



# IP Cameras

**IP-1XXXC**

## Operational Guide

Please refer to [www.brigade-electronics.com](http://www.brigade-electronics.com) for the latest version of this manual



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# 1 Introduction to IP Camera Technology

Internet Protocol Cameras also known as IP Cameras are a type of digital video cameras that receive and send control or image data via the Internet which uses internet protocol suite (TCP/IP) to link. They are commonly used for surveillance. Unlike analogue cameras, these IP cameras can be accessed through a local area network via a web browser.

IP Cameras have a default IP address, username and password for authentication, through which all settings and image output can be set or viewed by a computer. Brigade IP Cameras such as IP-1000C, IP-1100C and IP-1200C comply to a proprietary MDR5 protocol that is shared with Brigade MDR 500 Series. MDR 500 Series products have full access to these IP cameras' settings (such as resolution, image quality, recording setup) which can be transmitted from MDR to IP Camera. IP Cameras that comply with MDR5 protocol can utilize the quick and easy **Fast Setup** MDR function (explained in 3.2 *Fast Setup*).

Brigade MDR 500 Series also supports ONVIF (Open Network Video Interface Forum) protocol, which is a global and open standard for the interfacing of physical IP-based security products. MDR 500 Series can view and record video from ONVIF based cameras but is unable to adjust the camera's IP address.

Brigade IP Cameras have 1080p high definition resolution (1920 x 1080 pixels) which enables a clear and sharp video for recording. This is useful for reading number plates or identifying facial features in reviewing of recordings.

**Warning:** Latency is around 600 – 800ms which means it should only be used for surveillance purposes and not live view applications. The reason for the high latency is that video is first processed within the camera which is compressed and sent to the recorder which then stores video. This causes higher latency when compared to analogue cameras.

Table 1: Description of IP Camera Models:

MODEL	Resolution	Application	IP Rating	Infrared	Audio
IP-1000C	Refer to specification chapter	Forward Facing	IP20	No	Yes
IP-1100C	Refer to specification chapter	Surface-mount, side viewing	IP67	Yes	No
IP-1200C	Refer to specification chapter	Interior Use	IP65	Yes	Yes

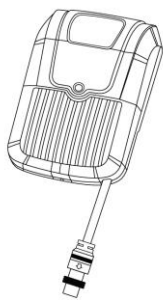
Note: IP camera resolution can drop to 720P based on IP camera configuration or MDR settings.

## 1.1 Features

- Infrared enables cameras to work independent of environment's light condition such as night (not IP-1000C)
- Automatic wide dynamic range (WDR) allows cameras to adapt to bright and dark image conditions easily
- Backlight compensation helps to automatically control image exposure
- White balance adjusts colours for a more natural image
- Embedded web setup menu, accessible via a web browser
- Adjustable network port 10/100/1000M
- Compatible with H.264 and H.265 compression
- Built-in G-sensor for automatic image orientation (IP-1100C only)
- Operating voltage 10-14V
- Operating temperature -40°C to +70°C

## 1.2 IP Camera Kits & Accessories

### IP-1XXXC

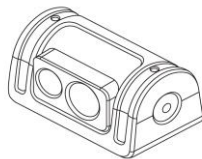


IP-1000C  
IP Camera - Forward Facing, Audio (1080p)

#### Accessories



Security torx tool



IP-1100C  
IP Camera - Surface-mount, IP67 (1080p)

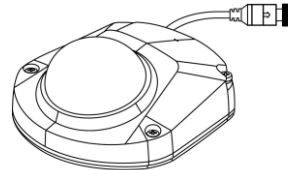
#### Accessories



fixings



Hex key



IP-1200C  
IP Camera - Interior Use, Audio (1080p)

#### Accessories



Fixings



Torx tool

### 1.3 Optional Ancillaries

#### Extension Cables



- IP-L6XX: IP Camera Extension Cable – X meter (“XX” in model name refers to cable length)

1.3.1

#### MDR 500 Series



1.3.2



MDR 500 Series 4 Channel Control Unit with 500 GB / 1 TB / 2 TB HDD, GPS, 4G, Wi-Fi & 32GB SD Card (Depending on model)  
MDR-504XX-XXXX(XX)

MDR 500 Series 8 Channel Control Unit with 1 TB / 2 TB HDD, GPS, 4G, Wi-Fi & 64GB SD Card (Depending on model)  
MDR-508XX-XXXX(XXX)

