IPETRONIK

IPEMOTION
Software

IPEmotion_PlugIn_VIDEO_V01_03_00

18. Januar 2019

Table of Contents

1   Important and general information

1.1   Important information

Please follow these instructions before and during the use and application on any IPETRONIK product!

1.1.1   Safety and Warning instructions

Please follow the instructions **and** information as contained in the user manual!

1. The user can **influence an electronic system by applying the IPETRONIK product**. This might cause risk of personal injury or property damages.

2. The **use and application of the IPETRONIK product is permitted only to qualified professional staff**, as well as, only in appropriate manner and in the designated use.

3. **Before using an IPETRONIK measurement system** in the vehicle it **has to be verified** that **no function of the vehicle, which is relevant for secure operation, might be influenced**:
    - by the installation of the IPETRONIK measurement system in the vehicle,
    - by an potential malfunction of the IPETRONIK system during the test drive.

    In order to avoid possible danger or personal injury and property damages, appropriate actions are to be taken; such actions have to bring the entire system into a secured condition (e.g. by using a system for emergency stop, an emergency operation, monitoring of critical values).

    Please check the following points to avoid errors:

    - Adaption of sensors to components of the electrical system / electronics, brake system, engine and transmission control, chassis, body.

    - Tap of one or several bus systems (CAN, LIN, ETHERNET) including the required electrical connection(s) for data acquisition.

    - Communication with the vehicle's control units (ECUs), especially with such of the brake system and/or of the engine and transmission control (power train control system).

    - Installation of components for remote data transmission (mobiles, GSM/GPRS modems, WiFi and Bluetooth components).

    The products can be operated in extended temperature ranges greater $70\,°C$ and therefore the operator has to take safety measures to avoid any skin burnings on hot surfaces while touching the products.

4. **Before** directly or indirectly using **the data acquired by an IPETRONIK measurement system to calibrate control units, please review the data regarding to plausibility**.

5. With regard to the application of IPETRONIK products in vehicles during use on public roads the manufacturer and/or registered user of the vehicle **has to ensure that all changes/modifications have no influence concerning the license of the vehicle or its license of operation.**

6. **User does agree to the instructions and regulations as mentioned above.** In case the user does not agree with the instructions and regulations as mentioned above, he has to notify this expressly and immediately in writing to IPETRONIK before confirming the sales contract.

1.2   Terms and conditions

See IPETRONIK website for details: www.ipetronik.com

1.2.1   Legend of used icons

	Tip	*This icon indicates a useful tip that facilitates the application of the software.*
	Information	*This icon indicates additional information for a better understanding.*
	Attention!	*This icon indicates important information to avoid potential error messages.*

1.2.2   Support

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Limited commercial partnership with its head office in Baden-Baden, registry court HRA No. 201313
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2   PlugIn overview

2.1   PlugIn description

With the Video PlugIn you have access to a large range of USB cameras supporting the Windows WDM driver and IP-Network cameras supporting the Real Time Streaming Protocol (RTSP).

2.2   PlugIn Installation

In order to use the PlugIn together with IPEmotion you need to install it. The PlugIn is available for download from the IPETRONIK website: https://www.ipetronik.com/ When you have installed the PlugIn, you need to launch the IPEmotion software. Then you need to access the application menu and open the OPTIONS. In the OPTIONS you can activate the PlugIn as indicated below.
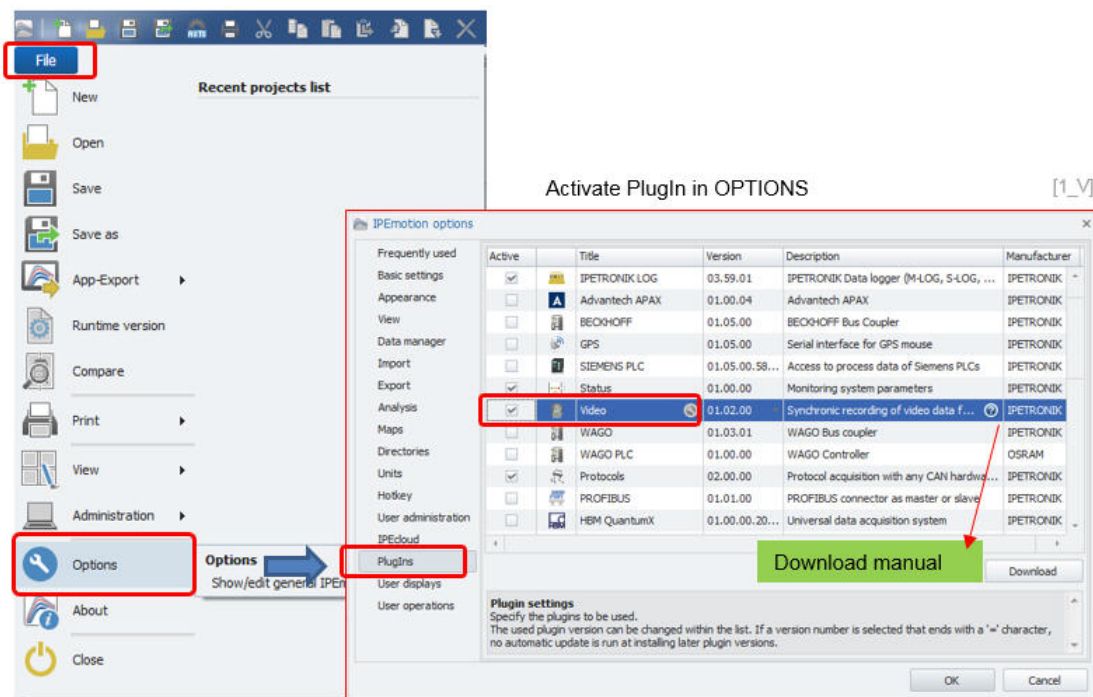
The PlugIn is supporting the following Windows operating systems:

▶ 32 bit

▶ 64 bit

2.3   Functional architecture

You can interface multiple USB- and IP-cameras to your PC and record the data. The USB cameras get the power supply via the USB port of the computer and can be automatically detected. The IP-Cameras are connected to the Ethernet interface of the computer. They require more configuration settings using fixed IP-addresses for the camera and the Ethernet interface of the PC. Also, framerate, GOV size, codec, login authentication, stream link address and port numbers need to be defined.
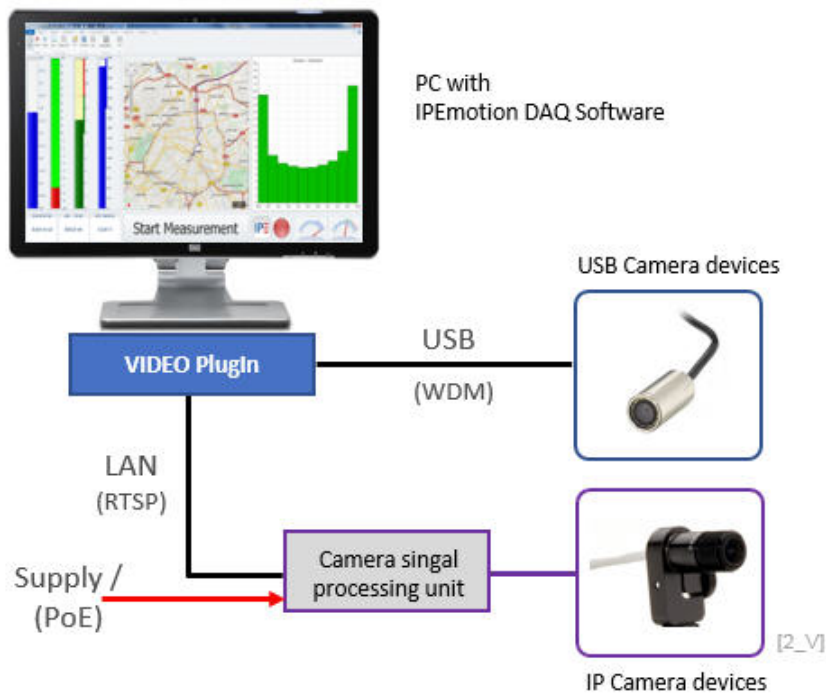
3   Create USB interface system

In the SIGNALS work space, you can create video interfaces. For USB cameras it is recommended to use the hardware detect function. Due to the standard USB drivers the cameras are automatically detected. Over the USB interface it is also possible to use the PlugIn settings to update frame rate, compression and picture pixel resolution on the USB camera. This is different to IP cameras where the setting have to be done in the web based configuration interfaces of the camera itself.

