

USER MANUAL



Avonic 4K Conference Camera USB3.0
AV-CM22-VCU

DISCLAIMER, CONTACTT, IP RATING, CE MARKING

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IP Rating

The IP Rating (ingress protection) for this Product is IP30. This means that the Product has an intrusion protection against solid objects over 2.5mm, e.g. tools & wires and has no moisture protection.

CE Marking

The Product has a CE Marking. The CE labels are placed at the bottom of the Product and on the packaging. See the respective figures below:

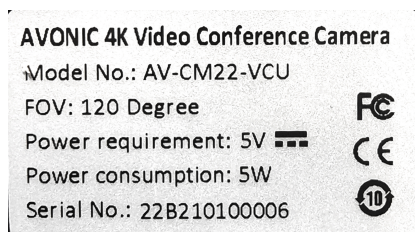


Figure 1: CE Marking (Product)



Figure 2: CE Marking (Packaging)

EU DECLARATION OF CONFORMITY

Table 1: CE Declaration of Conformity

 AVONIC	
1. Models No:	AV-CM22-VCU-B
2. Brand Name:	Avonic
3. Product Name:	4K Video Conference Camera USB3.0 & HDMI
4. Manufacturer:	Avonic Exportweg 11a 2645ED Delfgauw The Netherlands
3. This declaration of conformity is issued under the sole responsibility of the manufacturer	
4. The object of the declaration described in point 1 is in conformity with the:	
<ul style="list-style-type: none">• EC Council Directive 2014/30/EU Electromagnetic Compatibility• EC Council Directive 2011/65/EU of the EU Parliament and Commission Decision 2005/618/EC• FCC Rules and Regulations for Information Technology Equipment FCC Part 15 Subpart B Class B	
Standards	EN 55032: 2015 EN61000-3-2: 2019 EN61000-3-3: 2013+A1:2019 EN55024:2010+A1:2015
6. Signed for and on behalf of Avonic:	
Delfgauw, 19th of April 2020	
	
Martijn van Bodegom, Product Manager	

IMPORTANT INFORMATION

Liability

Avonic will NOT be held responsible for any damage or injury caused by unqualified persons carrying out these tasks, or by not following the instructions in this Manual.

Intended Use and Non-Intended Use

Installation



The following applies to the **installation** of the camera:

- The installation activities described in this Manual should ONLY be executed by experienced technicians.
- The installation activities should NOT be executed by minors, mentally disabled persons or other persons not qualified to perform these tasks.





Operation






The following applies to the **operation** of the camera:




- The operational activities described in this Manual should ONLY be executed by people with enough technical knowledge to perform the activities in a safe manner.
- This Product is specifically developed for video conferencing / streaming via internet by companies, institutes and universities. It is NOT meant for private use in the residential area.
- This Product should ONLY be used indoors.
- 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.

Important Precautions

	This Product is NOT intended for use where failure of the device could lead to death, personal injury, or severe environmental damage.
	Be sure that you have COMPLETELY READ and UNDERSTOOD ALL information in this Manual before unpacking, installing and using this Product. Keep the Manual in a safe place for future reference or download it from www.avonic.com .
	Failure to follow the SAFETY NOTES as described in this chapter could result in fire, electric shock, injury, or damage to this Product or other property.
	Power this Product ONLY with the included cable and power adapter. Other adapters may not meet applicable safety standards, and could pose a risk of death or injury when connected.

Symbols Used in This Manual

Symbol	Meaning	Description
	Danger	Not following the instructions associated with this symbol may lead to personal injury and / or serious damage to the Product.
	Electrical Shock	Not following the instructions associated with this symbol may lead to life-threatening situations and / or serious damage to the Product.
	Important	The information associated with this symbol requires special attention.

Symbol	Meaning	Description
	Information	The information associated with symbol refers to a general remark or a reference to other documentation.
	Instruction	This symbol refers to one or more user instructions.
	Recycling	Specific parts of the Product can be re-used.

Acronyms

The following acronyms are used in this Manual:

AWB	Aperture White Balance
BLC	Black Light Control
CMOS	Complementary Metal Oxide Semiconductor
DRC	Dynamic Range Compression
EV	Exposure Value
HD	High Definition
HDMI	High-Definition Multimedia Interface
MJPEG	Motion-JPEG
NR	Noise Reduction
OSD	On-Screen Display
PTZ	Pan / Tilt / Zoom
SKU	Stock Keeping Unit
SNR	Signal to Noise Ratio

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INTRODUCTION

Purpose of This Manual

This Manual describes the safety precautions and the instructions for safe unpackaging, installation, operation, maintenance and disposal of the Avonic CM22-VCU camera.



In this Manual the Avonic CM22-VCU camera is referred to as the 'Product'.

Target Audience

This Manual is developed for installation technicians who install the Product at client sites, and for IT professionals who are responsible for operating the Product.

Document Structure

The Manual is subdivided into the following **Chapters**:

1. Introduction
2. Safety
3. Product Overview
4. Unpacking
5. Mounting and Installation
6. Operation
7. Maintenance
8. Transport and Storage
9. Disposal and Recycling
10. Troubleshooting





Additionally, it contains the following:

- Appendix A - Dimensions
- Appendix B - CMOS Sensor Characteristics

SAFETY INSTRUCTIONS

This chapter contains important safety information regarding the unpacking, installation and use of the camera.


Important Precautions

	This Product is NOT intended for use where failure of the device could lead to death, personal injury, or severe environmental damage.
	Be sure that you have COMPLETELY READ and UNDERSTOOD ALL information in this Manual before unpacking, installing and using this Product. Keep the Manual in a safe place for future reference or download it from www.avonic.com .
	Failure to follow the SAFETY NOTES as described in this chapter could result in fire, electric shock, injury, or damage to this Product or other property.
	Power this Product ONLY with the included cable and power adapter. Other adapters may not meet applicable safety standards, and could pose a risk of death or injury when connected.


Intended Use

 See section [Intended Use and Non-Intended Use](#) on page iv for details.


