

# High-Speed BOX Camera for Sports QDCAM®



Global Shutter  
Multi-Camera Synchronizing Exposure System  
Multi-Camera High-Speed Video  
Synchronizing Playback System





# High-Speed Box Camera for Sports QDCAM®

## Affordable High-Speed Box Camera

Excellent  
image  
quality

Remote  
camera/lens  
control

High-precision  
multi-camera  
synchronized  
shooting



### Features

#### High-speed shooting

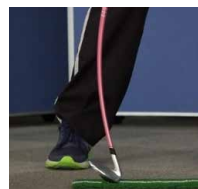
**4x speed**



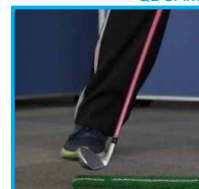
With 1920 x 1080 pixel FHD resolution, 4 x speed shooting at 239.8 fps or 200 fps is possible. In combination with a slow-motion server, smooth slow-motion playback can be performed, making high-precision sports analysis possible.

#### Global shutter

##### CMOS image sensor



Rolling shutter shooting



Global shutter shooting

QDCAM

Global shutter image sensor provides excellent picture without rolling shutter distortion in a quick moving object. Global shutter sensor is suitable for sports shooting.

#### High-resolution shooting

**4K**



At a frame rate of 59.94 fps or 50 fps, 3840 x 2160 pixel UHD resolution shooting is possible. At 24 fps, 4096 x 2160 pixel DCI 4K resolution shooting is possible.

#### Micro four thirds lens system

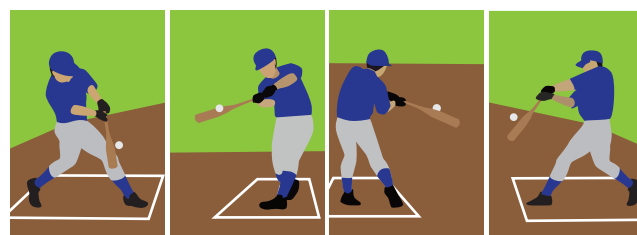


The adoption of micro four thirds allows the use of inexpensive, high-quality lenses. It also allows the use of bright lenses that are effective for high-speed shutter shooting under nighttime game lighting. The iris and focus can also be controlled remotely by electronic control using electrical contacts.

#### Optical transmission using a fiber optic camera cable



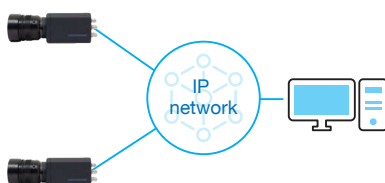
You can use optical transmission system using SMPTE standard fiber optic camera cables which are installed in stadiums and other facilities frequently used for sports broadcasting.



#### Multi-camera synchronizing exposure system

The exposure timing of multiple cameras can be synchronized with high-precision without being affected by differing camera cable lengths. This allows the video from multiple cameras to be frozen simultaneously, preventing any timing deviation when switching to a video from a different angle. This also can improve the calculation accuracy of automatic sports referee systems which use images from multiple cameras. (Japan patent No. 6635635)

#### Remote camera operation using a LAN/IP network



Box cameras for city view, weather view or other purpose, installed in a distance, can be controlled remotely by PC through an IP network.

#### Multi-camera high-speed video synchronizing playback system

When linked with a QDVS recorder/player, high-speed video from multiple angles can be synchronized for slow-motion playback or frame-by-frame playback, allowing the video to be checked for sports referee calls.

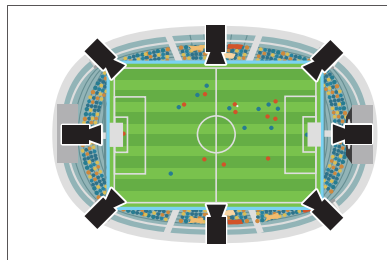


# QDCAM<sup>®</sup> for Sports

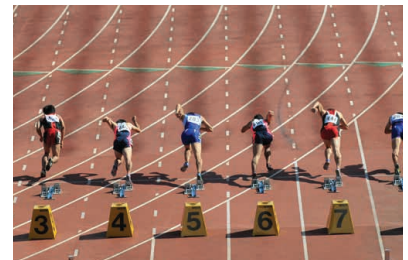


Affordable high-speed cameras **allow variety of slow-motion views.**

## Sports Broadcasting and Program Production

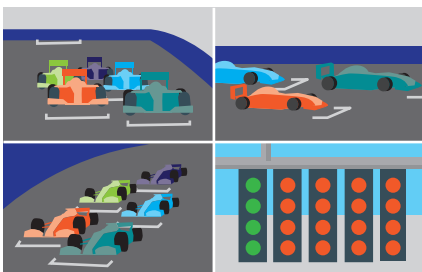


Affordable cameras are **ideal for multi-angle video or free viewpoint video production** that requires large number of cameras.

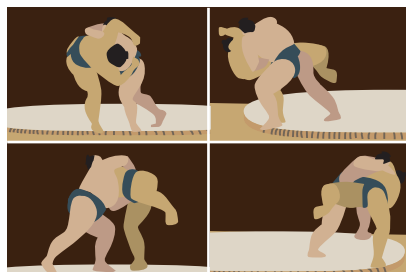


Can also be used for **UHD program production.**

## Video Assistant Referee



**Example: Race start and goal scenes**



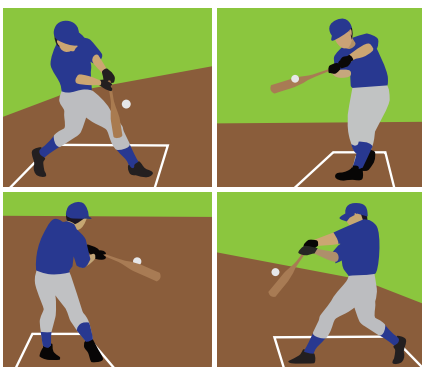
**Example: Martial arts game scenes**

High-precision **synchronous high-speed video shooting** and **synchronized playback** for checking the timing of a wide range of movements.

