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PMW-350 Series

PMW-320 Series

Solid-State Memory Camcorder

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XDCAM EX

Exmor
FULL HD 3CMOS

CINEALTA

Two powerful new XDCAM EX™ shoulder camcorders – boost your creativity; smooth your DVCAM™ transition

Two long-awaited shoulder camcorders have joined the XDCAM EX Series portfolio: the powerful, affordable new PMW-350 and PMW-320. They come equipped with the cutting-edge imaging technology of Exmor™ full-HD CMOS sensors and - like all XDCAM EX camcorders - they use SxS™ memory cards as the recording media.

They support DVCAM format* recording, which is the de facto standard for business and industrial video production, while also maintaining legacy, facilitating migration, and opening doors to new creative possibilities with multi-camera operation, satellite transmission, and much more via the optional CBK-CE01 50-pin interface.

These powerful camcorders pave the way to superb visual expression and new levels of convenience at affordable price points.

* The PMW-350 requires the option CBK-SD01 hardware key. This is a standard feature for the PMW-320.



SxS Memory Cards Combine High Transfer Speed with High Reliability

SxS memory cards use the PCI Express interface to achieve an extremely high data transfer speed of 800 Mbps, and can resist considerable shock (1500 G) and vibration (15 G). Also, a unique Salvage function serves to restore content that is damaged by power loss or memory disconnection during recording*.

In addition to the conventional SxS PRO™ memory card, there is now a new member of the SxS memory card family, the SxS-1™**. This maintains the superb usability and high-speed transfer rate of the SxS PRO card, at an affordable price. A high-capacity SBS-32G1 (32-GB) SxS-1 memory card is available.

* In some cases, images recorded just before an accident may not be restored (several seconds). Salvage function does not guarantee content restoration.

** SxS-1 memory cards support fewer re-writes than SxS PRO memory cards. Notification is given when an SxS-1 memory card approaches end of life.

Based on Sony internal performance testing, when recorded at full capacity one time per day, SxS-1 Memory Card will continue to function for approximately five years. This value may differ depending on the device or usage condition.

Media Adaptors for Alternative Recording Media

Two optional media adaptors - the MEAD-MS01 and MEAD-SD01 - enable the use of a high-speed Memory Stick or SD memory card (respectively) as alternative recording media.

1. The Memory Stick PRO-HG Duo 'HX' Series is recommended for use with the MEAD-MS01. San Disk Class 10 SD memory cards are recommended for use with MEAD-SD01.
2. Slow Motion and Salvage functions are not supported.
3. An early version of the PMW-350 requires an upgrade to use the MEAD-SD01.

Selectable Format and Bit Rates

A choice of bit rate is offered with XDCAM EX products - either 35 Mbps (HQ mode) or 25 Mbps (SP mode) - depending on the desired picture quality and recording time.

1920 x 1080 HD Recording Using the MPEG-2 Long GOP Codec

XDCAM EX products record 1920 x 1080 HD images using the MPEG-2 Long GOP codec, which conforms to the MPEG-2 MP@HL compression standard. With this highly efficient codec and a large-capacity SxS memory card, XDCAM EX products record high-quality HD images for a long recording time of 140 minutes on a single 32-GB SxS memory card in SP mode.

When a clip spans two cards, the transition is seamless, with virtually no artifacts or frame loss. SxS memory cards can be hot-swapped while shooting, without interrupting the recording. This feature makes XDCAM EX products ideal for a wide variety of long-form content-production applications.

Multiple-format Recording: 1080/720 and Interlace/ Progressive Switchable Operation

XDCAM EX Series camcorders offer a wide array of recording formats for multiple content-creation applications. The recording mode is switchable between 1920 x 1080, 1280 x 720, and 1440 x 1080 resolution. The scanning system is also selectable from interlace and progressive, such as 59.94i, 50i, 59.94p, and 50p.

