VANDEWIELE PROTECHNA

Service Manual

ARRAYCAM 5420

for Tricot Machines

Software-Version 2.0.52 - revision October 2018

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1 General

1.1 Safety instructions

- Always obey all warnings and instructions that are displayed or indicated on the unit itself, or are mentioned in this manual.
- This unit is sensitive to electrostatic discharges, which can damage its internal parts and impair their normal operation. Take the precautions necessary for handling components sensitive to electrostatic discharges.
- Before cleaning the unit or removing or installing any options, always disconnect the unit from the power supply.
- Do not use any liquid cleaning agents or cleaning sprays when cleaning the unit; use only a moistened cloth.
- Never operate the unit at locations where there is a risk that water or other liquids can penetrate into the unit.
- The installation location chosen for the unit must be absolutely stable, since severe vibration, such as the result of dropping the unit, can seriously damage it.
- Make absolutely sure that the voltage values specified for the unit power supply are complied with.
- Never attempt to insert objects through the openings on the unit, since the voltages that are present within the interior can cause short circuits or electric shocks.
- Except for the interventions explicitly described in the manual, you must never attempt to repair the unit yourself. Otherwise you expose yourself to the risk of coming into contact with parts that are live at high voltages.
- Although the power emitted by the transmitter of the (optional) laser setting aid is not sufficient to be hazardous (laser class 1), direct eye contact with the laser light beam should be avoided.

The electrical connection may be made only by a qualified electrician.

Before making the electrical connection you must ensure that there is no risk of coming into contact with parts that are live.

Use for the intended purpose
in the sense of point 1.1.2.c
EC Machinery Directive

Point 1
The ArrayCam 5420 system is intended for monitoring fabric on textile warp knitting machines and may be mounted and operated only on such machines.

The EMC requirements to DIN/EN 50082-2 and DIN/EN 50081 part 2 for industrial equipment are satisfied.

Point 2
The ArrayCam 5420 system must be permanently installed at the place of use.

Point 3
The camera unit must be mounted on the free-standing beam frame; the control unit must be mounted on the control cabinet or on the free-standing beam frame.

This work may be performed only by PROTECHNA technicians or by skilled workers (mechanic, electrician) of the customer.

1.2 Protechna Service

Installation service

We strongly recommend that at least the initial installation of the PROTECHNA units is performed by our service technicians. The customer will thereby receive professional installation and setting up of the system, together with instruction in the correct use of it.

This installation service is available at minimal costs and is normally available in all areas. Overseas customers should enquire at their local PROTECHNA agent about the installation service.

Service

Service technicians are available by special request to perform inspection of the PROTECHNA ArrayCam 5420 monitoring system.

In many cases, however, minor problems may be resolved by a phone call or e-mail, without requiring a visit by a technician.

2 System description

2.1 Control unit

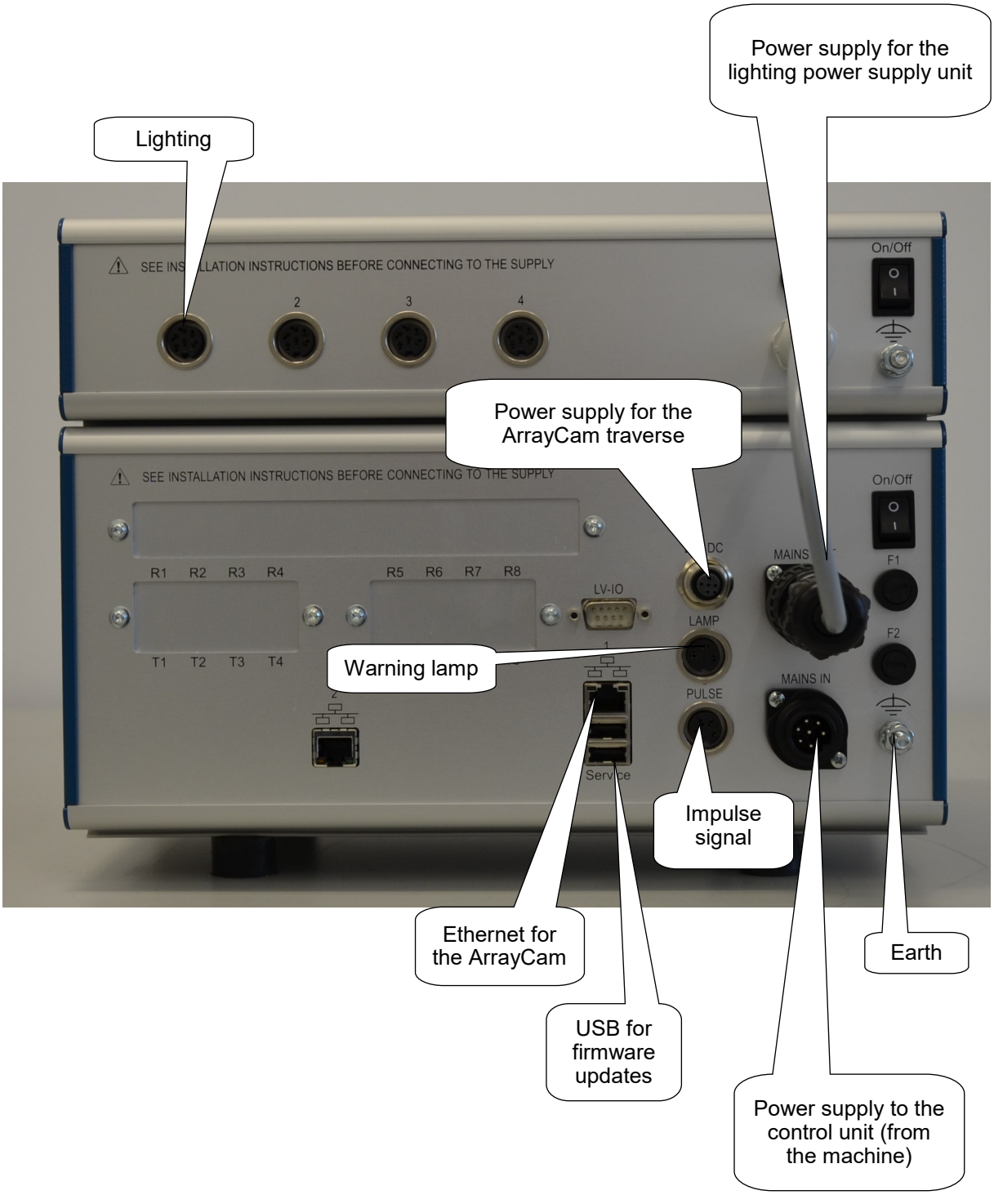
The control unit 5420 (below) has a total of 16 keys:

- 2 x 4 keys each, arranged vertically
- 6 keys arranged horizontally
- 1 back key
- 1 confirmation key

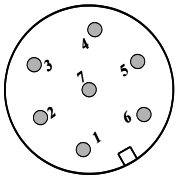
The mains switch is located on the back of the control unit.

The mains switch for the lighting power supply unit (above) is located on the back of the unit. Apart from that the lighting power supply unit has no further controls.

Backside view



MAINS IN
Power supply
Mains connection
(100V-240V AC 50-60Hz)

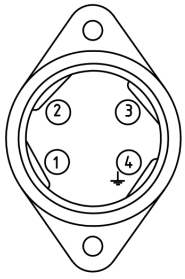


Pin assignment of the 7-pin (male) plug

View of the pin side (to the unit)

Pin-No.	Meaning
1	AC-IN (phase) (brown)
2	AC-IN (neutral) (blue)
3	HV-Reset (white)
4	Stop contact (black)
5	Stop contact (black)
6	HV-Reset (white)
7	Earth (green/yellow)

MAINS OUT
Power supply
100V-240V AC 50-60Hz)

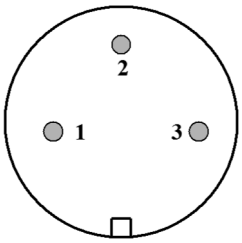


Pin assignment of the 4-pin socket (female)

View of the socket side (to the unit)

Pin-No.	Meaning
1	AC-OUT (phase)
2	AC-OUT (neutral)
3	PE

LAMP
Warning lamp connection



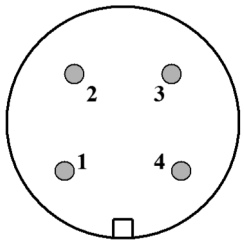
Pin assignment of the 3-pin (female) socket

View of the socket side

The lamp is protected by a Polyswitch fuse rated 1.1 A.

Pin-No.	Meaning
1	Lamp +24V CU+
2	Lamp ground (switched) CUGS
3	not used

PULSE
Machine impulse signal connection



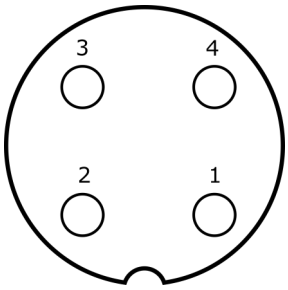
Pin assignment of the 4-pin (female) socket

View of the socket side

The SYN+ voltage output is protected by a Polyswitch fuse rated 1.1 A .

Pin-No.	Meaning
1	SYN1 (pulse input bipolar)
2	+24V (1.1 A) SYN+
3	SYN2 (pulse input bipolar)
4	GND

24V DC
24 V camera system power supply

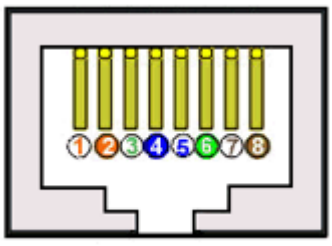


Pin assignment of the M12 4-pin A-coded socket

View to the housing rear panel, rotated 45 degrees

Pin	Function	Remark
1	+24V	Power supply +24V/2A for the camera system
2	+24V	Additional power supply +24V/2A (if connected)
3	0V	Additional power supply 0V (if connected)
4	0V	Power supply 0V for the camera system

Network 1 (RJ45)



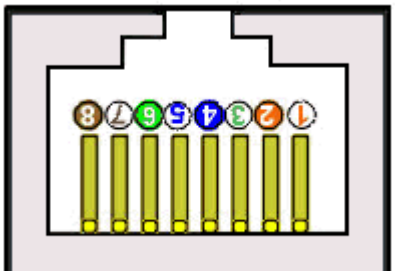
Pin assignment of the RJ45 socket

View of the socket side (to the unit)

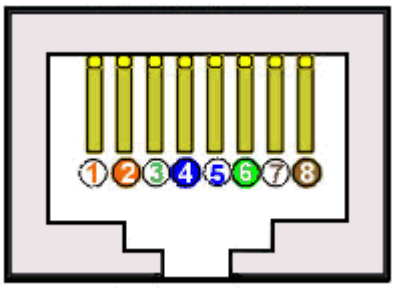
Pin	Function	Remark
1	TX +	
2	TX -	
3	RX +	
6	RX -	

Optional: Connection of the laser light barriers

Shown is one channel consisting of transmitter (T) and receiver (R). Pin assignment of the RJ45 socket8-pin
View of the socket side when looking at the back of the control unit.



Pin	Function	R (eceiver)
8	Receiver +	
7	Receiver -	



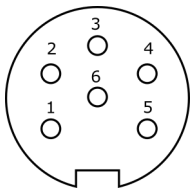
Pin	Function	T (ransmitter)
4	Transmitter +	
5	Transmitter -	

Pin assignment of the RJ45 socket

View of the socket side (to the unit)

2.2 Lighting power supply

24 V power supply for the camera lighting



Pin assignment of the M16 6-pin (female) socket

View of the socket side

Pin	Function	Remark
1	+24 V	power supply +24 V
2	+24 V	power supply +24 V
4	0 V	power supply 0V
5	0 V	power supply 0V

The plug on the gray cable is connected to the "Mains out" socket of the control unit 5420 and thus has a corresponding pin assignment.

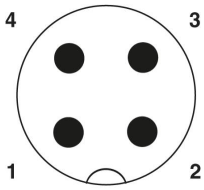
2.3 Camera system

All cables for the electrical connections must be shielded in every case.

For the 24 V power supply cable and for the Sercos interface ETH the screen must be connected to the casing of the M12 connector on the camera side. However, for the two EtherCAT connections EC IN and EC OUT the screen must not be connected at the camera side.

The housing of the camera system must be connected to the machine frame by means of an earth strap.

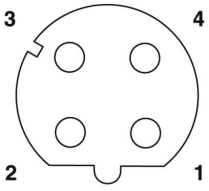
24V DC
24 V power supply for the camera system and for an additional power supply (if connected)



Pin assignment of the socket M12
4-pin
A-coded
View of the pin side

Pin	Function	Remark
1	+24V	Power supply +24V/2A for the camera system
2	+24V	additional power supply +24V/2A (if connected)
3	0V	additional power supply 0V (if connected)
4	0V	Power supply 0V for the camera system

ETH
10/100 MBit/s Ethernet interface for Sercos communication

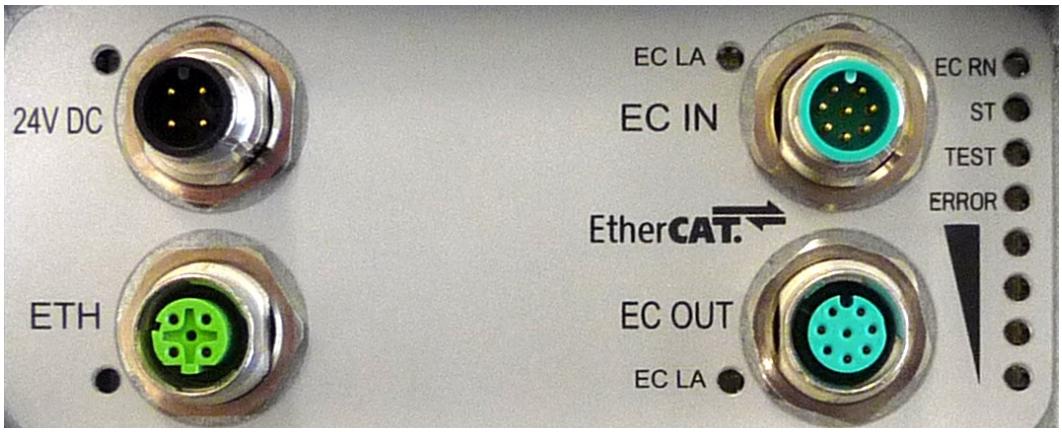


Pin assignment of the socket M12
4-pin
D-coded
View of the socket side

Pin	Function	Remark
1	TX plus	
2	RX plus	
3	TX minus	
4	RX minus	

EC IN: not used **EC OUT:** not used

Display elements of the camera traverse

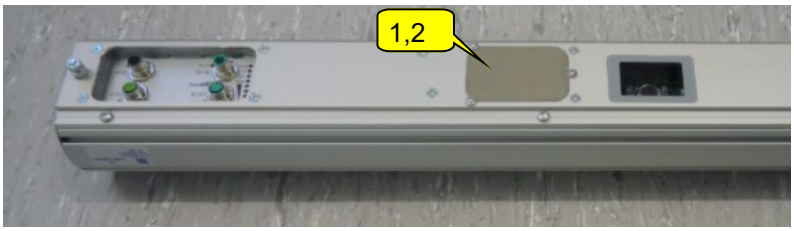


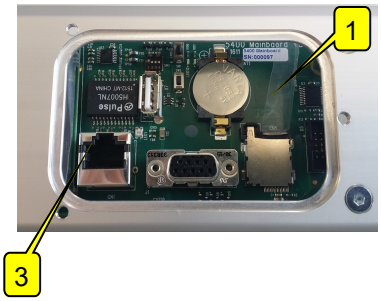
LED **24V DC**	
off	24V power supply not present
green	24V power supply present
LED **ETH**	
off	no Ethernet connection
green	Ethernet Link
yellow	Ethernet Activity
LED **EC LA**	
off	without significance
LED **EC RN**	
off	without significance
LED **ST**	
flashing green	Normal operation of the camera system. The system is operating with an external watchdog
yellow	Normal operation of the camera system. The system is operating with a processor-internal watchdog
flashing red	External watchdog starts the application
LED **TEST**	
off	Camera system running in normal monitoring mode
yellow	Camera system running in test mode
LED **ERROR**	
off	Camera system running in normal mode
flashing red	Camera system is in a fault condition
LED **Signal**	
off	Measurement is not active
green	Signal < 100 %. The camera monitoring has not detected any fault
red	Signal >= 100%. The camera monitoring has detected a fault

Service area of the camera traverse

The service area (1) is located on the side of the master modules with the cable connections, under the service cover (2).

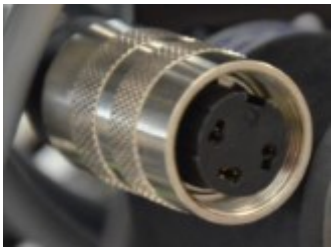
A Windows PC can be connected to the service-LAN-port (3) via a LAN-cable (CAT6e).

