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Avonic 4K Conference Camera USB3.0

AV-CM22-VCU

CONTENTS

INTRODUCTION

Thank you for your Avonic purchase. Before operating this product, please read the manual thoroughly and retain it for future reference. The manual can be downloaded on www.avonic.com. Save this manual for future reference.

CONTACT

For any questions or suggestions, contact your reseller or the local distributor of Avonic. Find the local distributor on the website of Avonic. For the most recent version of the manual or datasheet, look at the Avonic website: www.avonic.com.

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SAFETY NOTES

Important safety information

⚠️ **WARNING:** Failure to follow these safety instructions could result in fire, electric shock, injury, or damage to this Product or other property. Read all the safety information below before using this Product.

⚠️ **WARNING:** Before operating this product, please read the manual thoroughly and retain it for future reference. The manual can be downloaded on www.avonic.com.

Handling

Handle this Product with care. It is made of metal, glass, and plastic and has sensitive electronic components inside. this Product can be damaged if dropped, burned, punctured, or crushed, or if it comes in contact with liquid. If you suspect damage to this Product, discontinue use of this Product, as it may cause overheating or injury.

⚠️ **WARNING:** Do not pick up and move the unit while a tripod is attached. The fitting may break under the weight of the tripod, which may result in injury.

Installation

Set up this Product on a hard, stable surface or mount it to a wall or ceiling. Use the connected Avonic mount for mounting to a wall or ceiling. Ensure the mounting construction is capable of supporting four times the weight of the Product. (See 'General Specifications > Weight product' in the Product Datasheet for the exact weight.) Make sure to make use of a safety loop or drop protection that is capable of preventing the Product from falling if the mounting construction fails. Never install a product above persons to prevent any risk on injuries when it falls down.

⚠️ **WARNING:** In order to maintain adequate ventilation, do not install or place this unit in a bookcase, built-in cabinet or any other confined space. To prevent risk of electric shock or fire hazard due to overheating, ensure that curtains and any other materials do not obstruct the ventilation.

⚠️ **WARNING:** Check the installation at least once a year. An improper installation could cause the unit to fall off resulting in damage to the product, or personal injury.

Repairing

Don't open this Product and don't attempt to repair this Product yourself. Disassembling this Product may damage it or may cause injury to you. If this Product is damaged, malfunctions, or comes in contact with liquid, contact Avonic or an Avonic Authorized Service Provider. Repairs by service providers other than Avonic or an Avonic Authorized Service Provider may not involve the use of Avonic genuine parts and may affect the safety and functionality of the device. You can find more information about repairs and service at www.avonic.com.

Power

Power this Product with the included USB cable.. Other adapters may not meet applicable safety standards, and connecting with such adapters could pose a risk of death or injury.

⚠️ **WARNING:** Using damaged cables, or using the Product when moisture is present, can cause fire, electric shock, injury, or damage to this Product or other property. When you power this Product, make sure the cable is fully inserted into the power adapter before you plug the adapter into a power outlet. It's important to keep this Product, the cable, and the power adapter in a well-ventilated area when in use.

USB cable and Power supply

To operate the Avonic Power adapter and USB cable safely and reduce the possibility of heat-related injury or damage, plug the Power adapter and/or USB cable directly into Power outlet or an USB port of a computer. Don't use the Power supply and USB cable in wet locations, and don't connect or disconnect the Power supply or USB cable with wet hands. Stop using the Power supply and cable if any of the following conditions exist:

- The Power supply and/or USB cable plug or prongs are damaged.
- The Power supply and/or cable becomes frayed or otherwise damaged.
- The Power supply and/or USB cable is exposed to excessive moisture, or liquid is spilled into the power adapter.
- The Power Supply and/or USB cable has been dropped, and its enclosure is damaged.

Intended use

This Product shall not be used in the home environment and shall only be installed and operated by experienced technicians.

Not a medical device

This Product is not a medical device and should not be used as a substitute for professional medical judgment. It is not designed or intended for use in the diagnosis of disease or other conditions, or in the cure, mitigation, treatment, or prevention of any condition or disease. Please consult your healthcare provider prior to making any decisions related to your health.

Explosive and other atmospheric conditions

Using this Product in any area with a potentially explosive atmosphere, such as areas where the air contains high levels of flammable chemicals, vapours, or particles (such as grain, dust, or metal powders), may be hazardous. Exposing this Product to environments having high concentrations of industrial chemicals, including near evaporating liquified gasses such as helium, may damage or impair this Product functionality. Obey all signs and instructions.

High-consequence activities

This device is not intended for use where the failure of the device could lead to death, personal injury, or severe environmental damage.

PACKAGE CONTENTS AND ACCESSORIES

Contents

No.	Quantity	Description	Avonic SKU
1	1 pc	CM22 Camera	AV-CM22-VCU
2	4 pc	USB Power Adaptor (EU, UK, US, AUS)	AV-CM20-PSU
3	1 pc	Remote Control	CM-RC
4	1 pc	USB 3.0 cable	AV-USB30-AB

Handling precautions

Be cautious to take the camera by its base and do not touch the lens. See the pictures below.

PRODUCT OVERVIEW

The Avonic CM22-VCU boasts a 4K, wide angle lens up to 120 degrees FOV that makes sure you can capture all attendees. It's Smart automatic and fully user configurable modes guarantee crystal clear video even under the most challenging light conditions. Built in user configurable dual microphones allow for easy audio capture.