Handling

-  To prevent the risk of injury, take the following precautions when handling this Product:
- Handle the Product with care. It is made of metal, glass, and plastic and has sensitive electronic components inside.
 - The Product can be damaged if dropped, burned, punctured or crushed, or if it comes into contact with liquid.
 - Do not pick up and move the Product unit while a tripod is attached. The fitting may break under the weight of the tripod, which may result in injury.
 - If you suspect any damage to the Product, discontinue its use, as it may cause overheating or injury.

Mounting

-  To prevent the Product from falling down which may cause injuries:
- Set up this Product on a hard, stable surface or mount it to a wall or (computer) screen.
 - ONLY use an Avonic mount for mounting to a wall or (computer) screen.
 - 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.)
 - Use a safety loop or drop protection that prevents the Product from falling if the mounting construction fails.
 - During installation, NEVER install a Product above a person.
 - Check the installation at least once a year. An improper mounting could cause the unit to fall off, resulting in personal injury.

Ventilation

-  To prevent the risk of life-threatening injury or damage to the Product or other property, caused by electric shock or fire hazard due to overheating:
- Maintain adequate ventilation by NOT installing or placing the Product unit in a bookcase, built-in cabinet or any other confined space.
 - Ensure that curtains or any other material does NOT obstruct the ventilation.

Repair



Take the following precautions if the Product should be repaired:

- Don't open this Product and don't attempt to repair it yourself. Disassembling the Product may damage it or may cause injury to you.
- If this Product is damaged, malfunctioning, or if it comes into 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 and Adapter



To prevent the risk of life-threatening injury or damage to the Product or other property, caused by electric shock or fire hazard:

- Power this Product ONLY with the included cable and power adapter. Other adapters may not meet the applicable safety standards. They could pose a risk of death or injury when connected.
- Do NOT use damaged cables.
- Do NOT power the Product in a moist / wet environment.
- Before you power the Product, ensure the cable is fully inserted into the power adapter.
- Plug the power adapter directly into a power outlet.
- Do NOT use the power adapter at a moist / wet location.
- Do NOT connect or disconnect the power adapter with wet hands.
- Keep the Product, cable, and power adapter in a dry and well-ventilated area when in use.
- Stop using the power adapter and any cables if any of the following conditions exist:
 - The power adapter plug or prongs are damaged.
 - The cable becomes frayed or otherwise damaged.
 - The power adapter is exposed to excessive moisture, or liquid is spilled into it.
 - The power adapter has been dropped, and its enclosure is damaged.

Atmospheric Conditions



To prevent the risk of injury or damage to the Product or other property caused by a potentially explosive atmosphere:

- Do NOT use this Product in an area with a potentially explosive atmosphere, such as areas where the air contains high levels of flammable chemicals, vapors, 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.

PRODUCT OVERVIEW

Description

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

The Avonic CM22-VCU camera has the following features:

Lens	Fixed 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 microphones with 4 meter pick up range
Control	Control the camera via any UVC based video conference application or the included IR remote control
Presets	10 User definable presets with Digital Pan Tilt and Zoom including start-up 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
- Desktop Video Conferencing
- Telemedicine
- Small and Medium Size meeting rooms

UNPACKING

This describes the contents of a complete Product package, and instructions for safe unpacking and (if necessary) Product return.

It is subdivided into the following sections:

1. Package Contents
2. Handling Precautions
3. Unpacking the Camera
4. Return Procedure

Package Contents

The following tables contains an overview of the package contents of the Product.

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

Each item is visualized below and referenced by the associated number in the table above:



Figure 3: Package Contents

Handling Precautions

 Always take the camera by its base and do **not** touch the lens. See below.



Figure 4: Handling Precautions

Unpacking the Camera



Execute the following steps to unpack the camera and associated components:

1. Open the box.
2. Verify that the contents of the box exactly matches the items as described in [Package Contents](#) on page 12. If this is NOT the case, contact Avonic and stop here.

The camera should be in placed in the box as follows:

Camera in the box



Foam on top



3. Take the camera out of the box. Be sure to follow the [Handling Precautions](#) on page 12 while doing so.
4. Install the camera following the steps in the chapter [MOUNTING AND INSTALLATION](#) on page 14

Return Procedure



If, for any reason, you have to return the camera to Avonic, Execute the following steps:

1. Place the camera back in its protective foam with the lens **up** in the box! Put the covering foam on top. See pictures above.
2. Place the camera with **all** of its components in the box.
3. Verify that the contents of the box **exactly** matches the items as described in [Package Contents](#).
4. Contact Avonic for the Return Procedure.

MOUNTING AND INSTALLATION

This chapter describes the steps you have to perform to mount and install the Product in a correct and safe manner.

These steps are subdivided into the following groups, each of which is described in a separate section:

1. Mounting on a (computer)screen or wall
2. Connecting the Components to the Camera



Take the following precautions to prevent the Product from falling down which may cause injuries:

- Set up this Product on a hard, stable surface, or mount it to a wall or (computer) screen.
- ONLY use an Avonic mount for mounting to a wall or (computer) screen.
- 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.)
- Use a safety loop or drop protection that prevents the Product from falling if the mounting construction fails.
- During mounting and installation, NEVER install a Product above a person.
- Check the installation at least once a year. An improper mounting could cause the unit to fall off, resulting in personal injury.

Mounting on a (computer)screen or wall

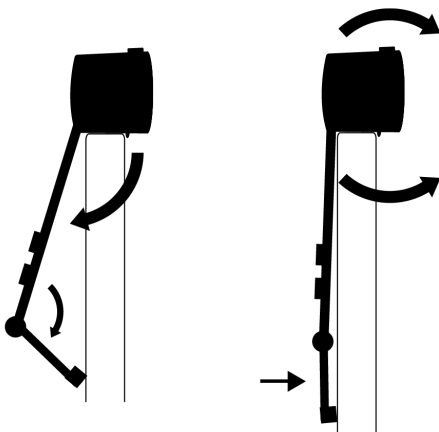
The CM22 comes with a detachable integration mount with multiple placement options:

1. Monitor placement



To place the CM22 to a monitor, follow these instructions:

1. Place the camera at the top of your screen.
2. Pull the base of the camera backwards.
3. Open the feet of the camera (picture below at the left), or place it in horizontal position (picture below at the right).



