# JVC

HD/SD Memory Card Camera Recorder

# GY-HM660RE

**Breaking News, Breathtaking Views.**

**ProHD**

Shown with optional microphone.

# Live Streaming from Virtually Anywhere in the World.

Newsworthy things are happening all the time, so deliver it as it happens with the IP connectivity and live streaming capability of JVC's GY-HM660RE. And to make sure you can tell it as it is, this high quality camera captures a high quality bright image with F13 (50Hz)/F12 (60Hz) sensitivity.

## SMPTE 2022-1 Protocol

Newly supported SMPTE 2022-1 protocol enables simple error correction for high quality streaming.

## High Quality Live Streaming up to 12Mbps

Real-time Full HD live streaming via 4G LTE/3G, Wi-Fi, and Ethernet up to 12Mbps.

## Advanced IP Connectivity

Support various IP connectivity and IP functions, providing immediate delivery for ENG applications.

## F13 (50Hz)/F12 (60Hz) Sensitivity

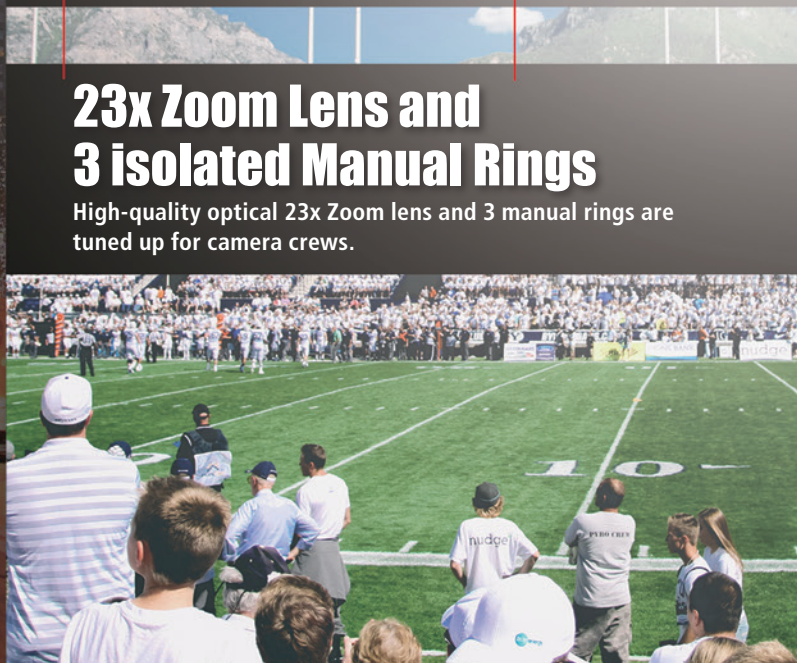New 3CMOS sensors enable extreme high sensitivity and low noise which strongly support ENG shooting.

## 23x Zoom Lens and 3 isolated Manual Rings

High-quality optical 23x Zoom lens and 3 manual rings are tuned up for camera crews.

# Quick Footage Transfer via FTP Server

Footage can be transferred from the camera while recording to an FTP server.
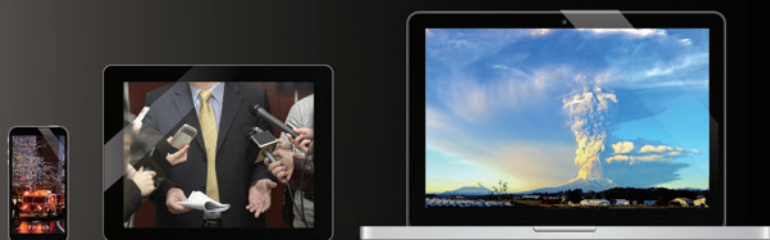
# Built-in Zixi Engine

Advanced live streaming with FEC and ARQ over 4G LTE or a standard Internet connection can be achieved with built-in Zixi technology.

