



MEASUREMENT CAMERA USER GUIDE

How to use your Aven camera's imaging and measurement tools

Part 1 of this guide identifies software icons for on-screen functions, camera settings and measurement tools.

Part 2 provides step-by-step operating instructions.

Part 3 shows how to measure a line, angle, arc, circle, center points, rectangle and polygon.

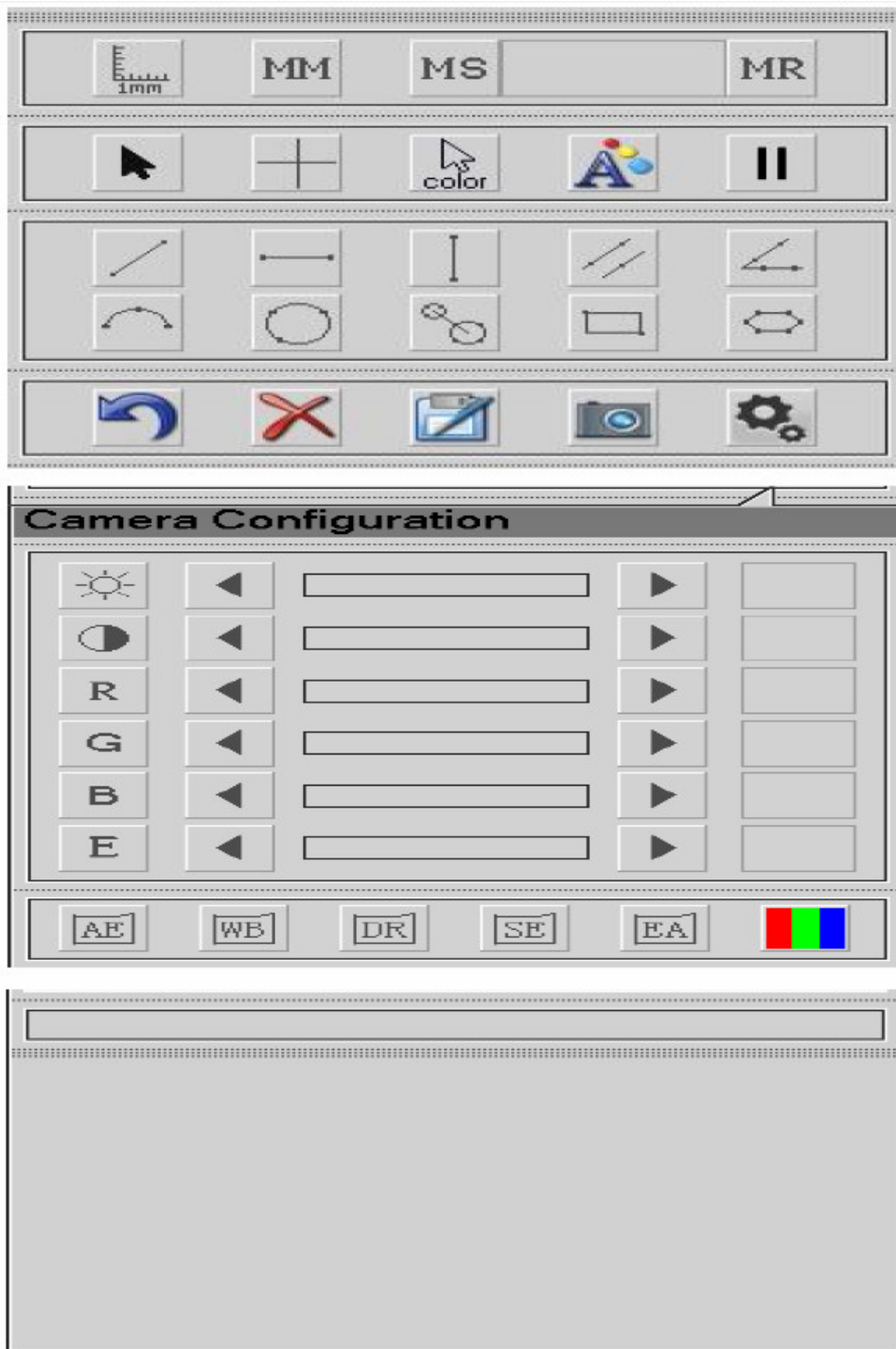
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1.1 Menu display



Measurement tools


















Camera settings

Magnified image display area

Note: After power is turned on, the camera takes about 10 seconds to initialize and display a green light. If no light appears after that time, unplug the unit, wait 3 seconds and supply power again to the camera.















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1.2 Function descriptions











Icon	Name and purpose
	Set calibration to 1 millimeter
	Set calibration to 0.1 millimeter
	Use millimeters as measurement unit (default setting)
	Convert measurement to inches (same button as above)
	Memory Save (Saves current calibration file)
	Memory Read (Chose calibration file to read)
	Mouse arrow pointer to set measurement points
	Mouse crosshair to set measurement points
	Set cursor color (blue, white, black, red or yellow)
	Set text and line color to contrast with background (red, yellow, blue)
	Live image displays on screen
	Freeze image
	Cancel current operation; return to previous step
	Delete measurement lines and data
	Save data on SD card
	Save image with measurement data on SD card
	Turn configuration settings on and off