## Automatic Judgement System

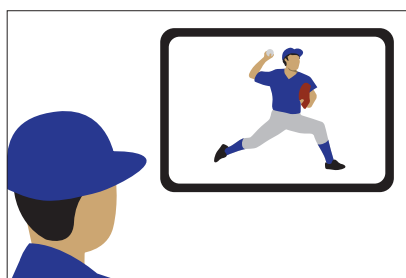


Synchronizing shooting with high-precision **improves the calculation accuracy of automatic judgement system.**



**A wide range of analysis** is possible using high-speed shooting synchronized with high-precision.

## Sports Analysis and Coaching

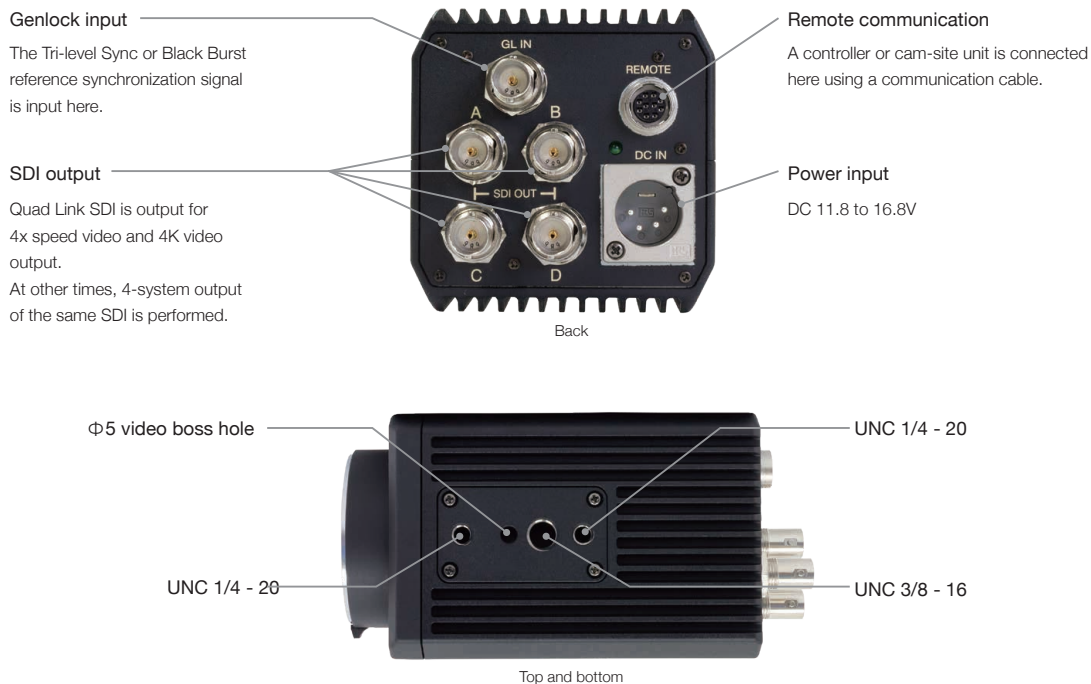


Delayed display of video with QDVS **allows athletes to check their own form.**



Team formations and player **movements** can be analyzed for use in coaching.





## Lens and Camera Communication Control Items

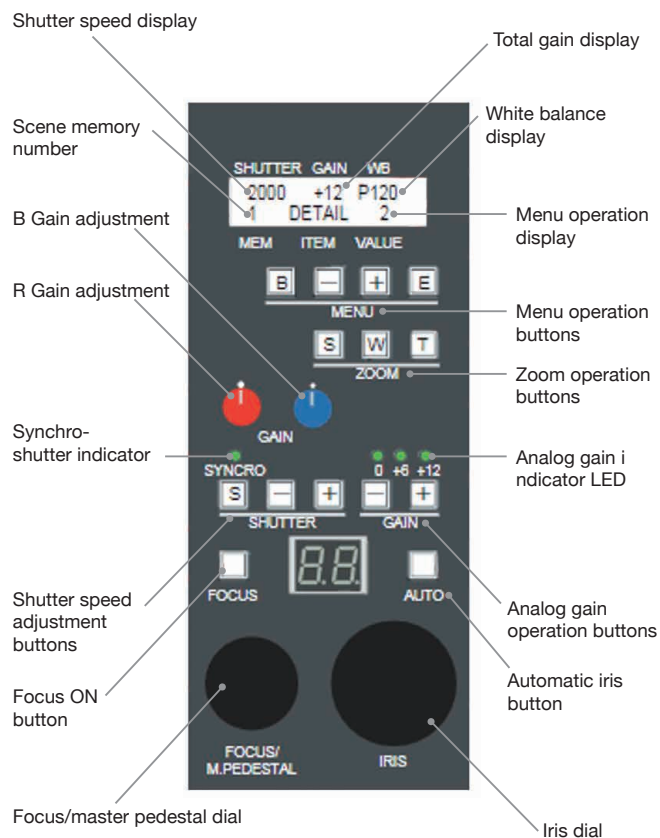
### ● Lens control

| Focus      | Iris         | Zoom  |
|------------|--------------|---|
| Near ↔ Far | Open ↔ Close | Wide ↔ Tele-photo<br>* Power zoom lens only |

### ● Camera control

|   |   |
|---|---|
| Video Format                                | DCI24/DCI23/UHD60/UHD59/UHD50/UHD24/UHD23/FHD240/FHD239/FHD200/FHD60/FHD59/FHD50/FHD24/FHD23/FHD59/FHD50i                       |
| Step Shutter                                | 1/50, 1/60, 1/100, 1/120, 1/125, 1/200, 1/250, 1/400, 1/500, 1/750, 1/1000, 1/2000, 1/3000, 1/4000, 1/6000, 1/8000, 1/12000 sec |
| Synchro-Shutter                             | 1/60.2 to 1/4096 sec  |
| Gain Adjustment                             | -6 to +36 dB (1 dB steps)   |
| Color Gain Adjustment                       | R_GAIN, G_GAIN, B_GAIN  |
| Black Level Adjustment                      | MASTER PEDESTAL, R_PED, G_PED, B_PED  |
| Automatic Iris                              | ON/OFF  |
| Automatic Iris Response Speed               | 0~15  |
| Target Luminance Level Adjustment           | -12 to +12 dB (1 dB steps)  |
| Gamma                                       | BT.709 standard gamma * Fine adjustments are possible.<br>BT.2100 hybrid log gamma (HLG)  |
| Knee Mode                                   | MANUAL/AUTO   |
| Knee Point                                  | 100%/95%/90%/85%/80%/75%/OFF  |
| Detail Enhancement                          | 0 (OFF) to 7 (high)   |
| Noise Reduction                             | OFF/ON  |
| Flicker Cancel                              | 50 Hz power lighting / 60 Hz power lighting / OFF   |
| White Balance Mode                          | AUTO/MANUAL/PRESET  |
| Manual White Balance                        | MAIN/CH A/CH B/CH C (Take & Load)   |
| Preset White Balance                        | Color temperature 2800 to 10000K (100K steps)   |
| Color Gamut                                 | BT.709, BT.2020   |
| 6-Axis Color Correction                     | Hue and saturation of each color axis: magenta, red, yellow, green, cyan, and blue  |
| Image Angle Selection for 4x Speed Shooting | CENTER ROI/FULL SCREEN  |
| Scene Memory                                | Camera setting data can be stored to 3 sets of scene memories and can be loaded from one of scene memories.                     |
| Color Bar                                   | ON/OFF  |
| Blemish Compensation                        | Automatic blemish detection and automatic blemish compensation  |

