



CUNIMA NANO

Operation Instructions

Congratulations for working with the Mini-HD-camera CUNIMA NANO! You have chosen a high quality camera which allows numerous ways to be used, for example as an onboard cam in motorsports, as a fixed camera position on stage at concerts or even for stereoscopic 3D-productions.

The CUNIMA NANO is the next generation of revolutionary mini-HD-cameras designed by _WIGE. With a new sensor, new electronics and new features, the CUNIMA NANO fits perfectly into your advanced film- and stereo3D-production workflow or live-broadcast - you name it!

Version 0.91 (FW1.9c)

Features and specifications are subject to change without notice.

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2. INTRODUCTION AND KEYFEATURES

CUNIMA NANO – highest performance, ultra-compact design. In the case of the CUNIMA NANO, outer dimensions of just 36.5 x 36.5 x 60mm are achieved by dividing the camera into the small head and the CCU.

The latest CMOS chip technology allow for professional HD operations with global shutter and framerates up to 60p.

CUNIMA is your perfect partner for sports, entertainment show, reality – you name it!

The CUNIMA's modular accessory concept permits a continuous and flexible adaptation of the camera to the respective production requirements. In this area, the wealth of experience gathered by the globally leading TV production expert, WIGE MEDIA AG, over the course of many years was incorporated – and the same applies to your individual demands.



Key Features:

- Revolutionary, compact design
- global shutter
- external CCU
- 3G HDSI, up to 50p/60p
- up to 2k resolution
- 640 ASA
- 4:2:2, 4:4:4, RAW
- interlaced and progressive scanning
- Electronic shutter, programmable gamma LUT's. (linear, REC 709), User defined Gamma
- Universal remote control via RS-485
- Modular and flexible accessories

2.1 CUNIMA NANO SPECIFICATIONS

Image Sensor	2/3" CMOSIS CMV 2000 Sensor 2112x1188 pixel, global shutter
FPN - Correction	automatic
Lens Mount	C-Mount, other mounts on demand, interchangeable glass filters
Lens Control	optional motor drives for iris and focus
Scanning Systems (HDSOI 4:2:2)	1080p/ 23.98, 24, 25, 29.97, 30, 50, 59.97, 60 Hz 1080i / 50, 59.94, 60 Hz 720p / 23.98, 24, 25, 29.97, 30, 50, 59.94, 60 Hz Full uncompressed 12Bit RAW(4:4:4) 2k D-Cinema
Gamma	linear, REC 709, manual adjustment
White/Black Balance, Saturation	manual adjustment, automatic white balance
Gain	user definable gain 0dB, +3dB, +6dB, +9dB, +12dB
Sync	internal, HDSOI, Tri-Level, Bi-Level
Output Signals	HDSOI (SMPTE-292M, 3G, Dual Link
Remote Control	RS-485, Software (Win), Hardware RCP optional
Power	12-32V DC, 3W
Weight	150g camera head, 250g CCU
Dimensions	35,8x35,8x61mm camera head, 70x70x25mm CCU

Depending on firmware-changes and software-status, these specifications may vary or be mutually exclusive.

Features and specifications subject to change without notice.

2.2 PACKAGE CONTENTS

For a smooth workflow, please check if the set is complete before going on production. If one of these items gets lost, feel free to order it at WIGE MEDIA AG.

This product is delivered with the following accessories.

Contents:

1x CUNIMA NANO HD-camera head

1x CUNIMA NANO CCU

1x Power Supply CUNIMA NANO

1x Device Cable for Power Supply

1x 4Pin XLR to 4Pin Fischer cable

1x 3m CUNIMA NANO camera cable (connection camera to CCU)

1x Adaptor Tripod (1/4 inch and 3/8 inch screws)

3. SETUP

Please notice that due to safety reasons this camera system may only be operated by trained staff!