[3_V]
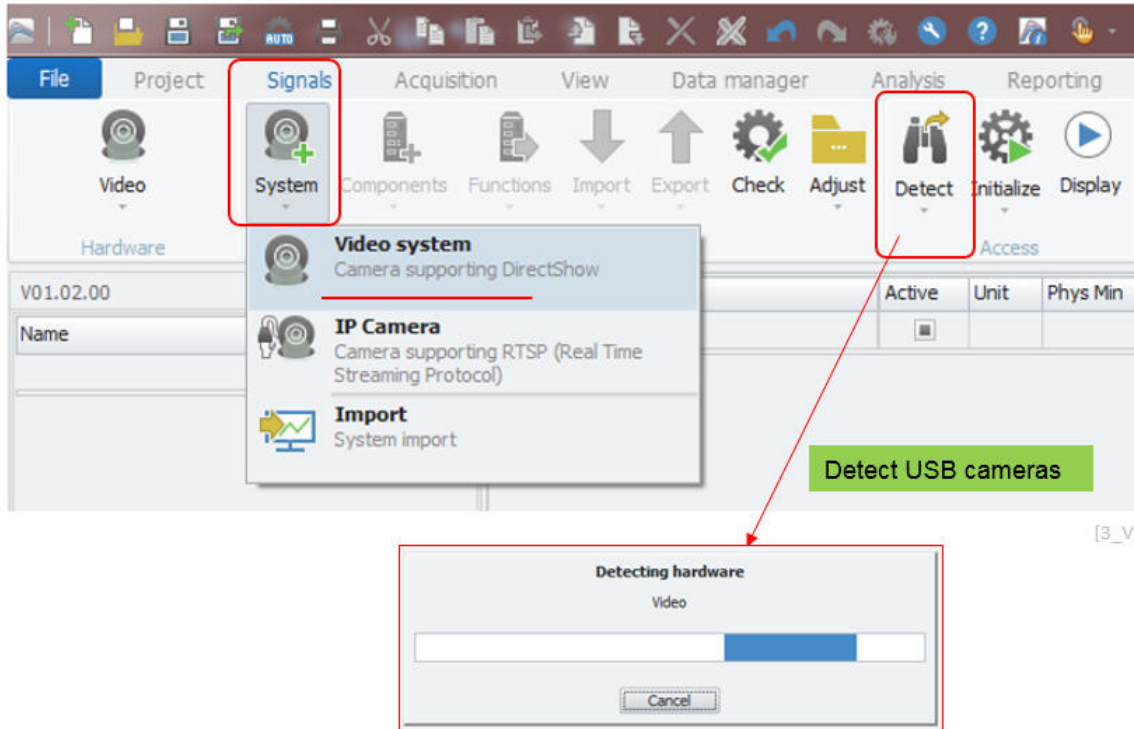
After successful detection the USB video interfaces is created and for every camera a video channel is created too. The frame rate is automatically detected from the camera device and set to the maximum value. The frame rate can be reduced but not increased.
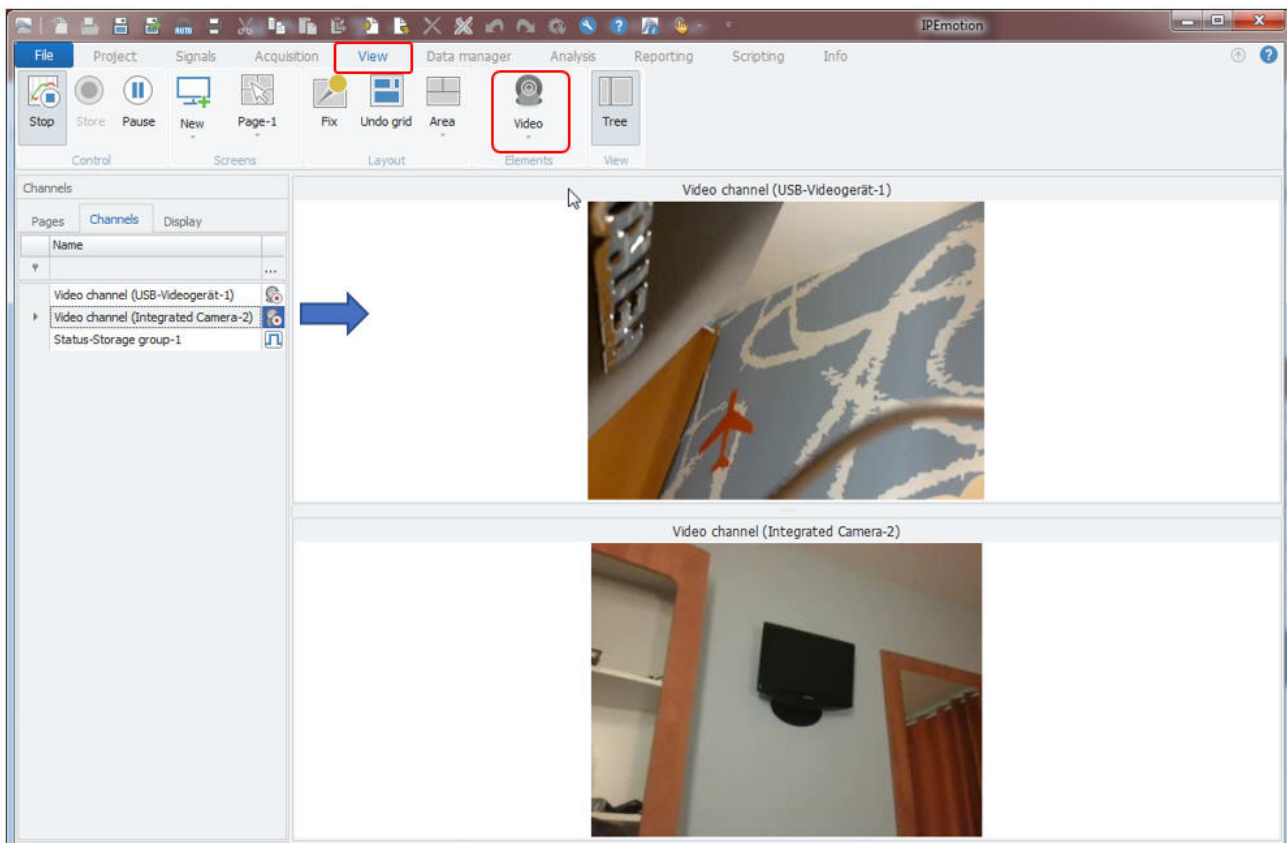

Detected cameras

[4_V]
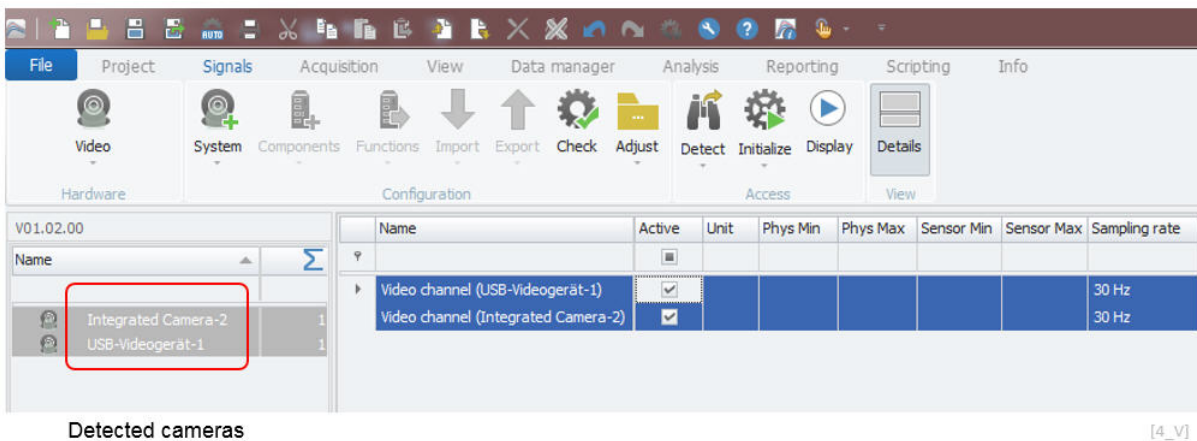
When you start the measurement you can see message picture data indicated as a measurement value on video channel level.
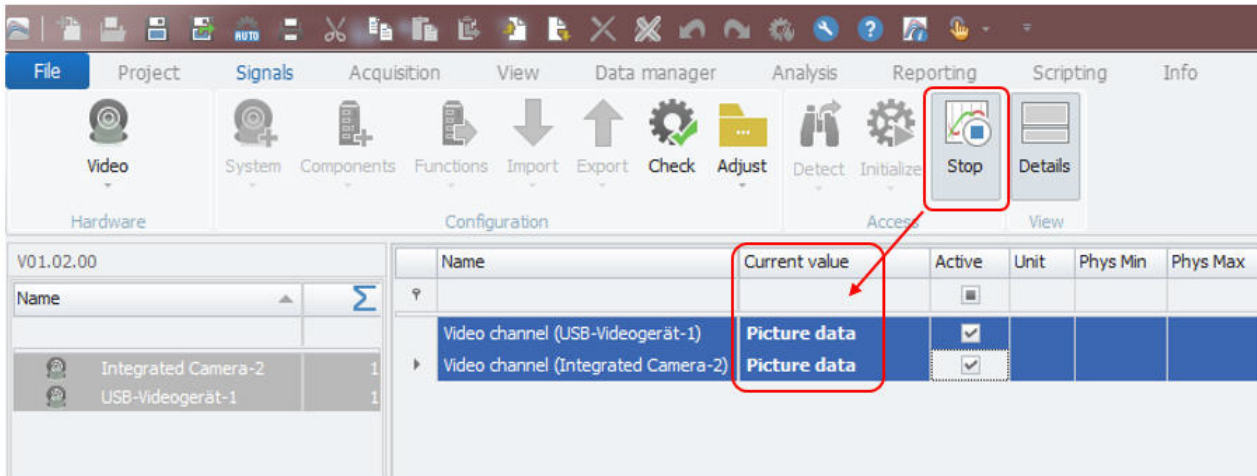
Start measurement [5_V]

You can view the video data in the VIEW workspace too. To see the online video stream, you can drag and drop the video channels into the video instrument.

Display online data in video instrument [6_V]

3.1   USB channel settings

On video channel level you can select from the following 3 data formats. Additional information about the data processing mechanism are provided in the last chapter.

Data formats   [7_V]

In the video settings tab sheet you have additional configuration functions to define the resolution of the stored pictures. 4 different modes with defined quality settings are provided. Depending on the selected quality rate an estimated data transfer rate is calculated.With the USB interface and the WDM driver it is possible to update the camera settings from the PlugIn
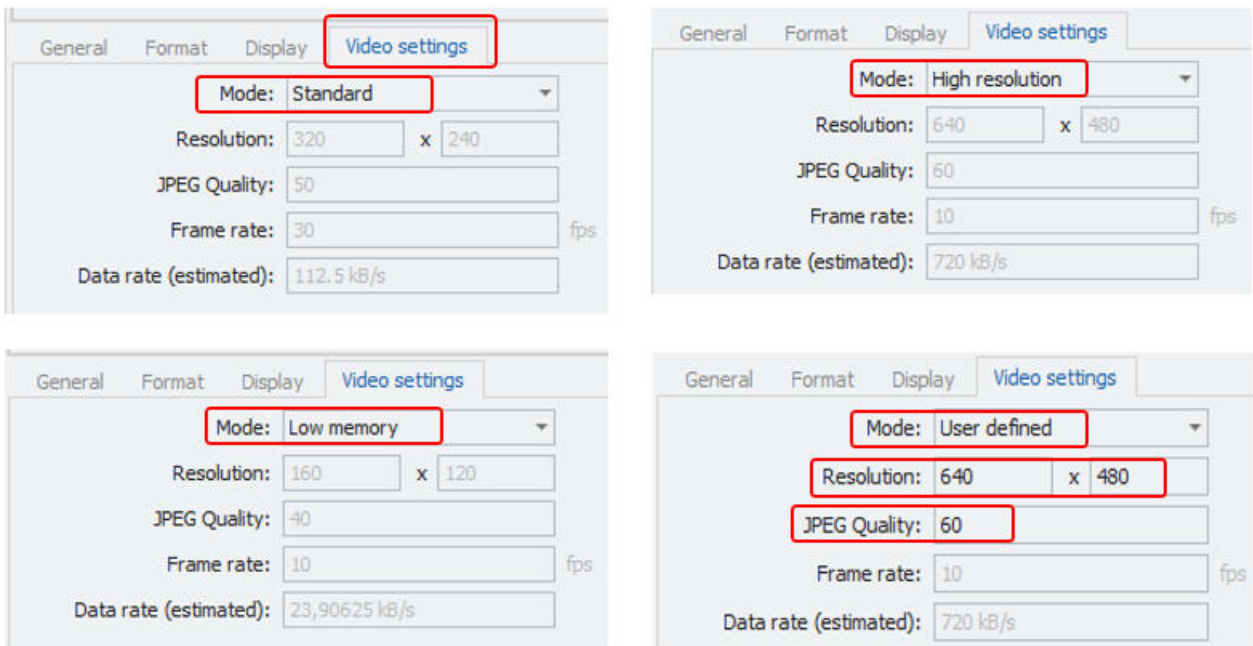
Different USB camera settings in the Video Settings tab sheet   [8_V]

4 Configure IP network cameras

The Video PlugIn is supporting IP cameras too. In the following the configuration is explained based on a one channel AXIS IP camera model P1214-E. The picture below shows the camera including a suction cup mounting system which is not part of the standard delivery.

