MFR-HD User Manual

User Guide for the MFR-HD PTZ Camera

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Document History

Version	Date	Change Summary
v1.0	17/8/2017	Amphenol Connector Version
v1.1	6/2/2018	Fischer Connector & IP Encoding Version
v1.2	16/8/2018	Encoder Pages and Player Updates
v1.3	17/8/2018	Video Adjustment Section Added
v2.00	6/8/2020	Updates to support v4.0 firmware release
v2.01	24/11/2020	Input Video Resolution Switch Added
v2.02	09/12/2021	Environmental Update
v2.03	11/04/2022	Updates to support VISCA communications

Warranty and Support

All Visual Engineering products are supplied as standard with a 12 month 'Return to Base' warranty.

Please note: Any unauthorised product disassembly, modification or the removal of tamper proof labels will void the warranty.

In the event of a suspected product failure, users should contact the Visual Engineering support team on the telephone number +44 (0) 1206 211842 or please email us at:

support@visualengineering.co.uk

Should the fault persist or if the support team are unable to resolve the fault, it may be necessary to return the equipment.

Equipment should only be returned using the RMA (Returns Management Authorisation) process. Users should contact the support team on the above number and request an RMA number.

Introduction

The MFR-HD is a very rugged HD PTZ camera environmentally sealed to IP67.

The optical camera incorporates a Sony high definition block camera with a 30x optical zoom lens and a 63.7° wide angle of view. It is capable of video resolutions up to 1080/60p via a 3G HD-SDI connection.

There is also the option to have the video output as an ONVIF compliant IP video stream with frame rates up to 1080/30p. The web interface and configuration of the integrated IP video encoder is explained in the IP Encoder section of this user guide.

The camera has absolute position feedback and therefore has the ability to self correct its actual position if external forces act upon it.

It also offers eight user preset settings that can be saved allowing PTZ framing and camera racking profiles to be easily recalled.

Pan and tilt movement is driven by gearless stepper motors, reducing the operational noise to a minimum. Pan and tilt speeds are zoom factor corrected, giving fine control over the entire range of the lens with pan speeds up to 100° per second.

Remote control of the camera is through VISCA protocol over USB or a RS232/RS485 serial connection.

All power and signals to and from the camera is via a Fischer MiniMax connector.

The outer casing is manufactured from aluminium. All external mating surfaces are gasket sealed to maintain its IP67 rating.

MFR-HD Kit

The MFR-HD camera comes complete in a foam lined Peli flight case. In addition to the MFR-HD camera the kit also includes a power comms interface cable, a mains power adaptor and a USB memory stick. The kit contents are shown and listed below, along with the kit part numbers.

Part Description	
①	MFR-HD Camera
②	Power Comms Cable
③	AC/DC Power Supply with Adaptors
④	Software and Documentation

Part Numbers	
MFR-HD Camera Kit	110-3841
IP Encoded Option	110-4012

Connections

The MFR-HD kit includes a power comms break out cable, part number 110-3562.

The cable assembly connects to the Fischer MiniMax connector on the base of the camera.
All signals are then split out to their relevant connectors. The connections are described below.

Connector	Signal
Micro USB	Comms
EXT 232/485	RS232/485
DC Coax	Power
RJ45	*Ethernet

* Only active if the MFR-HD
  includes an IP encoder.

Connector	Signal
BNC	HD-SDI
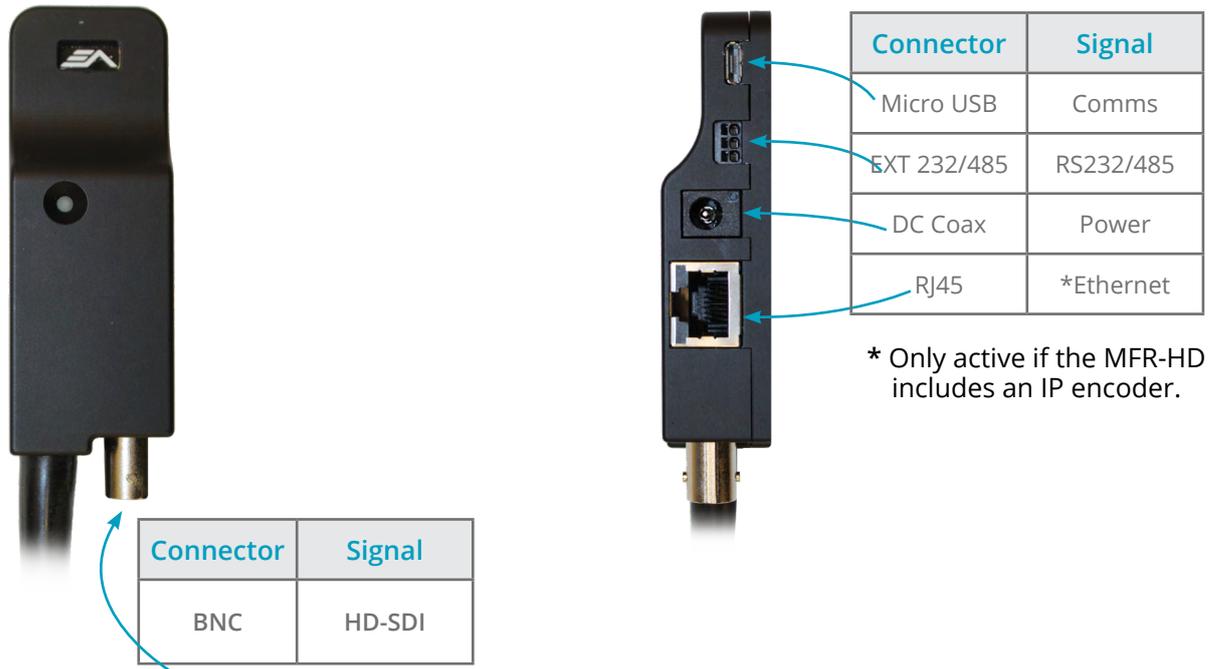
MFR-HD communications are supported via the micro USB and EXT 232/485 connectors.

The EXT 232/485 connector supports RS232 and RS485 comms, the pinout of the connector is described on the right.

EXT 232/485 Pinout	
RS232	RS485
RX (to cam)	B
TX (from cam)	A
GND	

Configuring the Camera

The MFR-HD can be configured for a specific user profile, to include; communication settings, motor control, and camera options. Once configured the camera will retain the settings.

The camera is configured using a menu structure on its control interface which is only accessible at power on. To access the control menu it is necessary to connect the camera to a serial comms software application, such as TeraTerm set to 9600 baud 8n1.

Boot Menu

- Connect the power comms cable to a USB port on a PC.
- Open the PC serial comms application
- Power on the camera, a > character will appear and shortly after a ! character.
- As soon as the ! appears type v e in quick succession.
- The Main Menu shown on the right will then be displayed.
- Select the required option.
- The function options are described in the following tables.
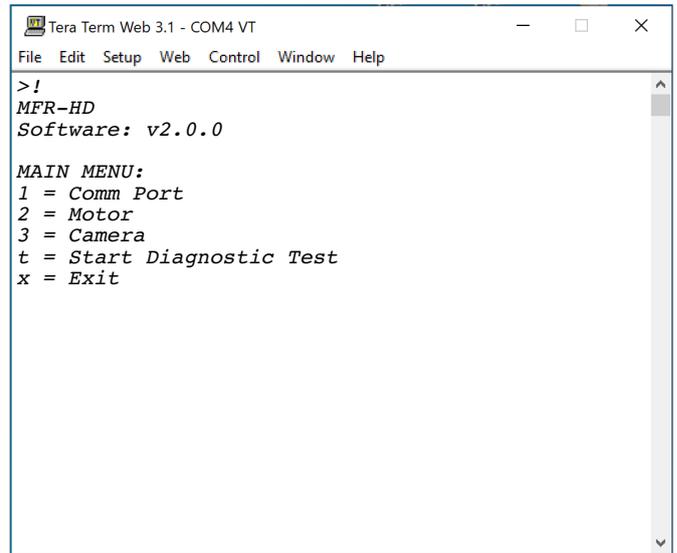
```
Tera Term Web 3.1 - COM4 VT              —    □    ×
File  Edit  Setup  Web  Control  Window  Help
>!
MFR-HD
Software: v2.0.0

MAIN MENU:
1 = Comm Port
2 = Motor
3 = Camera
t = Start Diagnostic Test
x = Exit
```

Comm Port Options

Comm Port Options		
Sub Menu	**Description**	**Options**
Mode	The serial comms standard	RS485, No Parity , RS232, No Parity, RS485, Odd Parity, RS232, Odd Parity RS485, Even Parity, RS232, Even Parity
Baud Rate	The serial comms baud rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
Protocol	The PTZ control protocol	Auto Detect, VISCA, PelcoD, PelcoP
Unit Address	The camera's unit address, this allows several cameras to be connected on the same comms bus	1, 2, 3, 4, 5, 6, 7

Motor Options

Motor Options		
Sub Menu	**Description**	**Options**
Auto Position Correction	Whether the camera automatically corrects its actual position if external forces act upon it	Disabled, Enabled
Stall Detection	Detects a stall in the motor drive	Disabled, Enabled
Motor Speed	The speed at which the motors are driven	High, Medium, Low
Hold Torque	The torque force which the camera uses to hold position	High, Medium, Low

Camera Options

Video Options		
Sub Menu	**Description**	**Options**
Output Mode	The output video format	PAL, NTSC, 720p/25, 720p/29.97, 720p/50, 720p/59.94, 1080i/50, 1080i/59.94, 1080p/25, 1080p/29.97, 1080p/50, 1080p/59.94
Digital Zoom	If disabled only optical zoom is allowed, applies only to the optical camera	Disabled, Enabled
On Screen Display	The OSD in the camera's video	Disabled, Enabled
Flip on Tilt	The video picture will automatically invert when the camera head it tilted over the top of its travel	Disabled, Enabled

Software Control

The camera's serial communication support VISCA protocol.