#### Power Over Network Switch

1.3.3



MDR - Power Over Network Switch - 4 Ports  
IP-EM4



MDR - Power Over Network Switch - 8 Ports  
IP-EM8

1.3.4 **Warning: IP-EM8 not able to work with MDR-504xx-xxxx products.**

#### Power and Ethernet Cable



Power and Ethernet Cable  
IP-1XXX-PC

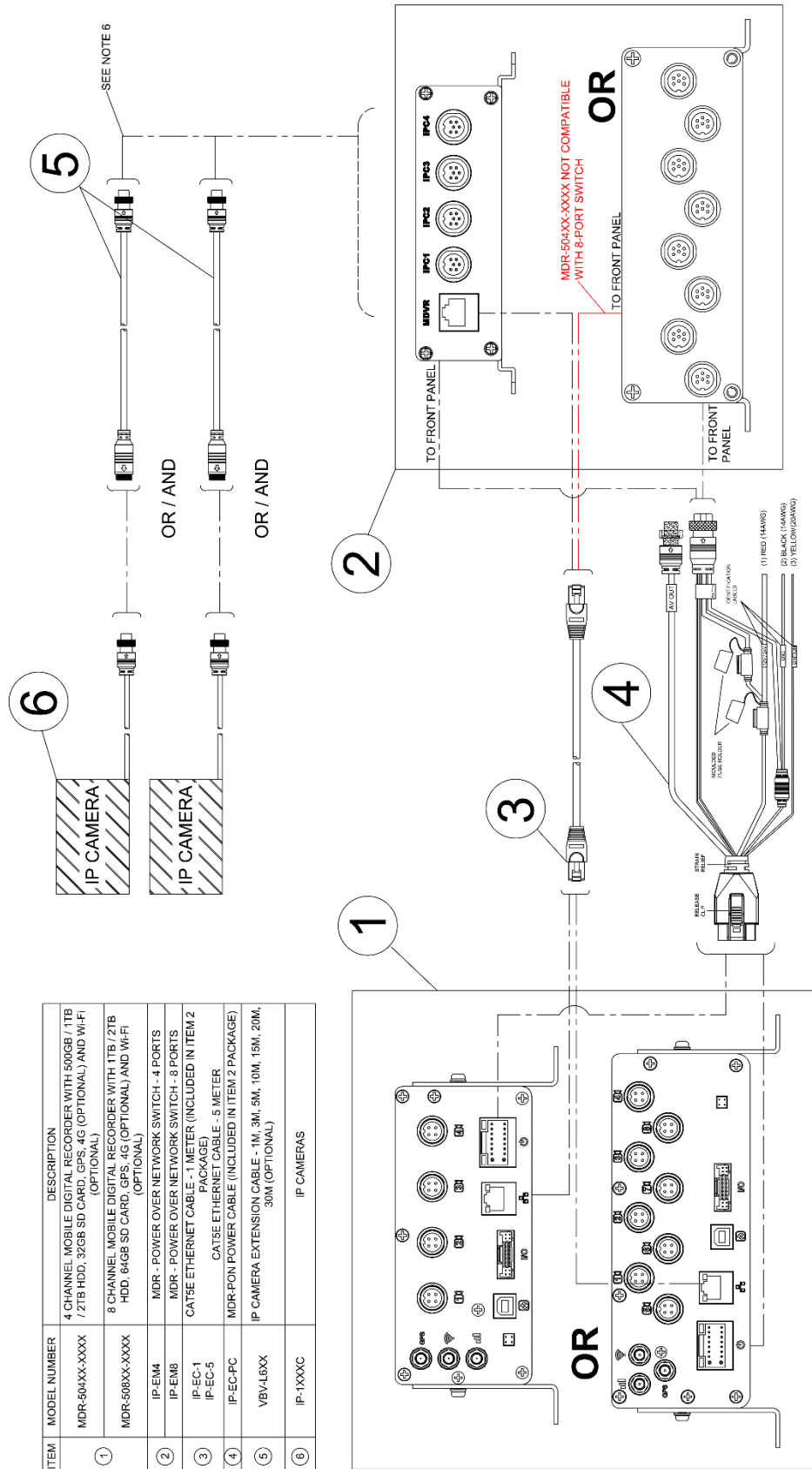
**Note:** Combined cable for single camera use when connecting directly to MDR

## 2 Hardware Installation

### Warning

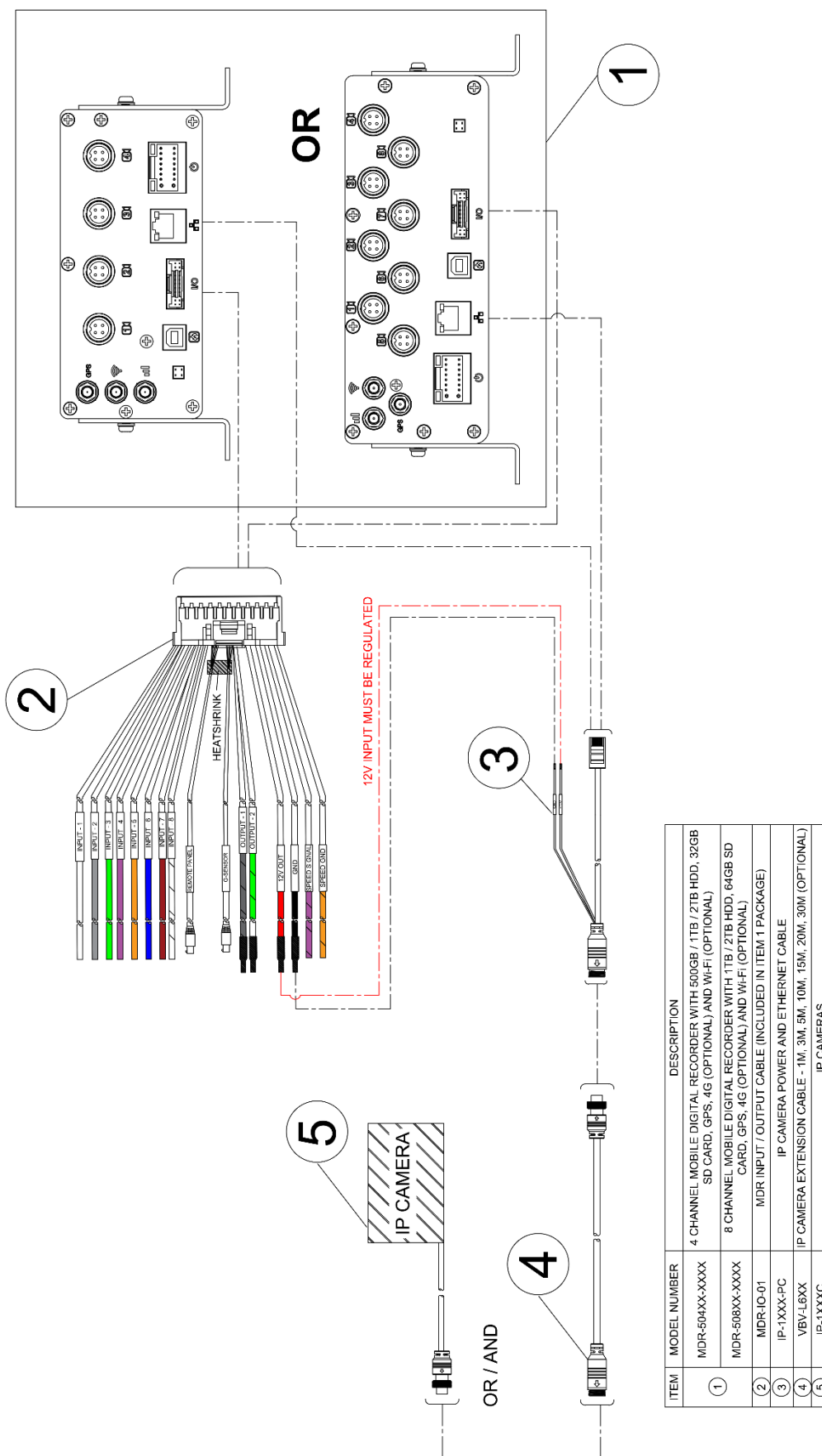
- IP camera must be powered with a 12V regulated power supply. Brigade will not be responsible for any damage caused due to negligence or incorrect usage.

