can be used in DHCP mode, we strongly suggest manually configuring a static IP address.



Configuring the Hub

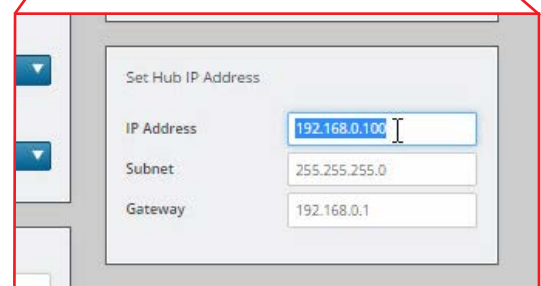
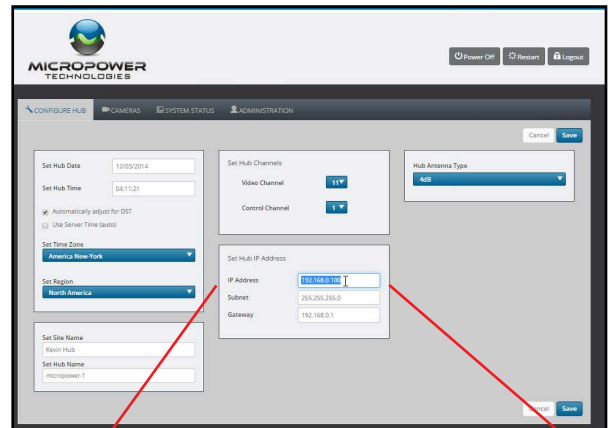
Changing The Hub IP Address

Once the antennas are connected, and the network cable is in place, connect the power cord and if the power light does not illuminate immediately, push the large silver power button on the front face of the hub to turn it on. It will generally require somewhere between 40 seconds to 1 minute before it will be accessible on the network.

Use a web browser (we recommend "Firefox" or "Chrome") to initially log into the hub on the default IP of <http://192.168.0.100>. If the IP settings on your computer are correct, and the hub is powered on and running, you should see the hub's login screen come up almost immediately.

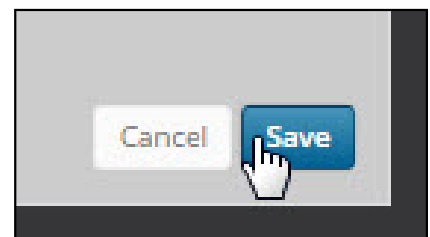
The login is "kevin" and the password is "kevin"...

On the first screen you will see the current IP address displayed. Click on the IP address, subnet, and gateway boxes, and change them to the desired values. When the IP information has been correctly entered and double checked, click the "save" button, and click through any prompts that follow.



If the receiver X needs to reboot, follow the prompts to allow it to do so. After approximately (1) minute, the hub should then be accessible on the newly assigned IP address.

System Configuration



Changing RF Channels

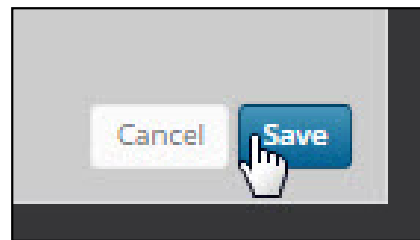
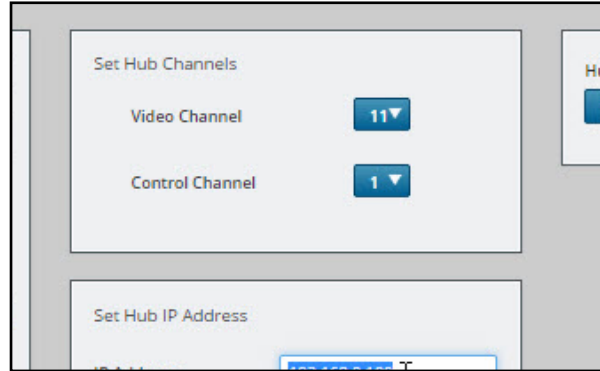
On the Solveil system, a hub will always default to the same radio channel (just as there is a default IP address) thus channel selection is very important, particularly if there are multiple hub systems operating in the same general area. Never run two Solveil systems on the same channels, within range of each other, or there will very likely be significant loss of system performance.

Video Channel: Represents the 2.4GHz channel that the video is transmitted on, from the camera to the hub. There are (3) choices, 2, 6, and 11. Try to choose a channel that has the least amount of traffic present.

Control Channel: Represents which small section of the video channel is also used for the camera to communicate with the hub, via 2-way communication.

Be sure to click “Save” when you have completed making your channel selections.

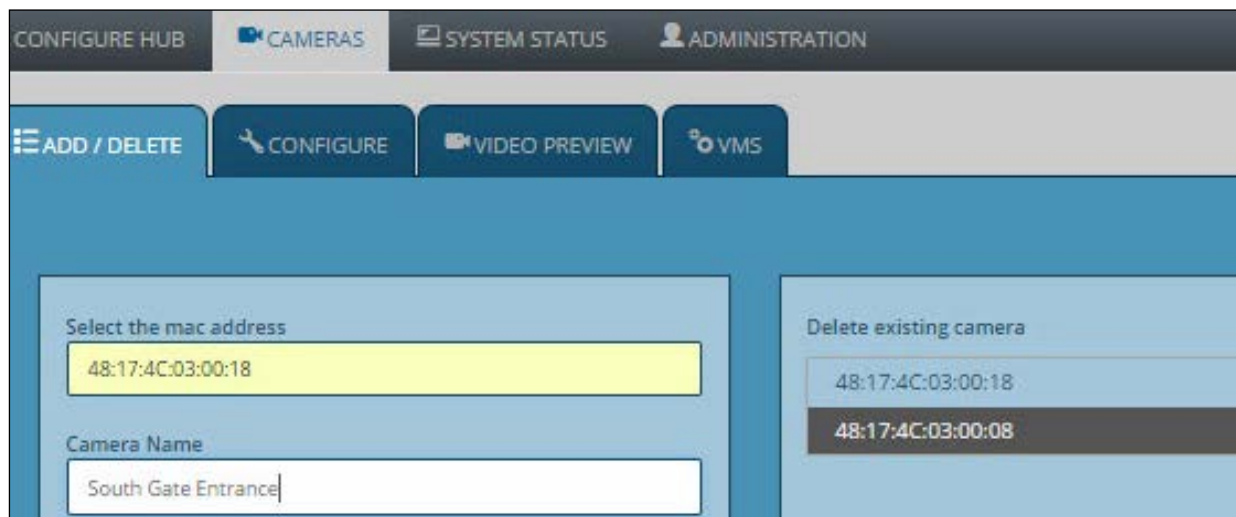
Security Note: The camera system does not communicate using any form of WiFi, and that the video signals and communication signals do not contain any IP addresses, or network data. This provides an enhanced layer of security because the system never transmits any network related data that could compromise the security of the host network. All networking tasks, are handled internally in the hub, and transmitted via the ethernet port, never via the wireless network.



Adding Cameras

On MicroPower systems, individual cameras are never actually part of your computer network. Cameras are identified to the hub by the MAC address that is assigned to the camera. This MAC address can be located on a sticker that can be found on the exterior and the interior of the camera. Generally they will resemble the following structure: “48:17:4C:02:xx:xx” (“xx:xx” will vary from camera to camera). Make a note of all of the camera MAC addresses in a given system and where those cameras are installed.

1. When logged into the hub click on the “Cameras” tab, and then on “Add/Delete”, here you will see a list of cameras that are currently added to the hub (click the “refresh” button to populate the list). The list should be blank if you are setting up a hub for the first time. If the hub is new, and you see a camera already added, click the



box next to it, and click “Remove”, then reboot the hub. On rare occasions, a test camera remains installed from the testing done during manufacturing.