## ROP (Camera Controller)



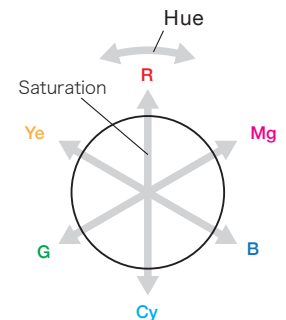
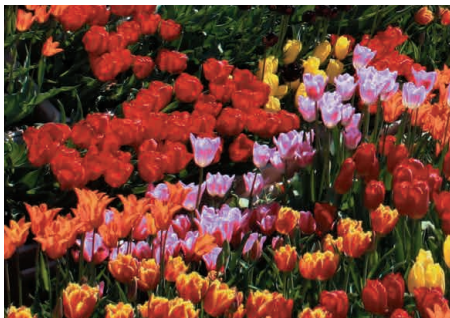
# Basic Camera Functions

## 6-Axis Color Correction

With the QDCAM camera, it is possible to adjust the hue and saturation independently for each of 6 axis colors as shown by the vector scope, specifically red, magenta, blue, cyan, green, and yellow.

This 6-axis color correction is useful in cases such as when shooting with cameras from multiple manufacturers, or when color differences cannot be identified when the image is changed by the switcher.

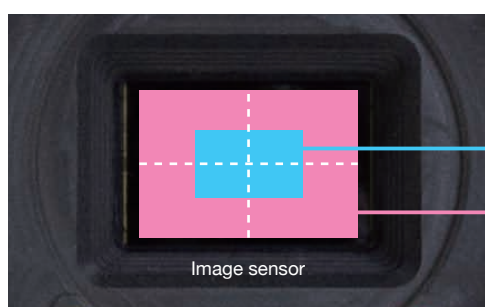
In addition, it is possible to change the overall Chroma Level by increasing or decreasing the saturation for all 6 colors without changing the hue. The latest firmware allows much more rich color; expanding saturation adjustment range.



## View Angle Mode for 4X Speed Shooting

When shooting at 4X speed such as 240fps, 239.8fps and 200fps frame rate, 2.1million pixel signals out of a total 8.8million pixels are read out. Normally, 2.1million pixel signals in the center of the image sensor are read out to provide high-quality, high-speed video without jaggy. (Center ROI mode)

However, you can also use Full Screen mode, which reads out 2.1million pixel signals by thinning out evenly from the full screen, to take a wider image.



Center ROI mode

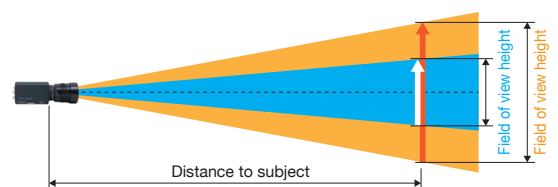


Full Screen mode



- Example of field of view height when using a micro four thirds lens with focal length  $f=42.5$  mm

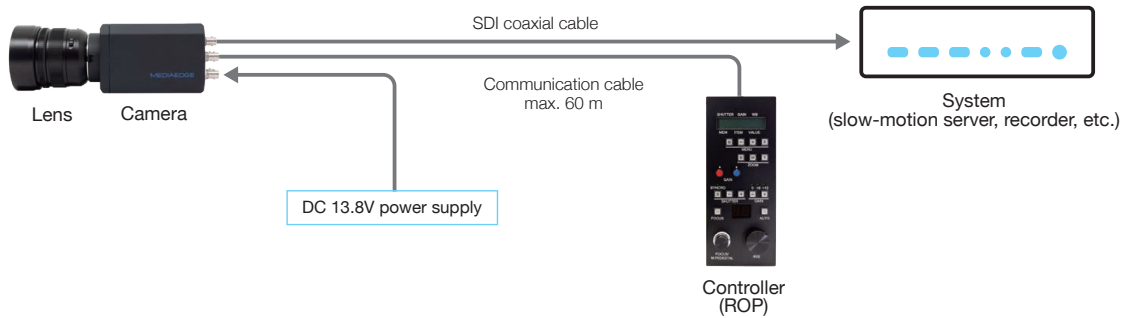
| Mode        | Vertical view angle | Field of view height          |                                |                                |
|-------------|---------------------|-------------------------------|--------------------------------|--------------------------------|
|             |                     | Distance to subject 7m / 20ft | Distance to subject 15m / 49ft | Distance to subject 30m / 98ft |
| Center ROI  | 4.66°               | 0.57m / 1.9ft                 | 1.22m / 4.0ft                  | 2.44m / 8.0ft                  |
| Full screen | 9.30°               | 1.14m / 3.7ft                 | 2.44m / 8.0ft                  | 4.88m / 16ft                   |



# Example of System Configuration

## Basic System

A simple system can be used as long as it is within the range that can be connected using a 3G-SDI coaxial cable with the maximum allowable length.



