

Sprinter-FHD

Sprinter-HD



User Manual

Ref. 1900-SU-02-G

About this manual

Thank you for using an Optronis product.

The purpose of this document is to provide a description of Optronis CamRecord-Sprinter series cameras. Please read this manual thoroughly before operating your new camera for the first time. Follow all instructions and observe the warnings.

CamRecord-Sprinter cameras are operated via separate PC and TimeViewer software. Refer to the TimeViewer manual for software operation.

This document is subject to change without notice and corresponds to the last camera firmware and control software versions.

You can check product page download area to be sure you are using latest versions of this manual and TimeViewer software.

<https://optronis.com/en/products/sprinter-fhd/>

<https://optronis.com/en/products/sprinter-hd/>

- Last firmware version. (Check Firmware Update paragraph)

Support

In case of any further question or if you wish to claim a service or warranty case, please contact your local dealer or refer to the Optronis support on our website or by email. Important: Your request must include:

- Serial-Number: « S/N: 190x-ST-xxx ». See label at camera rear side.
- TimeViewer Software version
- Operating System (Windows 7/10/32bit/64bit ...)
- Short but complete description of the problem

Contacts

To contact us, please use below information.

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Contents

Scope of delivery	3
Options	3
Safety Instructions	4
Installation	5
Camera Connection	5
Installing TimeViewer Software	5
Network / IP Address configuration	6
Operate Camera	6
Installing Object Lens	8
Nikon F-Mount lens	8
Nikon F-Mount for G lenses (/FMG)	9
Camera	10
Lens mount	10
Camera Socket	10
Camera connections	11
SSD Slot	11
Power Switch	11
Programmable Output (PO)	12
Synchronization Output (SO)	12
Firmware Slot (FW)	12
GigE / USB2 Connector	12
Power Connector	12
SSD Slot Mounting Screw	12
Trigger Input (TI)	12
Synchronization Input (SI)	12
LED A / LED B	13
Serial Number	14
Modify Camera IP Address	14
Read actual IP Address from Camera	14
SSD Slot operating	15
Unmount SSD	15
Mount SSD	15
Trigger (TI) / Sync Connectors (SI / SO) details	15
External Trigger (TI)	15
External TTL	16
External Switch	16
External Synchronization Input (SI)	16
Synchronization Output (SO)	16
Technical Data	18
IP Configuration (Standard)	18
Spectral Response	19
Performance (Examples)	20
Sprinter-FHD	20
Sprinter-HD	20
Mechanical Dimensions	21
External Inputs	22
Trigger & Synchronization Input	22

Synchronization Timing	22
Trigger Timing	22
External Outputs	23
Synchronization Output	23
Synchronization Timing	23
Firmware Update	24
Why updating camera firmware	24
How to update camera firmwares	25
Prepare USB Stick	25
Program new hardware firmware to Camera	25
Declaration of conformity	28
Revision	29

Scope of delivery

Sprinter-HD-M or
Sprinter-HD-C or
Sprinter-FHD-M or
Sprinter-FHD-C
with
SSD 256 GB (installed in camera)
Power supply
Gig-E cable
3x DIN1.0/2.3 to BNC cables
SATA - USB adaptor
USB stick, CD with TimeViewer software and manuals
Quickstart instructions (this manual)
Transport case

Options

F-Mount (CP-FM)
C-Mount (CP-CM)
F-Mount for Nikon G-Lenses (CP-FMG)
LabView Driver (CR-LabView)
Programmer Guide (download, free of charge)

Safety Instructions

- Please operate CamRecord-Sprinter camera power supply from a 110 Volt to 240 Volt, 50 Hz to 60 Hz power source. Other voltage levels or frequencies may damage the camera.
- Do not orientate the optical input of the camera to direct sunlight.
- Keep the camera protected from dirt, dust, grease and water.
- Make sure that all the connecting cables are in good condition and that they are well mounted to their sockets.
- Please use the socket of the camera and connect it to a sufficiently stable basis.
- Avoid strong system shocks and vibrations during transport or during operation.
- Always unplug the camera before cleaning it. Do not use cleaning liquids or sprays. Instead, use a dry and soft duster.
- For any further questions, please do not hesitate to contact Optronis GmbH, especially when the camera does not work as it is described in the user manual.

Installation

Camera Connection

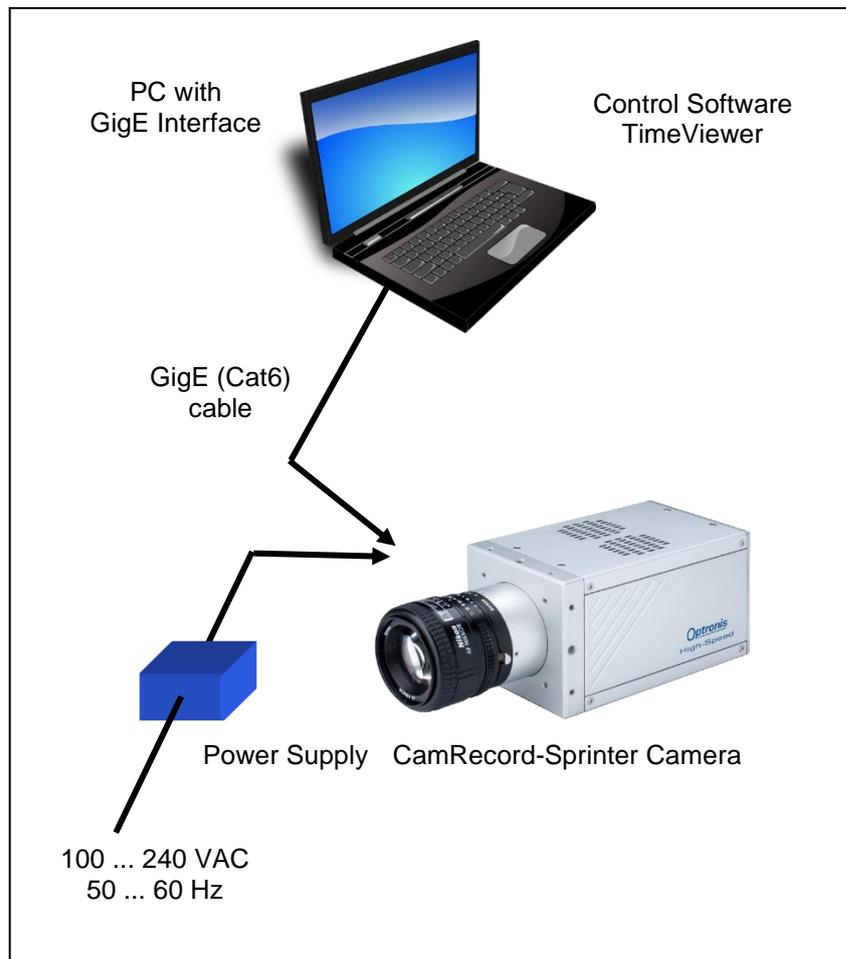


Figure 1: Typical System Configuration with PC and GigE connection

1. Connect the power supply to the camera (Power) connector.
2. Switch on camera by sliding power switch to (I). Camera will boot indicating by LED A and LED B which are red.
3. Connect GigE to PC by using a Cat6 cable.