AXIS network camera   [10_V]

In the first step you need to perform the hardware installation including power supply to the signal conditioning unit. Connecting the camera lenses unit and establishing an Ethernet connection between your PC and the conditioning unit. When the camera is powered up all LEDs are the signal conditioning unit are in green color.
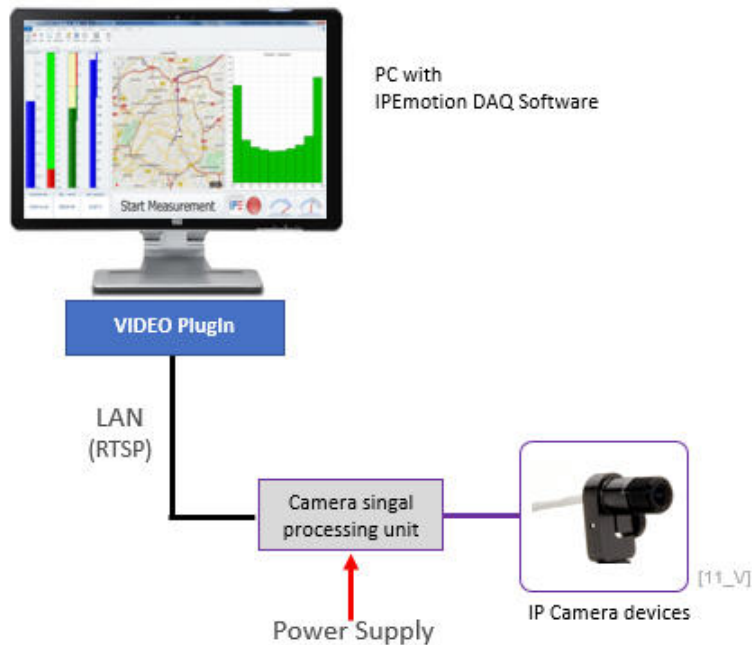
## 4.1   PC network card settings

In order to establish a data communication connection to the camera, you need to define a static IP address on the LAN interface of your computer, which is connected to your network camera. The network IP and subnet mask should be in the same range to that of the IP-camera. The network address of the IP-camera is mentioned in the manual. In this example the address of the camera is this: 192.168.234.102. This IP-address was selected in order to make configuration compatible to ETH 2 input of IPElog2 or M-LOG V3.
For the PC LAN network setting the IP-address 192.168.234.200 was selected.
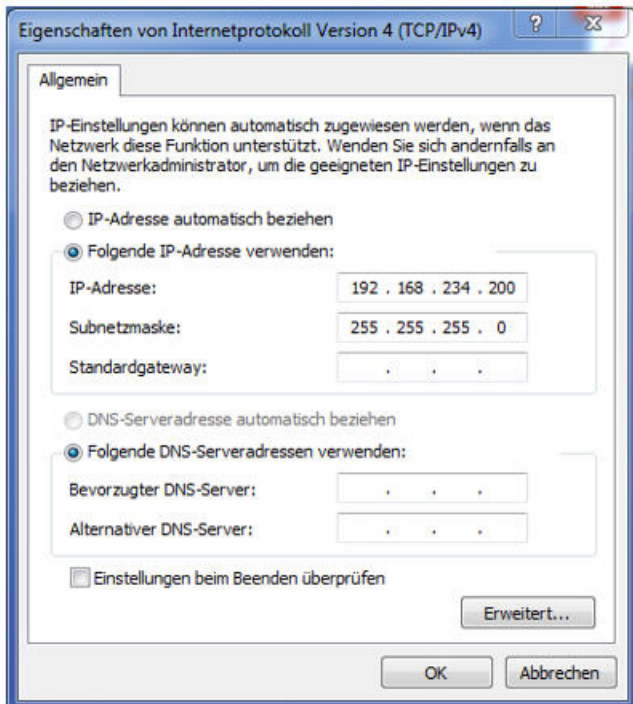
Define static IP for PC LAN IPv4 network settings   [12_V]

With a web browser you can access the configuration interface. The link to the web browser is part of the manual. In this example you enter the static IP-address to the browser to the live pciture:
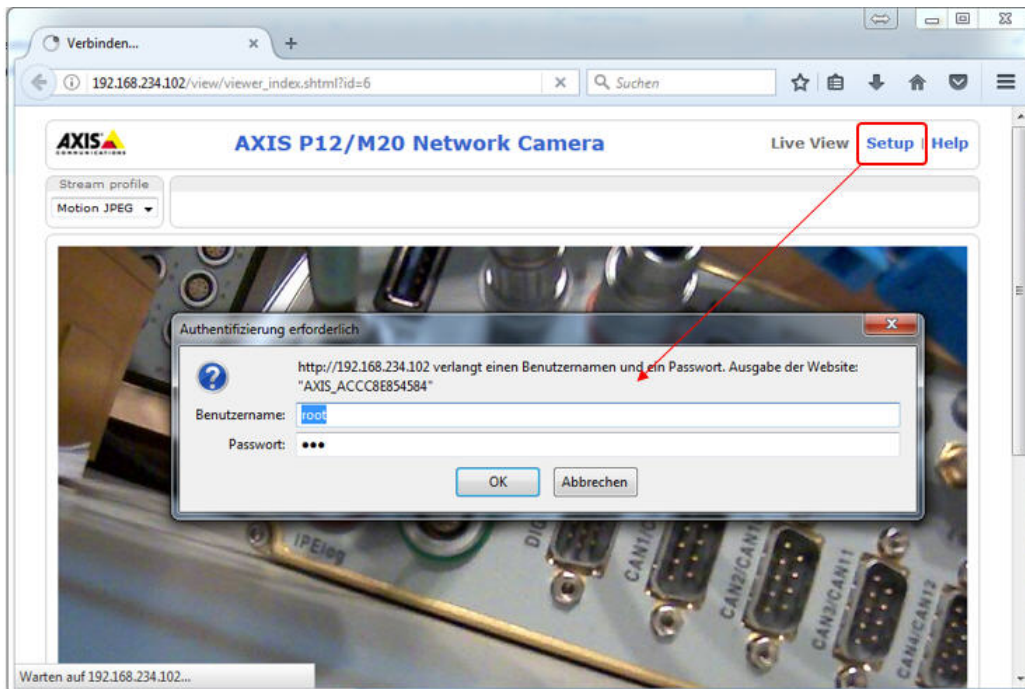http://192.168.234.102/
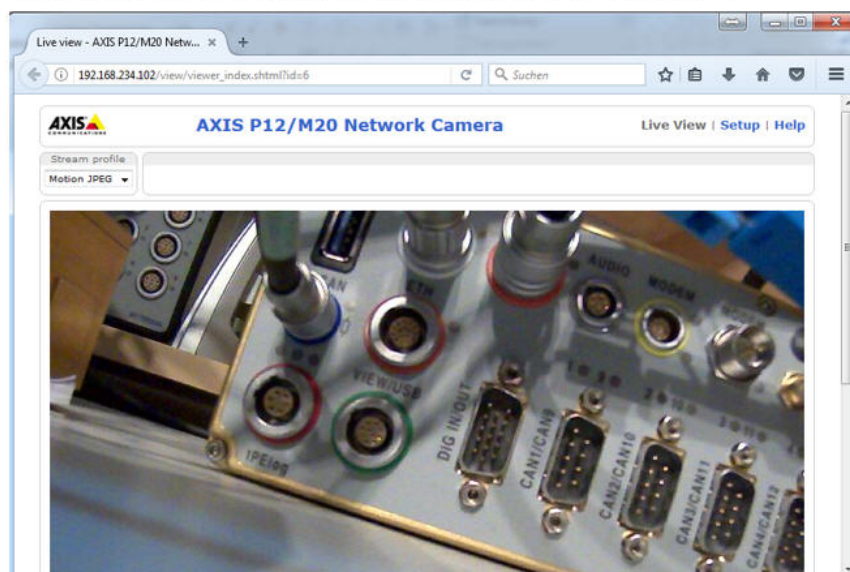
Data live view in browser   [13_V]

4.2   IP camera settings

From the web interface you can access the settings area. The default user name and password for this product is root.


Login to device configuration browser   [14_V]

In the configuration menu you need to create an administrative user who is later used by IPEmotion to retrieve the data from the camera. In the example below the user is called ipe with the corresponding password ipe.
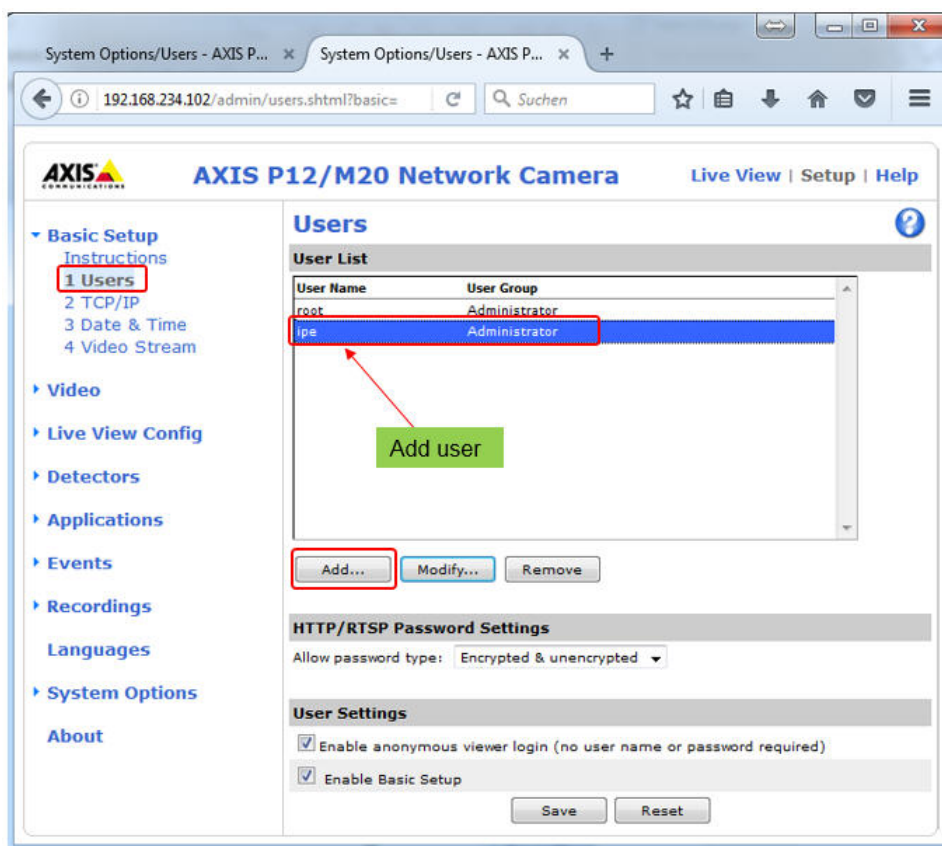
Create user   [15_V]