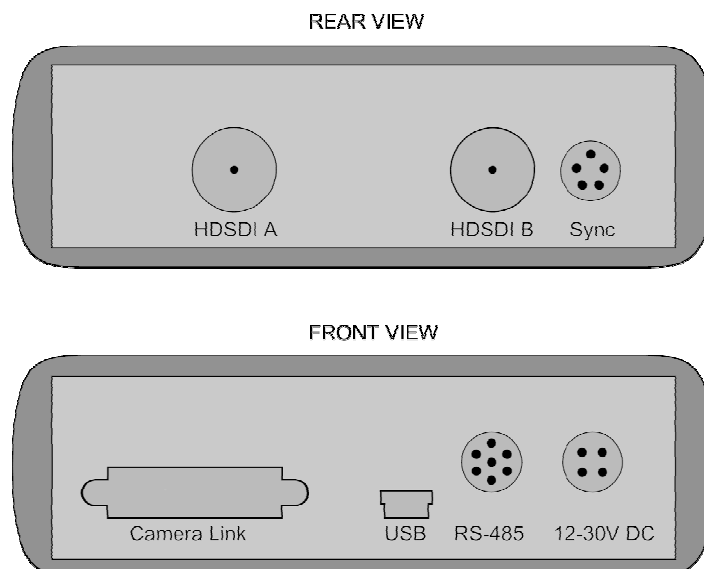
3.1 CAMERA SETUP

1. Check if all needed items are present (see 2.2.).
2. Connect the right comlink connector of the camera head with the CCU via the camera cable.
3. Plug the power supply to the CCU and then connect the power supply with a power source(220-240V).
4. The captured image should appear at the BNC connector of the CCU within seconds and can then be finished. The setup is now completed and the camera ready for use.

Please note: do not turn the connectors when pulling out the Fisher-cable. To disconnect, please just remove the cable by pulling straight. Turning it out with force may cause bended connectors and lead to irreparable damage.

3.2 CONNECTORS OF THE CCU

These are the connectors on the CUNIMA NANO CCU.



3.3 LENS SETUP

The C-Mount screw is a socket to hold applicable lenses. In some cases, an adaptor-coil is needed to ensure the correct flange back. This is not exceptional, but a current way to counteract imprecise manufacturing.

3.2.1. Choosing a lens

Independent of the focal length, there is an important characteristic of C-Mount lenses which should be considered when choosing a lens. Because of the existence of different sensor dimensions (1/3 inch, 1/2 inch and 2/3 inch) and sensor quantities (3x 1/2 inch or 1x 2/3 inch etc.) and the fact that the Cunima MCU[2] does contain single CMOS sensor with Bayer-pattern, please only use lenses which are engineered for that intended purpose (**CUNIMA: 2/3 inch single CMOS sensor**).

