DD309CS Hi-Def
Video Micrometer & Protractor

Users' Manual

Colorado Video

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SECTION I

GENERAL DESCRIPTION

1.1   PURPOSE OF EQUIPMENT

The DD309CS High Definition Video Micrometer and Protractor provides the means to measure dimensions and angles in a high definition DVI (HDMI) video picture.

Colorado Video Hi-Def Micrometer/Protractors make six different types of measurements between user-positionable cursors; (1) horizontal dimension between two vertical cursor lines, (2) vertical dimension between two horizontal cursor lines, (3) diagonal dimension between two diagonal cursors, (4) dimension between two cursor points, (5) angle between two cursor lines, and (6) angle between two cursor lines with positionable vertex.

An HDMI signal at the input by means of a simple adapter is acceptable provided it is not HDCP Encrypted. The DD309CS will not pass any audio or encrypted content that may be present in an HDMI signal.

1.2   DESCRIPTION OF EQUIPMENT

The Model DD309CS accepts DVI-D Single Link Video at its input, adds measurement cursors, user menu and measurement data, and provides a DVI-D Single Link Video output for display on a compatible monitor.

The DD309CS, constructed in an ABS plastic and aluminum chassis with an internal EMI shield coating, is free standing with a sloping face for bench top use. It requires an external power supply to provide 5 Volts DC regulated, <1 Amp, at its 5.5x2.5mm coaxial power connector.

The Input/Output connectors are physically compatible with all DVI cables. The signal must be DVI-D Single Link or HDMI without HDCP Encryption. Passive adapters and cables to interconnect DVI and HDMI equipment are widely available. Generally, cameras are free of HDCP but DVD, Blu-Ray, and Satellite sources are frequently encrypted.

1.3   SPECIFICATIONS

Size: 8.875"W x 6.5"L x 2.75"H sloping to 1.25"H

Mounting: Table Top

Construction: Solid-state, SMT PC Board, Optionally RoHS
                     Commpliant

Power: +5VDC, <1000mA regulated

Input Signal: DVI-D, Single Link (HDMI with adapter) HDCP not
                     permitted

Output Signal: DVI-D, Single Link, Output Resolution follows Input
                     Resolution

Controls: **Button:**: Multiple Functions
                     Knob II (lower Multi-Function Knob)
                     Knob I (upper Multi-Function Knob)

Indicators: Power (Flashing), Video OK (Steady)

Connectors: Video   In & Out: DVI-I
                     Power: Coaxial 5.5mm x 2.5mm (5.5mm x 2.1mm for
                     UK)

2.1 INSTALLATION

Connect a camera or other source of a DVI-D or HDMI video signal to the "input" connector on the rear of the DD309CS. If the video source provides HDMI, a simple HDMI-DVI adapter or cable will be required. HDCP encrypted video is not permitted and any audio will not pass through the DD309CS. Some consumer HDMI equipment may operate only if its output is set to 480p or 480i.

Connect a DVI-D video monitor to the "output" connector. HDMI monitors are also suitable with use of a DVI-HDMI adapter or cable.

Connect the coaxial power input to a regulated 5VDC, >1000mA, center pin positive regulated power source. The "Power/Video OK" LED should appear steady. If the LED flashes, power is present but the signal at the video input is absent or incompatible.

A steady green "Video OK" indicator but blank picture indicates that the DVI or HDMI source is HDCP encrypted and processing by the DD309CS is not permitted.

2.2 SETUP

2.2.1 Menu Settings

The menu appears when the control button is tapped. Its size, position, and persistance are controllable. To adjust these parameters:
 1. Tap the button to enter the "Main Menu".
 2. Use Knob II to select the "Tools" icon and tap the button.
 3. Use Knob II to select the "Menu Settings" icon and tap the button.
 4. To adjust the menu's persistance, use Knob II to select the "Persistance" icon, tap the button, use Knob II to make your setting, and tap the button.
 5. To adjust the menu's size, use Knob II to select the "Size" icon, tap the button, use Knob II to make your setting, and tap the button.
 6. To adjust the menu's position, use Knob II to select the "Position" icon, and tap the button. Use Knob II to adjust the menu's horizontal position and Knob I to adjust its vertical position, then tap the button.
 7. Select the "Return" icon and tap the button to exit the "Menu Settings" menu.