An SxS memory card can simultaneously hold a mix of multiple files in any of these recording formats, including DVCAM files allowing flexible memory card use**.

* Images are handled on XDCAM EX camcorders as 23.98p, and recorded as 59.94i signals via 2-3 pull-down in 1440x1080/23.98p (SP) mode.

** Memory cards with material recorded by a PMW-350 or PMW-320 camcorder in HQ 1440x1080 or DVCAM mode cannot be read by the PMW-EX1, PMW-EX3 and PMW-EX30.



Sony employs its considerable technical capabilities and know-how in the design of energy-efficient products. The PMW-350 is a good example of the company's camcorders in the networked HD domain. Designed to be environmentally friendly, the PMW-350 camcorder offers power consumption around 60% lower than conventional HD camcorders from Sony*, and its energy-saving design results in low CO2 emissions.

* As compared with the HDW-700 full-HD shoulder camcorder from Sony with a 2/3-inch image sensor.

PMW-350 Series PMW-320 Series



PMW-350K
(supplied with lens)
PMW-350L
(supplied without lens)

PMW-320K
(supplied with lens)
PMW-320L
(supplied without lens)

Three Exmor Full-HD CMOS Sensors



The PMW-350 and PMW-320 are equipped with three Exmor CMOS sensors, which deliver superb picture performance with full-HD resolution. The PMW-350 has a 2/3-inch-type image sensor, and the PMW-320 has a 1/2-inch-type image sensor. Both sensors provide an excellent sensitivity (F12 for the PMW-350 and F10 for the PMW-320), a remarkable signal-to-noise ratio (59 dB for the PMW-350 and 54dB for the PMW-320), and high horizontal resolution of 1,000 TV lines*. These high-performance sensors result in high-quality digital signals with extremely low noise. This significantly enhances shooting in low-light environments. Additionally, these large sensors can capture images with a shallower depth of field, giving users more freedom of creative expression.

* In HD-SDI, HQ 1080 mode.

Impressive Body Design

Designed to be very compact and ergonomically well balanced, the PMW-350 and PMW-320 provide a high level of mobility and comfort in various shooting situations. In particular, the main body of the PMW-350 weighs only 7lb 1 oz (3.2 kg), and it is one of the lightest shoulder camcorders with three 2/3-inch-type full-HD imagers. These camcorders have a low center of gravity, ensuring outstanding stability on the shoulder. The low-profile design provides a wide space between the main frame of the camera and the handle, and an unobstructed view to the right-hand side of the camera operator. The position of the shoulder pad can be adjusted to provide users with optimum weight balance even if the camera is docked with any type of lens or camera adaptor.

Low Power Consumption

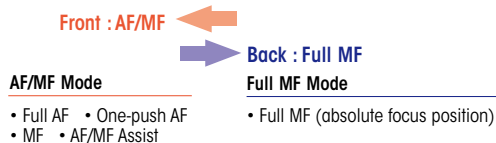
For the PMW-350 and PMW-320, power consumption is only 18 W*, and they can operate for approximately 310 minutes on a fully charged BP-GL95 battery pack.

* with supplied viewfinder, lens, and microphone while recording

Lens Package Choice (PMW-350K and PMW-320K only)

The PMW-350K and PMW-320K models come equipped with an HD lens with a standard bayonet interface. This lens features unique focus operation, as described below:

- The lens is equipped with two independent focus wheel mechanisms, which can be switched between Auto Focus mode and Full Manual Focus mode by sliding the focus ring itself back and forth.
- The MF Assist function helps to precisely focus on the target subject when shooting in MF mode. In this mode, Auto Focus is momentarily activated when the user stops adjusting the focus ring.



ALAC (Automatic Lens Aberration Compensation)

This feature decreases any chromatic aberration caused by the lens*. ALAC is activated only with the supplied lens and with certain third-party lenses that incorporate compensation data*.

* Please check with other lens manufacturers for ALAC support.