A true integration product with a discrete design and mount developed for PRO-AV installations. It can be easily mounted either on top of or below a screen for optimal line of sight during a meeting. The mount can be used in combination with modern thin-bezel screens.

Designed to last the CM22-VCU comes with 3 year warranty.

Features

- Lens: fixed focus focus lens with 120° Horizontal FOV.
- Crystal Clear Image: :   4K Progressive CMOS sensor 2160P UltraHD
- Output: HDMI and USB3.0 up to 4K30 or 1080p30 when using USB 2.0
- Audio: Built in noise cancelling micorphones with 4 meter pick up range
- Control: Control the camera via any UVC based videoconference application or the included IR remote control
- Presets: 10 User definable presets with Digital Pan Tilt and Zoom including startup preset
- Mount: The CM22 comes with an included detachable integration mount with the ability to secure and mount the camera above or below a screen

Applications

- Huddle Rooms
- Telemedicine
- Desktop Video Conferencing
- Small and Medium Size meeting rooms
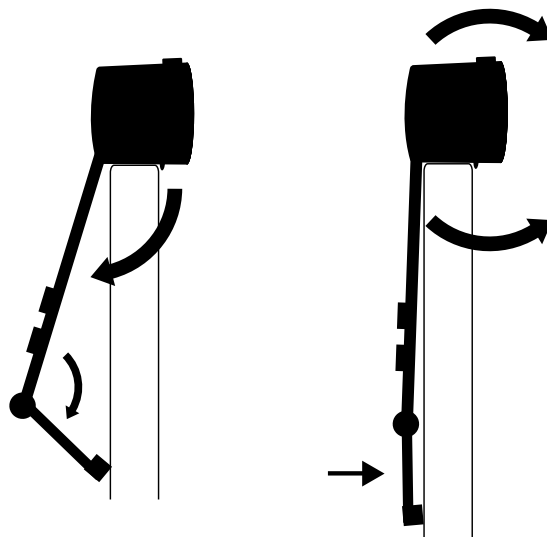
INSTALLATION

Connections

1. HDMI output
2. USB 3.0 connector

Camera placement

The CM22 comes with a detachable integration mount with multiple placement options:

1. Monitor placement

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2. Wall mounted above a screen

The minimum (depending on connector type used) and maximum depth are indicated, due to the dual articulated sliding mount design there are numerous variations to make.

70mm   207mm
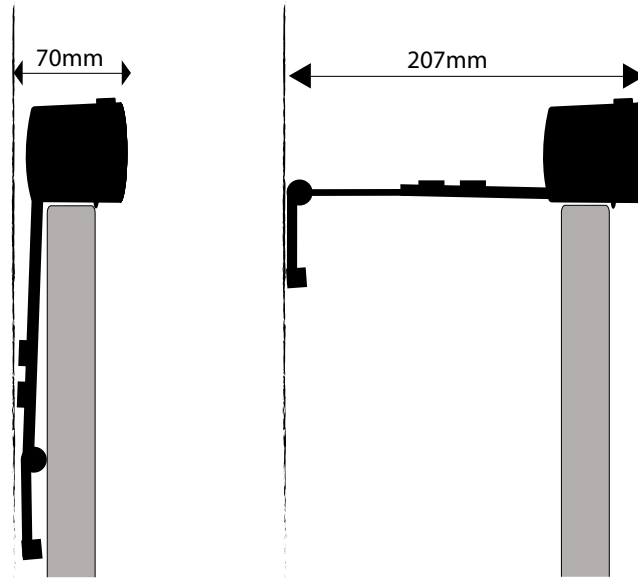
3. Wall mounted below a screen

The minimum (depending on connector type used) and maximum depth are indicated, due to the dual articulated sliding mount design there are numerous variations to make.

