

LYTRO
I L L U M



Lytro ILLUM User Manual

Documentation Version 2.1 – August 5th, 2015
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Introducing the Lytro ILLUM



Lytro ILLUM is a light field camera and software platform designed to redefine the way we portray the world around us. Harnessing the full power of the light field, the Lytro ILLUM gives photographers a unique way of capturing visual experiences — not as a static cross-section of reality but an interactive window into their world through Light Field Photography.

Benefits of the Light Field

Unlike a conventional digital camera, the Lytro ILLUM captures the light field, which includes the direction of light. Most recently, light field cameras lived only in academic labs – via a roomful of cameras tethered to a super computer. Lytro's scientists and engineers have optimized this technology so that the power of the light field can fit right in your hands.

Capturing this fundamentally new data gives consumers unprecedented capabilities, including the ability to focus, change the perspective, change the aperture, and view in 3D - all after a picture is taken. Photographers using the Lytro ILLUM have new creative opportunities to tell stories and capture moments, delivering Living Pictures to friends, family, and clients.

Learning to use Lytro ILLUM

This User Manual is a technical reference for using the Lytro ILLUM. It explains how to operate the camera, and the behavior of each of the modes, settings, and buttons.

For many photographers, getting the most out of a light field camera may require additional education and thought on how to best compose and capture images with depth.



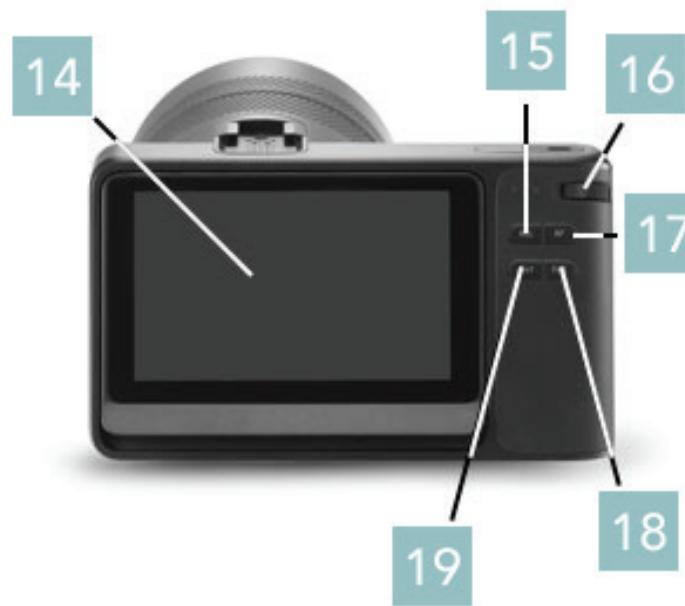
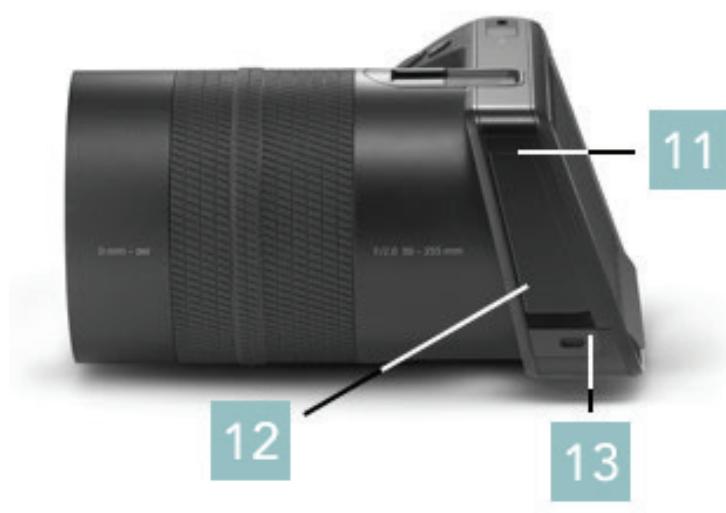
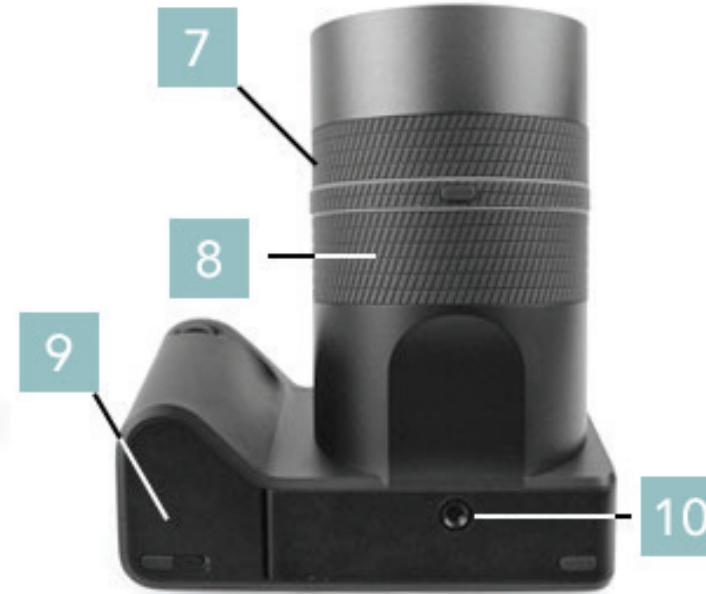
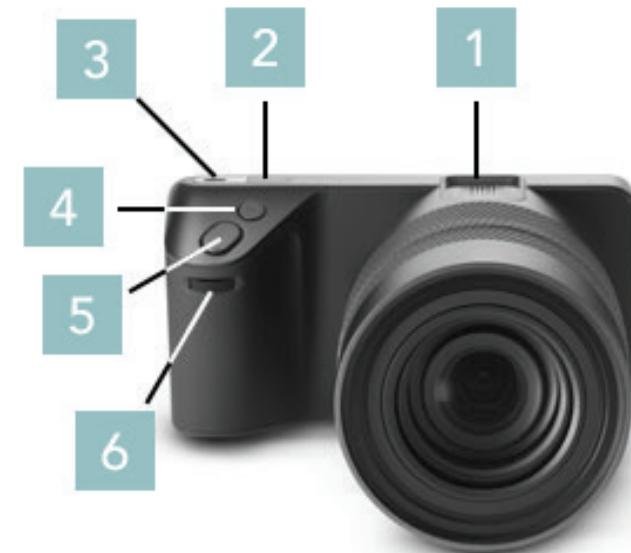
Watch education and training videos at training.Lytro.com

Lytro has developed a series of educational and training materials, including videos, online help, and transformational galleries. Visit training.Lytro.com to get in-depth information in the following categories:

- Orientation & Setup
- Light Field 101
- Light Field in the Field
- Workflow

The educational material covers the Lytro ILLUM ecosystem including camera, desktop software, publishing to web and mobile devices.

Quick Reference Guide



Camera Exterior

1. Hot shoe
2. Power button
3. Strap point
4. Lytro button*
5. Shutter button
6. Front dial
7. Focus ring
8. Zoom ring
9. Battery door
10. Tripod mount
11. Micro-USB 3.0
12. Port cover
13. Strap point
14. Touchscreen
15. AF button*
16. Rear dial
17. AEL button*
18. Fn button
19. Hyperfocal button

In the box

- Lytro ILLUM Camera
- Lytro ILLUM Quick Start Guide
- Lytro ILLUM Quick Charger
- Lytro ILLUM Rechargeable Li-ion Battery
- Lytro ILLUM Lens Cap
- Lytro ILLUM Lens Hood
- Shoulder/neck strap
- Strap anchors (2)
- Neutral density filter (ND8) – 72mm
- Micro-USB 3.0 cable
- Lens cloth

Product Requirements

SD card required (not included) **Recommended:** Class 10, 95 MB/second

Minimum:

Mac OS® X 10.9 or higher (min: 4GB RAM, Intel® Core™ 2 Duo or newer)

- or -

64-bit Windows® 7 or 64-bit Windows 8 (min: 4GB RAM, DirectX® 10.0 and dual-processor CPU)

Recommended:

Mac OS X 10.9 or higher (8GB RAM, Intel i5 or better)

- or -

64-bit Windows 7 or 64-bit Windows 8 (8GB RAM, Intel i5 or equivalent or better) **Graphics card:**