Installing TimeViewer Software

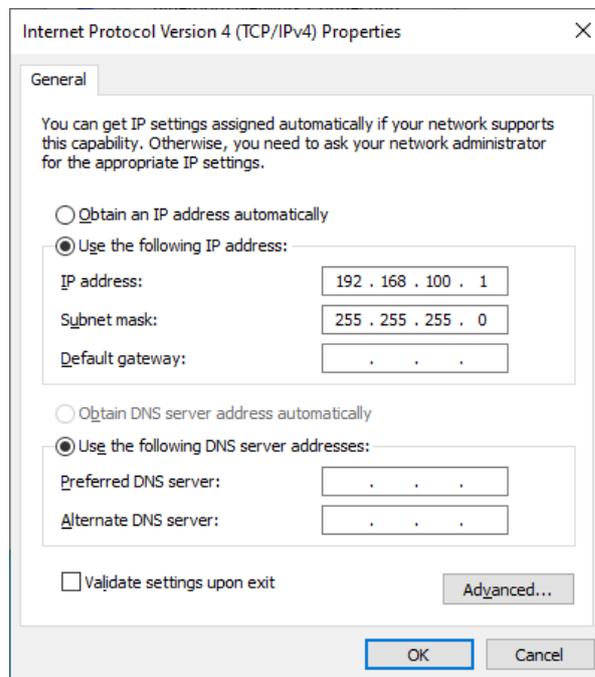
The TimeViewer software is required to capture video data and control CamRecord-CR series and CamRecord-Sprinter series cameras

1. Insert CD with TimeViewer software to PC
2. Dialog box will appear that allows installation of the TimeViewer software. If the dialog box doesn't appear, please run the file "SetupTimeViewer_vx.x.x_x.exe".
3. Follow instructions.

Refer to TimeViewer manual for more details of software installation.

Network / IP Address configuration

1. Assuming the camera is configured with standard IP address, please set your network adapter IP as follows:



2. In case IP address of camera is not standard, please modify IP address of adapter accordingly. Example:
Camera IP= 192.168.102.200 → adapter IP= 192.168. 102.1

Operate Camera

1. Make sure the camera is connected via Gigabit Ethernet (GigE) interface to the PC and powered on. Start TimeViewer.

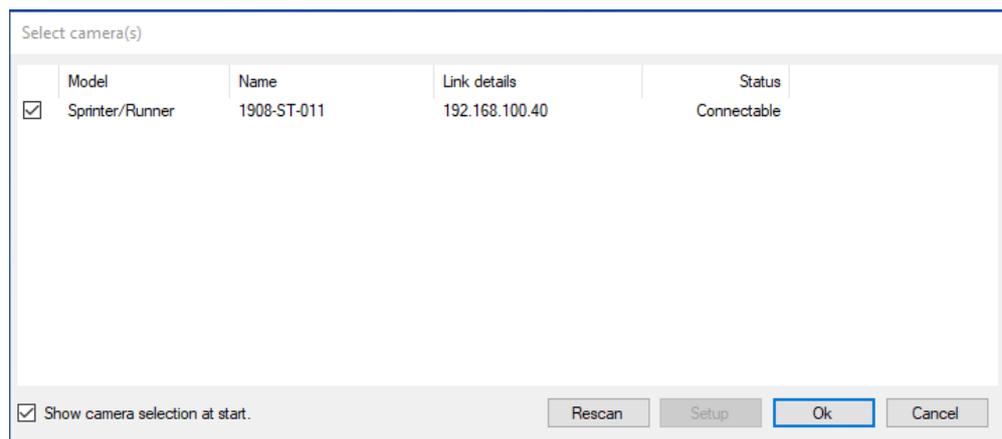


Figure 2: Camera detection

2. When starting, the software is detecting cameras over the network. Detection results are listed (see Figure 2) and at least one camera must be selected (check or more tick boxes) before clicking on “Ok”.
3. To verify the operation of the camera, the following parameters in the “Setup-Menu” of the software might be used:

	Sprinter-FHD	Sprinter-HD
Frame Format:	1920 x 1080	1280 x 860
Frame Rate:	50 fps	50 fps
Exposure Time:	20000µs (ie.1/50)	20000µs (ie.1/50)
Synchronization:	internal	Internal

4. The camera transfers live-images to the monitor of the PC. To optimize image quality, please adjust lens aperture and focus. Do not forget to remove lens cap.

Remark:

If there is a detection/communication problem between the camera and the PC, please make sure that the camera is well powered ON and that the camera is well connected to the PC.

In case camera booting was not finished or if the camera was not yet connected you can click on “Rescan” button to start another detection.

Please also make sure that the IP address of adapter and camera are set correctly.

TimeViewer only checks last byte of IP-address to find CamRecord-Sprinter cameras. Example: If adapter address is set to 192.168.100.1 and sub-net mask 255.255.0.0 only cameras on this adapter with IP-address within the range of 192.168.100.2 – 192.168.100.255 will be found.

In case selection window does not appear, it had been deactivated before AND the camera(s) selected before had been found. You might activate it again at the “Extra/Options” menu. See TimeViewer manual for details.

Installing Object Lens

Nikon F-Mount lens

F-Mount lens-holder



Figure 3: Overall Camera and lens view

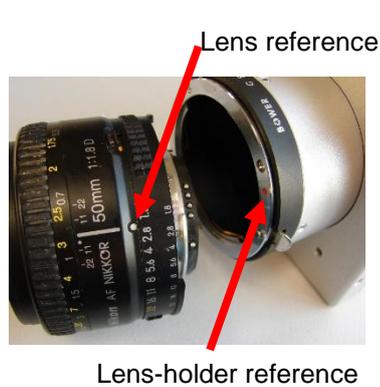


Figure 4: F-mount lens

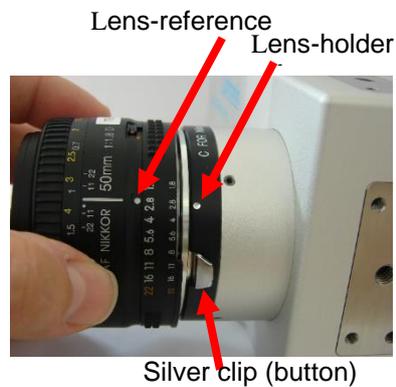


Figure 5: F-mount lens before rotation

To install a F-mount lens to the lens-holder, first put the lens-reference in front of the lens-holder reference. Then, turn the lens anti-clockwise until the silver clip (silver button) on the lens-holder locks.

To remove the lens please pull back first the silver clip (button) back in order to unlock the lens while the lens has to be turned clockwise until the lens is unmounted completely.