2. To add a camera type the camera MAC address into the box provided. (If your camera is powered on, you may see it indicated as a choice in a pull down menu)

3. Select the camera or enter the camera MAC address into the box, name the camera, and click “Save”.

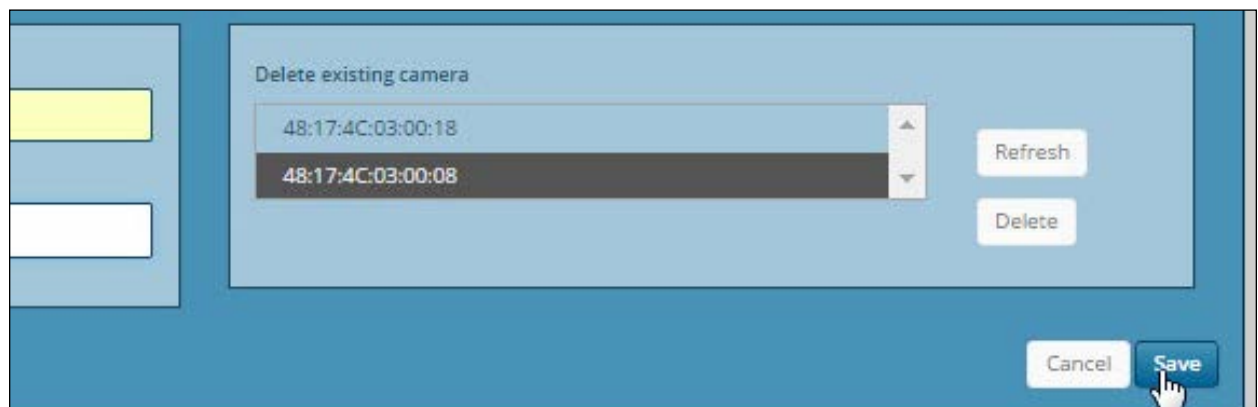
4. Click the “refresh” button every few seconds until the new MAC address appears in the list of active cameras.

5. Repeat the process for additional cameras.

4. When you have added all the cameras to the hub (up to a maximum of 4), reboot the hub by clicking on the “Restart” button at the top of the screen, and following any prompts.

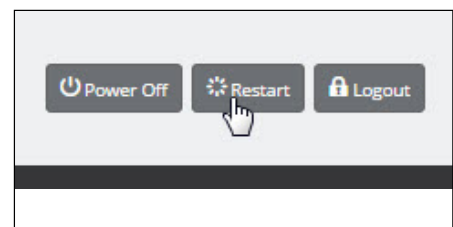
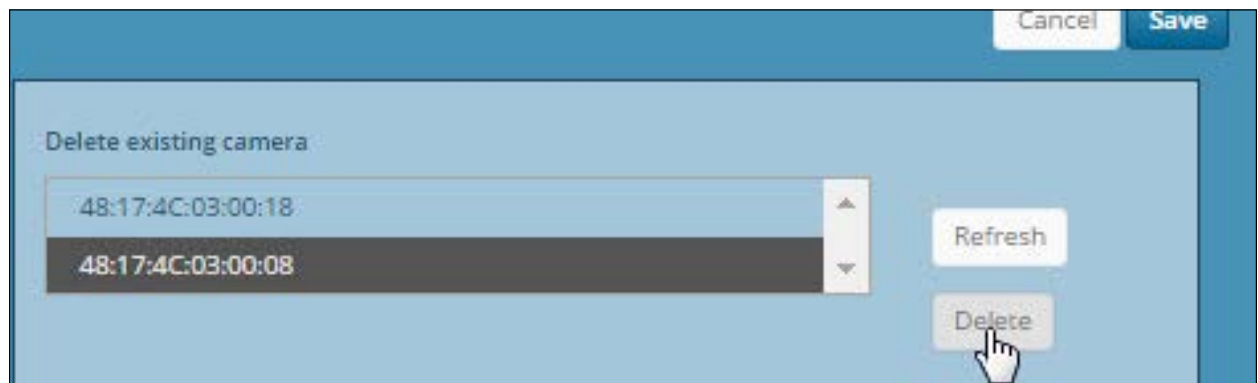
Removing Cameras

In some circumstance (such as moving a camera to another location on to a different hub, replacing a camera, etc....) you may need to “remove” a camera. To remove a camera from a hub, simply click on the camera you wish



to remove, and click on the “Delete” button. The camera will be removed from the system’s database, and may then be replaced, or moved to another hub.

After successfully removing any cameras, you should reboot the hub by clicking on the “restart” button found at the top of the screen.



Camera Configuration

IP Address: Here you can enter the IP address that will be used to represent a specific camera. A unique IP address is required here, do not enter the same IP as the hub.

Modulation: This is the speed of the communication that video is sent from the cameras to the hub. Generally installers keep this setting consistent for all the cameras on a hub. If the cameras are relatively close, and have a good signal strength (-55dB to -65dB), then 36 is fine.

If the cameras are at a distance, and/or have a weaker signal level (-66dB to -70dB) **Then most installers will change this setting to “24” in order to achieve a more reliable video link.**

The screenshot shows a web interface for configuring cameras. At the top, there are tabs: CONFIGURE HUB, CAMERAS (selected), SYSTEM STATUS, and ADMINISTRATION. Below these are sub-tabs: ADD / DELETE, CONFIGURE (selected), VIDEO PREVIEW, and VMS. The main area is titled 'Camera Settings' and contains a table with columns: Name, Mac Address, IP Address, Modulation, Solar Panel, and Night Mode. There are 'Cancel' and 'Save' buttons at the top right and bottom right of the table area.

Name	Mac Address	IP Address	Modulation	Solar Panel	Night Mode
South Gate Entrance	48:17:4C:03:00:18	192.168.14.205	36	Select	Off
North Gate Entrance	48:17:4C:03:00:08	192.168.14.206	36	Select	Off

Solar Panel: This setting should be changed to reflect the size of the solar panel that was shipped with your camera. Different size solar panels are used for different regions of the world, depending on the amount of sunlight they get on average each year. Setting this value to match your panel size, helps the system to accurately estimate the power levels and capacity of a camera.

Night Mode: This setting is relevant if your camera is equipped with IR illumination. “Auto” will allow the camera to automatically switch to night mode in low light situations. “Off” forces the camera to remain in day mode 24/7, and “On” locks the camera into night mode. “On” is provided for testing, and for certain very specific applications such as License Plate Recognition (LPR) when IR filtering. Generally an installer will always set this to “Auto”.

