

CamBall HD Remote Cameras



- DMX, Free D, M*, Motion Control Protocols
- Real Time Metadata for VR & AR
- 64 pre-programmed Moves
- Weatherproof & Rugged Carbon Fibre
- Output to 1080p
- 12bit Digital Signal Processing
- High Dynamic Range mode (HLG)
- Extensive CCU Control
- Genlock
- 30x optical zoom
- Slip Rings
- Inverted or Upright Mounting
- Switchable to Infra-Red sensitive
- Many Options & Accessories

CamBall4 model

Key Features

CamBall4 model	Key Features
CamBall XM	As above with 12bit sensors geared to shafts
Camball VR	+ 16bit absolute on-shaft encoders
Camball XM<i>i</i> Camball VR<i>i</i>	iBase For built-in IP & Fibre connectivity

The **CamBall XM/VR** is the latest in the long evolution of the **Camball**. Taking advantage of the latest in sensor technology and improved 12bit digital signal processing it offers better picture quality, extended CCU functions and a **High Dynamic Range** (HLG) feature. There are now 2 models, either of which can have the **iBase** which allows for built-in Fibre and/or IP connectivity, plus other options.

Over the past 15 years the **CamBall** has become a standard in the television and entertainment industries. Consistently outperforming competitors due to its ruggedness, feature-filled performance and weatherproof as standard. Move smoothness and CCU controllability are also notable compared to all others.

The **CamBall XM/VR** has many of the previous add-ons included in the standard model including HDR, Genlock, 1080p and Metadata. Our 'future-proof' design ethos has enabled these upgrades to be added to previous models. This ethos continues today and is central to our future developments.

Joystick Control

All the new **CamBall XM/VR** versions still respond in the same way to joystick control. Pan & Tilt speeds are now proportional to zoom angle on speeds 1-3 We have only *added* functionality, not removed any.

DMX Control

The '**DMX**' Control', developed in response to requests from leading show facilities, is now standard. It can still be controlled with any of our normal controllers but can also be controlled via 8 DMX channels, allowing 16bit commands in Pan, Tilt and Zoom plus Focus and Iris.

If the show computer can track follow spots then it can track this camera. When used as an auto tracking camera it can follow the artist extremely smoothly, including zoom & focus. The built-in **PMS** (Predictive Move Smoothing) algorithm predicts and smooths the moves. It also copes with missing data packets without stuttering.

BlackTrax has been used extremely successfully for **Camball** auto tracking. The **Camball** 3D model can be downloaded from **Cast-soft** and loaded straight into the show model – just like a lighting fixture. The model includes the pan and tilt angles and limits to get up and running in a matter of minutes.

The **CamBall** is the camera of choice for many stage shows and concert tours etc. It has been tried and trusted for over 15 years. Many are currently in use on major concert tours and configured as auto-tracking cameras, giving more shots-per-dollar than ever before.

Motion Control

With ever increasing moves towards automation, motion control, virtual reality and augmented reality, the **CamBall XM/VR** has it all. Using the industry-standard '**Free-D**' protocol for both Metadata and as a control protocol it enables full Motion Control. The **CamBall VR** has 16bit absolute encoders fitted directly onto the pan & tilt output shafts. This ensures zero mechanical linkage error (backlash) and also absolute positioning without the need for a home position. The **CamBall XM/VR** also responds to '**Mstar protocols**' which adds the ability to simultaneously control the camera CCU functions without interrupting the motion control.

Metadata

Metadata is the essential component for virtual and augmented reality (VR & AR). The **CamBall XM/VR** outputs **Real Time** continuous positional metadata in '**Free-D**' or **Mstar** format, whilst simultaneously responding to command inputs, either '**Mstar**', '**Free-D**' or '**Dstar**' commands. The metadata output contains, Pan, Tilt, Zoom, & Focus data and genlock status. This is sent as RS422 via the D-sub connector. A USB interface is available as an option.

The **genlock** input synchronises both the picture and the metadata and for higher accuracy, the **CamBall VR** has 16bit absolute shaft encoders which remove all variations due to mechanical backlash, non-linearity and other gear-train errors. They also remove the requirement to find a 'Home' position at start-up.

Pre-programmed Moves

All moves to pre-set positions follow a move profile, with Pan, Tilt and Zoom all moving in the same amount of **time**. The **total time**, the **ramp up** and **ramp down** are individually adjustable by the user via the **Multi-Function Controller**. The Zoom start and stop time can be independently adjusted.

This built-in on-shot move capability can often remove the need for external control of the camera. The **CamBall XM/VR** can perform position-to-position moves itself. So, a simple on-shot move can be programmed into the **CamBall XM/VR**. The **Real Time Metadata** enables the graphics computer to keep any overlays pinned to the shot.