2. Wall mounted above a screen

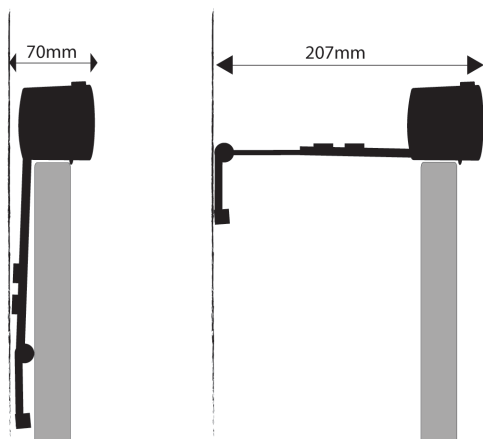


Follow the instructions below to place the camera to a wall:

1. Place the camera at the top of your monitor. The base must be in horizontal position (see the picture at the left below).
2. Pull the cameras feet to the wall. (see the picture at the right below).



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.



3. Mounting below a screen

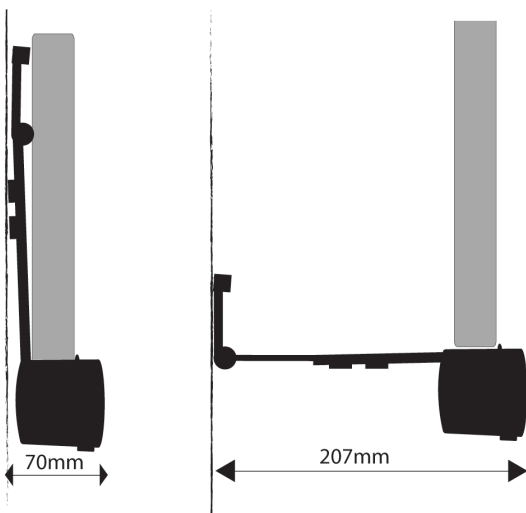


Follow the instructions below to place the camera at the bottom of your monitor:

1. Place the camera at the bottom of your monitor. Make sure the base is in horizontal position. (see the picture at the left below).
2. Pull the feet of the camera to the wall. (see the picture at the right below).



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.

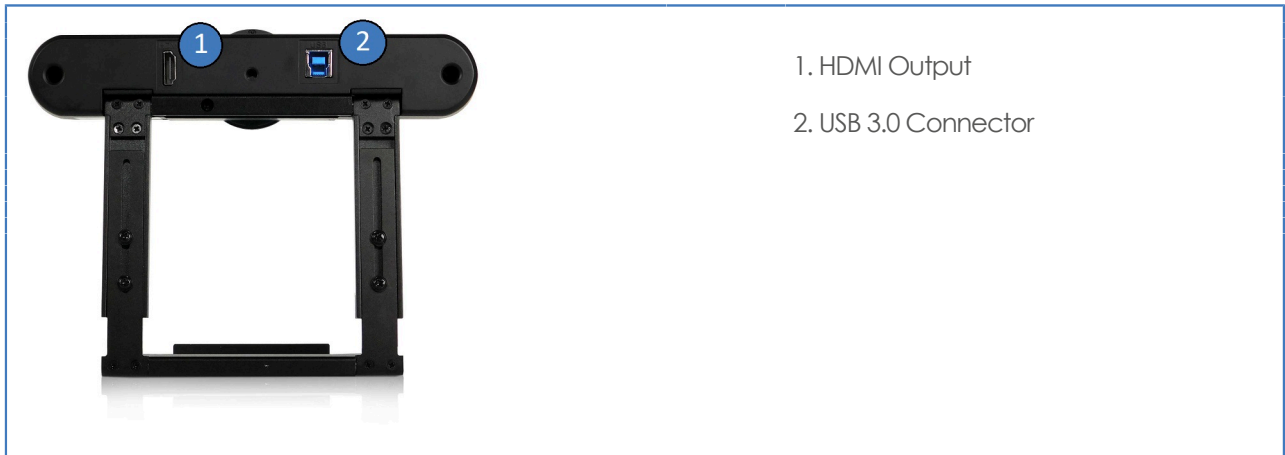


Connecting the Components to the Camera



Execute the following steps to connect the components to the camera:

1. Connect all provided components (see [Package Contents](#)) to the ports at the rear of the camera. The figure below shows the applicable ports.



2. If you have connected all the provided components to the camera (and your computer), start a third party camera app (like windows camera app for example).
3. Select under "**Video settings**" the CM22-VCU camera. This camera is displayed as "HD Camera". Do the same under "**Audio Settings**".

You will now see the image from the CM22-VCU.

The current settings of the camera are displayed on the [OSD Menu](#). From this point onwards, the user can start controlling the camera.

OPERATION

This chapter describes the ways in which you can set up and operate the Product. The descriptions are subdivided into the following sections:

1. Using the Remote Control
2. Other Key Combinations
3. OSD Menu

Using the Remote Control

The Product is provided with an IR Remote Controller for full control of the camera and use of the OSD menu.