2.2.2 Display Settings

The Dimension Display is always present. Its size and position are controllable. To adjust these parameters:

1. Tap the button to enter the "Main Menu".
2. Use Knob II to select the "Tools" icon and tap the button.
3. Use Knob II to select the "Display Settings" icon and tap the button.
4. To adjust the display's size, use Knob II to select the "Size" icon, tap the button, use Knob II to make your setting, and tap the button.
5. To adjust the display's position, use Knob II to select the "Position" icon, and tap the button. Use Knob II to adjust the menu's horizontal position and Knob I to adjust its vertical position, then tap the button.
6. Select the Return icon and tap the button to exit the "Display Settings" menu.

2.2.3 Cursor Settings

Two style palettes control the style of the two measurement cursor lines or points, A and B. One palatte is provided for each cursor line or point. Adjustable Style parameters include color, line-width, line-intensity (transparancy), line-shadow, and line-symbol size. To adjust these parameters:

1. Tap the button to enter the "Main Menu".
2. Use Knob II to select the "Style" icon and tap the button.
3. Use Knob II to select the "Palette A" or "Palette B" icon and tap the button.
4. Use Knob II to select the desired parameter (Color, Width, Intensity, Shadow, or Symbol Size) icon and tap the button.
5. Use Knob II to adjust the parameter and tap the button to return to the "Palette Menu".
6. If desired, the "Copy to Palette" icon can be selected and the button tapped to easily copy this palette's parameter settings to the other's.
7. Select the "Return" icon and tap the button to exit the "Display Settings" menu.

2.2.4 Calibration Settings

A choice between four separate calibration sets, A, B, C, or D, can be made active. Each Calibration Set automatically stores and uses settings made in the "Units", "Aspect Ratio", and "Calibration" menus in an ongoing basis.

To select a Calibration Set:
 1. Tap the button to enter the "Main Menu".
 2. Use Knob II to select the "Cal Set" icon and tap the button.
 3. Use Knob II to select the desired "Cal Set" icon and tap the button to exit the "Cal Set" menu.

2.2.4.1 Aspect Ratio Setting

A unique Aspect Ratio can be selected for each Calibration Set. Aspect Ratio can be set to one of four choices including Isotropic, 4x3, 16x9, or Custom. These choices refer to the video source (camera) only. A monitor's aspect ratio is irrelevant for obtaining accurate measurements.

Some rules of thumb for selecting the Aspect Ratio setting are:
 1. Standardized HDTV sources with formats like 720p, 1080i, and 1080p, can use either the "Isotropic" or the "16x9" selection.
 2. Video sources with pixels known to be square can use the "Isotropic" selection.
 3. All pixel formats where dividing the smaller number by the larger number equals 0.5625 can use the "16 x 9" selection.
 4. All pixel formats where dividing the smaller number by the larger number equals 0.75 can use the "4 x 3" selection.
 5. SDTV derived formats (NTSC, PAL) use non-square pixels for widescreen display. In this case, select 4 x 3 or 16 x 9, depending on whether the video source provides regular or widescreen aspect ratio, respectively. These formats normally appear 4 x 3, but some cameras and other sources can produce these formats in a widescreen variant by using rectangular pixels.
 6. Computer generated formats, like 1024 x 768, 1680 x 1050, 1600 x 1200, etc., also use square pixels, and so should normally be configured "Isotropic". Some of these formats are not exactly 4 x 3 or 16 x 9, so it's important in those cases to use the "Custom" selection.

To make the Aspect Ratio selection:
 1. Tap the button to enter the main menu
 2. Use Knob II to select the Aspect Ratio icon and tap the button.
 3. Use Knob II to select the desired Aspect Ratio and tap the button to exit the "Aspect Ratio" Menu.

2.2.4.2 Units Setting

A unique measurement Unit can be selected for each Calibration Set. Units can be set to one of eleven choices including yd, ft, in, mil, m, cm, mm, um, nm, px, or none. The selected unit is shown in the dimension display. If calibration is made in one unit and a different unit is subsequently selected, the calibration will automatically change. For instance, if calibration is made in "in" and the Unit selection is subsequently changed to "mm", the calibration will automatically change by a factor of 25.4.