70mm   207mm
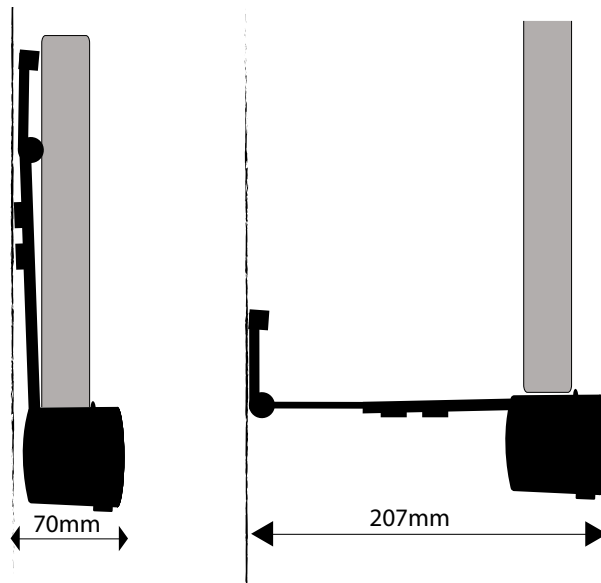
OPERATION

Remote controller

1. Standby Key

2. Number Key

3. *Key

4. Preset Key

5. Home key

6. Return Key

7. Zoom Button

8. Left/Right Setting Key

9. Focus Key

10. Camera IR Selection Key

11. #Key

12. IR Channel ProgramKey

13. Reset Key

14. PTZ control key

15. Menu Key

16. Backlight Key

17. PTZ reset key
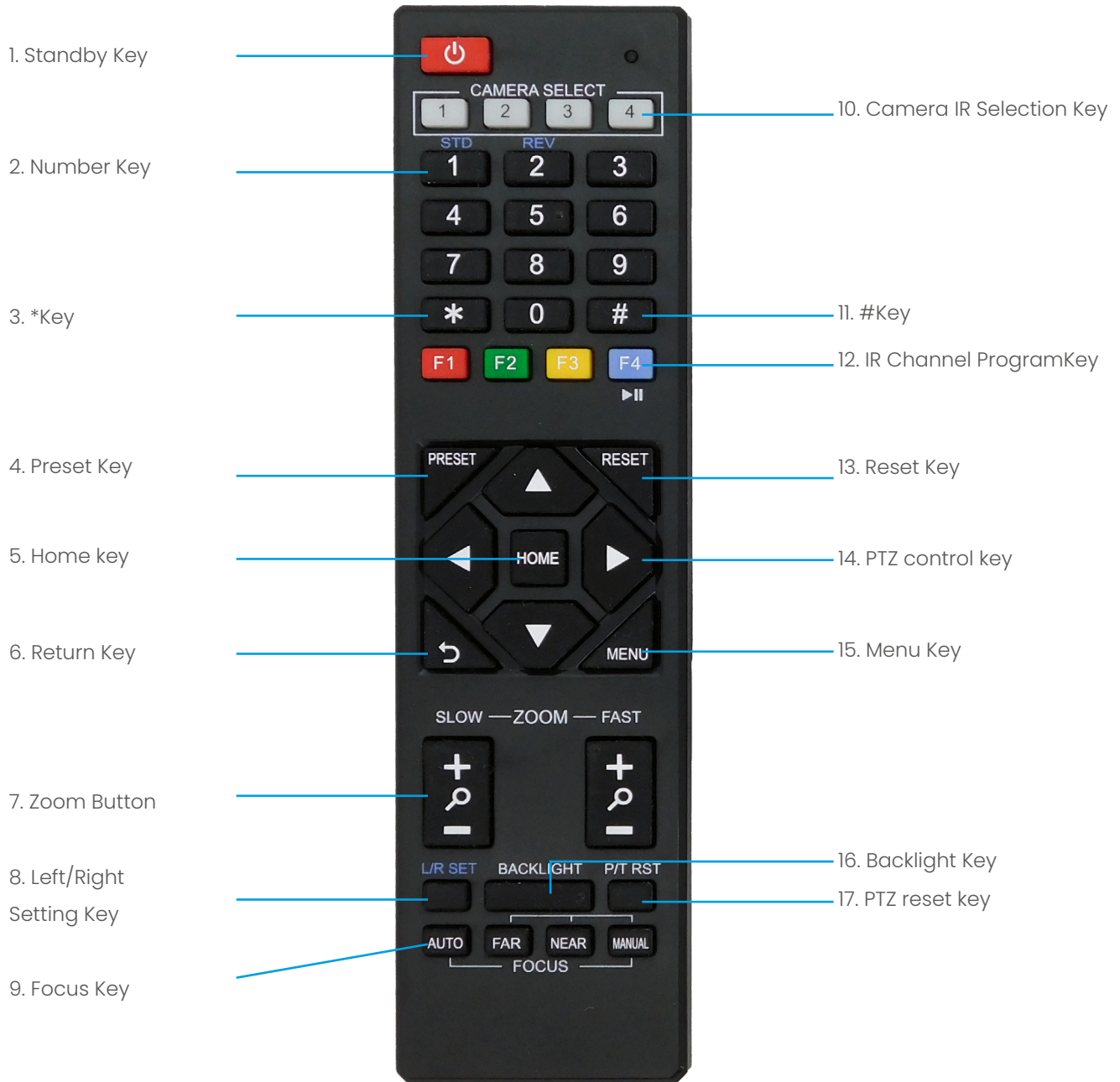
1. *Standby Key*

This button has no function with this camera.

2. *Number Key*

Call preset PTZ position.

3. **Key*

Used with other keys.

4. *Preset Key*

Preset memory in combination with numeric keys (0-9)

5. *Home Key*

The PTZ camera/image will go back to the center position, or "enter" function in "On Screen Display (OSD)" menu.

6. *Return Key*

Return back tot the previous level of the menu.

7. *Zoom + -*

Zoom the camera with these buttons. Slow zoom in and out/ fast zoom in and out.

8. *Left/Right Setting Key*

This button has no function with this camera.

9. *Focus Key*

This button has no function with this camera.

10. *Selection Key*

Select IR channel 1 to 4 to control multiple cameras individually.

11. *# Key*

Used with other keys.

12. *IR Channel Program Key*

[*] + [#] + [F1]/ [F2] / [F3] / [F4]: program camera to IR channel 1 to 4

13. *Reset Key*

Delete the memory preset in combination with the numeric keys (0-9).

14. *PTZ Control Key*

When zoomed in, move the image with the up/down/left/right keys.

15. *Menu Key*

This Menu button opens of closes the the OSD menu. If the menu is not in English, please press [*]+[#]+[1] to change the Menu language to English.

16. *Backlight Key*

This button has no function with this camera.

17. *PTZ Reset Key*

This button has no function with this camera.