# IP Remote Control

Remote control via wireless/wired LAN supported from smart devices and PCs to control the GY-HM660RE with screen viewing.

# 50Mbps H.264 & MPEG2, AVCHD Support

The GY-HM660RE supports various video formats and codecs required for just about any workflow.

# IFB Return Audio via IP

Live Streaming of original interview to Argentina at WTCC race of Thailand 2015

# Combination Rec with Dual CODEC

Recording to two SDHC/SDXC cards in same/different formats enable reliable backup and flexible utility with IP functions.

# Camera Features

## Newly developed 1/3-inch 3CMOS Sensor (1920 x 1080) boasts Sensitivity of F13/F12 (50/60Hz)

At the heart of the GY-HM660RE are three, newly developed 1/3-inch CMOS sensors with 2.5M pixels, each capable of capturing full HD 1920 x 1080 resolution images. Featuring 12-bit processing, an excellent sensitivity of F13 (50Hz)/F12 (60Hz) at 2000 lux, and a remarkable signal-to-noise ratio, the devices provide superior precision and color reproduction with minimal aberration. For improved CMOS sensor performance, flash-band compensation is also supported.

Compare the image brightness between sensitivity of F8 (left) of a conventional camera and F13 at 2000 lux on the GY-HM660RE.

## Revolutionary FALCONBRID™ Image Processing Engine

FALCONBRID™ is JVC's high-speed processor for advanced video applications. Delivering tremendous processing power on a single chip, the on-board engine is capable of processing large amounts of video data at exceptional speeds. The combination of FALCONBRID™ engine, 2D DNR processing & compensation circuitry, and wide dynamic range achieve superior image quality. The GY-HM660RE is equipped with two FALCONBRID™ engines, which enable parallel processing like recording at two formats (HD + SD and HD + Web) or Live Streaming while Recording.

## Various Codecs and File Formats including the Original H.264 XHQ (50Mbps) mode

FALCONBRID™ engine is capable of supporting major file formats such as .MXF with rich metadata optimized for asset management, .MOV with Apple Final Cut Pro, .MP4 of XDCAM EX™ cameras, and .MTS for AVCHD compatibility, as well as high-definition images in MPEG-2 35Mbps (HQ) and AVCHD 28Mbs (Progressive) format.

Furthermore, the processor also supports H.264 video format in 50Mbs extreme high quality (XHQ) mode for virtually no block noise and to capture high-speed moving subjects all the way to Web LP (480 x 270) mode (Web <Proxy>) suitable for internet applications. Using the camera's Dual recording capability, different combinations of HD+SD and HD+Web are also supported.

| Video format | | MPEG-2 | | | AVCHD | | | | | H.264 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mode (Bit rate) | | HQ (35Mbps) | SP (25Mbps) | SP (19Mbps) | Progressive (28Mbps) | HQ (24Mbps) | SP (18Mbps) | LP (9Mbps) | EP (5Mbps) | XHQ (50Mbps) | UHQ (35Mbps) | SD (8Mbps) | Web HQ (3Mbps) | Web LP (1.2Mbps) |
| File format | | MOV/MP4/MXF | | | MTS | | | | | MOV | | | | |
| Audio format | | Linear PCM 2ch | | | AC3 2ch | | | | | Linear PCM 2ch | | | µ-law 2ch | |
| HD | 1920 x 1080 | 60i/50i/ 30p/25p/24p | | | 60p/50p | 60i/50i | 60i/50i | | | 60p/60i/ 50p/50i/ 30p/25p/24p | 60i/50i/ 30p/25p/24p | | | |
| | 1440 x 1080 | 60i/50i/ | 60i/50i | | | | | 60i/50i | 60i/50i | | | | | |
| | 1280 x 720 | 60p/50p/ 30p/25p/24p* | | 60p/50p | | | | | | | | | | |
| SD | 720 x 576 | | | | | | | | | | | 50i | | |
| PROXY | 950 x 540 | | | | | | | | | | | | 30p/25p/24p | |
| | 480 x 270 | | | | | | | | | | | | | 30p/25p/24p |