Intel HD 4600 or better

AMD Radeon™ HD 6750 or better

NVIDIA® GeForce® GTS 450 or better

Touchscreen layout in Capture Mode

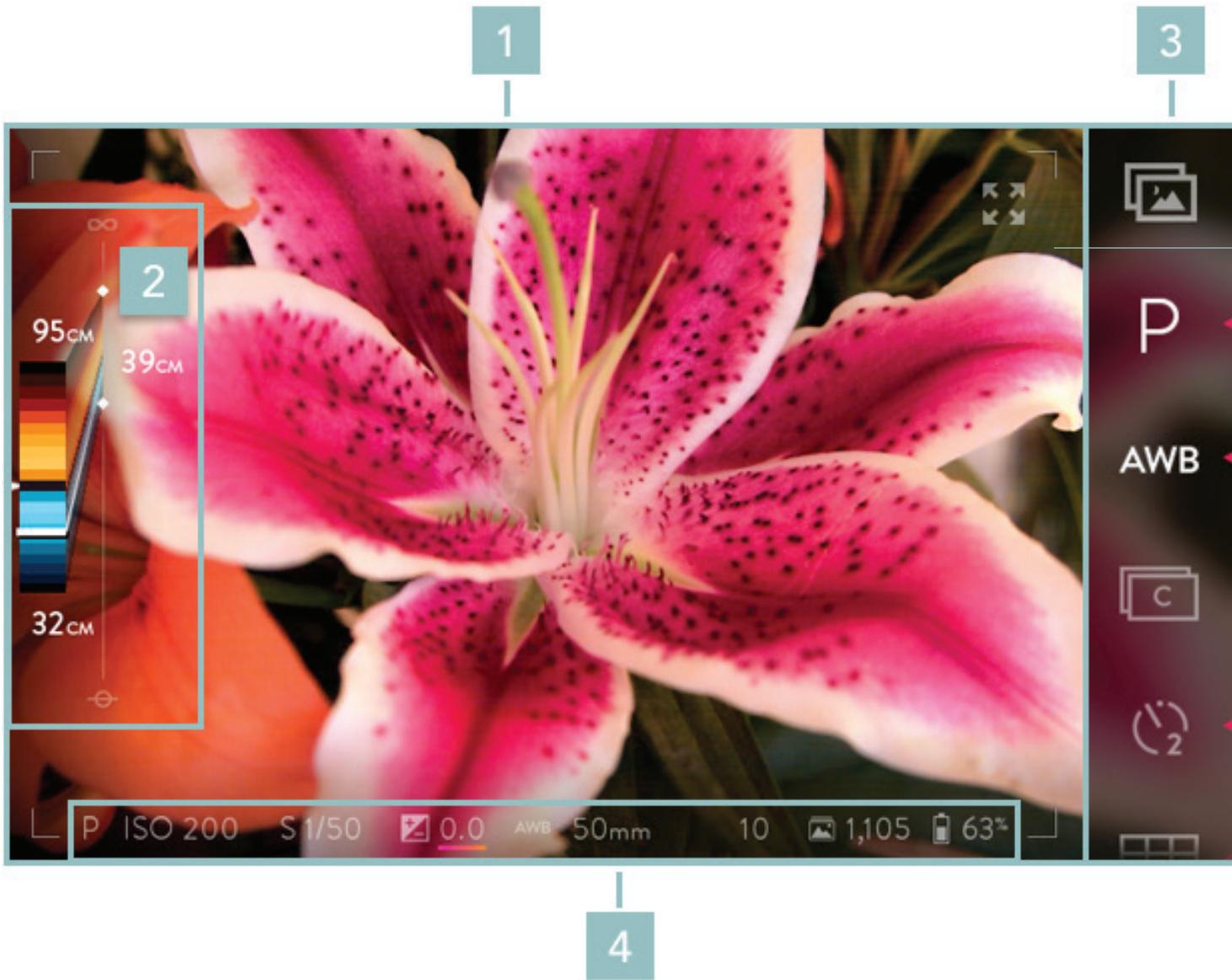
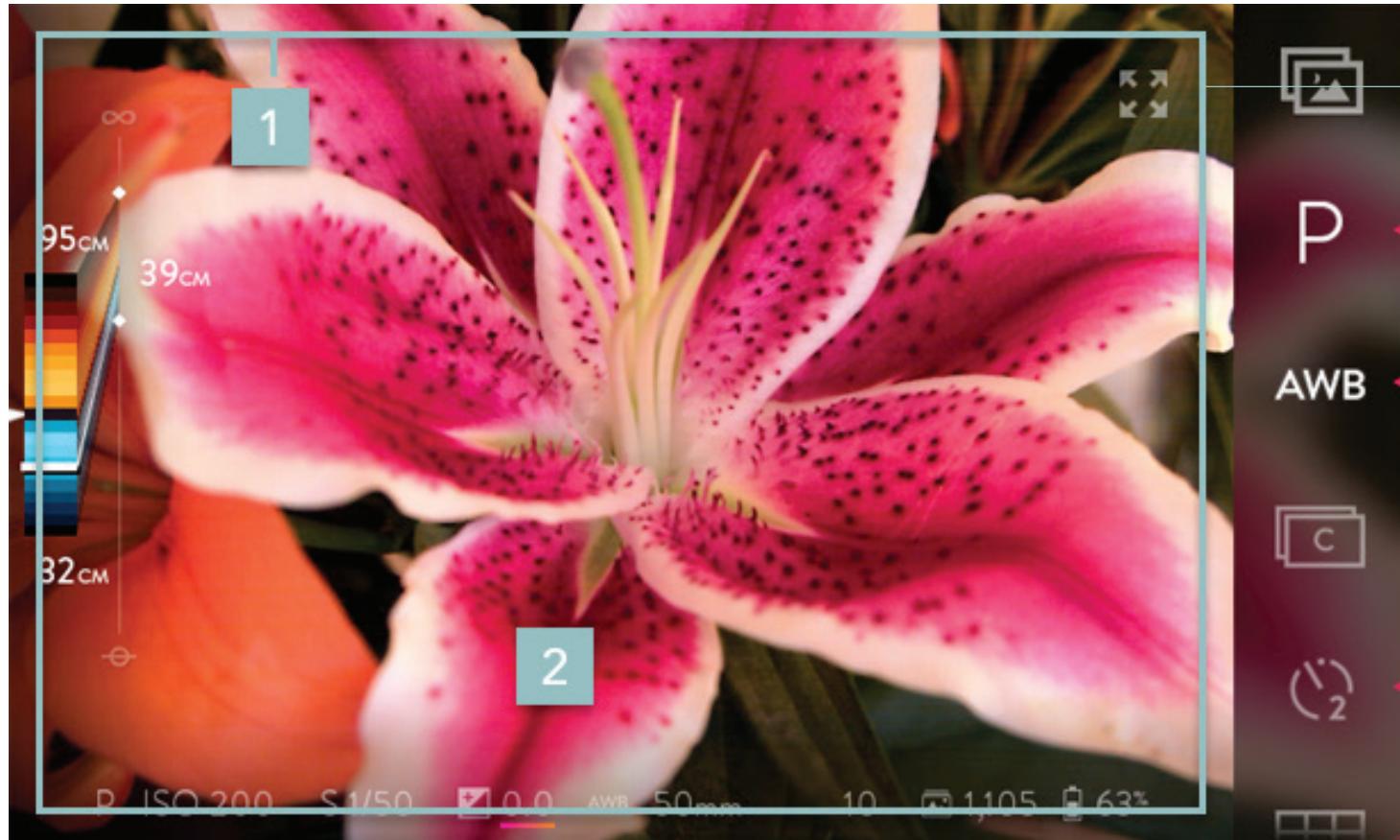
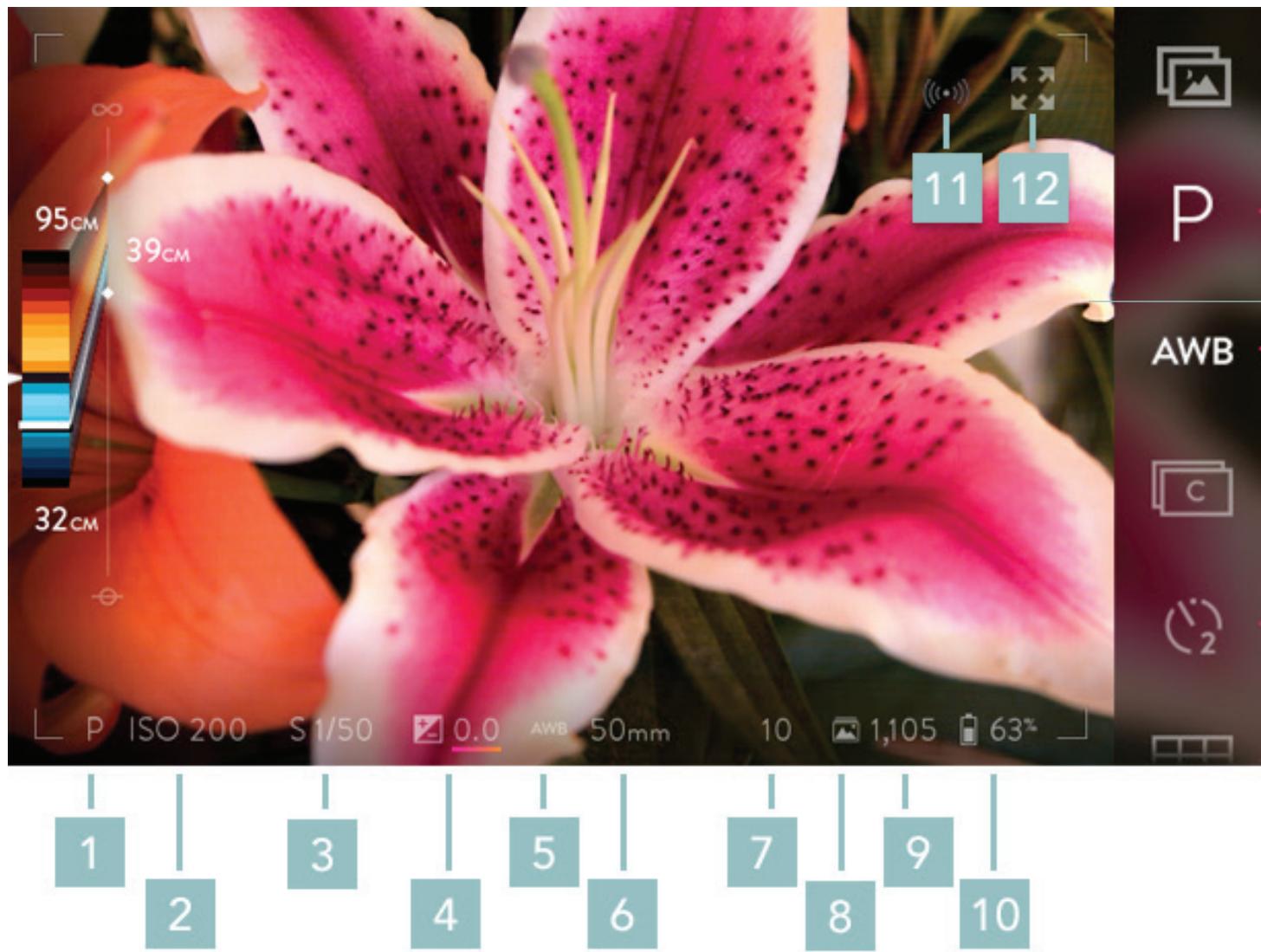


