Panasonic

The AG-CX350 Book

This document describes features available since firmware Version 2.01

v1.00E

Table of contents

1. Features

AG-CX350

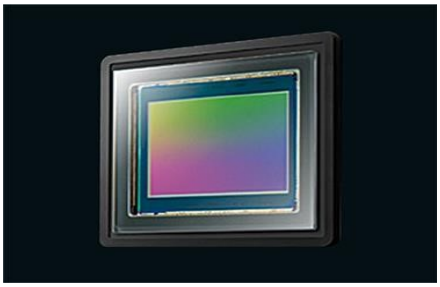
Wide-Angle 24.5mm*1 Optical 20x Zoom, plus i.Zoom

Panasonic boasts the world's largest market share in the aspherical lens segment. Its cutting-edge optical technology was maximized in the development of the integrated lens used in the AG-CX350. This lens has the industry's widest angle of 24.5mm*1 on the wide end and allows recording of wide-angle images with minimal distortion, without the use of a conversion lens. The optical 20x zoom covers up to 490mm telephoto in all modes. Furthermore, the i.Zoom enables seamless zooming of up to 32x in HD or up to 24x in UHD from the telephoto end with no degradation in resolution. The AG-CX350 also comes with digital 2x/ 5x/ 10x zoom.*2

*1 *In 35mm equivalent. The AG-*CX350's wide 24.5mm angle is the widest in the industry for *UHD/FHD (16:9). In the segment of camcorders with integrated lens, the Panasonic AG-*UX180 achieved the industry's widest angle of 24mm in UHD/24p (17:9). For UHD/FHD *(16:9), 25.4mm is the widest angle in the industry. (Both as of January 2019, according to a Panasonic survey)*

*2 *When using the digital zoom, picture quality degrades as the magnification rate increases.*

New High-Definition, High-Sensitivity 1.0-type 15M MOS Sensor



The 1.0-type MOS (approximately 15,030,000 pixels) offers an outstanding depth of field and excellent balance between image quality and sensitivity. It supports multi-formats, such as UHD (3840 x 2160), FHD, HD and SD, and provides images without cropping in all modes. This MOS sensor also boasts high sensitivity of F12 (60 Hz) /F13 (50 Hz) (in both UHD and FHD in High Sensitivity mode).

RTSP/RTMP/RTMPS-Compatible HD Streaming (P. 53)

HD streaming is possible while images are being acquired.*1 RTSP, RTMP and RTMPS streaming methods are compatible.*2 And Facebook, YouTube, and other streaming services are supported. The AG-CX350 can be used for live coverage of concerts and sports events as well as for live streaming of breaking news. Multicast streaming is also supported.

See 4-1. Understanding live streaming feature via YouTube, Facebook(P.53) for more details.

**1: There are some conditions under which streaming is not possible, such as when recording in UHD format or using NDI|HX mode. Please see the Operating Instruction Manual for details.*
**2: The P2 Network Setting Software is convenient for setting up the RTMP and RTMPS functions.* See the section, “Connectivity-verified live video services” for the live video streaming services that *have been confirmed to be compatible.*

Wireless Control from a Tablet or Smartphone (P.62)

The AG-CX350 can be controlled remotely and wirelessly using a tablet/smartphone app*1 (available on the App Store and Google Play for free). In addition to zoom, i.Zoom and focus lens control, the app enables remote control of various other functions, including camera setting, picture quality adjustment, REC start/stop and menu setting. What’s more, the app can be used to select the camera to control from up to eight cameras.*2

Panasonic CX ROP

Download on the App Store

GET IT ON Google Play

**1: iPad: iOS 9 or later are supported. Android devices: Android 5.0 or later are supported. Wireless module (sold separately; AJ-WM50 or recommended third-party Wi-Fi dongle) is required.*
**2: The app does not support simultaneous/synchronous control of multiple cameras. Camera switching takes several seconds.*

Parallel Output of SDI and HDMI

SDI and HDMI can be output in parallel. Output of UHD video via HDMI and output of HD video in high-image-quality 10-bit, 4:2:2 via SDI enable a variety of uses. In HLG shooting, either HDR or SDR can be selected for each of the SDI, HDMI and LCD video outputs.