Be sure to click “Save” to preserve your setting changes

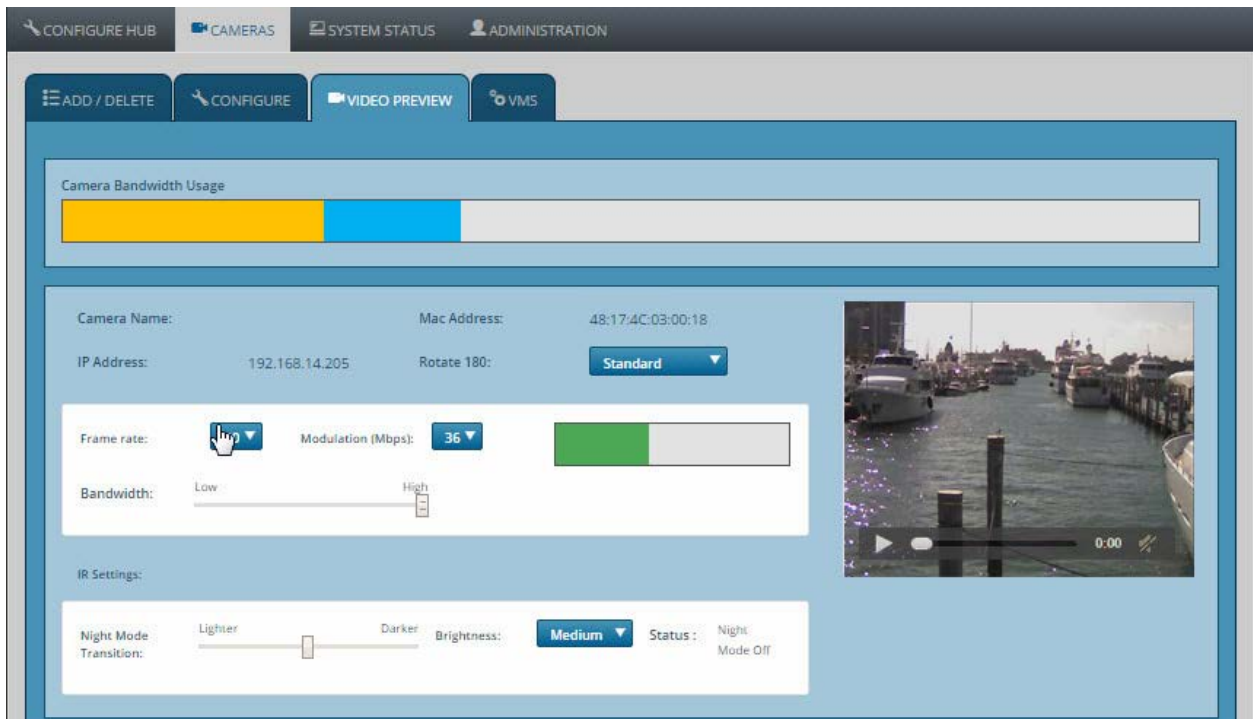


Camera Settings

Frame Rate, Bandwidth, Nightmode Transition, IR Brightness, Video Preview

Clicking on the “Video Preview” tab will reveal a variety of settings that are specific to each camera.

Frame Rate: This value may be set to determine the number of frames a camera sends per second. As of the publication of this document, each hub is capable of handling a system-wide total of 30fps, divided up between the cameras. It should also be noted that the energy consumption of a camera rises with it’s framerate. Cameras installed in areas with poor sunlight may find advantage to keeping the frame rate low. For most security applications in areas such as parking lots, 5fps is quite sufficient. However some analytic packages, or just personal preference may dictate that the frame rate be set higher.



Note: The above digram is from a (1) camera system. More or less cameras will display (scroll down) depending on your installation.

Modulation: (This is the exact same setting that was on the previous tab. It's inclusion here is just as a convenience.) Modulation is the speed of the communication that video is sent from the cameras to the hub. Generally installers keep this setting consistent for all the cameras on a hub. If the cameras are relatively close, and have a good signal strength (-55dB to -65dB), then 36 is fine.

If the cameras are at a distance, and/or have a weaker signal level (-66dB to -70dB) **Then most installers will change this setting to "24" in order to achieve a more reliable video link.**

Bandwidth: This value represents the amount of compression that is applied to the video stream. High bandwidth will produce better quality video, but larger file sizes.

Bandwidth Usage Graph: This graph represents the amount of available bandwidth that the camera is consuming at the current settings

Retransmission Graph: The green graph to the right of the camera settings, indicates how hard the hub is having to work to retrieve video from the camera. This is a good indication of RF noise, and interference.

Night Mode Transition: This setting influences at what level of brightness that the camera will shift into IR mode. (the default setting is generally best)

Brightness: The power level of the IR illuminator. This may be adjusted as needed to provide the best nighttime video. (Nearby reflective objects may require the level be lowered, whereas far away targets may need more output power)

Video Preview Box: Push the "play" icon on the video window to watch a live feed from the camera. This is useful for focusing, and evaluating your setting changes on the resulting video.

IMPORTANT: The settings on this page are saved and sent to the camera immediately. There is no "save" button on this page. Changing the modulation rate, may result in the camera briefly dropping the wireless link while the mode change goes into effect.

VMS Tab

Note: The above diagram is from a (2) camera system. More or less cameras will display (scroll down) depending on your installation.

The VMS Tab contains settings that pertain to how the camera system interacts with your NVR / VMS.

Hold Last Frame: In the event of a momentary camera outage, the settings here determine how long the video image will remain frozen before changing to a black screen. This setting is very useful to mask small camera glitches that may occur in a very heavily congested RF environment. Particularly if the camera video may be displayed in a publically viewable location.

Video Loss Mode: The user inputs a value in this location that determines how long a camera will be allowed to remain offline, before the IP address associated with that camera is deactivated. This provides a means of allowing your VMS/NVR system to detect that a camera has gone offline. (by producing the same conditions that would be present as if a conventional IP camera had been powered down, or disconnected) Note: This feature will only be active if the check box for “Send Notification” is selected in the next column.

Loss Alert: Check the box next to “Send Notification” for a specific camera, to enable the ability for your VMS to detect when a camera has gone offline for an extended period of time. (See “Video Loss Mode” above)

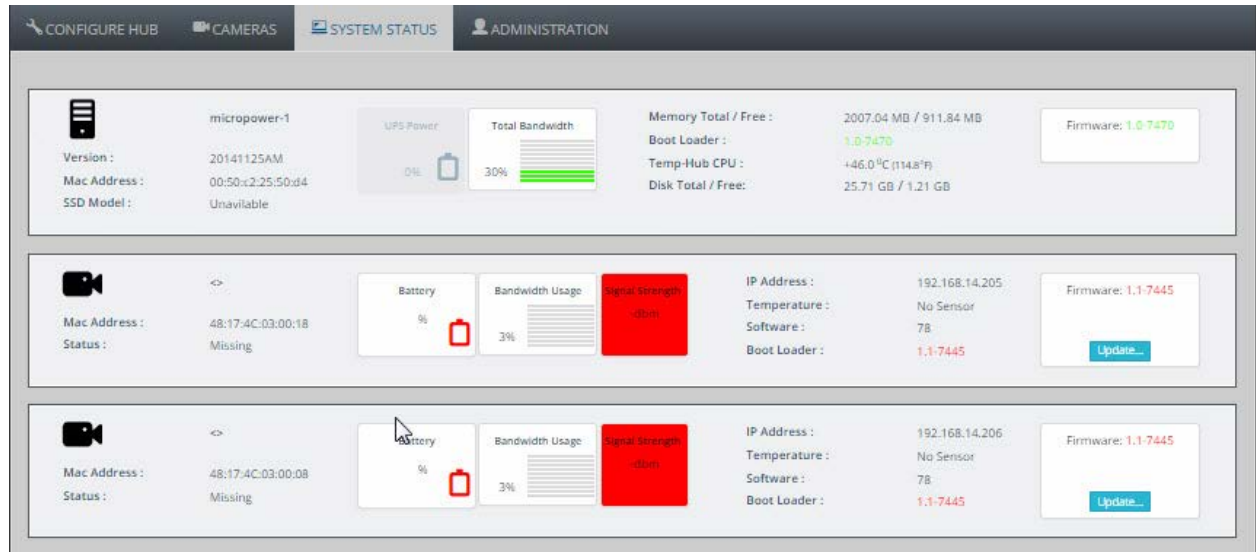
Type: Select the desired type of video stream you would like to access from a particular camera. Making a selection here will populate the “Connection String” box to the right, with the proper connection information that your VMS will need in order to communicate with the cameras via RTSP. This provides an easy way to choose your desired compression method, and to obtain the information that will be needed to set up your VMS to communicate with that camera.

Connection String: The connection information that is needed in order for your VMS to communicate with this camera, will fill in here, depending on your selection under “Type”. This connection information may be entered into a video player such as VLC to view the video streams as well.

Copy String: Copies the connection string to the computer clipboard, so you can easily paste it into your VMS or video player.

IMPORTANT: Be sure to click “Save” on this page after making any changes that you want to be preserved, alternatively if you made changes you do not want to keep, simply click “Cancel”, and the former values for these settings will return.

System Status Tab



Note: The above diagram is from a (2) camera system. More or less cameras will display (scroll down) depending on your installation.

The System Status Tab is primarily utilized to provide valuable system status information to the installer.

System Information: The first row contains information about the status and health of the hub. This includes a graph showing temperature, disk space, firmware version, etc.

Camera Information: These rows provide valuable performance information regarding the specific camera indicated. Most importantly, the battery level, Bandwidth usage, and Signal Strength.