### Sample uses

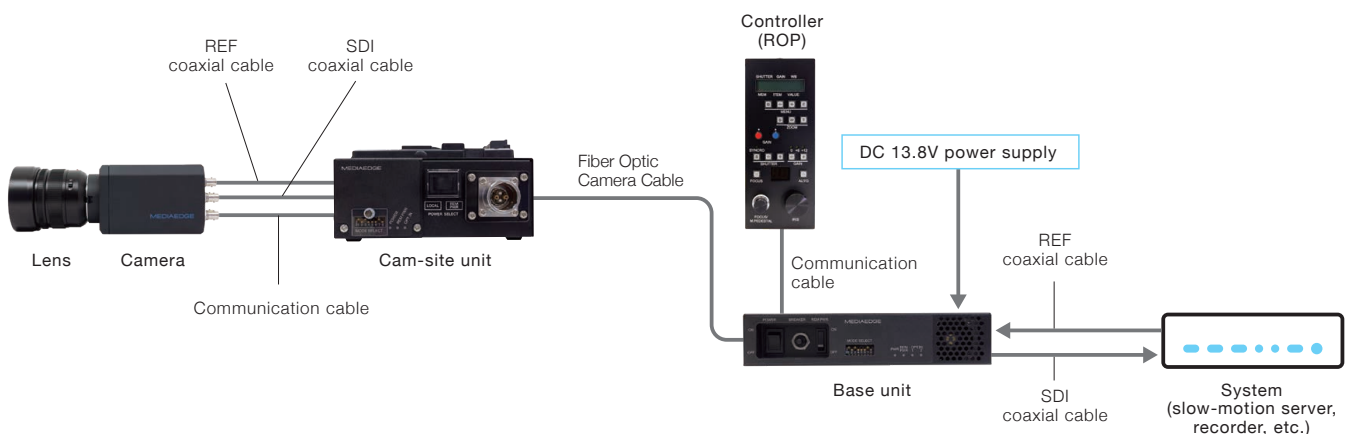
- Sports Judgement
- Sports analysis
- Video production
- ...etc.



## Fiber Optic Camera Cable Transmission System

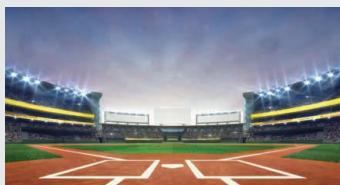
When operating in a stadium for sports broadcasting, or in cases where transmission over a large distance is required such as when using an OB van, optical transmission system can be used.

When supplying power to the camera via the optical camera cable, the maximum camera cable length is 500 m. When power is supplied directly to the cam-site unit, the maximum length can be extended to 2,000 m.



### Examples of uses

- Sports Broadcasting
- Sports Judgement
- ...etc.