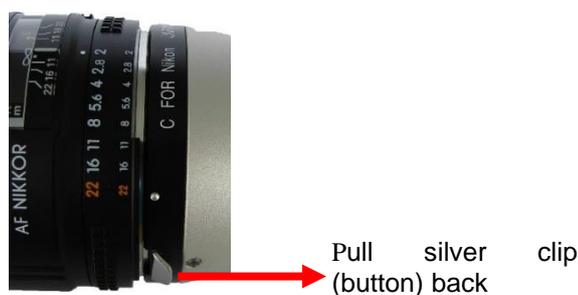


Figure 6: F-lens unmount

Nikon F-Mount for G lenses (/FMG)

Nikon G lenses do not offer mechanical aperture adjustment. The /FMG Adapter allows to perform mechanical aperture adjustment continuously.

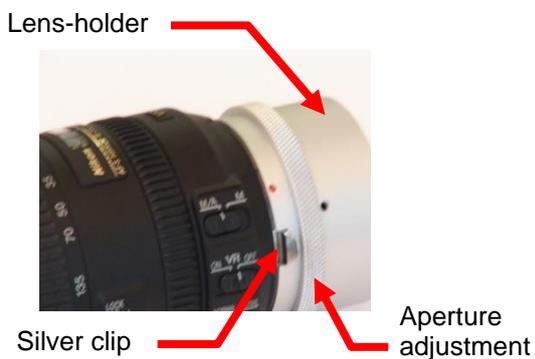


Figure 7: F-mount for G lens


<p>When mounting a standard F-Mount lens (with mechanical aperture ring) turn the aperture ring of the adapter anti-clock-wise (seen from the front) to its close position and keep it there.</p>

To connect the lens to the lens-holder, first put the lens-reference in front of the lens-holder reference. Then, turn the lens anti-clockwise until the silver clip (silver button) on the lens-holder locks.

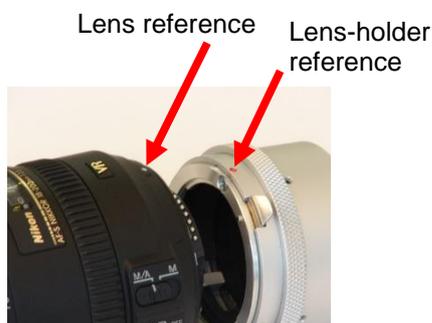


Figure 8: G lens mount 1/2

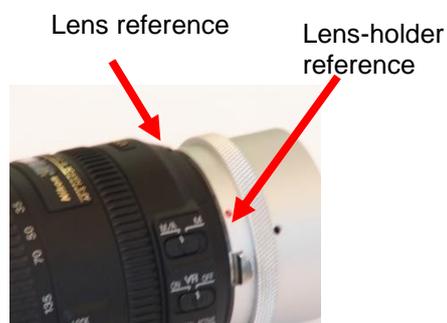


Figure 9: G lens mount 2/2, Lens locked

To remove the lens please pull back first the silver clip (button) back in order to unlock the lens while the lens has to be turned clockwise until the lens is unmounted completely.

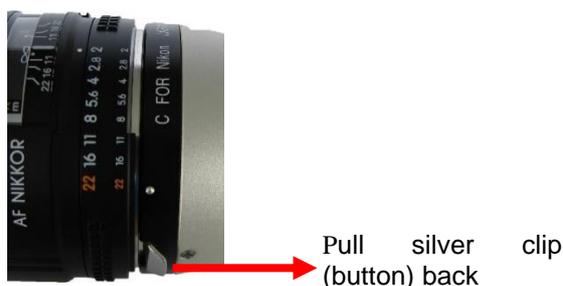


Figure 10: F-mount with G lens unmount

Camera



Figure 11: Sprinter Camera View

Lens mount

CamRecord-Sprinter cameras are typically delivered with a Nikon-F-Mount (CP-FM).

Remark:

For special needs, the Sprinter cameras may also be used with C-Mount (CP-CM), F-Mount for G lenses (CP-FMG). Please contact Optronis for other mounts.

Accessories:

Macro and magnification-applications may need special distance washers between lens interface and lens as e.g. the PK-11A (8mm length) from Nikon. Distance washers are available for Nikon F-Mount and C-Mount.

Camera Socket

The socket at the bottom side of the camera is used:

- To fasten the camera to a tripod or special holders by use of the five screw threads (1x 1/4"-20UMC in the middle or 4x M4 in the corners).
- Alternatively, the mounting holes of the camera head can be used to fasten the camera with more flexibility.

Camera connections



Figure 12: Sprinter camera rear face

- | | |
|--|---|
| 1. SSD Slot | 7. Power Connector |
| 2. Power Switch | 8. SSD Slot Mounting Screw |
| 3. Programmable Output (PO)
Synchronization Output (SO) | 9. Trigger Input (TI)
Synchronization Input (SI) |
| 4. Firmware Slot | 10. LED A / LED B |
| 5. GigE / USB2 Connector | 11. IRIG B Input |
| 6. Serial Number | |

SSD Slot

(1) SSD hard disk slot for non-volatile backup of the image sequences.

Power Switch

(2) The camera operates when the power supply is connected and the Power Switch is on 'I'. The power of the camera is switched off when the Power switch is on '0'.



Please note, that image data, that are stored inside the random memory of the camera, are lost when switching off the camera.

Programmable Output (PO)

(3) TBD.

Synchronization Output (SO)

(3) Gives out a TTL signal synchronous to the exposure time of the images. The TTL signal is always active.

Firmware Slot (FW)

(4) Micro SD card slot with firmware of the camera. Exchange of SD card required only for major firmware updates or in case of defects. Typically, no user action required.

GigE / USB2 Connector

(5) The GigE Connector is used to communicate with a PC. Please use Cat6 (or better) patch cable between camera and PC.

The USB2 connector is used for configuring camera network setting and firmware update (USB2 stick).

Power Connector

(7) The camera is supplied by a 12 Volt DC power source which is delivered by the camera power supply. To operate the camera, the power supply has to be connected and the Power Switch has to switch on "1".

Remark:

Please always use the power supply that is foreseen for the camera. When the camera shall be supplied by another power source, please contact first Optronis GmbH.

SSD Slot Mounting Screw

(8) Please switch off the camera and turn the SSD Slot Mounting Screw anti-clockwise to open the SSD slot of the camera.

Trigger Input (TI)

(9) The image sequence can be triggered (the recording will be stopped) by an external Switch or TTL signal. To use the trigger input, please refer to the TimeViewer software package.

Synchronization Input (SI)

(9) The synchronization input can be used to synchronize the exposure time of several cameras. To synchronize the cameras, a TTL level has to be

applied. Please refer to the TimeViewer software package to activate the synchronization input.