Desired Signal Strength Levels: For best performance, we find that the signal strengths should indicate at least -70dB or stronger. (-60dB is considerably **STRONGER** than -70dB, 'lower' numbers are better)

Firmware Update: In the event that there is a firmware update available for your camera, it will be indicated here. Clicking the button will push the update out to the camera via the wireless link. (You do not have to visit the camera in person) Please call MicroPower Technologies with any questions prior to updating your cameras.

System Administration

The screenshot displays the 'ADMINISTRATION' tab of a system configuration interface. It features several panels: 'Edit Login' with fields for Username (kevin), Password, and Confirm, along with 'Reset Default' and 'Save' buttons and checkboxes for 'Password protect streams' and 'Password protect cameras'; 'Add User' with similar fields and a 'User' role dropdown; 'Settings' with 'Save' and 'Load' buttons; 'Factory Default' with 'Reset' and 'Reset All' buttons and a 'Preserve IP Settings' checkbox; 'System Logs' with 'Save' and 'Send log to Micropower' buttons and a 'Daily Sync' checkbox; and a 'Users List' table with columns 'Username' and 'User Role', listing 'kevin' (admin) and 'takis' (user), with 'Reset Password' and 'Delete' buttons.

Username	User Role
kevin	admin
takis	user

Changing The Login and User Accounts, Saving Configurations, Factory Default

Edit Login: This section allows the operator to password protect the video streams and camera settings. (Note: password protecting the video streams may compromise VMS compatibility, depending on the make and model)

Add User: Adds new users to the system, allowing the administrator to secure the box, and allow specific intended people access to make changes, or see the settings.

Settings: Allows the operator to save the current hub configuration to their local computer, or, to load a saved configuration file to a hub. This can be used to restore a configuration to a hub that has been factory defaulted.

Factory Default: Clears the settings in a hub, and returns it to the factory default settings.

NOTE: Remote users should be certain to check the “preserve IP Settings” option, so that after the factory default, the programmed IP address will still remain in the system. Otherwise, the hub will return to its default IP address of 192.168.0.100, and potentially become inaccessible from a remote connection.

System Logs: This feature will save the system logs that are stored in the hub. The log data contains information about the performance of the hub, signal strengths, charge levels, etc. (No images or video clips are stored or transmitted) This information is useful to provide to MicroPower for trouble shooting purposes.

System Logs Daily Sync: If the hub has internet access, checking this box will instruct the system to upload the log data nightly to the MicroPower offices. This is useful in the event of a problem, MPT will already have the previous nights logs on hand for review and analysis. “Send Log to MicroPower” will cause the system to immediately begin uploading the log data to the MPT offices for analysis and troubleshooting.

Camera Kit Assembly & Installation

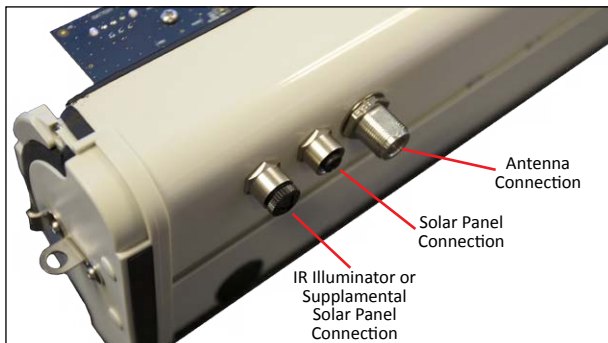
Next we will cover how the cameras and camera components are assembled and installed. Some installers find it easier to do the assembly process on multiple cameras at the same time, and bring the cameras to the pole “ready to bolt on”. Others prefer to assemble the parts at each location. Regardless the camera / solar panel / antenna assembly process should be done on the ground, prior to actually mounting any of the equipment. As much as possible this guide is moving in chronological order, so we will first cover the assembly of the parts, and then address the mounting / installation process.

System Assembly

Camera Assembly

The camera itself only needs to have the camera swivel bracket attached to it.

1. Remove the camera bracket from the packaging, and remove the pivoting mount from the main bracket, by removing the single screw that holds it in place. Replace the screw back into the pivoting bracket to prevent it from being lost.
2. Place the rubber bracket pad on the camera housing, and line up the captive screws with the holes.
3. Next, mount the bracket hinge on the underside of the camera by using the small/shallow Phillips screws included in a small plastic bag that may be found in the packaging.
4. Before tightening the bracket to the camera housing, slide it up and down the housing until you can lift the camera by the bracket, and find that it is balanced. A balanced camera will make the later mounting process much easier.
5. If your camera is equipped with an IR illuminator, you can plug it into one of the two power sockets at this time. The other power socket will be used by the solar panel input.

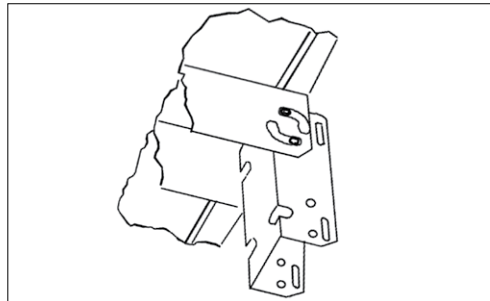


Solar Panel Assembly

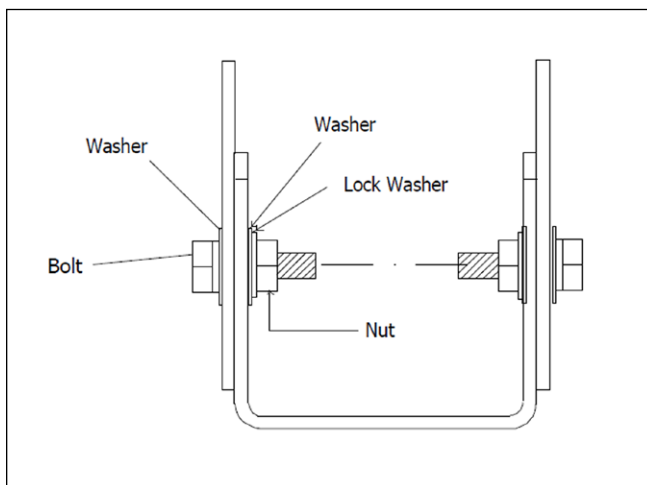
The solar panel bracket is extremely versatile, and is assembled based upon the mounting surface that it will be attached to. The “C” shaped bracket can be bolted to the solar panel with the flat side facing out (for bolting/ screwing to smooth surfaces), or with the edges of the bracket facing outward (for mounting using straps/hose clamps to poles). The panel may be mounted to poles, walls, or even inverted and mounted to rooftops or ledges. (See images).



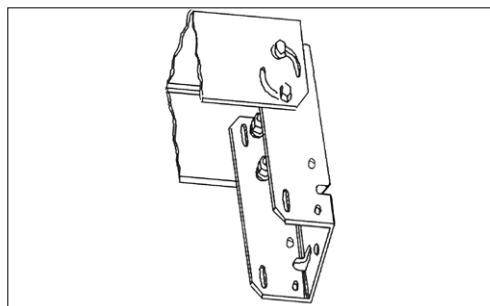
Solar panel mounted to a pole using stainless steel hose clamps that are passed through the slots in the bracket. This allows for a quick, non-permanent installation that may be easily relocated, without damaging the mounting surface.



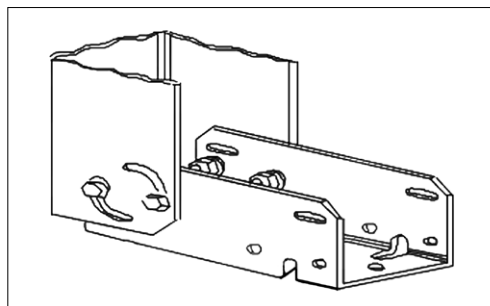
Bracket configured for mounting to a round or square pole by use of hose clamps / straps. (straps through the slots in bracket)



Assembly of the bracket, and the arrangement of the nuts, bolts, and washers.