1-1. Available format and record time

	Format	Sampling	File format	Frame rate	Audio	Rec time*
UHD 3840x2160	HEVC Long GOP 200M	4:2:0 10bit	MOV (HEVC)	59.94p, 50p	24 bit LPCM 4ch	40m
	HEVC Long GOP 150M	4:2:0 10bit	MOV (HEVC)	29.97p, 25p, 23.98p		55m
	HEVC Long GOP 100M	4:2:0 10bit	MOV (HEVC)	59.94p, 50p		1h20m
	422ALL-I 400M	4:2:2 10bit	MOV (AVC)	29.97p, 25p, 23.98p		20m
	422LongGOP 150M	4:2:2 10bit	MOV (AVC)	29.97p, 25p, 23.98p		55m
	420LongGOP 150M	4:2:0 8bit	MOV (AVC)	59.94p, 50p		55m
	420LongGOP 100M	4:2:0 8bit	MOV (AVC)	29.97p, 25p, 23.98p		1h20m
FHD (1080p/i, 720p)	AVC-Intra422 (200M)	4:2:2 10bit	MXF (OP1b)	59.94p, 50p	24 bit LPCM 4ch	32m
	AVC-LongG50 (50M, 1080i)	4:2:2 10bit	MXF (OP1b)	59.94i, 50i		2h08m
	AVC-LongG50 (50M, 720p)	4:2:2 10bit	MXF (OP1b)	59.94p, 50p		2h08m
	AVC-LongG25 (50M, 1080p)	4:2:2 10bit	MXF (OP1b)	59.94p, 50p		2h08m
	AVC-LongG25 (25M, 1080i)	4:2:2 10bit	MXF (OP1b)	59.94i, 50i		4h16m
	AVC-LongG25 (25M, 720p)	4:2:2 10bit	MXF (OP1b)	59.94p, 50p		4h16m
	AVC-LongG12 (24M, 1080p)	4:2:0 8bit	MXF (OP1b)	59.94p, 50p	16 bit LPCM 4ch	4h00m
	AVC-LongG12 (12M, 1080i)	4:2:0 8bit	MXF (OP1b)	59.94i, 50i		8h00m
	AVC-LongG12 (12M, 720p)	4:2:0 8bit	MXF (OP1b)	59.94p, 50p		8h00m
FHD (1080p/i)	422ALL-I 200M	4:2:2 10bit	MOV (AVC)	59.94p, 50p	24 bit LPCM 4ch	40m
	422ALL-I 100M	4:2:2 10bit	MOV (AVC)	29.97p, 25p, 23.98p, 59.94i, 50i		1h20m
	422LongGOP 100M	4:2:2 10bit	MOV (AVC)	59.94p, 50p		1h20m
	422LongGOP 50M	4:2:2 10bit	MOV (AVC)	29.97p, 25p, 23.98p, 59.94i, 50i		2h40m
	PS 25Mbps	4:2:0 8bit	AVCHD	59.94p, 50p	Dolby Audio 2ch	5h20m
	PH 21Mbps	4:2:0 8bit	AVCHD	23.98p, 59.94i, 50i		6h00m
	HA 17Mbps	4:2:0 8bit	AVCHD	59.94i, 50i		8h30m
HD	PM 8Mbps	4:2:0 8bit	AVCHD	59.94p, 50p		17h10m
SD	SA 9Mbps	4:2:0 8bit	AVCHD	59.94i, 50i		16h00m

*Record times are approx. with 128GB memory card.

1-2. Applicable memory cards

Applicable type or speed class of memory card varies depends on record format and mode.