LED A / LED B

(10)

Color code	Led color
O	Orange
G	Green
R	Red

State	Timing
Off	0% On
SO = Solid	100% On
SF = Slow Flash	0.5Hz (1s On, 1s Off)
FF = Fast Flash	5Hz (100ms On, 100mn Off)

Camera State	Led State	
	A	B
No power	Off	Off
1) <u>System Booting:</u>		
Camera booting	R-SO	R-SO
Booting finished (FF for 1s)	R-FF	R-FF
2) <u>Camera running</u>		
No image, live stopped		G-SO
Live mode (internal sync)		G-SF
Live mode (external sync and signal ok)		G-SF
Live mode (external sync but no sync signal)		R-SF
Waiting for trigger		O-FF
Triggered, recording sequence to DDR (internal sync)		G-FF
Triggered, recording sequence to DDR (external sync and signal ok)		G-FF
Triggered, recording sequence to DDR (external sync but no sync signal)		R-FF
Replay sequence from DDR (= not live)		G-SF
No SSD connected	O-SO	

SSD detected but not formatted	O-SF	
SSD RDY	G-SO	
SSD Saving sequence (WR SSD)	G-FF	G-FF
SSD replay (RD SSD)	G-SF	G-SO
SSD Full (no more backup possible but replay is ok)	R-SF	
SSD Error (not formatted, not detected, access error, ...)	R-SO	

Serial Number

(12)

REF: Indicates the camera model and the camera options

S/N: Indicates the serial number of the camera

Modify Camera IP Address

To set the IP Address of the camera please use an USB2 stick formatted to **FAT32** and use the Optronis tool IPConfiguration:

1. Start IPConfiguration tool "IPConfiguration.exe" to create a text file IP.CFG
2. Copy IP.CFG to the USB2 Stick
3. Power off the camera and plug the USB2 Stick into the camera
4. Power on the camera and wait, until boot time has finished (see led states detailed later in the document). USB2 stick can be removed once the boot is finished.

Alternatively

1. Create a text file on the USB2 stick named: IP.CFG
2. Open the text file and write 2 lines. First Line is the IP of the camera (e.g. 192.168.100.254), second line is the subnet mask (e.g. 255.255.255.0)
3. Save the file, plug it to the camera, power on the camera and wait until the camera has booted.
4. After boot, the camera has accepted the new IP address

Make a note of the changed IP address onto the camera for future reference.

Read actual IP Address from Camera

1. Plug an empty USB2 stick formatted to **FAT32** to the camera
2. Boot the camera (During Boot time, the camera creates a file with the name CAMERA_IP.CFG, CAMERA_IP.CFG shows the actual IP address of the camera)
3. Remove USB2 stick and plug it onto a PC.

4. Enter the desired camera IP address and subnet mask of CAMERA_IP.CFG with a text editor
5. Save the file and rename it to IP.CFG
6. Plug the stick into the camera, power cycle the camera and wait until boot has finished.
7. USB2 Stick can be removed once the boot is finished.

SSD Slot operating

Unmount SSD

To unmount the SSD please power off the camera, open the SSD slot screw and pull the SSD out of the SSD slot. The SSD can then be put into a USB docking station connected to a PC to readout image data with the TimeViewer software.



Figure 13: SSD and its holding system

Mount SSD

To mount the SSD please switch off the power of the camera, put the SSD gently into the camera SSD slot and close the SSD slot with the SSD slot screw. Power on the camera.

Please note, that a new SSD has to be formatted first by TimeViewer software before data can be saved onto the SSD.

Trigger (TI) / Sync Connectors (SI / SO) details

External Trigger (TI)

The external trigger input can be used to trigger a sequence. The schematic below shows the schematic of the input.

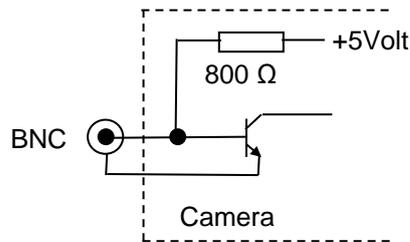


Figure 14: Trigger Input, schematic presentation

Please look at the “Technical Data / External Input” chapter of this manual for detailed technical specification.

External TTL

Allows to use a TTL signal at the BNC connector of the trigger input. The trigger is rising edge sensitive.

External Switch

Allows to use an external switch, a TTL signal or an open collector to trigger the sequence. The trigger signal is falling edge sensitive which means, that e.g. the switch has to be closed to trigger the sequence.

External Synchronization Input (SI)

The camera allows to be externally synchronized by an external pulse generator to frame rates, which are not given by the internal frame rates of the camera. To do this, a TTL signal has to be applied to the external Synchronization input. The camera detects the rising edge of the signal.

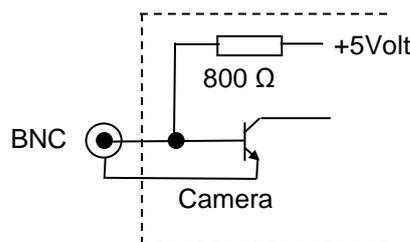


Figure 15: Synchronization Input, schematic presentation

Please look at the “Technical Data / External Input” chapter of this manual for detailed technical specification.

Synchronization Output (SO)

The synchronization output provides a TTL signal synchronous to the frame rate of the camera. The positive edge is synchronous to the beginning of the exposure time of each frame.

Output Impedance: 50 Ω
 Signal Level: approx. 4 Volt into high impedance (>500 Ω)
 approx. 2 Volt into 50 Ω

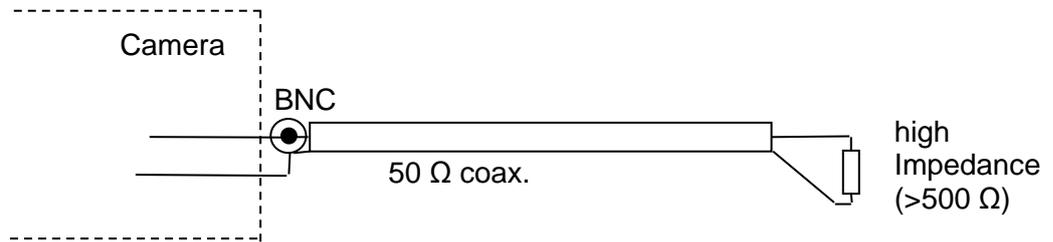


Figure 16: High impedance termination

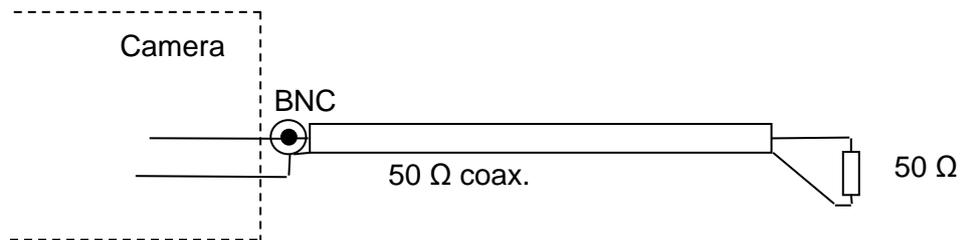


Figure 17: 50 Ohm termination

White balance (only for color cameras Sprinter-xx-C)

Weighting of RGB color pixel needs to be adjusted to obtain color neutral images. Weighting factors depend on camera but also on lighting conditions. To obtain optimized factors put a white object (e.g. a white sheet of paper) in front of the camera to see a complete white image. Use *White Balance* function of the software to initiate the calibration. Factors from previous white balance will be overwritten.