At stadiums



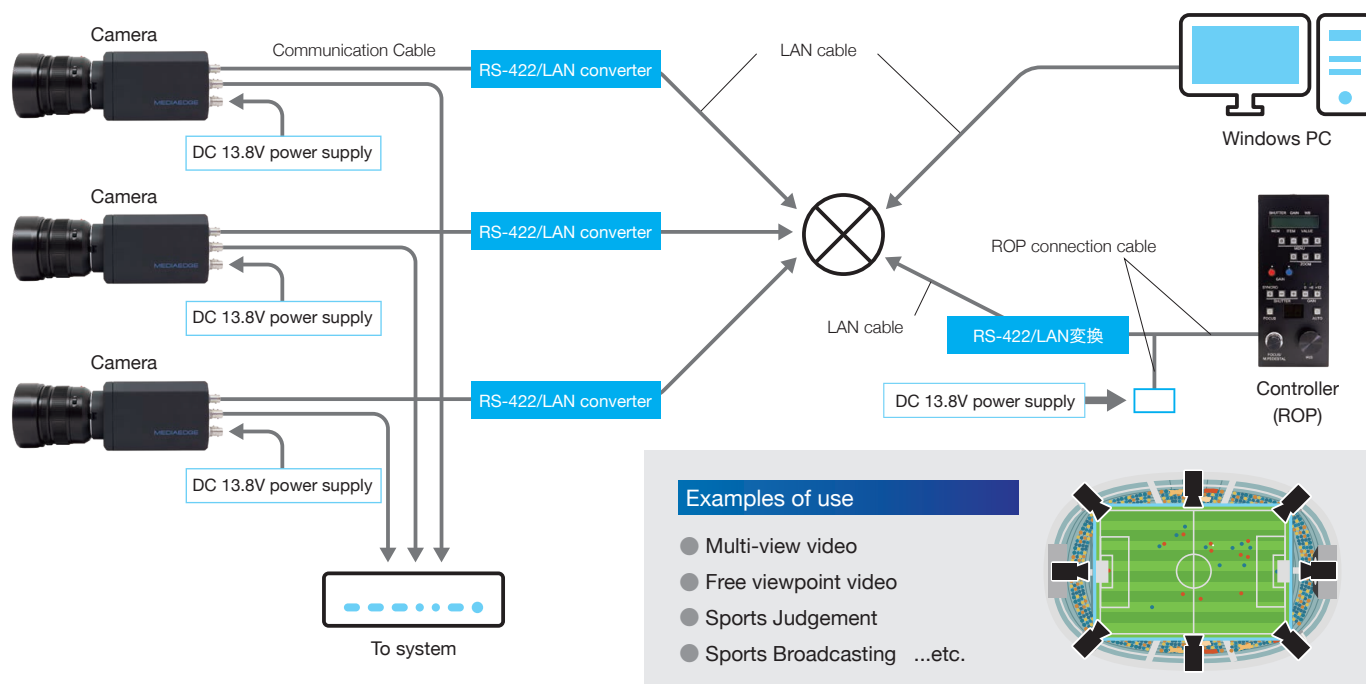
In sports arenas



Live golf broadcasts

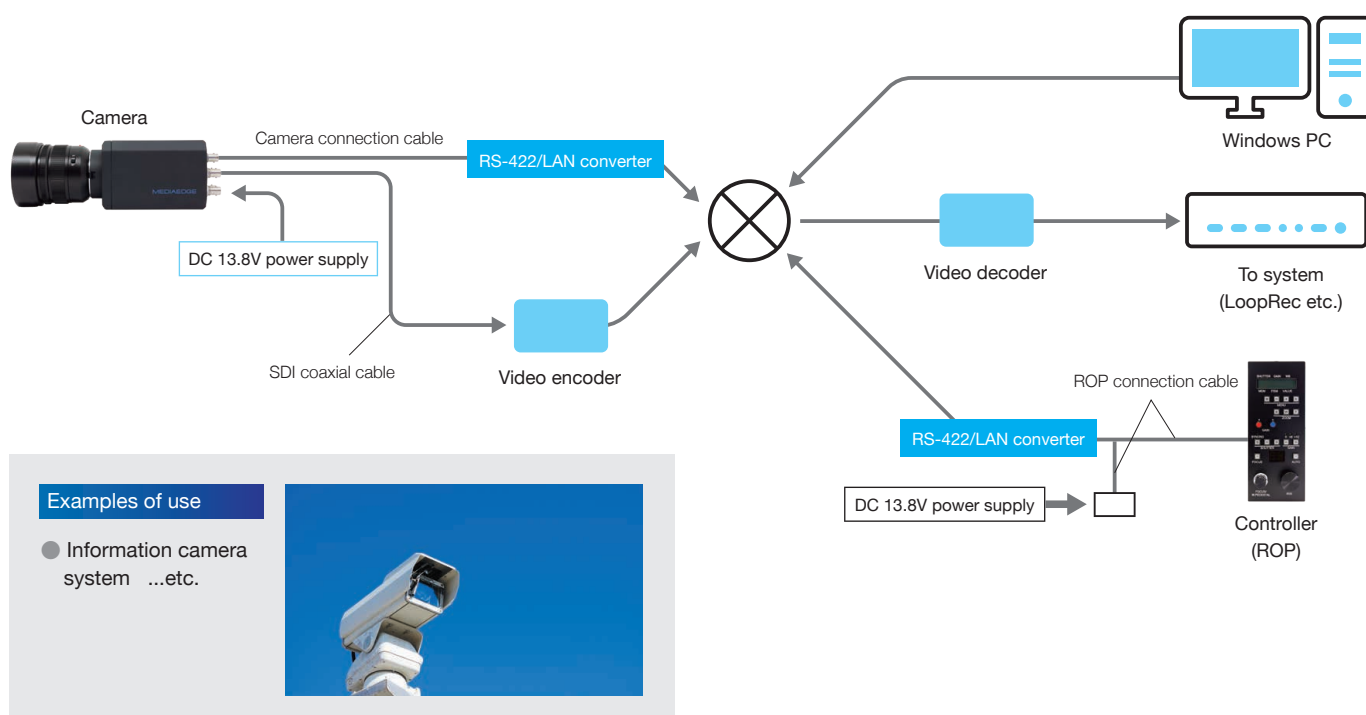
## Multi-Camera Central Control System

Remote control via an IP network is possible by performing LAN conversion of the RS-422 communication line used for camera and lens control. A QDCAM control app for Windows PCs is available, and up to 99 cameras and lenses can be controlled from a single Windows PC. The QDCAM control app allows independent control of each camera, as well as central control of a specified camera group. Cameras can also be identified by IP address, and controlled using the QDCAM controller (ROP).



## IP Network Remote Control System

An information camera, such as weather view camera, city view camera or traffic camera, which is installed in a distance from operation center, can be controlled via an IP network. In the same way as the multi-camera central control system, the QDCAM control app is used. When a video encoder is used, the video can also be transmitted using the same network.



# Slow-Motion Video Production

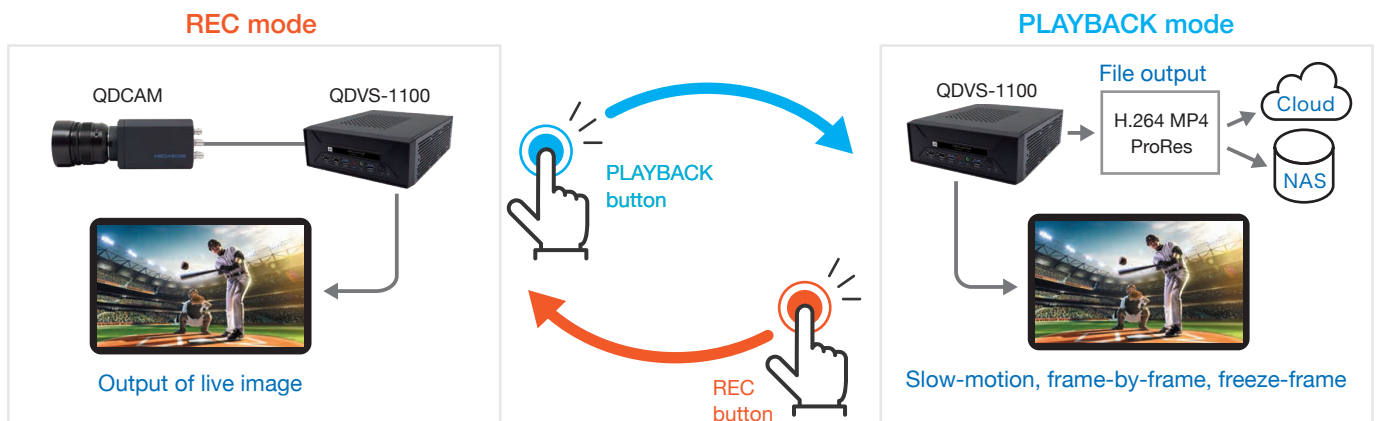
## Connecting to a Video Production Server

By connecting to a video production server or similar device, it is possible to perform slow-motion playback of live sports and to edit the highlights.



## Connecting to the Slow-Motion Recorder/Player QDVS

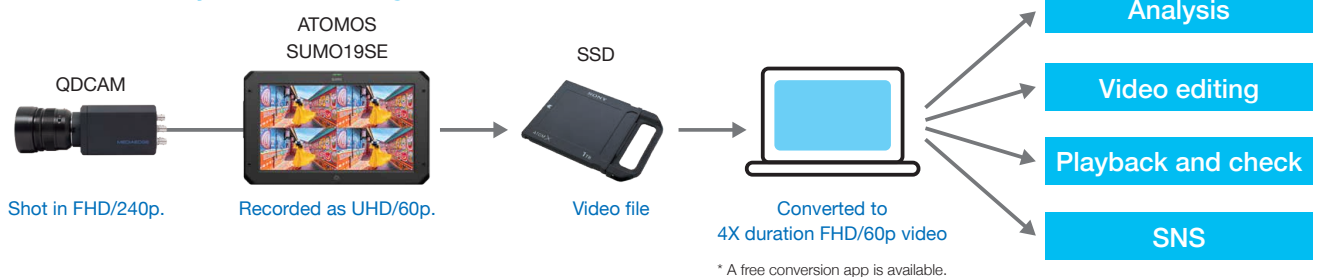
Loop recording is performed using the QDVS-1100 internal memory, and when a scene which you want to play again occurs, you can switch to playback mode and perform slow-motion playback, frame-by-frame playback, and freeze-frame display.