*Only with MOV/M4 file formats

## 23x Fujinon Auto Focus Zoom Lens with Manual Functions

The GY-HM660RE is equipped with the Fujinon wide angle 23x optical zoom lens to offer sufficient magnification for shooting. Delivering superior low-light performance and ensuring brightness at the tele end, the lens offers F1.6-3.0, a focal range of 29mm-667mm (35mm equivalent) and includes servo zoom, manual focus, and iris rings, along with a four-position (clear, 1/4, 1/16 and 1/64) ND filter. Other features include an optical image stabilizer and chromatic aberration correction.

**23x Zoom Lens**

Focus, zoom and iris rings are isolated and ergonomically aligned with buttons offering intuitive, stress-free operations.
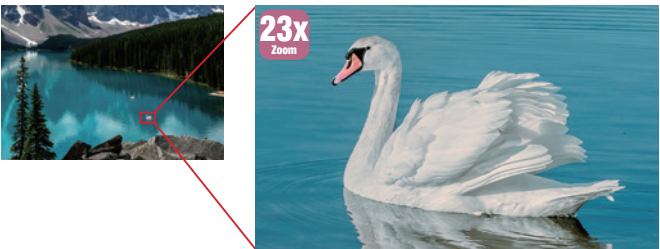
**23x Zoom**

23x zoom lens, sufficient magnification for shooting, at Wide end (left) on to Tele end (right).

## Upgraded High-resolution 920K Pixels 3.5-inch LCD Display with Focus Assist and various GUI

The high-resolution 920K pixels 3.5-inch LCD monitor provides a wide aspect ratio of 16:9 with a wide array of monitoring and setup indications. Since the LCD is top-mounted, not only is it ideal for shooting at various angles but also provides ample distance from the cameraman's eyes to the LCD to achieve better visibility in handheld camera applications. It also features a Focus Assist function that highlights the edges of objects shown in the viewfinder in color (red, green or blue) to help the cameraman stay focused on the action.

**3.5 inch**
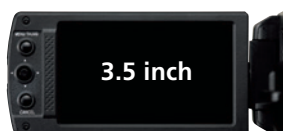


When the Focus Assist function is set to ON, objects that are in focus appear with colored edges (selectable from red, green or blue) as seen here.
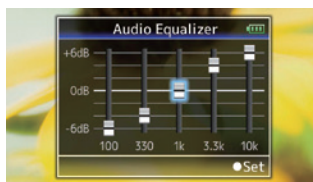


Audio equalizer
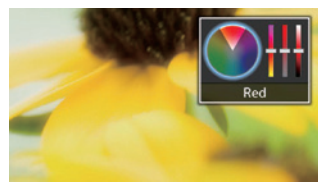


Color matrix adjustment

## Dual SDHC/SDXC Card Slots for Maximum Versatility

Dual SDHC/SDXC card slots make the GY-HM660RE a truly versatile camcorder, offering such benefits as series recording, dual recording, and backup recording modes using reliable and cost-effective media.

**Series (relay) recording mode:** Shoot continuously and seamlessly over multiple cards. When one card is full, the camcorder switches seamlessly and automatically to the other card. And because cards are hot swappable, there is in effect no limit to the continuous shooting time in any mode, even with lower capacity cards.
It is possible to start editing footage from one card while still shooting to the other.

**Dual (simultaneous) recording mode** (HD/HD, HD/SD or HD/Web)**:** Easily create duplicate backup files as you shoot—either to divide editing tasks or simply for peace of mind. With the new dual codec, it is now possible to record full HD files on one memory card while simultaneously creating smaller SD or proxy files on the other, providing the flexibility for a range of workflow possibilities.
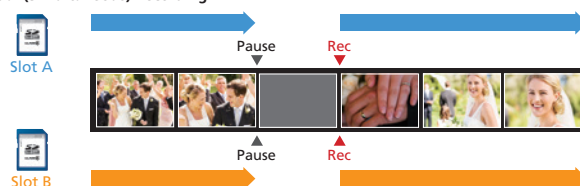
**Backup recording mode:** While the Rec trigger is used to REC and STOP recording on one card, the other card can act as a continuous backup that overrides the pause function.* This is a unique mode highly demanded by theatrical and bridal camera crews.