Image View Area

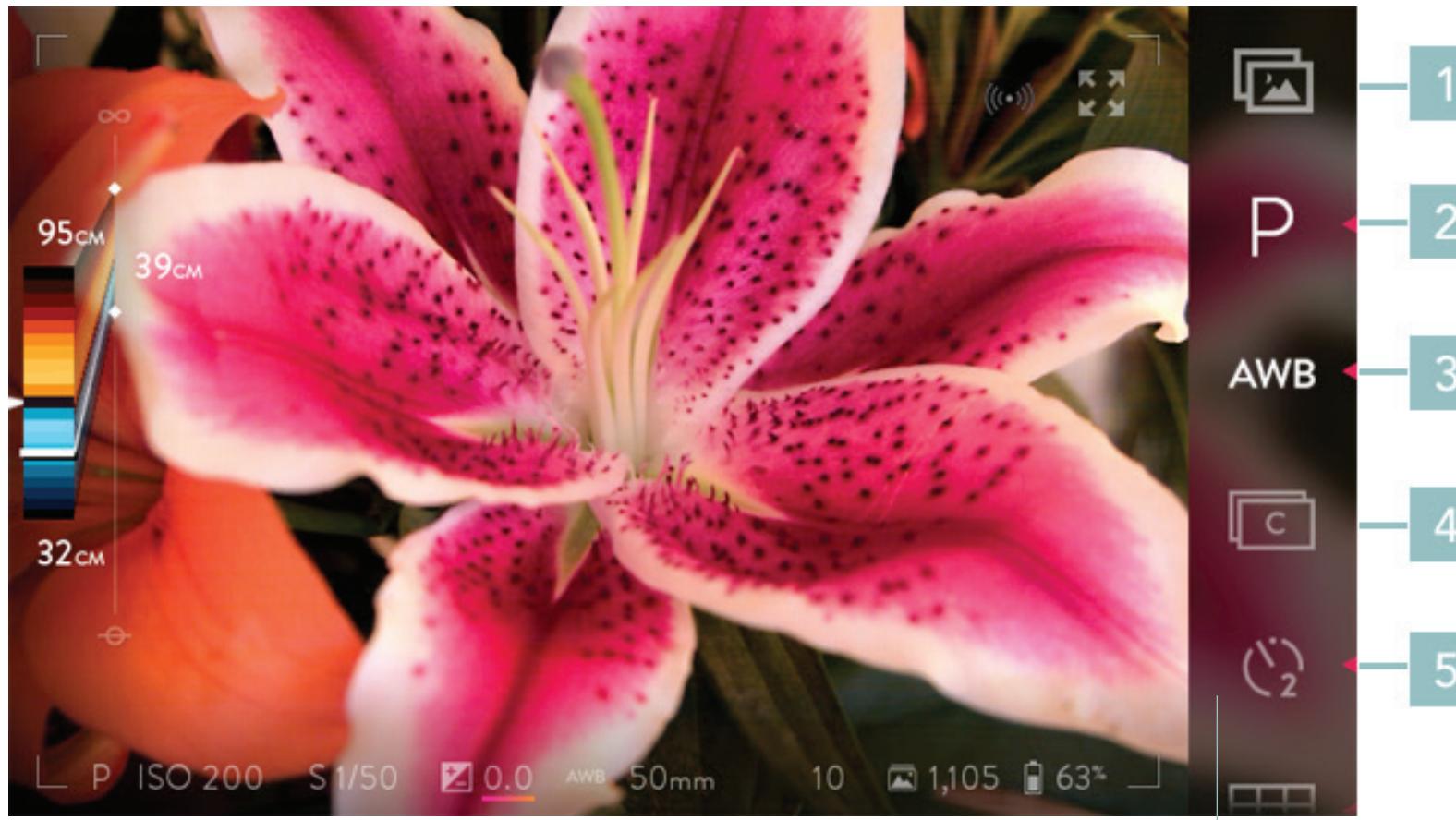


1. Sensor crop region
2. Live view area

Information Bar

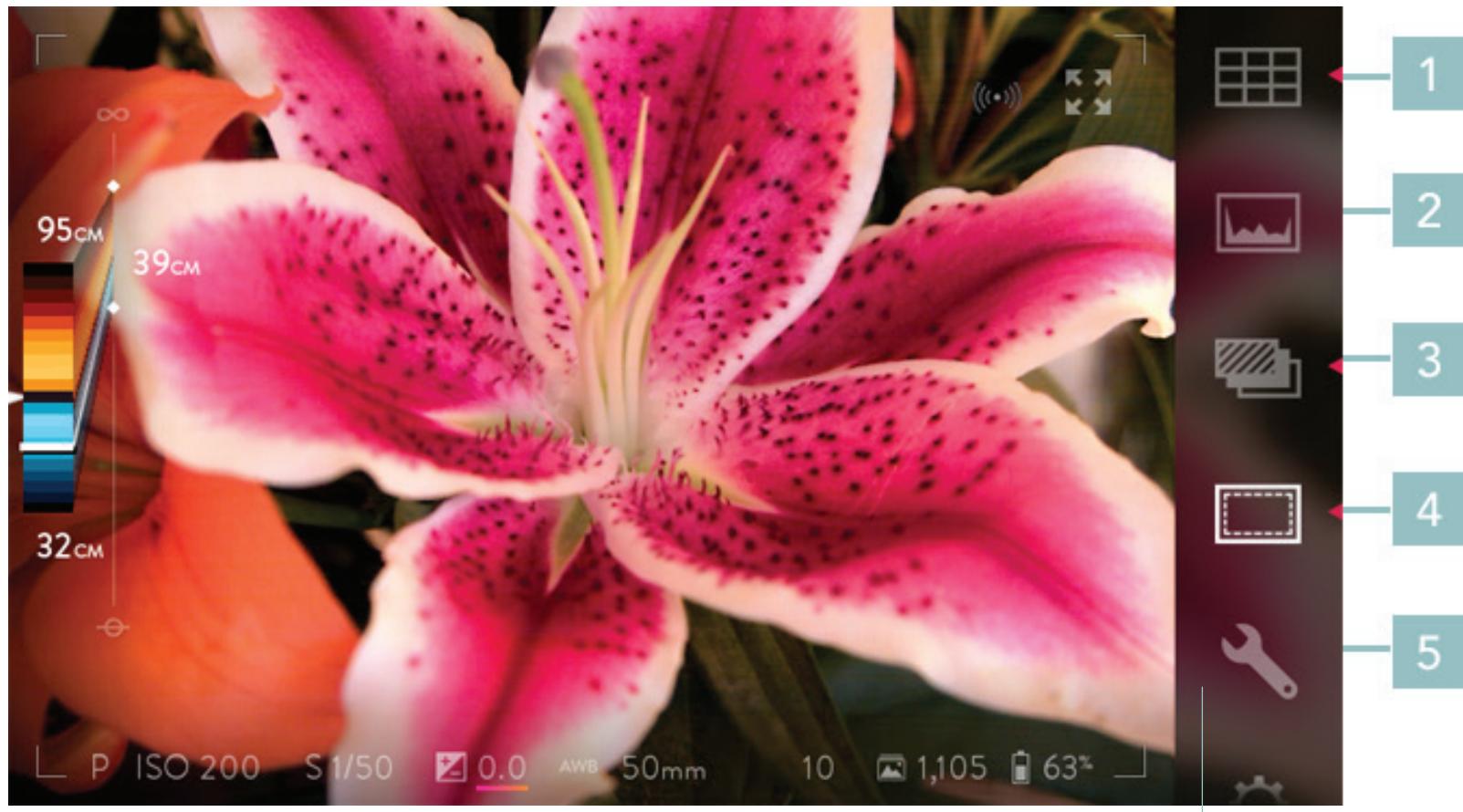


Menu Bar Page 1



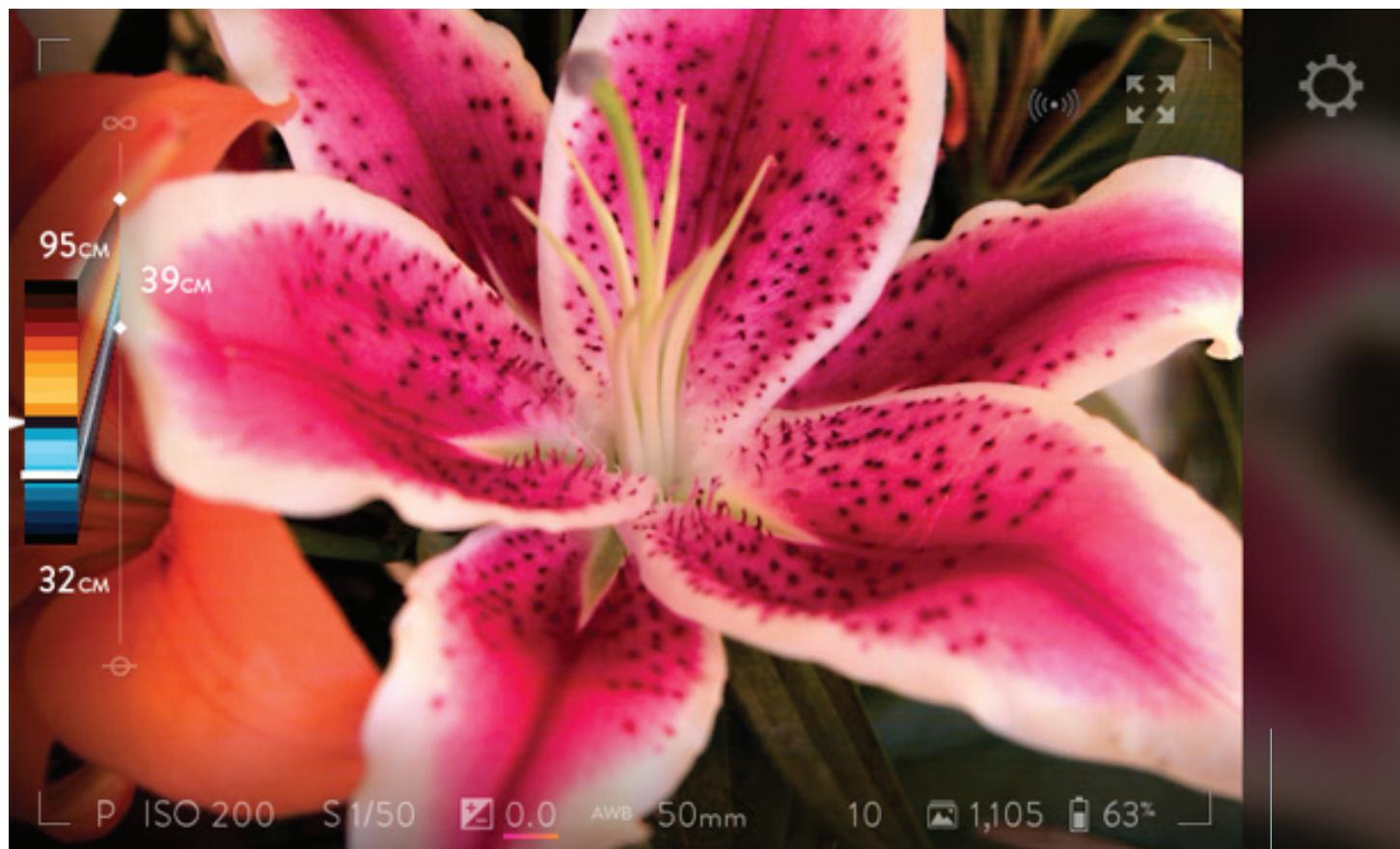
1. Playback Mode
2. Exposure mode
3. White balance
4. Continuous shutter
5. Self timer

Menu Bar Page 2



1. Grid overlay
2. Exposure histogram
3. Exposure bracketing
4. Exposure metering mode
5. Rearrange menu

Menu Bar Page 3



1

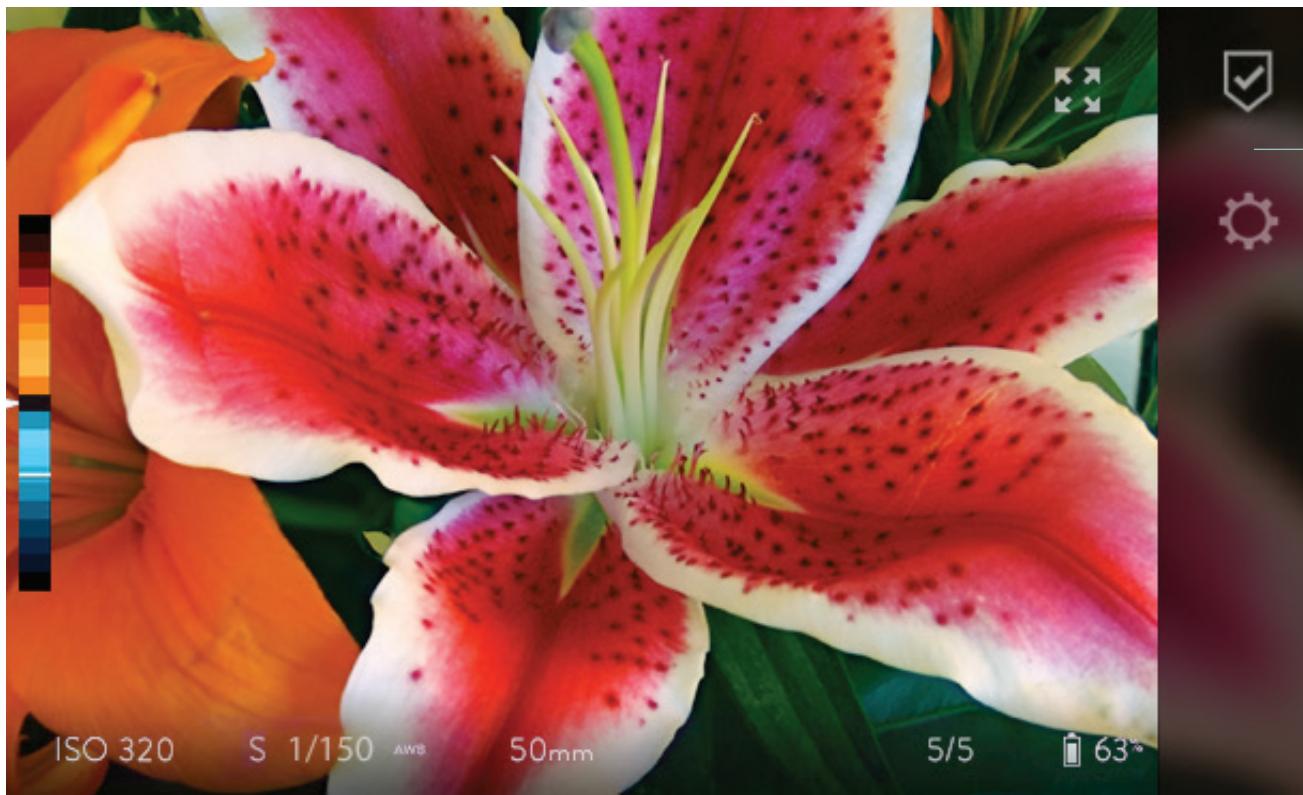
1. Settings

Touchscreen layout in Playback Mode, Menu Bar Page 1



1. ISO
2. Shutter mode
3. Shutter speed
4. White balance
5. Focal length
(35mm eq.)
6. Picture number /
total pictures
7. Battery charge
8. Capture Mode
9. Grid view
10. Exposure histo-
gram
11. Delete
12. Rotate image
13. Full screen
preview

Playback Mode, Menu Bar Page 2



1. Favorites
2. Settings

Getting Started

Charging the battery

Before using the camera for the first time, charge the lithium-ion battery. Place the battery into the included quick charger, and plug the charger into a standard 110- or 220-volt, 50-60 Hz electrical outlet. When taking the battery out of the box, it may be partially charged; a fully discharged battery may take four hours or more to charge completely.

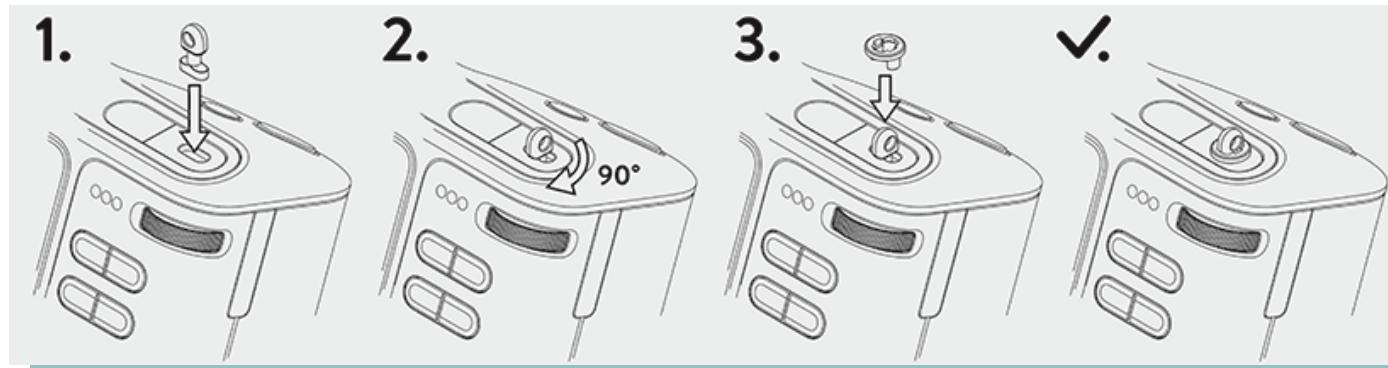
During charging, the LED on the charger will illuminate. When charging is complete, the LED will turn off. A blinking LED indicates a power or connection problem, such as the battery not being inserted properly.

Inserting the charged battery

The battery compartment is on the underside of the camera. Hold the camera upside down and slide the thumb-latch to one side to open the door. Insert the charged battery, hold the door fully closed, and slide the latch back to the locked position.

Inserting the strap rings

To prepare camera for use with a strap, install the included strap anchors. Insert an anchor into the strap point on the top of the camera beside the power button. Turn it 90 degrees to position it. Then place one of the included collars over the strap anchor and press down until it snaps into place. Repeat these steps for the strap point on the side of the camera, below the port cover.



Once strap anchors are installed, attach the strap using the split-rings.

Inserting an SD card

Open the port cover and insert a SD, SDHC, or SDXC card into the SD card slot. For the first time use of the camera, 2GB of free space is required on the SD card. This free space is required for the Pairing data (see Transferring the Pairing data in this section). Close the port cover.

Using the set-up assistant

The first time the camera is turned on, there is a walk through to set-up the camera, where you select the language for the camera to use, select time zone, set the date and time, and transfer the Pairing data (see next section). The camera will then give a very brief overview of its most unique controls and features.

Transferring the Pairing data

As part of the walk-through to set up the camera, Pairing data is transferred to the SD card. The Pairing data is required by the Lytro Desktop to optimally process pictures, and will be automatically copied off of the SD card by the Lytro Desktop the first time pictures are imported from that card.

The Pairing data requires approximately 2GB of free space on the SD card. Do not reformat or delete the contents of the SD card until the Pairing data has been transferred to the Lytro Desktop.

The Pairing data may be manually transferred at a later time (see Transfer Pairing Data to SD Card).

Powering on and off

Briefly press the power button to turn the camera on. To power off, briefly press the power button again.

Capture Mode

When the camera is first powered on, it will start up in Capture Mode. If there's a compatible SD card in place, and the card is not full, the camera is ready to capture a Living Picture. Compose the shot by looking at the live view displayed on the screen. When ready to capture a picture, press the shutter button all the way down and release.

To operate the camera in Capture Mode, use a combination of physical controls and on-screen controls.