23.98p Native Recording

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The PMW-350 and PMW-320 offer a native 23.98p* recording capability. This feature, accompanied by other creative features, makes the camcorder ideal for cinema production.

* In 1440x1080/23.98p (SP) mode, images are handled as 23.98p and recorded as 59.94i signals via 2-3 pull-down.

Slow & Quick Motion Function

The PMW-350 and PMW-320 offer a Slow & Quick Motion function that enables users to create unique 'looks' by slow- and fast-motion effects. The camcorders can capture images at frame rates selectable from 1 frame per second (fps) to 60 fps in 720p mode and from 1 fps to 30 fps in 1080p mode, in increments of 1 fps. For example, when viewed at 23.98p, images captured at 60 fps appear two-and-a-half times slower than normal. Conversely, images captured at 4 fps appear six times faster than normal. With this function, images are recorded natively with no padded frames and at full resolution.

Slow Shutter Function

The maximum accumulation period is at a 64-frame shutter speed.

Selectable Gamma Curves

The PMW-350 and PMW-320 offer a wide variety of gamma curves to flexibly handle contrast, and give a specific 'look' to an image. In addition to six types of standard gamma curves, there are four types of Hyper Gamma which are identical to those on high-end CineAlta™ camcorders.

Interval Recording Function

The Interval Recording function intermittently records one frame at pre-determined intervals. This is convenient for shooting over long periods of time, and also when creating special effects with extremely rapid motion.

Frame Recording Function

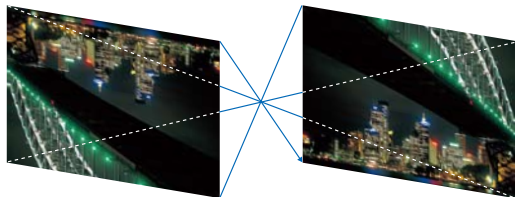
The Frame Recording function is particularly useful for clay animation shooting.

ATW (Auto Tracing White Balance) and Hold

The Auto Tracing White Balance function automatically adjusts the camera's color temperature according to changes in lighting conditions. If required, the user can hold auto tracing at a desired color balance via an assignable switch.

Image Inverter

With a DOF (Depth of Field) adaptor to attach a cinema or still-camera lens to the camera, the image is rotated 180 degrees. This Image Inverter function normalizes the image by reverse scanning.



Turbo Gain

The gain can be chosen from a wide range of preset values between -3 dB and +42 dB*.

* The range for the PMW-320 is between -3 dB and +24 dB.

DVCAM Recording and Playback



To realize smooth migration from current SD operation to near-future HD operation, the PMW-320 supports DVCAM format recording and playback as the standard function. For the PMW-350, an optional hardware key, the CBK-DV01, is required.

Picture Cache Recording

With the Picture Cache Recording function, up to 15 seconds of audio and video signals are buffered into the camcorder's internal memory even before the record start button is pressed. This helps to prevent loss of any unexpected yet important events.

Freeze Mix Function

The Freeze Mix function superimposes a previously recorded image on the viewfinder. This allows the operator to quickly and easily frame or reposition a subject when a shot must be taken from the same position, or in the same framework, as a previous take.

Four-channel Audio*

The PMW-350 and PMW-320 come equipped with four channels of 16-bit, 48-kHz, linear PCM uncompressed audio recording. Each channel level can be controlled individually.

* When an SxS memory card with four-channel audio is replayed by the PMW-EX1, PMW-EX1R, PMW-EX3, or PMW-EX30, only CH-1/2 or CH-3/4 can be replayed.

Scene File System

The Scene File feature allows camera operators to easily call up customized picture-tonal settings - such as the parameters of matrix, detail, gamma, and knee - to suit particular shooting conditions. This gives users greater operational efficiency. SxS memory cards can be used for storing and loading scene files.