The user may choose to use a software controller of their choice or use the VE Camera Controller. This software application can be downloaded from the Visual Engineering website:

www.visualengineering.co.uk/supportdownload/9

The user should install the Software application on a PC. The screen below shows the software application.
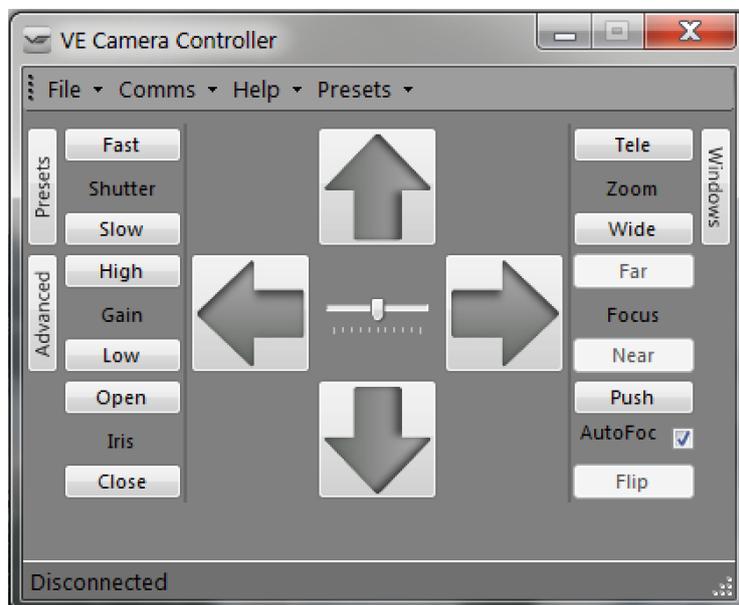
It is necessary to connect the camera to a USB port on the PC. The operating system of the computer will allocate this a COM port number. Once this connection has been made the user can go ahead and connect the application to the COM port. In the example below the port COM3 has been selected. Now select Connect.
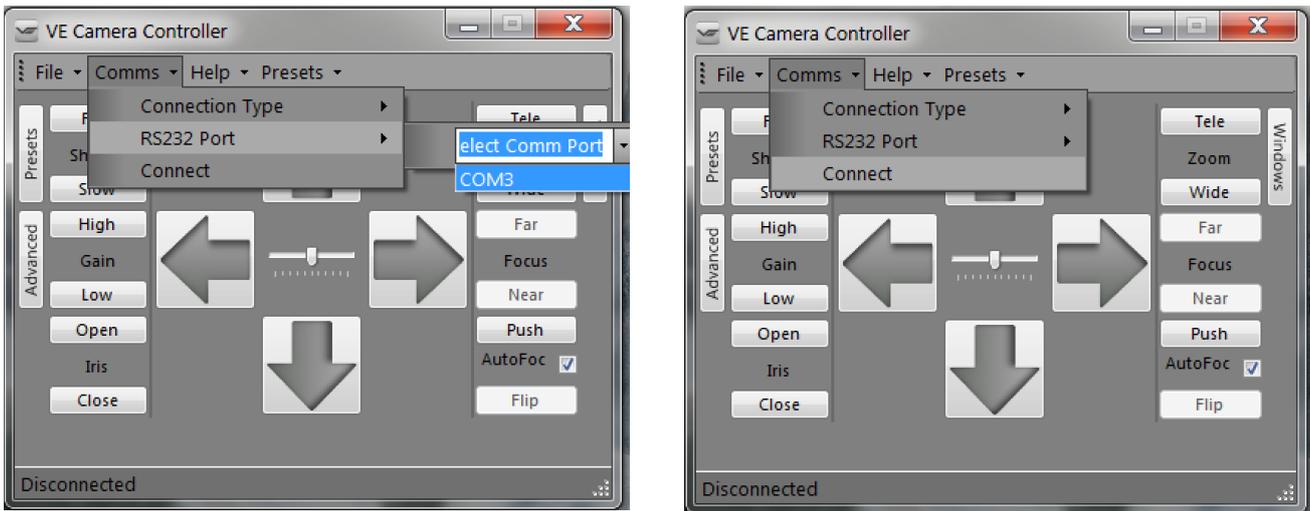
Once the software application is connected the functions of the software can be used. In the example below the pan right command has been selected. This will cause the camera to pan right. Similar commands for pan left, tilt up & down and zoom functions can also be sent using the intuitive software user interface.
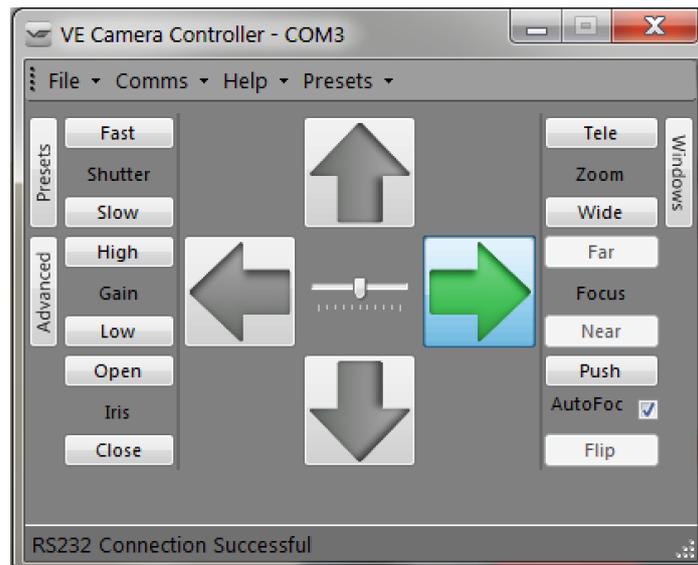
IP Encoder

If the MFR-HD camera has an IP encoder fitted it is possible to view the camera's video and configure the encoder's parameters over an IP connection to a PC.

The web browser control of the encoder's parameters allows the configuration of parameters such as resolution, bit rate, and network settings, once saved all configuration changes will be retained.

Connect a network cable between the RJ45 socket of the power comms lead and the controlling PC. Browse to the encoder's web page by typing the encoder's IP address into the web browser address bar.

Encoder Login

On trying to establish a connection the user will be prompted for the User Name and Password, enter the following details:

Default **User Name** is:
root

Default **Password** is:
1234
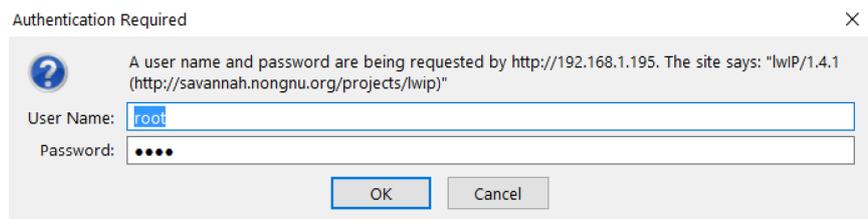
Default IP Address

The IP encoder is by default set with a fixed IP address of **192.168.1.195**

If the encoder is not responding on this address it is possible that the IP address has been changed.

If the new IP address is unknown, the user can use the VE Camera Viewer software application to locate the IP address. This method is explained in the VE Camera Viewer section.

Video Encoder Control

The mechanism for configuring the camera's H.264 encoder is its web interface.

The screen below shows what is to be expected once a valid connection between the PC and MFR-HD encoder has been established by typing the encoder's IP address into the web browser address bar. In this example it is using the IP address 192.168.1.195

On the left side of the screen are the Control Menus which allow the user to configure various encoder settings. The functions of these menus are described in the following sections.

The encoder's IP address is typed in here.
In this example the IP address is
192.168.1.195

Control Menus
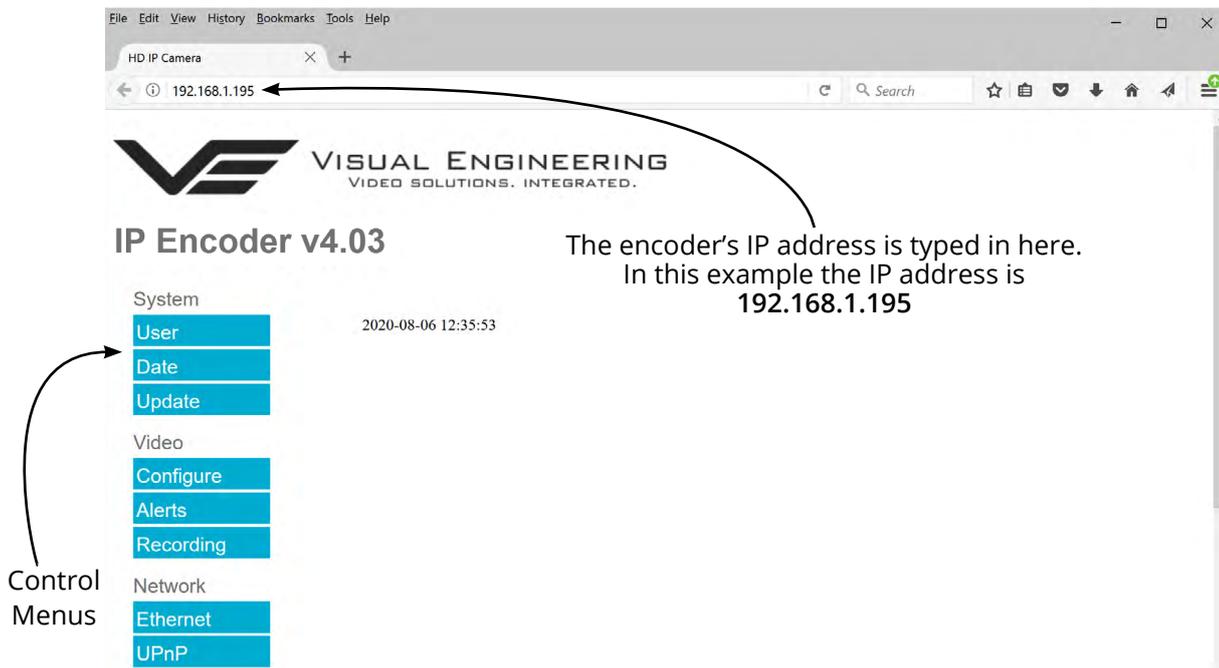
User Menu

The user menu page allows users to configure the user ID and password of the encoder. It is necessary to confirm the password to change it.