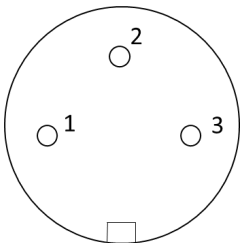




2.4 laser light barriers

Transmitter

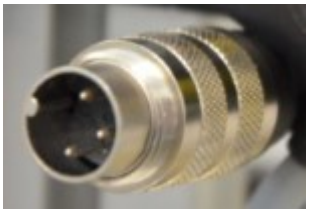


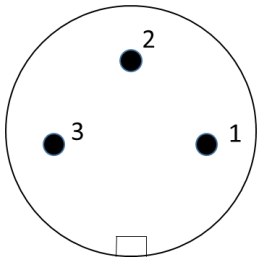


Pin assignment of the socket
M16 3-pin female
A-coded
View of the socket side

Pin-Nr.	Meaning
1	Transmitter +
2	Ground
3	Transmitter -

Receiver





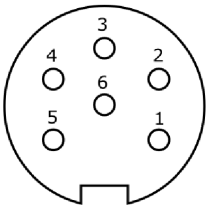
Pin assignment of the plug
M16 3-pin male
A-coded
View of the pin plug side

Pin-Nr.	Meaning
1	Receiver +
2	Ground
3	Receiver -

2.5 Lighting

First lighting module

24 V DC
24 V power supply for the camera lighting



Pin assignment of the pin plug M16 6-pin
A-coded
View of the pin side

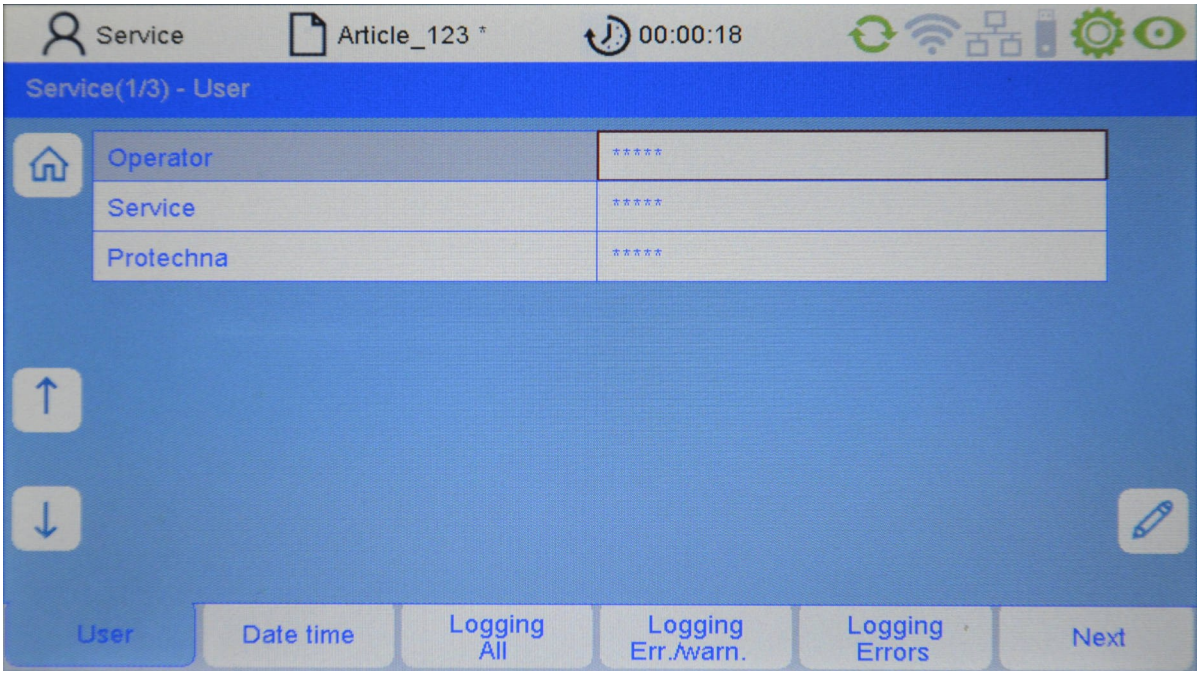
Pin	Function	Remark
1	+24 V	power supply +24 V
2	+24 V	power supply +24 V
4	0 V	power supply 0V
5	0 V	power supply 0V

3 Service menu

3.1 Passwords

Select the **"Service**" menu in the menu bar of the main screen. If you are not registered yet, enter the service password. You are then on page 1 of 3 of the service menu, in the submenu "**User** "

Hint:
The path to reach each submenu is always displayed in row 2 of corresponding submenu.



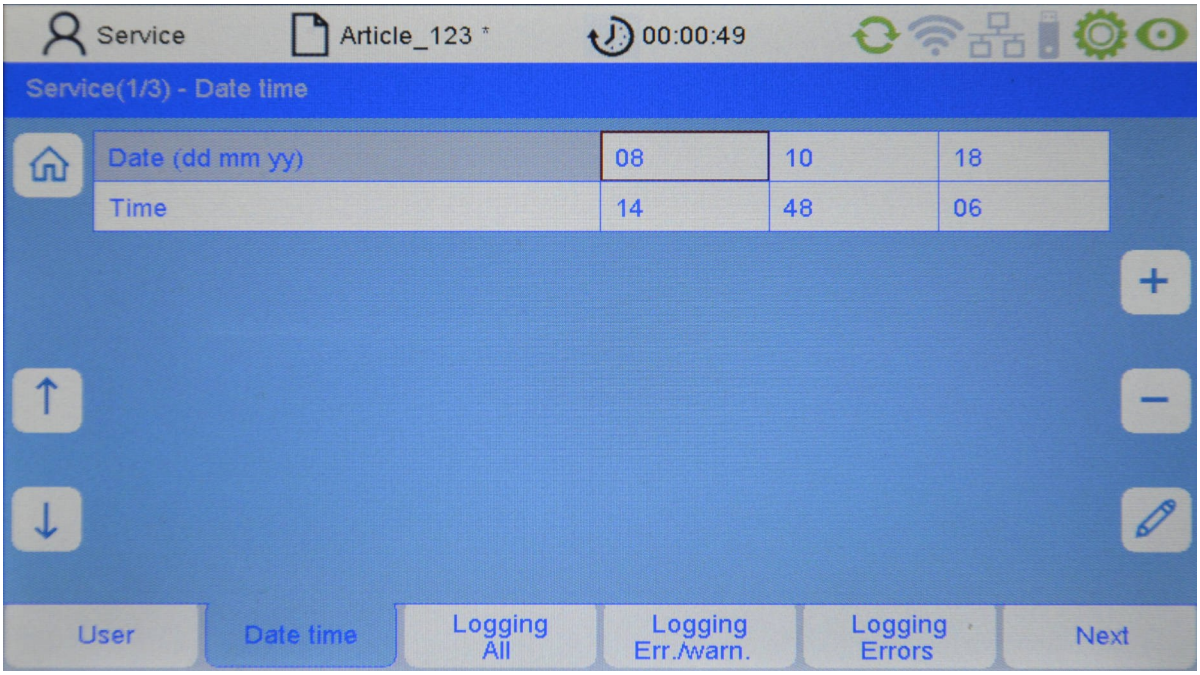
In this submenu you can change the password for the operator or for the service. The service password should only be known to the production master.

To change the password, the user must at least be logged in with the service identifier. After selecting the user to be changed with the arrow keys and pressing the key with the pen icon, you can change the password. The password for the service is factory set to "22222" and should be changed by the customer to prevent accidental adjustment of the system parameters.

Note: You can reach pages 1 to 3 of the service menu with the "Next" and "Back" buttons.

3.2 Date and Time

Select the menu **"Service"** in the menu bar of the main screen. Select the submenu "**Date time**" then.



Date (dd mm yy): In the 3 number fields the actual date (day, month, year) can be entered.

Time (hh mm ss): In the 3 number fields the actual time (hours, minutes, seconds) can be en tered.

3.3 Logging of messages, warnings and errors

Select the menu **"Service"** in the menu bar of the main screen. Select one of the „**Logging**“ submenus „**All**“ or „**Err/warn**“ or „**Errors**“.

The keys have the following functions

Arrow left: scroll back by date

Arrow right: scroll forward by date

Wast paper bin: delete the current entry (highlighted)

Arrow up: navigate message texts upwards

Arrow down: navigate message texts downwards

Home: jump to the main menu

1. „Logging All“

List of all messages, warnings and errors. The format of each line is as follows::

Time strap	Message number	Message text

2. „Logging Err./warn“

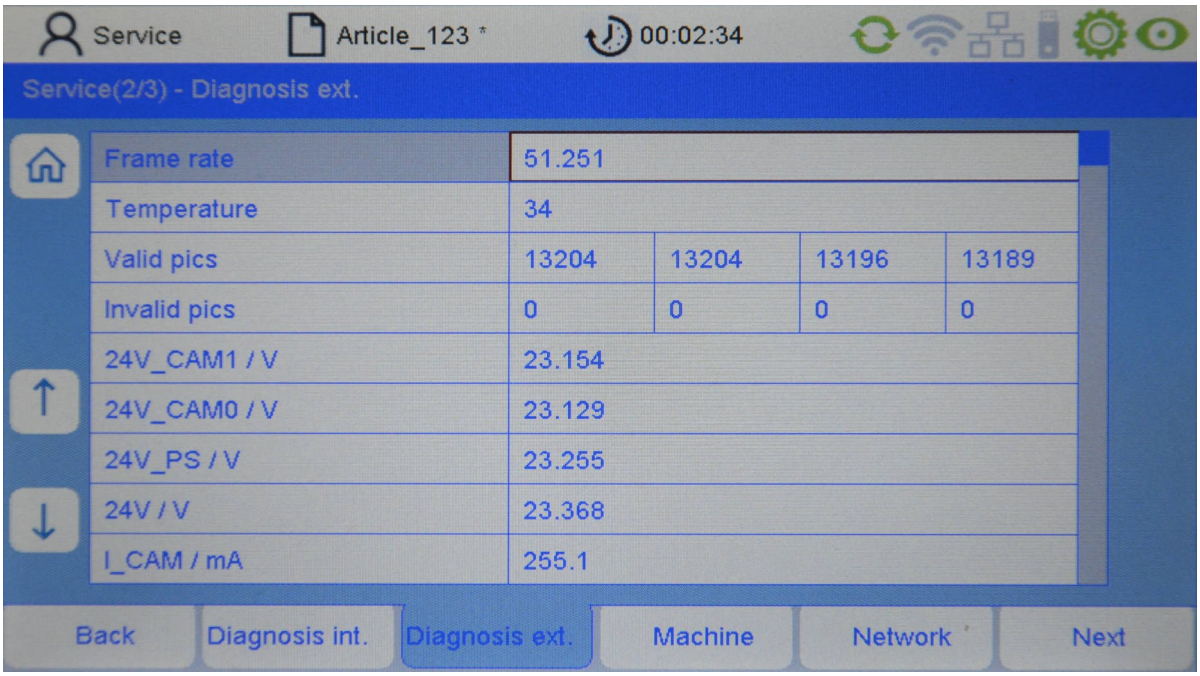
List of all errors and warnings without messages

3. „Logging Errors“

List of all errors without messages and warnings

3.4 System check of the Camera system

Select the "**Service**" menu in the menu bar of the main screen. Press the "**Next**" button and you get to page 2 of the service menu. Then select the submenu "**Diagnostics ext**.".



Technical information about the system status of the connected camera system can be called up here (read only):

Frame Rate: Image refresh rate of the cameras

Temperature: Processor temperature in °C

Valid Pics: Number of camera images that can be evaluated per camera (by camera index increasing from left to right). In the above illustration there are 4 cameras (camera 1 on the left, camera 4 at the far right).

Here the numerical values on the screen must increase continuously whilst the cameras transmit images. When the numerical values remain constant the cameras are not working correctly.

Invalid Pics: Number of invalid camera images per camera (by camera index increasing from left to right). In the above illustration there are 4 cameras (camera 1 on the left, camera 4 at the far right). If high values are displayed here, the cameras are not working correctly.

If the cameras are not working properly, check the camera covers for contamination. It is essential to ensure homogeneous and trouble-free illumination of the monitored area.

24V_CAM1 / V
Voltage of camera bus 1

24V_CAM0 / V
Voltage of camera bus 0

24V_PS / V
Voltage at the motherboard

24V / V
Voltage at the input to the power supply unit

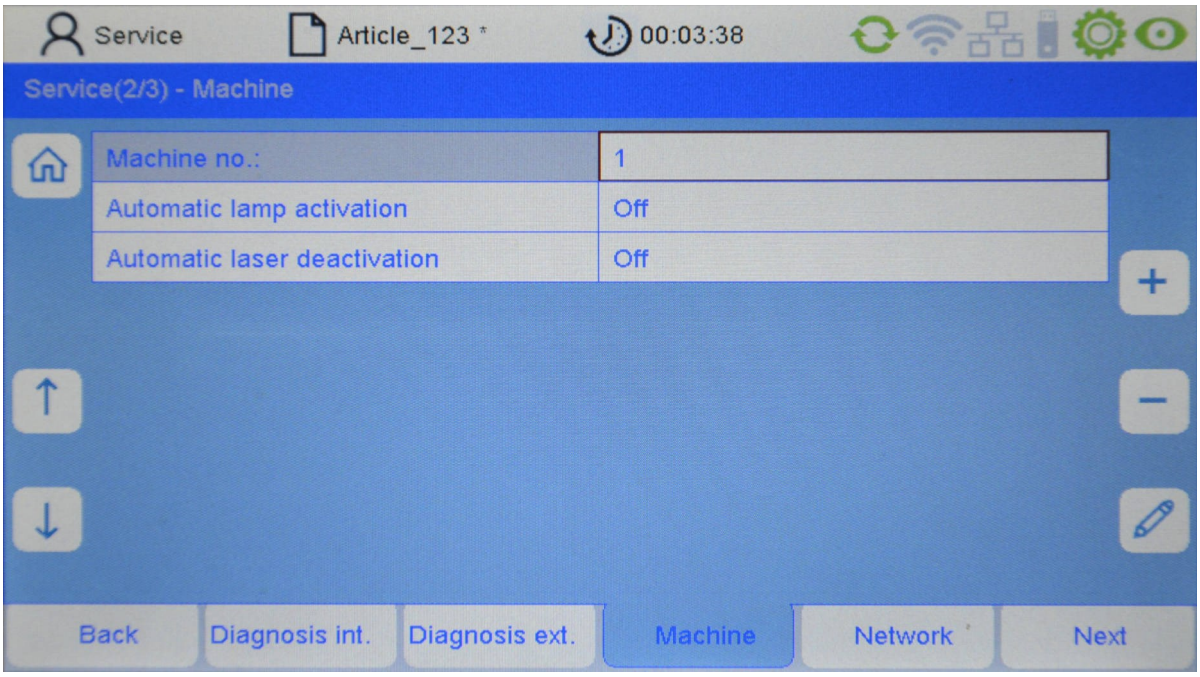
The normal values for the various voltages should be approx. 24 Volt.

I_CAM / mA
Power consumption of all the connected cameras should be approx. 250 mA.

.

3.5 Machine settings

Select the "**Service**" menu in the menu bar of the main screen. Press the "**Next**" button and you get to page 3 of the service menu. Then select the submenu "**Machine**.".



Machine no.: Machine number (do not change this parameter)

The following parameters can be set:

Auto. lamp activation: Specify here the machine operating mode in which the camera lighting should be switched on. The available settings are:

ON: The camera lighting lights up only when the machine is in operation or when the camera system is in test mode.

OFF: The camera lighting lights up at all times.

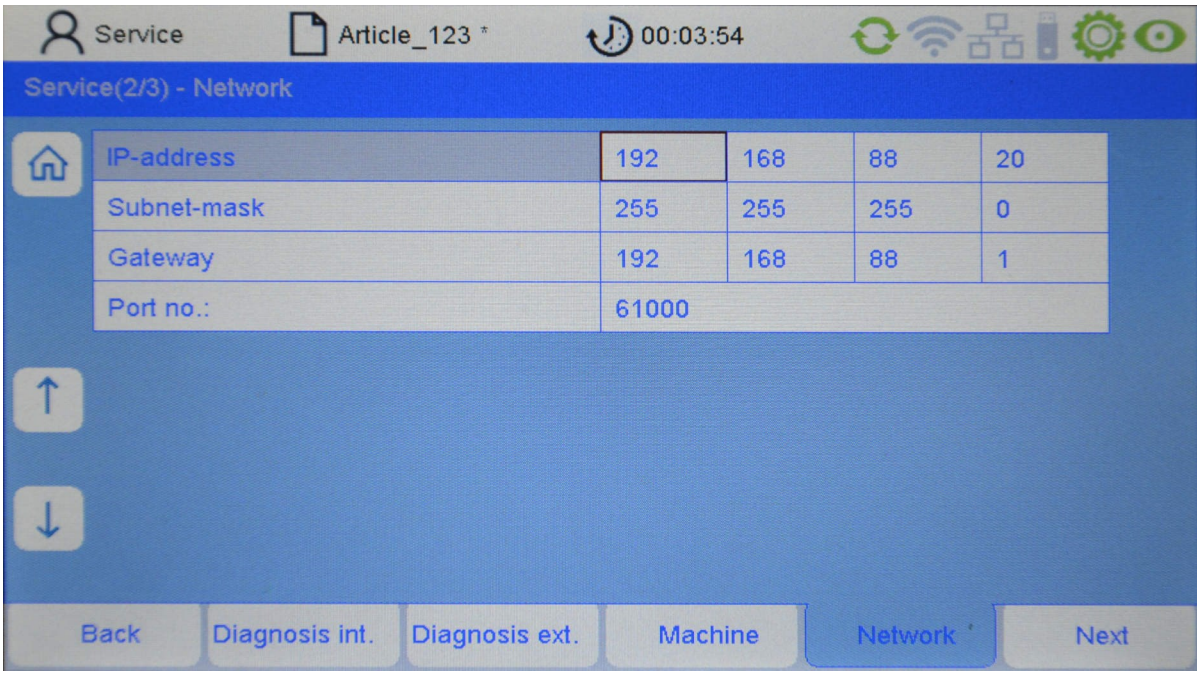
Auto. laser deactivation: Specify here whether the laser light barriers (optional) should be switched off when the machine is stopped. The available settings are:

ON: The laser light barriers are switched off when the machine is switched off, **unless** the camera system is in test mode.