### 2.1 Multiple IP Camera to MDR Solution



Multiple IP Camera to MDR Connection Diagram Figure 1

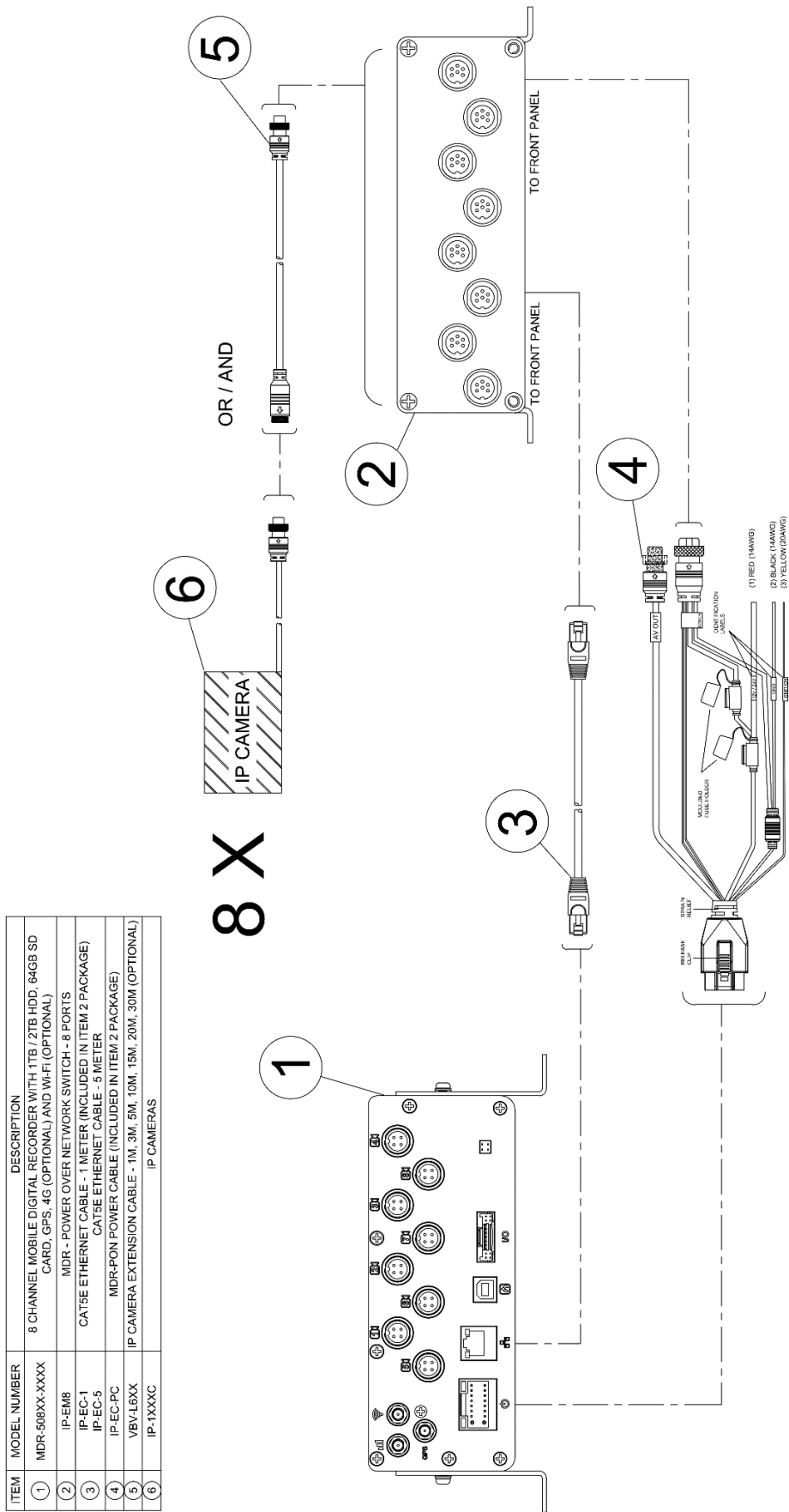
## 2.2 Single IP Cameras to MDR Solution



Single IP Cameras to MDR Connection Diagram Figure 2

# Maximum IP Cameras Solution

Note: this solution only available for MDR-508XX-XXXX.