There is also the option to enable/disable the following:

- FTP Server Connection
- OSD Print (On Screen Display)
- Audio Out - audio is not normally included for MFR cameras

Changes are only enabled when the **submit** button is pressed.

Date Menu

The date menu page allows the user to synchronise the camera time to a SNTP server. In this instance it is necessary to have the PC connected to a network.

If a network connection is not available it is possible to synchronise the camera to the PC time by ticking the "Sync Camera to PC Time" check box and pressing the **submit** button.

The "UTC Offset" can be altered to align the camera time with the local time zone. To align the camera to the actual PC time the "UTC Offset" should be made same as the value displayed in the "PC UTC Offset" field.

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IP Encoder v4.03

System	Date	submit
User		
Date	SNTP Server	0.uk.pool.ntp.org
Update	Camera Time	2020-07-29 15:41:11
	PC Time	2020-07-29 15:41:12
Video	UpTime	18472 Days 13:41:12
Configure	UTC Offset	2
Alerts	PC UTC Offset	2
Recording	Sync Camera to PC Time	☐
Network		
Ethernet		
UPnP		

Tick this box and press **submit** to sync the encoder to the PC time

Update Menu

It is possible to update the firmware of the encoder. There are three steps to updating the firmware, as shown on the right.

⚠️ **Only update the encoder with files that have been approved by Visual Engineering. Use of other files will render the encoder inoperable.** ⚠️

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IP Encoder v4.03

3. Submit the file

System	Update	
User		
Date	Firmware Download	Browse... No file selected. Submit
Update		
Video		Restore Defaults
Configure		
Alerts		Reset
Recording		

1. Select the Update tab   2. Browse to the file

Following a **Submit** the encoder will update the firmware and display the following text:
Programming in Progress...Do not remove power
Wait until the web page clears this text before trying to move away from the current web page or powering off the camera. Updates typically take approx 3 minutes to complete.

⚠️ **Important**: To fully ensure the upgrade has finished it is advised to refresh the web page and check the banner displays "**IP Encoder v4.03**" or the camera starts to once again stream video before switching off the power.
It is advised that following a firmware update that the **Restore Defaults** button is pressed, this will revert the encoder back to a default start state. The IP address of the encoder will **revert** to its **default IP address** of **192.168.1.195** following a power cycle.

Pressing the **Reset** button will completely re-start the encoder.

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Video Configure

The Video Page is where the camera's encoder parameters can be configured.

Two encoding formats are supported, H.264 and MJPEG. The choice of the format is initiated by the user when the video stream is started.

To initiate an H.264 stream with an IP address of 192.168.1.195 the URL is:
rtsp://192.168.1.195/h264

To initiate an MJPEG stream with an IP address of 192.168.1.195 the URL is:
rtsp://192.168.1.195/jpeg

It is possible to change the Encoder Type to any one of the following options:

- HD IP Camera
- PAL Input
- NTSC Input
- Guardian Node
- SWZ HD Camera
- LVDS Input 25Hz
- LVDS Input 29.97Hz
- SDI Input 25Hz
- SDI Input 29.97Hz

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IP Encoder v4.03

System			
User			
Date	Video Configure		submit
Update	Source	LVDS	
Video	Resolution	1920 x 1080	
Configure	Max FPS	25 FPS	
Alerts	Encoder Type	LVDS Input 25Hz	

	RTSP Port	554	(1 to 65535)

Network

Ethernet	Input Resolution	◉ 1080p/25 ○ 720p/25	
UPnP	H.264 Resolution	1920 x 1080	
	H.264 Quality	30	(0 to 51)
	H.264 IDR Frame	25	(1 to 1800)
	H.264 FPS	25fps	
	Bitrate Control	◉ Constant Bitrate ○ Constant Quality	
	H.264 Bitrate	6Mbit/s	

M-JPEG Resolution	800 x 450		
M-JPEG Quality	30	(0 to 63)	
M-JPEG FPS	25fps		
Bitrate Control	◉ Constant Bitrate ○ Constant Quality		
M-JPEG Bitrate	6Mbit		

⚠ LVDS Input 25Hz and LVDS Input 29.97Hz are the only two valid Encoder Types for the MFR-HD Camera. ⚠

The frame rate frequency of 25Hz or 29.97Hz allows it to be matched to the regional mains frequency. The frame rate frequency must match what the MFR-HD camera module has been set to. This can be configured in the Output Mode in the [Camera Options](#) menu.

Changing the Encoder Type between LVDS Input 25Hz and LVDS Input 29,97Hz and pressing the **submit** button will display the message on the web page as shown here.

Once the message clears the encoder will be set to the new format.

Ensure the camera matches the Encoder Type.

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IP Encoder v4.03

System	
User	Changing encoder type...
Date	Ensure hardware matches!
Update	
Video	
Configure	

RTSP Port
The port number the IP video stream will be transmitted on, this has the default port number 554, which can be configured to another port number as required.

Input Resolution
The accepted video input frame rate can be adjusted to either 1080p or 720p to match the output of the camera module. The camera module can be configured in the Output Mode in the Camera Options menu.

The encoder has two fundamental modes of operation:

• **Constant Bitrate**. This will output a constant bit rate IP video stream, as set in the Bitrate field.
• **Constant Quality**. In this mode the bit rate is varied in a effort to maintain a constant quality. The target quality is set using a number between 0 to 51, the lower the number the higher the quality, this is set in the quality field. Amendments to this value are only allowed when the constant quality mode is enabled. In this mode the 'ceiling' bit rate is controlled by the value set in the Bitrate field, the encoder will attempt to limit the maximum bit rate to this value.

H.264 Resolution
The maximum resolution is 1920x1080, users can select lower resolutions if there is restricted bandwidth available.

H.264 FPS (frames Per Second)
The maximum frame rate is 25fps or 30fps, users may choose to select lower frame rates, thereby reducing the bandwidth required.

H.264 IDR Frame changes to the I frame interval balances the stream's quality against latency, the lower the number the lower the latency. Lower latency however can incur picture degradation due to the effect of limiting the decoder buffer.

Video Frame Preview

It is possible to view a single still image from the connected camera via a web browser using the following URL format:

http://192.168.1.195/still.jpg

The above URL is applicable when the encoder is set to its default IP address.

Example Settings

The bit rate of the IP stream can be adjusted to suit the system bandwidth available. Changes to the resolution and frame rate will adjust the stream's bit rate. The following table shows H.264 example bit rates for particular resolution and frame rate values.

Bit rate Available	Resolution	Frame Rate
5-10MB/s	1920x1080	30
4-5Mb/s	1920x1080	15
3-4Mb/s	1280x720	30
2-3Mb/s	800x450	30
1-2Mb/s	800x450	15
512kb/s-1Mb/s	640x360	15
256-512kb/s	320x180	15

Alert Control

Motion and light level triggers can be configured such that an audible tone and a visual alarm alerts the viewer.

These controls can also be set using the VE Camera Viewer

Motion and dark to light level triggers can be used to trigger an OSD (On Screen Display) event. For this to occur users should ensure that the OSD Print option in the User Menu is enabled.

The level of motion required to invoke a trigger can be set with the Trigger Sensitivity between: Off, Low, Mid or High.

The duration of the alarm event will be the duration of the motion event plus the time set in the Trigger Duration field, values from 0 to 100 seconds are valid.

Users should press the **submit** button to enable any changes.

Triggered OSD Alerts

Ethernet Menu

Network parameters can be set on the encoder by selecting the Ethernet menu.

The encoder can operate with a fixed IP address, or can be allocated an IP address from the network, these modes are controlled using the DHCP Enable/Disable button.

Users should press the **submit** button to enable any changes.

HTTP Ports

The default HTTP port and ONVIF HTTP port to control and configure the camera is 80.

Selecting one of the five options as shown in the drop down box on the right will set both the HTTP port and ONVIF HTTP port number.

Moving the encoder's HTTP port number should only be carried out by users confident of keeping a track on what settings have been applied.

Setting a new IP address and new HTTP port simultaneously should be avoided.

Users should press the **submit** button to enable any changes.

Once an encoder has been set to a new port or IP address the web browser will be automatically re-directed to the encoder's new URL.

In the example shown below the encoder has been set to an IP address of 192.168.1.195 and port 8080. This extended URL format should be used to address encoders reconfigured to a HTTP port number which is not the default number of 80.

Unreachable Cameras

If an encoder has been set to an unknown IP address it can be found by using the VE Camera Viewer this will find any encoder IP address regardless of the IP subnet.

If port number the encoder has been configured to is unknown run a VMS software tool such as the ONVIF Device Manager. More information on VMS tools can be found in the Video Management System section.
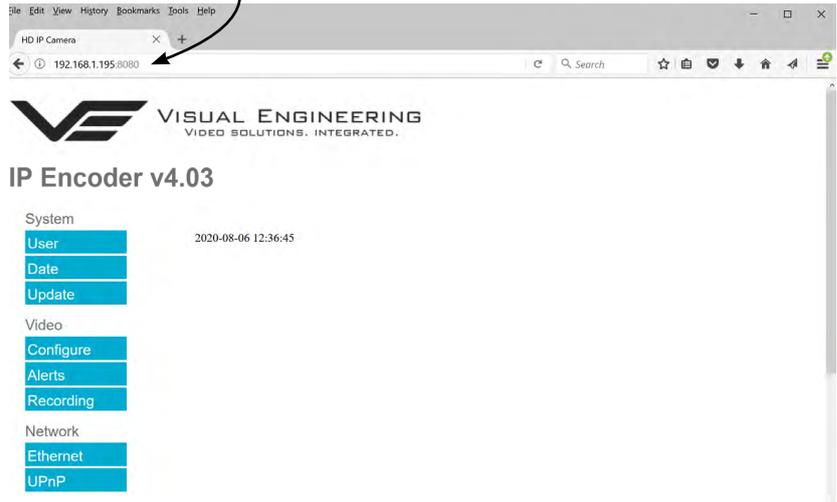
UPnP Menu

The Universal plug and play menu allows the user to set the Device ID and Camera Name.