## Recording to a Portable Recorder and Offline Conversion

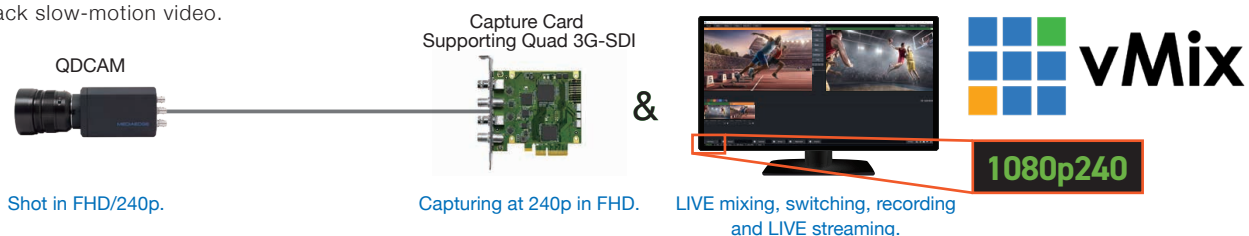
FHD/240p high-speed video can be recorded as UHD/60p 4K video, and the video file can be converted on a PC to 4X duration FHD/60p slow-motion video.

Video is recorded at the sports site, and the recording media is brought back to the office for analysis or uploading to SNSs.



## Connecting to Live Production and Streaming Software

Using a capture card, you can seamlessly capture 240fps video directly into vMix. This allows you to easily and cost-effectively capture and play back slow-motion video.





# Slow-Motion Recorder/Player

## QDVS-1100

The QDVS-1100 slow-motion server (recording/playback switching type) captures uncompressed QDCAM 240/200 fps high-speed video and records it by loop-recording in internal memory. When recording is stopped, it can perform FHD 60/50 fps slow-motion playback, frame-by-frame playback, or still-frame display. The playback speed and frame-by-frame playback can be operated as needed by keyboard operations or by using the optional jog controller or T-bar.



### ■ Live or delayed display during recording → Stop recording → Slow-motion, frame-by-frame, or still-frame display



While recording, both live display and delayed display are possible. A wide range of display settings are available that support all of the following: recording time, operation when recording is stopped while recording with delayed display, file transfer destination after encoding, still image settings, settings for divided memory use, and live display, as well as overlay display of a still image, drawn lines, or other image during slow-motion playback.

#### ● During recording



With live delayed display, checking immediately after the swing

#### ▶ During playback



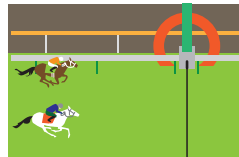
Slow-motion playback when user wants to check

#### ▶ During playback



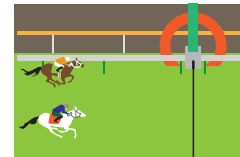
Frame-by-frame playback for more detailed checking

#### ● During recording



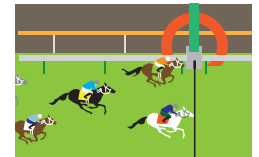
Setting the IN point when subject enters the frame

#### ▶ During playback



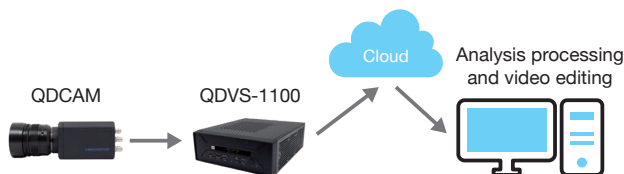
Recording stop, jump to IN point, and slow-motion playback

#### ▶ During playback



Frame-by-frame playback at goal line

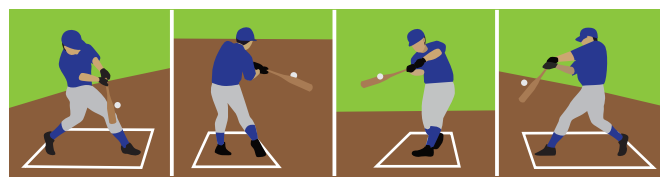
### ■ MP4 encoding function



A preset time of recorded video, or the time between the IN and OUT points, can be encoded in H.264-MP4 or MOV format and transferred to NAS or cloud storage.

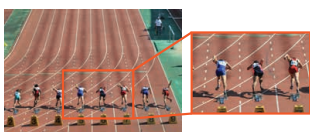
In addition to slow-motion playback, files can also be created for editing and analysis purposes.

### ■ Multi-camera simultaneous recording function



Simultaneous recording is supported. It is possible to use multiple sets of QDCAM and QDVS to synchronize recording and playback. Even with frame-by-frame playback of multi-angle high-speed video, multiple images can be displayed with precision synchronized timing.

### ■ Wide range of display functions



#### Zoom-in display during playback

The magnification function can be used during playback for a zoomed-in display centered on the desired location.



#### Picture overlay

Picture data can be overlaid to display sponsor logo, coaching assist lines, etc.

### ■ QDVS Series lineup

- QDVS-1100 / QDVS-500 25-second recording HDMI output
- QDVS-3000 5-minute recording HDMI output
- QDVS-5000 45-second recording, 10-bit support SDI output



- MSR-QDVS1K-W2UH Rack-mounting kit

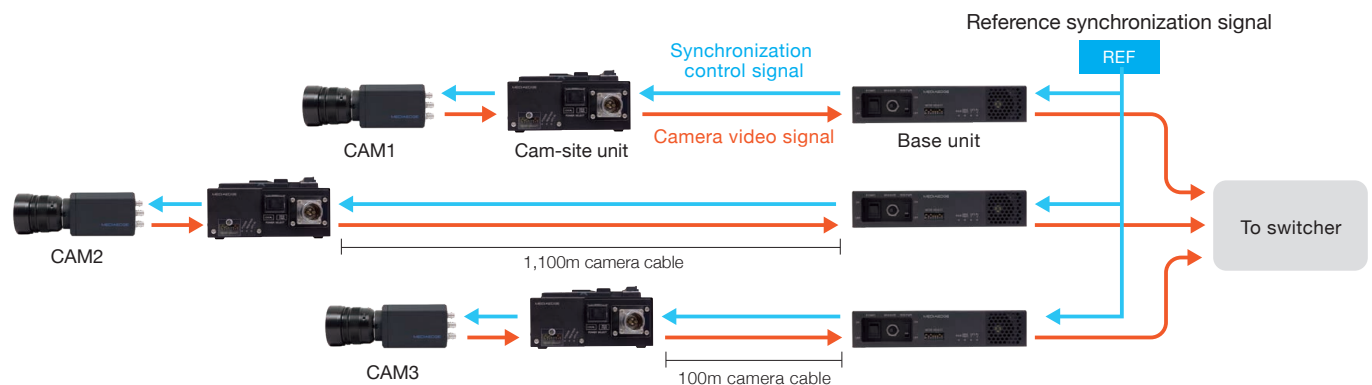
# System Functions

## Multi-Camera Synchronizing Exposure System

Consider a live sports broadcast system which transmits signals for multiple cameras using camera cables such as that shown below. With ordinary genlock synchronization, control is performed to align the video signal phases at the time of output from the base unit which is connected to the switcher. As a result, the exposure timing of each camera will be deviated due to the different camera cable lengths. For example, when a signal is transmitted 1,000 m using a fiber-optic cable, a delay of approximately 5  $\mu$ s occurs. As a result, the video signal becomes deviated by 5  $\mu$ s due to the different camera cable length, or else the synchronization control signal becomes deviated. This produces deviation of 5  $\mu$ s or more in the camera exposure timing.