Weighting factors are saved inside the camera (SW firmware version cr_server_v1.0.0.249 and later from Nov. 2021)


<p>To set white balance we recommend not to use white clothing. There is a strong blue shade in this white that is partly detected by the camera but not by human eye.</p>

Technical Data

	Sprinter-HD	Sprinter-FHD
Sensor resolution	1 280 x 860	1 920 x 1 080
Frame rate @ max. res.	20 .. 3 504 fps	20 .. 1 905 fps
Memory	16 GB internal	
Image sensor	CMOS, Global Shutter	
Exposure time	2 μ s - 1/framerate	4 μ s - 1/framerate
Active area	17.5 mm x 11.8 mm	19.2 mm x 10.8 mm
Sensor diagonal	21.1 mm	22.0 mm
Pixel size	13.7 μ m	10.0 μ m
A/D conversion	8 Bit	8 Bit
Dynamic	48 dB	48 dB
Sensitivity	25 V/lux x s @ 525 nm	20 V/lux x s @ 550 nm
Trigger modes	internal free-run, switch, rising or falling edge, pre- and post-trigger	
Power Supply	+12Volt \pm 5% / 3,75Amp., 100...240Vac / 50-60Hz	
Weight	1400 g without mount	
Dimensions	150 mm x 92 mm x 92 mm	
Housing	lightweight anodized aluminum	
SSD bay	data storage and backup	
PC software	TimeViewer for Windows (support for version 7, 8 and 10) for capture, video playback, export, export, image analysis with object tracking	

IP Configuration (Standard)

IP address: 192.168.100.254

Subnet mask: 255.255.255.0



In case of multi cameras setup used with the same PC, IP address of camera has to be different on the last number. Example: 192.168.100.254 and 192.168.100.253.

Spectral Response

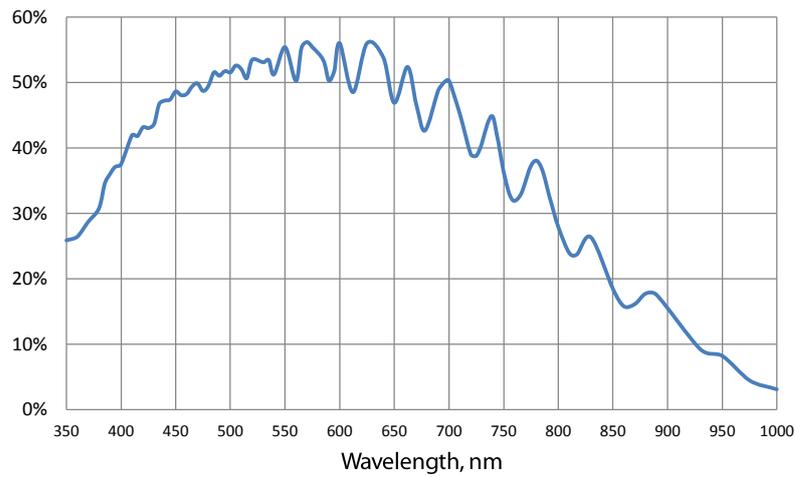


Figure 18: Spectral Response Sprinter-FHD-M

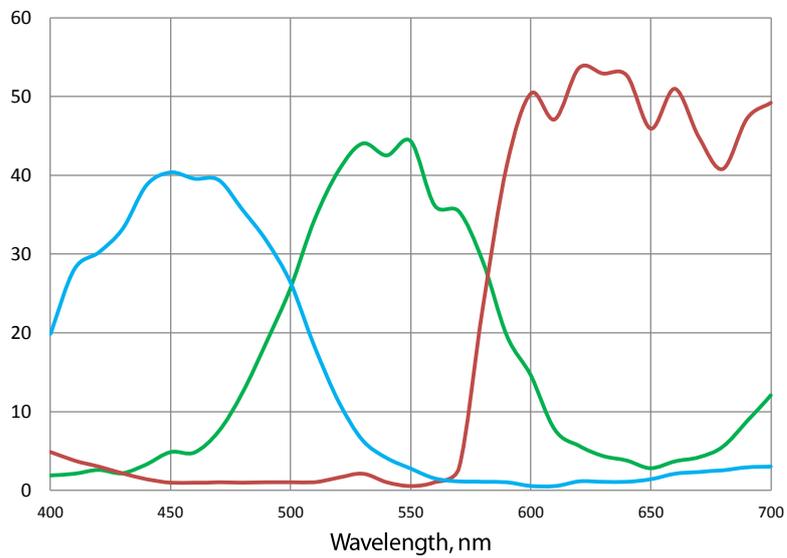


Figure 19: Spectral Quantum Efficiency Sprinter-FHD-C (sensor)

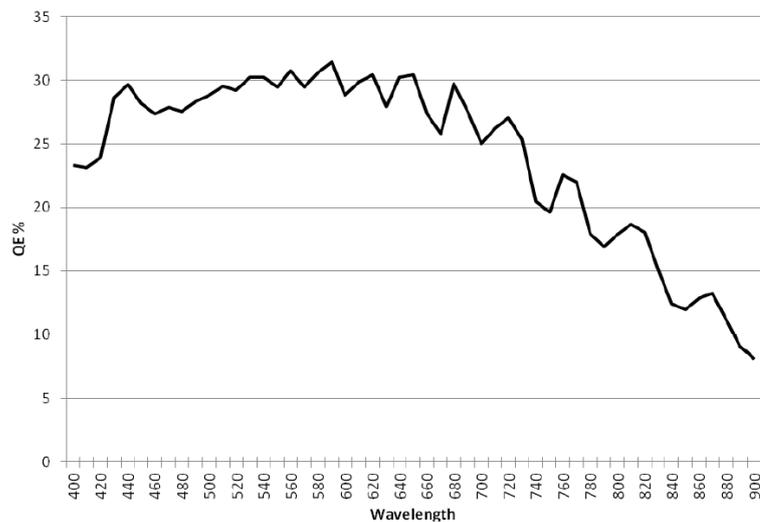


Figure 20: Spectral Quantum Efficiency Sprinter-HD-M

Performance (Examples)

Sprinter-FHD

Resolution (H x V)	Framerate (fps)	Recording Time (s)
1 920 x 1 080	1 905	4.35 s
1 280 x 960	2 141	6.53 s
1 280 x 720	2 843	6.55 s
640 x 480	4 230	13.21 s
384 x 288	6 937	22.38 s
256 x 128	14 866	35.19 s
256 x 8	104 065	78.15 s

