Focusing Arecont Vision Megapixel Cameras:

For megapixel imaging applications it is important to use a properly focused, high-quality lens. While proper focus procedures are not difficult, they are critical steps to ensure high quality video.

*Image: position of control and labeling varies with model and manufacturer; some fixed focal length lenses also have fixed iris value and will not have control for iris adjustment*

Basic Focus Procedure for MegaVideo® cameras:

1. Arecont Vision MegaVideo® cameras have CS lens mounts; if a C mount lens is being used, a 5mm C to CS adapter ring will need to be used (this comes in every MegaVideo® box). **NOTE:** Screwing a C mount lens directly on to MegaVideo cameras could cause damage to the IR cut filter if the lens protrudes into the camera, especially on the “DN” models. If the C / CS format is not known, it is recommended that the C to CS adapter be used first to avoid potential damage to the camera.

   **Note:** *C mount and CS mount lenses have the same pitch threading. C-mount has a longer throw from flange to sensor at 17.5mm whereas CS-mount is 12.5mm. A C-mount lens on a CS-mount camera without an adapter ring can’t be focused. Of the two standards CS is the newer and more versatile and will allow mounting of the newer and more compact CS format optics offered from some lens manufacturers while still allowing use of a C-mount lens with the 5mm ring.*

2. With the camera and a PC on the same subnet, use Arecont Vision’s setup utility, AV100, to connect to the camera. The default display mode is half (1/2) resolution.

   **Note:** *The default view in AV100 is in half (1/2) resolution to ensure the PC has enough CPU and graphic card power to display the video at the camera’s maximum frame rate with minimal latency. It is recommended that when focusing, the video be viewed in half resolution to reduce the potential latency. This is more noticeable on 3MP and higher cameras. To view the video in full resolution, simply double click anywhere on the video.*
3. Open the iris to its maximum position and wait for the image to adjust to the additional light. If using auto iris (AI) cameras and an auto iris (AI) lens, use AV100 software to turn AI function off and lock the iris open.

   **Note:** *With the iris completely open, the depth of field will be very short.*

4. When using a varifocal lens, adjust the Zoom Control (as shown above) to obtain the desired field of view (FOV). If using a fixed focal length lens, skip this step.

5. Choose a specific object in the middle of the depth of field and turn focus ring until that object is fully focused.

6. In the AV100 software, pick a specific object in the field of view and draw a region of interest around it by left clicking and drawing a box around it.

7. Page up and page down will zoom in and out and the arrow keys will move the zoom window. *(See Figure 1)* Adjust the focus ring again until the region of interest is in focus.

8. Slowly close down the iris control until the foreground and background come into focus.
   a. Depending on the lens this point will usually be somewhere around F2.0-4.0. However most lenses with adjustable aperture are only marked “O to C” so you must be the judge where that point is. Focal length, F-stop, and lens size format all affect exactly where and how great the depth of field will be.
   b. If using an auto iris lens, turn the AI function back on through the AV100 set up software.
   c. Note: There is a tradeoff between sharpness achieved by closing the iris and the noise in the image caused by less light reaching the sensor as a result of closing the iris. This can be compensated for by changing exposure settings in the software or by opening the iris back up slightly until an acceptable balance is achieved.

9. Move the zoom window around the image to ensure everything is as in focus as possible. If necessary repeat steps 5 through 8 until the image is fully focused.

**Additional Tips:**
- For optimal focus results, use a laptop and a PoE splitting focus tool such as the Veracity PINPOINT at the camera side of the network.
- If lens cannot be focused, verify that the C to CS ring is or is not supposed to be attached. If adjustments to the C to CS ring do not help the focus, back focusing may be necessary. Please reference the section on Back Focus adjustment.
**Back Focus Adjustment for MegaVideo cameras:**

Back focus is adjustment of the distance between the back flange of the lens mounting and the camera imager. C and CS mounting standards have specified this as 17.5mm for C, and 12.5mm for CS.

Slight variance in combinations of lens and camera from different manufacturers can impact focusing ability. This is particularly true when using manual varifocal lenses.

Under most circumstances it is not necessary to adjust the back focus position. For example, a varifocal lens is generally adjusted to the desired FOV during the installation process, and remains fixed in the adjusted position. When focused at this position, back focus adjustment is not needed. Thus, it is not recommended to adjust the back focus until first performing the basic focus procedure and confirming the lens format and mount adapter combination is correct and the lens in use is a high optic quality lens intended for Megapixel imaging. Check for smudges and fingerprints before starting back focus procedure.

*In the case the camera requires back focus adjustment; there are different back focus adjustment methods for Arecont Vision cameras depending on the model.*

**Back Focusing MegaVideo (Box) Cameras:**

- Plain style front: these models can be adjusted by adding or removing the 0.5mm spacer ring that ships with the MegaVideo cameras.