*During simultaneous backup recording in HD mode, the duplicate file records in the same file format and bit rate as the original.



## Cutting-edge Connectivity including SDI (HD/SD) Out

Equipped with leading edge connections, the GY-HM660RE offers versatility while meeting the needs of professional applications. For easy monitoring of footage, you can monitor from the digital SDI and HDMI outputs simultaneously, easily switching between output in HD or SD.

| | |
|---|---|
| SDI (HD/SD) out | XLR 3-pin x2 (MIC, +48V <phantom power>, LINE) |
| HDMI (HD/SD) out (60p/50p support) | Aux in for Wireless Receiver |
| TC Sync in/out | ø2.5mm Remote Control |
| AV out | ø3.5mm Stereo Headphone out |
| USB (Host x1, Device x1) | |

# IP Network & Live Streaming

## Live Streaming up to 12Mbps of High Bit Rate Streaming

If your task involves mission-critical ENG applications, turn to the GY-HM660RE as it is capable of streaming LIVE HD/SD and proxy video/audio files via network up to 12Mbps. Coupled with the superior mobility of the camera, this wireless capability allows you to stream backhaul live to the newsroom or to a reliable cloud service such as Zixi, as well as content delivery networks such as USTREAM and YouTube using Wi-Fi or 4G-LTE network. All you need to do is press a button and you're streaming HD to the world.

## IP Connection Realized with a Variety of USB Host Adapters

Full HD video footage recorded on the GY-HM660RE can stream backhaul live to the target location using an adapter such as 4G LTE/3G modem, Wi-Fi LAN, or Ethernet, whichever is more stable and cost-effective. Such use of an adapter enables uploading video clips to and receiving Metadata (in XML) from the FTP server, remote controlling web server content, viewing and editing Metadata, and most of all for live streaming footage from anywhere in the world immediately after it is recorded.

## Advanced IP Functions for FTP Uploading

Video clips recorded on an SDHC/SDXC card can be transferred from the GY-HM660RE via FTP server. Clips can be trimmed right on the camera, which is useful for selecting only vital scenes before uploading to an FTP server. What's more, if an upload is interrupted by a weak connection, the FTP Resume function is smart enough to restart from where it left off. This will help to save time for uploading.

## Supports SMPTE 2022-1 Protocol for HQ Streaming

Stable, high-quality live streaming over IP is made possible thanks to support for the new SMPTE 2022-1 protocol. Since its introduction in 2007, the SMPTE 2022-1 standard has added sections to cover more types of IP video transport. Of the standard, the GY-HM660RE supports the first protocol, which is  forward error correction (FEC) for real-time video/audio transport over IP networks.



On the field/Studio

Wi-Fi adapter

4G LTE or 3G modem

Ethernet adapter

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● Latency reduced for MPEG2-TS

WAN/LAN

INTERNET

**Optional Accessories**

**SSL-JVC50**
**Standard Li-ion Battery (IDX)**
DC7.4V, 4900mAh, 37Wh

**SSL-JVC75**
**Long-life Li-ion Battery with X-TAP Connector (IDX)**
DC7.4V, 7350mAh, 55Wh

**LC-2J**
**7.4V 2-ch Simultaneous Charger (IDX)**

## Advanced Live Streaming with Built-in Zixi Engine

For advanced live streaming solutions, JVC has tagged with Zixi. The GY-HM660RE features the Zixi engine, installed directly into the camera to provide high-quality delivery over 4G LTE or standard Internet connection. The powerful Zixi engine applies forward error correction (FEC) and adaptive bit rate control with the new "high reliable mode" to correct packet loss by over 40%*, delivering a robust, reliable HD stream. In the camera's FTP setting, the new Zixi protocol has been added for transferring clips while recording from the camera via Zixi server.