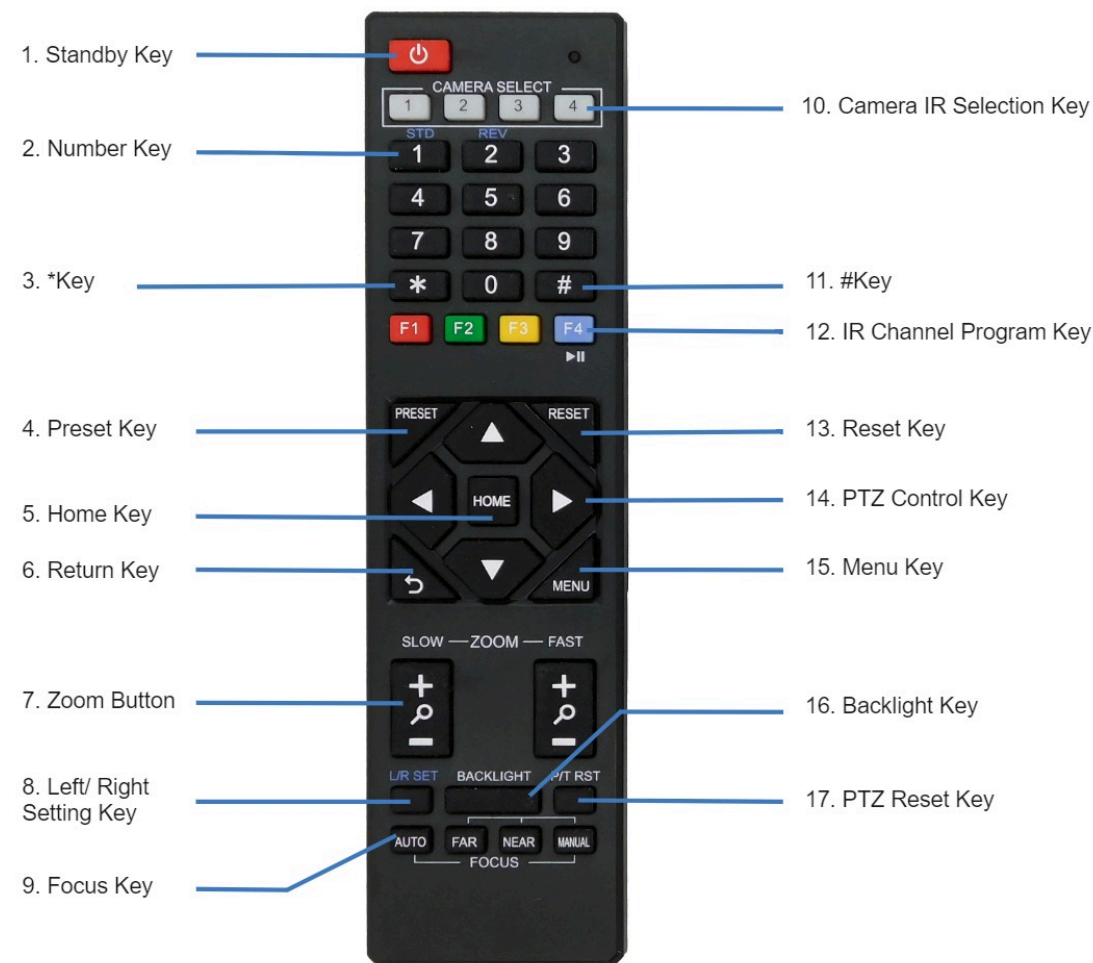


Figure 5: Remote Controller

The various options (1 to 17) are described below.

1. Standby Key

This button has **no** function with this camera.

2. Number Key

Call preset PTZ position.



Press the number **[0-9]** of the desired preset and the camera will respond accordingly (See 13. [Reset Key](#) on how to set & clear presets).

3. *Key

Use this key in combination with other keys. You can use this key in together with the # key. See [Other Key Combinations](#). It is also possible to select a camera channel. See [10. Camera IR Selection Key](#).

4. Preset Key

A preset is a specific position of a camera that you save in the camera. A preset is assigned to a number from 0-9. To delete a preset see [13. Reset Key](#).



1. To set a preset, first point the camera in a specific directing and a specific zoom position.
2. Assign the position to a number with the button **Set Preset**.
3. You can call the preset by pressing one of the numbers 0-9 on the remote control.

Set Preset: [PRESET] → [<number>]

Call Preset: [<number>]

If the position preset '0' has been stored, this position will be called after initialization. See for more information [How to set a default preset to the CM22](#) and [How to set/ call/ delete a preset with the CM22](#) on the website.



Since the camera has no output for a serial or IP connection, it is not possible to make presets of 10 and higher.

5. Home



1. Press the HOME key to let the image from the camera return to the "center" position.
2. Or press the HOME key when you are in the [OSD menu](#) to "Enter" a sub-menu.

6. Return Key



Return back tot the previous level of the [OSD menu](#).

7. Zoom + -



Zoom the camera with these buttons. You can choose between a slow zoom key (for a more 'natural' view when zooming in or out), or a fast zoom key (for zooming in or out quick).

8. Left/ Right Setting Key

This button has **no** function with this camera.

9. Focus Key



Set the camera to 'auto focus' or 'manual focus'.

If the camera is configured to 'auto focus', the buttons [Focus + -] are disabled.

If the camera is in 'manual focus' and the **Zoom** buttons are used, the camera automatically switches to 'auto focus'.



Manual Focus:

1. Push the button [manual focus] first before using the focus buttons.
2. Focus the camera with the [+] and [-] button.

If the camera does not respond, check if the camera is set to auto-focus.

10. Camera IR Selection Key

Up to 4 different cameras can be controlled with one IR Remote Controller. You can use the **camera select** buttons [1,2,3,4] to select the IR channel that the remote control is using. The default camera IR channel is 1.



1. To control a camera on first use, select camera 1 (IR channel 1) on the remote controller.
2. To control a second camera, you first need to change the IR channel stored in the camera from 1 to 2. Then do the following:
 - a. First turn off the other cameras in the room you don't want to change, to prevent that other cameras also get changed accidentally.
 - b. Select camera 1 on the remote control, because the camera is still configured to listen to IR channel 1.
 - c. Press [*]→[#]→[F2] to change the IR channel inside the camera to IR channel 2. The camera will confirm this on the screen.
 - d. Select camera 2 on the remote control to control this camera.

Key Combinations: (Default IR address is 1)

[*]→[#]→[F1]	Camera Address No. 1
[*]→[#]→[F2]	Camera Address No. 2
[*]→[#]→[F3]	Camera Address No. 3
[*]→[#]→[F4]	Camera Address No. 4



The Function buttons F1, F2, F3 and F4 are the colored buttons on the remote.



Figure 6: Function Buttons on Remote

11. #Key

Use this key in combination with other keys. You can use this key in together with the * key. See [Other Key Combinations](#). It is also possible to select a camera channel. See [10. Camera IR Selection Key](#).

12. IR Channel Program Key



Used to configure the IR channel of the camera. See "10. IR Camera Selection Key" above for instructions.

13. Reset Key

This key deletes a preset, so you can use this key again to make a new **preset**.