Maximum IP Cameras to MDR-508XX-XXXX Connection Diagram Figure 3

### 3 MDR On-Screen Display (OSD)

This chapter describes the configuration of the MDR.

Brigade's 500 Series MDR displays a single, quad or 9-split live view. Change this to 9-split by right click mouse and select from bottom banner. See *MDR-504xx-xxxx 9-split Screen Figure 4* and *MDR-508xx-xxxx 9-split Screen Figure 5*.

MDR-504xx-xxxx - by default, the first 4 channels are used for analogue cameras which cannot be used by IP cameras. IP cameras can be assigned to channel 5 and 6.

**Note:** For ease of understanding, channels that can accept analogue cameras will be referred to as **analogue channels**; those channels that cannot accept analogue cameras will be referred to as **IP channels**.

MDR-508xx-xxxx - by default, the first 8 channels are used for analogue cameras. These channels can be re-assigned for IP cameras. During the setup of an IP camera with an MDR, the installer can manually assign any 1-16 channel for an IP camera. MDR-508xx-xxxx IP camera usage is flexible to be used on any of the channel inputs.

**Warning:** For MDR-508XX-XXXX, all channels can be manually overridden to display IP camera footage. Make sure all cameras are visible during channel assignment.

To differentiate between analogue channels and IP channels:

- a. Analog channels are enabled by default, if the MDR cannot detect a camera or video signal then that OSD channel on OSD will show "VIDEO LOSS", as screenshots display.
- b. IP channels, however, are disabled by default and display "No device" instead. Once the IP camera channel has been setup and enabled but the IP camera has a data connection issue with the MDR, it will show "VIDEO LOSS". Refer to IP Camera Lost Data Connection Figure 6. Setup procedure will be explained in 3.2Fast Setup & 3.3Advanced Setup.



MDR-504xx-xxxx 9-split Screen Figure 4



MDR-508xx-xxxx 9-split Screen Figure 5



IP Camera Lost Data Connection Figure 6

#### 3.1 IPC Setup

In **SETUP->SURVEILLANCE->IPC SETUP** to view all IP camera settings. Refer to *IPC Setup Figure 7*

**Channel** lists all channels for this MDR. MDR-504xx-xxxx will have 6 channels listed here, with 1 to 4 channels greyed out. So, this cannot be **Enabled**. MDR-508xx-xxxx has 16 channels in total which allows for flexibility.

**Enable** is used to choose a specific channel for IP Camera usage. Without ticking this box, other settings will remain greyed out (cannot be set).

**IP and Port** displays the IP address and communication port of the currently connected IP camera. 80 is the default port used by MDR. There is no need to change this setting.

**Warning:**

1. IP cameras must have individual IP address to avoid conflicts.
2. The IP address should be in the range of e.g. 10.100.100.xxx (x stands for any number between 1 and 255)

**Outside** is currently not supported.



IPC Setup Figure 7



**Local Address** determines the IP address for this MDR and what range of IP addresses it can detect. The IP address range is fixed to 10.100.100.xxx, which means every connected IP camera must be within this range (subnet mask). This allows the MDR to detect and communicate with the IP cameras.

**Fast Setup** is an automatic configuration function which detects and assigns sequential IP address to IP cameras (currently compatible with MDR5 enabled cameras only) This allows installers to quickly batch set up multiple IP cameras at once without having to repeat the process. Brigade recommends using this feature for initial installations. (Fast Setup is explained in 3.2 *Fast Setup*)

**Default** is used to restore factory settings, all changed settings will be lost.

**Save** confirms and applies all settings to the system.

**Setup (Network Setup)** click  to view IP channel parameters.

**Warning:** All these settings only works for this specific channel. Please be careful if user want to change any parameters here in case the channel unable to map the correct IP camera.

The IP address section is also number-sensitive, please do not delete any zeros, for e.g. 010,100,100,001, all zeros need to be kept.

**Channel** shows current channel number

**Protocol Type** has 2 options which are **MDR5** or **ONVIF**. MDR5 protocol gives an MDR full access to the IP camera settings. Currently IP-1000C, IP-1100C and IP-1200C support MDR5.

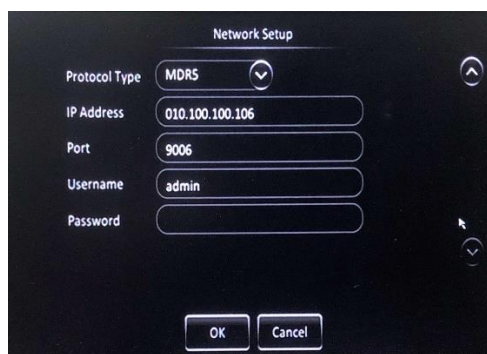
**IP address** shows the current IP address of the connected IP camera. Do not change the IP address to avoid the channel unable to find the correct IP camera.

**Port 80** for communicating between MDR and IP camera.

**Username** is authentication information which allows the MDR to display and fully control the IP camera.

**Password** is authentication information which allows the MDR to display and fully control the IP camera.

**Warning: Default username is admin, no password. If the installer leaves this blank, the MDR will not display live view or record any data. The channel will display "VIDEO LOSS".**



**Network Setup Figure 8**

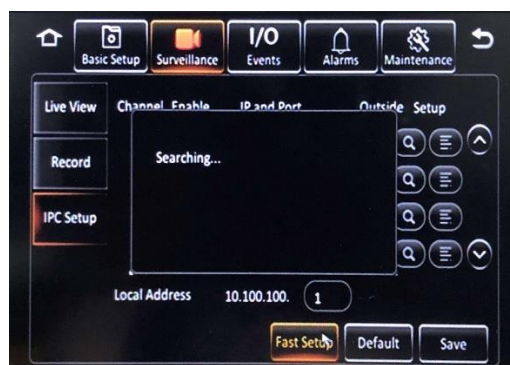
## 3.2 Fast Setup

Brigade recommends the use of **Fast Setup** for initial installation, so the cameras IP addresses are refreshed and automatically allocated to certain channels.