In the TCP/IP setup you may change the IP-address. However, in this example the default fixed IP is used. The fixed IP-address is an important setting to retrieve the video data in IPEmotion.
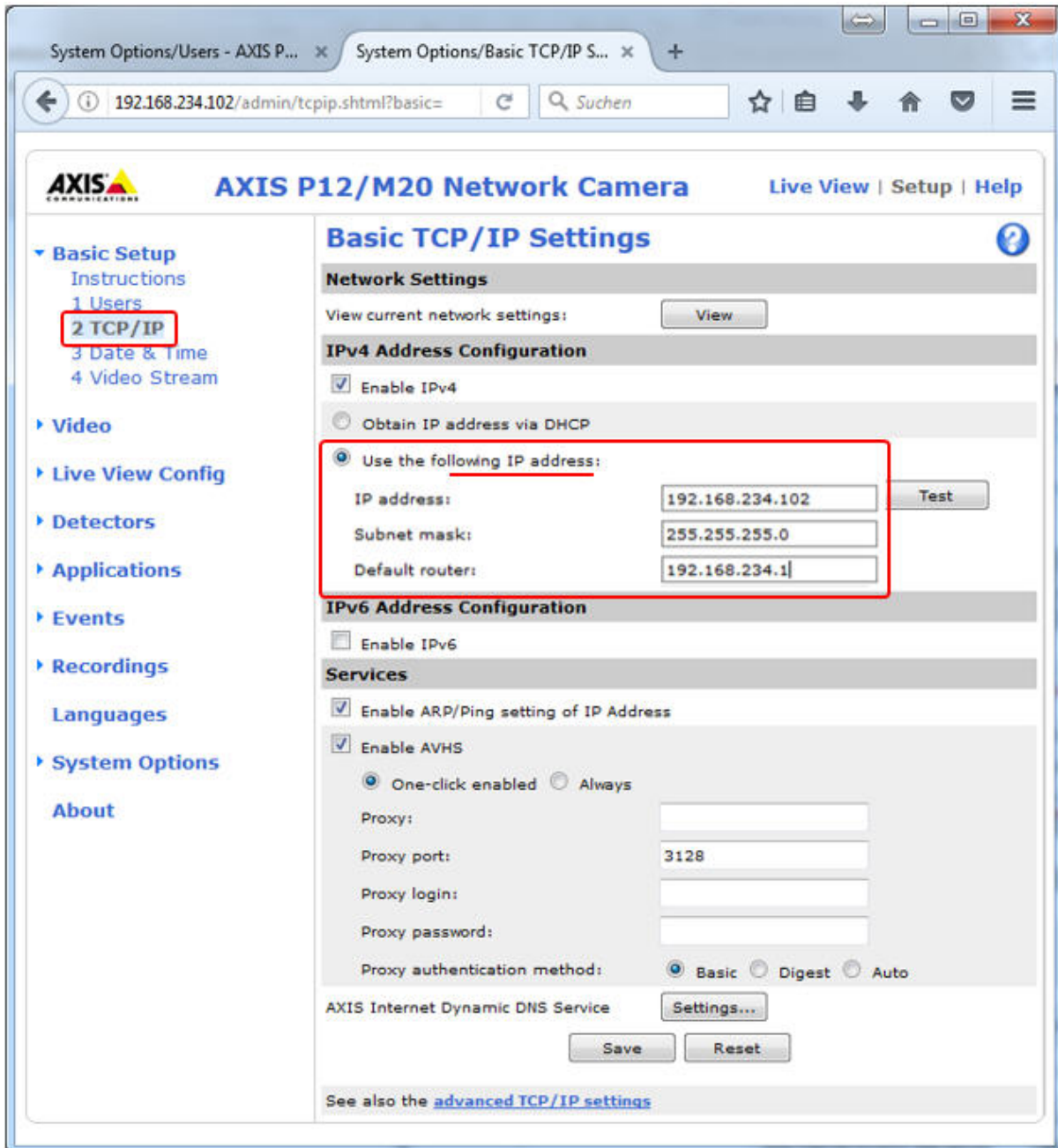
IP-address and routing settings [16_V]

▶	IP-address	Here you define the fixed IP-address to reach the camera from your browser. This IP-address will also be used to configure the connection parameters for measurements with IPEmotion. If you would like to use the camera on the IPEmotiuon RT data logger you should select the address suitable for the address range of the ETH input of the logger which should be in the range of ETH 2 of 192.168.234.xxx.
▶	Subnet mask	Here you can use the default setting 255.255.255.0.
▶	Default router	Here you define the IP-address which will be used by the IPEmotion ME (Mobile Edition) app to receive the video stream on your app. The router IP address must be in the same network range as the ETH input of the logger.

Another important configuration part are the image settings. Her you can define the image size in pix and the compression. The compression is ranging in percent from 0 = no compression to 100 = maximum compression. In this example we will use 50 percent compression as an initial recommendation. As standard frame rate 15 Hz is selected. The frame rate has to be considered for the settings in the PlugIn too. The impact of the different settings will be explained at the end of the manual.

Image settings   [17_V]

This camera is providing a h264 video stream. For the h264 codec you can define a GOV length. GOV is a setting for the Group of Pictures. This factor has a considerable impact on the amount of data you store. The factor is determining how many differential frames are transferred together with a full picture. Large GOV factor will group many different frames together with one full frame. If configure the GOV factor to one ever frame transferred is a full frame including all data which will cause high data storage volumes. In our example we will use a GOV factor of 16. The GOV factor will be configured in IPEmotion too.
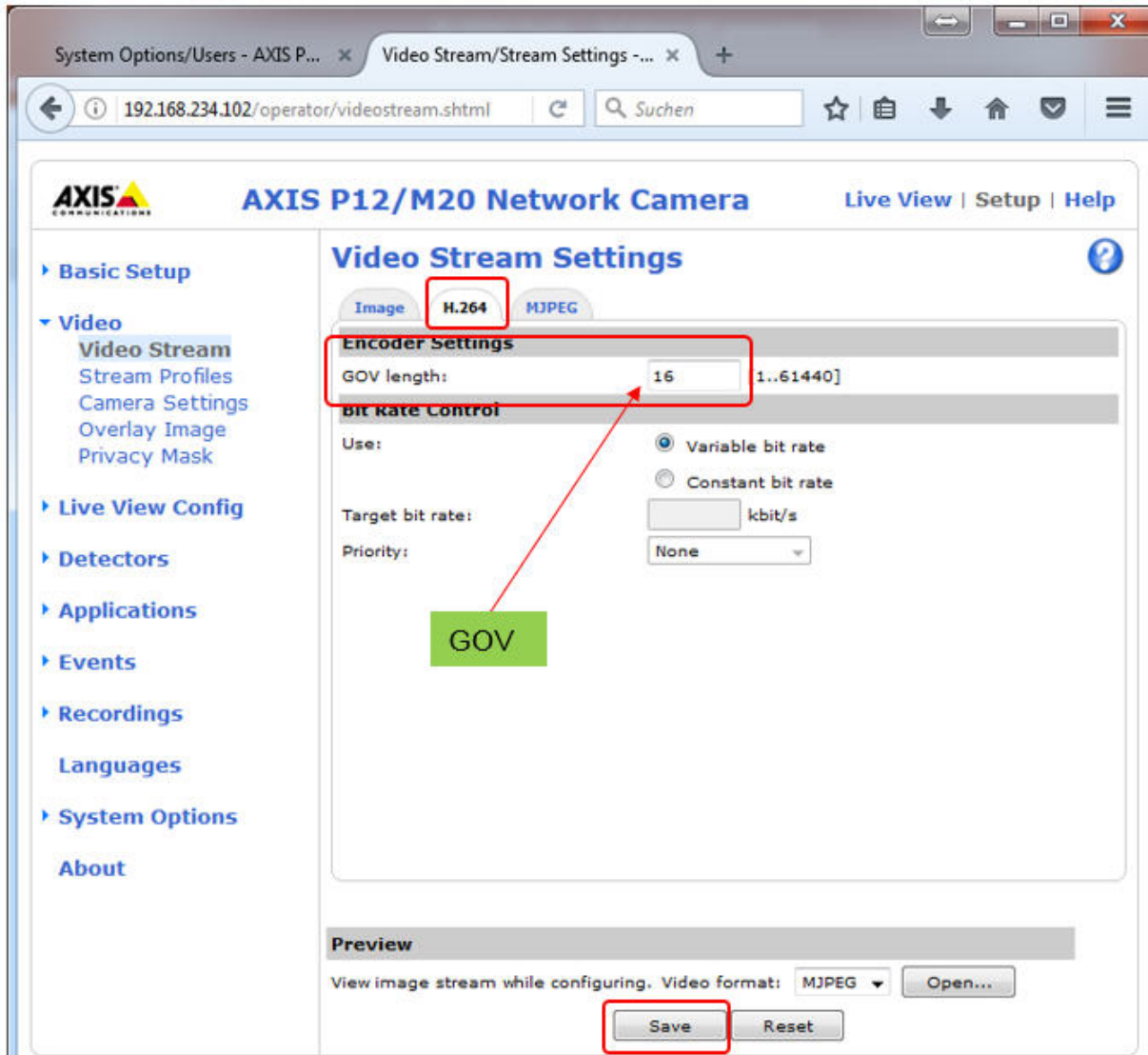
GOV = Group of Picture for h264 codec settings   [18_V]

Finally, we need to enable the RTSP stream and define the port number. This are important settings so that data is retrieved by the IPEmotion. The Port number will be used for the connection parameters in IPEmotion too.

In order to send the video stream to the IPEmotion Mobile Edition (app) it is required to define an alternative HTTP port: 8080. This port is considered in the App conenction string in section **??**

Advanced TCP/IP settings   [19_V]

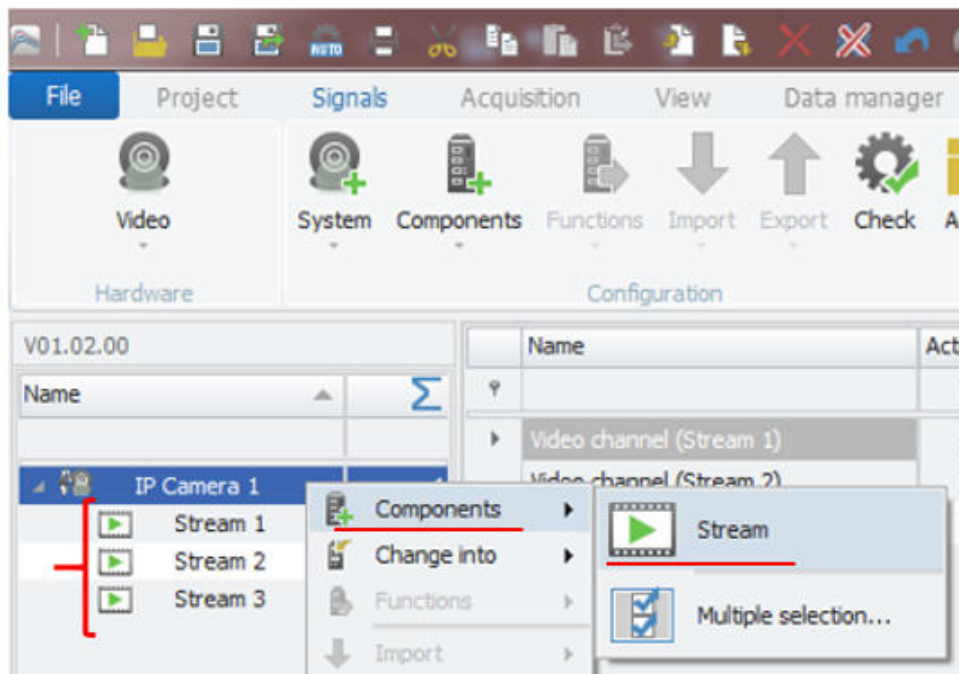# 5   PlugIn configuration for IP camera

5.1   Create IP camera interface

For IP cameras you need to create manually an interface system. An automatic hardware dietetic is not supported for IP camera devices.
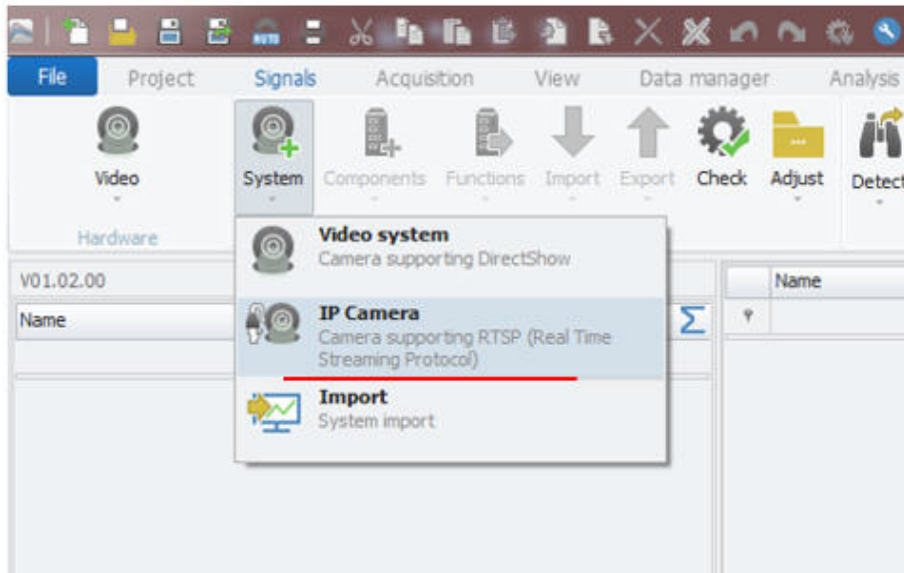
Create IP Camera system   [25_V]

If the camera system is supporting several video streams you can create additional streams in the IP camera system.