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1.3 Camera settings



Icon	Name and purpose
	Brightness
	Contrast
	Red gain adjustment
	Green gain adjustment
	Blue gain adjustment
	Edge-finding sensitivity adjustment
	Auto Exposure
	White Balance
	Dynamic Range increases or decreases camera's sensitivity to light
	Shape Edge Sharpen image edge definition for clarity)
	Edge, Auto lets system auto-selects an edge point (toggles with EM button)
	Edge, Manual lets user select an edge point (toggles with EA button)
	Black & white display of image (same button as below)
	Color display of image (alternate setting of button above)


1.4 Measurement tools


Icon	Name and purpose
	Find distance between two points on a line
	Measure horizontal distance
	Measure vertical distance
	Measure the distance between parallel lines. System creates the second line at a third point.
	Select 4 points to draw two lines. Degrees will be displayed for the inside angle, as well as outside for the supplementary angle.
	Select 3 points to measure an arc in degrees
	Select 3 points to measure a circle's radius, diameter and area
	Connect 2 center points and measure the distance between them
	Select 2 points to measure a rectangle's length and perimeter
	Select up to 10 points to measure a polygon's perimeter.

Part 2: Operating steps

2.1 Setting the camera

White Balance : Adjust illumination and brightness to maximum levels for best results. Place a white paper sheet under the lens and click the  button to set the correct balance automatically. Alternately, you can adjust white balance manually by using changing the R, G, B gain values as needed via those buttons on the left of the Camera Configuration menu.

Whether balancing automatically or manually, be sure to click the  icon to turn off the camera setting before the next operation.

Contrast : This step assures object edges are clear enough for accurate measurements. Adjust the contrast key until an image edge is sharp.

At the same time, you can adjust the edge threshold .


Higher edge threshold values make the system more sensitive in differentiating between edge and background pixels, which requires a higher contrast. Lower edge threshold values mean it will be less sensitive to contrast between pixels.

2.2 Measurement units and magnification calibration

Two reference units – 1mm and 0.1mm – are provided for calibration values.

Each time the lens magnification is changed, it's necessary to calibrate the system for measurement. For high-accuracy measurement, Aven recommends using a detented lens so that measurements are calibrated accurately at each detent.

How to calibrate:

1. Using the desired magnification, choose one of the two calibration units and then find the circle on the standard reference calibration scale board. Select 3 points on the circle edge as far apart as possible to improve calibration accuracy.
2. The monitor will draw a circular pattern and snap to the edge automatically. If it's imprecisely defined, click  to clear the pattern and calibrate again.

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2.3 Calibration value data (to save and read)

Magnification calibration (shown on screen's right side) can be saved in the camera for each detented lens setting, avoiding a need for repeated calibration. Up to nine sets of data can be stored, although they'll be precisely accurate *only* if using a detented lens with distinct click stops.

1. Click **MS** and the monitor will show this small keyboard.
2. Choose the calibration setting, type it into the bar and press the large arrow key to enter and save. To modify an entry, click the backspace key at top right.
3. After it's saved press the Esc key to exit.



To use a saved calibration, click the **MR** key for a drop-down menu. Select the calibration setting saved.

2.4 Unit conversion

This systems offer millimeters and inches as measurement units, though mm must be used in the calibration step. To display inches, click **INCH** to convert the measurement. Clicking **MM** reverses the process. (The choices toggle on the same button.)

2.5 Mouse cursor choices

The system provides two kinds of screen cursors for marking points. Choose whichever is most appropriate for the measurement task.



2.5 Mark an edge point











Auto-select an edge point:

The system can automatically select an edge point if you click **EA**, which toggles with **EM**. Click the left mouse button near the image edge. The software will find the edge and snap to it, automatically establishing a start point.

Manually select an edge point:

When using **EM**, find the edge by drawing a box near it with the cursor. Watch for a colored line on the magnification screen at bottom right to show the edge is identified, and then drag the mouse (while continuing to press the left button) until the image edge is fully included in the box. You then can select a corresponding edge as needed.

Part 3: Measurement operations

1. Line measurement: Mark 2 points to draw a straight line and see the distance. 
2. Horizontal line: See distance between 2 points. 
3. Vertical line: See distance between 2 points. 
4. Parallel lines: Select 2 points to draw a line. Then select a third point. The program will draw a line parallel to the first line and measure the distance between them. 
5. Angle: Select 2 points to draw a line. Select another 2 points to draw a second line, Measurement results will show the internal angle and its supplementary (external) angle in degrees. 
6. Arc: Select 3 points to draw a radian and see the curve data in degrees. 
7. Circle: Select 3 points to draw a circle and see its radius, diameter and area. 
8. Center measurement: Select 3 points to draw a circle and another 3 for a second circle. The program will connect two center points and display the distance between them. 
9. Rectangle: Choose 2 points to draw vertical and horizontal lines that form a closed rectangle and compute its height, width and area. 
10. Polygon: Select up to 10 points to form any closed shape. Click the right mouse button to draw the last point and the program will form a polygon shape by connecting all points from first to last. 

Note: Drawn graphics must fit completely on the screen or they will not display.

Part 4: Saving measurement data

The SD card can store an unlimited amount of measurement data. Nine sets at a time are displayed on the screen's right side. When the list is full, it must be saved so more can be entered.

How to save data:



Press this camera icon button on the last row of the measurement tools menu to save measurement **data with an image**.



Press this adjacent clipboard icon button to **save only data**.

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