However with QDCAM, the transmission delay time is measured when the base unit power is turned ON and when a camera cable is connected. After a dozen or so seconds for processing, the timing of synchronization control signal transmission will be advanced based on the measured delay time. This ensures that the synchronization signal phase is identical on the camera side, and enables fully synchronized exposure timing. (JAPAN patent / US patent) (EU patent pending)

This technology prevents deviation in timing when freezing the frame and when switching to another angle with multi-angle video. It also improves the calculation accuracy of systems which automatically make referee calls based on video images from multiple cameras.

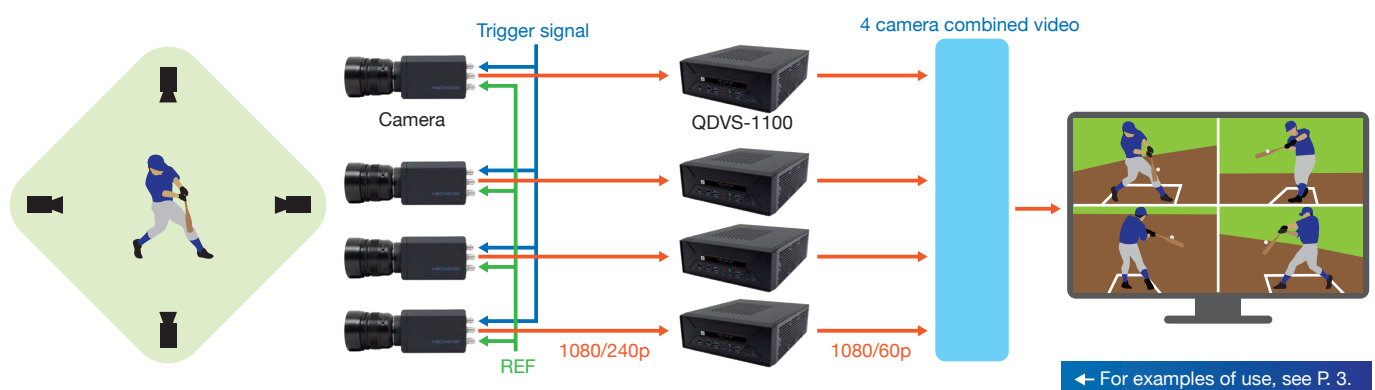


## Multi-Camera High-Speed Video Synchronizing Playback System

Linking a QDCAM camera and QDVS-1100 recorder/player allows synchronized slow-motion playback and frame-by-frame playback of high-speed video from multiple cameras. Because the camera exposure timing is fully synchronized, the timing matches even during frame-by-frame playback from multiple angles. As a result, it is possible to monitor for false starts in speed events, and check video for combat sports and other events.

With the QDVS-1100, encoding is performed with matching start frames, and the video files can be sent to external storage media or a PC for use in video editing and analysis.

In the system shown in the figure below, 4 cameras are shooting 1080/240p video. Synchronized shooting is possible at each camera using the reference synchronization signal (REF), and a common trigger signal is supplied. When each camera receives the trigger signal, it outputs high-speed video with a trigger pattern and supplies it to a QDVS-1100. When each QDVS-1100 detects the trigger pattern, it begins slow-motion playback from the specified time (specified number of frames) earlier based on the trigger pattern time position. Because one slow-motion controller can perform slow-motion playback, frame-by-frame playback, and freeze-frame of 4 QDVS-1100, it is possible to check video with matching time positions (frame numbers) in frame-by-frame or freeze-frame playback even in video which combines the images from 4 cameras.





## Products and Accessories



### QDCAM Camera

- Box camera  
Model ME-BXC-CM100

\* Lens and AC adapter are sold separately.



### QDCAM Controller

- ROP (operation panel)  
Model ME-BXC-RC100

\* With 5 m communication cable and connector



### QDCAM Transmission System

- Cam-site unit  
Model ME-BXC-CU100

\* With 3 m communication cable / Optical camera cable is sold separately and includes installation bands. Can also be used as an ordinary 12G-SDI video transmission system.



### QDCAM Transmission System

- Base unit  
Model ME-BXC-BU100

\* Optical camera cable and AC adapter are sold separately. Rack mounting kit MSR-BU100-W1UH: Can also be used as an ordinary 12G-SDI video transmission system.

### Communication Cables



- 10m  
Model ME-BXC-CC10M
- 20m  
Model ME-BXC-CC20M
- 30m  
Model ME-BXC-CC30M
- 50m  
Model ME-BXC-CC50M
- 60m  
Model ME-BXC-CC60M
- 3m  
Model ME-BXC-CC3M
- 5m  
Model ME-BXC-CC5M



### RS-422/LAN Converter Connection Cable

- Camera connection cable  
Model ME-BXC-SCA
- ROP connection cable  
Model ME-BXC-SCB

\* For connecting a MOXA NPort5130

### QDVS Slow-Motion Recorder/Player



- Recording time: 25 sec  
Model ME-QDVS-1100
- Recording time: 900 sec  
Model ME-QDVS-3000
- Recording time: 45 sec 422 10-bit  
Model ME-QDVS-5000

\* Rack mounting system MSR-QDVS1K-W2UH: 27,500JPY (tax inclusive)



- Recording time: 25 sec  
Model ME-QDVS-500

For MEDIAEDGE Share only



### Capture Card Supporting Quad 3G-SDI

- PC video capture card  
Model MS-SC710N1-12GSDI-QC

\* Includes Windows drivers.



### Musashi Controller Connection Kit

- USB-RS422 converter & cable  
Model ME-QDVS-OP422

## Peripheral Devices

### Jog Shuttle/Slow-Motion Controller

- Contour Design ShuttleExpress IM/SX Shuttle



### T-Bar Slow-Motion Controller



- MUSASHI MDC-70T



- MUSASHI MDC-22

### Monitor with Recording Functions



- SUMO 19SE High-brightness 19-inch



- SHOGUN STUDIO 2 Rack-mounting support Simultaneous recording of 2 monitors is possible.