Viewfinder with 3.5-inch* Color LCD

The PMW-350 and PMW-320 have a large, easy-to-view, color LCD with a high resolution of 1920 x 480 pixels, which simplifies focusing. The viewfinder can also be used to instantly review recorded footage, as well as access and view the camera's set-up menus, thumbnails, and status indications.

Both camcorders also have an interface for the DXF-20W, DXF-51, and DXF-C50W**.

* Viewable area measured diagonally.

** The supplied viewfinder and DXF viewfinder cannot be used concurrently.



HDMI

HDMI

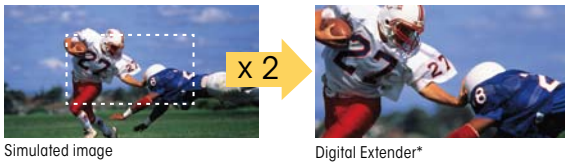
The PMW-350 and PMW-320 are equipped with an HDMI connector.

50-pin Interface and Digital Extender Function

The CBK-CE01, a 50-pin interface option*, offers a Digital Extender** function, which digitally doubles images in size. Unlike lens extenders, this function virtually does not lose image sensitivity, often referred to as the F-drop phenomenon.

* The CBK-CE01 is planned to be available in the end of November 2010. An upgrade to activate the Digital Extender function is planned to be released at the beginning of 2011.

** The Digital Extender function can not operate with Slow & Quick function.



Camera Adaptor for Multi-camera Operation

The CBK-CE01 also offers PMW-350 and PMW-320 connection to the XDCA-55, Camera Adaptor. This newly-designed camera adaptor and the XDCU-50, Camera Extension Unit enable control of the camcorders from a distance of 100 m, and expands the potential of these camcorders for multi-camera operation.

* The XDCA-55 and XDCU-50 are planned to be available in November 2010.



Affordable MPEG TS Option for Field and Satellite Transmission

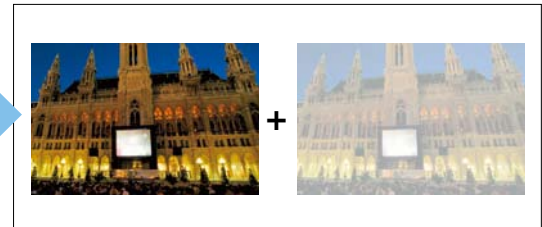
The HDCA-702 MPEG TS adaptor, which can be directly docked onto the PMW-350 and PMW-320, transmits an MPEG Transport Stream (TS) of MPEG via a DVB-ASI output. This function also requires the CBK-CE01; HDCA-702 activation is planned to be available at the beginning of 2011.

Flash Band Correction

Before Correction



After Correction



Simulated image

Acquisition Metadata (HD mode only)

As part of a variety of metadata, XDCAM EX camcorders have a unique capability of recording camera parameters onto the recording media while shooting - such as Focus, Zoom, Iris, Shutter, Gain, White Balance and Gamma.

The supplied software Clip Browser V2.6 allows users to review these acquisition metadata in viewing clips, which is useful as a reference for the editing process or the next shooting.

Camera Remote Control

A Sony 8-pin remote interface is supplied with the PMW-350 and PMW-320. Various camera settings can be remotely controlled using an optional Remote Control Unit, RM-B150, or RM-B750, or an optional Remote Control Panel, RCP-750, RCP-751, RCP-920, RCP-921, RCP-1000, RCP-1001, RCP-1500, RCP-1501, or RCP-1530 via its 8-pin remote connector*. Composite output is always available for monitoring purposes, regardless of HD/SD output selection.