Users should press the **submit** button to enable changes.
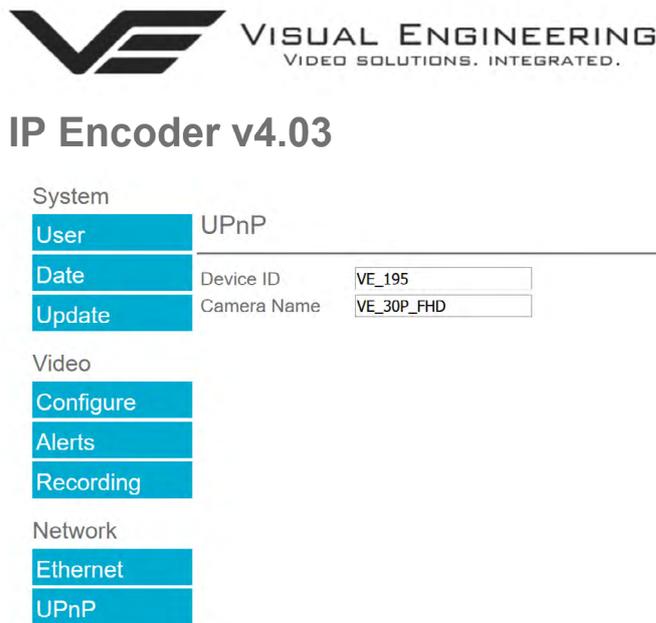
Recording Menu

Recording will only be available if the camera is fitted with the recording option.

The integral SD Card has a capacity of 32GBytes, this offers 17 hours of continuous recording at 4Mb/s, or 34 hours at 2Mb/s etc. If recording capacity is reached there is a user option to either stop recording or overwrite.

Timed Recording

There are 4 options for timed recordings, these are; Off, Continuous, Once and Daily.

Off = No recording takes place.

Continuous = Recording Continuously.

Once = Record once when the start time is reached and record for the set duration.

Daily = Record daily starting when the start time is reached and record for the set duration.

Trigger Recording

Trigger Recordings can be triggered by either motion or light level change. Trigger recordings are disabled by default, if enabled, a recording will be made. The duration of the recording will be the duration of the motion event plus the time set in the trigger duration.

SD Card Management

In the event of the SD card becoming full, there are two options for overwrite control. One option is to have the recordings stop when the SD card is full, or the other option is to have the oldest material to be overwritten when the SD card becomes full.

Users should press the **submit** button to enable changes.

Erase and Format

The SD card will be completely erased and formatted if the **Erase** button is used. The user will be asked to confirm that this is the intention before the SD card memory card is actually erased.

Recovering Recordings

Record Format

Recordings are stored on the SD Card as individual 10 second duration .avi files. This is for a frame rate of 30fps, lower frame rates will increase the length of the stored file proportionately. For example a frame rate of 15fps will create a 20 second video clip.

Video clip lengths are intentionally kept short, this allows integration with the VE Camera Viewer so that recent events can be played back with a low data upload overhead.

The file size is proportional to the total bit rate selected by the user.

The files follow the a naming convention of:

YYMMDDHHNNSS

For example a file with the name of: 170801134611 would have the meaning:

YY = Year is 2017
MM = Month is 08, August
DD = Date is 01, the 1st of the month
HH = Hour is 13, 24 hour format
NN = Minutes is 46
SS = Seconds is 11

Recordings are stored in directories for each individual hour, the directory has the form: YYMMDDHH
Since each file is a minimum of 10 seconds long there will only ever be a maximum of 360 files in each directory.

Recordings can be accessed and downloaded via FTP (File Transfer Protocol) using either the VE Camera Viewer or an FTP application such as FileZilla.

The VE Camera Viewer is available to download from the VE website at:
www.visualengineering.co.uk/supportdownload/26

FileZilla is a free application and can be downloaded from
http://sourceforge.net/projects/FileZilla/

When using FileZilla, downloaded recordings can be viewed in players such as VLC either individually by selecting Play stored File or in groups by creating a play list.

Using FileZilla

With FileZilla downloaded, installed and running it will appear as shown below.

Set the Host = Encoder default IP Address of **192.168.1.195** is shown here
Username = The encoder's default username is **root**
Password = The encoder's default password is **1234**

Then press 'Quickconnect'
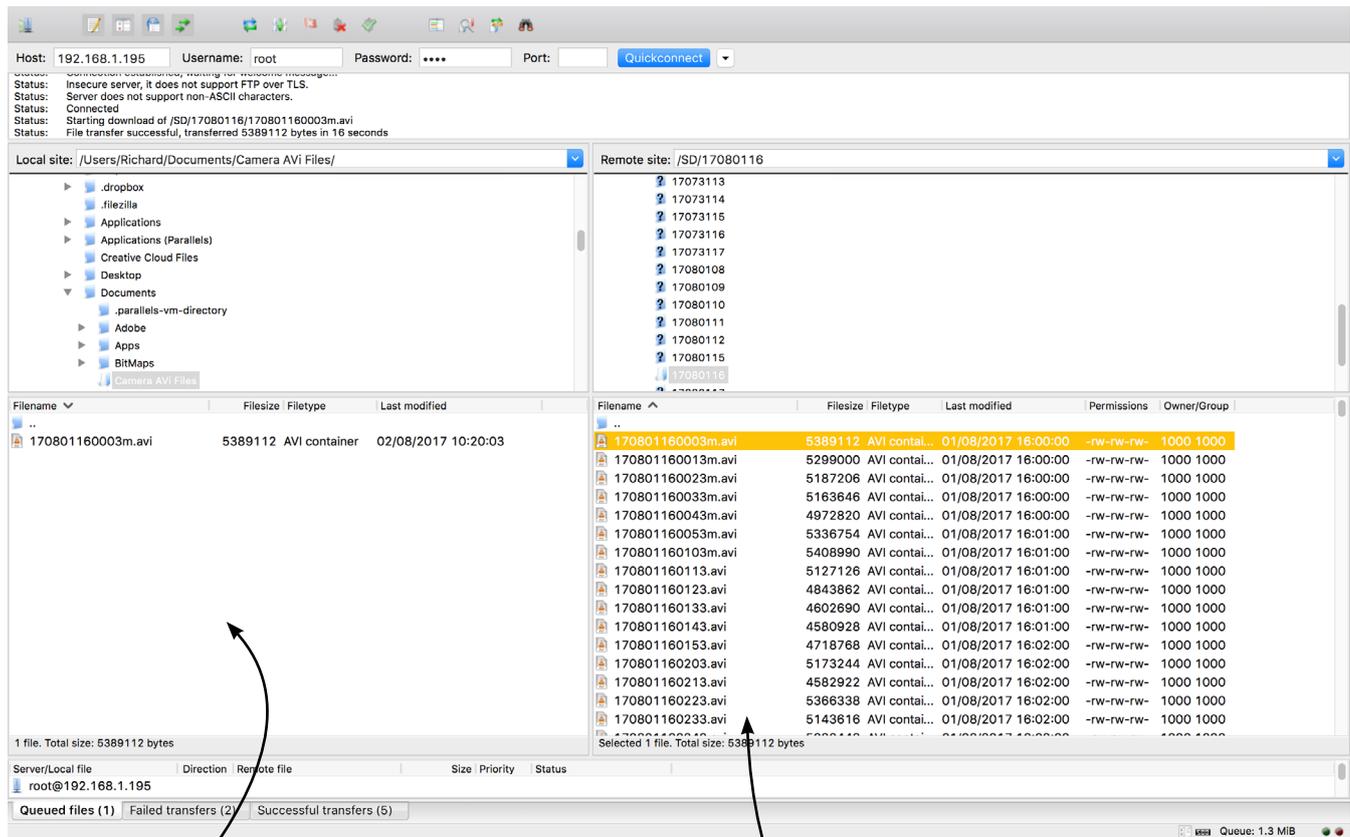
Files can be dragged across to the location selected on the local computer

File structure on the SD card of the encoder

Recordings on the encoder will be stored in the directory structure: SD/YYMMDDHH/ as shown above. Individual files can then be selected and downloaded or dragged across to the storage location selected on the local computer.

The VE Camera Viewer

The VE Camera Viewer is a software application used to display the video from all cameras in the system. It will auto detect any cameras and encoders that are on the network and populate a list on the left hand side of the player.