OFF: The laser light barriers are not switched off when the machine is switched off.

3.6 Network configuration

Select the "**Service**" menu in the menu bar of the main screen. Press the "**Next**" button and you get to page 2 of the service menu. Then select the submenu "**Network**.".



Here the current network settings are displayed (read only).

IP-address: Network address

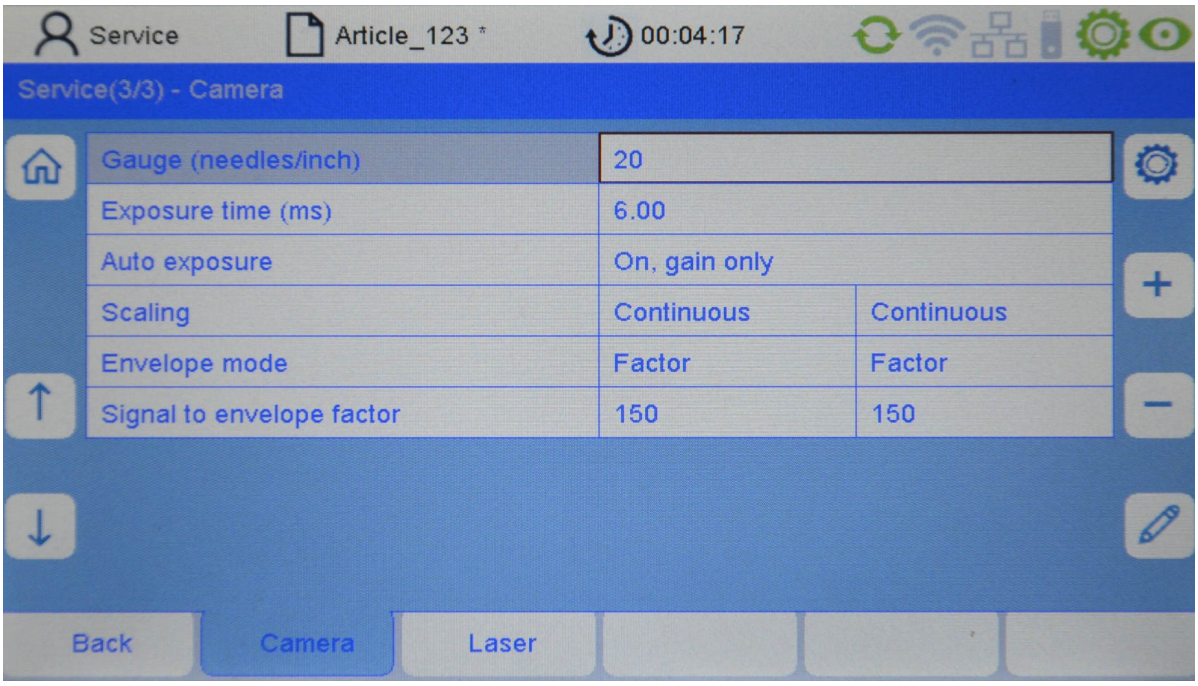
Subnet-mask: Network mask

Gateway: Network address of the Gateway that is used

Port no: Port (in combination with the IP ADDRESS forms the connection end point)

3.7 Advanced camerasettings

Select the "**Service**" menu in the menu bar of the main screen. Press the "**Next**" button twice and you get to page 3 of the service menu. Then select the submenu "**Camera**.".



Gauge (needles/inch): Gauge of the machine (number of needles per inch)

Exposure time (ms): Exposure time in ms

Auto Exposure: The following values can be set:

Off

On, gain only

On, gain and Time

Scaling: The left column displays the setting of camera surveillance module 1.
The right column displays the setting of camera surveillance module 2.

The scaling of the brightness signals can be set as follows:

Off

Only at start The coefficient is set once at startup

Continuous The coefficient is set continuously

Envelope mode

The left column displays the setting of camera surveillance module 1.
The right column displays the setting of camera surveillance module 2.

Sets the method used to generate the envelope. The following settings are available:

Factor The envelope curve is determined by the transmitted signal multiplied by a factor

Offset The envelope curve is determined by the transmitted signal plus an added offset

Threshold The envelope curve is set to a fixed threshold value

Signal to envelope factor

The left column displays the setting of camera surveillance module 1.
The right column displays the setting of camera surveillance module 2.

The speed with which the envelope curve is updated can be set here.

3.8 Advanced laser light barrier settings

Select the "**Service**" menu in the menu bar of the main screen. Press the "**Next**" button twice and you get to page 3 of the service menu. Then select the submenu "**Laser**".

Here you can set the operating modes Standard, Duo or Synchro for the laser light barriers.
The detailed description can be found in the Arraycam installation guide in chapter 10.2.

4 Diagnosis and troubleshooting

4.1 Check camera function

Check the proper functioning of the camera system using the system info as described in chapter 3.3. Additional information can be found in the calibration report. The description can be found in the Arraycam installation guide in chapter 9.3.

4.2 Check the laser light barrier function

Laser (transmitter) not lighting up

- Supply cable to the transmitter not plugged in
- Supply cable to the transmitter plugged in incorrectly
- Channel not activated
- Laser defective

Reception level deviation more than -10% (when newly installed)

- Supply cable to the transmitter and/or receiver plugged in incorrectly
- Light barrier out of alignment
- Optical glass of the light barriers dirty
- Laser defective
- Receiver defective

No reception level display

- Supply cable to the transmitter and/or receiver not plugged in
- Supply cable to the transmitter and/or receiver plugged in incorrectly
- Light barrier not adjusted
- Light barrier out of alignment
- Light beam obstructed
- Laser defective
- Receiver defective
- Defect in the control unit

Machine not switched off when a thread breakage occurs

- System is in test mode
- Sensitivity setting incorrect
- Channel not activated
- Supply cable to the transmitter and/or receiver plugged in incorrectly
- Thread got stuck and has not moved through the laser light barrier
- Stop contact not correctly connected
- Pulse sensor defective (only if SYNCHRO mode is used)
- Fade-out area wrongly defined (only if SYNCHRO mode is used)
- Thread breakage occurred during the start delay
- Defect in the control unit

Machine noise higher than the thread signal

- Light barrier out of alignment
- Optical glass dirty
- Supply cable to the transmitter and/or receiver plugged in incorrectly
- Connector to the transmitter and/or receiver loose
- Loose threads in the light beam
- Laser defective
- Receiver defective

No thread signal

- Channel not activated
- Supply cable to the transmitter and/or receiver not plugged in
- Supply cable to the transmitter and/or receiver plugged in incorrectly
- Laser defective
- Receiver defective

Level error display channel x

- Supply cable to the transmitter and/or receiver plugged in incorrectly
- Light barrier out of alignment
- Optical glass of the light barriers dirty
- When the machine is stopped, the light beam is partially covered
- Laser defective
- Receiver defective

No level present channel x

- Supply cable to the transmitter and/or receiver not plugged in
- Supply cable to the transmitter and/or receiver plugged in incorrectly
- Channel is activated but no light barrier is connected
- When the machine is stopped, the light beam is totally covered
- Light barrier not adjusted
- Light barrier out of alignment
- Light beam obstructed
- Laser defective
- Receiver defective

4.3 Check the lighting function

When the camera system is not functioning correctly, in certain cases it can be possible that there is a defect in the lighting.

In that case, please check the following points:

- Are the optical glasses of the camera covers and/or the covers of the lighting dirty?
- Is the camera traverse out of adjustment?
- Is there any possible damage evident to the camera traverse and/or the lighting?
- Are there any foreign objects on the optical glasses of the camera covers, the covers of the lighting or between the fabric and the lighting?
- Is the lighting delivering an equal illumination across the entire width of the fabric?

Please also check the installation and stability of the lighting device.
If the lighting is not operating, please check the setting for the "Automatic Lamp Activation" option in the “Service - Machine" menu. If this option is set to "ON", the lighting is switched on only when the machine is running or the camera system is in test mode.

Other possible causes could be a defect in the lighting power supply unit, defective cables or a defective lighting.

5 Service

All service work may only be carried out by a trained electrician.

5.1 Control unit

5.1.1 Replacing the backup battery

The backup battery is located in the casing of the control unit and supplies the real-time clock of the system. If it is necessary to replace this battery, please use exclusively the battery type **CR 2032** (Lithium button cell 3 V; nominal diameter 20 mm; height 3.2 mm). The jumper JP2 (to the right above the battery) must be set to "ON".

Open the housing of the control unit

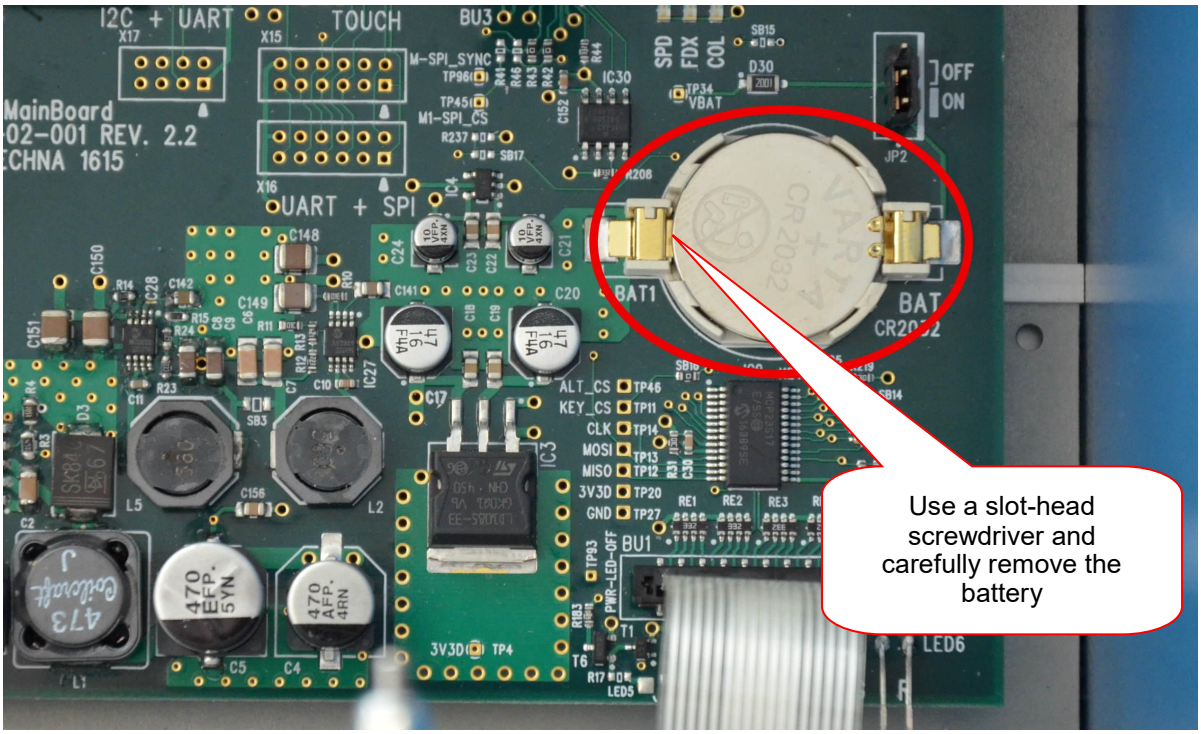
Before opening the control unit you must ensure that the control unit is disconnected from all power supplies so that there is no risk of coming into contact with parts that are live.

A Torx-10 screwdriver is required for opening the control unit. Please unscrew the six screws from the upper housing cover. Then please **carefully** remove the upper housing cover from the control unit, taking care that the two plastic decorative strips do not slip off the cover.

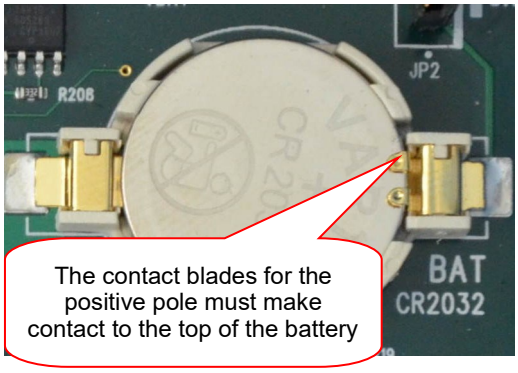
Once the upper housing cover has been removed, please do not press onto the front panel or the rear panel of the unit, otherwise these may bend inwards.

Removing the backup battery

The position of the battery can seen in the illustration below. Please use a small slot-head screwdriver to carefully remove the backup-battery out of its holder.



Installing the backup battery
Insert the new backup-battery slightly tilted into the holder and press it down until it snaps. Check that the polarity is correct. The positive pole of the battery (with the labelling) must face upwards. The negative pole faces towards the circuit board



Closing the housing
Finally please carefully place the upper housing cover back onto the housing.

Please place the housing cover to one side first and check that the tops of the front panel and rear panel are engaging in the slots. Then place the cover in position and pull the opposite side panels of the housing slightly outwards so that the cover can click home in the correct position.

Then the upper housing cover must be secured again using the six screws. The screws with the Schnorr washer should always be used for the centre positions.

5.1.2 Performing a firmware update on the control unit

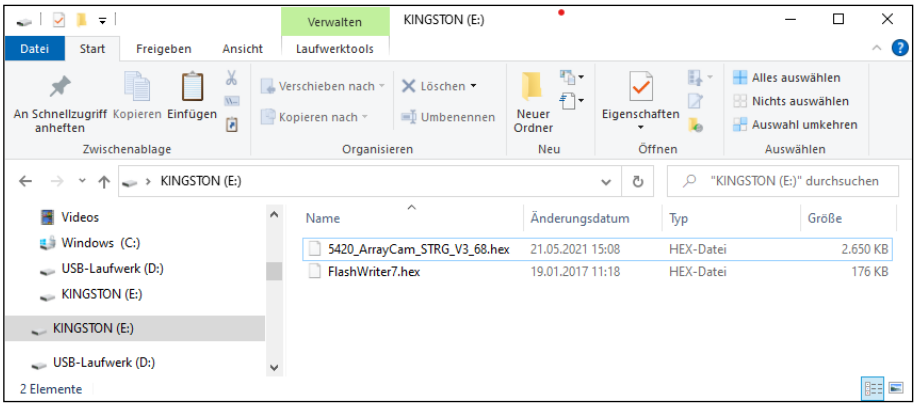
General information

The update procedure must always be executed accordingly and must not be manually interrupted. This can cause severe damage to the software installation of the camera system!

The camera configuration may be changed on purpose during the update process. Do not overwrite the configuration file with a backup after the update process is finished, as this will reset possible changes to camera configuration!

Prepare the USB stick

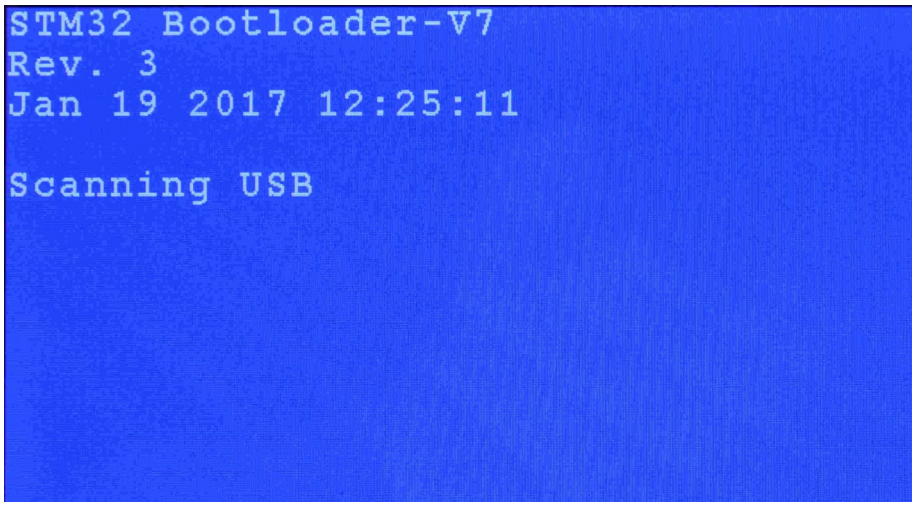
Copy the update file for the control unit and the “FlashWriter” to an empty USB stick (do not use any subdirectories) like follows:



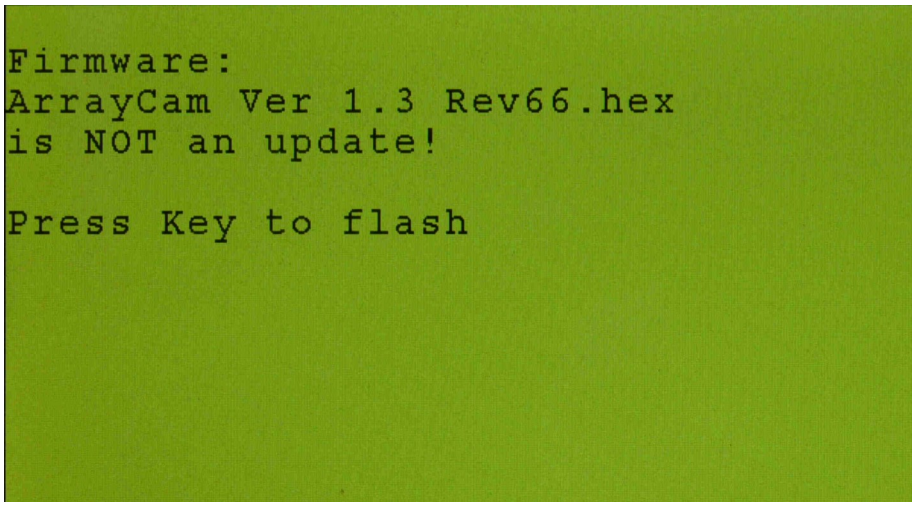
Start the update process

To start the update process for the control unit, proceed like below:

1. Power off the control unit.
2. Plug in the USB stick at the back of the control unit. The USB stick must be formatted with FAT32.
3. Power on the control unit.
4. The control unit will scan the USB stick.