Sprinter-HD

Resolution (H x V)	Framerate (fps)	Recording Time (s)
1 280 x 860	3 504	4.4 s
1 280 x 720	4 168	4.4 s
1 280 x 4	128 514	25.78 s
640 x 480	6 168	9.0 s
384 x 240	11 862	15.7 s
256 x 192	14 548	24.0 s
256 x 4	128 514	122.8 s

Mechanical Dimensions

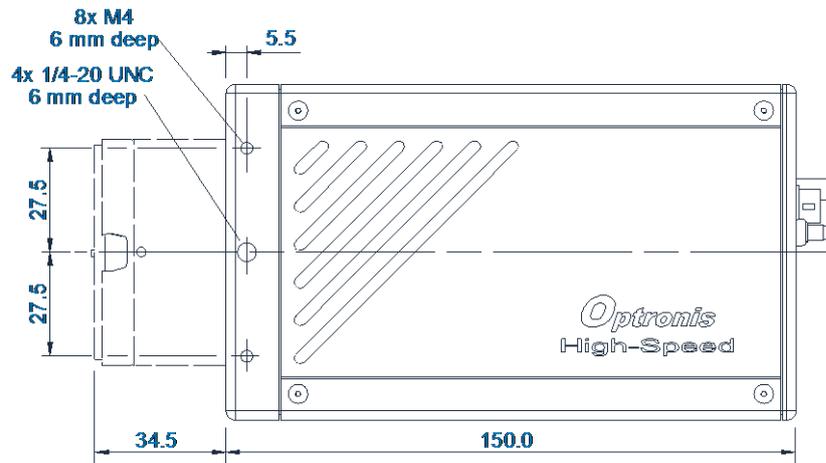


Figure 21: Side view

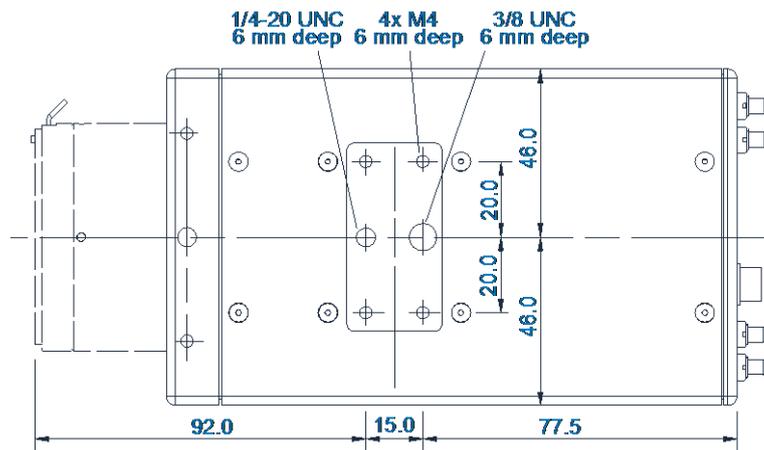


Figure 22: Bottom view

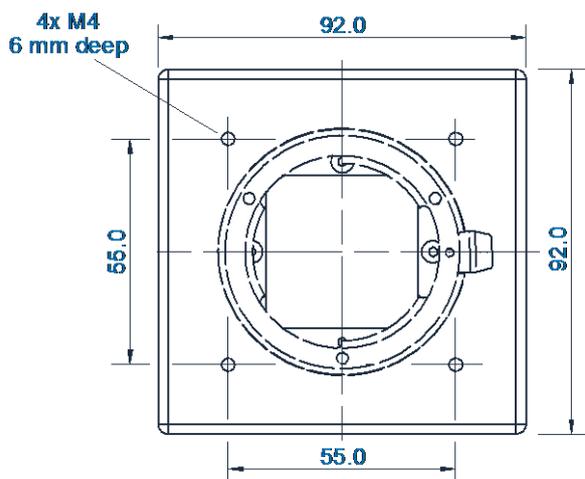


Figure 23: Front view

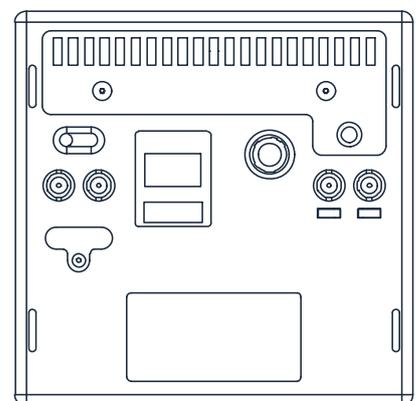


Figure 24: Rear view

External Inputs

Trigger & Synchronization Input

Level	<ul style="list-style-type: none"> - TTL Low Level: <0.8 Volt High Level: >2.0 Volt - External Switch or Open Collector - Edge triggered
maximum Input Level:	+24 Volt / -10 Volt
Edge	<ul style="list-style-type: none"> Rising: (TTL) Falling: (Trigger on external switch or Open Collector)
Rise-Time	<100 nsec
Input Impedance	high (~800 Ω)

Synchronization Timing

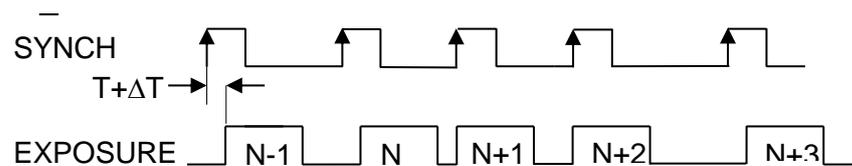


Figure 25: Input synchronization timing

All Sprinter models:

Delay (T): 3.27 μ sec

Jitter (Δ T): +/- 1.1 μ sec

Resulting delay (T+ Δ T): 2.17...4.37 μ sec

Trigger Timing

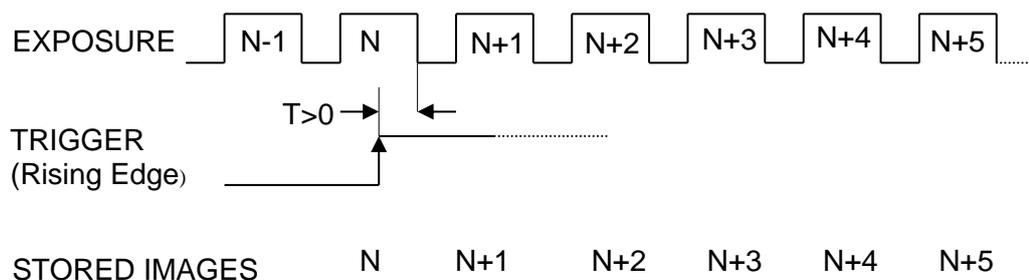


Figure 26: Trigger timing

External Outputs

Synchronization Output

Level	TTL Low Level: <0.8Volt High Level: 4 Volt typ. (into high imp.) 2 Volt typ. (into 50 Ω)
max. reverse Protection:	± 10 Volt
Edge	positive
Rise-Time	<50 nsec

Synchronization Timing

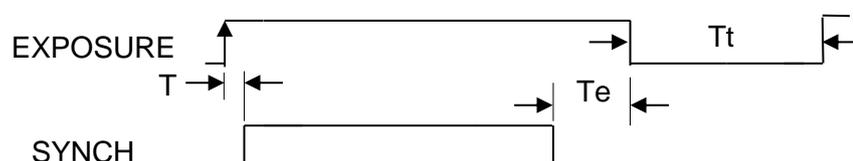


Figure 27: Output synchronization timing

All Sprinter models:

T : 100 nsec

Te: 100 nsec

Tt : min. 0

- T Delay between the beginning of the exposure and the beginning of Synch Output
- Te Time-interval between end of synch-signal and end of exposure-time
- Tt exposure dead time

Firmware Update

Why updating camera firmware

When updating TimeViewer control software, a pop-up message (see below example) might indicate that a camera firmware update is required to get all features working properly.