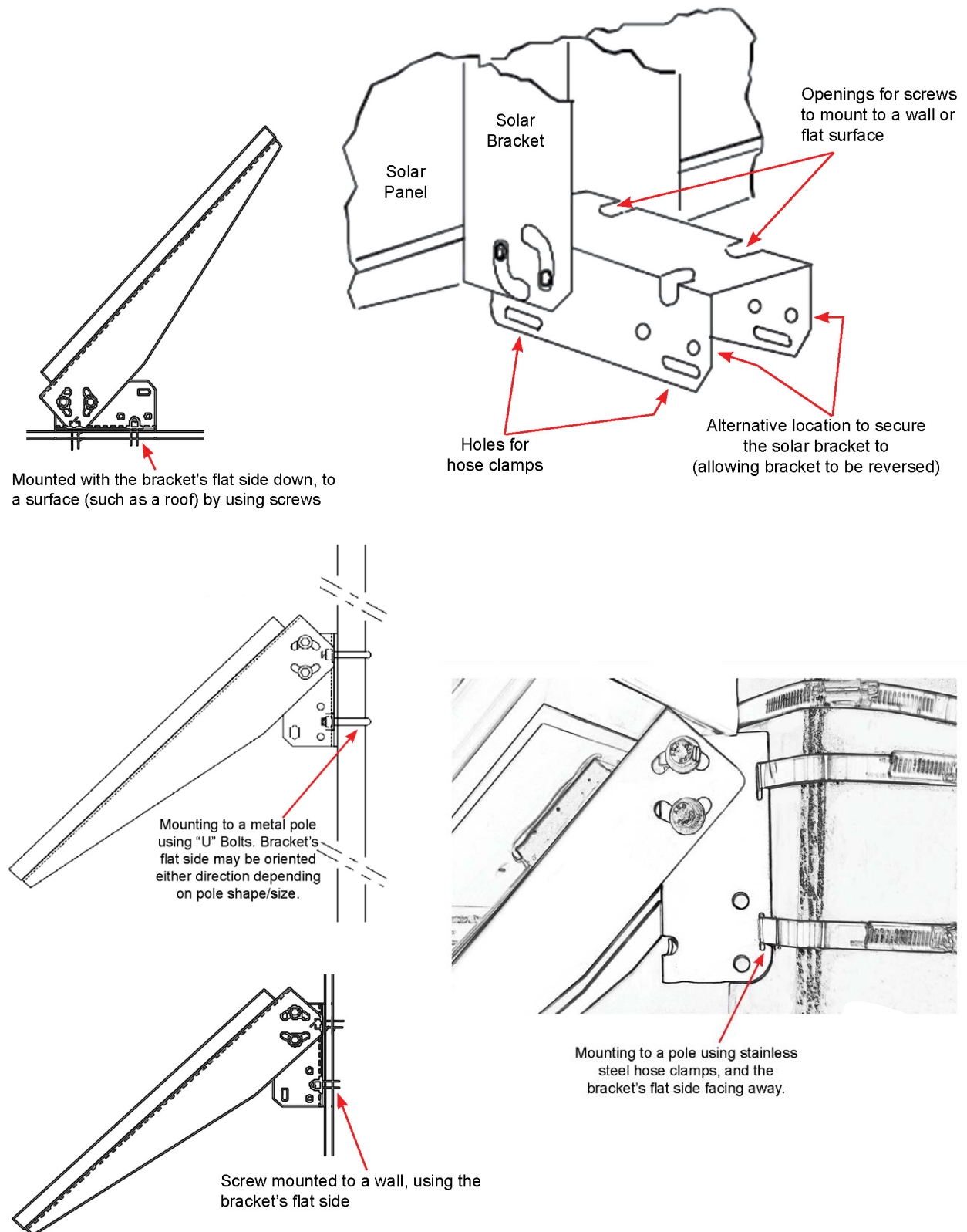


Bracket configured for mounting to a flat surface such as a wall, by use of screws or bolts



Solar bracket configured for mounting down, to a flat surface such as rooftop or ledge with the solar panel facing upward.

Solar Bracket Mounting Configurations



Camera System Installation / Mounting

The order of equipment on the pole may vary from installation to installation. Generally the solar panel will be on top, followed by the antenna, with the camera on the bottom. This arrangement generally provides the best unobstructed light for the panel, however there are exceptions. For example if your mounting pole has a large light on top that will cast a shadow on the panel, it might be wise to move it lower down the pole, or, if there are tall obstructions that must be cleared and the antenna must be placed much higher up the pole than the other equipment. For the purposes of this document however, we will start at the top with the solar panel, and move our way down the pole.

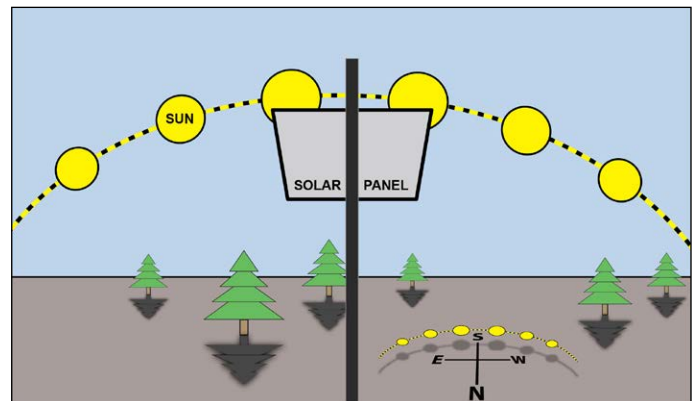
If the installer has any questions or concerns, feel free to snap some pictures, and call into MicroPower support for advice, we are always happy to assist. (877-536-0128)

Solar Panel Mounting

A solar panel is included with the camera which offers complete flexibility with the placement of the camera, and enables reliable operation in installation locations that may have lower light levels, such as northern climates where snow and ice may typically 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, extremely versatile mounting bracket.

How to Mount the Auxiliary Solar Panel:

The solar panel mounting bracket is extremely versatile, and is designed to be mounted to a pole 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.

What Direction to Mount the Solar Panel:

For mounting locations in the Northern Hemisphere (United States, Mexico, Canada, etc.) **The solar panel MUST 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 system is installed, the lower toward the horizon the glass panel should be angled, consistent with the position of the sun during the weaker, winter solar energy.

In 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. Additionally, it is very important that care is taken to ensure that objects such as trees, utility poles, buildings, and most especially the other equipment on the pole (antenna, camera, etc.) do not create any shadows on any of the solar panels in the system.

Note: The battery ships from the factory at about 40% capacity. During storage and shipment, the battery will be (and always should be) unplugged from the camera, and will need to be connected in order to power on the camera. When the camera is not in use, and stored out of sunlight, the battery should be disconnected.

Antenna Mounting

The directional antenna should be mounted as the sticker indicates on the back of the antenna, double checking that the drain holes are releasing any water toward the ground. This antenna arrangement polarizes them to a horizontal plane, which has the benefit of excluding a lot of the ambient RF noise that emits from the more common vertically positioned antennas. It is critical that all the antennas are oriented THE SAME WAY in a given system, or the noise exclusion mentioned previously, will work to ensure the camera can not communicate to the hub.