*Quality of live streaming depends on network conditions including packet loss.

## IP Remote Control with Viewing

When the camera is IP connected to a server console, vital camera operations can be remotely controlled via wireless or wired LAN from smart devices and computers. Remote control functions include lens and camera settings as well as registering zoom presets.
Best of all, recording and live streaming may also be triggered remotely—invaluable for minor adjustments when a single reporter is operating the camera or shooting with a 2-camera setup.



The camera on the stage can be remote controlled from a smart device. Controls include REC/STOP, Zoom, Focus, Iris and more detailed settings while viewing live images from the smart device screen.
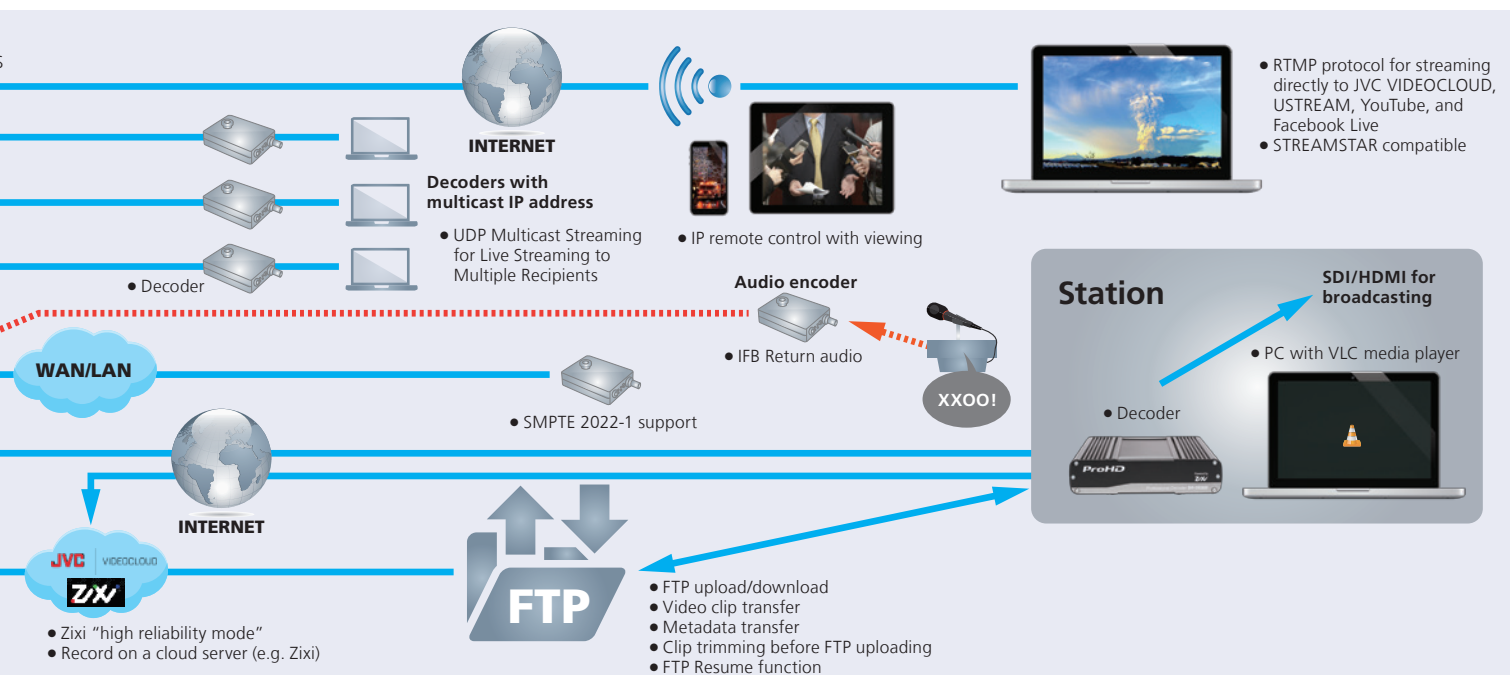
## IFB Return Audio via IP

With Interruptible FeedBack (IFB) return audio function*, the camera crew can listen to audio from remote locations via IP even while live streaming. The same audio can be heard from multiple GY-HM660RE cameras simultaneously.