Camera Controls

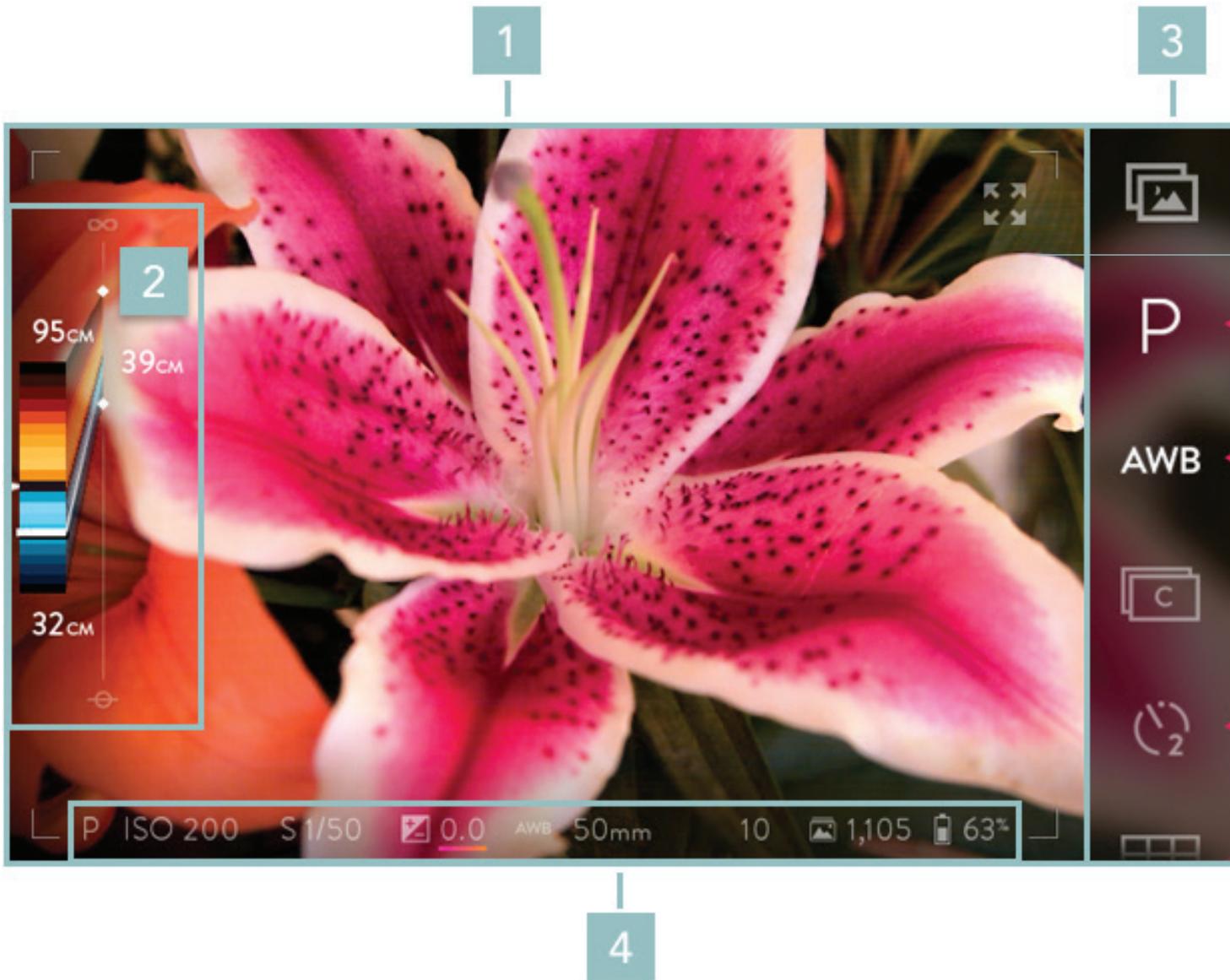
1. Power button
2. Lytro button
3. Shutter button
4. Front dial
5. Zoom ring
6. Focus ring
7. Touchscreen
8. AF button
9. Rear dial
10. AEL button
11. Fn button
12. Hyperfocal button

Note that these are the default behaviors of the controls. Many can be customized in *Settings* (see *Camera controls*).

Camera Control Behaviors

1. Power button — when the camera is off, a brief press turns it on; when the camera is on, a brief press turns it off
2. Lytro button — a half-press displays depth feedback for the object at the center of the frame; a full-press displays a live depth histogram and depth overlay
3. Shutter button — a half-press engages auto exposure lock (AEL); a full-press releases the shutter
4. Front dial — sets the ISO (in ISO Priority Mode); sets Shutter Speed (in Shutter Speed Priority Mode and Manual Mode)
5. Zoom ring — adjusts the focal length of the lens
6. Focus ring — adjusts the focus of the lens
7. Touchscreen — Provides view of scene through the lens, plus touch screen menus and information
8. Rear dial — sets the EV compensation in Program, ISO Priority, and Shutter Speed Priority Modes; sets the ISO in Manual Mode
9. AF button — activates autofocus when pressed
10. AEL button — locks the exposure at the current setting while held down
11. Fn — toggles between Capture Mode and Playback Mode
12. Hyperfocal button — sets the focus of the lens to the light field hyperfocal position (moves the far end of the refocusable range to infinity)

Touchscreen layout in Capture Mode

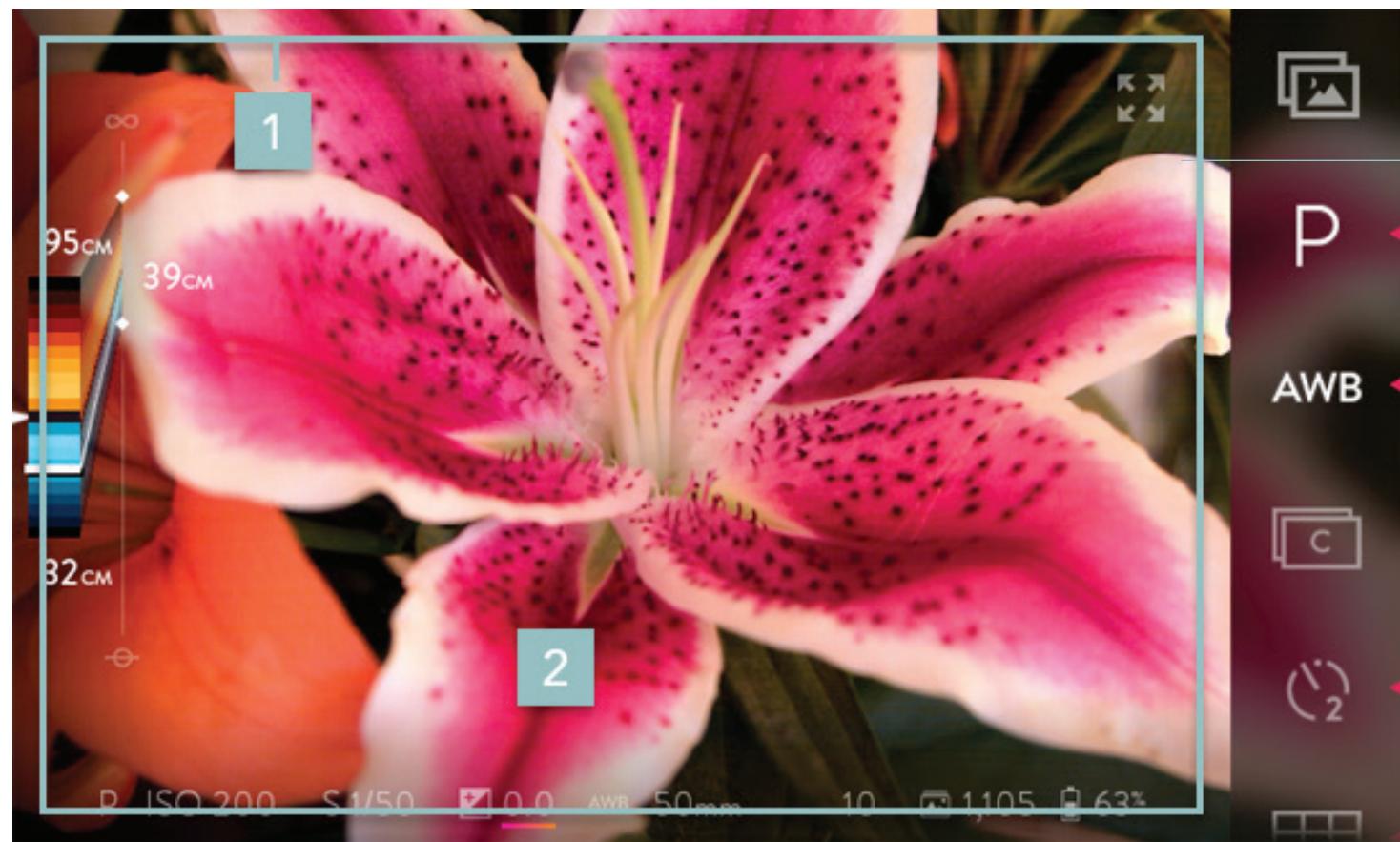


1. Image View Area
2. Depth Assist Bar
3. Menu Bar
4. Information Bar

Touchscreen layout in Capture Mode

1. Image View Area — displays the live view; sensor crop region is indicated by the thin gray frame
2. Depth Assist Bar — displays the refocusable range (indicated by the colored bands) for a Living Picture captured at the current settings
3. Menu Bar — displays touch control icons (swipe up to scroll to additional pages)
4. Information Bar — displays current capture settings, as well as SD card and battery status

Capture Mode, Image View Area

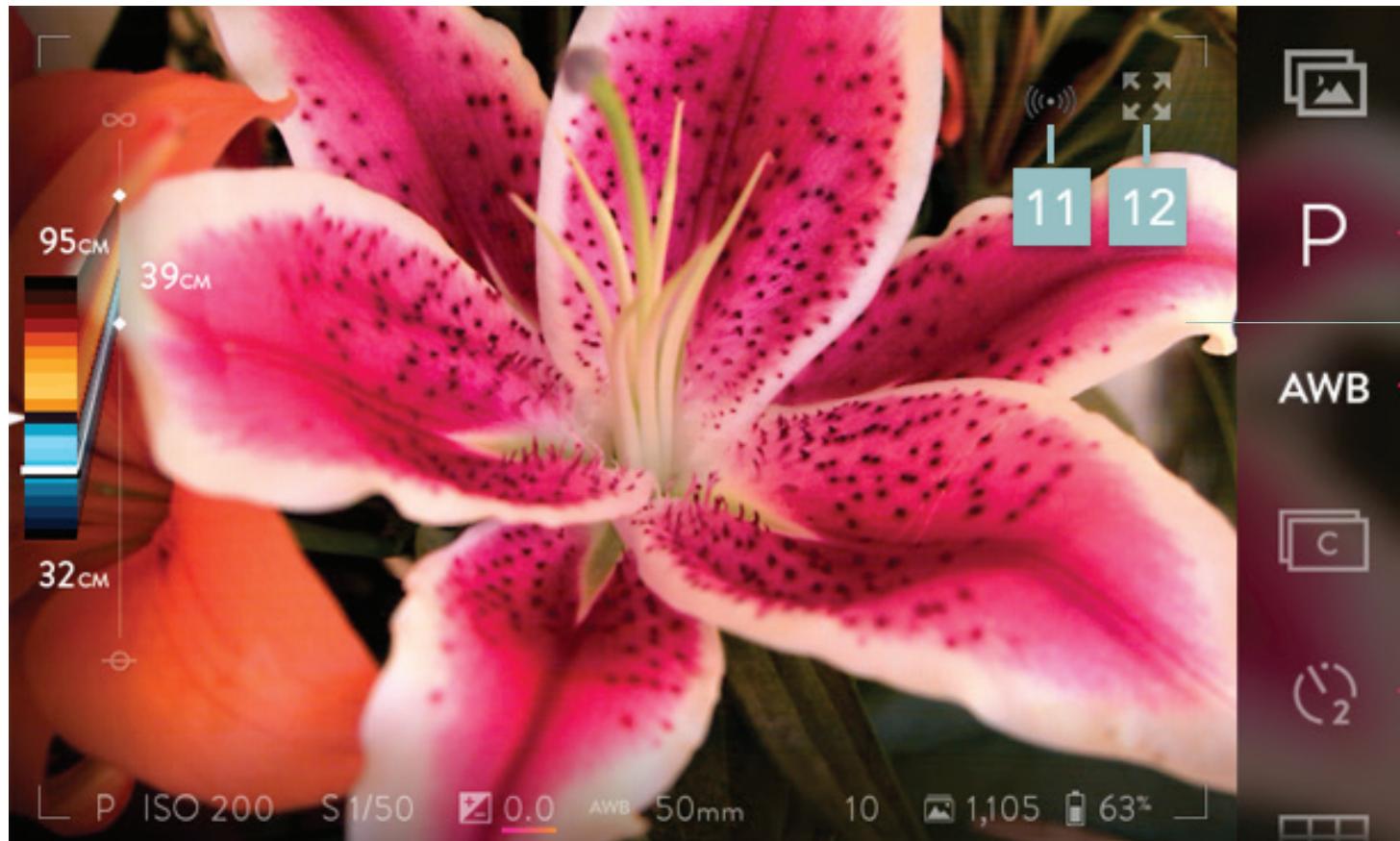


1. Sensor crop region
2. Live view area

Capture Mode, Image View Area

1. Sensor crop region – displays where the image is cropped after capture by viewing applications; portions of the picture outside of the sensor crop region are displayed only when the perspective is changed in a viewing application
2. Live view area – displays the live view of the camera