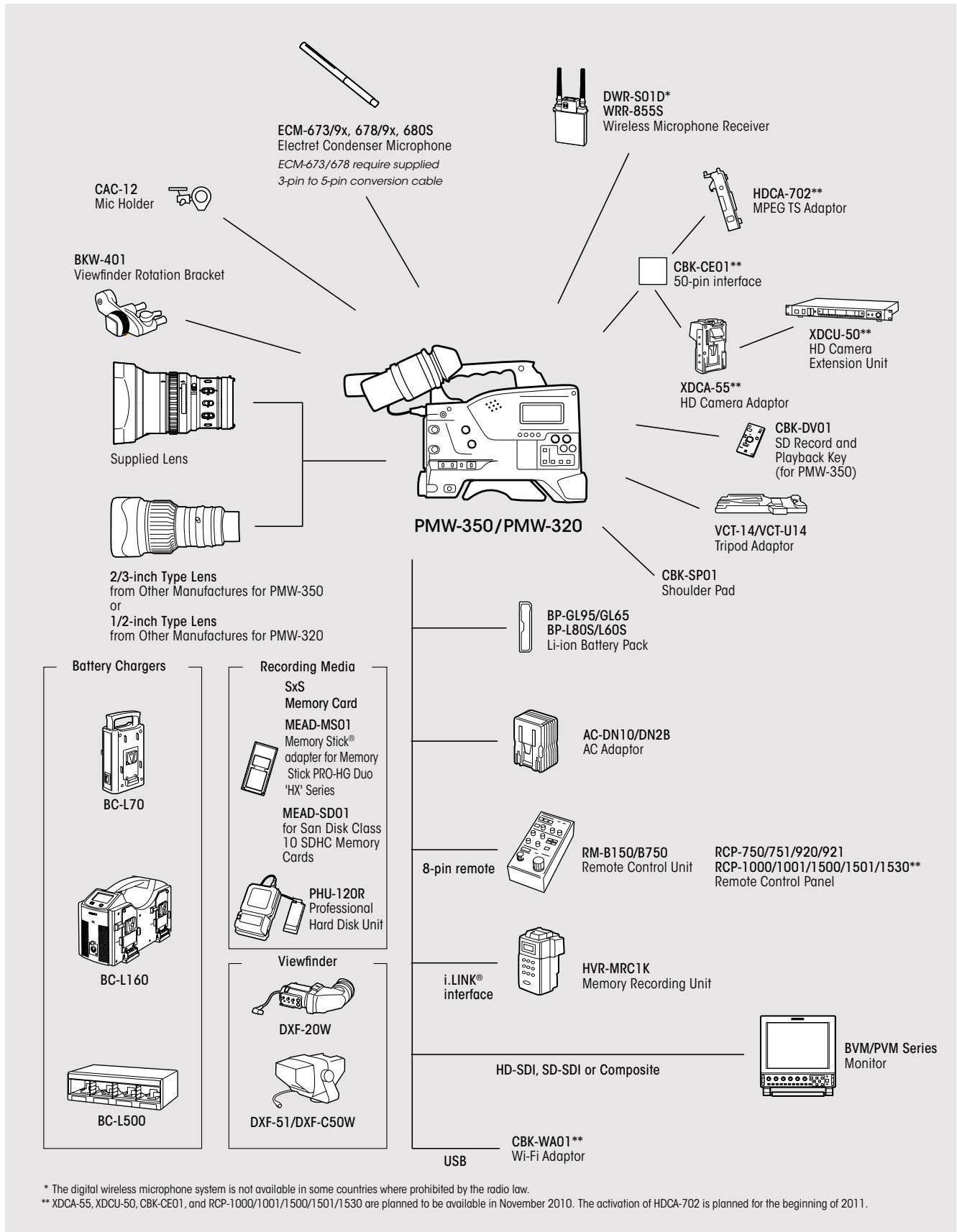
* Some controls on the remote control unit are not supported by the PMW-350 and PMW-320. Activation of RCP-1000/1001/1500/1501/1530 is planned for November 2010.