1. To delete a preset, press Clear Preset and after that the number of the preset that you want to delete.

Clear Preset: [(P)RESET] → [<number>]



As is mentioned under **Preset Key**, you can make and delete presets between 0-9, since the camera has no output for a serial or IP connection needed to make and delete presets of 10 and higher.

14. PTZ Control Key



1. Zoom in first with the camera before you can start using the PTZ Control Keys. See "7. Zoom +".
2. Move the image with the up/down/left/right keys (PTZ Control Keys).

15. Menu Key



1. Use the **Menu** button to open the **On Screen Display (OSD)** menu. This menu is visible on the USB3.0 and HDMI output.
2. If the menu is not in English, press **[*]→[#]→[4]** to change the Menu language into English.

16. Backlight Key

You can press the backlight key to enable the backlight function if there is strong illumination behind the filmed subject. In that case the backlight function will ignore the bright background and will adjust its exposure on the dark parts of the picture, including the subject. In other cases the backlight function is not needed. See also [Mode: Full Auto > Backlight](#) for more information.

17. PTZ Reset Key

This button has **no** function with this camera.

Other Key Combinations

The following key combinations on the Remote Controller have specific functions. These are:

Combination	Function
[*] → [#] → [1]	OSD menu default English
[*] → [#] → [4]	1080P@30fps default HDMI resolution
[*] → [#] → [5]	Disable microphone, setting is persistent even after power cycle
[*] → [#] → [6]	Factory default
[*] → [#] → [7]	1080P@60fps default resolution
[*] → [#] → [9]	Enable microphone, setting is persistent even after power cycle



See also [CM22 IR Remote shortcuts](#) on the website.

OSD Menu

Each camera is provided with an **On-Screen Display (OSD) Menu**.

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

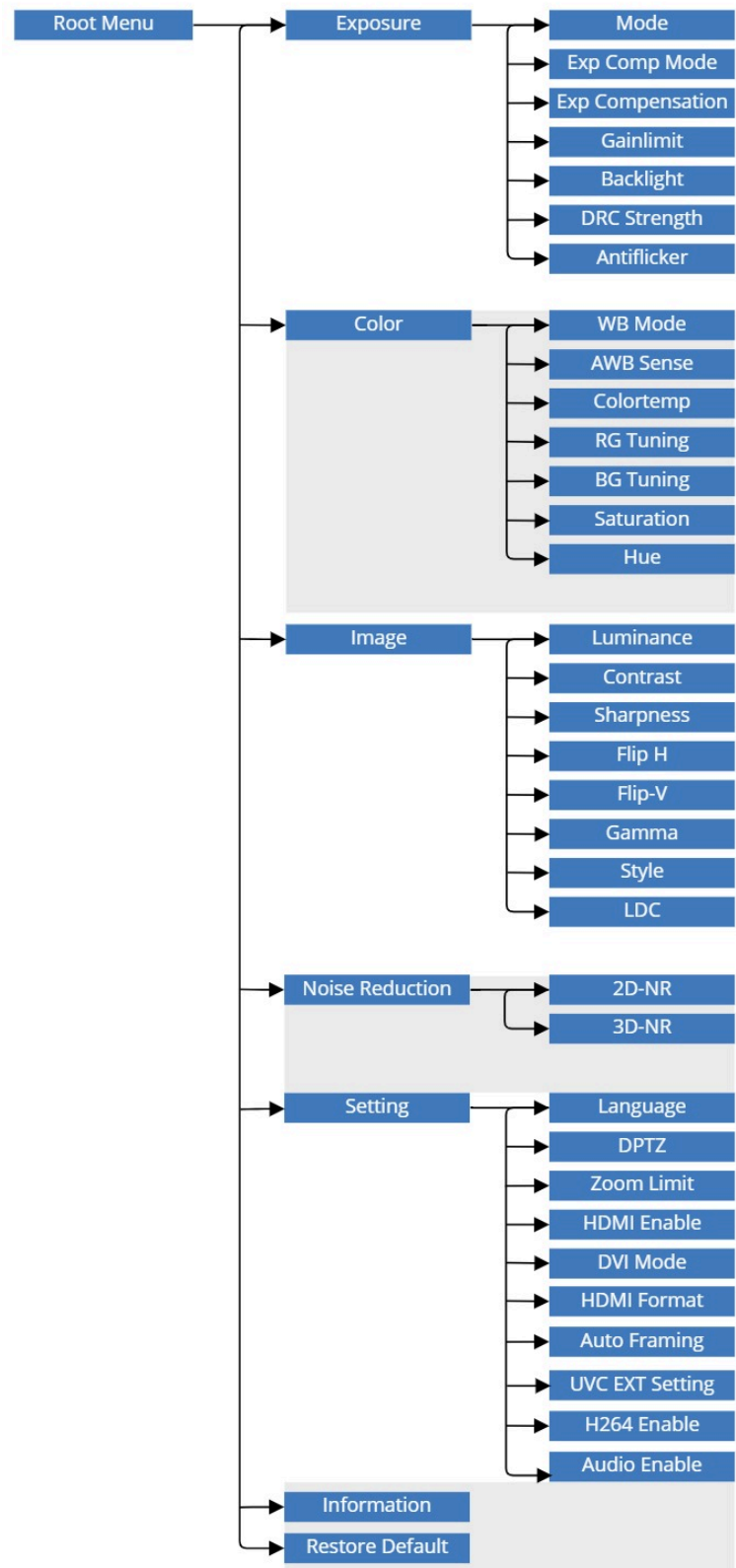


Figure 7: OSD menu structure

First Operation



If you start the camera for the first time, follow the instructions below:

1. * Connect the USB or HDMI cable to your computer.
2. Install and/ or open a third party UVC based video-conference application (VLC, Potplayer, Standard Windows Camera Application etc.)
3. Go to "Video Settings" and select "HD Camera". Do the same under "Audio Settings".
4. When you can see the image of the CM22-VCU (HD Camera), you can use the IR Remote Controller to open the OSD Menu.