3.2.2. C-Mount screw

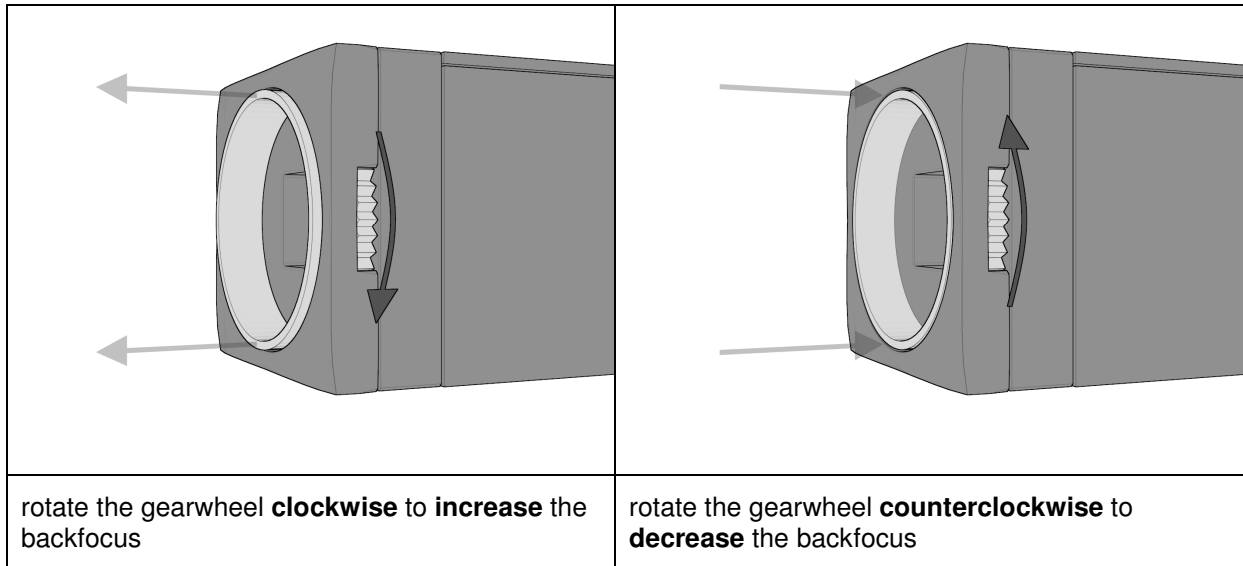
1. Please remove the rubber protection of the Cunima MCU[2]. You can see the C-Mount screw now. Please note that behind the screw is the glass protection of the sensor. This glass should not be damaged or it may constrain the image quality.
2. Remove the lens and check for possible damages. Please do never mount a damaged lens on the Cunima NANO. Further damages of the camera because of optical small parts like glass splinters could occur.
3. Screw the lens into the C-Mount.
4. If the flange back of the lens is not right, you may need a C-Mount adaptor-coil.

Whenever there is no lens screwed on the C-Mount, please make sure that a protection rubber protects the camera's glass filters to avoid any damages!

3.4 BACKFOCUS ADJUSTMENT

To ensure that you can use every lens with this camera properly, the housing of the CUNIMA lets you adjust the backfocus.

To adjust the backfocus, please follow the instructions below:



3.5 IRIS/FOCUS MOTOR

3.5.1 INSTALLATION

To use the iris/focus motor on the CUNIMA, mount it on any of the four sides of the camera. The two threads on each side of the head of the CUNIMA can be used to fix it. Make sure to align the gearwheel of the motor with the gearwheel of the lens properly.

Next plug the cable on the back of the iris motor into the 7Pin fischerconnector (for details see page 6) on the back of the CUNIMA.

Now please connect one end of the Y-fischercable with the RCP and the other end with the iris/focus motor.

3.5.2 OPERATION

You can use the RCP to control the iris/focus motor. Navigate to "IRIS" in the RCP Menu and use the Poti (for details see page 14) on the right, to open or close the iris.

3.6 CLEANING OF THE CAMERA

The metal body of the Cunima MCU[2] can be cleaned with a cleaning cloth. By trend the body is not very susceptible to damage, which makes the cleaning very easy.

Optical parts like glass protections and lenses can be polished with a dry microfiber lens cloth.

We can not be liable or give any guarantee services for damages caused through cleaning of the camera with aggressive cleaning agent.

4. RCP - REMOTE CONTROL PANEL

The RCP [4] is used to control up to 2 CUNIMA NANOs.
At this Point the serial protocol of he CUNIMA NANO **is not implemented yet.**

In the following the RCP4, which is developed for mobile occasions, is explained.

4.1. INTRODUCTION

Controls up to 2 CUNIMA NANO cameras.



4.2 INSTALLATION



1	Connector Camera 1
2	Connector Camera 2

Please note to not turn the wires when pulling out the Fisher cable out of the connector.