Supplied software for powerful, easy and intuitive management of recorded content

Supplied Clip Browser Version 2.6* enables not only to browse the video clip on PC or Macintosh, but also to display Acquisition Metadata of the clip, to detect and correct for Flash Bands, to convert file formats for nonlinear editing and portable devices, to register and edit metadata and to create still-image files (BMP files) for desired scenes. PDZK-P1 Version.2.12*, XDCAM® Transfer is plug-in software for Apple Final Cut Pro® nonlinear editing systems that provides support for MP4 files recorded by XDCAM EX products.

* The latest version of this software can be downloaded from Sony website. PDZK-P1 does not support DVCAM (AVI) files.

Camcorder System Diagrams



* The digital wireless microphone system is not available in some countries where prohibited by the radio law.

** XDCA-55, XDCU-50, CBK-CE01, and RCP-1000/1001/1500/1501/1530 are planned to be available in November 2010. The activation of HDCA-702 is planned for the beginning of 2011.

Optional Accessories for PMW-350 Series and PMW-320 Series



SBP-32/16
SxS PRO Memory Card



SBS-32G1
SxS-1 Memory Card



MEAD-MS01
Media Adaptor



MS-HX8G, HX16G, HX32G
Memory Stick PRO-HG Duo™
HX Series



MEAD-SD01
Media Adaptor



San Disk
Class 10 SDHC Card



PHU-120R
Professional Harddisk Unit



PXU-MS240
Mobile Storage Unit
Compatible with SxS Cards only.



PXU-HC240
HDD Cartridge
Compatible with SxS Cards only.



HVR-MRC1K
Memory Recording Unit



SBAC-US10
SxS Memory Card USB Reader/
Writer



BP-GL95/GL65/L80S/L60S
Lithium-ion Battery Pack
Photo Shows BP-L80S/L60S



AC-DN10/DN2B
AC Adaptor
Photo Shows AC-DN10



BC-L500/L160/L70
Battery Charger
Photo Shows BC-L500



RM-B150
Remote Control Unit



RM-B750
Remote Control Unit



RCP-750/751/920/921
Remote Control Panel
Photo Shows RCP-920
Photo Shows RCP-1000



**RCP-1000/1001/1500/
1501/1530****
Remote Control Panel



ECM-680S
Shotgun-type Electret Condenser
Microphone
Photo Shows ECM-678, Requires 3-pin to
5-pin conversion cable



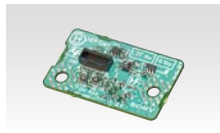
ECM-673/9X, 678/9X
Shotgun-type Electret Condenser
Microphone



WRR-855S
Wireless Microphone Receiver



DWR-S01D*
Wireless Microphone Receiver



CBK-DV01
SD Recording and Playback Key
(for PMW-350)



CBK-SP01
Shoulder Pad



VCT-14/VCT-U14
Tripod Adaptor



DXF-20W
2.0-type Monochrome Viewfinder



DXF-51
5-type Monochrome Viewfinder



DXF-C50W
5-type LCD Color Viewfinder



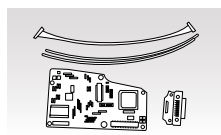
BKW-401
Viewfinder Rotation Bracket



CAC-12
Mic Holder



HDCA-702**
MPEG TS Adaptor



CBK-CE01**
50-pin Interface and
Digital Extender



XDCA-55**
HD Camera Adaptor



XDCU-50**
HD Camera Extension Unit

* The digital wireless microphone system is not available in some countries where prohibited by the radio law.

** XDCA-55, XDCU-50, CBK-CE01, and RCP-1000/1001/1500/1501/1530 are planned to be available in November 2010. The activation of HDCA-702 is planned for the beginning of 2011. The activation of CBK-WA01 will be in the Spring of 2011.