*Requires other devices

## JVC VIDEOCLOUD Support

GY-HM660RE has JVC VIDEOCLOUD simple setting function. GY-HM660RE can easily connect with JVC VIDEOCLOUD by using IP remote controller.



- RTMP protocol for streaming directly to JVC VIDEOCLOUD, USTREAM, YouTube, and Facebook Live
- STREAMSTAR compatible

**INTERNET**

**Decoders with multicast IP address**
- UDP Multicast Streaming for Live Streaming to Multiple Recipients
- Decoder

- IP remote control with viewing

**Audio encoder**
- IFB Return audio

**Station**

**SDI/HDMI for broadcasting**
- PC with VLC media player
- Decoder

**WAN/LAN**
- SMPTE 2022-1 support

XXOO!

**INTERNET**

- Zixi "high reliability mode"
- Record on a cloud server (e.g. Zixi)

**FTP**
- FTP upload/download
- Video clip transfer
- Metadata transfer
- Clip trimming before FTP uploading
- FTP Resume function

### RM-LP100
**Remote Camera Controller via LAN**
(Firmware update is planned in Autumn 2017)



## SDHC Class 4/6/10, SDXC recording time (approx.)

A recording file is automatically split when the size exceeds 4GB. SDXC card users can select "Splits a file when it exceeds 4GB or 30 minutes" or "Splits a file when it exceeds 64GB or 4 hours" at MOV/MXF recording mode.

| | MOV/MP4/MXF | | | MTS | | | | | MOV | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | MPEG-2/HD | | | AVCHD | | | | | H.264/HD | | H.264/SD | H.264/Proxy | |
| | HQ | SP | | HQ Progressive | HQ | SP | LP | EP | XHQ | UHQ | SD | HQ | LP |
| | 720p/1080i | 1080i | 720p | 1080p | 1080i | | | | 1080i/1080p | | 480i/576i | 540p | 270p |
| 4GB | 12m | 17m | 22m | 16m | 19m | 25m | 46m | 1h 22m | 9m | 12m | 47m | 2h 10m | 4h 45m |
| 8GB | 25m | 35m | 45m | 33m | 38m | 50m | 1h 35m | 2h 48m | 18m | 25m | 1h 35m | 4h 30m | 9h 40m |
| 16GB | 50m | 1h 10m | 1h 30m | 1h 7m | 1h 18m | 1h 40m | 3h 10m | 5h 36m | 36m | 50m | 3h 10m | 9h | 19h 20m |
| 32GB | 1h 40m | 2h 20m | 3h | 2h 15m | 2h 36m | 3h 20m | 6h 20m | 11h 12m | 1h 12m | 1h 40m | 6h 20m | 18h | 19h 20m |
| 64GB | 3h 20m | 4h 40m | 6h | 4h 30m | 5h 12m | 6h 40m | 12h 40m | 22h 24m | 2h 25m | 3h 20m | 12h 40m | 36h | 78h 40m |
| 128GB | 6h 40m | 9h 20m | 12h | 9h | 10h 32m | 13h 20m | 25h 20m | 44h 48m | 4h 50m | 6h 40m | 25h 20m | 72h | 157h 20m |