\* The file conversion software can be downloaded from the MEDIAEDGE website.

## Main Product Specifications

### ● Box camera (ME-BXC-CM100)

|                         |   |
|-------------------------|---|
| Image Pickup Device     | 1/1.1" 8.8 megapixel CMOS imaging element with global shutter   |
| Imaging Method          | Single image sensor with Bayer color configuration  |
| Lens Mount              | Micro four thirds system  |
| Output Video Format     | 4096 × 2160/24p, 23.98p (Quad 1.5G-SDI)<br>3840 × 2160/60p, 59.94p, 50p (Quad 3G-SDI)<br>3840 × 2160/24p, 23.98p (Quad 1.5G-SDI)<br>1920 × 1080/240p, 239.8p, 200p (Quad 3G-SDI)<br>1920 × 1080/60p, 59.94p, 50p (3G-SDI)<br>1920 × 1080/24p, 23.98p (1.5G-SDI)<br>1920 × 1080/59.94i, 50i (1.5G-SDI) |
| Genlock Reference       | Tri-level Sync or Black Burst   |
| Communication Interface | RS-422 (using communication cable)  |
| Gain Setting            | -6 dB to +36 dB   |
| Shutter Speed Setting   | Shutter OFF to 1/12000 sec  |
| Gamma Setting           | BT.709 gamma / BT.2100 HLG  |
| Color Gamut Setting     | BT.709 / BT.2020  |
| White Balance           | Manual / Auto / Preset (2800K to 10000K)  |
| Flicker Cancel          | OFF / 50Hz / 60Hz   |
| Operating Temperature   | -5 to 45°C (23 to 113°F)  |
| Operating Humidity      | 20 to 80% RH (Must be no condensation.)   |
| Weight                  | 690g (1.52 lb)  |
| Dimensions              | 75 (W) × 127 (D) × 75 (H) mm (excluding protrusions)<br>3.0" (W) × 5.0" (D) × 3.0" (H) (excluding protrusions)  |
| Power Voltage           | DC 13.8V (DC 11.8 to 16.8V)   |
| Power Consumption       | 10W (excluding power supply to lens and controller)   |

### ● Slow-Motion Recorder/Player (ME-QDVS-1100)

|                       |   |   |
|-----------------------|---|---|
| USB Port              | USB3.0 standard   | Type A × 2 on front   |
|                       | USB2.0 standard   | Type A × 2 on front, 4 on back                                  |
| LAN Port              | RJ-45   | 1000Base-TX × 1<br>Conforms to Ethernet/IEEE802.3 frame format. |
| Video Output          | HDMI  | HDMI 2.0 × 1  |
| Operating Temperature | 0 to 50°C (32 to 122°F)   |   |
| Operating Humidity    | 10 to 90% RH (Must be no condensation.)   |   |
| Weight                | 1.91 kg (4.21 lb)   |   |
| Dimensions            | 200 (W) × 250 (D) × 78 (H) mm (excluding protrusions)<br>7.9" (W) × 8.1" (D) × 3.1" (H) (excluding protrusions) |   |
| Power Voltage         | AC adapter  | Input: AC 100 to 240V, 2.5 A max.<br>Output: DC 19.5V, 9.23 A   |
|                       | Main unit   | Input: DC 19.5V, 9.23 A   |
| Power Consumption     | 60W (during normal operation)   |   |

### ● Camera Controller (ME-BXC-RC100)

|                         |  |
|-------------------------|--|
| Communication Interface | RS-422 (using 10-pin communication cable)  |
| Operating Temperature   | 0 to 40°C (32 to 104°F)  |
| Operating Humidity      | 20 to 80% RH (Must be no condensation.)  |
| Weight                  | 850 g (1.87 lb)  |
| Dimensions              | 92 (W) × 226 (D) × 36 (H) mm (excluding protrusions)<br>3.6" (W) × 8.9" (D) × 1.4" (H) (excluding protrusions) |
| Power Voltage           | DC 13.8V (DC 11.8 to 16.8V)<br>* Power is supplied through the communication cable.                            |
| Power Consumption       | 1W   |
| Accessories             | 5 m communication cable,<br>cable connector, mounting bracket  |

### ● Transmission System Cam-Site Unit (ME-BXC-CU100)

|                         |   |
|-------------------------|---|
| Compatible Camera Cable | SMPTE 311 camera cable with SMPTE 304 connectors  |
| Cable Length            | Max. 500 m (when power is supplied to the camera through the camera cable)<br>Max. 2000 m (when local power supply is used for the camera unit) |
| Operating Temperature   | -5 to 45°C (23 to 113°F)  |
| Operating Humidity      | 30 to 90% RH (Must be no condensation.)   |
| Weight                  | 1.26 kg (2.78 lb)   |
| Dimensions              | 150 (W) × 150 (D) × 60 (H) mm (excluding protrusions)<br>5.9" (W) × 5.9" (D) × 2.4" (H) (excluding protrusions)                                 |
| Power Voltage           | DC 13.8V (DC 12 to 17V: when local power supply is used)  |
| Power Consumption       | 14W (not including camera power supply)   |

### ● Transmission System Base Unit (ME-BXC-BU100)

|                         |   |
|-------------------------|---|
| Compatible Camera Cable | SMPTE 311 camera cable with SMPTE 304 connectors  |
| Cable Length            | Max. 500 m (when power is supplied to camera through the camera cable)<br>Max. 2000 m (when local power supply is used for the camera unit) |
| Operating Temperature   | 0 to 40°C (32 to 104°F)   |
| Operating Humidity      | 30 to 90% RH (Must be no condensation.)   |
| Weight                  | 1.60 kg (3.53 lb)   |
| Dimensions              | 200 (W) × 200 (D) × 42 (H) mm (excluding protrusions)<br>7.9" (W) × 7.9" (D) × 1.7" (H) (excluding protrusions)                             |
| Power Voltage           | DC 13.8V (DC 12 to 17V: when local power supply is used)  |
| Power Consumption       | Max. 60W (including power supply to cam-site unit and cable loss)   |

\* Specifications may be changed without notice.

# MEDIAEDGE

<https://www.mediaedge.co.jp> (Japanese)  
<https://www.mediaedge-corp.com> (English)

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