In the OSD you can configure the camera settings (see the [OSD menu structure](#) above and the descriptions of the settings below). It is not possible to control the camera using the OSD menu. You can use the [PTZ](#), [zoom](#) and [focus](#) keys on the IR Remote Controller to do this.

More information about how to start the camera for the first time can be found on the [CM22 Quick Start Guide](#) on the website.



- * If you use the HDMI cable, do not forget to connect the USB cable and the USB Power adaptor to the power net. ([See Connecting the Components to the Camera](#)).
- For a crystal clear image its is recommend to change the Video Format to 1920x 1080 or higher when using full screen mode of your monitor.

1. MENU

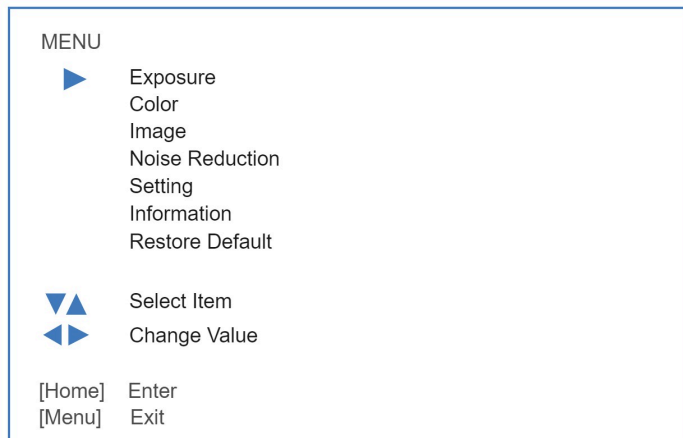


Figure 8: OSD - MENU



1. Press the [\[MENU\]](#) button to display the main menu on the screen.
2. Use the arrow buttons to move the cursor to the item to be set. Press the [\[HOME\]](#) button to enter the corresponding sub-menu.
3. Press [\[◀▶\]](#) to change settings. Press [\[MENU\]](#) again to go back.



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.

1.1 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	
[Home]	Enter	
[Menu]	Exit	

Figure 9: OSD - EXPOSURE

Mode: Full Auto

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.

G.Limit

Gain limit is the maximum level of artificial brightness and contrast that the camera can automatically add to the image. This setting will make a significant difference to the overall picture.



This setting can add noise to the picture in dark areas and produce a washed out, greyish picture. This is done for a reason.

Backlight

Under some circumstances, your camera may try to bring brighter areas into proper exposure, especially when there is natural light or a strong illumination behind the subject. To do so, it will lower the exposure to match the bright background. However, it would also be darkening other areas of the scene, including the subject, leaving it under-exposed and too dark. To ensure that the areas of interest remain bright, you would need to enable the Backlight compensation. This will ignore the bright background and will adjust its exposure based on the darker areas of the image.

DRC Strength

Dynamic Range Compression 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, as they will become lighter/more grey as the level of DRC increases.



DRC Strength and **Gain limit** with decreased settings **DRC Strength** and **Gain limit** with increased settings

Anti-flicker

Set up your camera so that it can handle the flickering of artificial lighting in the space where it is operating. The options are 50Hz, 60Hz and OFF.

Shutter Priority

The shutter setting determines the amount of time per second that the sensor is exposed. The range of the shutter speed setting is 1/30th of a second (40 milliseconds) to 1/10000th of a second (0.1 milliseconds).

If you shoot a video with a shutter time of 1/30th of a second, you can imagine that the video becomes blurry and overexposed. The faster the shutter is set to open and close, the sharper your filmed object will become. However, the amount of light that falls onto the sensor is also diminished.

To compensate for poor lighting conditions, it is possible to adjust the DRC Strength. See the [DRC Strength](#) for more information.



If you are unexperienced or if the light conditions change a lot, it's best practice to keep the camera on the automatic exposure setting.

Bright Mode

This mode is to try and create a decent image when the light conditions are exceptionally poor. In this mode, you should keep the Bright level, Gain limit and DRC as low as possibly acceptable to avoid getting too much noise in the picture. If the level of noise in the image becomes unacceptable, you can use noise reduction to smooth the picture over.

1.2 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	
[Home]	Enter	
[Menu]	Exit	

Figure 10: OSD - COLOR

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 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:

- RG Tuning
- BG Tuning
- Saturation
- Hue
- Colortemp



The Colortemp of 2500K will give the image cold (blue) colors, while 8000K will give the image warm (yellow) colors.

1.3 IMAGE

IMAGE		
▶	Luminance	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	
[Home]	Enter	
[Menu]	Exit	

Figure 11: OSD - IMAGE

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. The setting of sharpness coincides with the setting of noise reduction.



Be careful not to set this too high as it will create a sort of halo around sharp edges of filmed objects!

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:

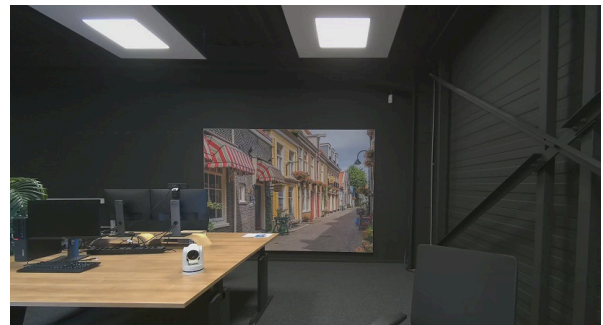
Default	Standard setting
Normal	Which makes the picture more 'natural'
Clarity	Makes the picture more clear
Bright	Which makes the picture more bright
PC	Optimal setting for a computer screen
Clarity (led)	For filming under Led light
Face	Optimal setting for filming faces

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 Correction on -10



Lens Distortion Correction on 10

1.4 NOISE REDUCTION

NOISE REDUCTION		
▶	NR-2D	Close / Auto / 1 ~ 5
	NR-3D	Close / Auto / 1 ~ 8
▲▼	Select Item	
◀▶	Change Value	
[Menu]	Back	

Figure 12: OSD - NOISE REDUCTION

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. However, if you do this, take note that you will lose details!
- 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.
- Be careful when adjusting the noise reduction, it can take away the natural 'crispness' of the image!



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.