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Quick Codes list

[*]+[#]+[1] : OSD menu default English

[*]+[#]+[4] : 1080P@30fps default hdmi resolution

[*]+[#]+[5] : Disable microphone, setting is persistant even after power cycle

[*]+[#]+[6]: Factory default
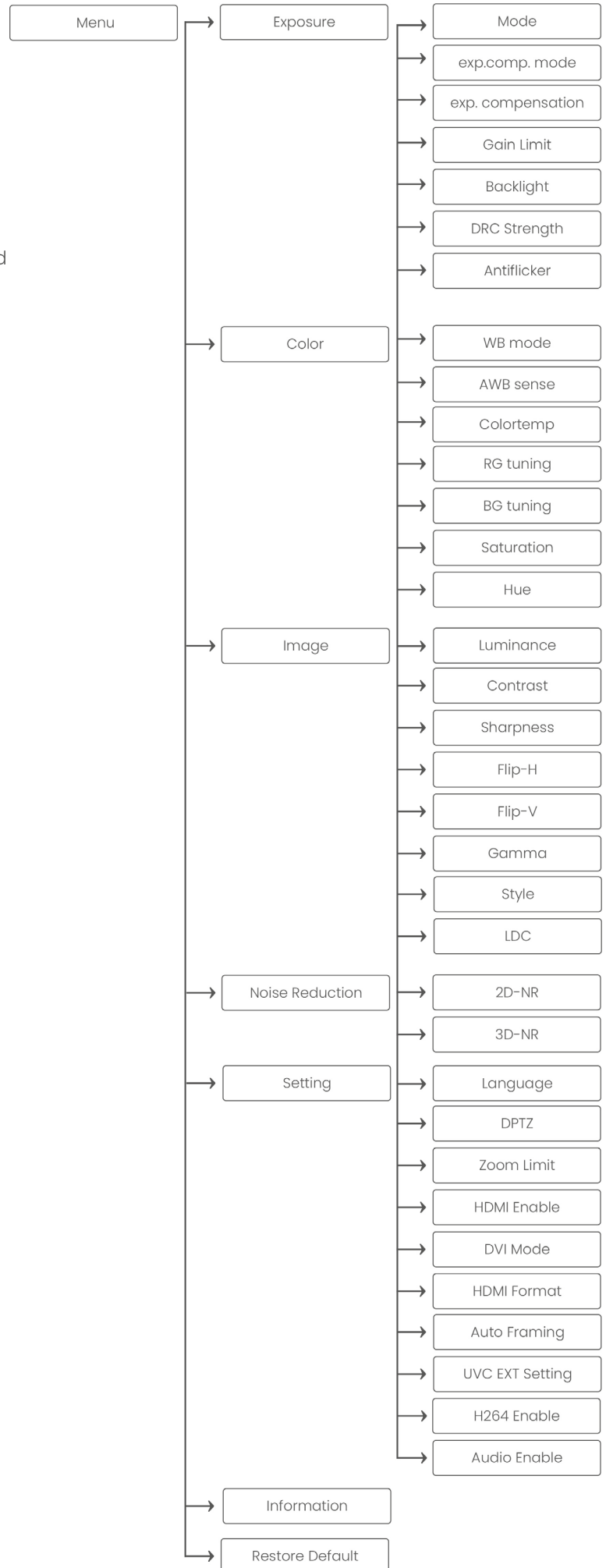
[*]+[#]+[7]: 1080P@60fps default resolution

[*]+[#]+[9]: Enable microphone, setting is persistant even after power cycle

Contact Avonic for latest firmware info@avonic.com

OSD Menu

The OSD menu can be accessed by using the IR Remote Control and a third party UVC based videoconference application; such as many Media players like VLC or Potplayer, the standard windows camera application etc.
In the following pages, the navigation is described for using the IR Remote Control.

Menu

Exposure → Mode
→ exp.comp. mode
→ exp. compensation
→ Gain Limit
→ Backlight
→ DRC Strength
→ Antiflicker

Color → WB mode
→ AWB sense
→ Colortemp
→ RG tuning
→ BG tuning
→ Saturation
→ Hue

Image → Luminance
→ Contrast
→ Sharpness
→ Flip-H
→ Flip-V
→ Gamma
→ Style
→ LDC

Noise Reduction → 2D-NR
→ 3D-NR

Setting → Language
→ DPTZ
→ Zoom Limit
→ HDMI Enable
→ DVI Mode
→ HDMI Format
→ Auto Framing
→ UVC EXT Setting
→ H264 Enable
→ Audio Enable