Format	Card type	Record bit-rate & record mode	Minimum requirement of speed class		
			Speed class	UHS speed class	Video speed class
MOV	  (64GB)	400Mbps	--	--	V60
		FHD VFR(23.98p)/SUPER SLOW ALL-I (Variable frame rate or super slow record mode)			
		200Mbps	--	U3	V30
		150Mbps			
		100Mbps			
		FHD VFR(59.94p, 50.00p, 29.97p, 25.00p), ALL-I Variable Frame Rate record mode)			
		FHD VFR/SUPER SLOW Long GOP (Variable frame fate or super slow record mode)			
		50Mbps	C10	U1	V10
AVCHD	  	PS PH HA PM SA	C4	--	--
P2		AVC-Intra422 AVC-LongG	--	--	--

*microP2 is an SD card size memory card designed for Panasonic's professional video cameras and recorders.

2. Preparation before recording

2-1. Terminals

Image resolution of HDMI and SDI signals vary depend on the system settings.
See P.82 -83 for the details of output signals.

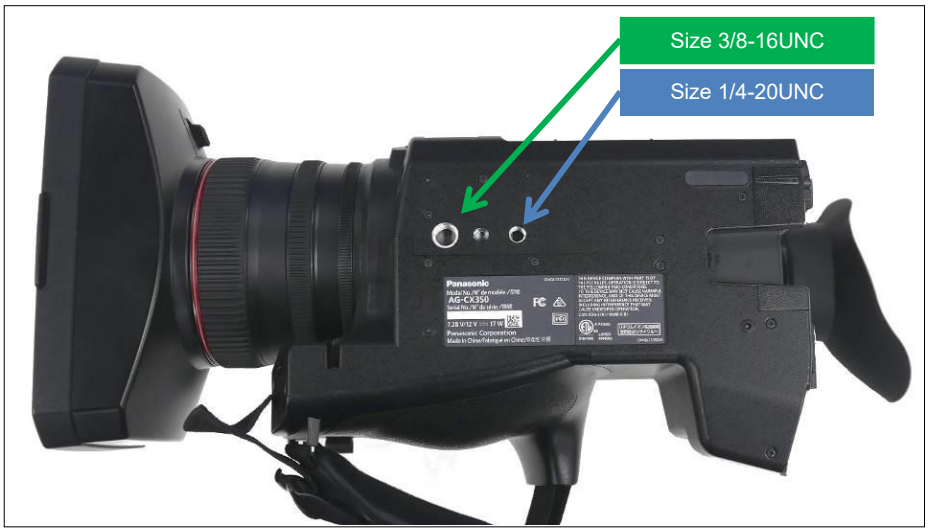
REAR VIEW

2-2. Accessory and tripod mounting holes

The AG-CX350 has two screw holes for tripod mount, industrial standard **1/4-20UNC** size and cinema/broadcast equipment standard **3/8-16UNC** size.

BOTTOM VIEW (holes for mounting tripod)

Use screws shorter than 5.5mm in length, otherwise damage may occur to internal parts.



REAR VIEW (holes for mounting an accessory)

Use screws M3 size and shorter than 6.0mm in length, otherwise damage may occur to internal parts.

2-3. Audio setting

The AG-CX350 is equipped with a built-in stereo microphone and two external audio inputs. It also supports 4-channel audio recording.

Setting audio

1. **Connect external audio source**
   Connect microphone or external audio source to the XLR (AUDIO INPUT1, and INPUT2) terminals when record without using built-in microphone.

2. **[A] Select audio source with CH1 SELECT, CH2 SELECT switches**
   Set audio source of CH1 and CH2. Choose “INPUT1” when using audio source connected to INPUT1 XLR terminal. Choose INT (L) or INT (R) when using built-in microphone.

3. **[B] Set input level using INPUT1, INPUT2 switches (this selection is not available when INT(L), INT(R) is selected as audio source).**
   Set audio level for LINE level, Microphone with +48V powered, and Microphone with no +48V powered, using selectors in INPUT1 and INPUT2. Audio levels for LINE and MIC input can also be set in MENU > AUDIO > INPUT SETTINGS.