These moves can also be externally triggered, either by a data command or via a GPIO unit. The BR Remote **Camera Automation Surface** is the ideal touch screen interface to utilise this feature and enable simple studio automation.

Control Priorities

No features have been removed from the normal joystick operation and the system is rigged in the normal way, with a joystick controller.

On all **CamBall** models, **Dstar**, '**DMX**', '**Free-D**' and '**M***' commands can be used. The operator can take control with the joystick panel at any time and, when no further joystick moves are detected, the camera automatically reverts back to the previous control protocol.

The pan and tilt speeds can be set to adjust proportionally to the zoom angle. This greatly assists with shots using pan, tilt and zoom simultaneously. As the camera zooms in the pan & tilt speed reduce so little displacement of the joystick is required to continue the shot. The reverse occurs when zooming out.

Master / Slave Operation

in development

The **CamBall XM/VR** can be used in master or a slave configuration. This enables its movements to be slaved to a master camera. The master camera can be another **CamBall XM/VR**, a manually operated camera on an encoded tripod, or any camera with a metadata output.

In 'Slave' mode, the camera follows the movements of the master camera with a variety of adjustable parameters, making it smooth and useable at all times. An example application is for a matching wide shot to a tighter shot master camera.

Environmental Protection

The **CamBall XM/VR** is weatherproof to **IP65** as standard. **IP66** can be specified. It can withstand extended periods outdoors without further protection. A remotely switched internal heater can be fitted to clear lens fogging in cold conditions. Additional heaters can be integrated for operating temperatures below -10C.

Mechanical

The main parts are machined from aluminium with deep pocketing to give a rigid and strong chassis. The carbon-fibre outer shell makes it very strong and durable. The motors and moving mechanics have been proven over many years, evolved from the original **CamBall**.

Slipping clutches are fitted to both axes to protect the motors and gearboxes. Unlike many competitors, these clutches prevent damage whilst rigging and during operation. It can be mounted either way up.

Slip rings enable continuous pans. All the power, data and video signals pass through the slip rings delivering HDSDI on the fixed base.

Pictures

The camera uses the latest sensor with 12bit DSP and is switchable to various standards up to 1080p. Both 50Hz and 60Hz frame rates are supported. Camera CCU functions are remotely controlled via our **Remote Camera Panel Mk3**. The CCU control on a small camera is unmatched, with both white and black level control, together with many other adjustments not normally available on small cameras. The new **Dynamic Noise Reduction** feature enables low noise with high gain settings.

The **CamBall** is used worldwide on many high-end, TV programmes and can be matched with larger cameras.

Zoom Lens

A **30x optical** zoom is standard, matched to the larger and higher resolution sensor. This has a wide angle of 64deg. and also the option of fitting a **Wide Angle Adaptor** inside the housing, giving a wide end nearing 90deg.



Specifications

Weight:	2.9kg(XM) – 3.1kg(VR)	
Dimensions:	W.166mm, H.222mm, D.206mm (+ connectors)	
Operating Temp:	-10 to +40degC Out of sunlight	
Environmental:	IP65 minimum (IP66 option)	
Mounting:	2 x 3/8", 2 x 1/4" + safety bond point	
Connections:	XLR4 - Power & Data, BNC1 – HDSDI, BNC2 – Genlock	
Power:	12-16v @ 1A	
Data:	RS485	
Control Protocols:	DMX (8 channels), Free D, Dstar, Mstar, (DMX model from CastSoft)	
Metadata:	Free-D RAW, Free-D Angular	
Pan Range:	360deg. Continuous. (DMX 720 deg.)	
Tilt Range:	+/- 120deg from vertical.	
Pan Speed Range:	<0.05deg/sec - >180deg/sec. Other ratios on request.	
Tilt Speed Range:	<0.03deg/sec - >120deg/sec. Other ratios on request.	
Speed Ranges (Gears):	10	
Speed Proportional:	Pan/Tilt Speed, proportional to zoom angle on ranges 1-3	
Pre-Set Positions:	64	
Positional Accuracy:	XM 0.083deg - VR 0.0055deg.	
Profile Moves:	64	
Profile Move Adjustments:	Ramp Up, Ramp Down, Total Time, Zoom Start +/-, Zoom End +/-	
Master/Slave Mode:	Multiple adjustable parameters for move slaving to a master camera	
Camera Sensor:	0.36" NMOS, 12bit DSP	
Active Pixels:	2.38 Mpixels	
Signal / Noise Ratio:	>50dB	
HDSDI Standards:	1080i/50/59.94/60, 720p/50/60, 1080p/23.97/24/25/29.97/30/50/59.94/60	
Zoom:	30x optical	
HFOV:	64deg. to 2.3deg	
MOD:	<30cm	
Distortion:	<3% (wide)	
Iris:	F1.6 - F28 – 256 steps	
Sensitivity:	1.4 lux. (F1.6 AGC On)	
PTZ Remote:	Pan, Tilt, Zoom, (fully proportional,) Iris, Focus, (positional), Pre-set Store (P,T,Z,F), Pre-set Recall, Profile Move Time, Profile Move Ramp Up, Profile Move Ramp Down, Profile Move Zoom Offsets, Absolute Position mode, P,T,Z,F reverse, speeds 1-10, Turbo Speed, Set Home, Goto Home, etc.	
CCU Remote:	Auto / Manual White, Pre-set White, Rgain, Bgain, Master Pedestal, Red Pedestal, Blue Pedestal, Shutter, Gain, Micro Gain, Gamma, Digital Zoom On/Off, Auto Iris On/Off, Auto Focus On/Off, IR Mode On/Off, Chroma, Detail, Shading, Knee, WDR, Dynamain Noise Reduction, RGB balance, Output Standard, ND Filter, Colour Bars, etc.	
iBase Connections:	IP control (RJ45), RS485, HDSDI, Genlock, Power ST SM Fibre for control (up to 10km) ST SM Fibre for pictures (up to 10km) SMPTE converter options Fibre Base Station	- all standard - option - option - option
Other Features:	High Dynamic Range (HLG), Genlock, Enhanced CCU Control, Slip Rings, Inverted or Upright Mounting, Switchable to Infra-Red sensitive, Genlock, LCD status screen, Master/Slave mode, Tally Light	