Click the **Fast Setup** button on the IPC setup page to start the search for currently connected IP cameras. If the camera is compatible with the MDR5 protocol, the IP address will all automatically be changed to 10.100.100.xxx.

**Note:** If multiple IP camera were connected at the same time and all complied with MDR5 protocol, all the IP addresses will be changed by the Fast Setup function to a sequence from 10.100.100.100 to 10.100.100.10x. This feature prevents 2 issues:

- Ensures the correct subnet mask is used, that is within a certain IP address range so that it can communicate with an MDR.
- Ensures all IP addresses are unique so that there are no conflicts.



**Fast Setup Searching Figure 9**

After the search is completed, a new interface will be displayed to complete fast setup. Refer to *Fast Setup Settings Figure 10*

Left hand side displays the IP camera's live view to assist with positioning the camera during installation. The text overlay in the image is OSD information, which can be configured in Setup->Surveillance->Record->Record OSD. Right hand side displays basic setting information.

**IPC ID** displays how many IP cameras are connected and tags the camera by number. E.g. "2/2" implies you are viewing the second camera and there are 2 cameras connected in total.

**Binding CH** determines which channel it located. Installers be able to re-allocate it to other channels by click and scroll down the list.

**IP Address** shows assigned IP address for the chosen camera. This is a read-only field, there is no need to change the IP address.

**Port** is a communication port which is a read-only field. The port cannot be changed in this menu.

**Protocol Type** shows the protocol this camera complies with. The other options is ONVIF. Brigade does not recommend changing this setting, as the MDR could lose control of the IP camera.

**Username** and **Password** are automatically detected and populated.

**Previous CH** and **Next CH** is used for switching between all available IP cameras for configuration.

Ensure **save** is clicked after configuring a channel before switching to configure the next channel. If save is not clicked, all changed settings will be lost.

**Save** is used to store each camera's settings.

After all channels have been configured, click **Exit** to view the previous IPC Setup page and click the **Save** button on the right bottom corner to save all channel settings.



**Fast Setup Settings Figure 10**




**Save All Settings Figure 11**

### 3.3 Advanced Setup

**Note:** If using a non-Brigade IP camera, the IP address must within 10.100.100.xxx range.

This setup process is recommended for non-MDR5 protocol IP cameras. This process can also be used for maintenance such as changing binding channels. (Fast Setup will reset all connected MDR5 IP cameras including its IP address and allocated channels)

Refer to *IP Camera Regular Setup Figure 13*

**Enable** the IP channel to display it by ticking the box. Click the magnifier  button to search for current available IP cameras. In this case, Channel 13 will be used as an example.

All connected and available cameras show in the IPC Search page, refer to *IP Camera Search Result Figure 14*.

**Remote Chn** confirms which IP camera that will be displayed on the channels that was enabled in the previous screen.

**MAC Address** refers to media access control address which is a unique identifier. This is assigned to network interfaces for communications at the data link layer of a network segment. This consists of 6 groups of 2 hexadecimal digits. This cannot be changed.

**IP Address** refers to the internet protocol address of the IP camera. This is for identification purposes. This address is used to join the network.

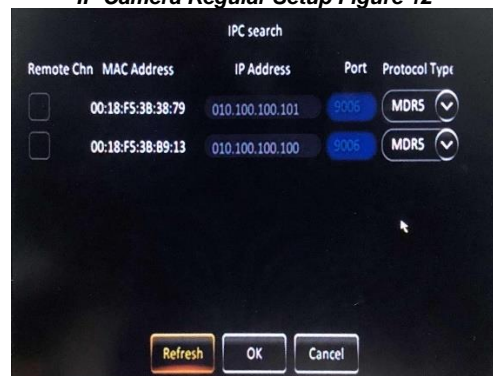
**Port** and **Protocol Type** are auto-detected. Brigade suggests that this is not changed.

Choose the IP camera that should be displayed and click the **OK** button. All chosen IP cameras information will be shown in the IPC Setup page after the channel closed.

Save before exiting the IPC Setup page, then check the live view to ensure it displays properly.



**IP Camera Regular Setup Figure 12**



**IP Camera Search Result Figure 13**

Note: IP cameras differ from analog cameras. The video stream is transmitted using a digital signal. An IP camera can be displayed simultaneously in 2 different channels if both channels are configured correctly (i.e IP address, protocol, username and password).

### 3.4 Recording Setup

After binding the MDR channel with all IP cameras, go to the recording setup menu *Setup->Surveillance->Record->HDD* for mainstream recording setup.

Please refer to MDR Installation and Operational Guide for details information. Only IP camera related settings will be highlighted below.

**Resolution** will automatically detect the camera's highest resolution. The scroll-down list will provide all available resolutions. (Utilizing a lower resolution saves storage space which can help prolong recording time left before overwriting). A 1080P (full HD) IP camera can be set to 720P (HD). 720P IP cameras cannot be set to 1080P because of the IP cameras hardware limitation.

**Encode Mode** allows users to choose between Constant Bit Rate (CBR) and Variable Bit Rate (VBR). The difference is minimal as the Variable Bit Rate is not efficient as it involves more processing power and may introduce some visible artefacts due to higher compression rates.

**Save** before exiting this screen.

For sub-stream setting please refer to MDR 500 Series Installation&Operational Guide.