4. **[C] Set record level**
   Set audio record level using AUDIO LEVEL knob.
   (This control is available when following menu item is set to “MANUAL”.
   MENU > AUDIO > REC CH SETTINGS > CH1 LEVEL / CH2 LEVEL)

Setting Input level
(MENU>AUDIO>INPUT SETTINGS)

Menu item	Setting
INPUT1 LINE LEVEL	4dB, 0dB
INPUT2 LINE LEVEL	4dB, 0dB
INPUT1 MIC LEVEL	-40dB, -50dB, -60dB
INPUT2 MIC LEVEL	-40dB, -50dB, -60dB

[B] [A] [C]

Setting example:
Using a microphone (+48V power required) as INPUT1 source, and assigning built-in microphone as INPUT2 source.

	CH1	CH2
(A) CH SELECT selector	INPUT1	INT(R)
(B) INPUT selector	+48V	Any position(*)

* Does not function when built-in microphone is chosen.

2-4. Recording/outputting 4 channel audio

Audio source for channel 3 and channel 4 are automatically determined and fixed by audio channel settings of CH1 and CH2. See table below for details.
* The 3rd and 4th channels are not available when using any AVCHD codec.

CH1 SELECT	CH2 SELECT	Audio sources to be taken for record/output			
		CH1	CH2	CH3	CH4
INT (L)	INT (R)	Built-in MIC (Left)	Built-in MIC (Right)	AUDIO INPUT1	AUDIO INPUT2
	INPUT1		AUDIO INPUT1		Built-in MIC (Right)
	INPUT2		AUDIO INPUT2		
INPUT1	INT (R)	AUDIO INPUT1	Built-in MIC (Right)	Built-in MIC (Left)	AUDIO INPUT2
	INPUT1		AUDIO INPUT1		Built-in MIC (Right)
	INPUT2		AUDIO INPUT2		
INPUT2	INT (R)	AUDIO INPUT2	Built-in MIC (Right)	Built-in MIC (Left)	AUDIO INPUT2
	INPUT1		AUDIO INPUT1		Built-in MIC (Right)
	INPUT2		AUDIO INPUT2		

Interchange ability of clips

Video clips recorded with 4-channel audio cannot be played back on the AG-CX350 firmware version 1.x.

The “!” icon is shown on the thumbnail screen for all unplayable clips.

NOTE: How to set INPUT MIC LEVEL

MIC level can be set to -40dB, -50dB or -60dB as determined by **MENU > AUDIO > INPUT SETTINGS > INPUT1/2 MIC LEVEL.** Choose the closest value that matches the sensitivity of your microphone. Following is an example using one of Panasonic's microphone i.e. AG-MC200. With this microphone, "-40dB" would be the most suitable Input Mic Level setting to use.

Specifications

Power supply: Phantom power supply, 48 V DC
Current consumption: 2.0 mA (typical)