Specifications

| | PMW-350K, PMW-350L *1 | PMW-320K, PMW-320L *1 |
|--|--|--|
| General | | |
| Weight | 7 lb 1 oz (3.2 kg) (without lens), 13 lb 14 oz (6.3 kg) (with LCD VF, AF lens, Mic, BP-GL95 battery, one SxS PRO memory card) | |
| Dimensions (W x H x D) | 5 x 10 5/8 x 13 1/8 inches (124 x 269 x 332 mm) without projection (body) | |
| Power requirements | DC 12 V | |
| Power consumption | Approx. 18 W (with supplied viewfinder, lens, and microphone while recording), Approx. 15 W (body while recording) | |
| Operating temperature | 32°F to 104°F (0°C to 40°C) | |
| Storage temperature | -4°F to +140°F (-20°C to +60°C) | |
| Battery operating time | Approx. 310 min with BP-GL95 battery | |
| Recording format (Video) | MPEG-2 Long GOP HQ mode: VBR, maximum bit rate: 35 Mbps, MPEG-2 MP@HL SP mode: CBR, 25 Mbps, MPEG-2 MP@H-14 SD mode (option): DVCAM | MPEG-2 Long GOP HQ mode: VBR, maximum bit rate: 35 Mbps, MPEG-2 MP@HL SP mode: CBR, 25 Mbps, MPEG-2 MP@H-14 SD mode: DVCAM |
| Recording format (Audio) | HD mode: Linear PCM (4 ch, 16-bit, 48-kHz), SD mode (option): Linear PCM (2 ch, 16-bit, 48-kHz) | |
| Recording frame rate | NTSC area: HQ mode: 1920 x 1080/59.94i, 29.97p, 23.98p, 1440 x 1080/59.94i, 29.97p, 23.98p, 1280 x 720/59.94p, 29.97p, 23.98p SP mode: 1440 x 1080/59.94i, 23.98p (pull down) SD mode (option): 720 x 480/59.94i, 29.97PsF PAL area: HQ mode: 1920 x 1080/50i, 25p, 1440 x 1080/50i, 25p, 1280 x 720/50p, 25p SP mode: 1440 x 1080/50i, SD mode (Option): 720 x 576/50i, 25PsF | NTSC area: HQ mode: 1920 x 1080/59.94i, 29.97p, 23.98p, 1440 x 1080/59.94i, 29.97p, 23.98p, 1280 x 720/59.94p, 29.97p, 23.98p SP mode: 1440 x 1080/59.94i, 23.98p (pull down) SD mode: 720 x 480/59.94i, 29.97PsF PAL area: HQ mode: 1920 x 1080/50i, 25p, 1440 x 1080/50i, 25p, 1280 x 720/50p, 25p SP mode: 1440 x 1080/50i, SD mode: 720 x 576/50i, 25PsF |
| Recording/Playback time *2 | HQ Mode: Approx. 100 min with SBP-32 (32 GB) memory card Approx. 50 min with SBP-16 (16 GB) memory card Approx. 25 min with SBP-8 (8 GB) memory card SP / SD Mode (SD : option): Approx. 140 min with SBP-32 (32 GB) memory card Approx. 70 min with SBP-16 (16 GB) memory card Approx. 35 min with SBP-8 (8 GB) memory card | HQ Mode: Approx. 100 min with SBP-32 (32 GB) memory card Approx. 50 min with SBP-16 (16 GB) memory card Approx. 25 min with SBP-8 (8 GB) memory card SP / SD Mode: Approx. 140 min with SBP-32 (32 GB) memory card Approx. 70 min with SBP-16 (16 GB) memory card Approx. 35 min with SBP-8 (8 GB) memory card |
| Lens | | |
| Lens mount | 2/3-type SONY bayonet | 1/2-type SONY bayonet |
| Zoom ratio | 1.6x (optical), servo/manual (AF lens for PMW-350K) | 1.6x (optical), servo/manual (AF lens for PMW-320K) |
| Focal length | f = 8 mm to 128 mm (equivalent to 31.5 mm to 503 mm on 35 mm lens) | f = 5.8 mm to 93 mm (equivalent to 31.4 mm to 503 mm on 35 mm lens) |