The VE Camera Viewer software can be downloaded from the VE website support page:

www.visualengineering.co.uk/supportdownload/26

Viewing Video

The VE Camera Viewer is intuitive and simple to use. Any camera on the network will be displayed in a list on the left hand side of the player. The video can be viewed by clicking the "Eye Icon" next to the camera's name. The video panel selector can be used to select how the video panels are arranged, this is useful when several video feeds are in the system.
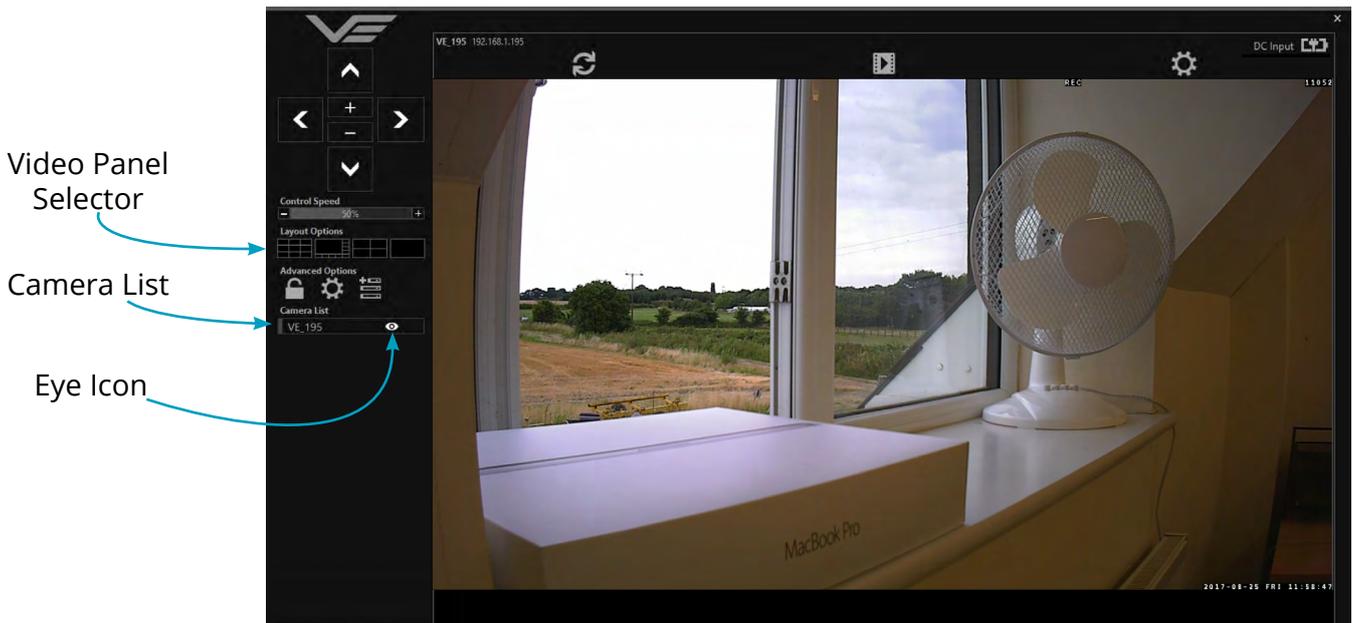
Video Panel Options

The top of the video panel displays information on the playback mode of the displayed video. In the above instance the video playback is a Live stream, it can also be noted that the camera is currently recording since the REC icon is shown in the OSD. Since this MFR-HD camera instance does not contain an integrated battery the power source will be displayed as a DC input.

If the mouse is hovered between the video panel and the above information the player will offer the user the three options, Refresh the video session, Play a Recording or edit the Settings.

Settings

- The MFR-HD encoder does not support the Flip Video or Mirror Video options
- The Motion Sensitivity can also be set to: Off, Low, Mid or High
- The Trigger Duration sets the alarm time (in secs) following the end of the triggered event
- Audio - not normally included in MFR cameras

Play Recordings

Recordings will only be available if the camera is fitted with the recording option.

If the Play Recording option is selected the player will allow the user to select a recording to playback.

The player will find all available files that are stored on the SD card in the camera. The update screen as shown on the right will be displayed until all files are discovered.
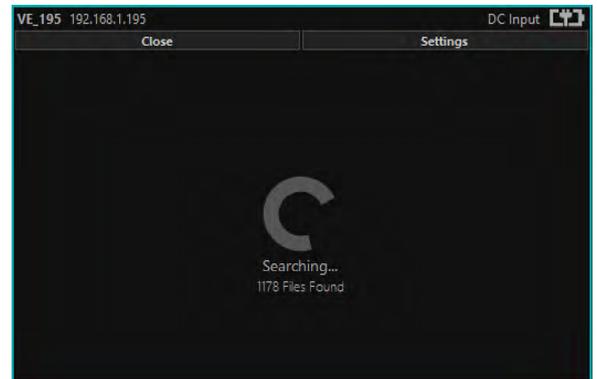
Users can then select a segment of recorded video to be played back from memory. Options are from 30 seconds to 10 minutes.

The full range of download periods is only available in advanced mode.

To access the advanced mode the user needs to hold keyboard keys "A", "D", and "V" then click on the padlock icon next to the Advanced User text.
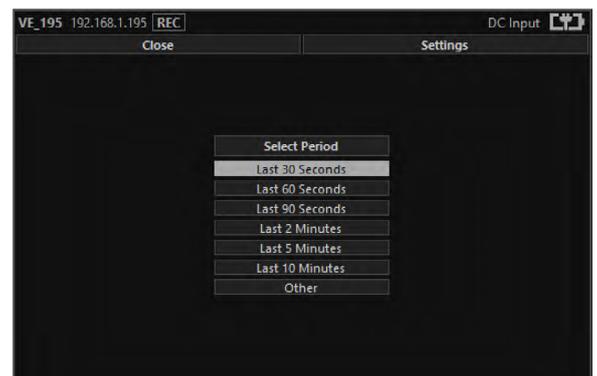
Select "Other" to choose a specific period
of timed recording.
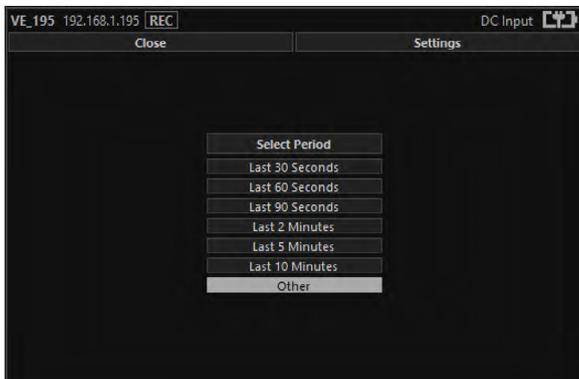
Select the required month, months that
don't hold recordings are greyed out.

Select the required date, days that don't
hold recordings are greyed out.
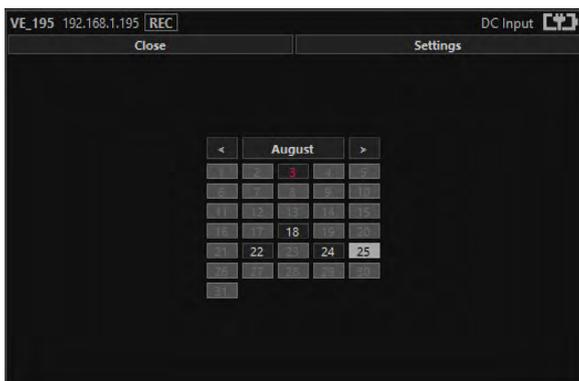
Select the required hour of day, hours
that don't hold recordings are greyed out.
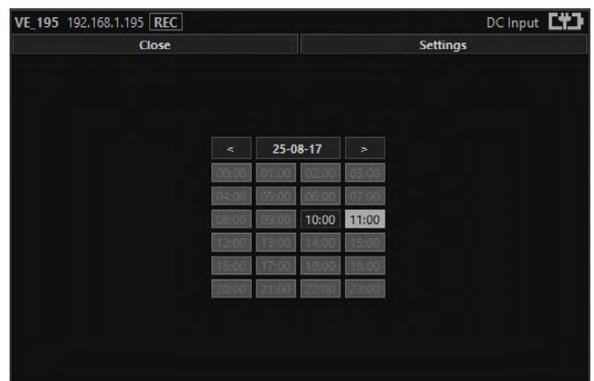
Select the required start and end time
from the time dial. Press the play icon.

The files will then be downloaded, after
which time the video recording will be
played out in the video panel.
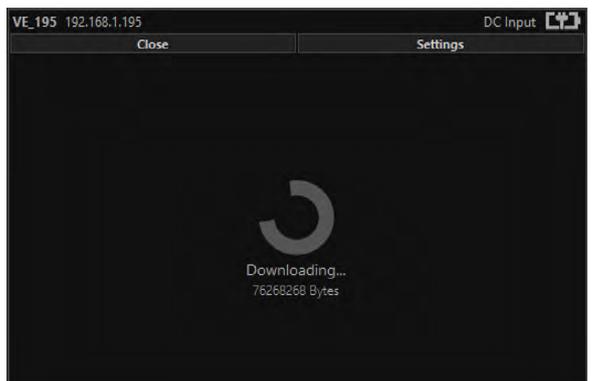
Video Panel Coloured Border

The video panel is edged in a colour, the meaning of which is described in the following table.

Video Panel Edge Colour	Meaning
Red	A trigger alarm has occurred
Blue	The panel has been selected for Pan Tilt Zoom Control
Grey	No trigger alarms & not selected for PTZ Control

Trigger Alarms

The trigger alarms are enabled either via the player or the web interface. Once a trigger event occurs it will be displayed and sounded in the player. The video panel will have a red edge border and an icon will be shown in the bottom left corner. The trigger icon is either a motion trigger or a low to high light level change as described in the table below.

Trigger Icon	Trigger Source
	A low light level to high light level transition has been detected.
	Motion has been detected in the video.

Pan, Tilt & Zoom Control

Select a camera from the Camera List, this will cause the selected camera description being edged in blue, as shown on the right. The video panel for the camera will also be edged in blue.

- Pan Control: left & right arrows
- Tilt Control: up & down arrows
- Zoom in: + symbol
- Zoom out: - symbol

Advanced User

To access the advanced mode, which allows full access to the stored recordings, the user needs to hold keyboard keys "A", "D", and "V" then click on the padlock icon next to the Advanced User text.
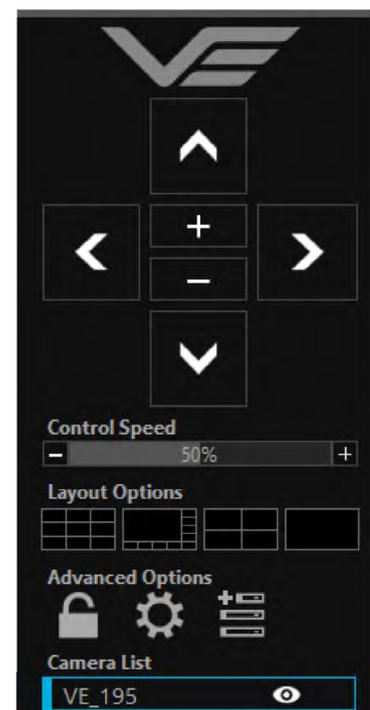
Selecting the centre settings icon allows access to several player settings including:

- Network Cache Size
- Encoder Type
- Internet Protocol
- Multicast

Increasing the Network Cache Size will cause the player to cache more data before streaming video. Decreasing this value will result in the latency of the video stream being reduced, values below 350mS are not recommended.