Information

Restore Default

First Operation

1. Install and/or open a third party UVC based videoconference application (VLC, Potplayer, Standard Windows Camera Application etc.)
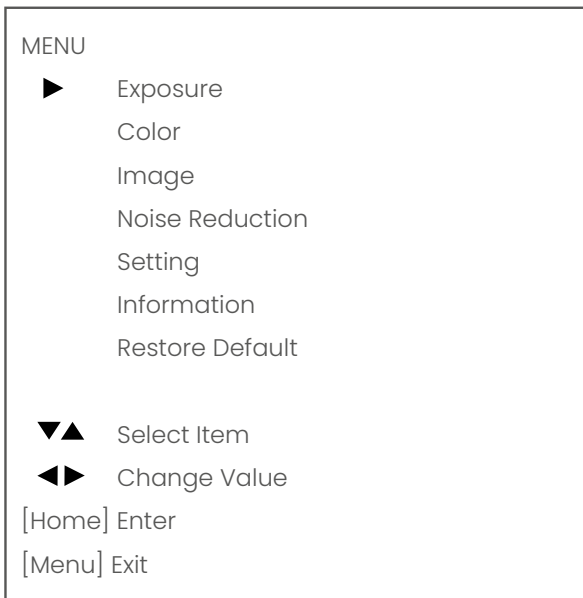2. Connect the USB or HDMI cable to your computer. If you use the HDMI cable, do not forget to connect the USB cable and the USB Power adaptor to the power net. (See chapter Package Contents and Assesoiries)
3. In your Third Party software the camera will automatically appear as "HD Camera". Select this camera. For a crystal clear image we recommend to change the Video Format to to 1920x 1080 or higher when using full screen mode of your monitor.
4. When you can see the image of the CM22 (HD Camera), you can use the IR Remote Control to open the OSD Menu.
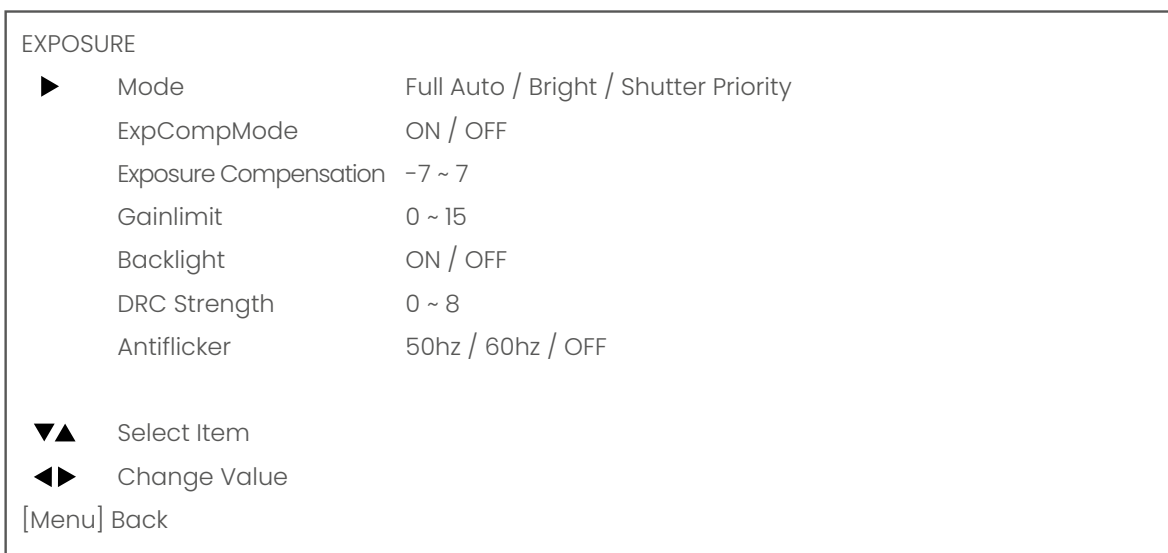
Menu

Press [MENU] button to display the main menu on the screen. Use the arrow buttons to move the cursor to the item to be set. Press the [HOME] button to enter the corresponding sub-menu. The sub-menu's have, beside the underlying settings, also a [RETURN] option. By selecting [RETURN] ↰ and pressing the HOME button on the remote control, it is possible to return to the main menu.

Note that, when you are zooming in to the picture, the text of the OSD menu will be enlarged. Make first your adjustments in the OSD Menu before you are zooming in.

```
MENU
    ▶        Exposure
             Color
             Image
             Noise Reduction
             Setting
             Information
             Restore Default


    ▼▲       Select Item
    ◀▶       Change Value
[Home] Enter
[Menu] Exit
```

EXPOSURE

```
EXPOSURE
    ▶        Mode                     Full Auto / Bright / Shutter Priority
             ExpCompMode              ON / OFF
             Exposure Compensation    -7 ~ 7
             Gainlimit                0 ~ 15
             Backlight                ON / OFF
             DRC Strength             0 ~ 8
             Antiflicker              50hz / 60hz / OFF


    ▼▲       Select Item
    ◀▶       Change Value
[Menu] Back
```

The camera determines the iris and shutter settings. There are a couple of settings to present the camera with some limits as to what it may do to the image:

ExpCompMode (Exposure Compensation Mode)
The Exposure Compensation Mode is to create a quick adjustment to your current exposure settings, if the light conditions require this without actually changing the fundamental values like shutter and brightness. Set this mode ON to make changes to the **Exposure Compensation.**

Gainlimit
Gain limit is the maximum level of artificial brightness and contrast that the camera may add to the image automatically. This setting will make a significant difference to the overall picture. Make sure that this setting is kept 'within reason' as it can add noise to the picture in dark areas and produce a washed out greyish picture.

Backlight
Note that the camera will do nothing when this setting is "ON". Despite there is a Backlight button on the IR Remote Control and a Backlight option in the OSD menu, the camera itself has no Backlight function.

DRC Strength
Dynamic Range Compression Strenght has a similar effect on the picture as the above mentioned gain limit. The DRC works by compressing the natural dynamic range of the image by taking out the darkest and lightest parts of the image. This can be a particular helpful setting when the light conditions are challenging. The differences should be clearly visible in dark parts of the image, they will become lighter/more grey once the level of DRC is increased.

DRC Strength and Gainlimit with decreased settings

DRC Strength and Gainlimit with increased settings

Antiflicker
This setting is to set your camera up in such a way that it's able to cope with the flickering of artificial lighting in the space where it has to operate. The options are 50Hz, 60Hz and OFF.

Shutter Priority
In this mode the shutter speed is user adjustable, the camera itself decides the best iris F-stop value for an optimal exposure setting.

Keep in mind that the shutter speed is the amount of time that each frame of the sensor has been exposed to light.

To compensate for poor lighting conditions, it is possible to adjust the DRC Strength. See the DRC Strength paragraph on this page for more information.