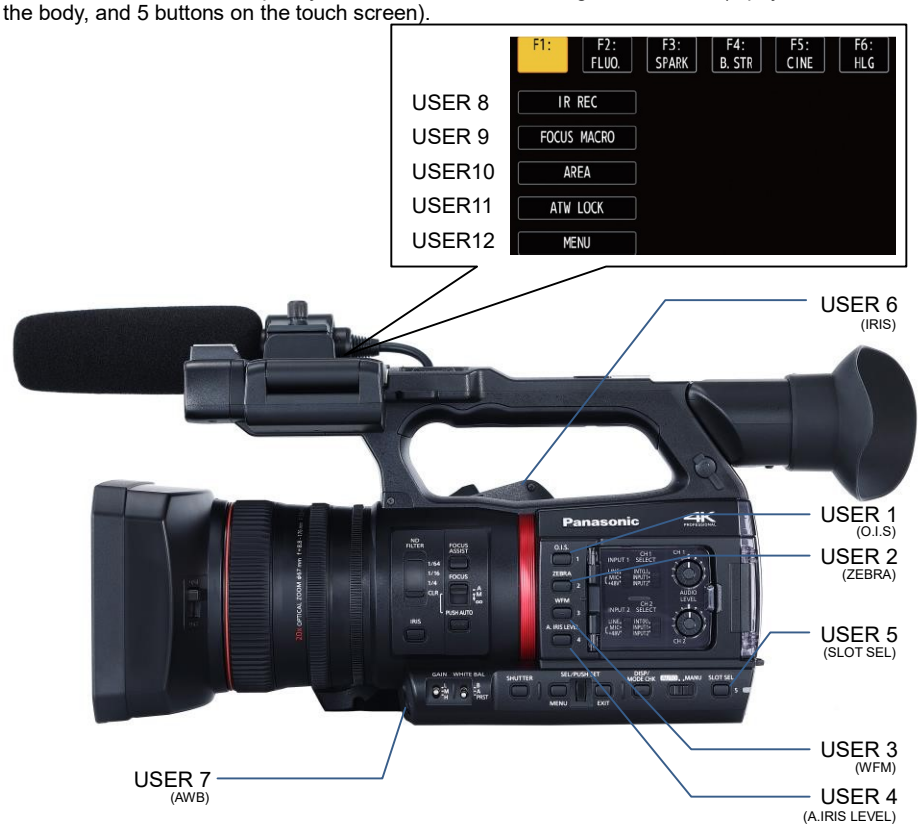
▭ indicates safety information.

Type:
Back electret capacitor type microphone
Frequency response:
160 Hz to 20 kHz
Sensitivity:
–40 dB ±3.5 dB (0 dB = 1 V/Pa, at 1 kHz)
Maximum input sound pressure level:
127 dB S.P.L. (at 1 kHz, 1% distortion)
S/N ratio (1 kHz/Pa):
69 dB or more
Output Impedance:
100 Ω ±30% (at 1 kHz)

Example: Sensitivity specification of Panasonic AG-MC200 microphone

2-5. User assignable buttons

Features/functions can be quickly recalled, from 12 user assignable buttons (7 physical buttons on the body, and 5 buttons on the touch screen).



Checking functions assigned to USER buttons

Keep pressing “DISP/MODE CHK” button for 1 second, and then press the button 3 times to see.

2-5-1. Assigning functions

MENU > CAMERA > USER SW > Assign any function to any button.

2-5-2. Assignable functions

(⏻) : Features that turn OFF when switch off the unit.

Menu item	Description
INHIBIT	The user button is disabled (nothing is assigned)
AWB	Perform the auto white balance adjustment.
DRS	Turn ON/OFF the dynamic range stretcher function. The DRS works to minimize compressed blacks and overexposed highlights
(⏻) FBC	Turn ON/OFF the flash band compensation feature.
ONE PUSH AF	Focus mode becomes AUTO while keep pressing the USER button.
(⏻) S.GAIN	Turn ON/OFF super gain function that allows boosting image gain 24dB or higher.
(⏻) AREA	Turn ON/OFF the AREA mode. This mode allows the camera to set iris and focus by tapping the built-in touch screen.
(⏻) AF AREA	Adjust the size of window where auto focus (AF) is enabled.
ATW	Turn ON/OFF auto tracking white balance.
(⏻) ATW LOCK	Maintain and lock the last white balance achieved by Auto Tracking White (ATW) mode.
(⏻) SPOTLIGHT	Switch auto iris mode to Spotlight mode. The spotlight mode optimizes iris control behavior when the contrast around the subject is high (example: the subject is a spot light etc.)
(⏻) BACKLIGHT	Switch auto iris mode to backlight mode. The backlight mode can prevent underexposure when the main lighting is emanating from behind the subject.