**Specifications subject to change without notice
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Options:

All CamBall models can be fitted with:

- iBase
- Wide angle convertors & Hoods
- Internal port heaters (7 watt)
- Internal space heaters
- Fixed ND Filter
- Variable ND Filter
- Roll levelling
- Genlock
- GPIO trigger interface



Variable ND Filter

There is also CamBall **Net-Cam** version. (toughened housing and faster operation for in-goal applications)

Compatible products include:

- Joystick Controllers
- Remote Camera Panels
- Radio data links
- Fibre Converters
- IP Converters
- Camera Automation System



Multi Function Controller



Remote Camera Panel

Please refer to our website for details of other products that we offer –

<http://br-remote.com/products>

iBase



iBase with IP and ST fibre options.

The **iBase** can be fitted to the **Camball XM** or the **Camball VR** they then become the **Camball XMi** and the **Camball VRi**.

Fitting the **iBase** enables **IP** and **Fibre** options to be fitted.

Standard Connections

XLR3 - Control Input

XLR4 - Power and Control input

Dsub9 - Metadata Output and Motion Control input

BNC - HDS DI output

BNC - Genlock input

Optional Connectivity

RJ45 - Control over IP (replaces XLR3)

Power over Ethernet (internal fitting)

HDS DI on Fibre (ST, LC, FC)

Control on Fibre (ST, LC, FC)

RE-Clocker (internal for increased cable range)

SMPTE connector (Neutrik or Lemo – includes 48v power)

For the fibre connections a compatible '**Base Station**' is required to send the control data and 48v power and to receive the HDS DI.



iBase fitted with SMPTE connector, fibre and 48v power options.

What our customers are saying about the CamBall:

Video Design have several **Camballs** used on concert tours.

'This is so good I'd be happy putting it on a show tomorrow' – Oli Metcalf

'The pictures are now so good you can't tell whether you're on a big camera or a robocam' – Alex Leinster

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In an article for Zerb magazine (The Guild of Television Cameramen) freelance cameraman **James Aldred** sang the praises of our CamBall cameras:

'By far the best option currently available in my opinion is the CamBall range of camera systems..... CamBalls have played a vital part in filming several tricky sequences at height in the past..

*.....Where the CamBall really came into its own was on a six-month installation inside the nest cave of a Californian condor in the Grand Canyon for Earth's Natural Wonders (TX BBC 2015).
..... That camera took everything Arizona could throw at it: storms, 40° heat, sub-zero cold, grit, sleet, even Condor droppings. It just kept on working. I tried hard to break it but I just couldn't!*

James Aldred, Zerb (Spring 2017)

<http://www.gtc.org.uk/media/fm/Zerb%20articles/High-level-web.pdf>

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Jo Charlesworth, freelance natural history camera operator

'In my opinion BR Remote make the best small form factor remote heads currently available, particularly with regard to the fluidity of pan and tilt control.

They already offer a wide range of products to suit most applications, but also have always been willing to undertake special projects for me, which has been extremely helpful for some of my natural history work.

I have been using their CamBall cameras for the last 10 years and have yet to find anything that performs better. During this time the picture quality has improved and the price has decreased. What more could you want?

Jo Charlesworth, Freelance camera operator

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