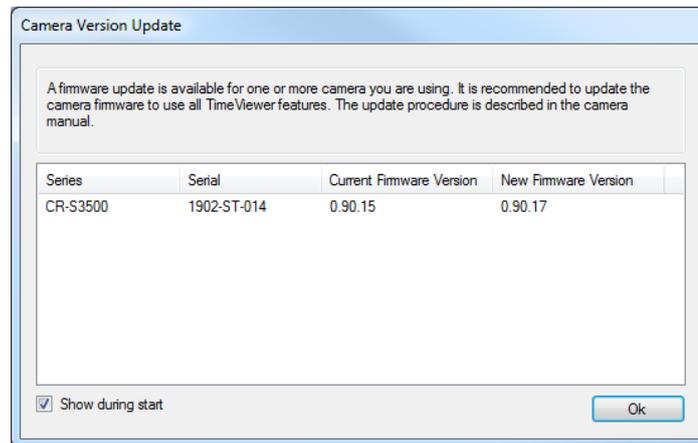


Figure 28: TimeViewer detects an out-of-date camera firmware

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Please be careful when updating camera firmwares and follow below instructions.

Do not power off camera during a firmware update.

Check website product page and check download tab to get the latest camera firmwares.

<https://optronis.com/en/products/sprinter-fhd/>

<https://optronis.com/en/products/sprinter-hd/>

Alternatively, you can check TimeViewer installation folder “/Firmware/” and use its cr_server and .rbf files.

Alternatively, you might have received a newer firmware from Optronis support or by checking website product page.

How to update camera firmwares

Camera has 2 firmwares:

- hardware (HW file of rbf type named “CR1900_version.rbf”)
- software (SW file without extension named “cr_server_version”).

To ensure compatibility, both firmwares must be updated at the same time. We also encourage you to get the last version of the TimeViewer software when updating the camera.

Prepare USB Stick

Use an USB2 stick formatted to FAT32.

1. Start CR1900_FlashTool to copy new files on USB sticks.
2. Select HW and SW files and USB stick path (see Figure 29).
3. Click on copy button (see **Error! Reference source not found.**).

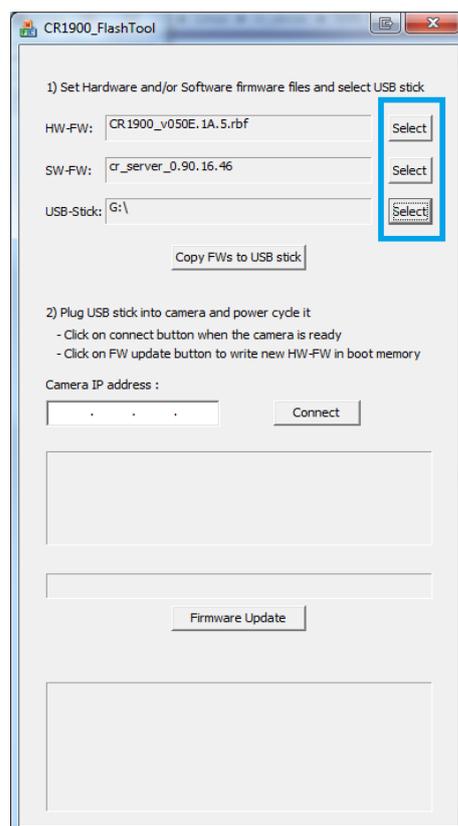


Figure 29: Select files and path

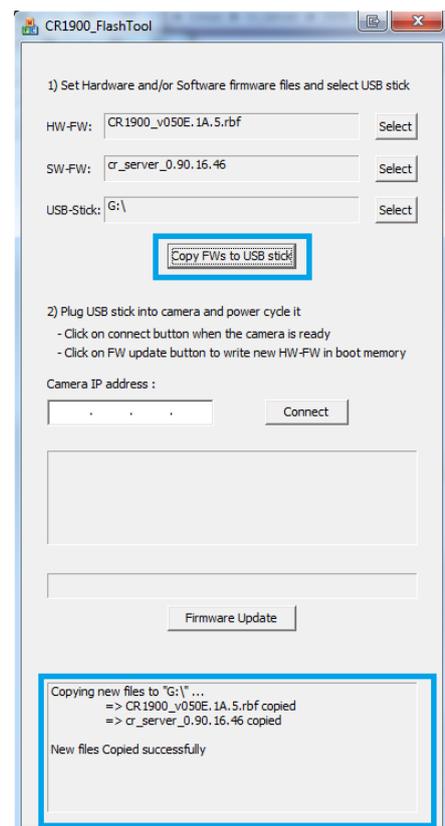


Figure 30: Copy files to USB stick

Program new hardware firmware to Camera

1. Plug USB stick into camera and power cycle.
2. Start CR1900_FlashTool.
3. Set camera IP and when the camera network is established click on connect button (see Figure 31)

- Click on “HW Firmware Update” button and wait (see Figure 32 and Figure 33). Update process takes ~8 minutes.