Add multiple streams   [26_V]

In the General tab sheet you define interface name and description.
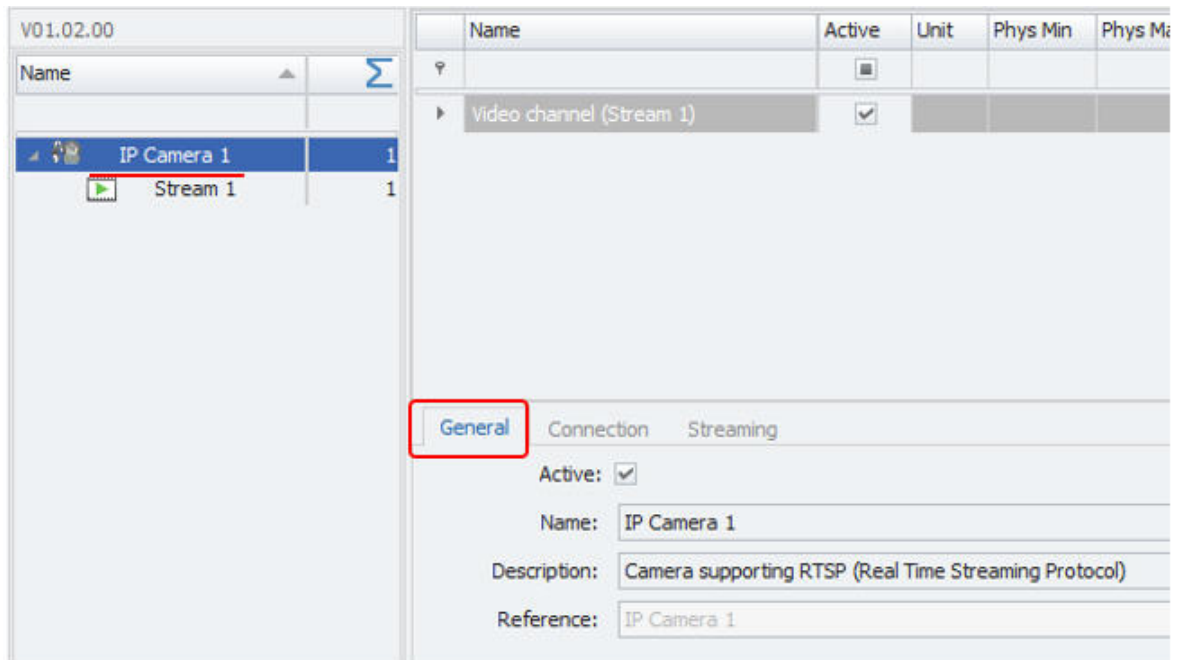
System - General [27_V]

In the Connection tab sheet you define the fixed IP-ddress of the camera, the user and the password, which was defined in the web interface of the camera. See section 4.2

System - Connection [28_V]

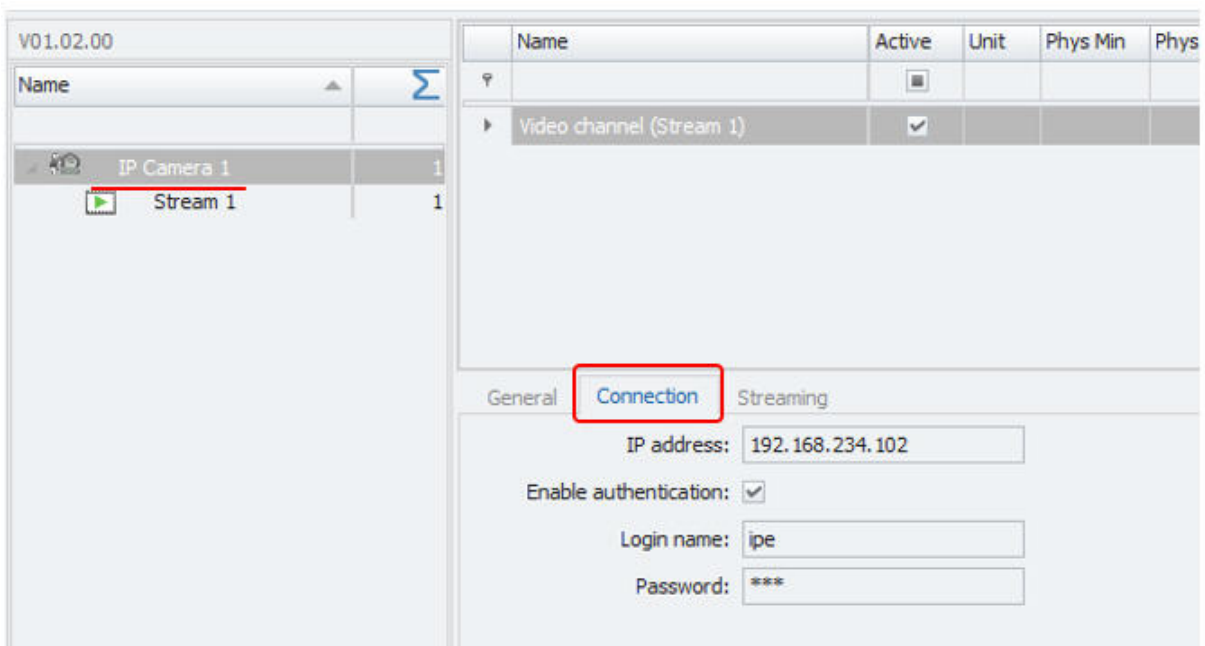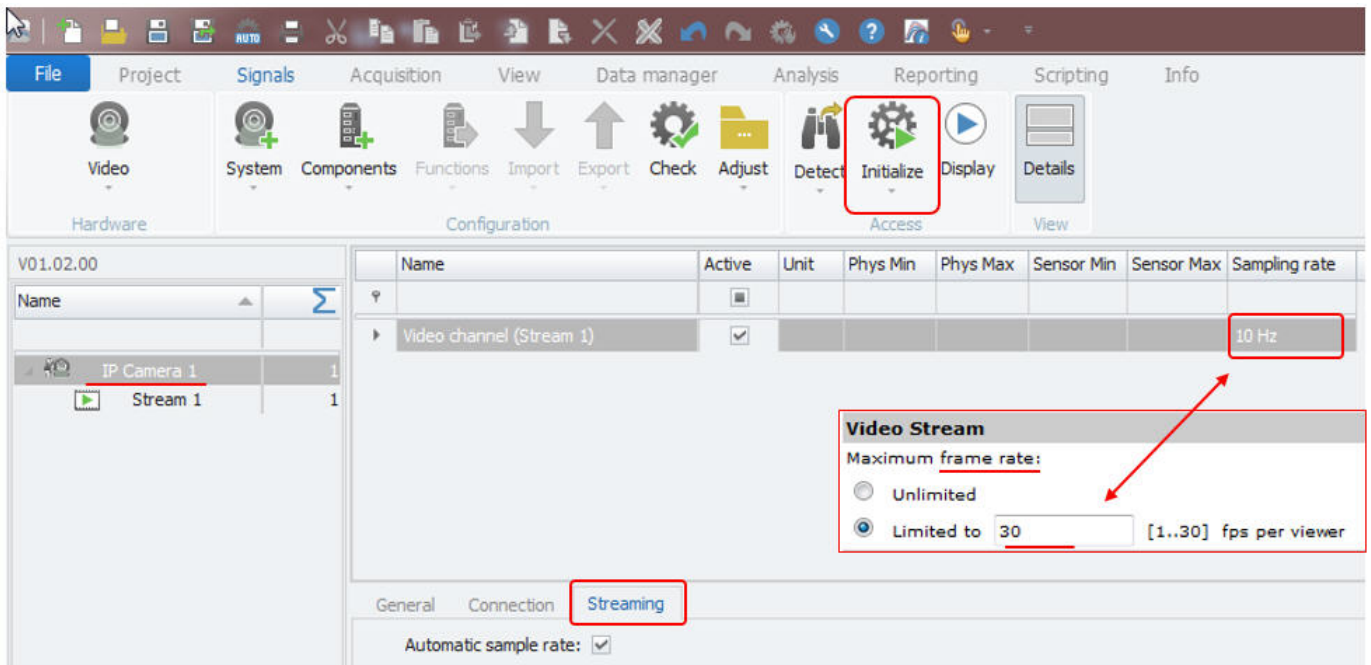In the Streaming tab sheet you have a check box to activate a function called

▶ Automatic sample rate

When this check box is activated the PlugIn will check during an initialization process which is the sample rate setting of the camera.

System - Streaming   [29_V]

|		
ⓘ	*Information*	*It is recommended to deactivate this check box because is it extending the initialization time for each measurement. You can only identify the defined frame rate of the camera when all connection parameters which are discussed below are defined.*
ⓘ	*Information*	*When you make any updates in the web interface of the camera like frame rate, compression, GOP factor, resolution, etc you have to execute the initialize function in IPEmotion to make the changes in the web interface also affective to the PlugIn.*

5.2 Stream configuration

On Stream level you have to define the stream configuration setting. When you use e.g. AXIS F44 camera you have 4 cameras in one IP interface system. In this case you need to add 3 more streams to your configuration as discussed above. In the General tab sheet you define stream name and description.
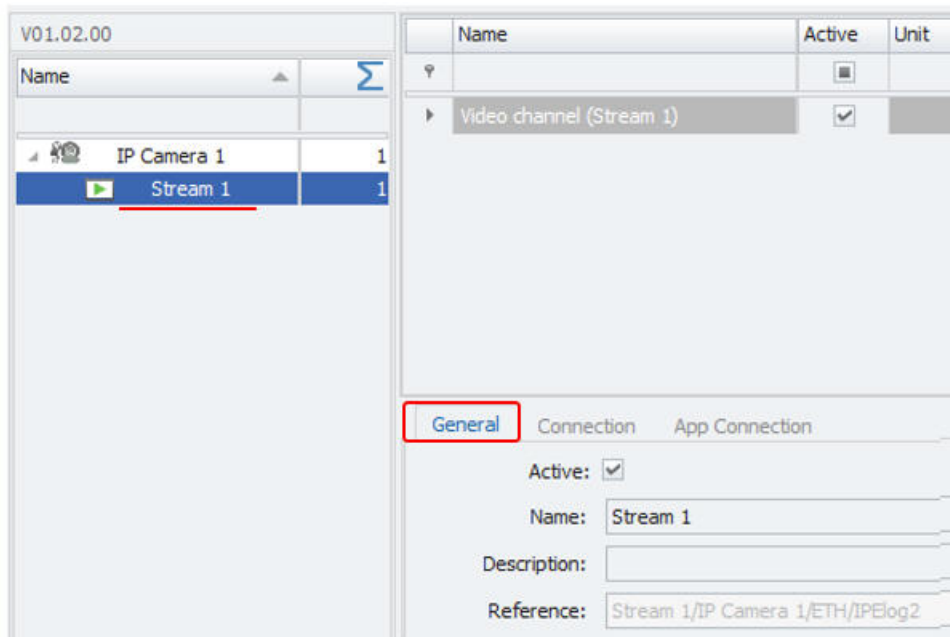
Stream - General   [30_V]