5. If the control unit has found the update file, the following screen will come up:



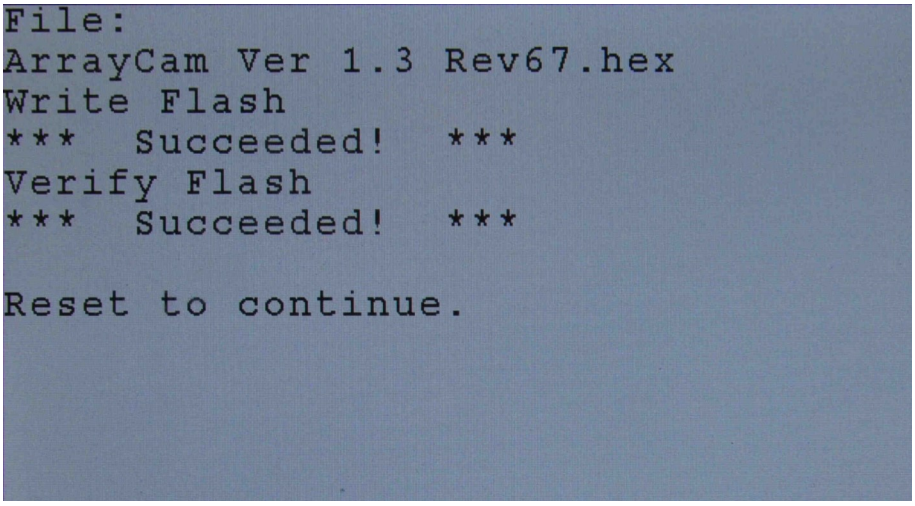
6. When this message appears on the screen (e.g. during a downgrade), you must press a key within a short time to confirm. If you do not press a key, the loading process is skipped and terminated.

7. After confirm the actual update process begins.

Never switch off the control unit until the update process has been completed! The camera system could become inoperable and would have to be replaced!

8. The control unit will write the internal flash memory first and will finish with a verify.

9. After the update process is finished, the following screen will come up.



The message Write Flash *** Succeeded! *** indicates that the file has been written without problems into the unit memory and the message Verify Flash *** Succeeded! *** indicates that comparison of the updated file against the original file on the USB stick returned a positive match.

When "Reset to continue" is displayed on the screen, please switch the control unit off and then unplug the USB stick from the control unit.

Please wait approx. 10 seconds before switching the control unit back on again. The control unit will then perform a self-test (blue screen) and then starts with the user interface.

5.2 Camera traverse

5.2.1 Replacing the backup battery

The backup battery is located under the service cover of the camera traverse and supplies the real-time clock of the system. Please use exclusively the battery type CR 2032 (Lithium button cell 3 V; nominal diameter 20 mm; height 3.2 mm).

Removing the backup battery

Please ensure that the control unit and the lighting power supply unit are switched off before you open the service cover.

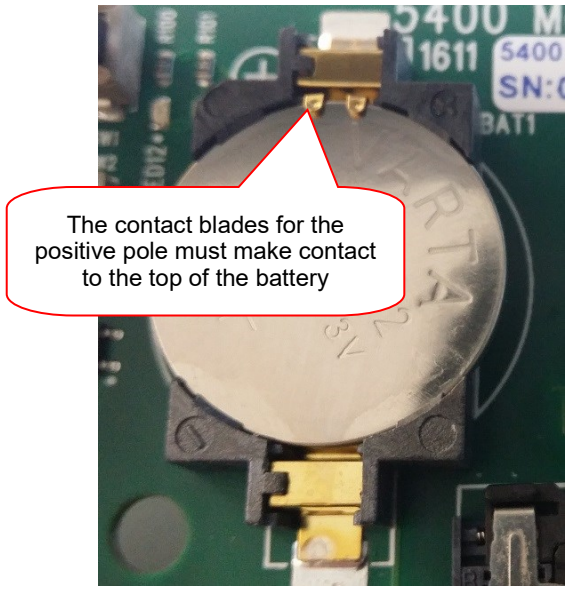
Undo three screws (2.5 mm socket head) from the service cover of the camera traverse, and remove the cover.

Use a small slot-head screwdriver to carefully remove the backup-battery out of its holder.

Installing the backup battery

Insert the new backup-battery slightly tilted into the holder and press it down until it snaps. Check that the polarity is correct. The positive pole of the battery (with the labelling) must face upwards. The negative pole faces towards the circuit board.

Now replace the service cover and secure it with the three screws.



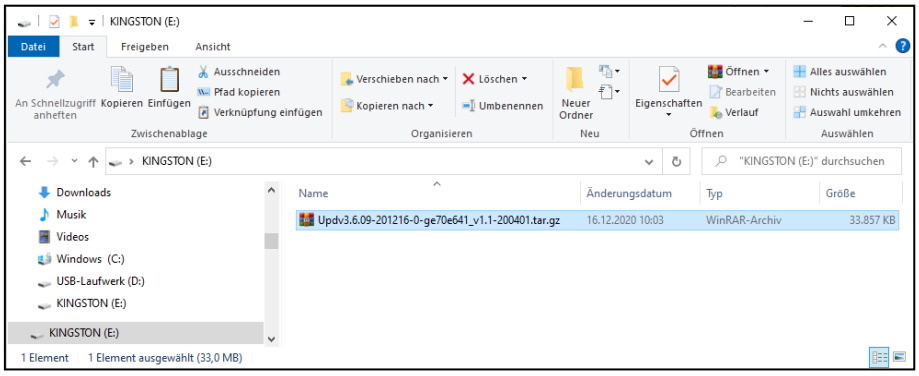
5.2.2 Updating the software of the camera traverse

The software update for the ArrayCam is a two-step procedure. In the first step the update file is copied to the camera (via the control unit), in a second step the camera system is updating its internal software by its own.

5.2.2.1 Performing a software update of the camera traverse by USB

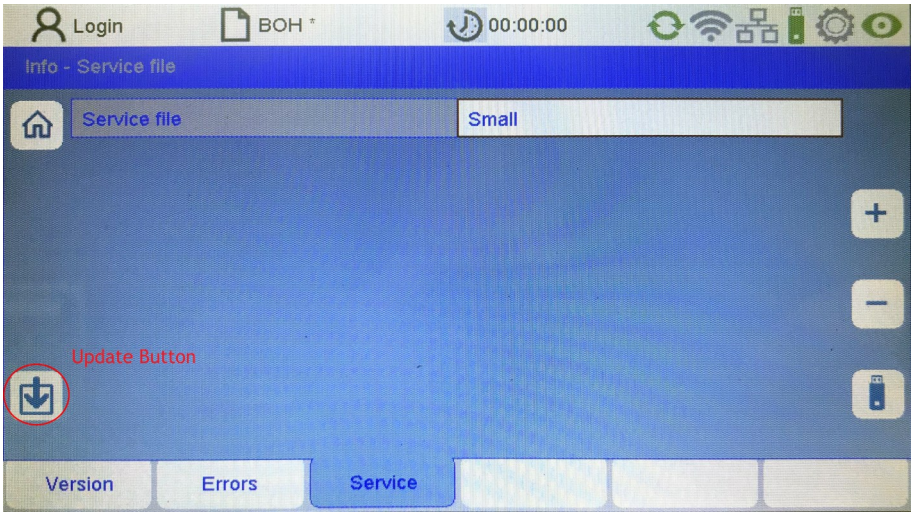
Copy the update file to the camera

Copy the update file for the camera to an empty USB stick (do not use any subdirectories) like follows:

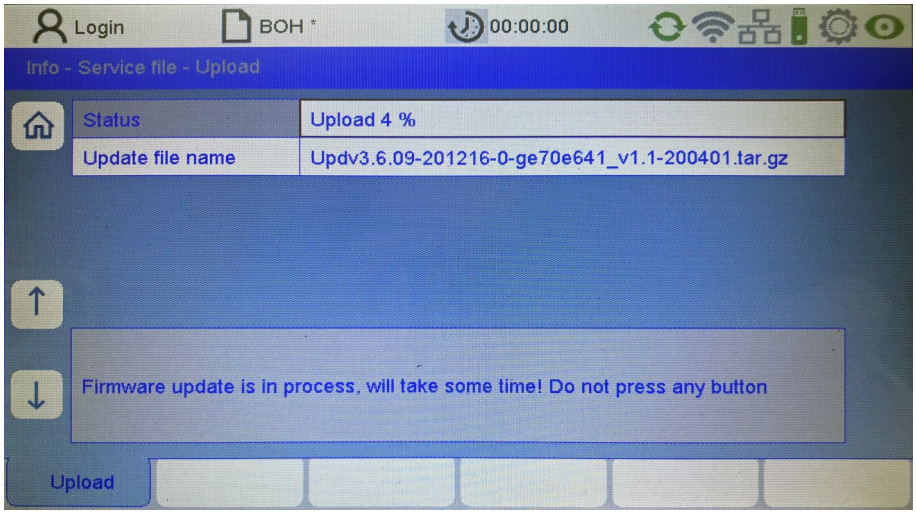


To copy the update file to the camera and to start the update process, proceed like below:

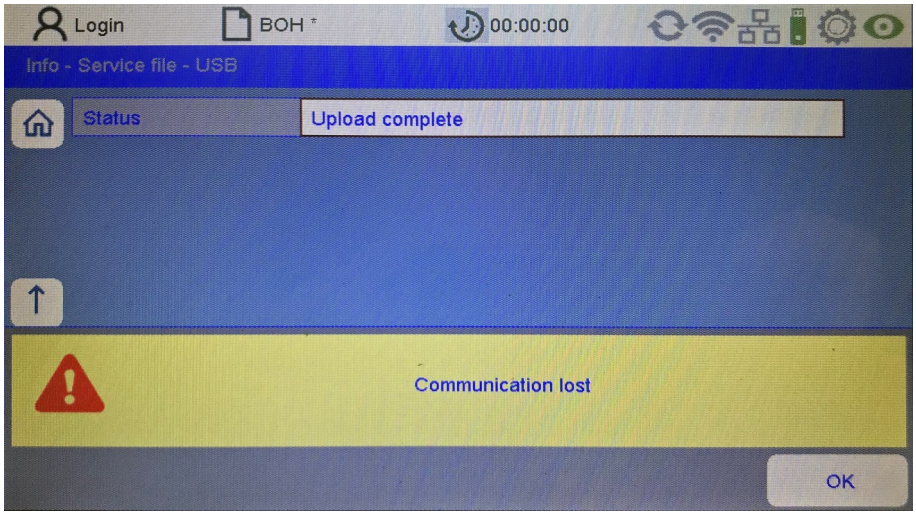
1. Plug in the USB stick to the **running** control unit.
2. Go to the “Info” menu and select the tab “Service”
3. Press the “Update” button (red circled) to start the upload



4. The control unit will read the update file from the USB stick and send it to the camera.



5. After the upload is finished, the camera will start the update process and is rebooting. After some seconds the connection to the control unit will be interrupted.



Automatic update procedure

After the update file has been copied to the camera, the system will reboot automatically. It is then starting the update process. This process is running through different stages and is automatically rebooting the camera system for several times!

Please do not disturb this update process by switching off the system / switching off the electrical power before the update process has been finished completely! The whole process is running for several minutes!

The status LED's at the connection panel of the ArrayCam master module showing the status / progress of the update procedure. The whole procedure is running through the following stages described below…

LED Status: "**ST**" is orange The Linux system is running and is starting the update process of the SD card.	
LED Status: "**ST**" is orange "**L1**" is blinking green "**L4**" is blinking red The update process is updating the SD card.	
LED Status: "**ST**" is blinking orange / green The update of the SD card has been finished successfully. The system is triggering a reboot.	
LED Status: "**ST**" is blinking green The hardware of the system is rebooting / the Linux system is starting up.	
LED Status: "**ST**" is orange The Linux system is running and is starting the update process of the internal flash.	
LED Status: "**ST**" is orange "**L1**" is blinking green "**L4**" is blinking red The update process is updating the internal flash.	
LED Status: "**ST**" is blinking orange / green The update of the SD card has been finished successfully. The system is triggering a reboot.	

LED Status: "**ST**" is blinking green The hardware of the system is rebooting / the Linux system is starting up.	
LED Status: "**ST**" is orange The Linux system is running and is starting the camera software.	
LED Status: "**ST**" is orange "**L2**" is green "**L3**" is green "**L4**" is green The update process is complete – there have been no errors.	
Wait for approximately 1 minute to allow the Linux system to finish some internal processes correctly!	
To start up the camera application, manually restart the camera hardware – switch off / switch on the control unit. After the restart, the camera application will start up automatically and the camera will be back online at the control unit again.	

Manually restart the camera hardware only if the update process is complete and if the status LEDs "L2" / "L3" / "L4" are green!!! Wait at least 10 minutes for the update to finish. Only then, continue with the trouble shooting procedures explained on the following pages!

5.2.2.2 Performing a software update of the camera traverse by FTP

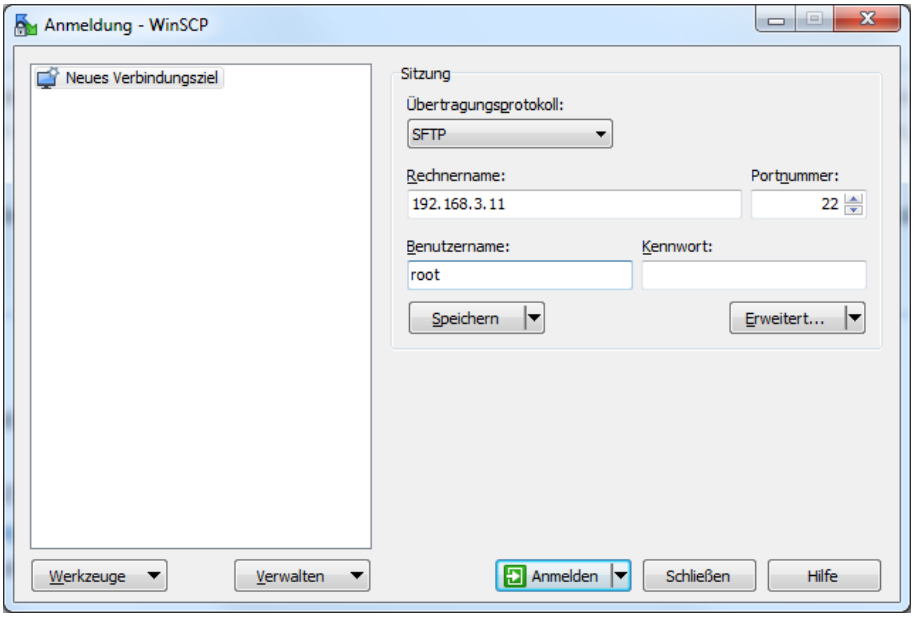
Copy the update file to the camera

In case the update procedure via the control unit is not working, it is possible to manually transfer the update file to the camera and to trigger the update by restarting the camera. Please follow the procedure below:

For this you need a Windows PC on which the camera update files are stored and the FTP client program "WinSCP" is installed.

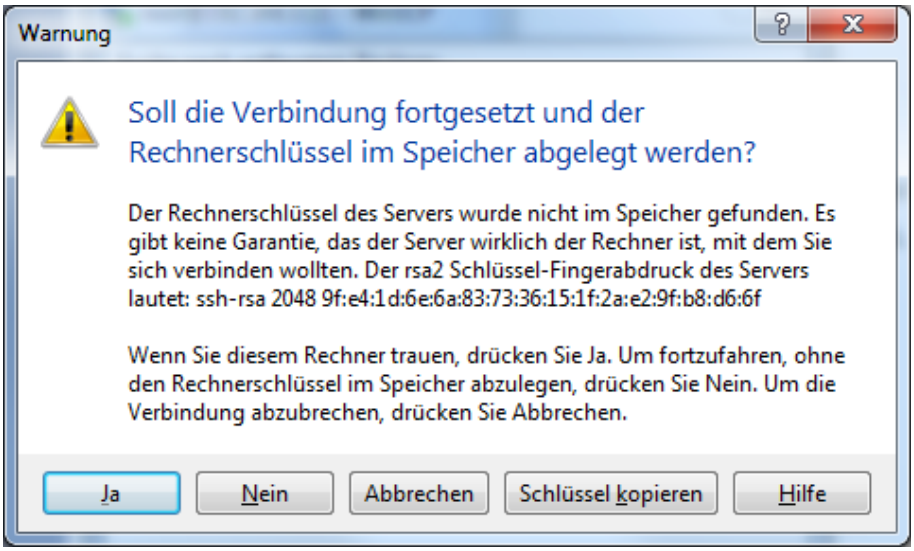
1. Connect a Windows PC via a LAN cable to the service LAN port of the camera traverse and change the connection settings as described in the installation manual in chapter 5.6.