1.5 SETTING

Figure 13: OSD - 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	
[Home]	Enter
[Menu]	Exit

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



Select **ON** if you want that the camera will automatically zoom in and out on the amount of people before the camera:

1. Select **AUTO Framing** option.
2. Use the **PTZ keys** on the remote to set this **ON**.



- The camera will automatically shift the filmed picture if the person or persons before the camera will move to another position in the room.
- It is also possible to limit how far the camera shall zoom in (**Zoom Limit**). The camera can zoom in with a max of 8x digitally.

HDMI and DVI



You can use the CM22, beside using the USB port of the camera, also over HDMI:

1. Change **DVI mode** to **HDMI**
2. Set **HDMI Enable** to **ON**
3. Choose the **HDMI Format** you want (4K@30, 1080p30, 1080i60, 1080i50)

Auto Framing

When the Auto Framing option is "ON", the camera will automatically detect the amount of people before the camera.



There is one difference with **DPTZ**:

- 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 and audio. If you disable the audio setting, the camera microphone will no longer show up in third party video conference software like google meet for example. This allows you to use your own microphone or a headset with microphone in combination with the CM22 to limit the background noise when using a video conference application.

1.6 INFORMATION

Read out of (Firmware) Version, (Product) Model, and (Installation) Date

Figure 14: OSD - INFORMATION

Read out of the firmware version, product model number and installation date. If you want to update your camera, read and watch the video in [How to update the CM22 camera firmware on the website](#).

1.7 RESTORE DEFAULT

RESTORE DEFAULT

▶ Restore Default? YES / NO / RETURN

▼▲ Select Item

◀▶ Change Value

[Menu] Back

Figure 15: OSD - RESTORE DEFAULT

Here you can restore the factory default settings. See for more information [How to reset the CM22 to its factory defaults](#) on the website.

MAINTENANCE

Camera Maintenance



Take the following actions to maintain the camera:

- If you will not be using the camera for a long time, turn off the power switch and disconnect the AC powercord of the AC adaptor to the outlet.
- Use a 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 neutral detergent.



Do not use any type of solvents, which may damage the surface.

Usage Precautions



Take the following precautions to ensure good image quality:

- Do not film extreme bright objects for a prolonged period of time, such as sunlight, light sources, etc.
- Do not operate in unstable lighting conditions, otherwise the produced image could be less than optimal.
- Do not operate close to powerful electromagnetic radiation, such as TV or radio transmitters, etc.

TRANSPORT AND STORAGE

The camera must be transported in its original packaging box. Inside the box, it is recommended to wrap the camera in the original plastic bag and to place it in the protective foam.

Specific guidelines apply to the environmental temperature and humidity when operating and storing the camera.



See 'Operating humidity' and 'Storage temperature' in the provided Datasheet for the applicable values.

DISPOSAL AND RECYCLING

In general, the term 'E-Waste' applies to items of all types of electrical and electronic equipment and its parts that have been discarded by the owner as waste without the intention of re-use.

Avonic outsources the disposal and recycling of its E-Waste camera materials to the **Stichting Open**.



See <https://stichting-open.org/> for more information about the disposal and recycling.

TROUBLESHOOTING

General



1. Turn the camera off and on again and check if the problem persists.
2. If it does, restore to the factory default.

Power Issues



If the camera does NOT perform a self-test and / or if the power LED is OFF:

1. Check the net power.
2. Check the power supply.

Image

No image



1. Check the power of the camera and monitor.
2. Check the quality and length of the video cable.
3. Check if the video specifications of monitor match the specifications of the camera.

Abnormal image



1. Check the quality and length of the video cable.
2. Check the cable connections.
3. 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



1. Check the camera fixation and nearby vibration sources.
2. Check the **Anti-flickering** setting in the OSD.
3. Check the **Noise Reduction** settings in the OSD.

Color issues



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



When experiencing image problems, you may also check [Appendix D - CMOS Image Sensor Characteristics](#).

Autofocus Issues



- Check the autofocus (position, speed etc.) before streaming
- Check Video/Camera Settings in the OSD menu (for example: if the image is too bright, too dark, or too noisy, the camera will have difficulties to focus)



Check environmental conditions and the subject of focussing. The camera will have difficulties to focus in the following situations:

- Light: Strong light, low light/dark areas and backlight conditions
- Moving subjects
- Small objects before a plain or solid background
- Blurry or unsharp subjects: filming through wet glass or dirty objects
- Distance: filming two or more different subjects, some near and some far away
- Position in the image: subject positioned in the corners of the picture
- Faces: partly hidden faces, sideways filmed faces, diagonal or up side down
- When the camera itself moves, or when the iris is narrowed down



When you experience one or more of the above mentioned problems check also our [Appendix - CMOS characteristics](#)