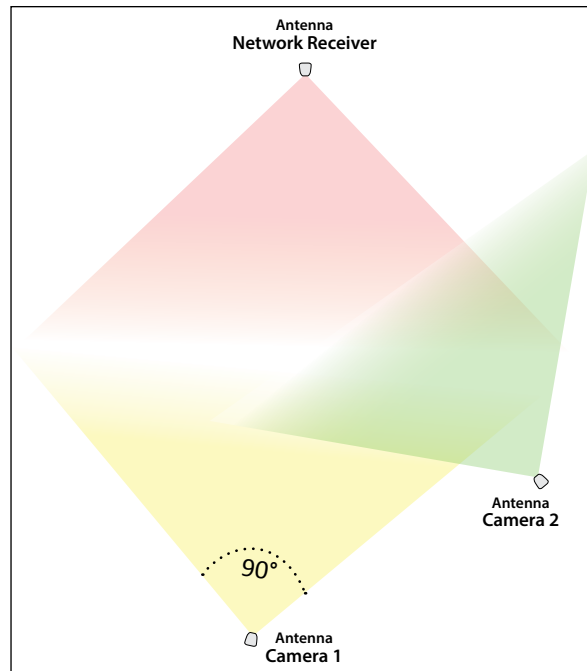
Each camera should have one antenna, while each hub may have one or two antennas depending on the location of the cameras in the field. Note that if more than one antenna is being used on a hub, then the maximum transmission range will be reduced due to the usage of a signal splitter.

**** NOTE: THE ANTENNAS HAVE DRAIN HOLES TO RELEASE ANY ACCUMULATED MOISTURE. THE DRAIN HOLE MUST BE FACING THE GROUND WHEN MOUNTING ****

The directional antennas when placed flat have an approximate 90 degree field of view. The camera antennas should be positioned pointing toward the hub, within the “cone” of the antenna’s field of view, for the system to properly communicate.

(Note that the camera’s antennas should point only to the hub antenna, not at each other).

The directional antennas will need to be mounted to the desired location, using hardware supplied by the installer. Typically this would be done via stainless steel hose clamps, “U” bolts, or some other clamping mechanism.



The antenna included in both the camera and receiver hub kit is an 8dBi 50 Ohm directional antenna with about a 90° Field of View. It should be mounted and oriented as the sticker on the back indicates, with the plastic front facing your desired target.

Camera Mounting

During the assembly process, you've already attached the rotating portion of the camera bracket to the camera housing. This leaves the lightweight camera arm bracket to be easily attached to the desired mounting surface.

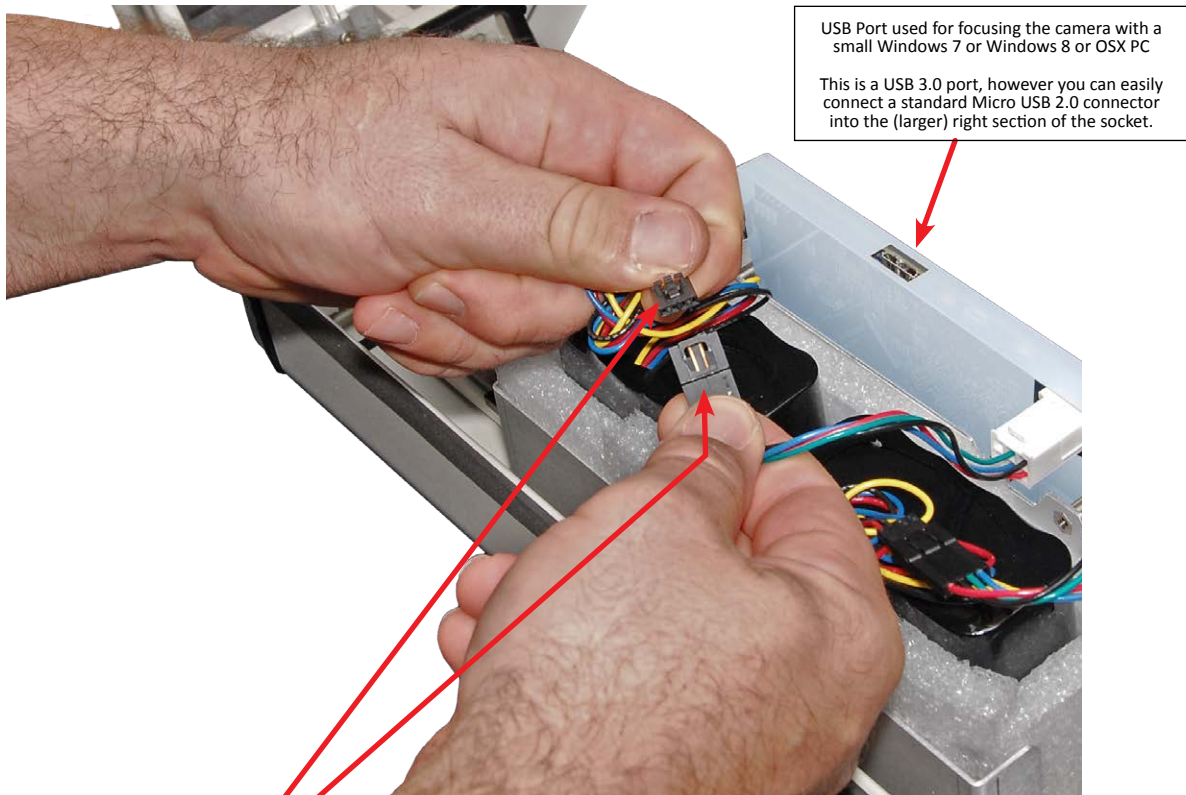
1. Use the appropriate hardware to mount the bracket to your desired surface. This may require stainless steel hose clamps (easiest and quickest, particularly for large poles), screws (good for flat wood surfaces), or perhaps stainless steel "U" bolts (good for narrow gauge masts).
2. Once the camera arm bracket has been secured to your desired mounting surface, then place the camera+rotating portion of the mount, onto the camera arm bracket. If you arranged the movable bracket such that the camera was balanced, it should be very easy to hold the camera in place on the arm bracket, while you attach the single screw to secure the entire assembly together.
3. Now you can adjust the position of the camera, and connect the solar power cable and the antenna cable.
4. Once you have the antenna cable and solar power cable attached, you may then power on the camera by connecting the battery plug inside the camera. IR enabled cameras will have (2) battery plugs that must be connected (or disconnected to power off the camera) (see next page)
5. Be sure to tightly secure the arm bracket screw, thus locking the camera in place. It is easy to forget to secure it tightly, leaving the camera vulnerable to unintended movement or potentially falling during high winds.



The solar panel should be positioned above the camera, or, arranged such that so no shadows are created on the panel surface. (Even small shadows will dramatically decrease the solar panel efficiency)

Powering On The Camera

Once you have the antenna cable and solar power cable attached, you may then power on the camera by connecting the battery plug inside the camera. IR enabled cameras will have (2) battery plugs that must be connected (or disconnected to power off the camera)



USB Port used for focusing the camera with a small Windows 7 or Windows 8 or OSX PC

This is a USB 3.0 port, however you can easily connect a standard Micro USB 2.0 connector into the (larger) right section of the socket.

Battery cables connect together to power on the camera.