2. Start the “WinSCP“ program and enter the following settings:



3. Establish a network connection by clicking on “Anmelden”.

   The following warning dialogue will appear:



4. Answer the question with “ja".

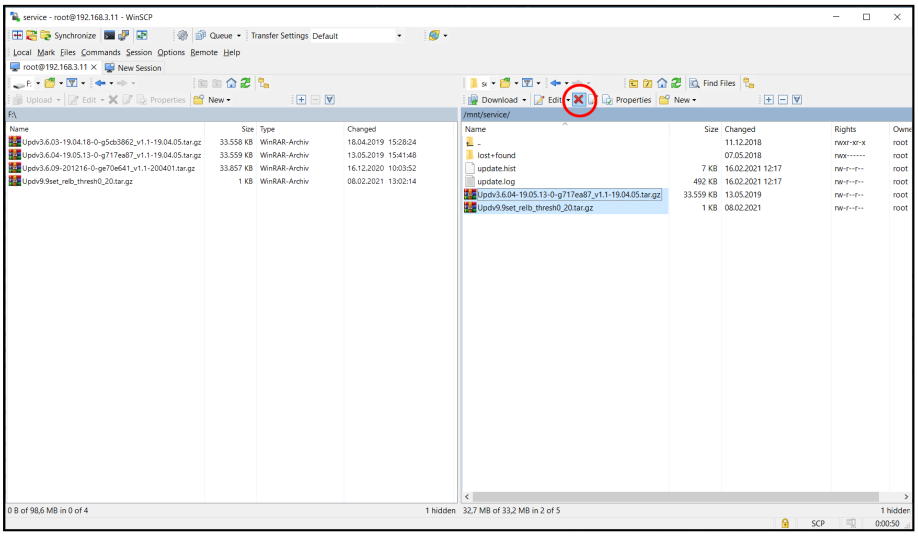
5. The left part of the window shows the local computer, the right part shows the directories of the camera system. In the right part, navigate to the directory "/mnt/service" of the camera. In the left part navigate to the local directory that contains the update package and highlight the package that is to be installed.
   The name of this package always has the format:

   Upd<versionsnummer>.tar.gz

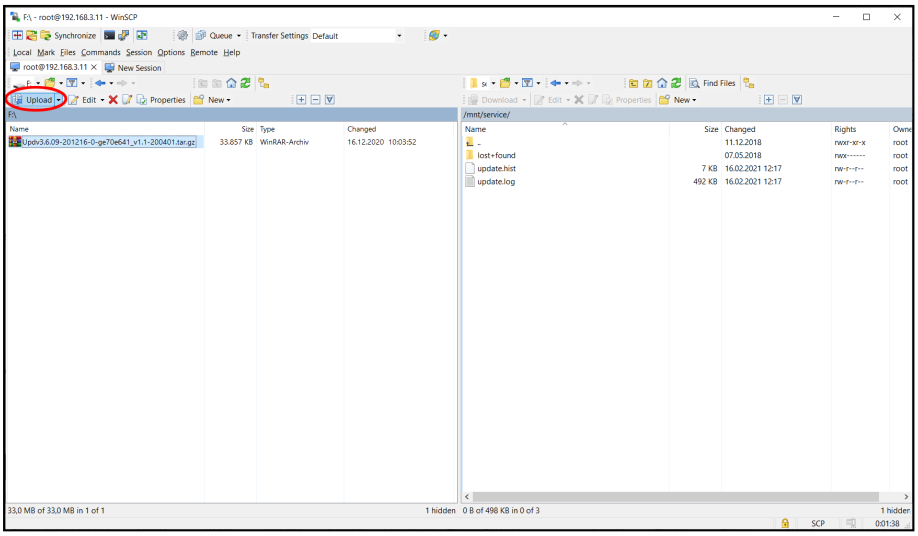
   where the version number corresponds to the version number of the CameraArray binary (the actual camera application).

There must always be only one update package in the directory "/mnt/service", otherwise no update will be performed.

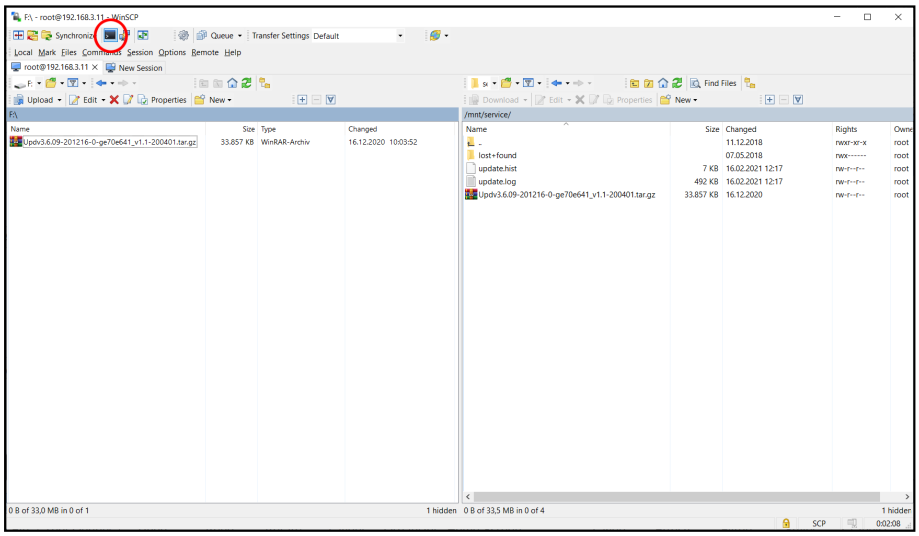
6. In case that directory contains older update files (files ending with “*tar.gz*”) please delete them before uploading the new update file. Otherwise the update will not work!



7. Now that all old update files are removed, you can upload the new update file to the camera.



8. After the upload is finished please synchronize the file system of the camera to make sure the file is completely written to the flash memory of the camera.



9. You can now close WinSCP and restart the camera. The update procedure will now run in the same way as described in the chapter before (Automatic update procedure).

The restart can be performed in various ways:

1. By inputting "reboot" at the Linux prompt (pressing <CTRL>+T in WinSCP opens a terminal)
2. By pressing the Reset button on the mainboard
3. By switching the control unit off and on (see chapter 5.4)

Before using the last two methods, first make sure that the writing procedure of the update package to the SD card has been completed. Otherwise the file might be corrupted and the update might fail. (see chapter 5.6.10)

The update procedure itself lasts several minutes. In the course of this, the camera normally boots up twice. Intermediate messages are saved by the camera system in the files "/mnt/service/update.log" and "/mnt/service/update.hist".

5.2.2.3 Updating the software of the camera systems via SD card

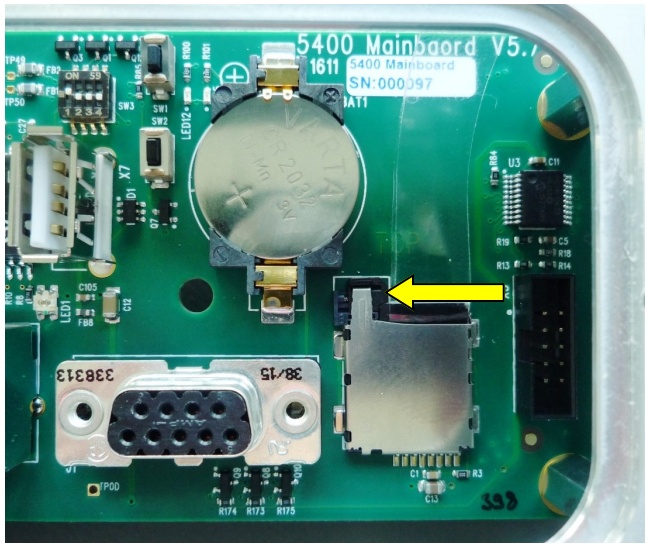
For a software update via the SD card you will require a SD card with the update package prepared by Protechna. The SD card of the camera system is accessible via the service cover on the camera traverse.

Please **switch the camera system off** before opening the service cover on the camera traverse and exchanging the SD card.

Removing the SD card

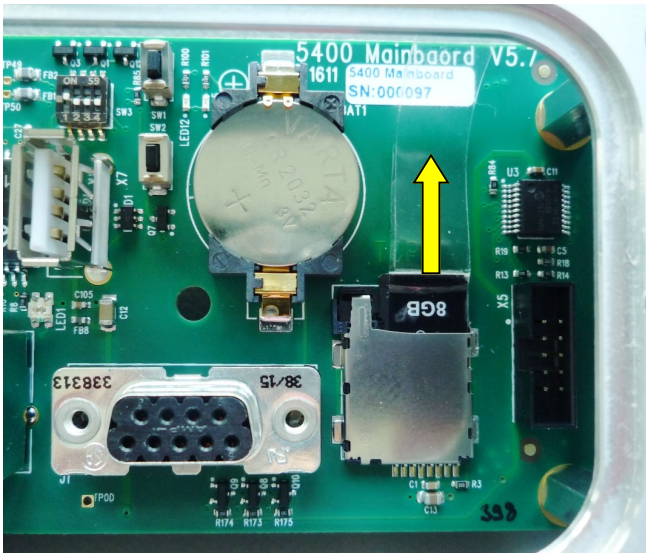
Hold the SD card by the tab glued on to it, so that when the locking is released the card cannot fall out in an uncontrolled manner.

Using the other hand, push the locking fully to the left, as shown in the photo.



The card will then be ejected by springs. In some cases the card must be pulled out carefully.

Hold the locking in the left-hand position until the card has been completely removed.



Inserting the SD card

Keeping the card straight, feed it carefully into the holder (writing facing upwards, contacts facing downwards). The locking is pushed by the card to one side. Make sure that the card is locked again after it has been inserted.

The card must slide into the holder without any great resistance. Otherwise, please check that the tab is glued on correctly.

Power on the system, then wait, analogous to the other two update methods.

5.2.3 Trouble shooting the update process

If the update process fails – the status LEDs “L2” / “L3” / “L4” are not green after at least 10 minutes of waiting - there are three different possibilities how to handle this.

5.2.3.1 The update of the internal flash failed

The following LED status displays a failure during the update of the internal flash: “**ST**” is orange “**L4**” is red “**L2**” is green	

Please continue with recovery procedure 1…

5.2.3.2 The update of the SD card failed

The following LED status displays a failure during the update of the SD card: “**ST**” is orange “**L4**” is red “**L1**” is green.	

Please continue with recovery procedure 2…

5.2.3.3 The update failed for other reasons

If none of the above mention 2 failures states comes up and the update process is not finished after a waiting time of at least 10 minutes there is some other failure.

Restart the system. If the system doesn`t run then please continue with recovery procedure 1...

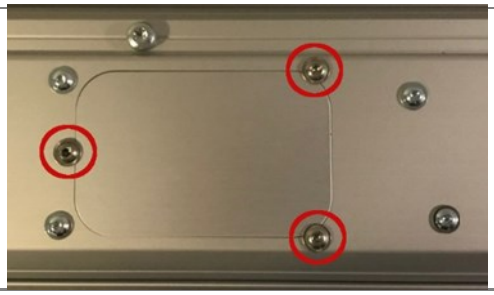
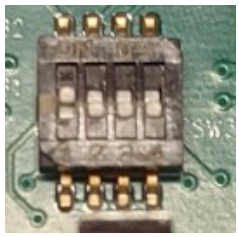
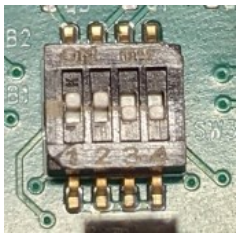
5.3 Recovery procedures

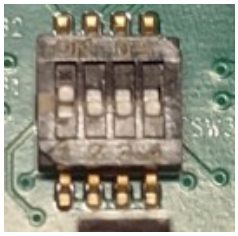
5.3.1 Recovery procedure 1 – Internal flash damaged

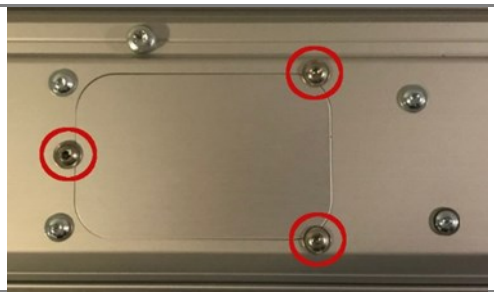
The internal flash is the primary boot device of the camera system and is normally used to start up the Linux system and to run the camera software. If the internal flash is damaged the Linux system cannot properly start up anymore which prevents the camera software from running.

If the internal flash is damaged the system can be switched to the secondary boot device (SD card), which holds a complete backup of the system. After starting up from that device, a special repair procedure can recover the internal flash again. Please execute the following procedure…

Power off the system

Power off the system and open the service port by removing the three screws as marked in the image on the left.	
There is a DIP switch on the service port, which contains switches labeled 1-4. By default, only switch "1" is set.	
To activate the secondary boot device it is necessary to activate switch”2” as well. Use a tool with a small, pointed plastic head to activate switch “2”. Power on the camera system to reboot from the SD card.	
LED Status: “**ST**” is blinking green The hardware of the system is rebooting / the Linux system is starting up from the SD card.	
LED Status: “**ST**” is orange The Linux system is running and is starting the camera software.	

After about 10 seconds, the camera software is running and the system will be back online.	
Now copy the update file to the camera as described for the normal update procedure and reboot. (see chapter 5.2.2)	
LED Status: "**ST**" is blinking green The hardware of the system is rebooting / the Linux system is starting up.	
LED Status: "**ST**" is orange The Linux system is running and is starting the recovery process for the internal flash.	
LED Status: "**ST**" is orange "**L1**" is blinking green "**L4**" is blinking red The recovery process is updating the internal flash.	
LED Status: "**ST**" is orange The recovery of the internal flash is finished and after about 10-20 seconds, the system will be back online.	
Power off the system again and reset switch "2". Power on the system again.	
LED Status: "**ST**" is blinking green The hardware of the system is rebooting / the Linux system is starting up from the internal flash.	

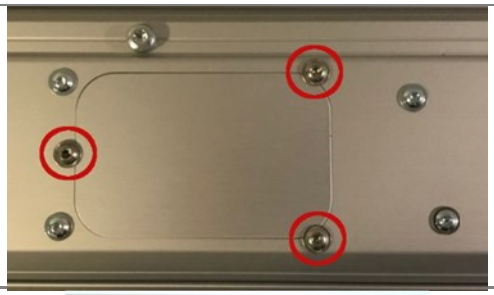
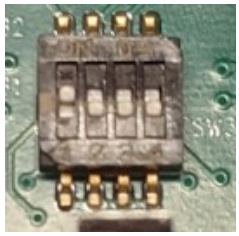
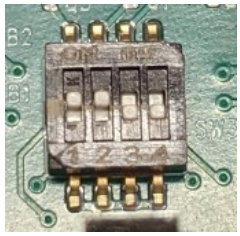
LED Status: "**ST**" is orange The Linux system is running and is starting the camera software.	
After about 10-20 seconds, the system will be back online.	
Close the cover of the service port appropriately with the three screws.	

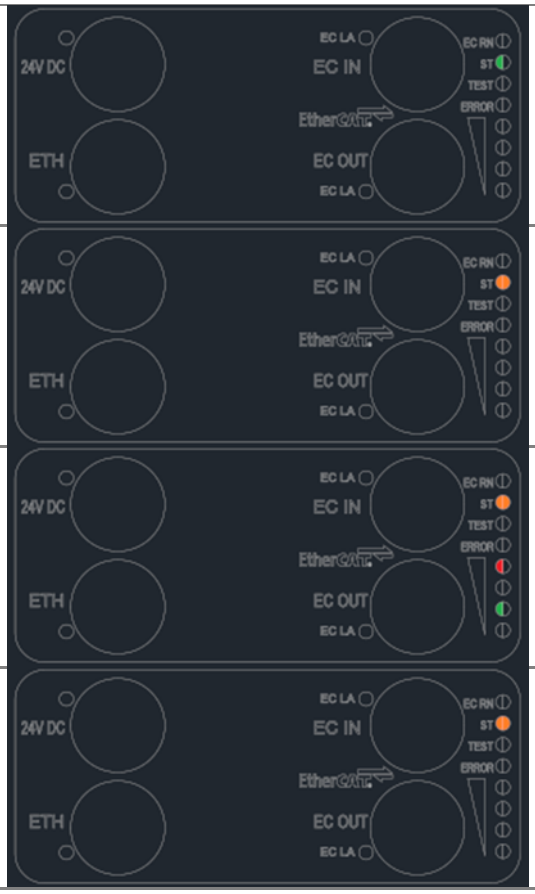
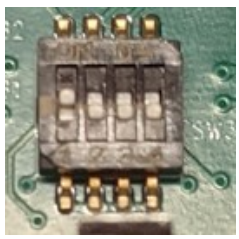
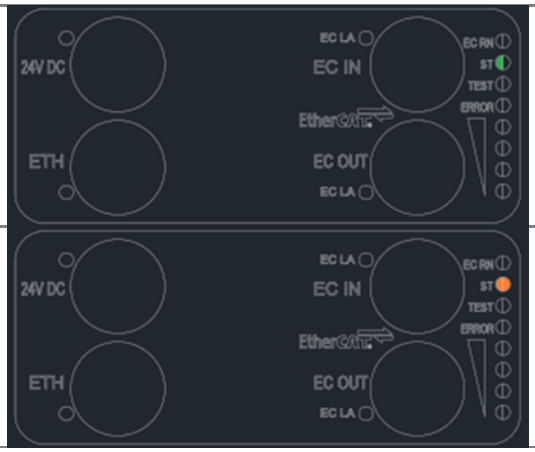
If anything goes wrong and not as described as above, it is very likely that the internal flash cannot be recovered. Retry the procedure and in case of another fail continue with the recovery procedure 2.