2-5-2. Assignable functions (Continued)

Menu item	Description
A.IRIS LEVEL	Turn ON/OFF auto iris level adjustment mode that allows users to set auto iris target level.
IRIS	Enable/disable auto iris mode.
(⏻) Y GET	Turn ON/OFF the spot meter function.
FOCUS MACRO	Turn ON/OFF the macro mode. With macro mode ON, focus adjustable range at Wide-end is from 10cm to infinity. (With macro mode OFF, from 1m to infinity.)
O.I.S.	Turn ON/OFF the optical image stabilizer.
i.ZOOM	Turn ON/OFF the “i.Zoom” mode that allows the camera to magnify the image (electronically).
(⏻) D.ZOOM	Use Digital Zoom (electronic image magnification) feature. The magnification ratio can be set from x2, x5, x10, or can be toggled through each of them.
IR REC	Turn ON/OFF the Infrared shooting mode.
(⏻) FAST ZOOM	Increase servo zoom speed.
PRE REC	Turn ON/OFF the pre-record mode. This mode allows the camera to start recording video and audio from approx. 3 to 10 sec before the REC/PAUSE button is pressed.
VFR	Enable/disable variable frame rate record function.
SUPER SLOW	Turn ON/OFF super slow record mode.
REC CHECK	Plays last 3 sec of the last recorded clip on the SD memory card.
BACKGR PAUSE	Quit from the Background record mode (P.60)
DEL LAST CLIP	Delete the last clip from the memory card.
SLOT SEL	Switch memory card slots for recording/playing back.
(⏻) EXPAND	Turn ON/OFF image magnification focus assist function.
(⏻) PEAKING	Turn ON/OFF peaking and square focus assist function.
(⏻) WFM	Display the Waveform or Vector scope on the built-in LCD monitor. Set MENU > VIDEO OUT/LCD/VF > EI ASSIST > WFM mode to select the item (Waveform or Vector scope).
ZEBRA	Turn ON/OFF the ZEBRA indicator.
LEVEL GAUGE	Display a level gauge on the viewfinder for the horizontal and vertical axes. Inclinations can be indicated up to approx. 30 degrees in the horizontal, and the vertical directions.
LEVEL GAUGE SET	Set the current angle as level gauge reference.
LCD/VF HDR	Choose image mode to be displayed on the built-in LCD monitor and viewfinder from High dynamic range to standard dynamic range.
(⏻) VF ON/OFF	Turn ON/OFF the EVF display.
LCD/VF DETAIL	Make focusing easier by enhancing the subject’s edge on the viewfinder and built-in LCD monitor.
AUDIO MON SEL	Output audio on the CH3 and 4 from AV OUT, phones out, and built-in speaker while keep pressing the USER button.
MENU	Open MENU.
LOAD SETUP FILE	Recall set up file (setting data) from an SD memory card.
LCD BACKLIGHT	Set backlight level of the built-in LCD monitor.
(⏻)CARD READER MODE	Turn ON/OFF card reader mode (USB mass storage mode).
(⏻)STREAMING START	Start/stop video streaming distribution from the AG-CX350.

3. MENU operations

AG-CX350

3-1. MENU items overview

The AG-CX350 has two menu areas :

MENU	Purpose	How to open
MENU	Most of basic and advanced settings can be set in this layer.	Press “MENU” button.
OPTION MENU	Some initial settings	Press “MENU” button while keep pressing “EXIT” button. 

MENU (Press “MENU” button to open)

OPTION MENU (Press “EXIT” + “MENU” to open)