**Mainstream Recording Setup Figure 14**



**VBR vs CBR Figure 15**

### 3.5 IPC Upgrade

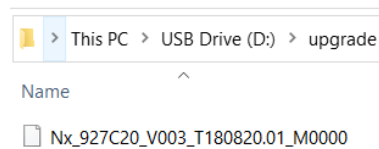
IP camera firmware upgrade is possible via the MDR 50X series. This feature is currently available for MDR5 compatible IP cameras only. Create a folder named "upgrade" in a USB flash drive. Plug the USB flash drive into the USB port on the MDR front panel. Multiple upgrade files can be saved in the same folder since the IP camera will search for the most recent file for upgrading before installing the file.

Enter MDR OSD, **Setup->Maintenance->Upgrade->IPC**

Click **IPC Upgrade** to display currently connected and available IP cameras.

The upgrade process can be completed on one specific camera or simultaneously on "All" IP cameras.

**Current Version** displays the existing FW version on the IP camera.



**Upgrade File in Flash Drive Figure 16**



**Upgrade Figure 17**

**Upgrade Result** shows the result of the upgrade process completion. Results can be:

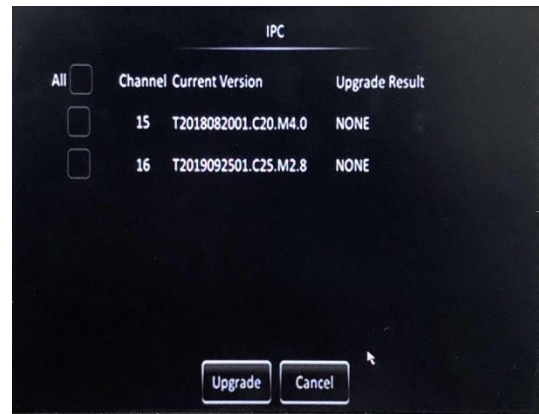
**None** occurs when the process has not been completed. To start the process **Tick** the camera and click the "Upgrade" button.

**No External Device!** occurs when the MDR cannot detect a USB flash drive. The USB flash drive could be damaged.

**Same Version** occurs when the upgrade file matches the existing version on the IP camera.

**No upgrade file!** occurs when the file or folder is not compatible for the IP camera model.

**Upgrade successfully!** occurs when the process has completed successfully.



*IPC Upgrade List Figure 18*

## 4 Appendices

### 4.1 Maximum Extension Cable Length

The maximum extension cable length for IP camera should no more than 30 metres. See lab testing results below:

Model	Power Output	IP Camera Input	Voltage Drop	Remark
IP-1000C	12.21V	11.88V	0.33V	15m extension cable + no IR
IP-1100C	12.23V	11.19V	1.04V	15m extension cable + IR on
IP-1200C	12.23V	11.54V	0.69V	15m extension cable + IR on
Model	Power Output	IP Camera Input	Voltage Drop	Remark
IP-1000C	12.25V	11.41V	0.84V	2*15m extension cable + no IR
IP-1100C	12.16V	9.99V	2.17V	2*15m extension cable + IR on
IP-1200C	12.28V	10.93V	1.35V	2*15m extension cable + IR on

Note: IP camera working voltage: 9 – 16V; Switch working voltage: 11.7 – 13V.

## 4.2 Recording Resource

The IP camera work with MDR 500 Series product in most cases, so the recording resource of the MDR is essential. MDR-504xx-xxxx and MDR-508xx-xxxx limitation listed below:

- MDR-504xx-xxxx supports 2 x 1080P @ 30fps at most
- MDR-508xx-xxxx supports 8 x 1080P @ 30fps at most

For MDR-508xx-xxxx, please refer to table below for available recording time. Note: 2TB users please multiple table numbers with 2 for actual time available. All values below are experience figures, for reference purpose only

Main Stream	Quality Level	1 (Highest)	2	3	4	5	6	7	8 (Lowest)
Recording Time Available Left for <b>1TB</b> HDD (Days)	8x1080P 30fps	1.1	1.5	1.7	2.0	2.5	3.3	4.9	9.2
	8x1080P 15fps	1.9	2.4	2.8	3.4	4.2	5.5	8.1	15.2
	8x720P 30fps	1.5	1.9	2.3	2.7	3.4	4.4	6.5	12.2
	8x720P 15fps	2.5	3.3	3.8	4.5	5.6	7.4	10.9	20.4

Sub-Stream	Quality Level	1 (Highest)	2	3	4	5	6	7	8 (Lowest)
Recording Time Available Left for <b>64GB</b> SD Card	8x640*360 30fps			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	8xD1 30fps			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	8xHD1 30fps			<1.0	<1.0	<1.0	<1.0	1.2	1.3
	8xCIF 30fps			<1.0	1.2	1.3	1.7	1.9	2.1
	8xCIF 10fps	<1.0	1.3	1.5	1.9	2.2	2.8	3.2	3.5

Note: cells without value represents the combination or setting exceeds MDR resource limit, cannot being applied. Sub-stream and Mainstream recording onto SD card have resource limitations, the maximum bitrate is 12Mbps.