Bright mode

This mode is to try and create a decent image when the light conditions are exceptionally poor. In this mode keep the Bright level, Gainlimit and DRC Strength as low as possibly acceptable to avoid too much noise in the picture. If the level of noise in the image becomes unacceptable, noise reduction is available to smooth the picture over. It is also possible to reduce flickering in the image with the AntiFlicker (see Antiflicker above).

COLOR

```
COLOR
   ▶      WB Mode              auto / indoor / outdoor / One Push / manual / VAR
          AWB Sense            low / middle / high
          Colortemp            2500K ~ 8000K
          RG Tuning            -10 ~ 10
          BG Tuning            -10 ~ 10
          Saturation           60 % ~ 200%
          Hue                  0 ~ 14


  ▼▲      Select Item
  ◀▶      Change Value
 [Menu] Back
```

The color mode inside the camera is designed in such a way that the video output of the camera can match the current light conditions to produce accurate colors. There are several automatic preset modes and a manual mode to set the colors to the preference of the user.

WB mode: auto

The camera continuously measures and defines the light conditions and acts accordingly. In this mode there are some adjustments that can be made to tune the image to the preference of the user.

AWB Sense or Auto White Balance Sensitivity
how quickly the camera responds to changing light settings.

RG Tuning
Red Gain Tuning, increase or decrease red
RG: Set the intensity of the red you want

BG Tuning
Blue Gain Tuning, increase or decrease blue
BG: Set the intensity of blue you want

Saturation
How saturated the image colors are. 0% would produce a black and white image.

Hue or tint
The balance between green and red. 0 is green, 14 is red.

WB mode: Indoor/ Outdoor

Select these modes when you are filming inside (indoor) or outside rooms or buildings (outdoor). It is possible to change saturation (saturation of image colors) and Hue settings (balance between green and red).

WB Mode: One Push

This mode will focus once on an object or person in the image and will keep the focus in that position until another command to focus again is send. This allows you to change the color settings in such a way that it is optimal for that camera position. The same settings can be changed as is described under "WB mode auto" (see above).

WB Mode: Manual

In this mode you can change manually the color settings such as R Gain (amount of red), B Gain (amount of blue), saturation (how saturated the colors are) and the Hue (Balance between green and red).

WB Mode: VAR

This mode allows you to change the color temperature settings. Beside RG/ BG Tuning, Saturation and hue settings, you can change also the color temperature (Colortemp). 2500K will give the image cold (blue) colors, while 8000K will give the image warm (yellow) colors.

IMAGE

```
IMAGE
    ▶      Luminace              0 ~ 14
           Contrast              0 ~ 14
           Sharpness             0 ~ 14
           Flip-H                ON / OFF
           Flip-V                ON / OFF
           Gamma                 0.45 / 0.50 / 0.56 / 0.63 / EXT / Default
           Style                 Default / Normal / Clarity / Bright / PC / Clarity (LED) / Face
           LDC                   -10 ~ 10


    ▼▲     Select Item
    ◀▶     Change Value
[Menu] Back
```

The image section of the camera consists of settings that have an effect on the image post-processing. Basically these settings are all artificial, they don't affect the optical parts of the camera itself.

Luminance
This setting will enlighten the image and change the amount of detail that is visible in darker areas of the image. Be careful not to set this setting too high as you will see that the image becomes 'milky-white'.

Contrast
The amount of detail that is visible in lighter areas of the image.

Sharpness
Artificial contrast, be careful no to set this too high as it will create a sort of halo around sharp edges of filmed objects. The setting of sharpness coincides with the setting of noise reduction.

Flip-H, Flip-V
The Flip-H mode turns the picture horizontally, while the Flip-V mode turns it vertical by 180 degrees.

Gamma

The gamma curve selection has to do with the perception of the human eye to lighter and darker. If you select a higher rate of gamma, you will see that the picture become darker, but you get also more detail.

Gamma on Default


Gamma on 0.63

Style

Here you can choose the style you want, such as default (standard setting), normal (which makes the picture more 'natural'), clearity (makes the picture more clear), bright (wich makes the picture more bright), PC (optimal setting for a computer screen), clarity (led) (for filming under Led light), Face (optimal setting for filming faces.)

LDC

LDC or Lens Distortion Correction will correct distortions in the picture by giving the picture a "fisheye" look (making the picture ball). It can also be used to widen the angle of the image. Settings range from -10 to "off" and from "off" to 10.

Lens Distortion Correcten on -10
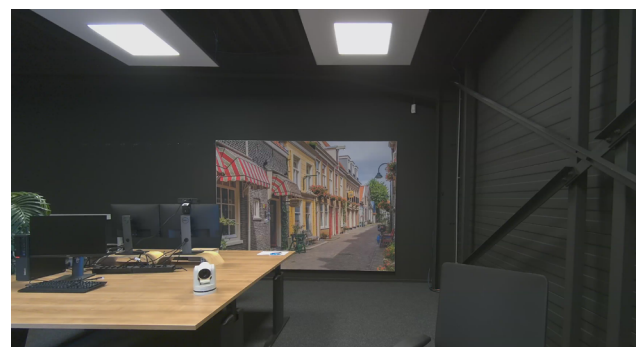
Lens Distortion Correction on 10

NOISE REDUCTION

```
NOISE REDUCTION
   ▶     2D NR                Close / Auto / 1 ~ 5
         3D NR                Close / Auto / 1 ~ 8


   ▼▲    Select Item
   ◀▶    Change Value
[Menu] Back
```

Noise reduction can be used to soften the image when noise is present due to poor lighting conditions. The higher the amount of noise reduction, the softer the image will get, ultimately losing details. Be careful when adjusting the noise reduction, it can take away the natural 'crispness' of the image.
The same is applicable for a low Contrast and high Gain. The higher the Gain and the lower the Contrast, the more noise will become visible (see also Exposure/Gain and Image/Contrast in this manual). Better practice is to add light to the filmed object to avoid this.