4.3 OPERATION



1	Cursor
2	Screen
3	Poti
4	Controller for RED
5	Controller for GREEN
6	Controller for BLUE
7	Controller for black level of RED
8	Controller for black level of GREEN
9	Controller for black level of BLUE

The Operation of the Panel is separated in options, which and in direct controller (4.-9.).



navigate through the menu,

The menu can be navigated with the cursors (up) and (down)



A changing of an adjustment in the menu can be done with (left) and (right)

CUNIMA NANO

OEM DOC CCU – V 1.2
Serial communication interface RS485 /
USB
12.01.2012

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5.2 TERMINAL SETTINGS

The camera CCU can be controlled by a simple terminal connection.

All commands are simple ASCII characters.

The camera starts with default settings.

For flexible configuration provides a simple terminal interface.

The interface setting is:

- 9600 baud
- 8 bit data
- no parity
- 1 stop bit
- no flow control

The CCU gives simple text messages and accepts commands in text form.

Every command is confirmed by "OK" or "FAIL".

The user of host software must handle any errors.

After the camera is ready you get a prompt ">".

Now you can send commands to control the camera or get status information.

Check next chapter to get detailed information about available commands and options.

5.3 GENERAL COMMAND FORMAT

Whenever the camera is ready to accept commands, it sends its prompt ("> ").

Every command line is accepted as a single text line, terminated by either CR or LF.

The command consists of a command, followed by none or more parameters, separated by a single space. Numbers are accepted as hexadecimal (0xffffffff), decimal (4711), unsigned and signed.

The command will be executed and may produce some text output on one or more lines,

finally the status will be sent as a single line containing either "OK" or "FAIL".

In case of failure an error code may be added in the same line, e.g. "FAIL -3".

The lines sent by the firmware are terminated with both CR and LF.

5.4 COMMANDS

5.4.1 Videomode

Command: *svmode <n>*

1 <= n <= 13

Sets the video mode:

1080p30	4
1080p25	5
1080p24	6
1080p23_98	7
1080p29_97	8
1080p50	9
(1080p60	10)
(1080i60	11)
1080i50	12
(1080i59_94	13)

5.4.2 Automatic white balance

Command: *awb1*

Let the camera do a single-shot-auto-white-balance operation.

5.4.3 Whitebalance manual RED/GREEN/BLUE

White balance manual red

Command: *wcam 0x20424 0 - 255*

White balance manual green

Command: *wcam 0x20444 0 -255*

White balance manual blue

Command: *wcam 0x20464 0 – 255*

5.4.4 Analog gain

Command: *sgain <n>*

33 <= n <= 350

Switches the camera auto gain feature to "manual" and sets the gain value.

5.4.5 Exposure time

Command: *stv* <n>

0 <= n

Sets the exposure time in microseconds. This value is automatically initialised by "svmode" as being the half of the frame period.

n is microseconds

1/25	=	40000
1/30	=	33333
1/50	=	20000
1/60	=	16667
1/100	=	10000
1/200	=	5000
1/400	=	2500
1/800	=	1250
1/1600	=	625
1/3200	=	312
1/6400	=	156
1/12800	=	78

5.4.6 Color Adjustment White

Color adjustment white red

Command: *sred* <n> <m>

n <= 3

m < 255

Sets the gain factor for the red colour component as (n + m/255).

Color adjustment white green

Command: *sgreen* <n> <m>

Same as sred

Color adjustment white blue

Command: *sblue* <n> <m>

Same as sred

5.4.7 Color Adjustment Black

Color adjustment black red

Command: *sbred* <n>

-4096 <= n <= 4095

Sets the black level for the red color component.