Capture Mode, Information Bar

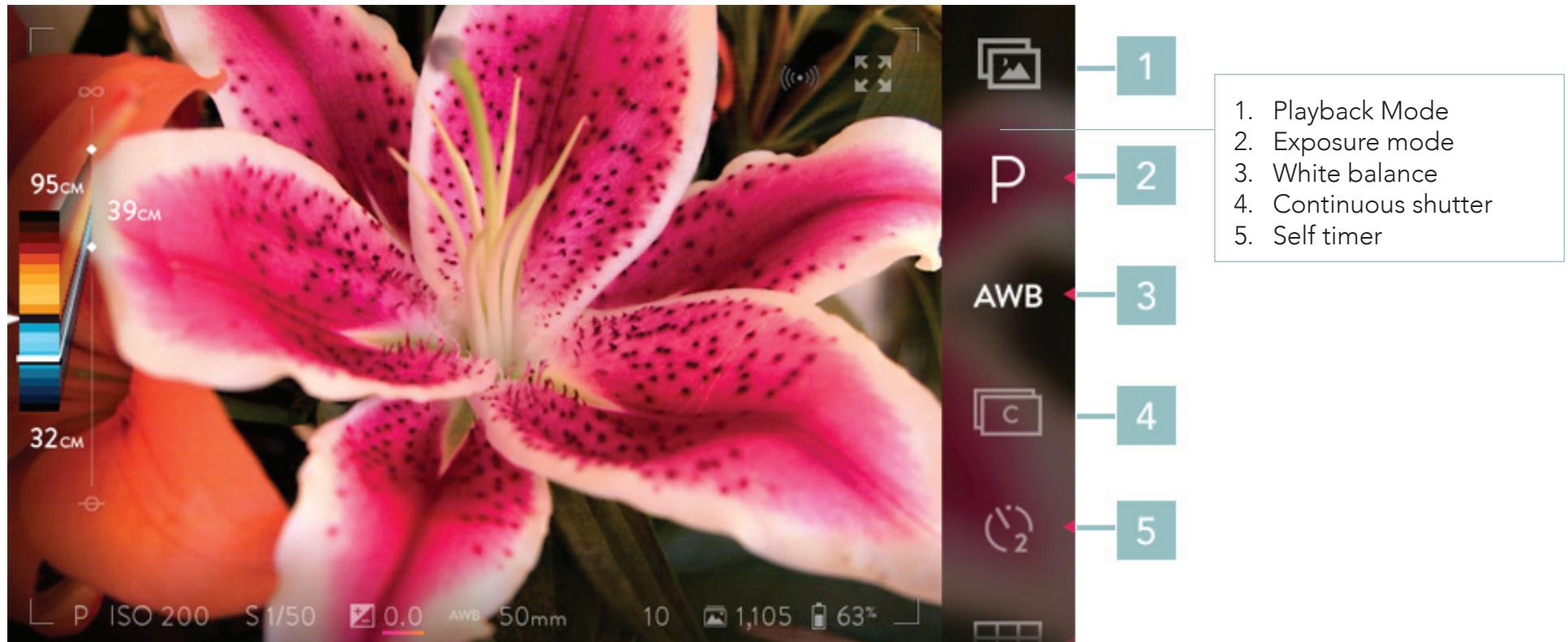


- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

Capture Mode, Information Bar

1. ISO indicator — displays the current ISO; tap to set ISO in ISO Priority Mode and Manual Mode
2. Shutter speed indicator — displays the current shutter speed; tap to set speed in Shutter Priority Mode and Manual Mode
3. EV compensation indicator — displays the compensation currently selected; tap to set compensation (not available in Manual Mode)
4. Exposure mode indicator — P for Program, I for ISO Priority, S for Shutter Speed Priority, M for Manual; replaced by a lock symbol when AE is locked
5. White balance indicator — displays the current white balance setting
6. Focal length indicator — displays the current focal length (35mm equivalent)
7. Shot buffer indicator — displays the number of shots remaining in the internal buffer used for burst capture; when the indicator reaches zero, the maximum continuous frame rate is limited by the write speed of the SD card
8. Shots remaining indicator — displays how many additional Living Pictures the SD card can hold; when no SD card is inserted, the no SD card indicator will appear here
9. Battery remaining indicator — displays the battery's remaining charge
10. Wi-Fi (iOS Connect) indicator — visible only when the camera is enabled as an access point in Settings, iOS Connect
11. Full screen mode -- Hides all extraneous data for simple composition.

Capture Mode, Menu Bar Page 1

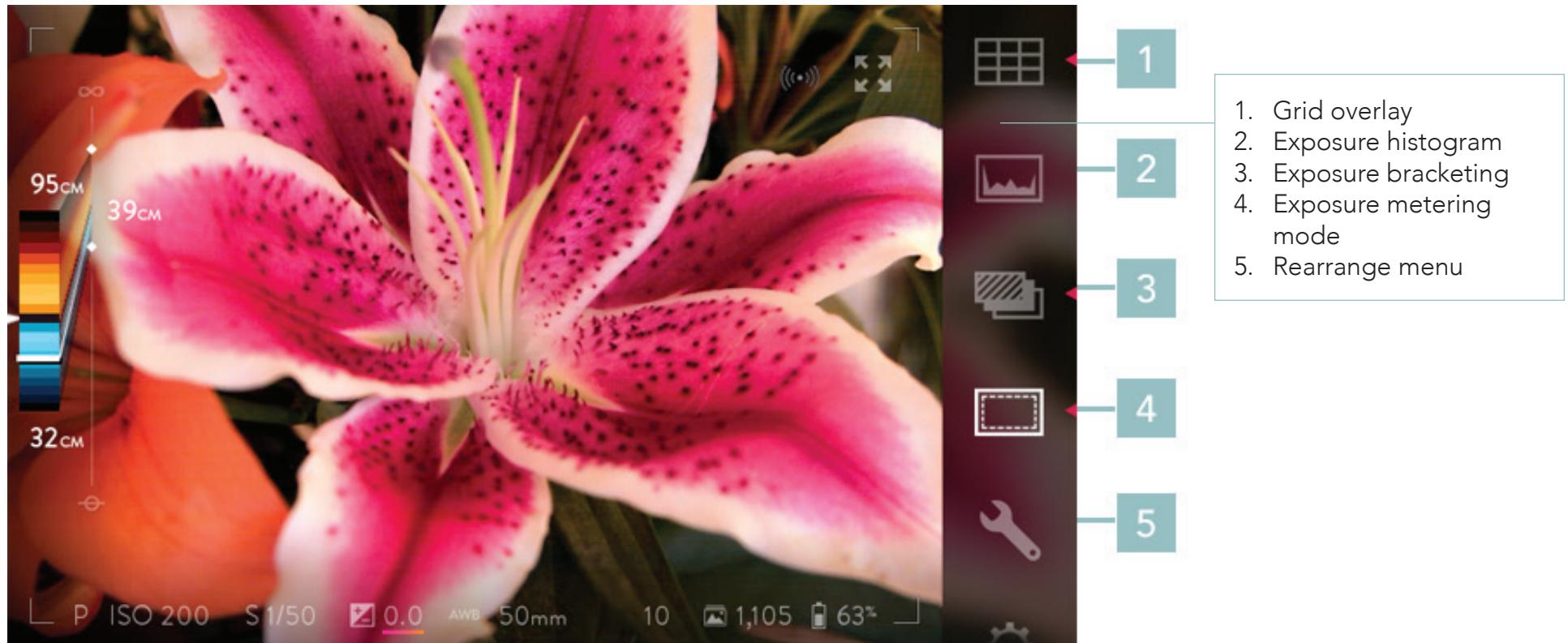


Note that the order of the icons in the Menu Bar may be customized and additional icons may be added (see Rearrange Menu). The default order is referenced here.

Capture Mode, Menu Bar Page 1

1. Playback Mode icon — tap to open Playback Mode, displaying the most recent Living Picture
2. Exposure Mode icon — tap to open the submenu for setting the mode; icon changes to reflect the current mode
3. White Balance icon — tap to open the submenu for setting the white balance; icon changes to reflect the current setting
4. Continuous Shutter icon — activates continuous shutter when tapped/illuminated
5. Self-Timer icon — tap to activate the self-timer; tap and hold opens the submenu to set the countdown at 2 or 10 seconds; icon changes to reflect the current setting

Capture Mode, Menu Bar Page 2



Capture Mode, Menu Bar Page 2

1. Grid Overlay icon — tap to activate grid overlay; tap and hold opens the submenu for selecting the style of overlay; icon changes to reflect the current selection
2. Exposure Histogram icon — displays the live exposure histogram on screen when tapped/illuminated
3. Exposure Bracketing icon — tap to activate exposure bracketing; tap and hold opens on-screen selection bands, which can be swiped to set the number of shots and the increment in EV compensation between each shot
4. Exposure metering mode - switches between averaged, evaluative, and spot metering modes
5. Rearrange menu - allows you to customize the camera Menu interface
6. Settings — opens the Settings menu (this will replace the live view; tap CAPTURE or press the shutter button halfway to close the menu and restore the live view

Additional touch control icons (not in the Menu Bar by default)

The additional touch controls below may be added to the Menu Bar. For details on selecting and reordering the controls shown in the Menu Bar see Rearrange Menu.



The list below describes the basic functionality of the Menu Bar icons pictured above.

- Focus Bracketing icon — tap to activate focus bracketing; tap and hold opens on-screen selection bands, which can be swiped to set the number of shots and the increment in Depth Steps between each shot
- Optical Offset icon — tap to activate optical offset control (using the front dial) and display (at the right edge of the screen)
- Manual Focus icon— when tapped/illuminated, autofocus is disabled
- Lights-out icon – tap to power-down the touchscreen. Tap and hold anywhere on the screen to restore power
- Focus Lock icon — when tapped/illuminated, the focus ring is disabled
- Zoom Lock icon — when tapped/illuminated, the zoom ring is disabled
- Hyperfocal icon — when tapped, sets the focus of the lens to the light field hyperfocal position (moves the far end of the refocusable range to infinity)
- Horizon Level icon — when tapped, turns on/off the horizon level gauges to indicate if camera body is level front to back, and side to side
- Rearrange Menu icon — when tapped the Rearrange Menu is opened to further customize the Capture Mode and Playback Menu Bars.

Using the Depth Assist Bar

See Depth Assist Bar in Depth composition features.

Using Auto Focus

Press the AF button to focus on the object at the center of the screen. Tap the screen to focus the lens on any area of the live view (see Tapping the screen to focus, below). This will not work if autofocus is disabled (see Using manual focus).

Tapping the screen to focus

Focus by simply tapping the screen in the area to bring into focus. This will not work if autofocus is disabled (see Using manual focus).



Focus the lens by touching the screen. The lens will focus on any part of your scene based on where you've touched.

Hiding and displaying the Menu Bar and Information Bar

The Menu Bar and Information Bar can be hidden by touching the Full Screen Preview icon in the upper right corner of the preview window. To display all menus again, touch the Full Screen Preview icon again. To hide just the Information Bar swipe it down. To display it again, swipe up from the bottom edge of the screen.



The Full Screen Preview icon will hide all menus with a single touch. A second touch returns all menus.

Choosing an exposure mode

The camera offers four exposure modes. The first letter of the currently selected mode appears in the exposure mode indicator in the Information Bar at the bottom of the screen. It is also displayed and illuminated as the exposure mode icon — the first item in the Menu Bar. To select a different mode, tap the exposure mode icon. The exposure mode submenu will open to the left, displaying the four mode options.



The list below describes the basic functionality of the Exposure Mode icons pictured above.

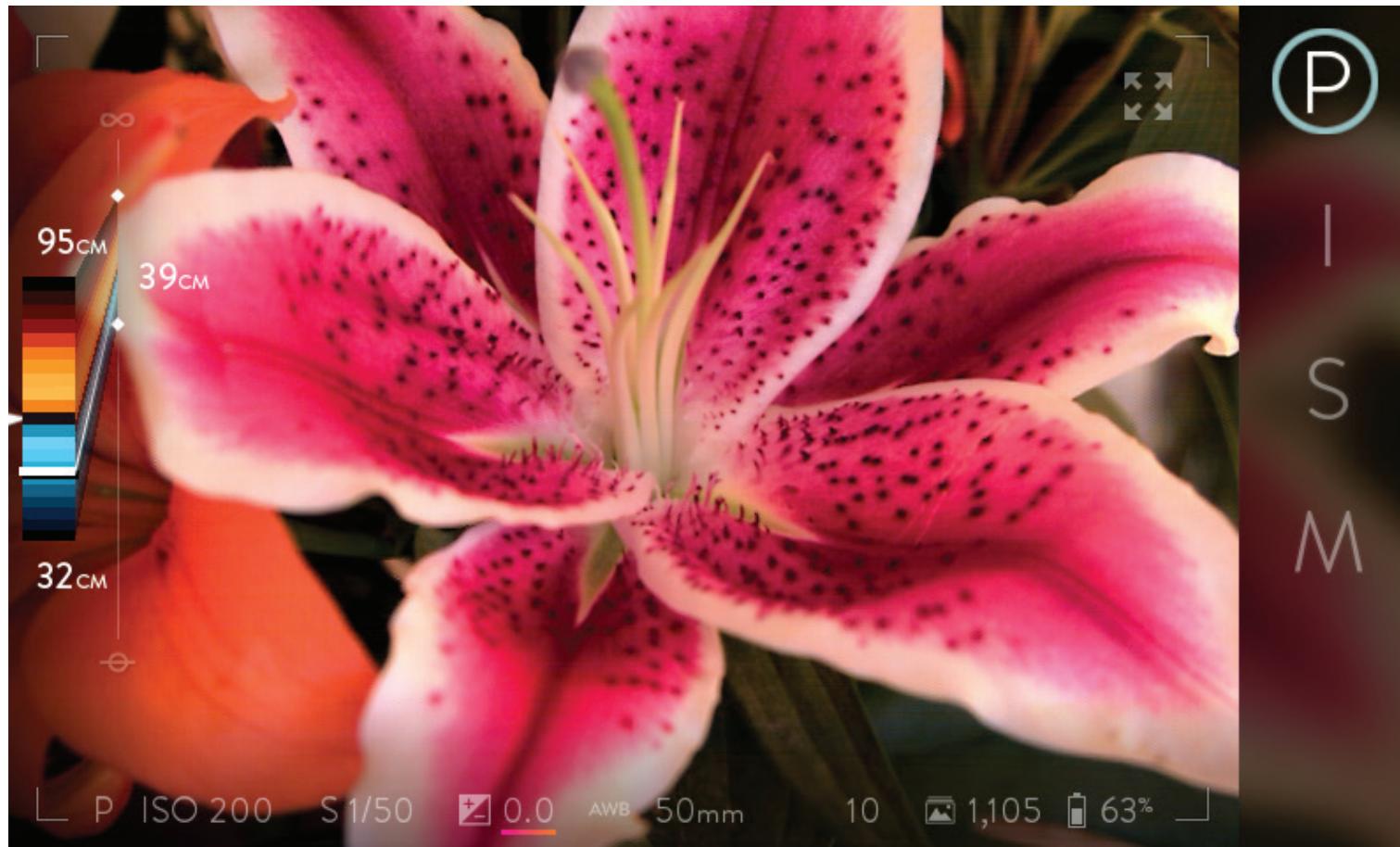
- P: Program Mode — the camera sets the ISO and the shutter speed based on metered value and EV compensation value
- I: ISO Priority Mode — manually set the ISO, and the camera sets the shutter speed based on metered value and EV compensation value
- S: Shutter Priority Mode — manually set the shutter speed, and the camera sets ISO based on metered value and EV compensation value
- M: Manual Mode — manually set both the shutter speed and the ISO

Tap on one of the letter options to set the exposure mode. The submenu will close, and the new selection will now be displayed as the exposure mode icon as well as in the exposure mode indicator in the Information Bar. If no selection is made, after a few seconds the submenu will close.