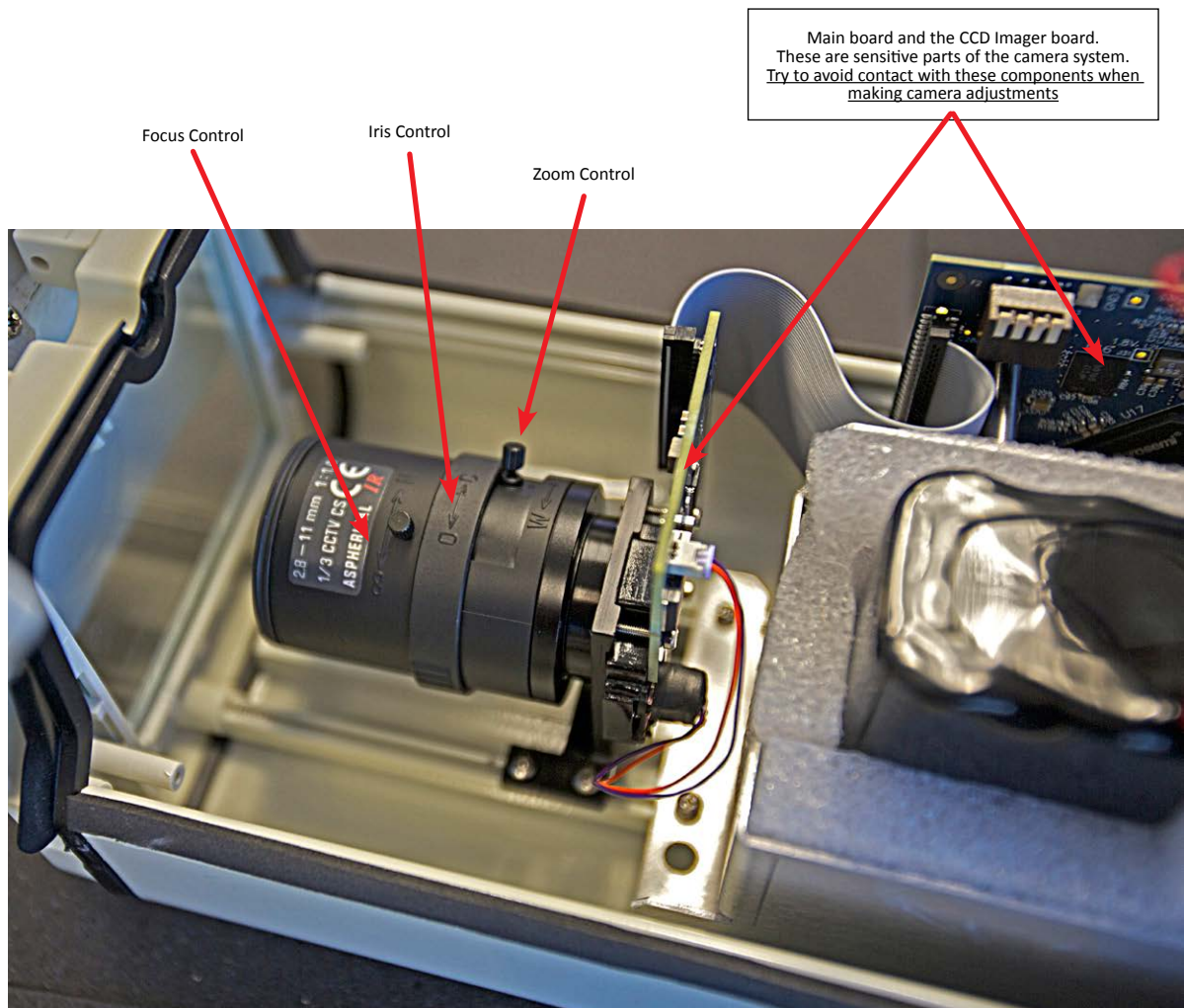
- Standard Non-IR cameras have (1) power connector.
- Cameras equipped with IR Illuminators will have (2) power connectors, both of which must be connected for reliable long-term operation.

Focusing and Adjusting The Camera

The system uses common “CS-Mount” threaded, mega-pixel CCTV lenses. Standard MicroPower cameras come equipped with either a 2.8-11mm IR corrected lens, or a 10-40mm IR corrected lens. All the lenses are equipped with a manual iris control, that in most circumstances, should always be opened up completely to offer the best low light performance. The telephoto and focus controls should be adjusted to provide the desired field of view and magnification.

Remember, these are wireless cameras that are more flexible for mounting than traditional wired CCTV, so whenever possible you should try to bring the camera closer to your target, rather than resorting first to magnifying it through a more powerful lens. Closer positioning will provide greater clarity and better low light performance, and more “pixels on target”.

Note: There are sensitive components exposed inside the camera, such as the CCD imager board, and the diplexer board (seen below). Take care not to touch these parts when focusing the camera, particularly if the camera is powered on.



Solveil Camera Equipped with a 2.8-11mm Lens

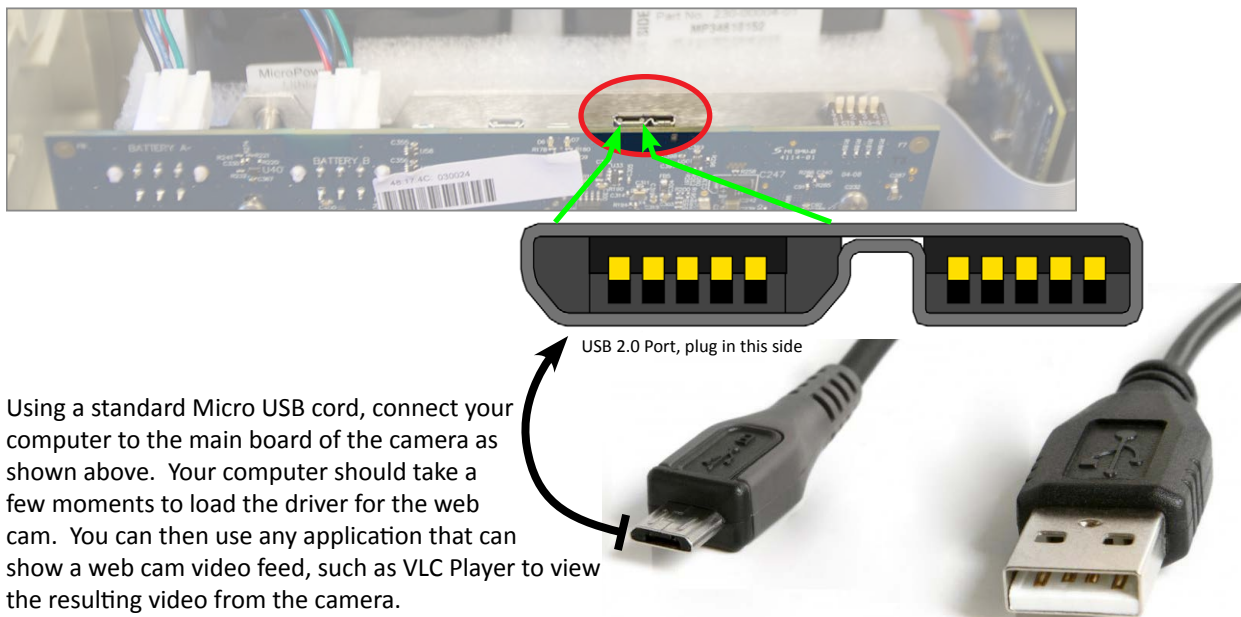
Viewing Live Video at the Camera for Focus and Adjustment

Since the camera is 100% digital, but not actually on the computer network, video from the camera must always be viewed through the hub. However, with the new Solveil generation of cameras, a USB port has been added that can be connected to a Windows based computer. The camera will be detected by your computer as a generic USB web cam, allowing an installer to use a tablet or small laptop to focus the camera live on the pole.

There are (4) main methods for viewing video when setting up a Solveil camera system.

Direct at the Camera via USB:

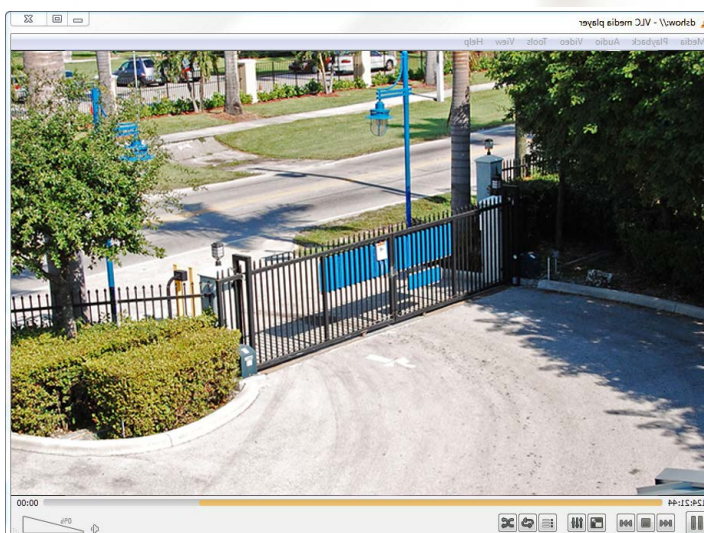
The Solveil cameras are equipped with an internal USB port that allows almost any computer running a full version of Windows 7 or Windows 8, to view the live video as a generic web cam. While this won't provide signal strength feedback, it does allow the camera to be adjusted easily in the field. All you need to do is power on the camera, and plug your computer's USB port into the USB port located on the top of the interior main board.