- Back focus ring front: this ring is secured by two small hex set screws at the top & bottom of the housing. The 0.5mm spacer ring can be used on this style as well.

**Procedure to perform detailed back focus using the lens mounting ring:**

**For fixed focal length lens**-

1. Make certain that the lens has been threaded up tightly to the mounting ring.
2. Focus the camera as much as possible using the basic focus procedure listed above.
3. Loosen the set screws so the lens mounting ring and the lens can be turned together incrementally until the image is sharp.
   - Make only small incremental adjustments; do not turn the ring a full rotation, but rather a few degrees of rotation at a time as small adjustments have a large impact on the lens focus.
   - Be careful to not turn the ring so far that it backs into the IR cut mechanism if there is one.
4. Once focused, re-tighten the mounting ring set screws to secure the lens mounting ring from further movement.
For varifocal lens

1. Make certain that the lens has been threaded up tightly to the mounting ring.
2. Open the Iris all the way.
3. Move the focus ring to the infinity position. This is usually marked “∞” or “F” on most lenses and is opposite of the “N” or near position. On most lenses this position is the furthest clockwise the focus ring can be turned.
4. Point the camera at a nearby object a few meters away. Now turn the lens zoom ring to the widest view possible, often marked “W” and usually to the most counterclockwise position on the zoom ring for most varifocal lenses. Rotate the lens and lens mounting ring together until the image of the distant object is in focus in the AV100 viewing window, see basic focus procedure steps 2 and 3.

   - *Make only small incremental adjustments; do not turn the ring a full rotation, but rather a few degrees of rotation at a time as small adjustments will have a large impact on the lens focus*
   - *Be careful to not turn the ring so far that it backs into the IR cut mechanism if there is one.*

5. In the AV100 software, LEFT click and drag out a zoom window around the distant object, then scroll your mouse to zoom in until you can distinguish individual pixels as in step 6 of the basic focus procedure above.
6. Rotate the lens and lens mounting ring together until the image of the distant object is as sharp as possible. Then tighten the set screws for the lens mount ring to secure it in place.
7. Rotate the zoom ring on the lens to the tightest field of view usually marked “T” and as far clockwise as the zoom ring can be turned on most lenses.
8. Make adjustment using the focus ring as needed to keep the object as sharp as possible in the wide field of view.
9. Now point the camera at a distant object to confirm the back focus has been adjusted and repeat step 7 – 8. If the object can be focused on, the back focus procedure was successful. In the case of some model varifocal lenses, it may be necessary to repeat steps 2-8 and then back the Iris closed a bit from fully open position to achieve optimal focus at the widest and tightest focal lengths.
**Back Focusing MegaDome Cameras:**

MegaDome cameras ship with varifocal lenses installed and back focused by Arecont Vision. Normally, there should be no need to back focus these cameras in the field; however, the rigors of shipping and handling may leave a few cameras needing some back focus adjustment upon arrival. This model can be back focused by loosening the two small set screws holding the silver lens mounting ring in the imager housing. Follow the same procedure for back focus adjustment of varifocal lens for the box cameras. It may require a separate back focus adjustment procedure for best focus at the 4mm & 10mm zoom positions with this model.

**MegaDome Focus tool:**

An inherent concern with dome cameras is the optical distortion introduced by the plastic bubble of the dome. When using analog or VGA resolution cameras, the distortion is not as noticeable as with a megapixel camera, where it can significantly impact image quality. No matter how well the lens is focused, upon placing the bubble on the camera, there is a high probability that the image will become distorted. The only way to compensate is to focus the camera with the bubble on. Installation while trying to focus the camera through the bubble can be challenging because it is difficult to hold the bubble the correct distance and angle from the front of the lens.

Arecont Vision has provided a simple solution with our **MegaDome focus tool (MD-FT)**. This accessory ships with each MegaDome to help the installer achieve the best-possible focus for Arecont Vision megapixel dome cameras.

1. The focus tool is placed over the lens, as shown in image x.x. The thickness and optic curve simulate the distortion caused by the bubble.
2. Focus the lens following the focus procedure listed above.
3. Remove focus tool from lens.
4. Replace bubble on dome.

*Use of this tool has been shown to significantly improve the image focus with MegaDome cameras. Improvement is most noticeable when used to focus 3 and 5 megapixel cameras. The tool is also available on separate from the camera; part number is MD-FT. Contact your local Arecont Vision sales representative for purchase.*
Focusing SurroundVideo Cameras:

The 180° and 360° cameras are calibrated for field of view and focused by Arecont Vision during production.

Under normal circumstances you should not need to focus or adjust the lenses on Arecont Vision megapixel cameras; however, in the case focus adjustment is necessary, the thumb screw at the base of the lens can be loosened which allows the lens to be focused. No other adjustment should be needed with these models. If further adjustment of optics image is necessary, please contact Arecont Vision’s technical support team.