To select Units:
 1. Tap the button to enter the main menu
 2. Use Knob II to select the "Units" icon and tap the button.
 3. Use Knob II to select the desired Unit and tap the button to exit the "Units" Menu.

2.2.4.3 Calibration

Calibration should be made only after camera, optical, and physical aspects of the measurement system have been configured. A separate calibration setting needs to be made for each of Model DD309CS's four Calibration Sets.

To Calibrate for 4 x 3, 16 x 9, and Isotropic Aspect Ratio modes:
 1. Verify that the desired "Cal Set" is active (see 2.2.4).
 2. Place a known dimensional reference in the camera's field of view, preferably in or near the region of the picture where most measurements will be taken, and fairly near the same dimension as those that will be taken.
 3. From the "Main Menu", select the "Measurement Mode" icon and tap the button.
 4. Use Knob II to select any of the four "Distance" modes, preferably the one that you anticipate using most often after calibration and tap the button.
 5. Refering to the monitor, position the cursors about the reference as though you were taking its measurement (see 3.X.X.X).
 6. Tap the button to enter the "Main Menu".
 7. Use Knob II to select the "Calibration" icon and tap the button.
 8. Use Knob II to obtain the correct numerical reading given the reference's dimensions.
 9. Tap the button to return to the "Main Menu".

To Calibrate for "Custom" Aspect Ratio mode:
 1. Verify that the desired "Cal Set" is active (see 2.2.4).
 2. Place a known dimensional reference horizontally in the camera's field of view, fairly near the same dimension as, and preferably in or near the region of the picture where, most measurements will be taken.
 3. From the "Main Menu", select the "Measurement Mode" icon and tap the button.
 4. Use Knob II to select the "Horizontal Distance" mode and tap the button.
 5. Referring to the monitor, position the cursors about the reference as though you were taking its measurement (see 3.2).
 6. Tap the button to enter the "Main Menu".
 7. Use Knob II to select the "Calibration" icon and tap the button.
 8. Use Knob II to obtain the correct numerical reading given the reference's dimensions.
 9. Tap the button to return to the "Main Menu".
10. Repeat steps 2-9 for vertical (instead of horizontal).

SECTION III Operation

3.1 Measurement Mode Selection

Six Measurement Modes are available: "Horizontal Distance" between two vertical cursor lines, "Vertical Distance" between two horizontal cursor lines, daigonal distance between two "Parallel" diagonal cursors, "Point Distance" between two points, "Line Angle" between two lines, and "Vertex Angle" also between two lines.

To select the Measurement Mode:
 1. Tap the button to enter the main menu.
 2. Use Knob II to select the "Measure Mode" icon and tap the button.
 3. Use Knob II to select the desired Mode and tap the button to exit the "Meas Mode" Menu.

3.2 Using Horizontal Distance Mode

 1. After selecting "Horizontal Distance" mode (see 3.1) use Knob II to select the "Adjust Lines" icon and tap the button.
 2. Use Knob II to position the Base Cursor Line A. The distance between the cursors will be preserved (to facilitate comparison of dimensions in different areas of the picture).

3. Use Knob I to position Offset Cursor Line B. The dimension display reading will change with adjustment of Knob I.

3.3 Using Vertical Distance Mode

1. After selecting "Vertical Distance" mode (see 3.1) use Knob II to select the "Adjust Lines" icon and tap the button.
2. Use Knob II to position Base Cursor Cursor Line A. The distance between the cursors will be preserved (to facilitate comparison of dimensions in different areas of the picture).
3. Use Knob I to position Offset Cursor Line B. The dimension display reading will change with adjustment of Knob I.

3.4 Using Parallel (Diagonal) Distance Mode

1. After selecting "Parallel Distance" mode (see 3.1) use Knob II to select the "Adjust Base" icon and tap the button.
2. Use Knob II to rotate the cursor lines perpendicular to the dimension to be measured.
3. Use Knob I to position Base Cursor Line A. The distance between the cursors will be preserved (to facilitate comparison of dimensions in different areas of the picture). Tap the button to return to the "Main Menu"
4. Use Knob II to select the "Adjust Offset" icon and tap the button.
5. Use Knob II to position the Offset Cursor Line B. The dimension display reading will change with adjustment of Knob II.