The MFR-HD Camera is capable of transmitting H.264 and MJPEG video streams, select the preferred stream to be viewed.

The video stream packets can be sent over TCP or UDP, select the preferred transport method. More information on this is described in the TCP Vs UDP section.

Select multicast on sends a request to the camera to send a multicast IP stream. Currently the MFR-HD does not support multicast streaming.
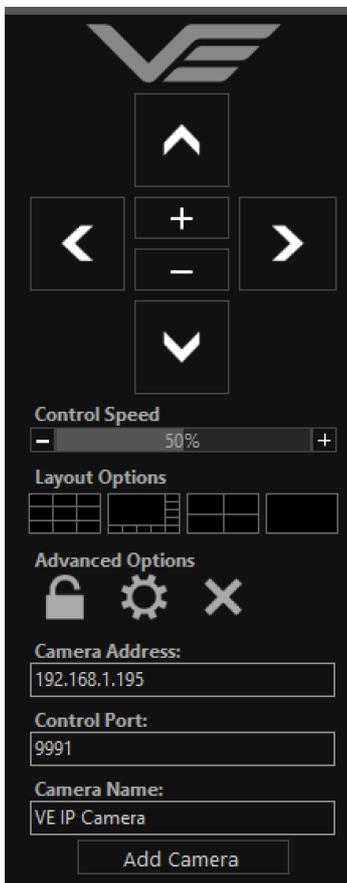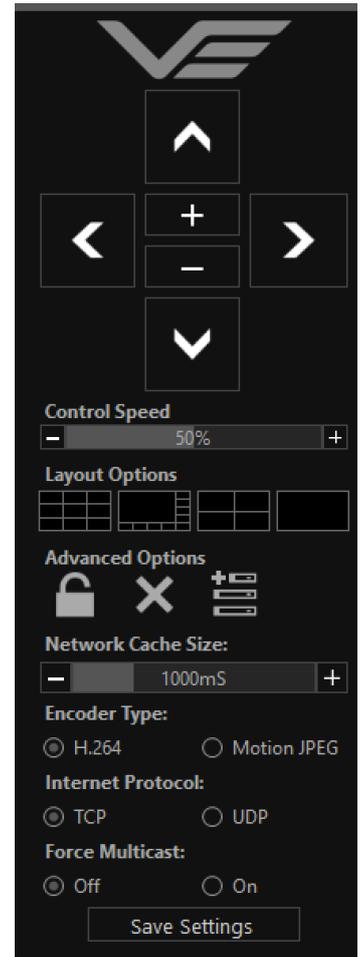
Selecting the right hand side icon allows the user to manually add a camera by IP address.

Adjustment to the TCP/IP control port and camera name settings can also be made.

Using VLC to Play Streams

The MFR-HD encoder is compatible with many IP video players, a simple freeware player is VLC Media Player. Users should download VLC Media Player and run the application.

VLC is a free media player and can be downloaded from:

http://www.videolan.org/vlc/index.en_GB.html

- Install the VLC Media Player application.
- From the Media menu select the 'Open Network Stream' as shown below.
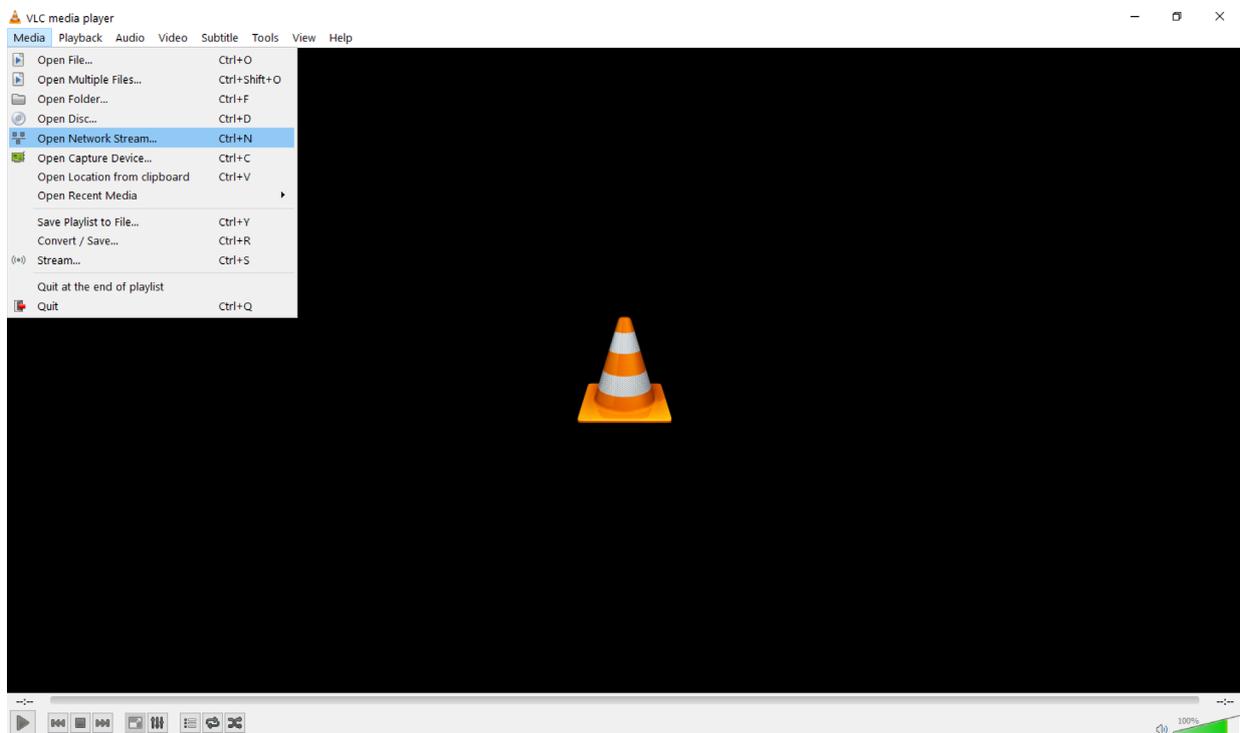
- Enter the camera's URL and stream type, eg: **rtsp://192.168.1.199/h264**
  The URL depends upon the IP address of the camera's encoder and the stream
  type, eg: h264 or jpeg.
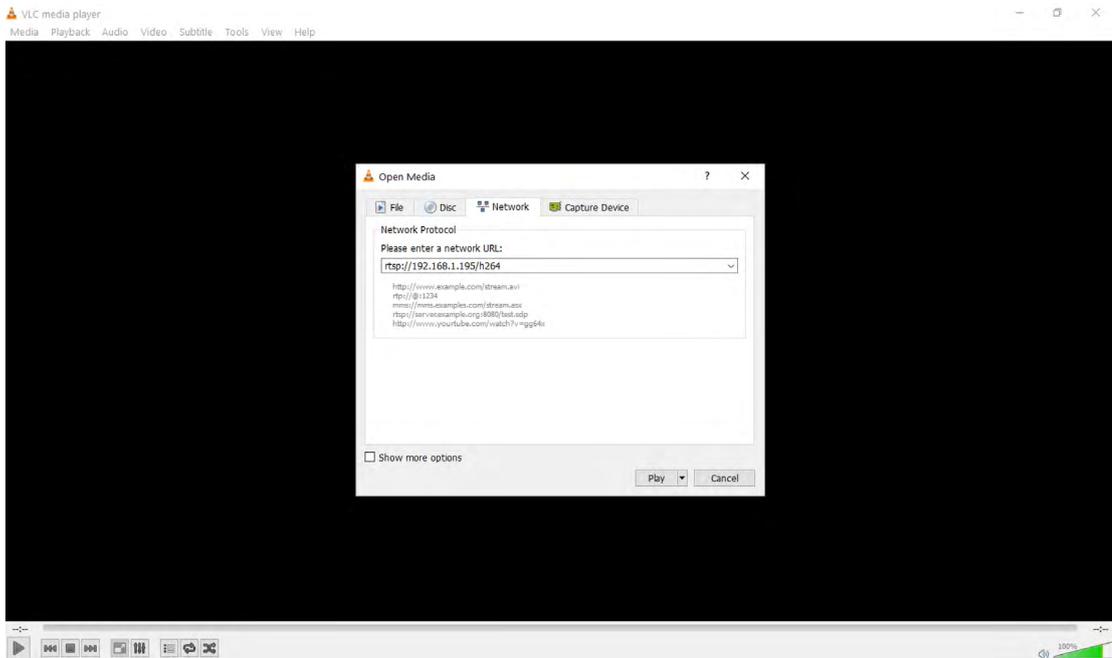
- Press play and the video stream will appear, as shown below.

Multiple Viewing

Multiple Viewers

It is possible to connect multiple instances of a video player to a single camera.

There is however a maximum limit at which the encoder bit rate can be set to whilst streaming video to multiple viewers using the unicast method of transmission. Bit rates set to a value greater than the allowed maximum value for a given number of clients will result in video breakup.

With the camera set to constant bit rate mode, the table below describes the maximum bit rate the camera can be set to for a given number of connected viewing clients using the unicast method of network transmission.

Client Count	Maximum Camera Bit rate
1	10Mb/sec
2	8Mb/sec
3	6Mb/sec
4	4Mb/sec

TCP Vs UDP

The camera is capable of transmitting a video stream over either UDP or TCP transmission protocols. The benefits of each protocol is particular to the specific deployment of the camera. In general terms UDP is a more efficient method which carries less overhead than TCP but lacks some reliability as not all video frames are required to be received in full.