Color adjustment black blue

Command: *sbblue* <n> <m>

same as sbred

Color adjustment black green

Command: *sbgreen* <n> <m>

same as sbred

5.4.8 Black level over all / pedestal

Command: *wcam 0x20204*

0 – 255

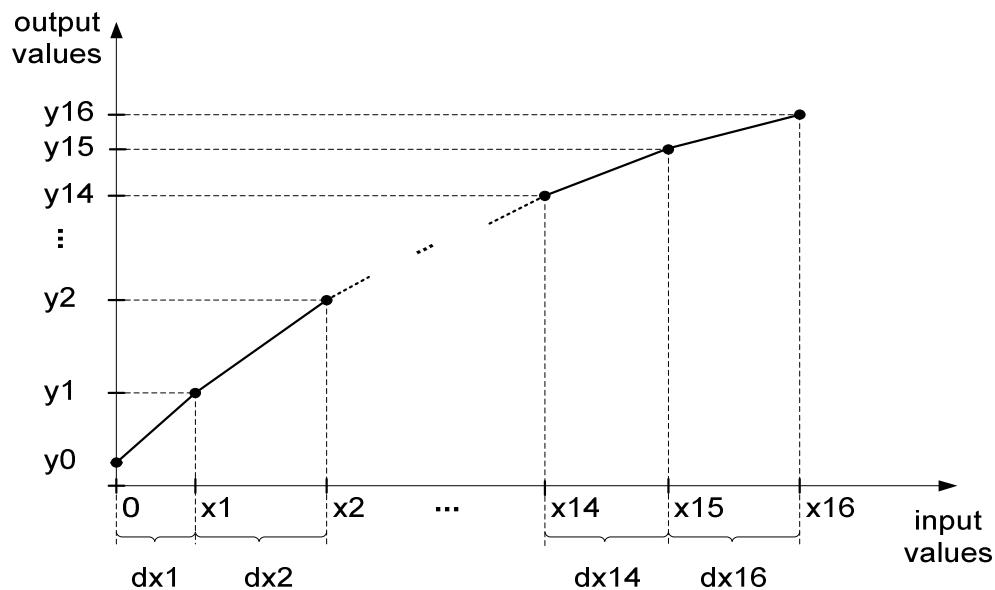
5.4.9 Gamma correction

Command: *sgammac <y0> .. <y16>*

$0 \leq n_i \leq 1023$

Sets the $y[i]$ gamma curve for output correction.

$Dx[1]$ depends of settings of *sgamma*. Defaults are optimized dx settings for ITU-R BT.601 standard: $dx_1 = 64, dx_2 = 64, dx_3 = 64, dx_4 = 64, dx_5 = 128, dx_6 = 128, dx_7 = 128, dx_8 = 128, dx_9 = 256, dx_{10} = 256, dx_{11} = 256, dx_{12} = 512, dx_{13} = 512, dx_{14} = 512, dx_{15} = 512, dx_{16} = 512$.



5.4.10 gamma points

Command: *sgamma <mode>*

Sets gamma curve x distance.

Two modes are supported 0 / 1.

Mode 0 (default)

These optimized dx settings for ITU-R BT.601 standard are:

$dx_1 = 64, dx_2 = 64, dx_3 = 64, dx_4 = 64, dx_5 = 128, dx_6 = 128, dx_7 = 128, dx_8 = 128, dx_9 = 256, dx_{10} = 256, dx_{11} = 256, dx_{12} = 512, dx_{13} = 512, dx_{14} = 512, dx_{15} = 512, dx_{16} = 512$.

Mode 1

All $dX[i]=256$

5.4.11 Sharpening On/OFF

Command: *sharpen <n>*

n = 1: Activates the sharpening filter with some example configuration.

n = 0: **Switches sharpening and denoising filter off**

5.4.12 Sharpening filter 1

Command: *psharpen <mode>*

mode = 0..8

The sharpening filter has a pre filter stage.

This stage has 9 different modes. It is recommended to run a smooth with this prefilter first, before sharpening.