NR-2D
Is used for still standing objects.

NR-3D
Is used for moving objects.

SETTING

```
SETTING
   ▶     Language             English / Chinese
         DPTZ                 ON / OFF
         Zoom Limit           1.5x / 2x / 3x / 4x / 8x
         HDMI Enable          On / Off
         DVI Mode             DVI /HDMI
         HDMI Format          4K30 / 1080p30 / 1080i60 / 1080i50
         Auto Framing         OFF/ ON
         Uvc EXT setting
         H264 Enable          ON/ OFF
         Audio Enable         ON/ OFF


   ▼▲    Select Item
   ◀▶    Change Value
[Menu] Back
```

Under setting it is possible to change the language, the DVI mode (change between DVI and HDMI), HDMI Format and Auto Framing options. You can change also DPTZ and Uvc EXT settings.

Language
It is possible to change the language to English or Chinese.

DPTZ and Zoom Limit

When Digital PTZ is "ON", the camera will automatically zoom in and out on the amount of people before the camera and will shift the filmed picture if the person or persons before the camera will move to another position in the room or area. It is also possible to limit how far the camera shall zoom in (Zoom Limit). To use the DPTZ option, select the AUTO FRAMING option and change it to "ON" (See also the AUTO FRAMING paragraph below).

HDMI and DVI

You can use the CM22, beside using the USB port of the camera, also over HDMI. To do that, change the DVI Mode to HDMI. When using the camera over HDMI, you must set the HDMI enable to "ON". Than you can change the HDMI Format to the Format you want.

Auto Framing

When the Auto Framing option is "ON", the camera will automatically detect the amount of people before the camera. In demo position it will track individual persons before the camera and will (when the DPTZ option is ON) zoom in on one of the persons if another persons are walking out of the frame.

Uvc EXT setting

By selecting Uvc EXT setting it is possible to change video coding settings such as H264.

INFORMATION

Read out of (Firmware) Version, (Product) Model and (installation) date

RESTORE DEFAULT

```
RESTORE DEFAULT
    ▶        Restore default?              YES / NO / RETURN


   ▼▲       Select Item
   ◀▶       Change Value
[Menu] Back
[Home] OK
```

Here you can restore the factory default settings.

MAINTENANCE

Camera Maintenance

- If the camera will not be used for a long time, please turn off the power switch, disconnect AC power cord of AC adaptor to the outlet.
- Use soft cloth or tissue to clean the camera cover.
- Please use the soft dry cloth to clean the lens. If the camera is very dirty, clean it with diluted neuter detergent. Do not use any type of solvents, which may damage the surface.

Unauthorized Use

- Do not film extreme bright objects for a long period of time, such as sunlight, light sources, etc.
- Don't operate in unstable lighting conditions, otherwise the image might flicker.
- Don't use this device close to powerful electromagnetic radiation, such as TV or radio transmitters, etc.

TROUBLESHOOTING

General advise

- Turn the camera off and on again and check if the problem persists.
- Restore to factory Defaults.

Power Issues

- No power LED
  - Check the USB cable
  - Check the power supply

Image

- No image
    - Check power of camera and monitor
    - Check video cable quality and length
    - Check if video specifications of monitor match the specs of the camera

- Abnormal image
    - Check video cable quality and length
    - Check all cable connections
   - Check Third Party software settings
        For a correct functionality of the camera, it is recommend to use 1920x1080
        or higher as Video Format and MJPG or H264 as Video Compression

- Dithering or flickering image
    - Check camera fixation and nearby vibration sources
    - Check anti-flickering setting in OSD
    - Check Noise Reduction settings in OSD

- Color issues
    - Check options in OSD, like exposure, color temp, Red and Blue tuning

Control

- Remote Controller does not work
    - Check batteries of the controller

Note: When you experience one or more of the above mentioned problems check also our Appendix D - CMOS characteristics