Tap the current exposure mode icon to open the submenu displaying the four options.

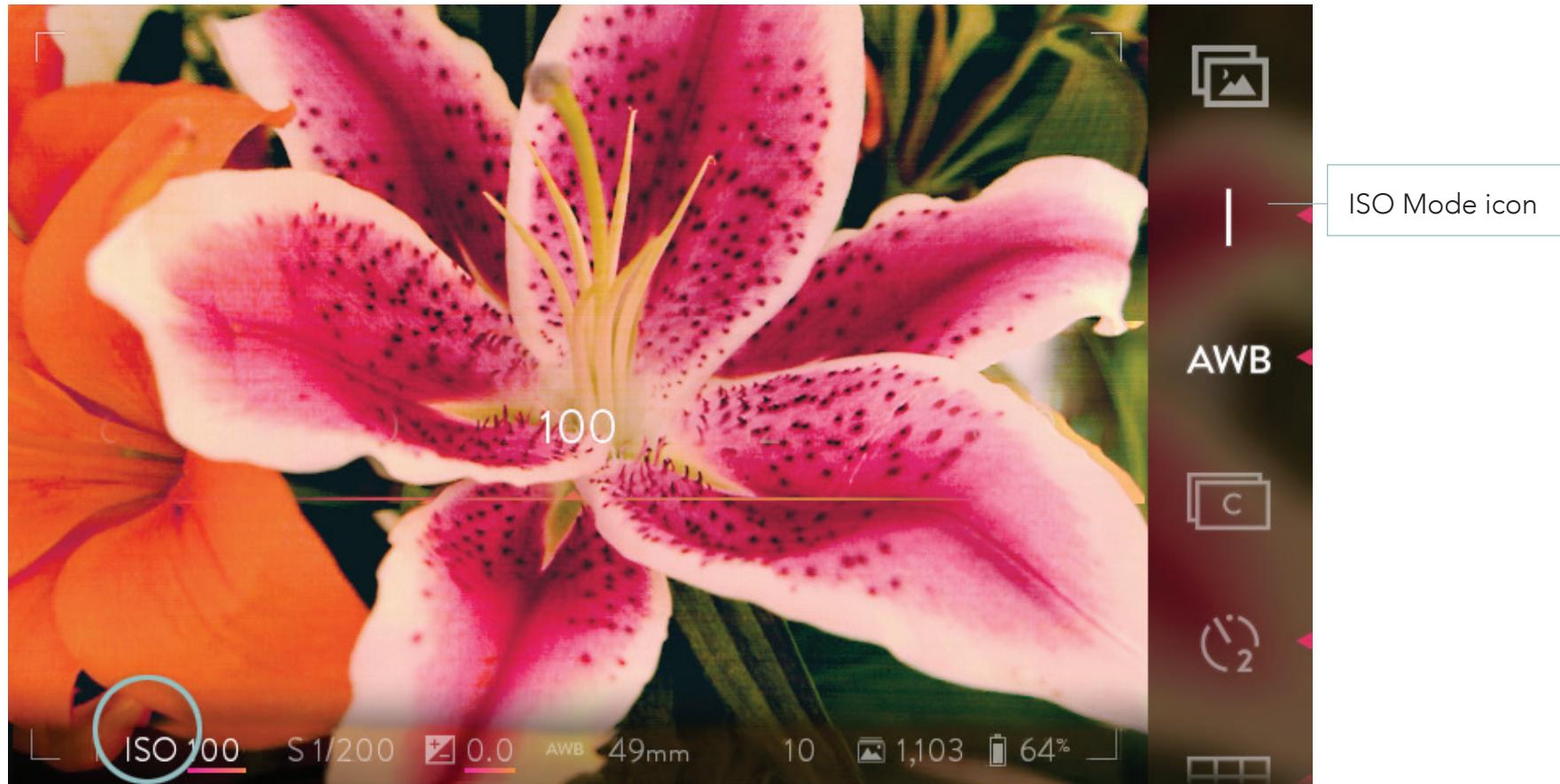
After the first tap of the exposure mode selection, all four exposure modes will be available to choose from.



Tap on one of the letter options to set the exposure mode from the following four options: Program Mode, ISO Priority Mode, Shutter Priority Mode, or Manual Mode

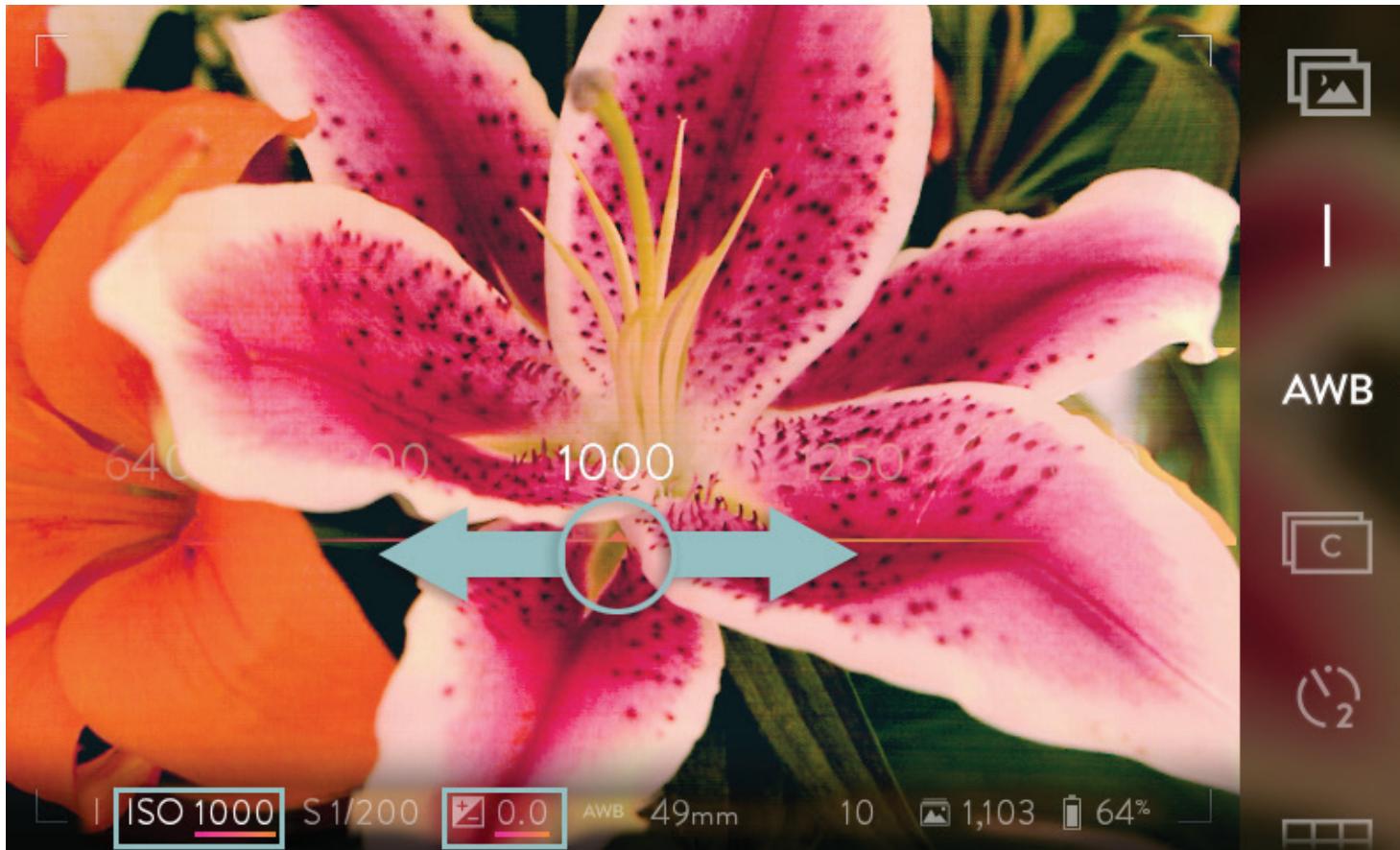
Setting the ISO

In ISO Priority Mode and Manual Mode, set the ISO by tapping the ISO indicator at the left end of the Information Bar. A selection band will open across the middle of the screen, with the current ISO at the center. Available ISO speeds range from 80 to 3200.



Tap the ISO indicator to open the ISO selection band.

Swipe the band from right to left to increase the ISO, or from left to right to lower it. Tap on any ISO visible in the selection band to go directly to that setting. Double-tap on the selection band returns to the initial ISO setting.



Swipe the ISO selection band to increase or lower the ISO.

Once the selection has been made, tap the screen anywhere outside of the selection band to close the band. A half press of the shutter button will also close the selection band. A full press will close it and take a picture.

Set the ISO using the front dial while in ISO Priority Mode or using the rear dial while in Manual Mode*. As the dial is rotated, the ISO indicator in the Information Bar at the bottom of the screen will change to display the current setting.

*Note that the functions assigned to the front and rear dials in the various exposure modes can be changed (see Camera controls). The default assignments are referenced here.

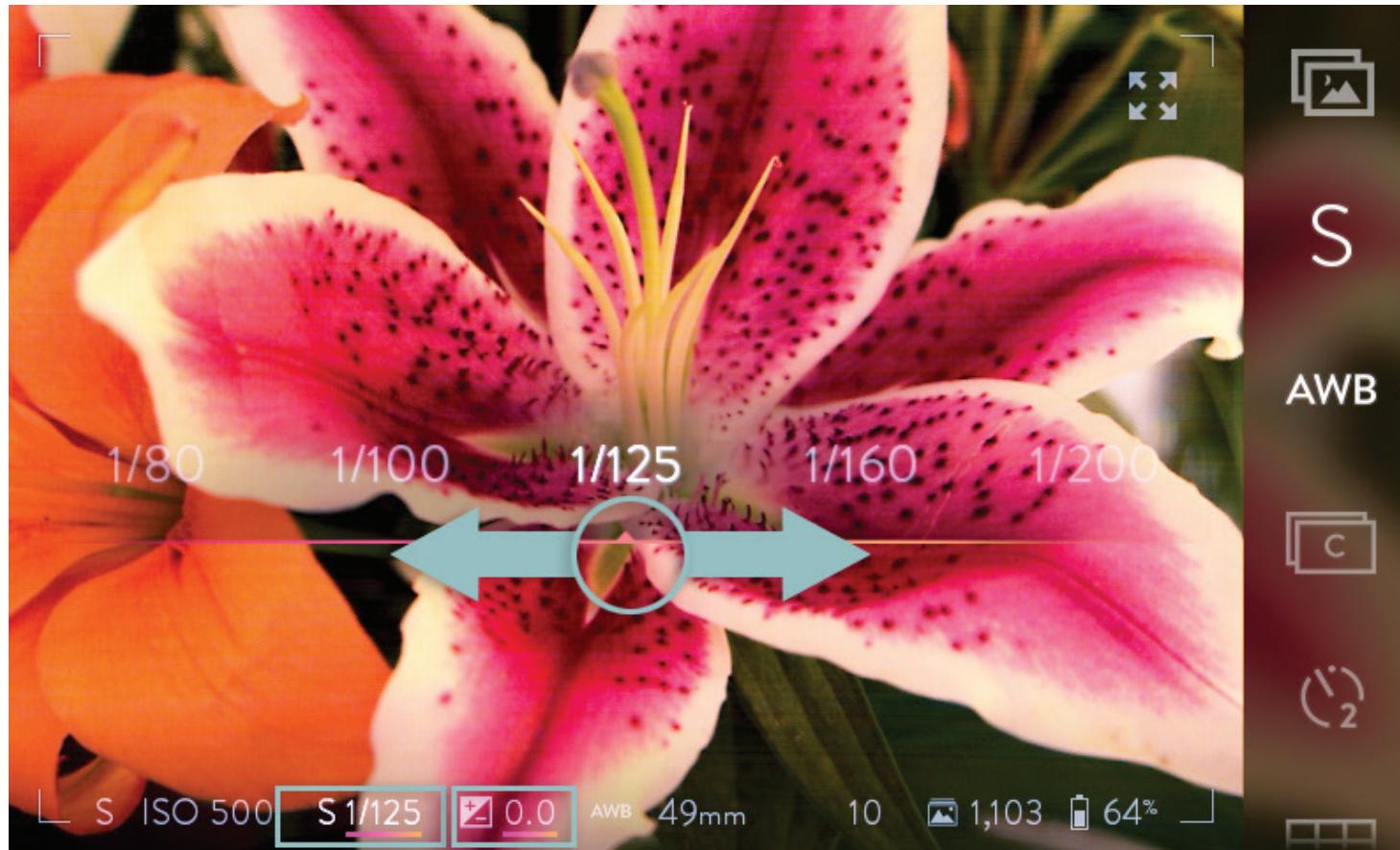
Setting the shutter speed

In Shutter Priority Mode and Manual Mode, set the shutter speed by tapping the shutter speed indicator in the information bar at the bottom of the screen. A selection band will open across the middle of the screen, with the current speed at the center. Available shutter speeds range from 1/4000th of a second to 32 seconds.



Tap the shutter speed indicator to open the shutter speed selection band.

Swipe the band from right to left to increase the shutter speed, or from left to right to lower it. Tap on any speed visible in the selection band to go directly to that speed. Double-tap on the selection band to the initial shutter speed setting.



Swipe the shutter speed selection band to increase or lower the speed.