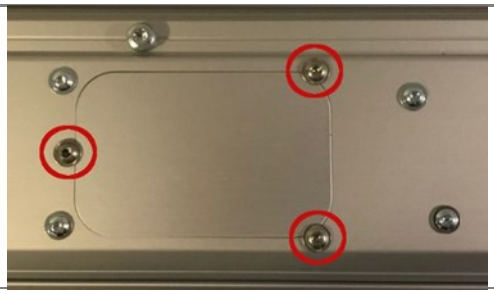
5.3.2 Recovery procedure 2

This procedure is necessary if the internal flash cannot be recovered or if there is any additional damage to the SD card. In this case, it is necessary to recover the system by using a so-called recovery SD card. Please execute the following procedure…

Power off the system

Power off the system and open the service port by removing the three screws as marked in the image on the left.	
Remove the original SD card by pushing the release button of the SD card slot using a tool with an appropriate plastic head.	
The SD card will be automatically released by the cardholder and jumps out a little bit. Use the plastic stripe attached to the SD card to remove the card completely. Insert the new card into the holder and press in the card until the release button jumps back and is locking the SD card.	
There is a DIP switch on the service port, which contains switches labeled 1-4. By default, only switch "1" is set.	
To activate the secondary boot device it is necessary to activate switch”2” as well. Use a tool with a small, pointed plastic head to activate switch “2”. Power on the camera system to reboot from the SD card.	

LED Status: “**ST**” is blinking green The hardware of the system is rebooting / the Linux system is starting up from the SD card.	
LED Status: “**ST**” is orange The Linux system is running and is starting the recovery process for the internal flash.	
LED Status: “**ST**” is orange “**L1**” is blinking green “**L4**” is blinking red The recovery process is updating the internal flash.	
LED Status: “**ST**” is orange The recovery of the internal flash is finished and the camera software is starting up.	
After about 10-20 seconds, the system will be back online.	
Power off the system again and reset switch “2”. Power on the system again.	 
LED Status: “**ST**” is blinking green The hardware of the system is rebooting / the Linux system is starting up.	
LED Status: “**ST**” is orange The Linux system is running and is starting the camera software.	

After about 10-20 seconds, the system will be back online at the online.	
Close the cover of the service port appropriately with the three screws.	

If this recovery process is also not working, the system might be damaged more severely. Contact your responsible service partner for further assistance.

5.4 Saving the service file

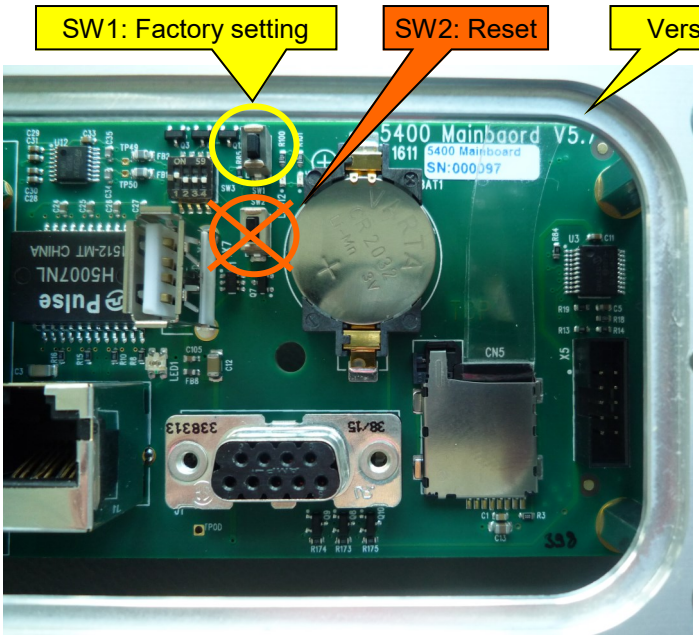
The description can be found in the Arraycam user manual under chapter 9.3

5.5 Restoring the factory settings

Restoring the factory settings must be performed only when the machine is stopped.

First open the service cover. Keep the SW1 key depressed for 2 seconds. Please do not confuse this with the Reset key SW2. As confirmation the LED next to the 24 V DC connecting cable will light up yellow.

The camera software is then automatically restarted, which means that for a short time the communication with the control unit may be interrupted.



Note

This function is not present in software versions supplied before July 2016 and is available only for mainboards with version 5.7 and later.

The network settings are reset to default values:

- IP address of the machine interface: 192.168.88.20
- Gateway of the machine interface: 192.168.88.10
- IP address of the service interface: 192.168.3.11
- Gateway of the service interface: 192.168.3.10
- Network masks: 255.255.255.0

When the system has already been calibrated, the settings for the time of the last successful calibration are loaded.

If no calibration has yet been performed, the status at delivery is restored. The most important parameters of the status at delivery are:

- Machine number: 1
- Sensitivity, fault width, monitoring width, faded-out areas, number of messages: These are standard values

5.6 Connecting to the Linux file system via WinSCP

The camera is running on Linux system, that is providing access to the internal file system via a SCP connection. By using the WinSCP software it is possible to access that file system.

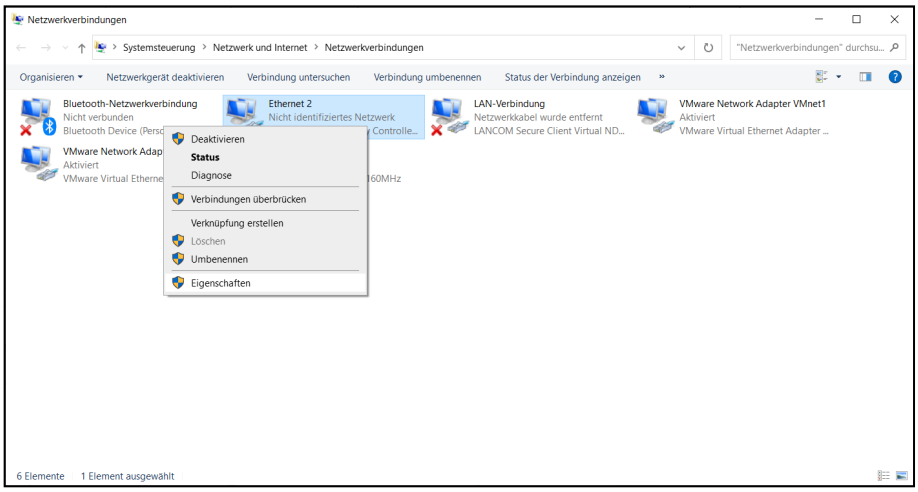
5.6.1 Download and Install WinSCP

- Download WinSCP from www.winscp.net
- Install with default options

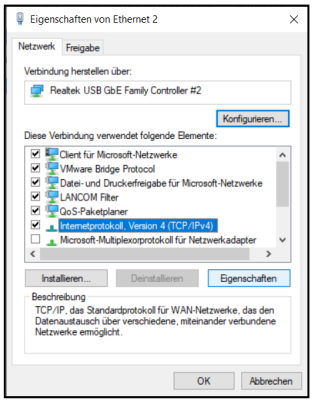
5.6.2 Setup the network properties of your laptop

The camera service port is running with the IP address 192.168.3.11. To be able to connect you have to setup the network port of your laptop to a IP address that fits this network range (i.e. 192.168.3.100) To do so, follow the below procedure:

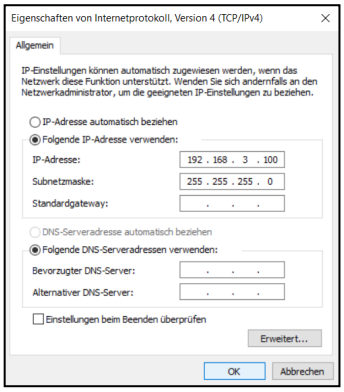
1. Open the network connections panel on your laptop, select the item for the right Ethernet port, right click and select "*Properties*".



2. In the properties dialog select the item "*Internet protocol version 4 (TCP/IPv4)*" and click on "*Properties*".



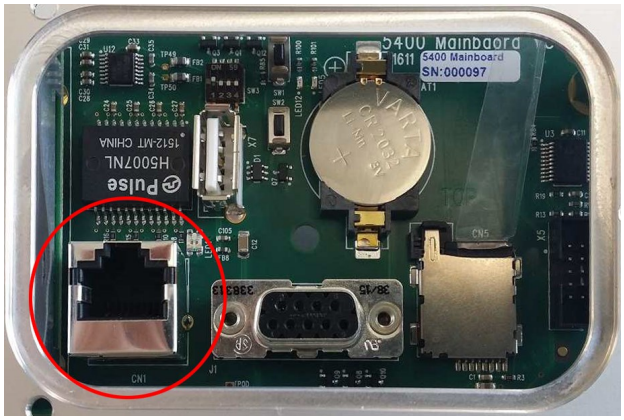
3. In the properties dialog enter the IP address “192.168.3.100” and the subnet mask “255.255.255.0”.



4. Close the dialog. The Ethernet port of the laptop is now running with the IP address 192.168.3.100 and fits the network segment of the camera.

5.6.3 Connect the laptop to the service port of the camera

Open the service cover at the camera and connect the RJ45 cable to the RJ45 jack.

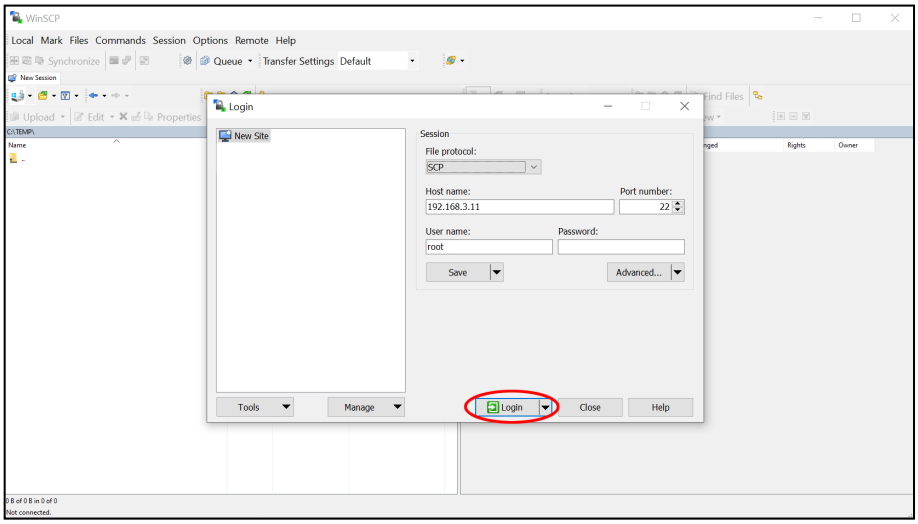


5.6.4 Connect to the camera with WinSCP

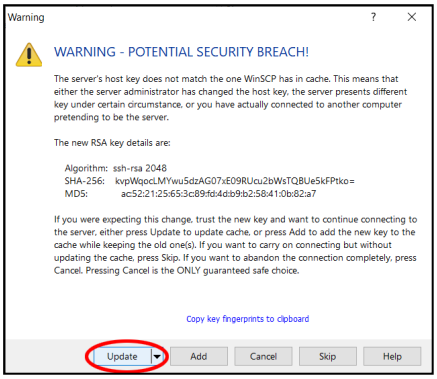
To connect to the file system of the camera you have to start and to setup WinSCP. Please proceed like below:

1. Start WinSCP and enter the connection details and click “Login” to connect:

- Set the “File protocol” to “SCP”.
- Set the “Host name” to “192.168.3.11”
- Set the “Port number” to “22”
- Set the “User name” to “root”



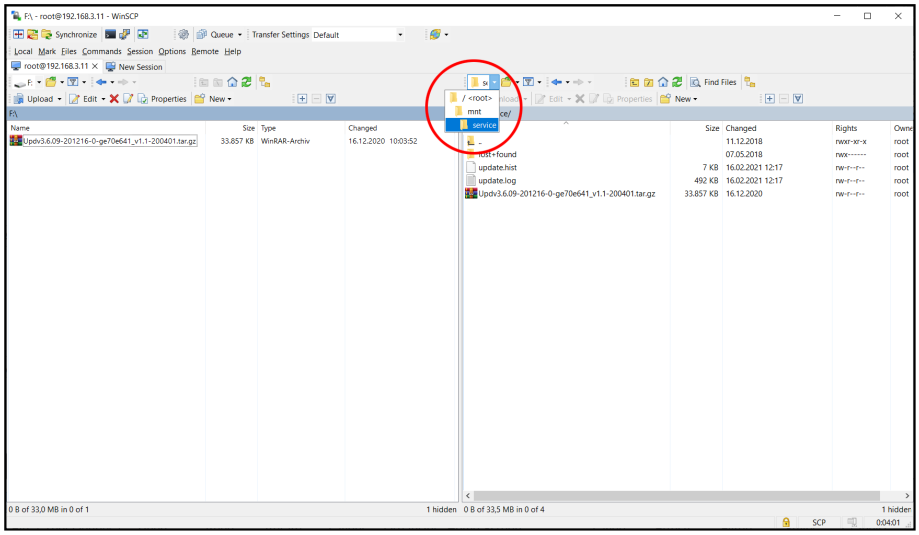
2. Usually there will be a warning regarding security key. Just click “Update” to bypass this warning.



5.6.5 Navigate in the directory

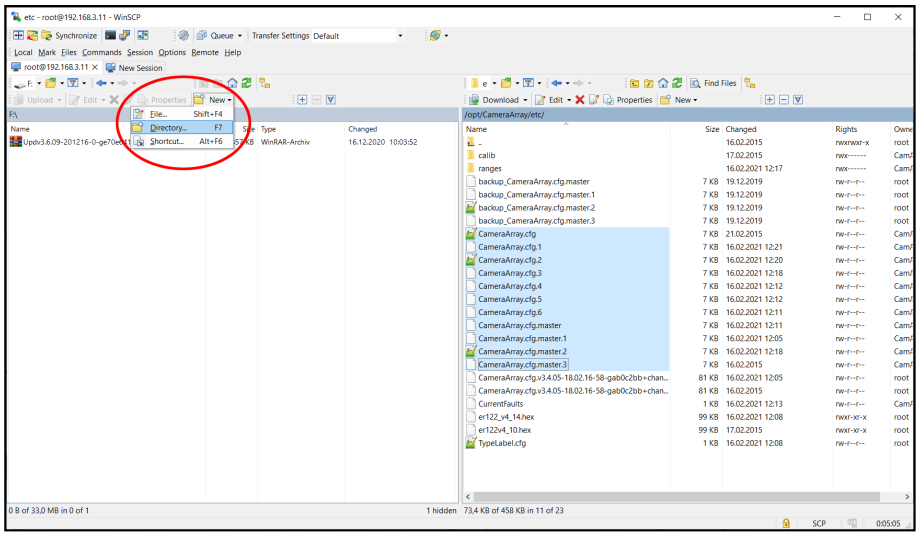
After successfully connecting to the file system of the camera you will see two directory trees. The left part of the window contains the directory tree for your laptop, the right part is the directory tree for the camera. You can navigate in different ways:

- You can use the “drive / folder” selector to select the drive you want to open. In the image below, the selector for the camera is selected. Just click on the drive/ folder you want to access.
- You can double click a folder directly from the directory tree to go into that folder.
- You can click on the first item in the list “…” to leave the folder and go back to the parent directory.



5.6.6 Creating new folders

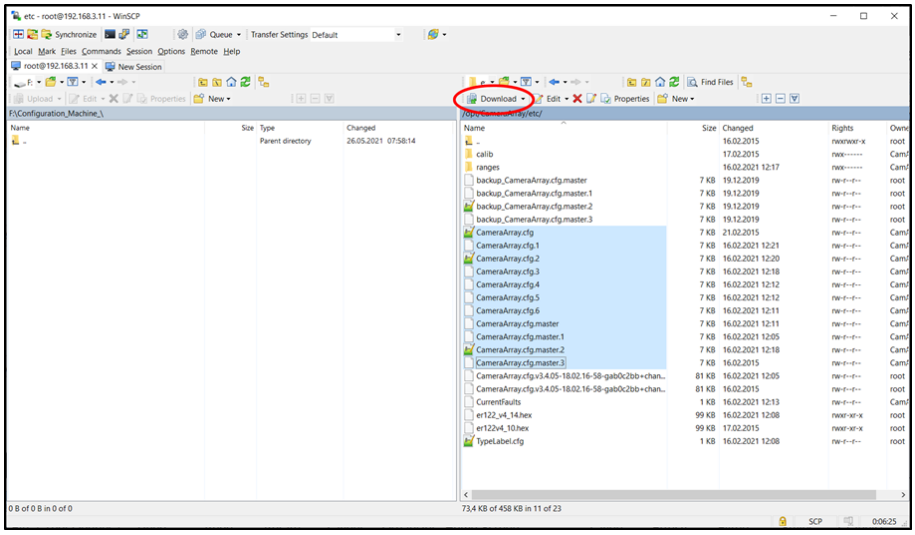
Within each directory tree you can create a new folder by clicking the “New” item from the menu bar. Enter the name of the directory in the upcoming dialog and click “Ok”.