This table shows the supported modes:

Filter 1 select	Filter matrix	Comment / use case
0	6 8 6 8 8 8 6 8 6	Max blur filter for very noisy input data or pre filter for down scaling
1	5 8 5 8 12 8 5 8 5	blur filter for noisy input data
2	4 8 4 8 16 8 4 8 4	Maximum line noise rejection (like separate vertical + horizontal filter with [1 2 1]/4 mask)
3	5 6 5 6 20 6 5 6 5	Maximum line noise rejection with balanced symmetry
4	4 6 4 6 24 6 4 6 4	Optimum compromise between noise rejection and sharpening
5	3 5 3 5 32 5 3 5 3	Weak low pass for sharpening
6	3 4 3 4 36 4 3 4 3	Weak low pass for sharpening
7	2 3 2 3 44 3 2 3 2	Weakest low pass filter mask for sharpening
8	0 0 0 0 64 0 0 0 0	bypass mask enables 3x3 over all filter modes

5.4.13 Sharpening filter 2

Command: *ssharp* *filt_fac_sh1 filt_fac_sh0 filt_fac_mid filt_fac_bl0 filt_fac_bl1*

Sets the parameters of the sharpening matrix.

<i>register</i>	Sharpening level										
	0	1	2	3	4	5	6	7	8	9	10
<i>filt_fac_sh1</i>	0x4	0x08	0x0C	0x10	0x16	0x1B	0x20	0x26	0x2C	0x30	0x3F
<i>filt_fac_sh0</i>	0x4	0x07	0x0A	0x0C	0x10	0x14	0x1A	0x1E	0x24	0x2A	0x30
<i>filt_fac_mid</i>	0x4	0x06	0x08	0x0A	0x0C	0x10	0x13	0x17	0x1D	0x22	0x28
<i>filt_fac_bl0</i>	0x2	0x02	0x04	0x06	0x08	0x0A	0x0C	0x10	0x15	0x1A	0x24
<i>filt_fac_bl1</i>	0x0	0x00	0x00	0x02	0x04	0x04	0x06	0x08	0x0D	0x14	0x20

5.4.14 Denoise On/Off

Command: *denoise <n>*

n = 1: Activates the denoising filter.

n = 0: Switches sharpening and denoising filter off

5.4.15 Denoise filter

Command: *sdenoise filt_thresh_sh1 filt_thresh_sh0 filt_thresh_bl0 filt_thresh_bl1 stage1_select filt_chr_v_mode filt_chr_h_mode*

Sets the parameters for the denoise filter.

<i>register</i>	De-Noise level										
	0	1	2	3	4	5	6	7	8	9	10
<i>filt_thresh_sh1</i>	0	33	44	51	67	100	120	150	200	300	1023
<i>filt_thresh_sh0</i>	0	18	26	36	41	75	90	120	170	250	1023
<i>filt_thresh_bl0</i>	0	8	13	23	26	50	60	80	140	180	1023
<i>filt_thresh_bl1</i>	0	2	5	10	15	20	26	51	100	150	1023
<i>stage1_select</i>	6	6	4	4	3	3	2	2	2	2/1*	2/1/0*
<i>filt_chr_v_mode</i>	1	3	3	3	3	3	3	3	3	3	3
<i>filt_chr_h_mode</i>	0	3	3	3	3	3	3	3	3	3	3

5.4.16 COLORMATRIX 3 x3

colormatrix on/off

Command: *wcam 0xE0004 0-1*

matrix red 1

Command: *wcam 0xE0024 0-255*

matrix red 2

Command: *wcam 0xE0044 0-255*

matrix red 3

Command: *wcam 0xE0064 0-255*

matrix green 1

Command: *wcam 0xE0084 0-255*

matrix green 2

Command: *wcam 0xE00A4 0-255*

matrix green 3

Command: *wcam 0xE00C4 0-255*

matrix blue 1

Command: *wcam 0xE00E4 0-255*

matrix blue 2

Command: *wcam 0xE0104 0-255*

matrix blue 3

Command: *wcam 0xE0124 0-255*

5.5 STATUS COMMANDS (REQUESTS)

Read out camera settings

Command: *getall*

answer in extra sheet

Read out actual exposure value

Command: *ghist*

Get histogram (16 values)

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