For MDR-504xx-xxxx, please refer to table below for available recording time. Note: 1TB users please multiple table numbers with 2 for actual time available. All values below are experience figures, for reference purpose only

Main Stream	Quality Level	1 (Highest)	2	3	4	5	6	7	8 (Lowest)
Recording Time Available Left for <b>500GB</b> HDD	2x1080P 30fps	2.3	2.9	3.4	4.1	5.1	6.7	9.8	18.3
	2x1080P 15fps	3.6	4.9	5.7	6.8	8.4	11.1	16.3	30.5
	2x720P 30fps	3	3.9	4.5	5.4	6.7	8.9	13	24.4
	2x720P 15fps	5.1	6.5	7.6	9	11.2	14.8	21.7	40.7

Sub-Stream	Quality Level	1 (Highest)	2	3	4	5	6	7	8 (Lowest)
Recording Time Available Left for <b>32GB</b> SD Card	2x640*360 30fps	<1.0	<1.0	<1.0	<1.5	<1.5	<1.5	1.6	1.8
	2xD1 30fps	<1.0	<1.0	<1.0	<1.5	<1.5	<1.5	1.6	1.8
	2xHD1 30fps	<1.0	<1.0	1.1	1.5	1.8	2.1	2.3	1.6
	2xCIF 30fps	1.1	1.5	1.8	2.3	2.7	3.3	3.8	4.2
	2xCIF 15fps	1.9	2.5	3	3.8	4.4	5.6	6.3	7

How to calculate total recording hour for both Analogue and IP camera connected:

1. Use MDR calculator to get the analogue recording time:  $T_a$ ;
2. Use table above to find the IP camera recording time  $T_i$ , if camera amount is not exact 2 or 8, just use math method to get the figure for certain number of cameras.
3. Use the equation below:

$$\text{Total Recording Remaining Time} = \text{storage capacity} / [(\text{storage capacity} / T_a) + (\text{storage capacity} / T_i)]$$

## 5 Maintenance and Testing

This information is addressed to the operator of the vehicle where an IP camera is installed:

- 1) Check the power supply before using an IP camera. If the IP camera is connected with a PON Switch, check if the 'IPC' LED on PON Switch is illuminated; if the IP camera is powered by a single Power and Ethernet cable, ensure the power supply is 12V regulated. Refer to the electrical specification.
- 2) Operators using this equipment are strongly recommended to check the system's operation at the beginning of every shift.
- 3) Keep these instructions in a safe place and refer to them when maintaining and/or reinstalling the product.
- 4) This information is addressed to the operator for maintenance and testing of a vehicle with a Brigade IP camera installed. This is also to familiarise the operator with the features and behaviour of the system. More frequent inspections should be performed in cases where:
  - The vehicle is operating in a particularly dirty or harsh environment.
  - The operator has reason to suspect the system is not working or has been damaged.

Procedure:

- 1) Clean the camera lens and housing of any accumulation of dirt, mud, snow, ice or any other debris.
- 2) Visually inspect the cameras and verify that they are securely attached to the vehicle and are not damaged.

- 3) Visually inspect the system's cables and verify that they are properly secured and not damaged.
- 4) Ensure the area in front of the cameras is clear of obstacles and has the right coverage area to view objects.

If any of the following tests fail, follow the appropriate sections of this instruction guide or contact Brigade if still in doubt.

- 5) This test can only be performed when the IP camera is connected to an MDR 500 Series product. PON Switch status LEDs can help with the diagnosis procedure.
- 6) Activate the Brigade IP camera and verify a live view is displayed on a monitor from the MDR. If the IP camera has been properly set up, it will take approximately 15 – 20 seconds to display.
- 7) Alarm alert testing can be performed depending on the configuration. For instance, if Motion Detection is activated, the IP camera channel would also trigger the alarm.

## 6 Troubleshooting or FAQ

Q: I've installed the PON Switch, but the IP Camera does not work?

A: Troubleshoot process as below:

- 1) Step 1 Check if the Network Switch been powered correctly by checking the "PWR" LED on the front panel.
- 2) Step 2 Check if the IP Camera been powered up by covering lens to listen for a light click sound indicating IR is switched on.
- 3) Step 3 Check if the connection between MDR and IP camera works by checking the 'MDVR' LED on Network Switch. "MDVR" LED means the Switch has been connected with MDR. IPCx LED flashes means the IP camera is communicating with MDR.
- 4) Step 4 Check the output channel. If the channel shows background with text "No device", this means the channel is not enabled to display an IP camera signal. Please refer to Chapter 3.2 and Chapter 3.3 for setup procedures.
- 5) Step 5 If the output channel shows "Video Loss", this means either the IP address is incorrect and therefore is unable to find the IP camera signal or the Username or Password is wrong of the IP camera so MDR failed authentication. If you are using Brigade IP camera, please refer to Chapter 3.2 Fast Setup procedure to fix the issue. If not, please follow Chapter 3.3 to configure your IP camera.

Q: I'm using the single power and Ethernet cable and the IP camera doesn't work.

A: For Brigade IP cameras, please ensure the power supply is regulated 12V or it may damage the camera. Following Chapter 3.2 Fast Setup to search for the camera. If can't be found, either the cable is broken, or the camera is not working. Try another camera or cable. For non-Brigade camera, please read Chapter 3.2 to guarantee the IP address is in the specific range.

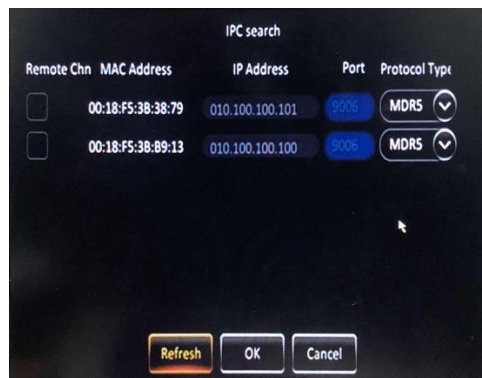
Q: I'm using non-Brigade IP Camera, what should I do?

A: Please follow steps below:

- 1) Confirm IP Address and login details for this IP camera.
- 2) If the IP address is in this range: 10.100.100.01 – 10.100.100.254, then please follow Chapter 3.3 Advanced Setup process
- 3) If the IP address is out of above range, please contact supplier to change the IP address. Or you can change the IP address manually by yourself in IP Camera web page, please read Web Interface Manual for reference.
- 4) After change the IP address, please follow Chapter 3.3 for later setup.