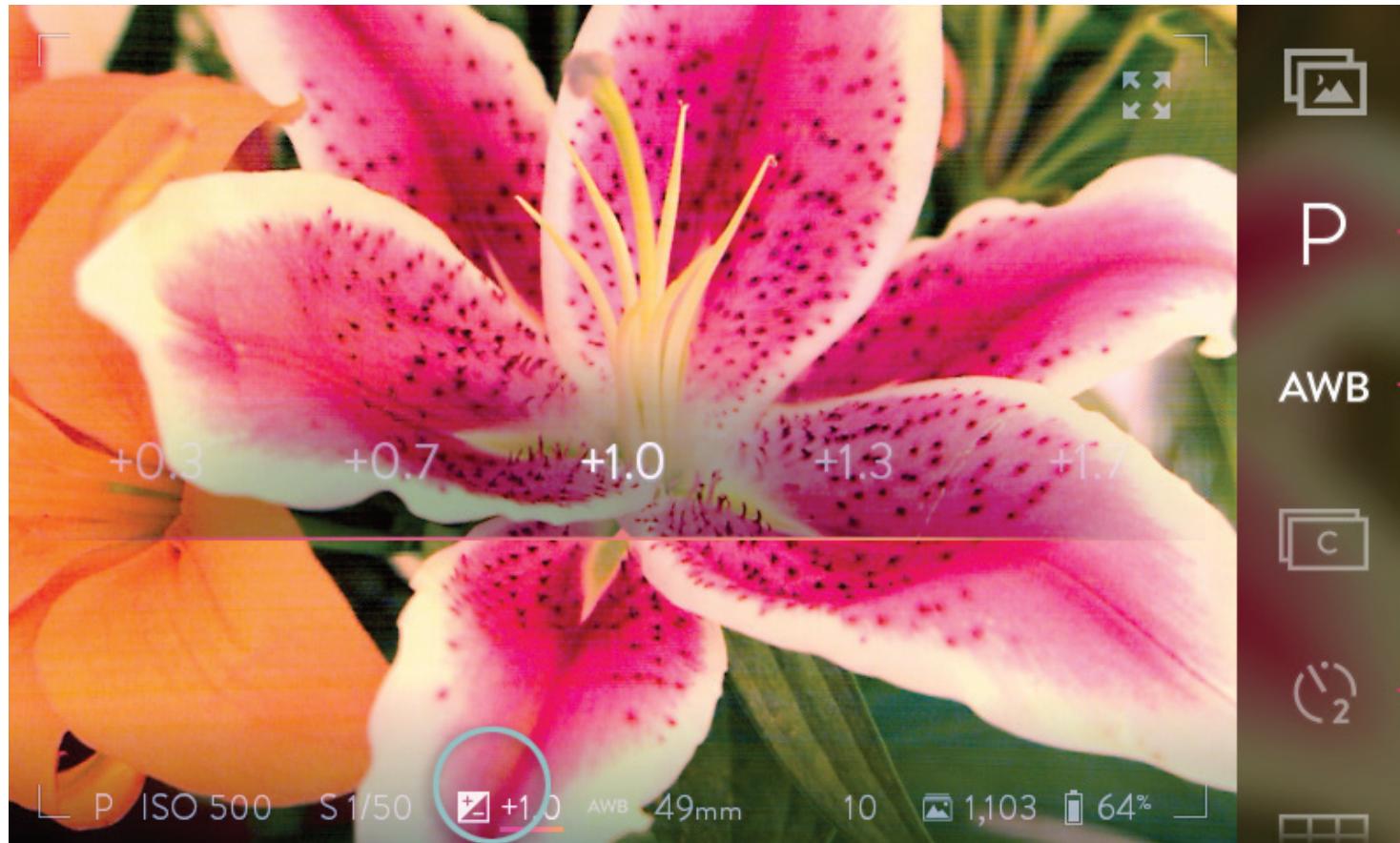
Once the selection has been made, tap the screen anywhere outside of the selection band to close the band. A half press of the shutter button will also close the selection band. A full press will close it and take a picture.

Set the shutter speed using the front dial while in Shutter Priority Mode or Manual Mode*. As the dial is rotated, the shutter speed indicator in the Information Bar at the bottom of the screen will change to display the current setting.

*Note that the functions assigned to the front and rear dials in the various exposure modes can be changed (see Camera controls). The default assignments are referenced here.

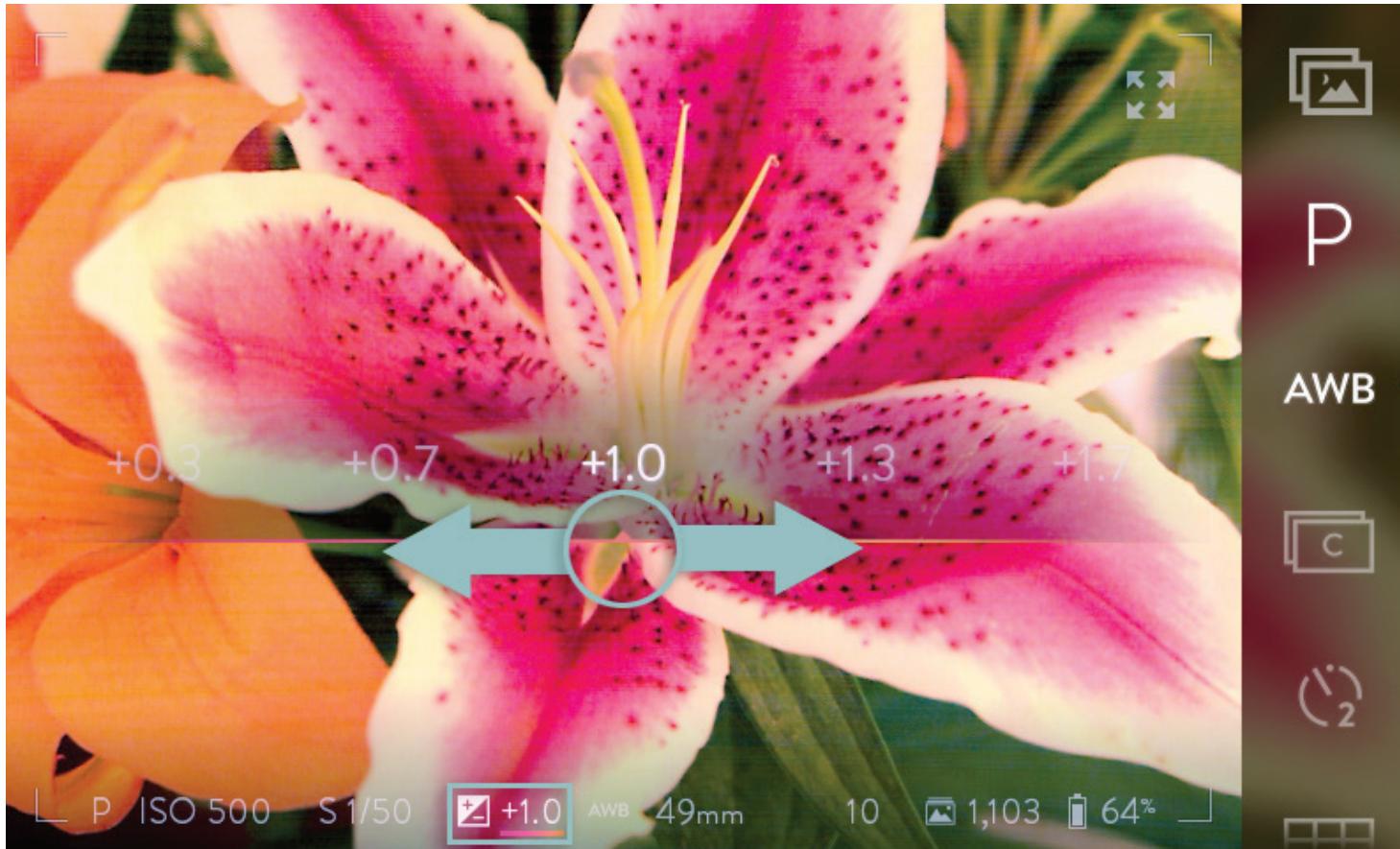
Setting the EV compensation

Exposure value compensation is available in all exposure modes except Manual Mode. Set the EV compensation by tapping the EV compensation indicator in the information bar at the bottom of the screen. A selection band will open across the middle of the screen, with the current setting at the center. The available settings range from -2.0 to +2.0.



Tap the EV compensation indicator to open the selection band.

Swipe the band from right to left to increase the compensation, or from left to right to lower it. Tap on any value visible in the selection band to go directly to that setting. Double-tap on the selection band to return to the initial compensation setting.



Swipe the selection band to set the EV compensation.

Once the selection has been made, tap the screen anywhere outside of the selection band to close the band. A half press of the shutter button will also close the selection band. A full press will close it and take a picture.

Set the EV compensation using the rear dial while in Program, ISO Priority, and Shutter Priority Modes*. As the dial is rotated, the EV compensation indicator in the Information Bar at the bottom of the screen will change to display the current setting.

*Note that the functions assigned to the front and rear dials in the various exposure modes can be changed (see Camera controls). The default assignments are referenced here.

Setting the white balance

To set the white balance, tap the White Balance icon in the Menu Bar. A submenu will open to the left, displaying available options. Swipe up on the submenu to view additional options. Tap any option to change the setting. The submenu will close, and the new selection will now be displayed as the White Balance icon as well as in the white balance indicator in the Information Bar. If no selection is made, after a few seconds the submenu will close.

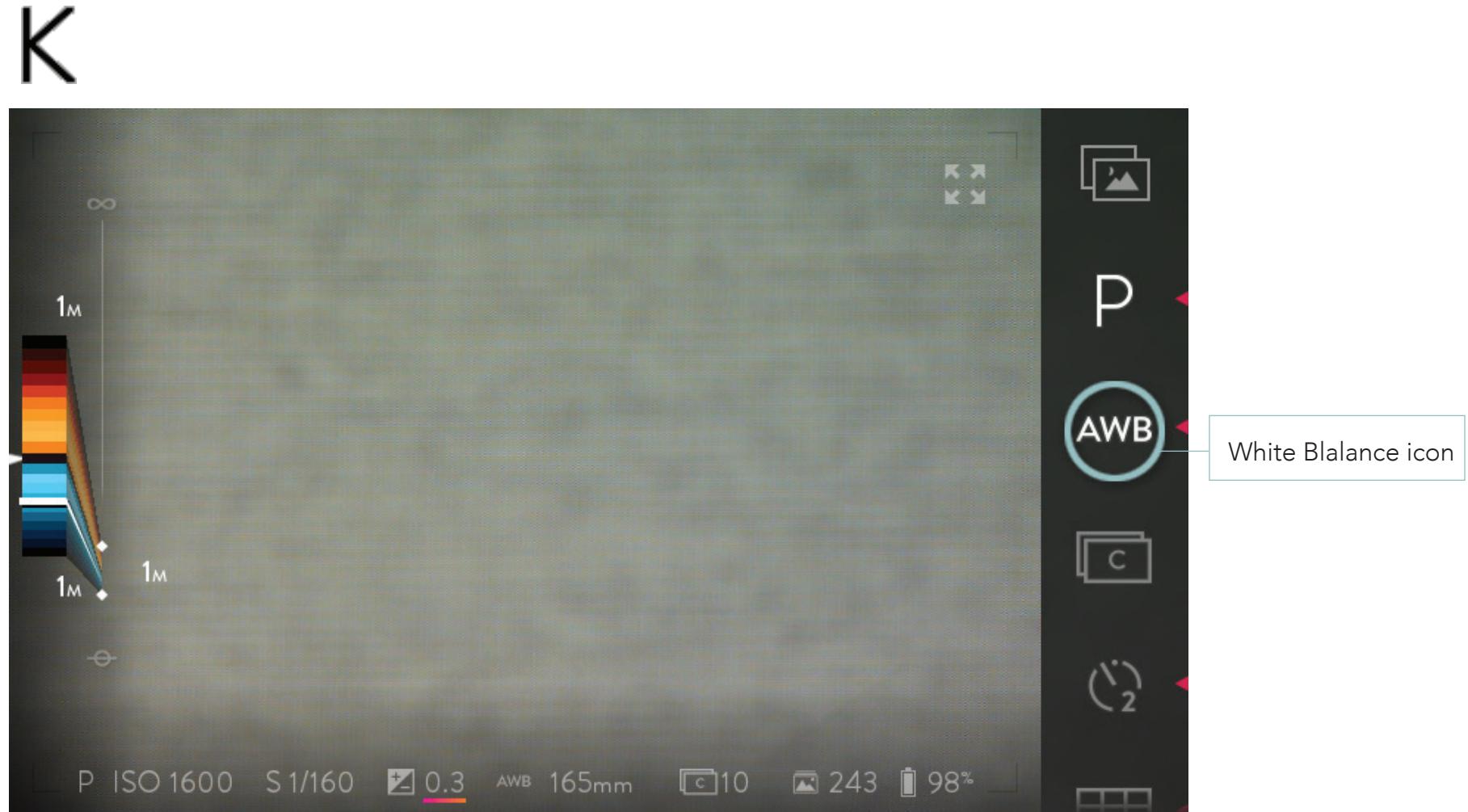


The list below describes the basic functionality of the White Balance icons pictured above.