APPENDIX A – DIMENSIONS
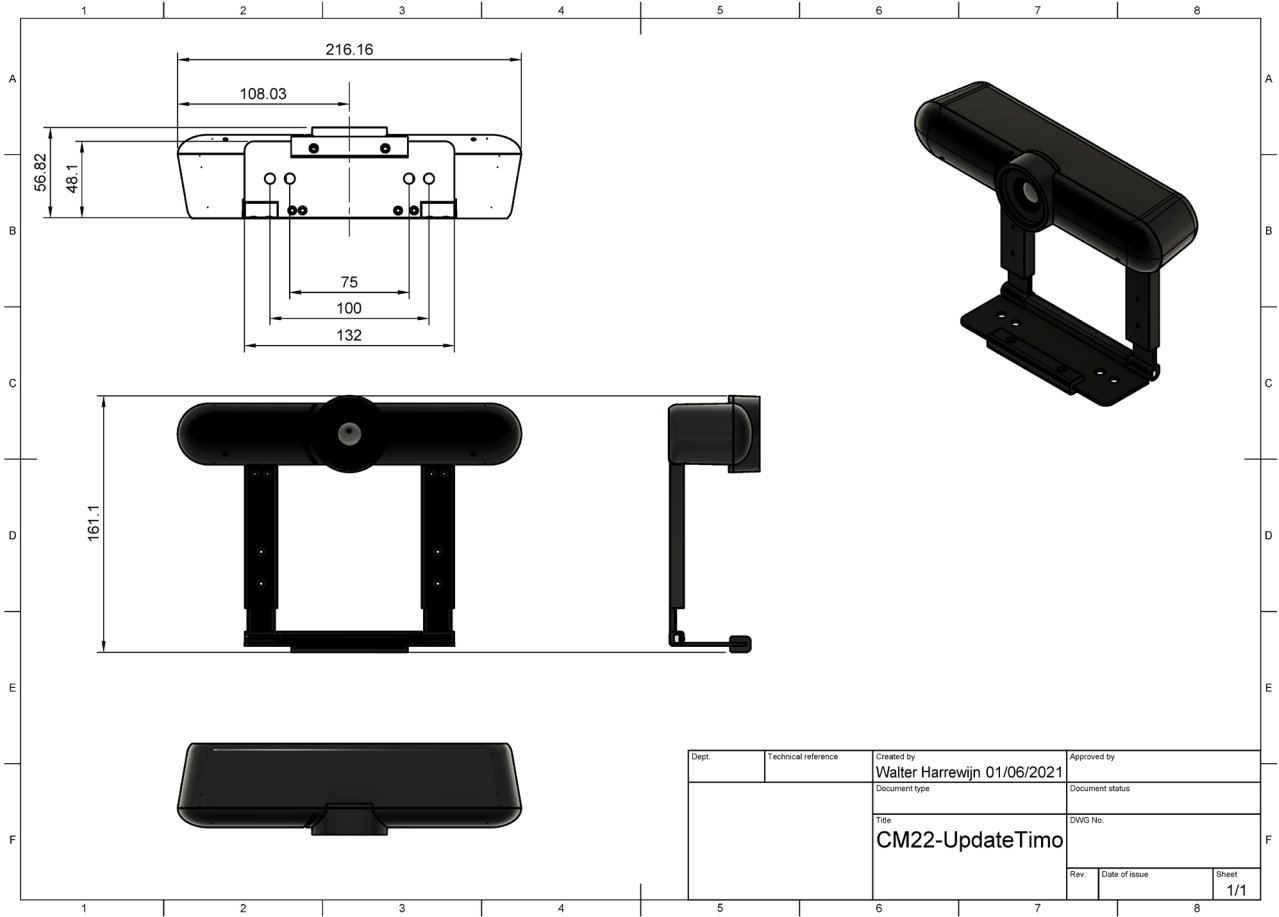
APPENDIX B - CMOS IMAGE SENSORS CHARACTERISTICS

The following occurrences that may appear in images are specific to CMOS (Complementary Metal Oxide Semiconductor) image sensors. They do not indicate malfunctions.

White flecks

Although the CMOS image sensors are produced with high-precision technologies, fine white flecks may be generated on the screen in rare cases, caused by natural and/or artificial radition, which causes a "false exposure" on the image sensor. The shape of these spots may vary from dots to lines or other, sometimes irregular shapes. These spots occur in random locations of the image, last only for a single frame and are more visible in dark images. This is a principle issue of all image sensors and not a malfunction.
The white flecks especially tend to be seen in the following cases:
• when operating at a high ambient temperature
• when you have raised the gain (sensitivity)
The white flecks may be reduced by turning the camera off, then on again.

Aliasing

When fine patterns, stripes, or lines are shot, they may appear jagged or flicker. Aliasing refers to the effect produced when a signal is imperfectly reconstructed from the original signal. Aliasing occurs when a signal is not sampled at a high enough frequency to create an accurate representation. This effect is shown in the following example of a sinusoidal function:
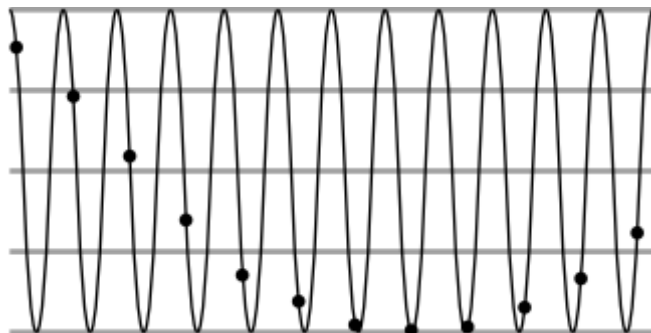
In this example, the dots represent the sampled data and the curve represents the original signal. Because there are too few sampled data points, the resulting pattern produced by the sampled data is a poor representation of the original.

Focal plane

Owing to the characteristics of the pickup elements (CMOS image sensors) for reading video signals, subjects that quickly move across the screen may appear slightly skewed. Since a CMOS sensor typically captures a row at a time within approximately 1/60th or 1/50th of a second (depending on refresh rate) it may result in a "rolling shutter" effect, where the image is skewed (tilted to the left or right, depending on the direction of camera or subject movement).

Flash band

If you film a strobe or quick-flashing light, brightness may differ between the upper and lower halves of the picture. See the Focal Plane explanation above for clarification of this occurrence.

Flicker

If recording under lighting produced by discharge tubes, such as fluorescent, sodium, or mercury-vapor lamps, the screen may flicker, colours may vary, or horizontal stripes may appear distorted. In such cases, turn the anti-flicker setting on. Depending on lighting types, such occurrences may not be improved with the antiflicker setting. It is recommended to set the shutter speed to 1/100 sec. in the areas of 50 Hz power supply frequency and to 1/60 in the areas of 60 Hz.