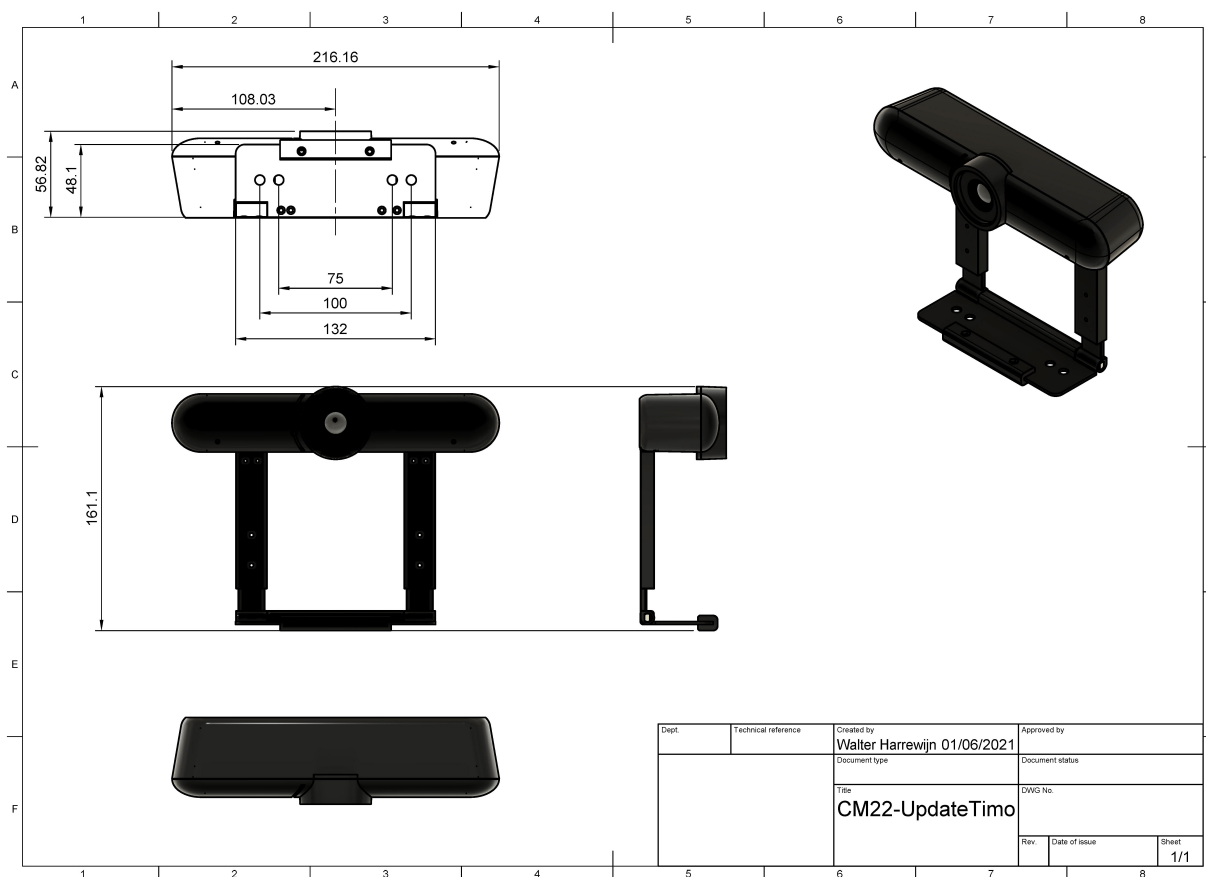
Control

IR Remote Controller does not work



1. Check the batteries of the controller.

APPENDIX A - DIMENSIONS



APPENDIX B - CMOS SENSOR CHARACTERISTICS

The following occurrences that may appear in images, are specific to CMOS 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. These flecks are caused by natural and / or artificial radiation, 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, occur only in a single frame and are more visible in dark images. This is a principle issue of all image sensors and **is not a malfunction**.

The white flecks especially tend to be seen in the following cases:

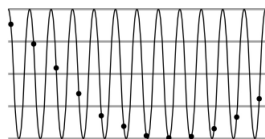
- When operating at a high ambient temperature
- When you have raised the gain (sensitivity)

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 flickering. **Aliasing** refers to the effect that is produced when a signal is imperfectly reconstructed from the original signal. It 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 not enough 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 (i.e., tilted to the left or right, depending on the direction of camera or subject movement). Since a CMOS sensor typically captures one row at a time within approximately 1/60th or 1/50th of a second (depending on the refresh rate), it may result in a “rolling shutter” effect. In such cases, the image is skewed.

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 a clarification of this occurrence.

Flicker

If you are recording under lighting that is produced by discharge tubes (such as fluorescent, sodium or mercury-vapor lamps), the screen may flicker, colors may vary, or horizontal stripes may appear distorted.

In such cases, set the **anti-flicker** setting to 'on'.



Depending on lighting types, such occurrences may not be improved with the anti-flicker setting. It is recommended to set the shutter speed to 1/100s in areas of 50 Hz power supply frequency, and to 1/60s in areas of 60 Hz power supply frequency.

APPENDIX C - DATASHEET SPECIFICATIONS

SPECIFICATIONS

Camera

Video Systems HDMI	2160p/30, 1080p30, 1080i60,
Video Systems USB	1080i50 2160/p30, 1080p/30, 720p/30, 160x120, 176x144, 320x240, 352x288, 640x480, 750x576, 1600x896, 1280x720, 1024x768, 1024x576, 960x540, 848x480, 800x600, 800x448, 640x360, 480x272, 424x240, 320x180p30.
Sensor	1/2.5" CMOS, 8.51 MP
Shutter	1/30s ~1/10000s
Scanning mode	Progressive
Lens	f=2.8mm, 120° FoV
Zoom	8x (digitally)
Minimal Illumination	0.05 LUX
White Balance	Auto, Outdoor, Indoor, Manual, OnePush, Variable 2500K-8000K in steps of 100K
Backlight Compensation	present, but limited functionality
Lens Distortion Correction	present
Digital Noise Reduction	2D & 3D DNR
Signal Noise Ratio	>55 dB
Horizontal Field of View	120°
Vertical Field of View	67,5°
H&V image flip	supported
Number of presets	0~9
Preset accuracy	0.1
Microphones (active on USB only)	2
Microphones pick up range	4 meter

Output Interface

HDMI output (video only)	version 1.4, 2160p30
USB output (microphone + video)	USB3.0, type B female, 2160p30 USB2.0 max. 1080p30
Control protocol	Standard UVC drivers in computer OS

General Specifications

Input voltage	5V
Power consumption	4W
Operating temperature	-5°C ~ 40°C
Storage temperature	-20°C ~ 60°C
Operating humidity	20% ~ 95% non-condensing
Bottom fastening screw thread	1/4" 20 UNC
Color	Black
Dimensions product excl. mount and connectors. WxHxD (mm)	219x43x58mm
Dimensions product incl. mount. WxHxD (mm)	219x52x61~205mm (depth depends on mounting position)
Weight product	480 gram
Dimensions box WxHxD (mm)	310 x 97 x 258
Shipping weight	1159 gram
In the box	1 x AV-CM22-VCU camera + adjustable mount 4 x USB psu (EU, UK, US, AUS) 1 x remote control CM-RC 1 x 1.8m USB 3.0 A to B cable 1 x lens cap 1 x quick guide

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Avonic 4K Conference Camera USB3.0
AV-CM22-VCU

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