For example, if the camera is used in a scenario where the video is being monitored in real time and the stream is being sent across an RF link that is susceptible to break up, UDP would be the best choice. The reason for this is that re-sending any missed video packets using the TCP method will result in out of date video frames being reconstructed, which will ultimately result in an increase to the video latency.

TCP/UDP in VLC
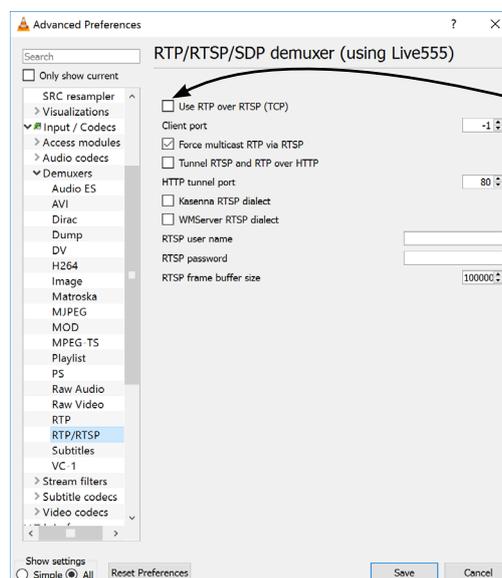
If this checkbox is ticked VLC will request that the camera sends video packets over TCP, otherwise it will request that the camera sends video packets over UDP.

ONVIF

Video Management Systems

The MFR-HD camera with an IP encoder fitted supports the ONVIF protocol such that it can be controlled and viewed on ONVIF compliant VMS platforms such as ONVIF Device Manager, Milestone and Airship.

ONVIF Device Manager is available as a free download available here:

https://sourceforge.net/projects/onvifdm/

The software will locate IP encoders on the network. Click the Network settings tab to display the port that the encoder is configured to. In the example shown below the port has been set to 8080, therefore the camera's URL is 192.168.1.195:8080
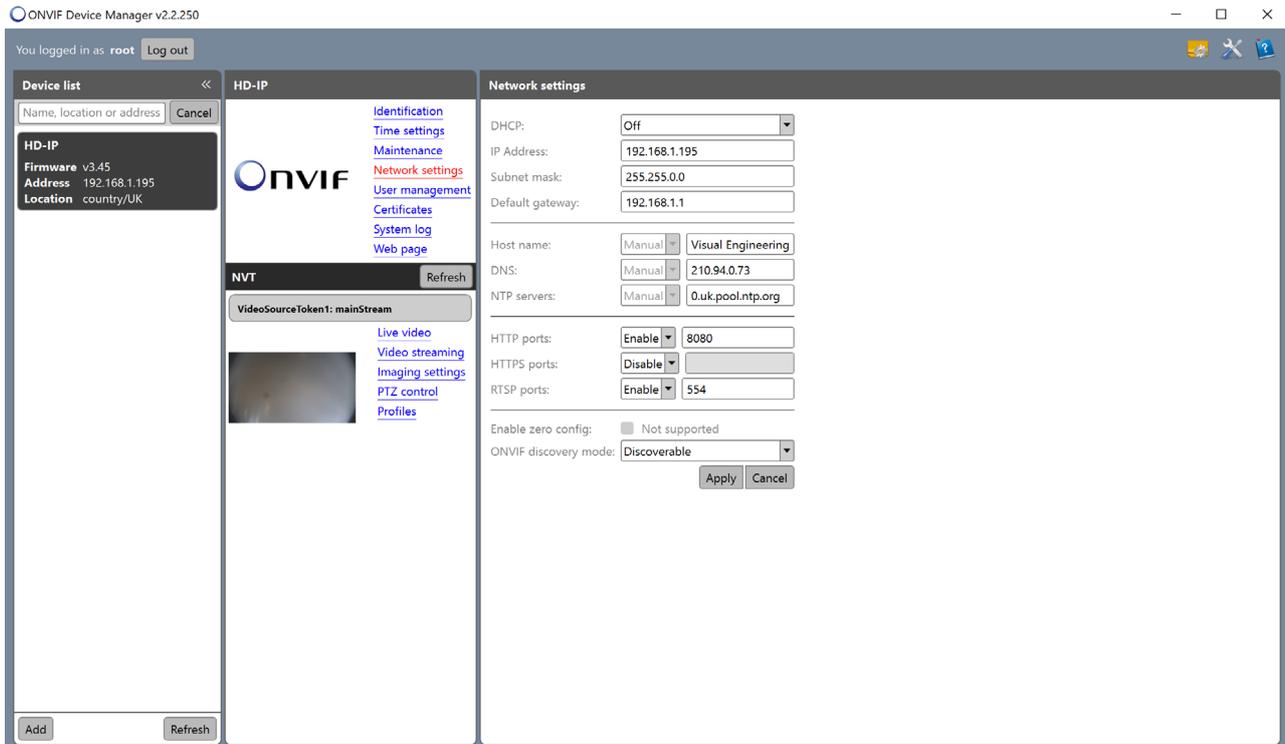
If the controlling PC and the encoder are on separate IP subnets and the encoder's IP address is unknown run the VE Camera Viewer application, which will find the IP address of the encoder.

Control Across The Internet

Port Forwarding

If the camera has an IP encoder included it is possible to control the MFR-HD and view its video remotely through an internet connection. One way of achieving this is through port forwarding on a router that is connected to the internet and also connected to the MFR-HD camera.

As many internet enabled routers are capable of providing this gateway, the settings and control interface will differ dependant on manufacturer and model.

The example below shows a router's NAT/PAT (Network Address Translation/Port Address Translation) configured to forward port 8080 (the HTTP port) and port 554 (the RTSP port) of an encoder which has an IP address of 192.168.1.194

Both of these ports can be configured in the camera's encoder through the following web pages:

- The HTTP port can be configured in the Ethernet Menu
- The RTSP port can be configured in the Video Menu

NAT/PAT settings

these rules are needed to authorise a remote communication from Internet to reach a specific device of your LAN. you can also define the ports(s) that this communication will use.

NB: following rules are only applied with IPv4.

⚠ warning : make sure you have not filtered these ports in the firewall.

customize rules

application / service	internal port	external port	protocol	device	activate	
Camera H	8080	8080	TCP	192.168.1.194		save
HD IP Camera	554	554	both	192.168.1.194	☑	delete
Camera HTTP	8080	8080	TCP	192.168.1.194	☑	delete

Remote Configuration

Internet access to the encoder's web pages can be addressed by using the gateway IP address of the router along with the HTTP camera port that has been forwarded.
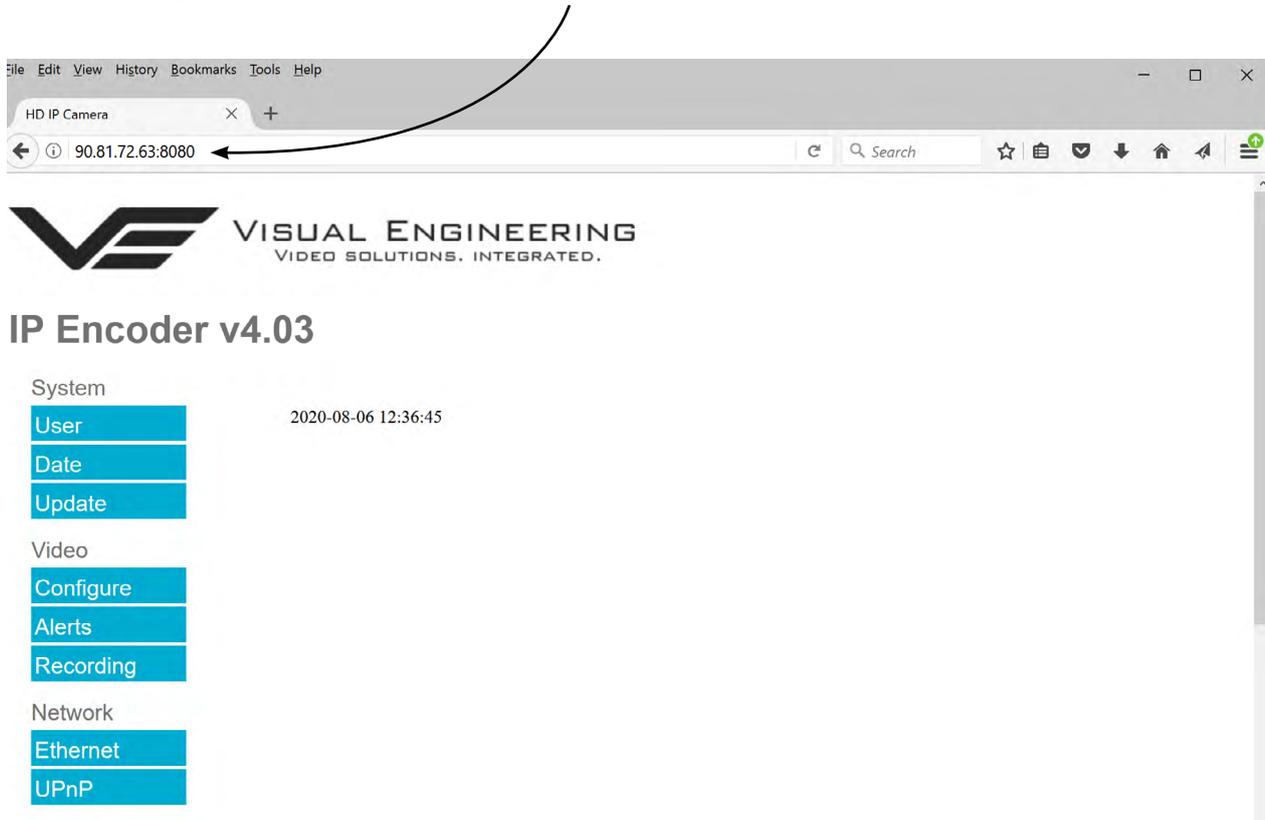
Remote Video Streaming

To stream the camera's video across the internet a URL similar to the one described below should be used.

rtsp://90.81.72.63:554/h264

In the above URL example the internet router's gateway IP address (90.81.72.63) and the camera's RTSP port (554) should be substituted where relevant.