Using a standard Micro USB cord, connect your computer to the main board of the camera as shown above. Your computer should take a few moments to load the driver for the web cam. You can then use any application that can show a web cam video feed, such as VLC Player to view the resulting video from the camera.

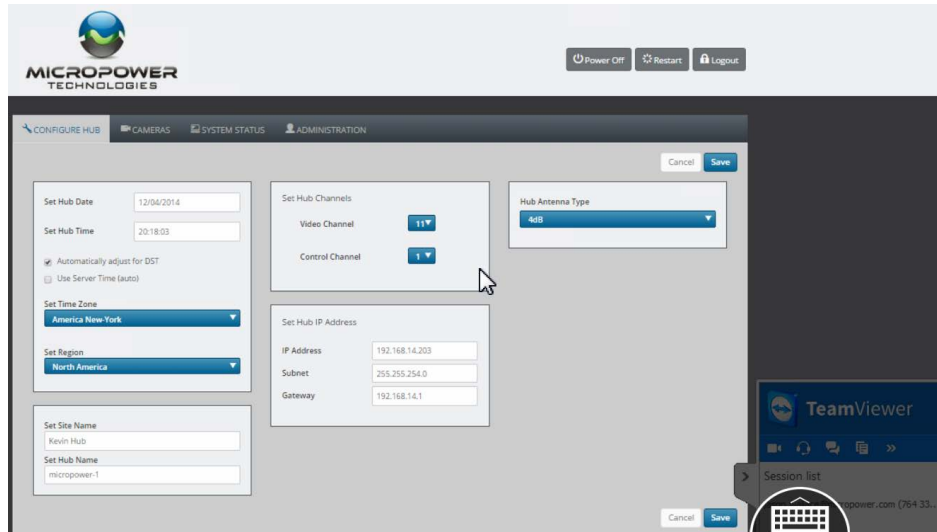
[Launch VLC player, select "Open Capture Device", select "Direct Show", and choose "MicroPower" as the camera]

When the adjustments are made, carefully remove the cable and securely close the camera housing, and lock the camera latch.



Remote Desktop Access (preferred):

The second method often proves to be the most useful and versatile. It requires that you have a computer such as a laptop that is capable of communicating with the hub. This computer will also need an Internet connection, either from the host network, or, via a wireless devices such as a cellular to WiFi “MyFi” type device. Using remote desktop software such as “LogMeIn™” or our favorite, “TeamViewer™” you can use the remote desktop app on your personal smart phone (Android or iPhone) to directly access your computer.



Screen shot from the iPhone TeamViewer App, connected to a Solveil hub

This method allows you to see the web interface, view signal strengths, make setting changes and preview video with full visibility to the system performance. An additional benefit is that most commercial remote desktop packages generally do not require any port forwarding issues, or network changes to provide remote access.

VMS Client Access:

The third most common method requires that the hub is loaded and configured to the VMS that will be recording the video, and that the VMS is set up for remote viewing access. Most modern VMS platforms offer iPhone or Android remote client apps that can be used to log directly into the VMS and view the video being produced by the cameras. This method will strictly show you video, and is not useful for accessing signal strengths or making changes to the Solveil setup.

Cell Phones:

Lastly, often people just take the more simple, “Two guys with cell phones” approach. It simply requires that one installer remains inside with access to the hub, and communicates via cell phone with the installer on the camera pole.

Keep in mind that this still requires a computer and for that computer to have direct access to communicate with the hub. If an internet connection can be obtained, then you probably have everything you need to use the more preferred remote desktop method, that will then provide the camera installer direct access to the video.

Contacting MicroPower Customer Support

MicroPower's customer support strategy is through a network of best-in-class business partners including OEMs, systems integrators and systems resellers. 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
Toll Free Phone Support Worldwide:	+1-877-536-0128 +1-858-914-5198 Press option 2 for Customer Support
Fax Support – Worldwide:	+1-858-947-3907

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1. DEFINITIONS. As used herein, the following terms shall have the following meanings:

1.1. "Documentation" means any and all end user documentation provided by MPT in connection with the Software, and all Updates thereto.

1.2. "Factory Installed Software" means Software that is installed by MPT on a MPT hardware product prior to delivery of that MPT hardware product to Licensee, and all Updates thereto. Factory Installed Software may include, without limitation, TrustLinux firmware, and certain third party file server programs.

1.3. "GPL Software" refers to certain open source software that MPT may provide to Licensee in connection with a MPT hardware product, including but not limited to the Linux software provided by MPT in connection with the MPT-C20S, MPT-C20S-IR, MPT-H10HA, MPT-H10AO products. GPL Software is provided by MPT to Licensee solely under the terms of the GNU General Public License, Version 2, June 1991 (the "GNU GPL"), a copy of which accompanies this Agreement. Consistent with the requirements of the GNU GPL, MPT will provide a complete machine-readable copy of the source code for GPL Software for a charge of no more than MPT's cost of physically performing such distribution, provided that such copy is requested within three (3) years following Licensee's receipt of the corresponding GPL Software from MPT.

1.4. "Remote Software" means Software that is meant to be installed on Licensee's own hardware and that is not installed by MPT or a MPT reseller on a MPT hardware product prior to delivery of that MPT hardware product to Licensee, and all Updates thereto. Remote Software may include, without limitation, MPT's Web Interface or GUI program.

1.5. "Software" means all software and firmware that accompanies this EULA, all copies thereof, all media associated therewith, and all Updates thereto; provided that the term "Software" does mean any software or other materials for which a separate end user license agreement is provided (including but not limited to the GPL Software).

1.6. "Updates" means any and all updates, upgrades, new releases, modifications, and/or supplements that may be provided by MPT from time to time, whether through an online download process or otherwise.

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FCC Compliance Statement (Part 15.19)

Compliance Statement (Part 15.19)

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- 1. This device may not cause harmful interference, and*
- 2. This device must accept any interference received, including interference that may cause undesired operation.*

Warning (Part 15.21)

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

FCC Interference Statement (Part 15.105 (b))

This equipment has been tested and found to comply with the limits for a 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 uses 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 of the following measures:

Reorient 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.

To comply with FCC/IC RF exposure limits for general population / uncontrolled exposure, the antenna(s) used for this transmitter must be installed on outdoor permanent structures to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

Installation Notes:

Installation Site Name _____

Hub IP Address:_____._____._____._____ WB Ch_____ NB CH_____

Camera 0, MAC Address: 48:17:4C:02:_____:_____, IP Address:_____._____._____._____

Camera 1, MAC Address: 48:17:4C:02:_____:_____, IP Address:_____._____._____._____

Camera 2, MAC Address: 48:17:4C:02:_____:_____, IP Address:_____._____._____._____

Camera 3, MAC Address: 48:17:4C:02:_____:_____, IP Address:_____._____._____._____

Hub IP Address:_____._____._____._____ WB Ch_____ NB CH_____

Camera 0, MAC Address: 48:17:4C:02:_____:_____, IP Address:_____._____._____._____

Camera 1, MAC Address: 48:17:4C:02:_____:_____, IP Address:_____._____._____._____

Camera 2, MAC Address: 48:17:4C:02:_____:_____, IP Address:_____._____._____._____

Camera 3, MAC Address: 48:17:4C:02:_____:_____, IP Address:_____._____._____._____

Hub IP Address:_____._____._____._____ WB Ch_____ NB CH_____

Camera 0, MAC Address: 48:17:4C:02:_____:_____, IP Address:_____._____._____._____

Camera 1, MAC Address: 48:17:4C:02:_____:_____, IP Address:_____._____._____._____

Camera 2, MAC Address: 48:17:4C:02:_____:_____, IP Address:_____._____._____._____

Camera 3, MAC Address: 48:17:4C:02:_____:_____, IP Address:_____._____._____._____