Q: What if I want to change IP camera address in MDR?

A: Yes, you can. First go to the IPC Setup page, find the camera whose IP address you want to change. Note down its current IP address. Click Search (magnifying glass icon after each channel). In the search result page, enable the camera then you can freely change it's IP address. This feature only works for Brigade IP Cameras (MDR5 protocol).



Change IP address Figure 19

## 7 Specifications

### 7.1 IP-1000C

#### Environmental Specifications

Operating Temperature Range	-40°C to +70°C
Storage Temperature Range	-40°C to +85°C
Ingress Protection	IP20
Vibration Rating	6G
Shock Rating	51G

#### Features

Mounting Directions	Front, windshield mount, cable on bottom camera housing
Camera Adjustment Range in Assembly	0° downwards to 71° (camera housing obstruction will appear below 46°)
Mirror / Normal View and Setting Method	Via web interface or MDR OSD
Network Port	10M/100M adjustable Ethernet network port
Client terminal preview	Built-in WEB server; Support IE browser
Setup	Available in MDR 500 Series to auto-assign IP address for IP cameras
Microphone	Yes, integrate
Type of Connector	VBV type female connector (6-pin)
Back Light Compensation	Yes
Automatic White Balance	Yes

#### Technical Specifications

Operating Voltage	12 Vdc ± 2Vdc
Current Consumption	140mA @ 12Vdc
Viewing Angle (H / V / D)	87° / 48° / 95°
Lens Focal Length	4mm
Picture Elements (Hor. x Ver.)	1920 x 1080
Visual Resolution	800 TV Lines
Required Minimum Luminance	0.05 Lux
Pick-up Device Type	CMOS
Video and Sound Output Signal	H.264 or H.265
Network Protocol	MDR5, ONVIF, TCP/IP, HTTP, DHCP, NTP, FTP
Overall Dimensions (W x H x D in mm)	75 x 121.5 x 42
Weight (typ. Installed Assembly)	Approx. 224g
Material of Housing Parts	Cast Aluminium / ABS + PC
Finish	Black

### 7.2 IP-1100C

#### Environmental Specification

Operating Temperature Range	-40°C to +70°C
Storage Temperature Range	-40°C to +85°C
Ingress Protection	IP67
Vibration Rating	16.6G
Shock Rating	51G

#### Features

Mounting Directions (typical)	Outdoor vehicle side mounted
Camera Adjustment. Range in Assembly	45° for left and right
Mirror / Normal View and Setting Method	Via web interface or MDR OSD
Network Port	10M/100M adjustable Ethernet network port
Client terminal preview	Built-in WEB server; Support IE browser
Setup	Available in MDR 500 Series to auto-assign IP address for IP cameras
Microphone	No
Type of Connector	VBV type female connector (6-pin)
Back Light Compensation	Yes
Automatic White Balance	Yes

### Technical Specifications

Operating Voltage	12 Vdc $\pm$ 2Vdc
Current Consumption	133mA @ 12Vdc (IR off) 360mA @ 12Vdc (IR on)
Viewing Angle (H / V / D)	84° / 46° / 103°
Lens Focal Length	4mm
Picture Elements (Hor. x Ver.)	1920 x 1080
Visual Resolution	850 TV Lines
Required Minimum Luminance	0 Lux (IR)
Pick-up Device Type	CMOS
Video and Sound Output Signal	H.264 or H.265
Network Protocol	MDR5, ONVIF, TCP/IP, HTTP, DHCP, NTP, FTP
Overall Dimensions (W x H x D in mm)	95.6mm x 51.8mm x 62.1mm
Weight (typ. Installed Assembly)	Approx. 354g
Material of Housing Parts	Cast Aluminium / PC
Finish	White and Black

### 7.3 IP-1200C

#### Environmental Specification

Operating Temperature Range	-40°C to +70°C
Storage Temperature Range	-40°C to +85°C
Ingress Protection	IP65
Vibration Rating	6G
Shock Rating	51G

#### Features

Mounting Directions (typical)	Internal vehicle cabin mounted
Camera Adjustment Range in Assembly	Up and Down: Max. 90° Left and Right: Max. 90°
Mirror / Normal View and Setting Method	Via web interface or MDR OSD
Network Port	10M/100M adjustable Ethernet network port
Client terminal preview	Built-in WEB server; Support IE browser
Setup	Available in MDR 500 Series to auto-assign IP address for IP cameras
Microphone	Yes, integrated
Type of Connector	VBV type female connector (6-pin)
Back Light Compensation	Yes
Automatic White Balance	Yes

### Technical Specifications

Operating Voltage	12 Vdc $\pm$ 2Vdc
Current Consumption	118mA @ 12Vdc (IR off) 196mA @ 12Vdc (IR on)
Viewing Angle (H / V / D)	106° / 61° / 129°
Lens Focal Length	2.6mm
Picture Elements (Hor. x Ver.)	1920 x 1080
Visual Resolution	800 TV Lines
Required Minimum Luminance	0 Lux (IR)
Pick-up Device Type	CMOS
Video and Sound Output Signal	H.264 or H.265
Network Protocol	MDR5, ONVIF, TCP/IP, HTTP, DHCP, NTP, FTP
Overall Dimensions (W x H x D in mm)	101.5 x 54.6 x 96
Weight (typ. Installed Assembly)	Approx. 332g
Material of Housing Parts	Cast Aluminium / ABS + PC
Finish	White and Black

Approvals (for each)

CE

UNECE Regulation No. 10 Revision 5 ("E-marking")

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