Ensure that the video bit rate of the camera is matched to the available connection capacity.

Camera Communications

Since the MFR-HD incorporates a Sony optical camera the adopted control protocol is Sony VISCA. This standard is used to communicate with the Sony camera and for PTZ control.

The VISCA command list is used for Sony camera communications which are detailed in the standard VISCA commands document, available here:

https://www.visualengineering.co.uk/supportdownload/57

Additional Commands

Additional commands adopting the VISCA protocol format have been developed by Visual Engineering for use with the MFR-HD camera, as described in the following tables.

Additional Commands			
Cmd Set	**Command**	**Command Packet**	**Comments**
PAN TILT DRIVE	Move	8x 01 06 01 <aa> <bb> <cc> <dd> FF	<aa> = Pan Speed (0x01-0x18)
			<bb> = Tilt Speed (0x01-0x14)
			<cc> = Pan Direction (0x01 = Left, 0x02 = Right, 0x03 = Stop)
			<dd> = Tilt Direction (0x01 = Up, 0x02 = Down, 0x03 = Stop)
	Absolute Position	8x 01 06 02 00 00 0p 0p 0p 0p 0t 0t 0t 0t FF	<pppp> = Pan Position <tttt> = Tilt Position The value sent is a 16-bit signed integer calculated as below where <x> is equal to the required angle (-180° to +180°) Value = x*20
	Slew To Cue	8x 01 06 04 00 00 0x 0x 0y 0y FF	<xx> = Percent Of HFOV <yy> = Percent Of VFOV

Additional Inquiry/Command With Response Data				
Cmd Set	Command	Command Packet	Response Packet	Comments
UNIT TYPE	Unit Type	8x 01 04 24 92 00 01 FF	Y0 51 24 92 <aa> FF	<aa> = Unit Type 0x11 = MFR-HD 0x12 = MFR-DB 0x13 = MFR-TI
PAN TILT DRIVE	Absolute Position	8x 09 06 12 FF	y0 50 0p 0p 0p 0p 0t 0t 0t 0t FF	<pppp> = Pan Position <tttt> = Tilt Position The value returned is a 16-bit signed integer, the actual angle can be calculated as below where <x> is equal to the value returned. Angle = x/20

Command Packet

The Command Packet invokes a Response Acknowledge followed by a Response Packet, as described below. The following example describes a UNIT TYPE request for a MFR-HD camera

8[x]	0x01	0x04	0x24	0x92	0x00	0x01	0xFF

[x] The Unit Address, which can be set in the Comm Port Options in the boot menu.

Response Acknowledge

[y]0	0x41	0xFF

Response Packet

[y]0	0x51	0x24	0x92	0x11	0xFF

[y] The Unit Address+8.

Video Adjustment

Certain video parameters of the MFR-HD camera can be adjusted by sending a serial data packet to the camera, the format of the data is based on the PelcoD protocol.

Connect a serial comms client, such as TeraTerm set to 9600 baud 8n1 to the RS232 comms port of the camera and build a PelcoD packet as described.

If the camera is fitted with an IP Encoder it is also possible to send the packet across a TCP/IP connection.

The PelcoD 'Go To Preset' message type is used for controlling the parameters, the format of the packet is as follows:

Synch Byte	Address	Command 1	Command 2	Data 1	Data 2	CheckSum
0xFF	0x01	0x00	0x07	0x00	0xnn	0xnn

All values shown are hexadecimal (base 16).

The CheckSum is the 8 bit (modulo 256) sum of the bytes from the Address byte up to and including the Data 2 byte.

The 0xnn value in the Data 2 byte defines the camera controlling parameter. All supported parameters are listed in the table on the next page.

Data 2 Value	Parameter	Control
0x15	ICR	ON/OFF (manual only)
0x16	ICR	Auto/Manual
0x17	Wide Dynamic Range	ON/OFF
0x18	Back Light Compensation	ON/OFF
0x19	Image Flip	ON/OFF
0x1A	Digital Noise Reduction	OFF then 1-5 steps
0x1B	Image Freeze	ON/OFF
0x1C	Digital Zoom	ON/OFF
0x1D	Auto Exposure	Full Auto
0x1E	Auto Exposure	Manual
0x1F	Auto Exposure	Shutter Priority
0x20	Auto Exposure	Iris Priority
0x21	Auto Exposure	Bright
0x22	Slow Shutter	Auto/Manual
0x23	Shutter Speed	Reset *
0x24	Shutter Speed	Increase *
0x25	Shutter Speed	Decrease *
0x26	Iris	Reset *
0x27	Iris	Increase *
0x28	Iris	Decrease *
0x29	Gain	Reset *
0x2A	Gain	Increase *
0x2B	Gain	Decrease *
0x2C	Bright	Reset -only in AE Bright mode
0x2D	Bright	Increase-only in AE Bright mode
0x2E	Bright	Decrease-only in AE Bright mode
0x30	On Screen Display	ON
0x31	On Screen Display	OFF
0x3C	Image Stabilisation	ON
0x3D	Image Stabilisation	OFF

* Does not work in AE full auto

Specifications

Specifications			
Optical Sensor	1/2.8" Type CMOS	**Control Protocol**	VISCA
Optical Sensitivity	<0.05 Lux, ICR On	**Serial Comms**	USB, RS232/485
Optical Resolution	1920 x 1080 Pixel	**Pan & Tilt Range**	360° Pan , 240° Tilt
Optical SNR	>50dB	**Lens Drive**	Silent Stepper
Optical Field of View	63.7°	**Pan & Tilt Drive**	Low Noise Stepper
Optical Zoom	30x	**Connector**	Fischer MiniMax
Streaming Protocol	RTSP over TCP or UDP	**Power Requirement**	9-18V DC, 11.5W
Video Encoding	H.264	**Environmental**	IP67
Max Bit Rate	10Mb/s	**Weight**	1.5kg
Optional Storage	32GB micro SD Card	**Dimensions**	ø 115 x 182.4mm
User Presets	8	**Casing**	Aluminium

Dimensions

Overall Dimensions

182.4

ø 115
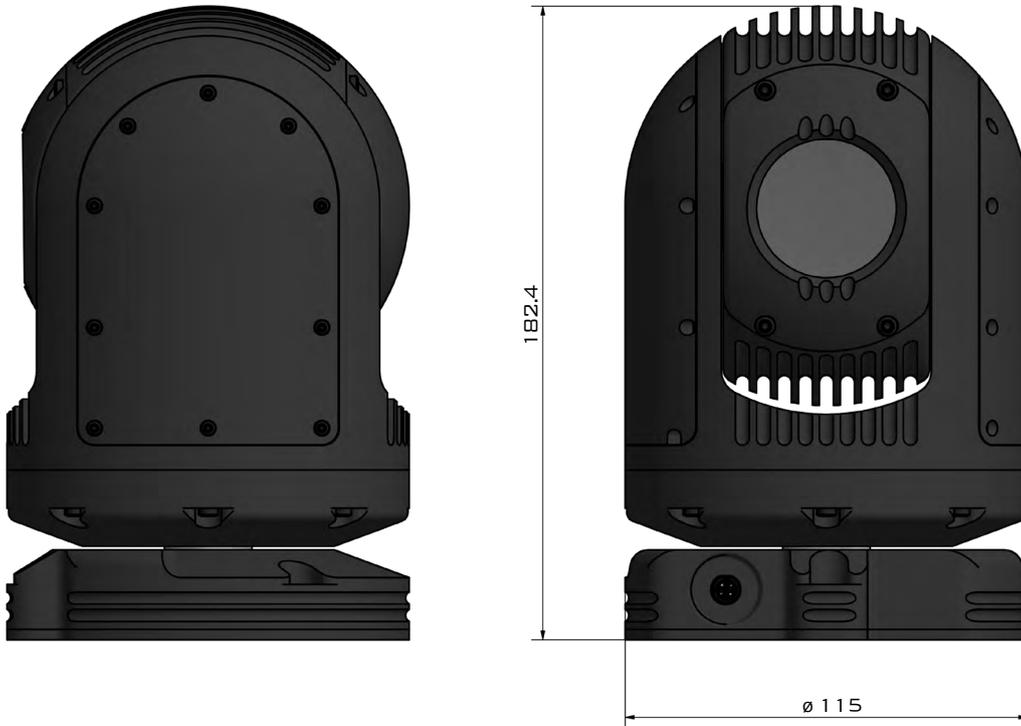
Base Plate Hole Centres
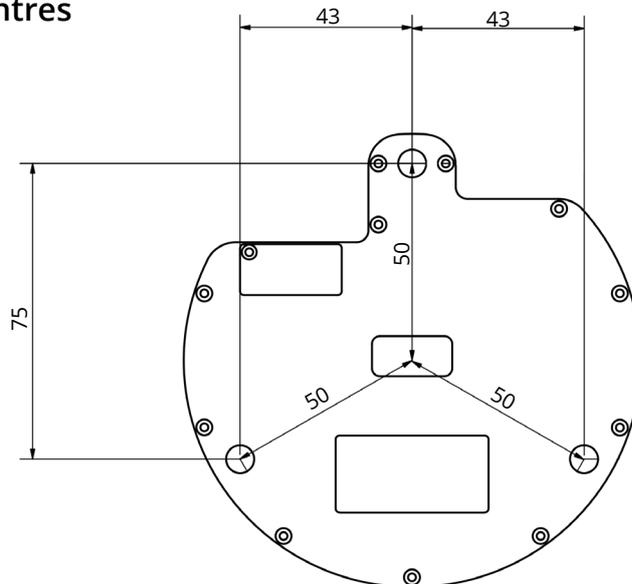
43   43

75

50

50   50

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Tel: +44 (0)1206 211842
Web: www.visualengineering.co.uk
Email: sales@visualengineering.co.uk