5.6.7 Download files from the camera

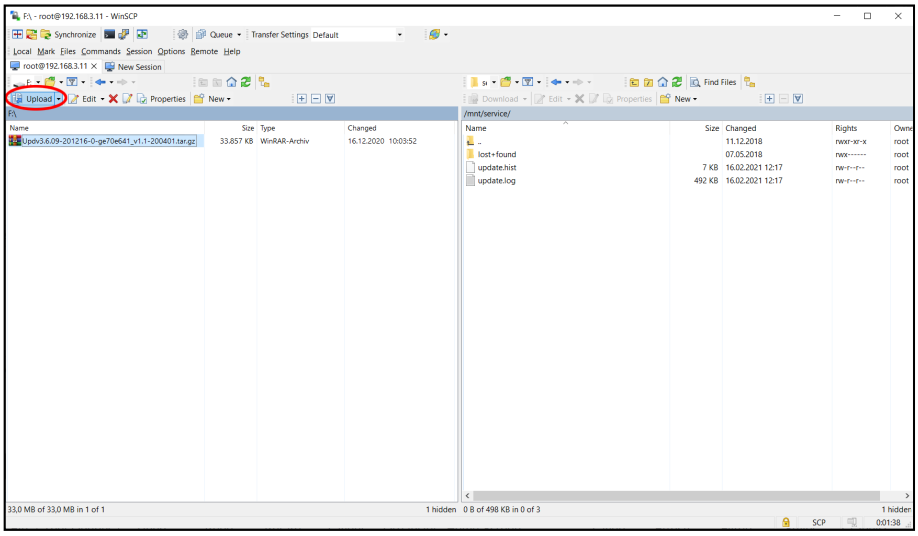
You can download files from the camera with the following procedure:

- Select the target directory on your laptop (left pane) where you want to copy the files to.
- Open the source directory on the camera (right pane) that contains the files you want to download.
- Select the files you want to download in the camera directory (right pane) and click on the “Download” button from the menu. The files will be download to the laptop.



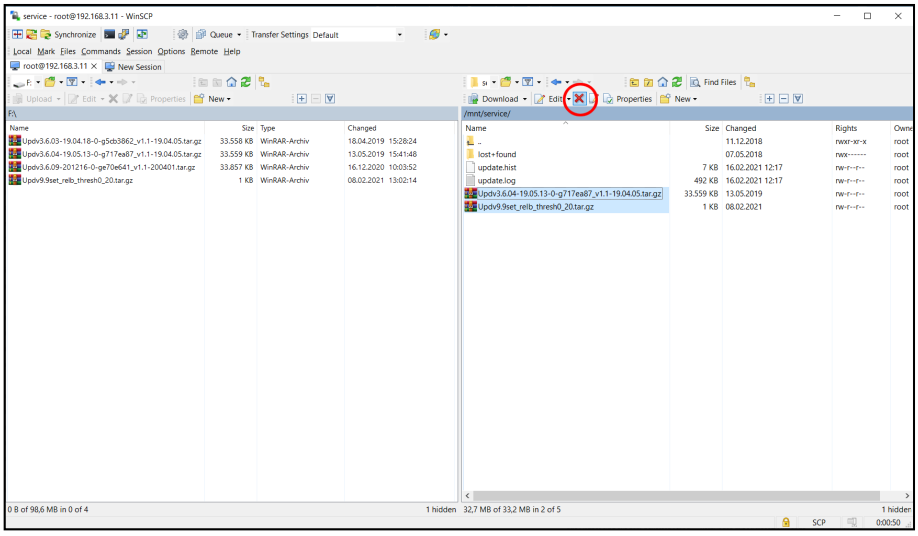
5.6.8 Upload files to the camera

You can upload files to the camera in the same way as downloading files. Go to the right directories and select the files you want to upload in the directory tree of your laptop (left pane). Then click “Upload” from the menu you start the file transfer.



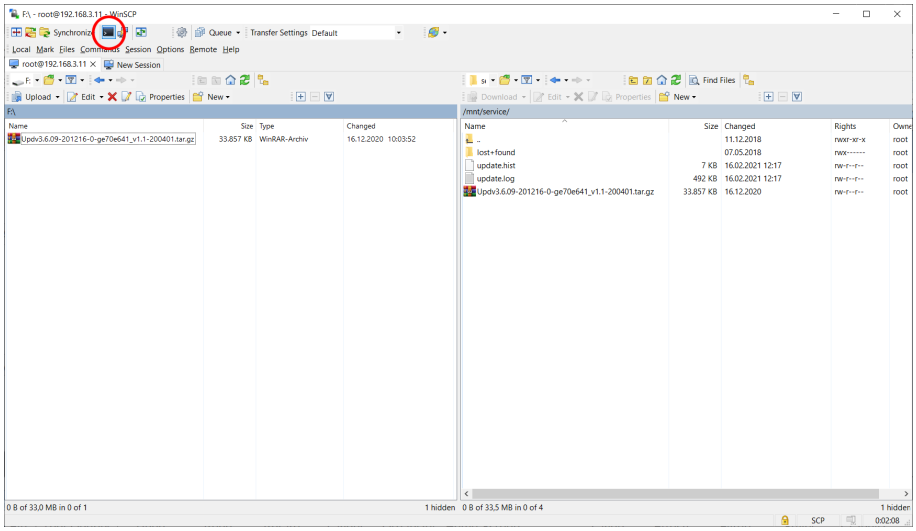
5.6.9 Delete files via WinSCP

It is possible to delete files (either on the laptop or on the camera). Just select the file you want to delete within the directory tree and click on the “Delete” button from the menu.

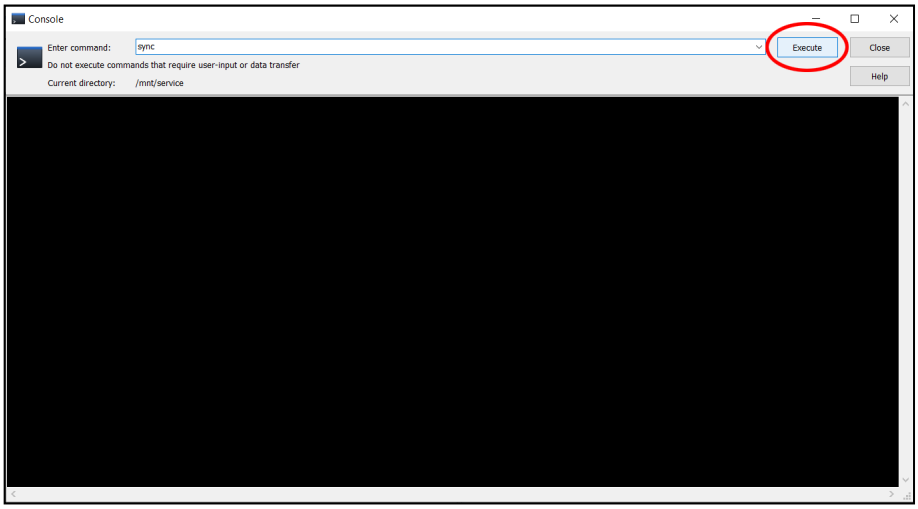


5.6.10 Synchronize the file system of the camera

Especially when uploading large files to the camera it might be necessary to synchronize the file system of the camera, especially if you want to restart the camera after uploading a file (i.e. when you upload an update file). Problem is, that even when the WinSCP upload is finished the Linux file system needs some time to physically write the uploaded file to the flash memory. By synchronizing the file system, you force Linux to finish that physical write. Only then it is safe to restart the camera. To do a so called “Sync” proceed like below:



1. Click on the “Terminal” button in the top menu.



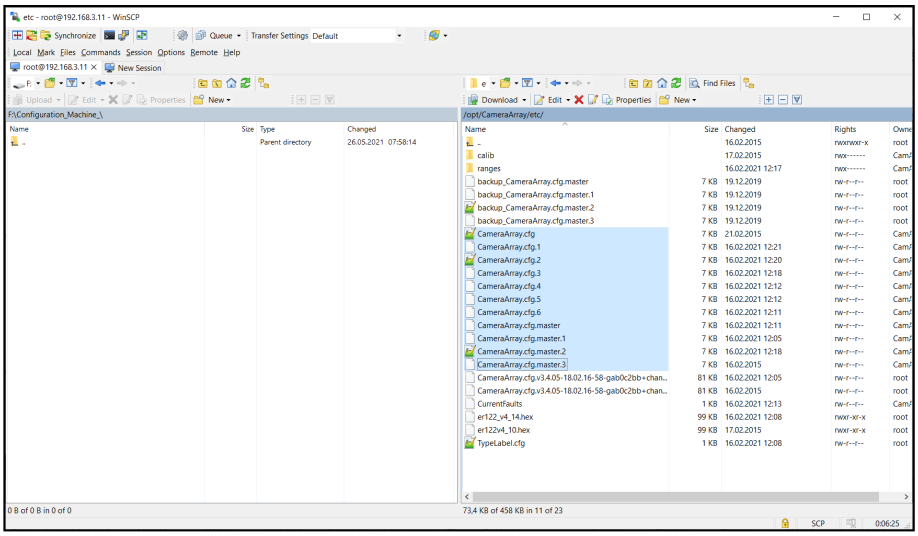
2. In the upcoming terminal window enter the command “Sync” and click on “Execute”.

3. After the “Sync” is finished you will see the command added to the result window. You can leave the terminal window and are safe to restart the camera.

5.7 Backup the configuration of the camera

Sometimes it might be necessary to have a backup of the camera configuration. To back up the camera configuration proceed like below:

1. Open a connection with WinSCP. Open the folder on your laptop where you want to store the camera configuration and open the following directory “/opt/CameraArray/etc/” on the file system of the camera.

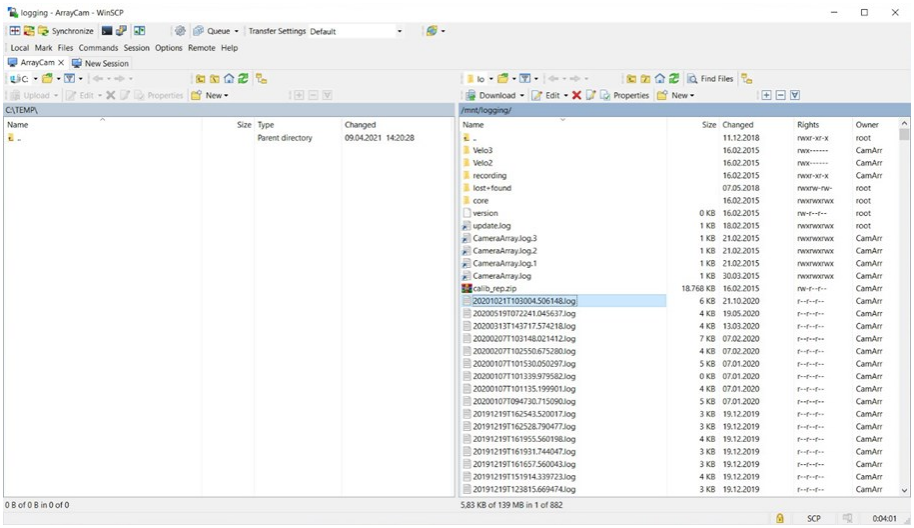


2. Select all configuration files (all files starting with “CameraArray.cfg…” and use the download button to transfer the files to your laptop.

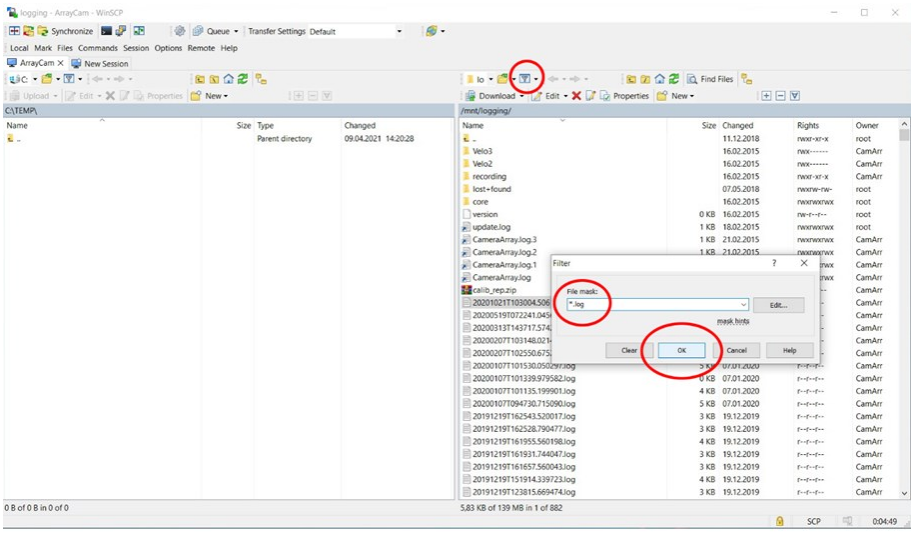
5.8 Download the camera logs

Sometimes it will be necessary to retrieve the log files from the camera and download them. To download these files, proceed like below:

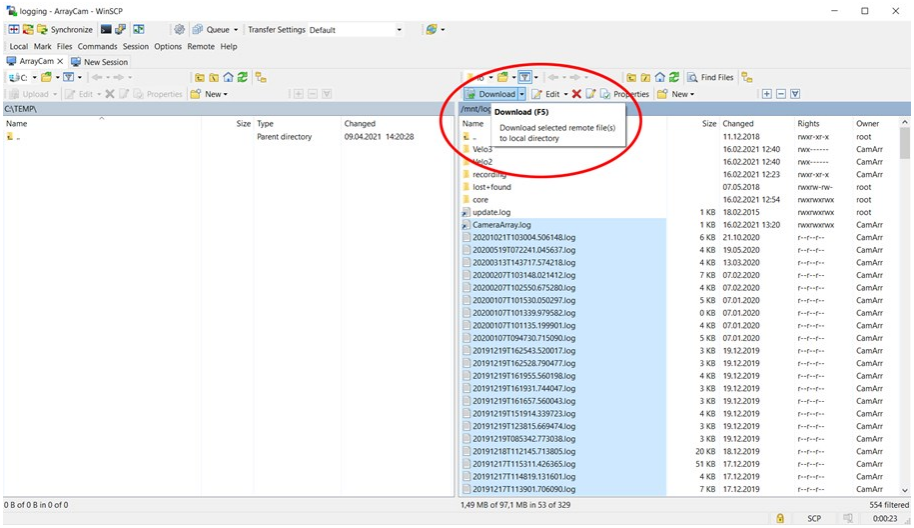
1. Open a connection with WinSCP. Open the folder on your laptop where you want to download the files to and open the following directory “/mnt/logging/” on the files system of the camera.



2. Use the WinSCP “File Filter” to filter for log files (the file extension for the log files is “.log”) and to get a list of all available log files.



3. Select all the log files and download them.



A Repair instructions

A1 Exchanging the mainboard of the camera traverse

Before the mainboard is removed you must copy the configuration files "CameraArray.cfg" and "CameraArray.cfg.master" to a PC and copy them back again once the mainboard has been exchanged.

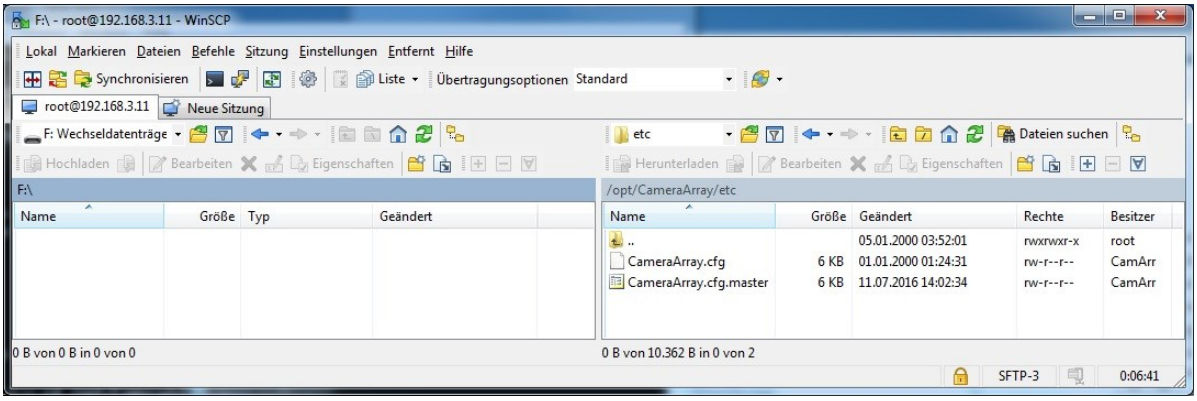
Connect a Windows PC via a LAN cable to the service LAN port of the camera traverse and change the connection settings as described in the installation manual in Appendix A.

Start the FTP-program “WinSCP“ using the settings as described in chapter 5.2.2.2.

Navigate to the right (in the directory structure of the camera system) to the directory "/opt/CameraArray/etc" and select the following files:

"CameraArray.cfg" and "CameraArray.cfg.master"

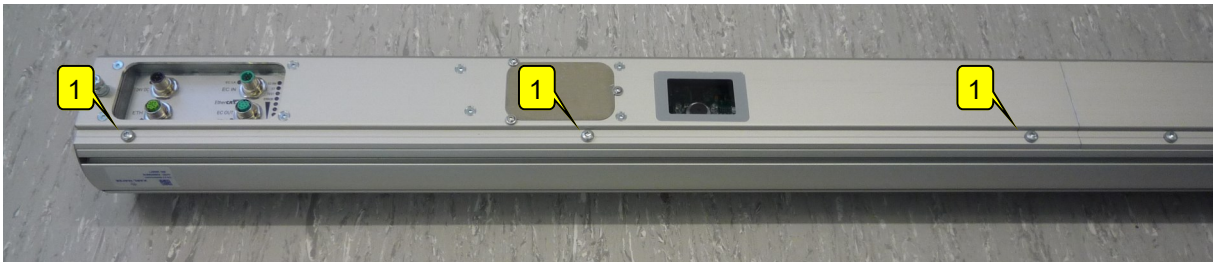
Then click on “Download” (Herunterladen). Please ensure that the files have arrived in your local directory.