Notes: Recording times are estimate. Recommended SDHC/SDXC memory card brands: Panasonic, Toshiba, and SanDisk
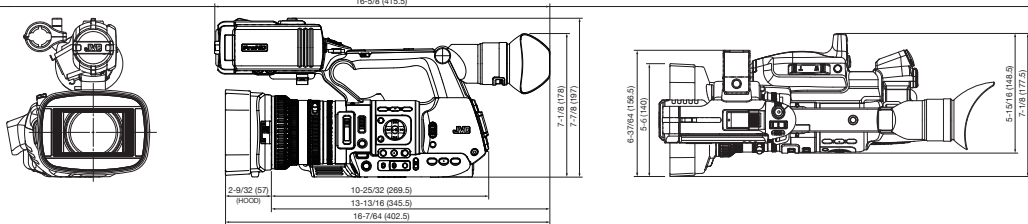SDHC Class 10 enabled only in XHQ mode; SDHC Class 4 enabled in AVCHD mode.

| GENERAL SPECIFICATIONS | |
|---|---|
| Power | DC12V (AC adapter), DC7.4V (battery) |
| Power consumption | Approx. 12 W (with VF in REC mode, default setting) |
| Dimensions | 177.5 mm (W) x 197 mm (H) x 415.5 mm (D) |
| Weight | approx. 2.5 kg (including battery) |
| Operation temperature | 0°C to 40°C (32°F to 104°F) |
| Storage temperature | -20°C to 50°C (14°F to 122°F) |
| Operating humidity | 30% to 80% |
| Storage humidity | under 85% |

| CAMERA | |
|---|---|
| Image sensor | 1/3" CMOS 2.5M pixels |
| Synchronizing | Internal synchronization |
| Stabilizer | Optical image stabilizer |
| Lens | F1.6 (wide) to F3.0 (Tele) f=4.1mm to 94.3mm (f=29 mm to 667mm (35mm equivalent)) |
| Filter diameter | 72mm |
| Shutter speed | 1/6 ~ 1/10000, EEI |
| Gain | (-6, -3: Extended mode only), 0, 3, 6, 9, 12, 15, 18,21,24 dB, Lolux (30,36 dB), AGC |
| ND filter | none, 1/4, 1/16, 1/64 |
| LCD display | 3.5-inch 920 k pixels, 16:9 |
| Viewfinder | 0.45-inch 1.22 M pixel, 16:9 |

| VIDEO/AUDIO RECORDING | | |
|---|---|---|
| Recording media | | 2x SDHC/SDXC memory card (HD: Class 6/10 AVCHD/SD/Web: Class4) |
| Video recording | Video codec | MPEG-4 AVC/H.264 (HD/SD), MPEG-2 Long GOP VBR (HD) - MPEG-2 Long GOP CBR (HD), AVCHD (HD/SD) |
| | File format | MOV, MP4, MTS (AVCHD), MXF |
| | HD (MPEG-2 Long GOP VBR) | NTSC setting: HQ mode:1920 x 1080/59.94i, 29.97p, 23.98p, 1440 x 1080/59.94i |
| | | 1280 x 720/59.94p, 29.97p, 23.98p (Max 35Mbps) |
| | | PAL setting: HQ mode: 1920 x 1080/50i, 25p, 1440x1080/50i |
| | | 1280 x 720/50i, 25p (Max 35Mbps) |
| | HD (MPEG-2 Long GOP CBR) | NTSC setting: SP mode: 1440x1080/59.94i, 1280x720/59.94p (18.3Mbps) |
| | | PAL setting: SP mode: 1440x1080/50i, 1280x720/50p (18.3Mbps) |
| | HD (H.264) | NTSC setting: XHQ mode: 1920x1080/59.94p, 59.94i, 29.97p, 23.98p (Max 50Mbps) |
| | | 1920x1080/59.94i, 29.97p, 23.98p (Max 35Mbps) |
| | | PAL setting: XHQ mode: 1920 x 1080/50p, 50i, 25p (Max 50Mbps) |
| | | 1920 x 1080/50i, 25p (Max 35Mbps) |
| | AVCHD | NTSC setting: Progressive mode (Max 28Mbps): 1920 x 1080/59.94p |
| | | HQ mode (Max 24Mbps): 1920 x 1080/59.94i, SP mode (Max 18Mbps): 1920 x1080/59.94i |
| | | LP mode (9Mbps): 1440 x 1080/59.94i, EP mode (5Mbps): 1440 x1080/59.94i |
| | | PAL setting: Progressive mode (Max 28Mbps): 1920 x 1080/50p |
| | | HQ mode (Max 24Mbps): 1920 x 1080/50i, SP mode (Max 18Mbps): 1920 x1080/50i |
| | | LP mode (9Mbps): 1440 x 1080/50i, EP mode (5Mbps): 1440 x1080/50i |
| | SD (H.264) | PAL setting: 720 x 576/50i |
| | Proxy (H.264) | NTSC setting: HQ mode (3Mbps): 960 x 540/29.97p, 23.98p, LP mode (1.2Mbps) |
| | | 480 x 270/29.97p, 23.98p |
| | | PAL setting: HQ mode (3Mbps): 960 x 540/25p, LP mode (1.2Mbps): 480 x 270/25p |
| Audio recording | | LPCM 2ch, 48kHz/16-bit (MOV/MP4), Dolby Digital, 2ch (AVCHD), µLaw 2ch (Proxy) |