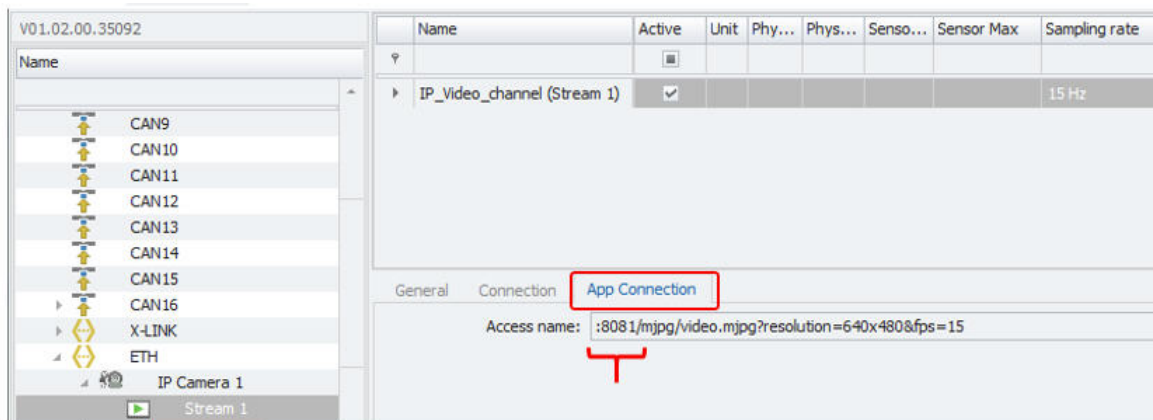In the Connection tab sheet the stream specific parameters are defined.
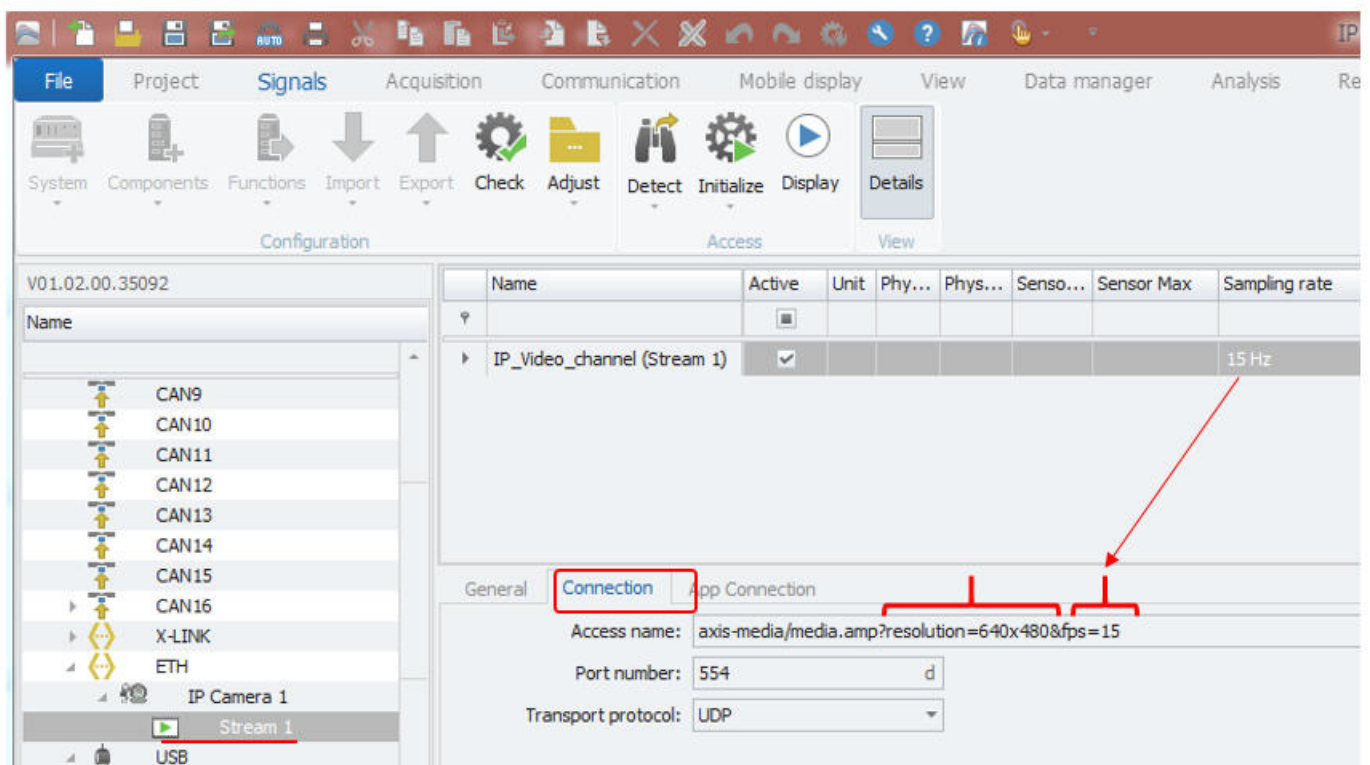
Stream - Connection   [31_V]

When the settings are all defined you can use the initialize function to test the communication to the camera. When the automatic sample rate check box is still active, the PluIn retrieves the sample rate / frame rate setting of the camera. Which match quite close to the setting in the web interface.

▶ Access name   The access name cannot be directly obtained from the web in-
                              terface of the AXIS camera. To identify the correct access name,
                              you must consult the camera vendors user manual. In this exam-
                              ple the stream is defined as: axis-media/media.amp

▶ Port number   The port number was defined in the advanced settings of the web
                              interface of the AXIS camera 4.2.

▶ Transport protocol   The transport protocol can be selected UPD or TCP. The default
                              setting for RTSP protocols is the UPD protocol. However, the cor-
                              rect setting of the transport protocol is depending on the camera
                              vendor. In some cases both TCP or UPD work alike.

▶ App connection   This tab sheet is required to stream the data to IPEmotion ME
                              (app) application. See explanaition below.

(IPEmotion ME) App - Connection   [32_V]

The App connection tabsheet is only visible for IPEmotion RT loggers. Here you define the streaming
parameters to display the video image in the IPEmotion ME app. The connection string consists of the
mandatory port number (8081) as defined in the web interface of the advnced network settings and the
resolution and the frame rate (fps) which where also defined in the web interface of the camera.

5.3   Video channel data formats settings

Similar to the USB cameras you can define on channel level the data format. For IP cameras the following 3 data formats are supported.

- ► Motion

- ► Motion with live picture

- ► Image

The default setting is the Motion format. With the Motion (Motion with live picture) format the h264 stream is stored in the data file considers the GOP factor. The GOP factor (Group of Picture) was defined in the web interface of the camera and should match with the PlugIn settings. In this example the GOP factor was set 16. See chapter: 4.2
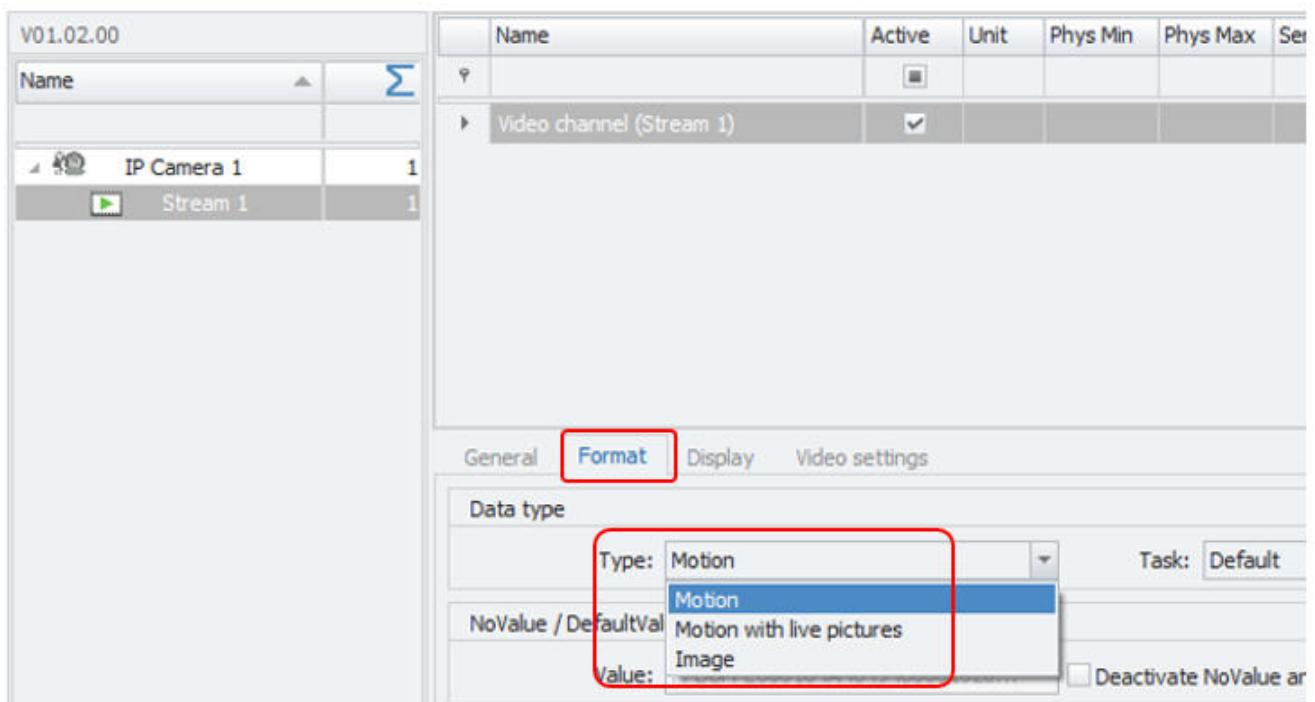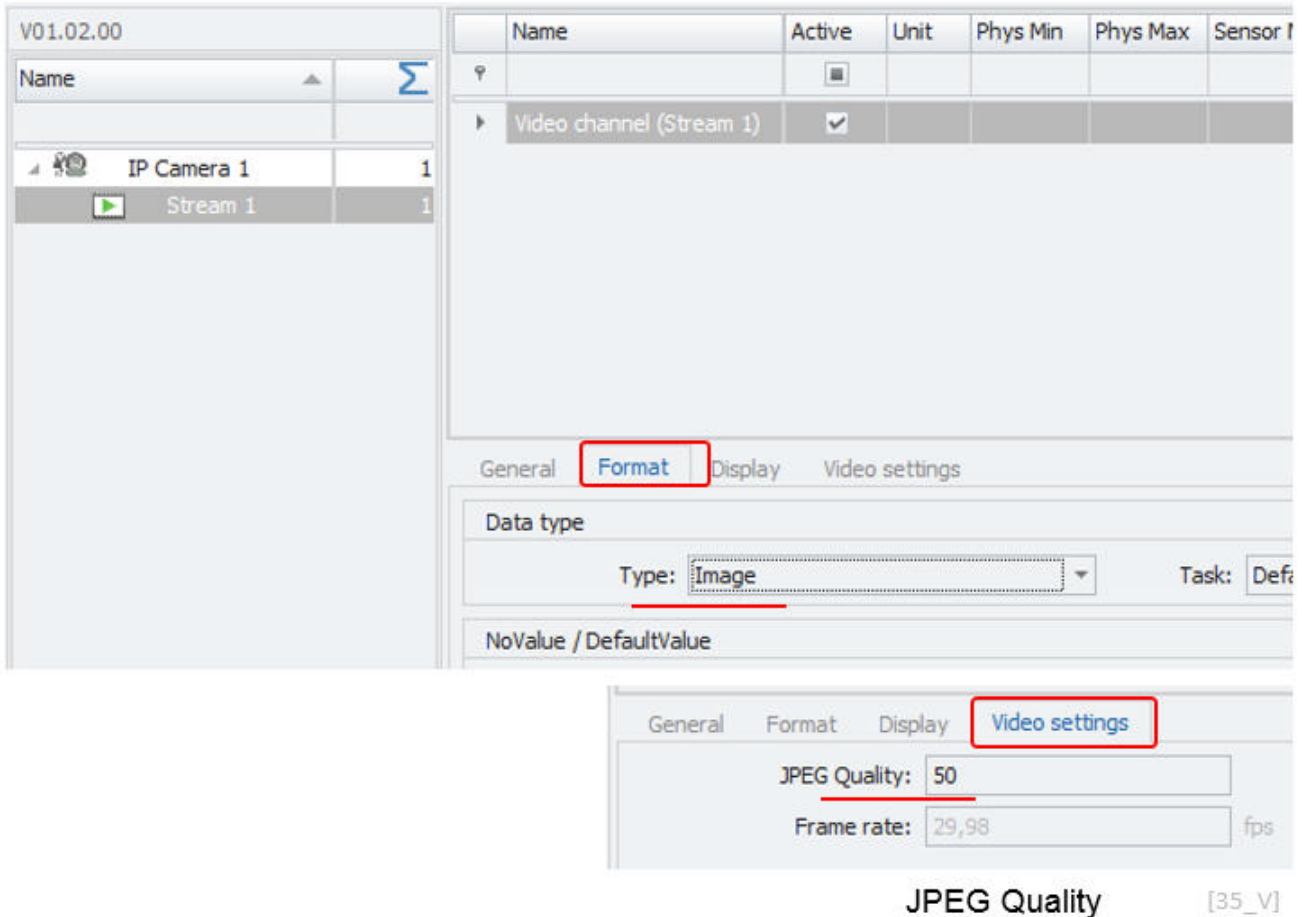