Removal of the motherboard

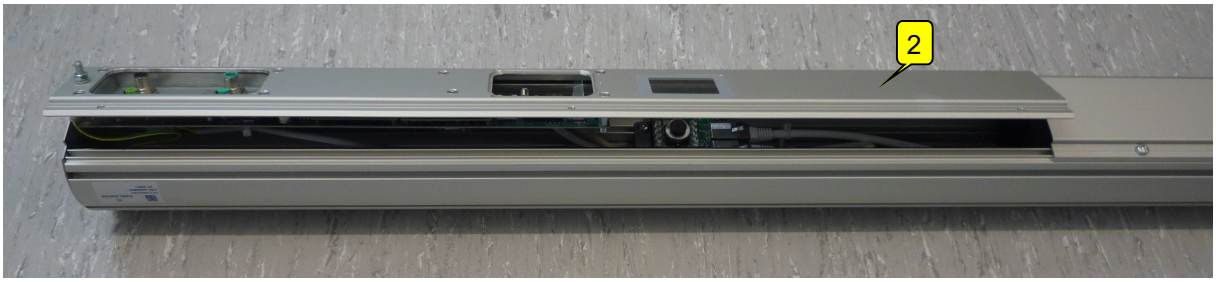
First disconnect the camera system from power by switching off the control unit. Only then remove the connected cables and the earthing strap.

Loosen the three fixing screws (1) of the cover with a torx-25 screwdriver.

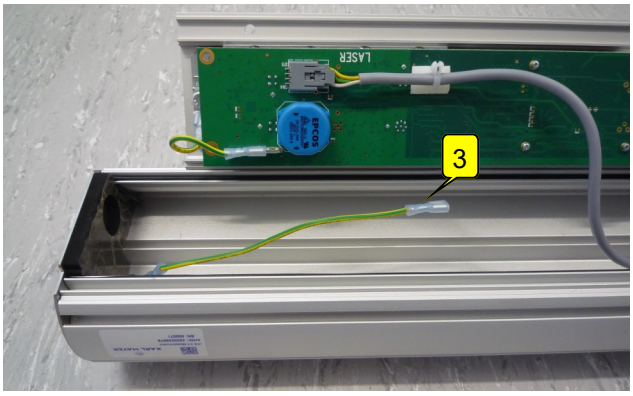


Be aware of the risk of electrostatic discharges throughout the entire process of the exchange. It is absolutely necessary to wear an earthing wristband!

Swing open the cover (2) as shown in the photo, taking care not to damage the cables .

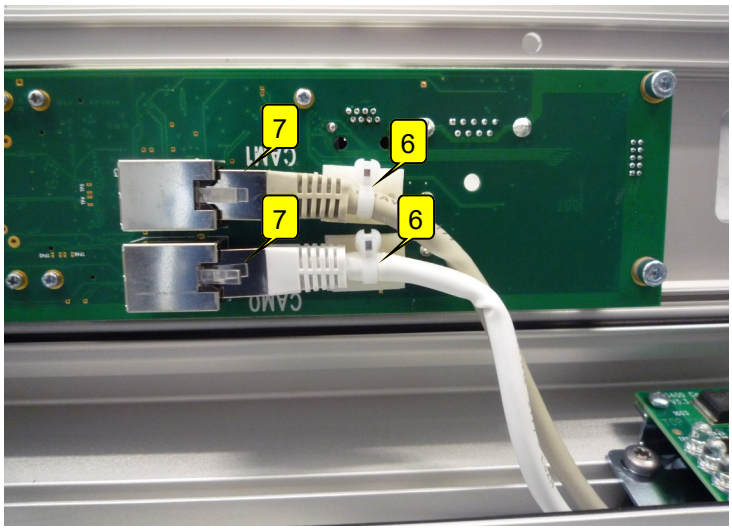


Disconnect the earth cable (3).



Then cut through the cable ties (6) at both of the camera connecting cables (7).

Then the cover with the mainboard can be removed.



Reinstalling the mainboard

The assembly is the reverse of the removal. Please check that all plug connectors are correctly engaged and that cable strain is prevented by fitting a cable tie.

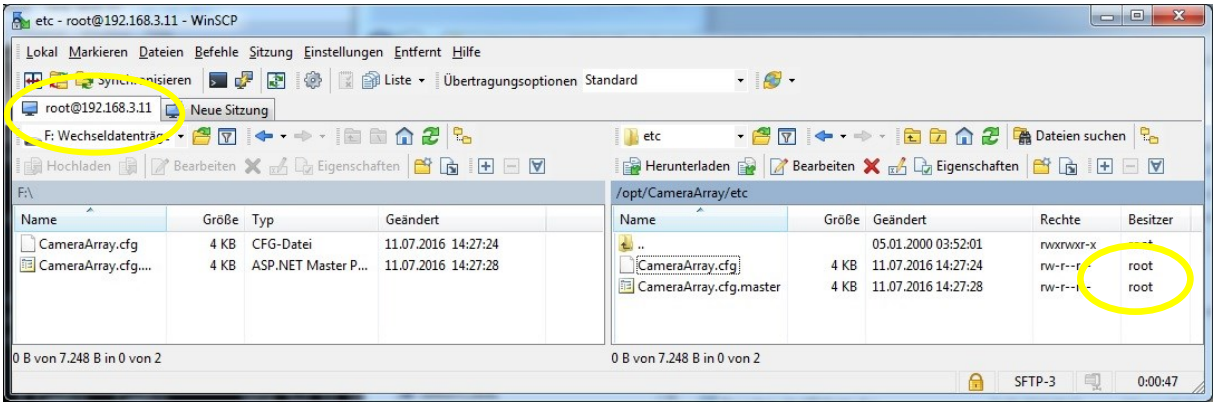
The two camera connecting cables must not be confused:

- **CAM0 = yellow (or white) cable**
- **CAM1 = gray cable**

After the mainboard has been installed the files must be reloaded. To do so, please establish a connection again.

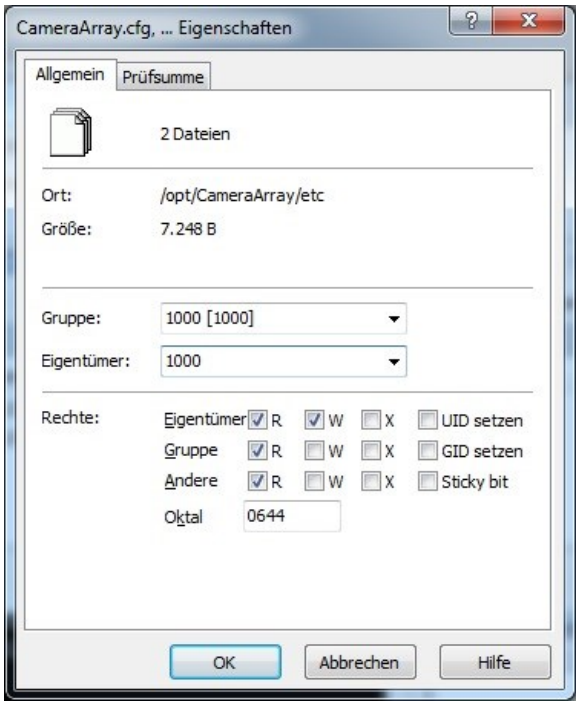
Select the correct directories and click on “Upload” (Hochladen).

You must check the owner of the files that are uploaded (shown on the right-hand side) and change it if necessary. If "root" appears in the “owner” column, select the two files "CameraArray.cfg" and "CameraArray.master.cfg" in succession.



After right clicking on them call up the properties and enter for “Group" and “Owner" the value "1000".

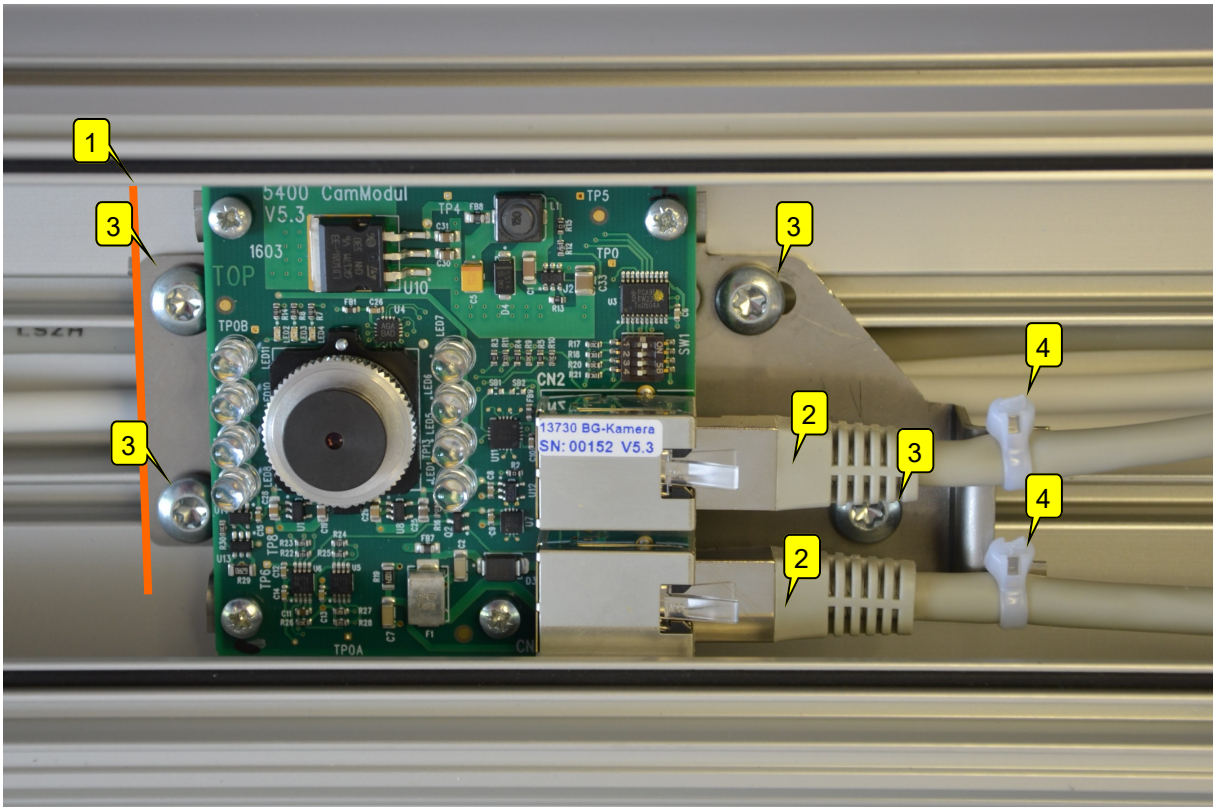
This changes the owner from "root" to "CamArr".



A2 Exchanging a camera module in the camera traverse

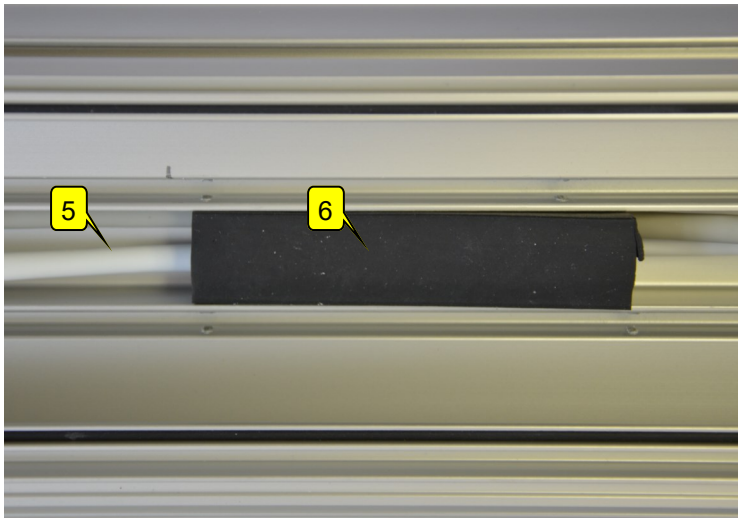
Removing the camera

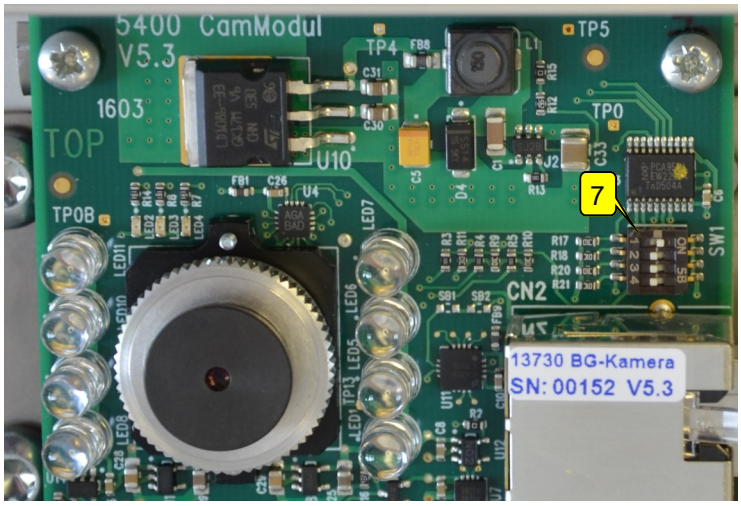
- First switch off the camera system.
- Remove the cover at the relevant position. If it is the camera next to the electronics connections that must be changed, firstly the mainboard must be removed (see chapter B.1).
- Mark the position of the camera module (1) on the traverse (for example, with a pencil).
- Mark the connector positions of the cables (2) or the cable to prevent confusion. Note: Depending on the position of the camera there are either one cable or two cables connected to the camera.
- Release the four fastening screws (3) on the retaining plate of the camera and remove the camera with the connected cables from the traverse.
- Cut through the cable ties (4) on the back of the retaining plate, to avoid damaging the cables.
- Unplug the previously marked cables.



Installing the camera

- Lay the cables in the duct provided (5) and place the foam pad (6) over it.
- Install the new camera module at the marked position.
- Plug in the previously marked cables at the correct positions. Make sure that the connectors are correctly locked.
- Secure the cables with a cable tie.
- Set the correct camera address (corresponding to the camera that was removed) at the DIP switches (7). Use a small screwdriver or tweezers to do this.
- Then install the covers.

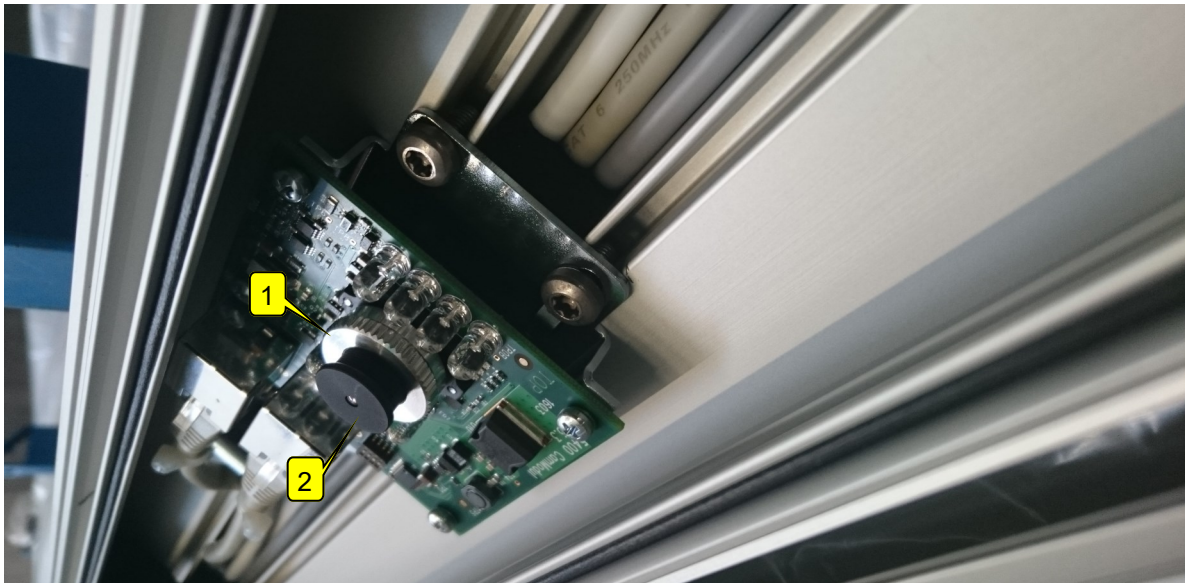




A3 Focussing the camera

The cameras are installed at a distance of 930 mm or 1125 mm between the camera casing and the fabric. If the distance varies significantly from these values (deviation > +/-100 mm) or if the cameras are incorrectly set, then they must be re-focussed.

To do this, please remove the cover at the respective camera.



Connect a Windows PC via a LAN cable to the service LAN port of the camera traverse and change the connection settings as described in the installation manual in Appendix A.

The images of the different cameras can then be viewed with a browser (Firefox or Chrome) under the network address "http://192.168.3.11:8080/".

To focus, place a pattern (e.g., a page from the manual) on the fabric or at the desired distance from the camera and focus on it.

Loosen the knurled aluminium ring (1) slightly and twist the lens (screw thread) (2), until the picture is in focus. Retighten the knurled aluminium ring.

B Maintenance and cleaning

- Keep the covers of the cameras and the lighting equipment clean.
- Avoid putting fingerprints on the covers of the cameras. Use only a dry non-linting cloth to clean the covers of the cameras.
- Before cleaning the unit or removing or installing any options, always disconnect the unit from the power supply.
- Do not use any liquid cleaning agents or cleaning sprays when cleaning the unit; use only a slightly damped cloth.
- When stubborn dirt is present, use exclusively isopropyl alcohol. No other cleaning agents may be used.
- Make sure that the plug connectors are securely screwed on. Plug connectors that are not securely screwed on can negatively impair the operation of the monitoring system.

For your notes