| LIVE VIDEO STREAMING | |
|---|---|
| Protocol | RTMP, MPEG2-TS/UDP, MPEG2-TS/RTP, RTSP/RTP, ZIXI |
| Resolution and bit rate | 1920 x 1080 (59.94i/50i) Audio AAC 128 k 12/8/5/3 Mbps |
| | 1280 x 720 (59.94p/50p) Audio AAC 128 k 12/8/5/3 Mbps |
| | 1280 x 720 (29.97p/25p) Audio AAC 128 k 8/5/3/1.5 Mbps |
| | 720 x 480 (59.94i) 720 x 576 (50i) Audio AAC 128 k/64 k 8/5/3/1.5/0.8/0.3 Mbps<br>640 x 360 (59.94p/50p) Audio AAC 128 k 3/1. 5Mbps |
| | 640 x 360 (29.97p/25p) Audio AAC 128 k/64k 3/1.5/0.8/0.3 Mbps |

| INTERFACE | |
|---|---|
| Video output | AV output (ø3.5mm mini jack x1) |
| | SDI output (BNC x1) |
| | HDMI output x1 |
| Audio input | XLR x2 (MIC,+48V/LINE), ø3.5mm mini jack x1 |
| Audio output | AV output (ø3.5mm mini jack x1) |
| Headphone | ø3.5mm mini jack x1 |
| Remote | ø2.5mm mini jack x1 |
| Time code link input/output | RCA x1 |
| USB | HOST x1 (network connection), DEVICE x1 (mass storage) |

| PROVIDED ACCESSORIES | |
|---|---|
| Battery (SSL-JVC50) x1, AC adapter x1 | |

## Dimensions

Unit: inches (mm)



16-5/8 (415.5)
7-1/8 (178)
7-7/8 (197)
2-9/32 (57) (HOOD)
10-25/32 (269.5)
13-13/16 (345.5)
16-7/64 (402.5)

6-37/64 (156.5)
5-6 (140)
5-15/16 (148.6)
7-1/8 (177.5)

*Simulated pictures.*
*The values for weight and dimensions are approximate.*
*E.&O.E. Design and specifications subject to change without notice.*

# JVCKENWOOD

**DISTRIBUITO IN ITALIA DA:**
JVCKENWOOD Italia S.p.A.
Via Sirtori 7/9
20129 Milano (MI)
Tel: 02-204821
Fax: 02-29516281
E-mail: info@jvcpro.it

Per maggiori informazioni:
www.it.jvc.com
f Facebook JVCKENWOOD
▶ YouTube KENWOODCOMMUNITY
in LinkedIn JVCKENWOOD ITALIA S.p.A.

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