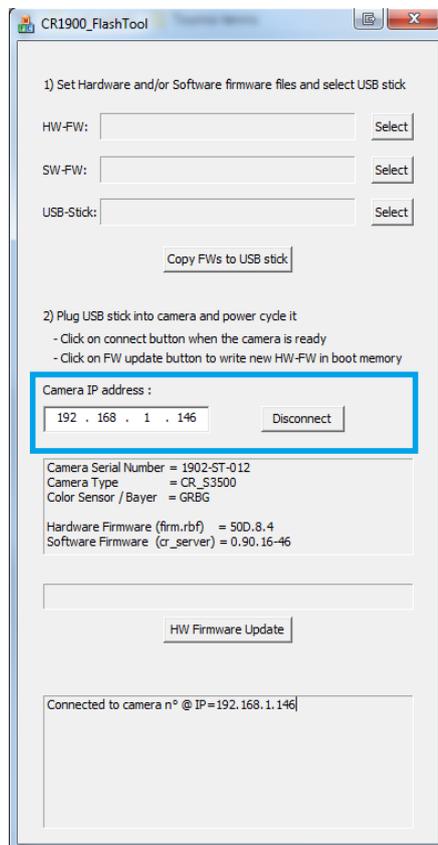


Figure 31: Connected to camera

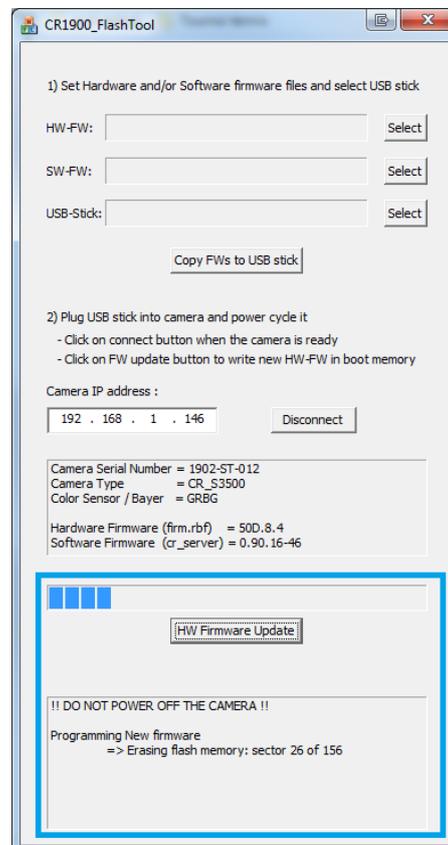


Figure 32: HW Update progressing 1/2

- When Update is finished (see Figure 34), power cycle the camera.
- You can see update success by connecting again to the camera (click on “Disconnect” / “Connect” or restart software).

New version is now programmed (see Figure 35)

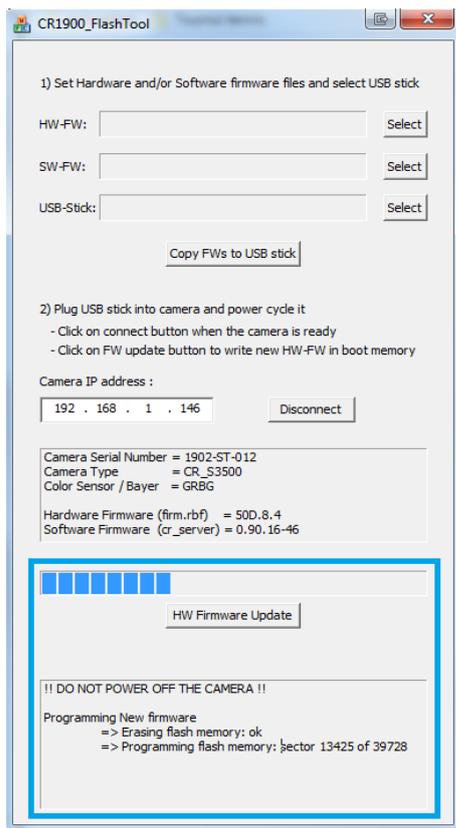


Figure 33: HW Update progressing 2/2

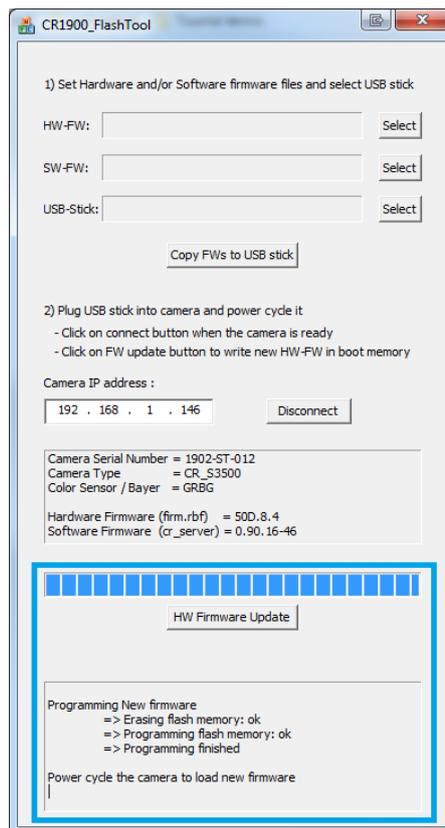


Figure 34: Update finished

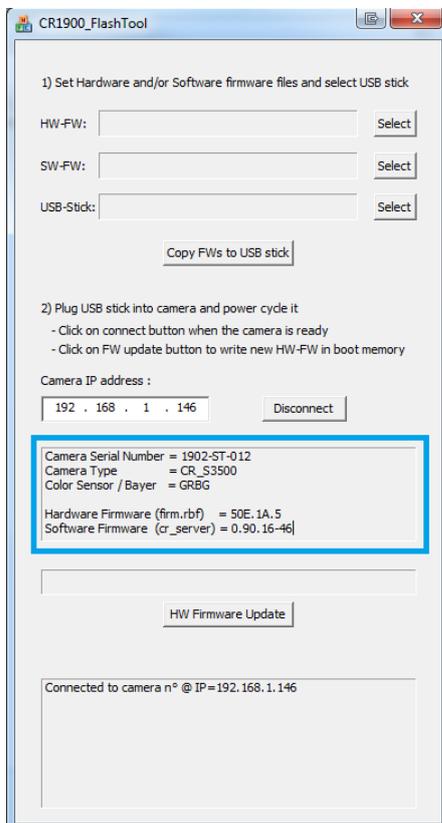


Figure 35: New HW is loaded at next power cycle

Declaration of conformity

Manufacturer: Optronis GmbH
Address: Ludwigstr. 2, 77694 Kehl, Germany

We certify and declare under our sole responsibility that the following apparatus

Product: Sprinter-FHD or Sprinter-HD

Conforms with the essential requirements of the EMC Directive 2014/30/EU, based on the following applied specifications:

Specifications: EN 61000-6-3 Emission
 EN 61000-6-1 Immunity



CamRecord-Sprinter series cameras are Pb free manufactured and RoHS compliant.

Kehl, 24.02.2017

Optronis GmbH
Dr. Patrick Summ
Managing Director

Revision

Manual revision	Date	Comments
1900-SU-02-G	12.11.2021	- Framerate table updated, lens installation modified, standard IP address information added, manual partly restructured, spectral response for Sprinter-FHD added, white balance information added
1900-SU-02-G	22.07.2020	- Framerate table updated
1900-SU-02-F	09.07.2019	- Minor corrections
1900-SU-02-E	26.03.2019	- Minor corrections - New minimum Sprinter FHD minimum exposure (4 μ s) - New minimum FPS (50fps)
1900-SU-02-D	10.12.2018	- Rename CR-S3500 to Sprinter-HD - Add Sprinter-FHD model
1900-SU-02-C	28.09.2017	- Update content
1900-SU-02-B	29/03/2017	- Update layout - Add Firmware update paragraph
1900-SU-02-A	28/02/2017	- 1 st version