Data formats
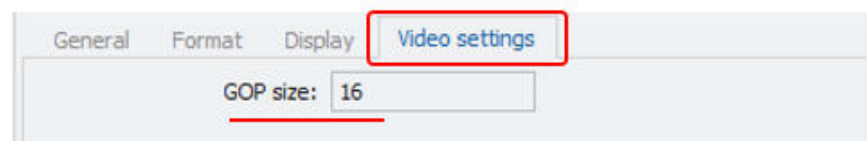
GOP factor for h264 streams [34_V]

When you select the Image format for the channel, you have in the video settings tab sheet a configuration function of the JPEG quality. The quality factor is ranging between 0 and 100 percent. High quality settings will lead to higher stored data volumes and better pictures in the video instrument. However, the picture quality can be influenced with the compression setting in the web interface of the camera too. Some test data file are presented in section 5.4.5

JPEG Quality   [35_V]

The Image data format is not supporting a GOP factor setting. The Image format requires more processing CPU resources because h264 stream from the IP camera in this case is transformed into MJPEG picture data stream for storage.

5.4   Video stream processing examples

Depending on the camera interface (USB / Ethernet) and the related drivers (WDM / Direct X) for USB cameras or protocols like RTSP (Real Time Streaming) for IP cameras different processing mechanisms can be applied. Not all drivers and data formats are compatible from all camera vendors. Therefor it is recommended to test the camera together with the video PlugIn before to purchase the product.

5.4.1   Image format

The Image format is taking incoming data streams and converting them to JPEG pictures. However, this format is consuming plenty of storage space.
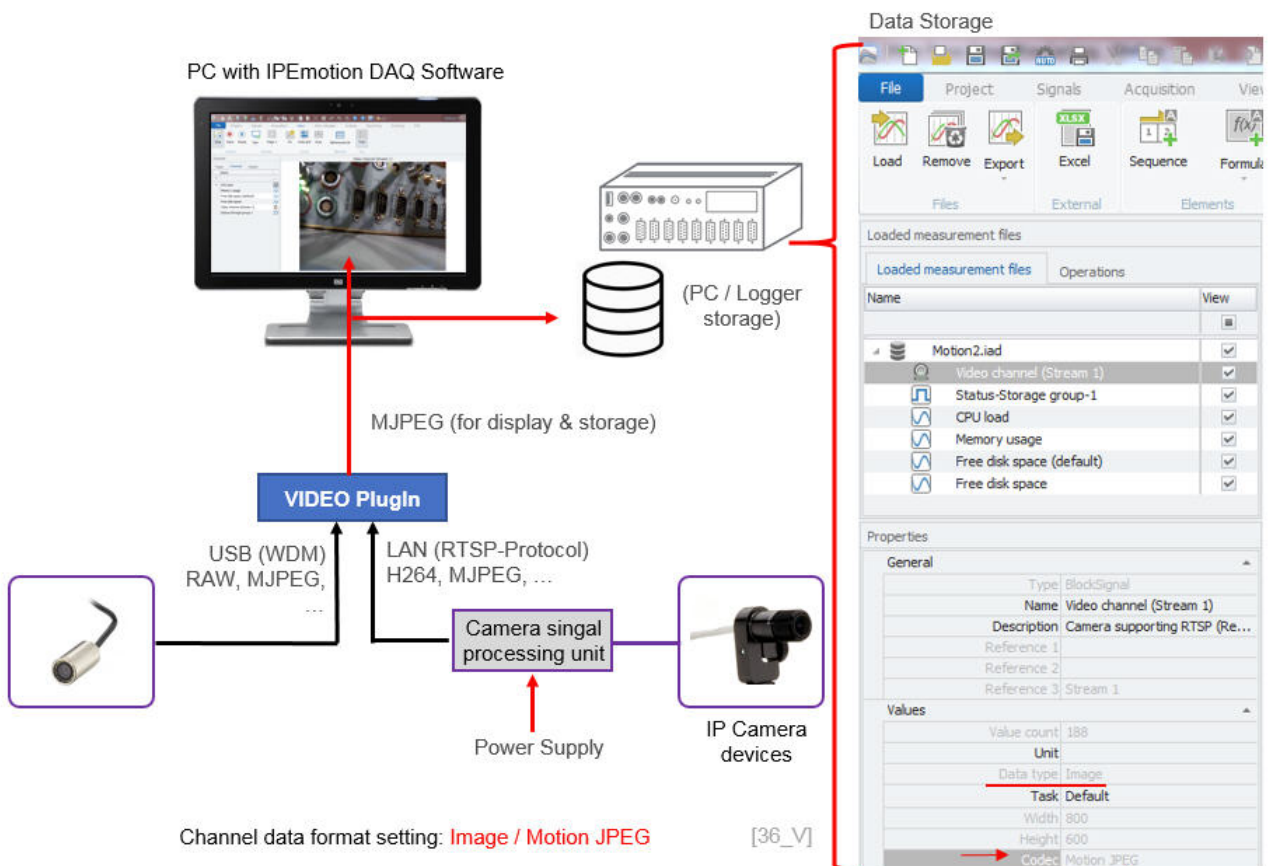
5.4.2   Motion format

The Motion format is basically routing the incoming data stream in the same format to the data storage. That means incoming h264 data streams are also stored in the format. An incoming MJPEG stream will be stoerd in the MJPEG format. However, the driver of the camera hardware and the PlugIn must be compatible. Not all cameras support the Motion format.
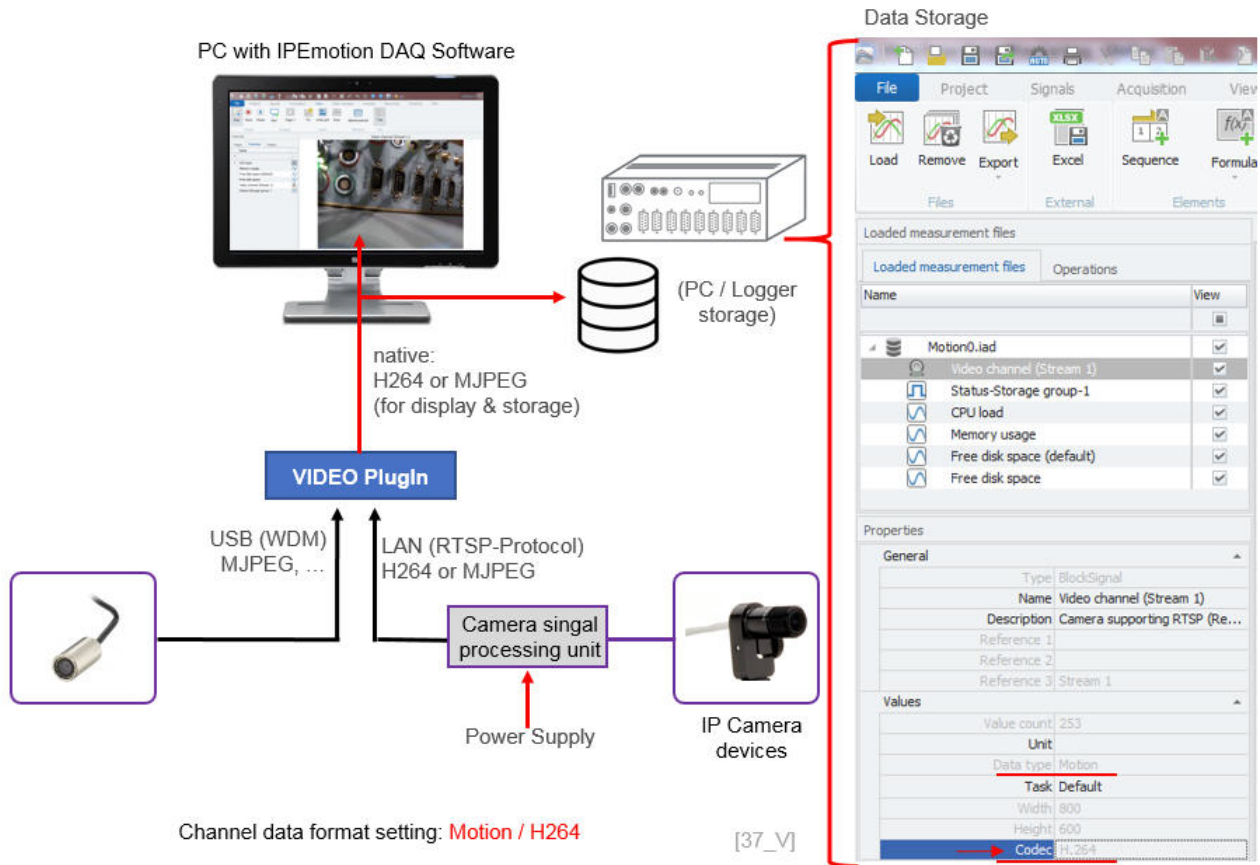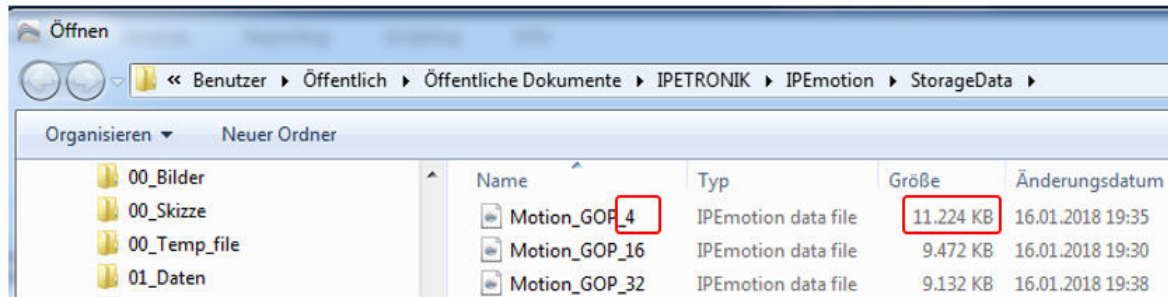
5.4.3   Motion with live picture format

This format is a derivate from the Motion format. The main difference is that the PlugIn is processing the incoming data stream to an additional MJPEG picture in order to have a good update rate of the online picture for the user. The Motion format supports for h264 streams the GOP factor. The GOP factor is a good setting to save storage capacity, but it is causing on the downside a delay in the online picture screen update.