3.5 Using Point-to-Point Distance Mode

1. After selecting "Point Distance" mode (see 3.1) use Knob II to select the "Adjust Point A" icon and tap the button.
2. Use Knob II to position point A along the horizontal axis and Knob I to position point A along the vertical axis. The dimension display reading will change with these adjustments. Tap the button to return to the "Main Menu".
3. Use Knob II to select the "Adjust Point B" icon and tap the button.
4. Use Knob II to position point B along the horizontal axis and Knob I to position point B along the vertical axis. The dimension display reading will change with these adjustments. Tap the button to return to the "Main Menu".

3.6 Using "Line Angle" Mode

 1. After selecting "Line Angle" mode (see 3.1) use Knob II to select the "Adjust Line A" icon and tap the button.
 2. Use Knob II to rotate Line A about its circular flag into desired orientation and Knob I to move it along its perpendicular axis into position. The angle display reading will change with these adjustments. Tap the button to return to the "Main Menu".
 3. use Knob II to select the "Adjust Line B" icon and tap the button.
 4. Use Knob II to rotate Line B about its square flag into desired orientation and Knob I to move it along its perpendicular axis into position. The angle display reading will change with these adjustments.

3.7 Using "Vertex Angle" Mode

 1. After selecting "Vertex Angle" mode (see 3.1) use Knob II to select the "Adjust Vertex" icon and tap the button.
 2. Use Knob II to position the vertex along the horizontal axis and Knob I along the vertical axis. Tap the button to return to the "Main Menu".
 3. Use Knob II to select the "Adjust Rays" icon and tap the button.
 4. Use Knob II to adjust Base Cursor Line A. The angle between the cursors will be preserved (to facilitate comparison of angles in different areas of the picture).
 4. Use Knob I to position Offset Cursor Line B. The angle display reading will change with adjustment of Knob I.

WARNING

This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a class A computing device pursuant to subpart of J of part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

WARRANTY

Colorado Video, Incorporated warrants the equipment of its manufacture to be free of defects in material and/or workmanship under normal use and service. Colorado Video, Incorporated's obligation under this warranty is limited to making good at its laboratories any part or parts thereof , which shall within one (1) year after delivery to the original purchaser be returned to Colorado Video, Incorporated at its laboratories, with transportation charges prepaid, and which Colorado Video, Incorporated's examination shall disclose to its satisfaction to have been defective.

This warranty is expressly in lieu of all other warranties and representation, express or implied, and of all other obligations or liabilities on the part of Colorado Video, Incorporated. In no event shall Colorado Video, Incorporated be liable for damages of any kind connected with the use of its equipment or its failure to function properly.

This warranty shall not apply to any equipment which shall have been repaired or altered outside of Colorado Video, Incorporated's laboratories so as to, in Colorado Video, Incorporated's judgement, affect its use, function, reliability, or which shall have been subject to misuse, alteration, improper installation, negligence, or accident.

Before any equipment is returned to Colorado Video, Incorporated for repairs or adjustments, shipping instructions should be obtained from Colorado Video, Incorporated. Colorado Video, Incorporated assumes no responsibility for unauthorized returns.

If Your Unit Carries the Optional CE Mark:

Colorado Video Inc., Boulder CO, USA, declare under our sole responsibility that the Model DD625CS, if installed and operated in accordance with instructions, is in conformity with the following European,harmonized and published standards at date of this declaration:

Safety:
EN/IEC 60950-1:2001: safety of information technology equipment

Electro-Magnetic Compatibility:
EN 55022:1998: Electro magnetic *emissions:* Class A
EN 61000-3-2:1996: Harmonic current emissions
EN 61000-3-3:1995 Limitation of voltage fluctuations
EN 55024:1998: Product group *immunity* standard IT equipment:
EN 61000-4-2: electrostatic discharge (ESD) immunity
EN 61000-4-3: Radiated Electro-Magnetic field immunity
ENV 50204:1995: Digital radio telephones immunity
EN 61000-4-4:1995: Electrical fast transients (EFT) immunity
EN 61000-4-5:1995: Surge transient immunity
EN 61000-4-6: 1996: Conducted Radio-Frequency disturbances imm.
EN 61000-4-8: 1993: Power frequency magnetic field immunity.
EN 61000-4-11: 1994: Immunity to voltage dips and short interrupts