| Iris | F1.9 to F1.6 and Close, auto/manual selectable | |
| Focus | AF/MF/Full MF selectable, 800 mm to ∞ (MACRO OFF), 50 mm to ∞ (MACRO ON, Wide), 732 mm to ∞ (MACRO ON, Tele) | AF/MF/Full MF selectable, 800 mm to ∞ (MACRO OFF), 50 mm to ∞ (MACRO ON, Wide), 782 mm to ∞ (MACRO ON, Tele) |
| Filter diameter | M82 mm, pitch 0.75 mm (on lens) | |
| Camera Section | | |
| Imaging device | 3-chip 2/3-inch type Exmor Full HD CMOS | 3-chip 1/2-inch type Exmor Full HD CMOS |
| Effective picture elements | 1920 x 1080 (H x V) | |
| Optical system | F1.4 prism system | F1.6 prism system |
| Built-in optical filters | 1: Clear, 2: 1/4ND, 3: 1/16ND, 4: 1/64ND | |
| Sensitivity (2000 lx, 89.9% reflectance) | F12 (typical) (1920 x 1080/59.94i mode), F13 (typical) (1920 x 1080/50i mode) | |
| Minimum illumination | 0.003 lx (typical) (1920 x 1080/59.94i mode, F1.4, +42 dB gain, with 64-frame accumulation) | |
| SN ratio | 59 dB (Y) (typical) | 54 dB (Y) (typical) |
| Horizontal resolution | 1,000 TV lines or more (1920 x 1080i mode) | |
| Shutter speed | 1/60 sec to 1/2,000 sec + ECS | |
| Slow shutter (SLS) | 2, 3, 4, 5, 6, 7, 8, 16, 32, and 64-frame accumulation | |
| Slow & Quick Motion function | 720p: Selectable from 1 fps to 60 fps as recording frame rate, 1080p: Selectable from 1 fps to 30 fps as recording frame rate | |
| White balance | Preset (3200K), Memory A, Memory B/ATW | |
| Gain | -3, 0, 3, 6, 9, 12, 18, 24, 30, 36, 42 dB | -3, 0, 3, 6, 9, 12, 18, 24 dB |
| Inputs/Outputs | | |
| Audio input | XLR-type 3-pin (female) (x2), line/mic/mic +48 V selectable | |
| Composite output | BNC (x1), NTSC or PAL, COMPONENT Y | |
| Audio output | XLR-type 5-pin | |
| SDI output | BNC (x1), HD-SDI/SD-SDI selectable | |
| i.LINK interface | IEEE 1394, 4-pin (x1), HDV™ (HDV 1080i) /DVCAM stream input/output, S400 | |
| Timecode input | BNC (x1) | |
| Timecode output | BNC (x1) | |
| Genlock input | BNC (x1) | |
| USB | USB device, Mini-B (x1) | |
| Headphone output | Stereo mini jack (x1) | |
| Speaker output | Monaural | |
| DC input | XLR-type 4-pin | |
| DC output | 4-pin | |
| Remote | 8-pin | |
| Lens remote | 8-pin | |
| MIC | XLR-type 5-pin | |
| HDMI output | A type (x1) | |
| Monitoring | | |
| Viewfinder | 3.5-inch*3 type color LCD monitor: approx. 921,000 effective pixels, 640 (H) x 3 (RGB) x 480 (V), 1.6:9, hybrid type | |
| Built-in LCD monitor | Black & White LCD (Audio level, TC, battery and media remaining capacity) | |
| Media | | |
| Type | ExpressCard/34 slot (x2) | |

*1. The specifications are measured with supplied lens. *2. Recording /Playback time may vary the according to the encoding or memory. *3. Viewable area measured diagonally.

PMW-350 Series and PMW-320 Series are produced at Sony EMCS Kosai Tec, which has received ISO 14001 the Environmental Management Certification.



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