[CAMERA] MENU

3-1-1. SW MODE

Menu item	Description	Value (Factory default underlined)
LOW GAIN	Set GAIN value when the gain selector is set to “L”.	-3dB -- 0dB -- +18dB
MID GAIN	Set GAIN value when the gain selector is set to “M”.	-3dB -- 6dB -- +18dB
HIGH GAIN	Set GAIN value when the gain selector is set to “H”.	-3dB -- 12dB -- +18dB
SUPER GAIN	Set GAIN value in the SUPER GAIN mode, which is available as one of the user assignable functions.	24dB, 30dB, 36dB, ALL * The gain value can be chosen from any of the above or can be toggled through each by selecting “ALL”.
O.I.S	Turn ON/OFF optical image stabilizer function.	ON, OFF (USER button assignable)
HYBRID O.I.S	Turn ON/OFF electrical image stabilizer which works in addition to optical one i.e. OIS	ON, OFF
O.I.S MODE	OIS characteristic customization.	NORMAL: PAN/TILT: suitable when camera is used in hand held mode STABLE: suitable when camera mount is stable i.e. on tripod etc.
ATW	Assign Auto Tracking White (ATW) to any position of WHITE BAL selector.	Ach, Bch, PRE, OFF
ATW SPEED	Set response and adjustment speed of ATW function.	FAST, NORMAL, SLOW
ATW TARGET R	Fine-tune the ATW adjustment result (to make it more/less Reddish).	-10 -- 0 – 10
ATW TARGET B	Fine-tune the ATW adjustment result (to make it more/less Blueish).	-10 -- 0 – 10
W.BAL PRESET	Set white balance mode when WHITE BAL selector is set to PRST.	3200K, 5600K, VAR
H ZOOM SPEED	Increase/decrease service zoom speed with a zoom lever on the carrying handle.	1 -- 50 – 99
i.ZOOM	Activate electronic image zoom feature, which can extend zoom ratio while maintaining a image quality.	ON, OFF
MF ASSIST	Focus mode is momentarily set to “AUTO” immediately after manual focusing.	ON, OFF
MACRO	Turn ON/OFF macro mode.	ON, OFF (USER button assignable)

[CAMERA] MENU

3-1-1. SW MODE (Continued)

Menu item	Description	Value (Factory default underlined)
AF AREA WIDTH	Set the size of window where auto focus is enabled.	ON, OFF
A.IRIS SPEED	Set adjustment speed of auto iris control.	FAST, NORMAL, SLOW
A.IRIS WINDOW	Set the type of window where auto iris is enabled.	NORMAL1: Set a window on the center of screen NORMAL2: Set a window on the upper of screen CENTER: Set a window at the center spot of screen
AREA MODE	Choose the feature that works when tapping the subject on the built-in LCD.	INH, FOCUS, IRIS, YGET, FOCUS/IRIS, FOCUS/YGET INH :No function is assigned. FOCUS :Adjust the focus so that the pointed subject is in focus. IRIS :Adjust the iris so that aperture level is appropriate for the pointed subject. Y GET :Indicate Y level of the pointed subject. FOCUS/IRIS :Adjust both focus and iris for the pointed subject. FOCUS/YGET :Adjust focus and indicate Y level of the pointed subject.
IR REC	Turn ON/OFF the Infrared shooting mode.	ON, OFF

3-1-2. AUTO SW

Set features that enable while the camera is in AUTO mode.

Menu item	Value
A.IRIS	ON, OFF
AGC (Automatic image Gain Control)	ON, OFF
AGC LIMIT (Set the upper limit of the gain while in AUTO mode.)	3dB, 6dB, 12dB, 18dB
AGC POINT (Set F-number value to switch aperture control from auto iris to AGC)	F4.0, F5.6
A.SHUTTER (Auto shutter)	ON, OFF
A.SHUTTER LIMIT (Set upper limit of the shutter speed while in AUTO mode.)	1/100, 1/120, 1/250
A.SHUTTER POINT (Set F-number value to switch aperture control from auto iris to auto shutter)	F8.0, F9.6
ATW (Auto Tracking White balance)	ON, OFF
AF (Auto focus)	ON, OFF

[CAMERA] MENU

3-1-3. USER SW

Menu item	Default value	Description
USER 1	O.I.S	Features/functions can be quickly recalled from 12 user assignable buttons (7 physical buttons on the body, and 5 buttons on the touch screen). See 2-5. User assignable buttons (P.16) for more details.
USER 2	ZEBRA	
USER 3	WFM	
USER 4	A.IRIS LEVEL	
USER 5	SLOT SEL	
USER 6	IRIS	
USER 7	AWB	
USER 8	IR REC	
USER 9	FOCUS MACRO	
USER 10	AREA	
USER 11	ATW LOCK	
USER 12	MENU