Channel data format setting: Motion with live Picture   [38_V]
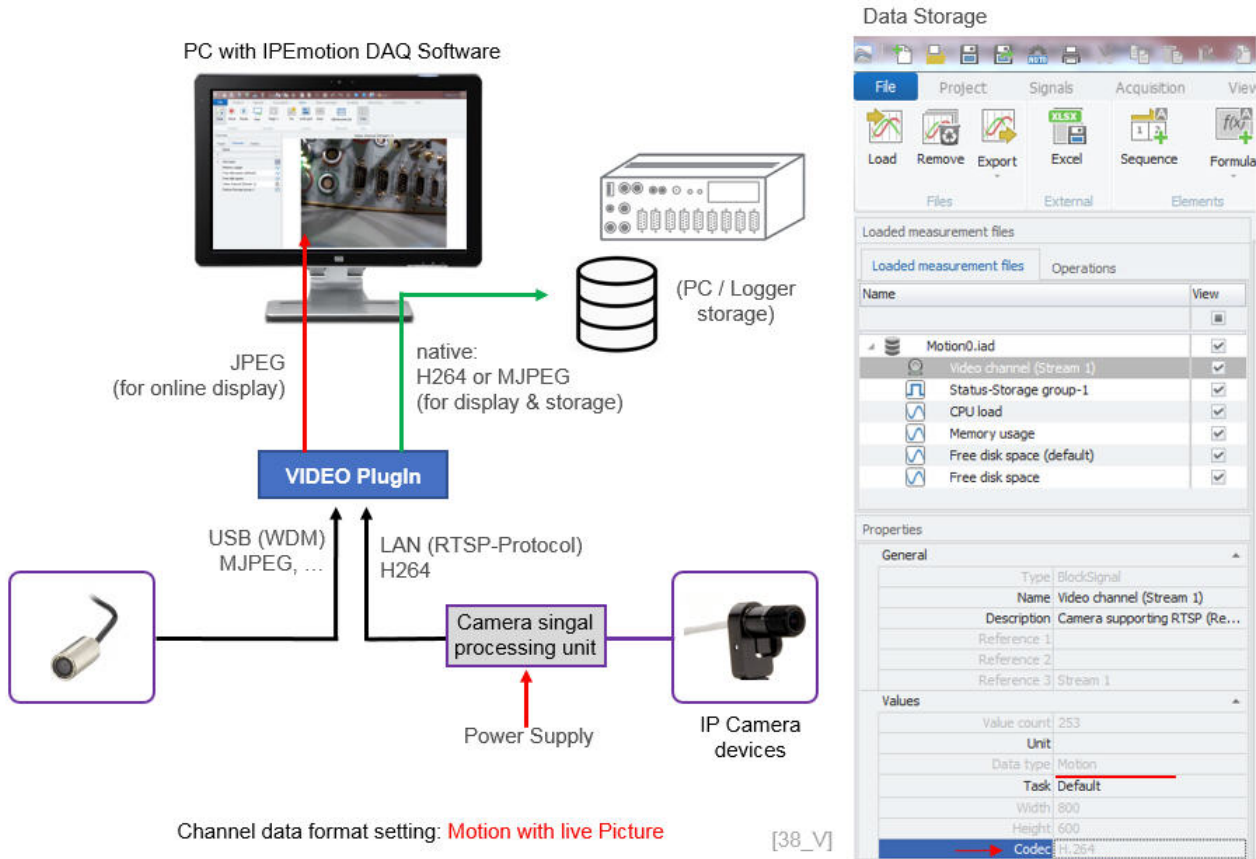
5.4.4 GOP factor

In the example below a data files was recorded for 30 second with the resolution of 800x 600 pixel. As you can see an increased GOP/GOV (Group of Picture) factor leads to smaller data files. However, when the GOP factor is getting larger than for example 32 the impact on the storage volume is not much lower compared to the factor 16.


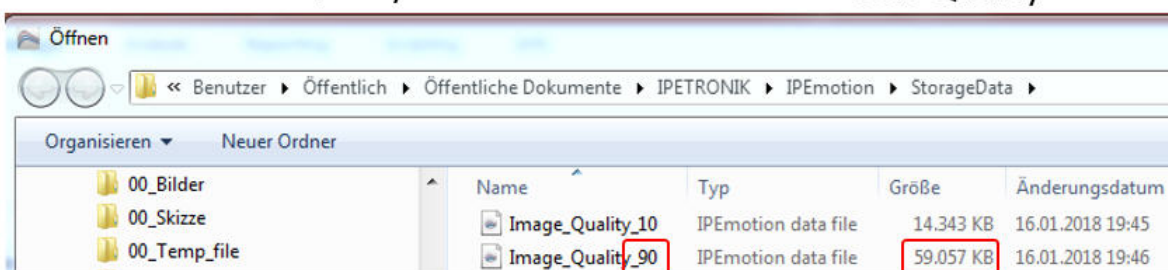GOP factor - impact to data file size   [39_V]

5.4.5 Quality factor

Another setting is the quality when you store the data in the Image (MJPEG format). In this case the h264 stream is converted to MJPEG pictures by the PlugIn and you can change the storage and online display quality. The data was stored again from a 800 x 600 pixel picture for 30 seconds duration. As you can see the quality has a significant impact on the storage volume.
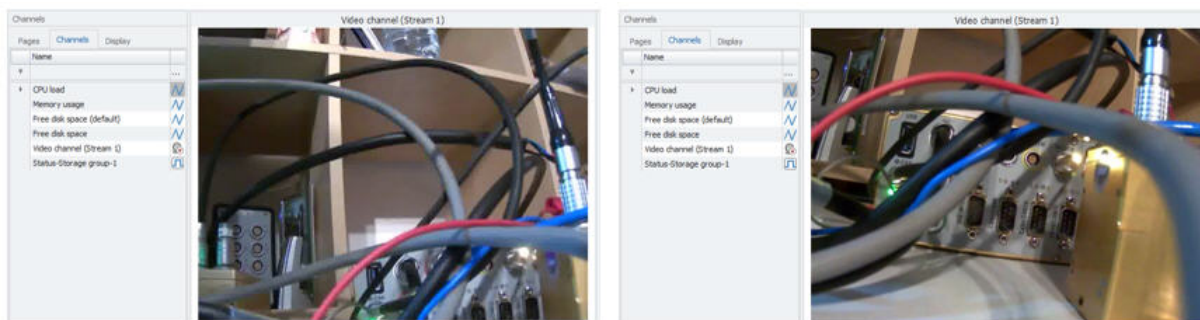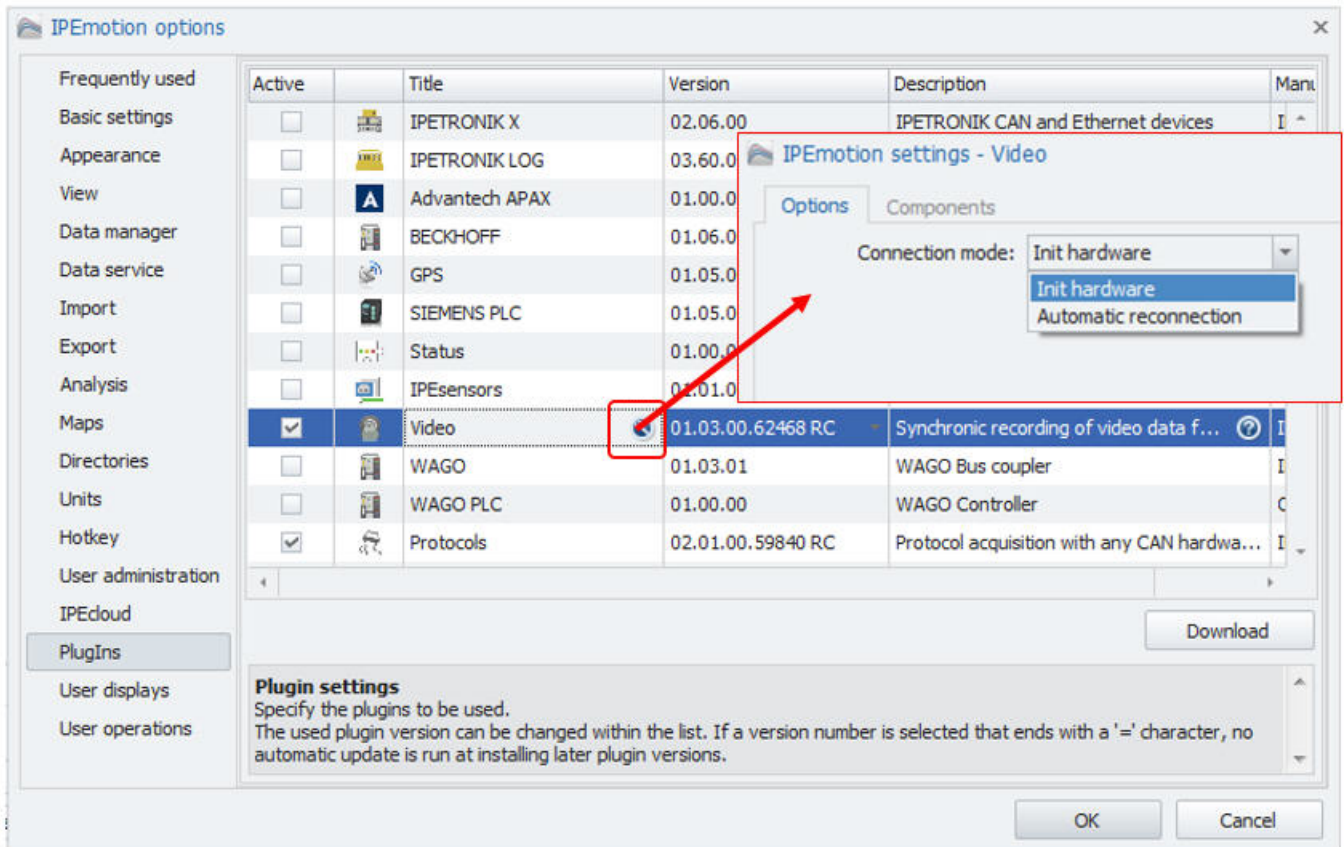

Quality – impact to data file size   [40_V]

6 PlugIn Options

6.1 Initializing setting Options

In the PlugIn options 2 initialization settings are supported.

[41_V]

▶ Init hardware

This is the default setting. With this setting the hardware is initialized before every measurement is started. This requires that al measurement systems are up and running which may can take some time especiall for cold starts of IP-camera systems.

▶ Automatic recognition

This setting is developed for IP-cameras. IP-cameras require on first time initializations longer time periods in order to boot the signal processing unit. With the automatic recognition setting, the measurement is started without causing any time delays for the other measurement PlugIns. However, when the video stream ist not available during measurement the data will be stored in the data file but not be displayed in the online VIEW video instrument. Another benefit of this function is that you can connect an a single IP-camera to a running measurement task provided and record data. This recognition setting requires at any case that the measurement configuration is configured with the suitable IP-camera connection parameters.

Author: FOT