- Auto White Balance — camera will determine the correct white balance automatically in this mode
- Tungsten —selected when shooting under incandescent tungsten lighting conditions
- Flourescent— selected when shooting under fluorescent tube lighting conditions
- Flash WB – selected when shooting with flash
- Cloudy —selected when shooting in cloudy, overcast conditions
- Shaded —selected when shooting in a shaded location, in otherwise sunny conditions
- Manual WB — selected to choose a custom white balance tint and temperture in Kelvin

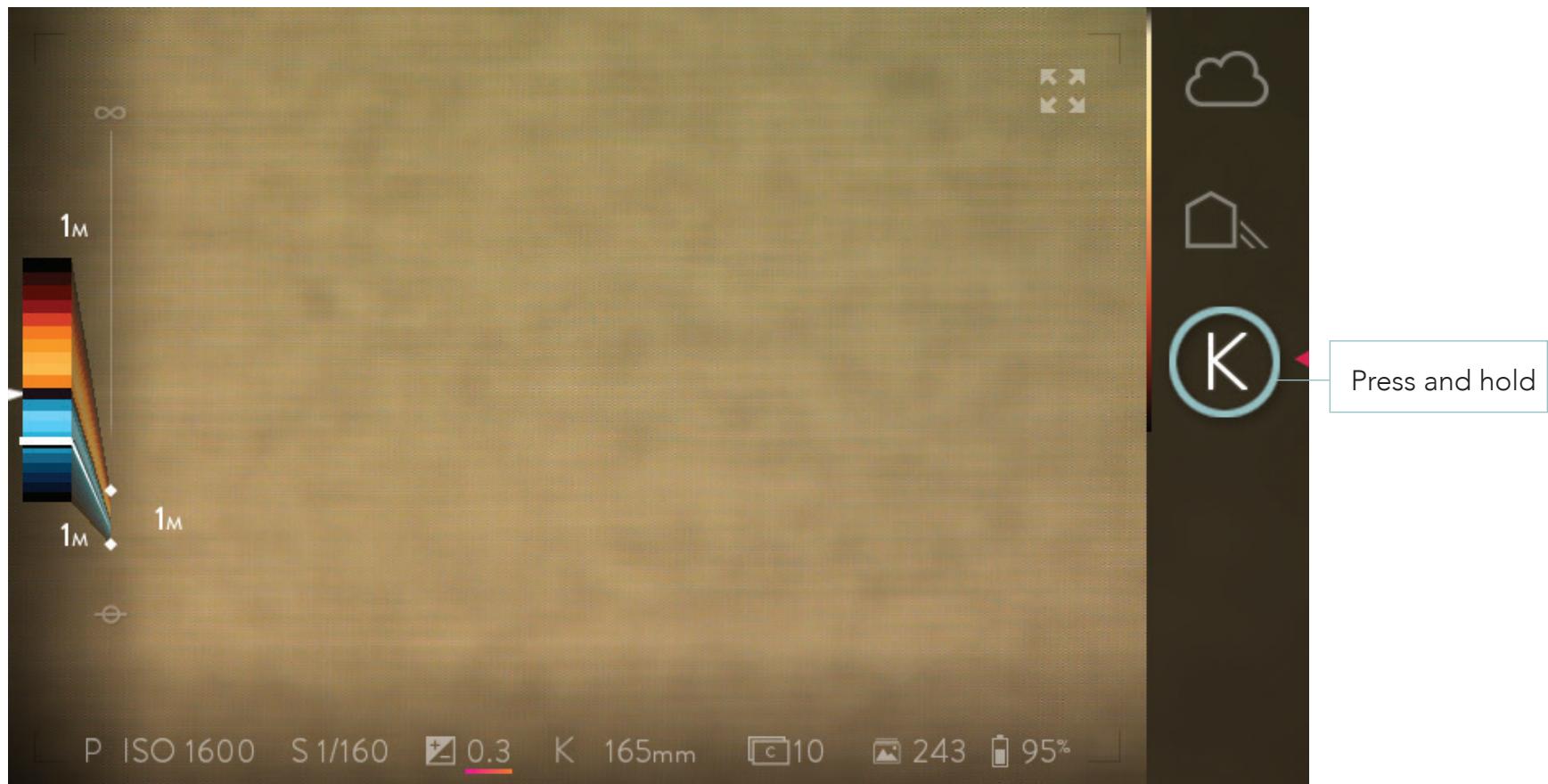
Manually setting the white balance

Manually set the white balance by tapping the White Balance icon in the Menu Bar at the side of the screen. The submenu described on the previous page will appear. Tap the Manual White Balance icon shown below:

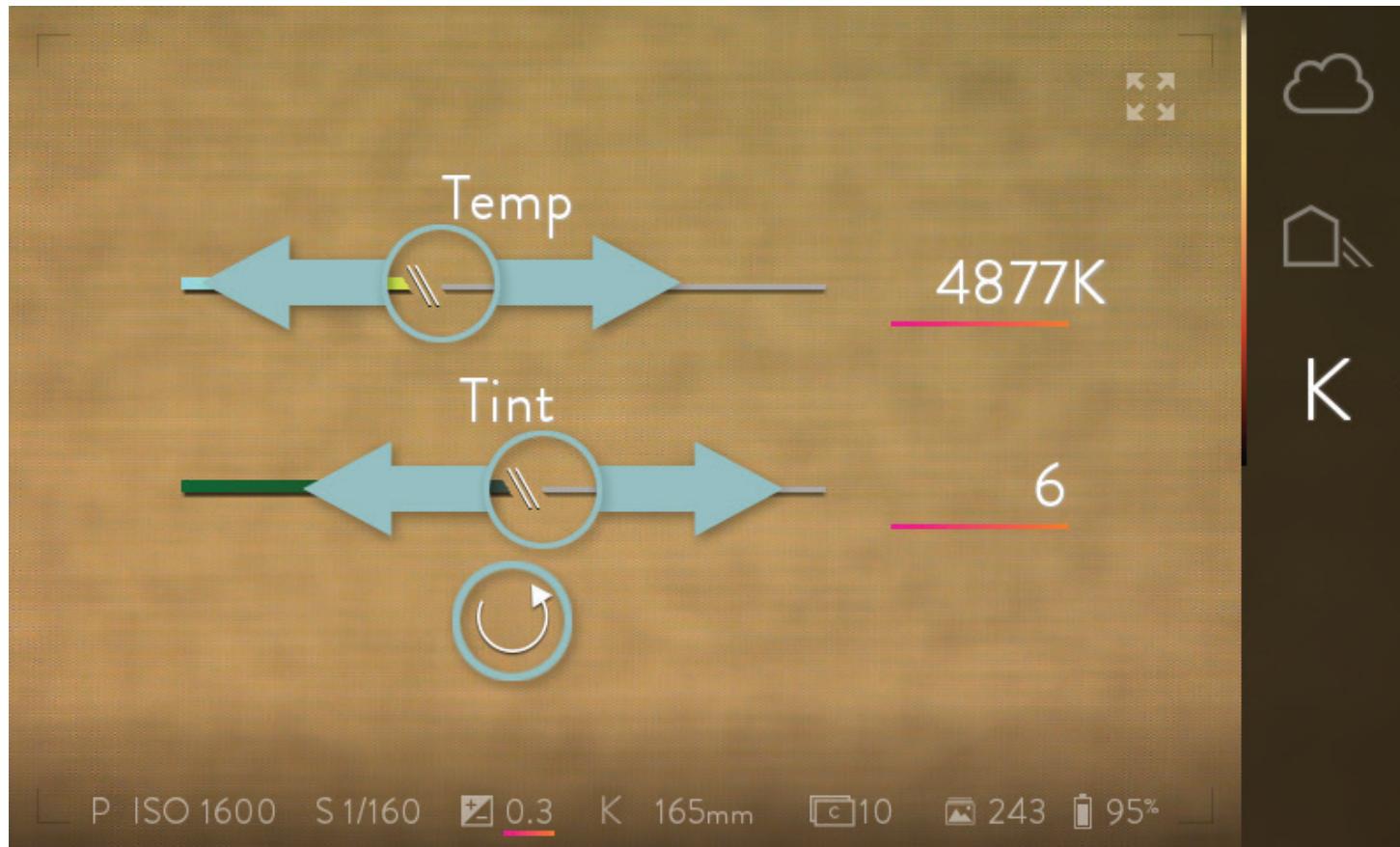


Tap the White Balance icon to open the white balance submenu of options

To assist manual setting the white balance, point the lens at a neutral gray card or surface in the same light you are shooting with. Fill the lens with image of the card's surface. This will be used as your surface for evaluating the lights' color and tint. If you have a color meter that displays Kelvin color temperature, this is even more accurate. Press and hold your finger on the Manual white balance icon until the white balance adjustment sliders are displayed on screen.



Tap and sweep side to side to adjust the slider values. Adjust the light color temperature K to match the values on your color meter, or until the gray on screen is a neutral value that matches the gray you see on the card in the scene. The color temperature range is 2000K - 10000K. Adjust Tint to fine tune the white balance, the default setting for Tint is 0. The counterclockwise arrow will reset the Manual White Balance value to your original starting point. Tap the screen to return to Capture Mode. The Manual White Balance value you've set will be stored in the camera until you edit it again.



Tap the sliders and sweep side to side to adjust their values. Tap the counter clockwise arrow to revert to the original Manual White Balance.

Shooting with continuous shutter

When continuous shutter is active, the camera will trigger the shutter as rapidly as possible for as long as the shutter button is held down — or until the shot buffer is full. To activate continuous shutter mode, tap the Continuous Shutter icon in the Menu bar and the icon will illuminate. To return to single shutter mode, tap the icon again.



Using the self timer

To activate the self-timer and set the countdown duration, tap and briefly hold the Self-Timer icon. The icon will illuminate and a submenu will open to the left, with options for 2 and 10 seconds. Tap on the desired selection, the submenu will close, and the new selection will now be displayed as the Self-Timer icon. The self-timer indicator will also replace the shutter mode indicator in the Information Bar. If no selection is made after a few seconds, the submenu will close.

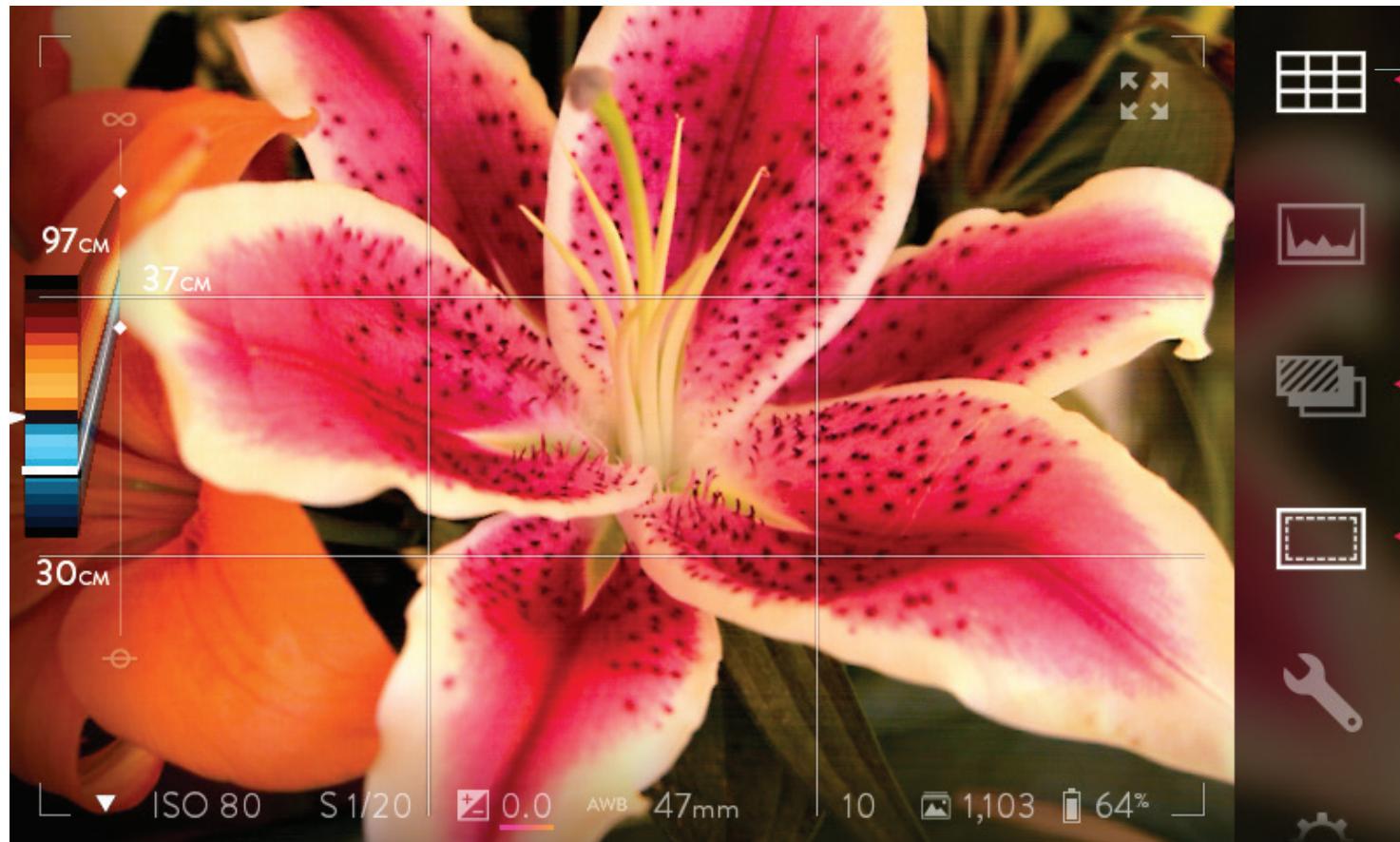
To turn off the self-timer, tap the icon again. The camera will remember the selected countdown the next time the self-timer is activated.



Applying a grid overlay

To select a grid overlay and apply it to the live view, tap and briefly hold the Grid Overlay icon. A submenu will open to the left, displaying available options. Swipe up on the submenu view additional options. Tap any option to select an overlay style. The submenu will close, and the new selection will now be displayed as the Grid Overlay icon. If no selection is made, after a few seconds the submenu will close. To turn off the grid overlay, tap the icon again. The camera will remember your selected settings the next time the overlay is activated.

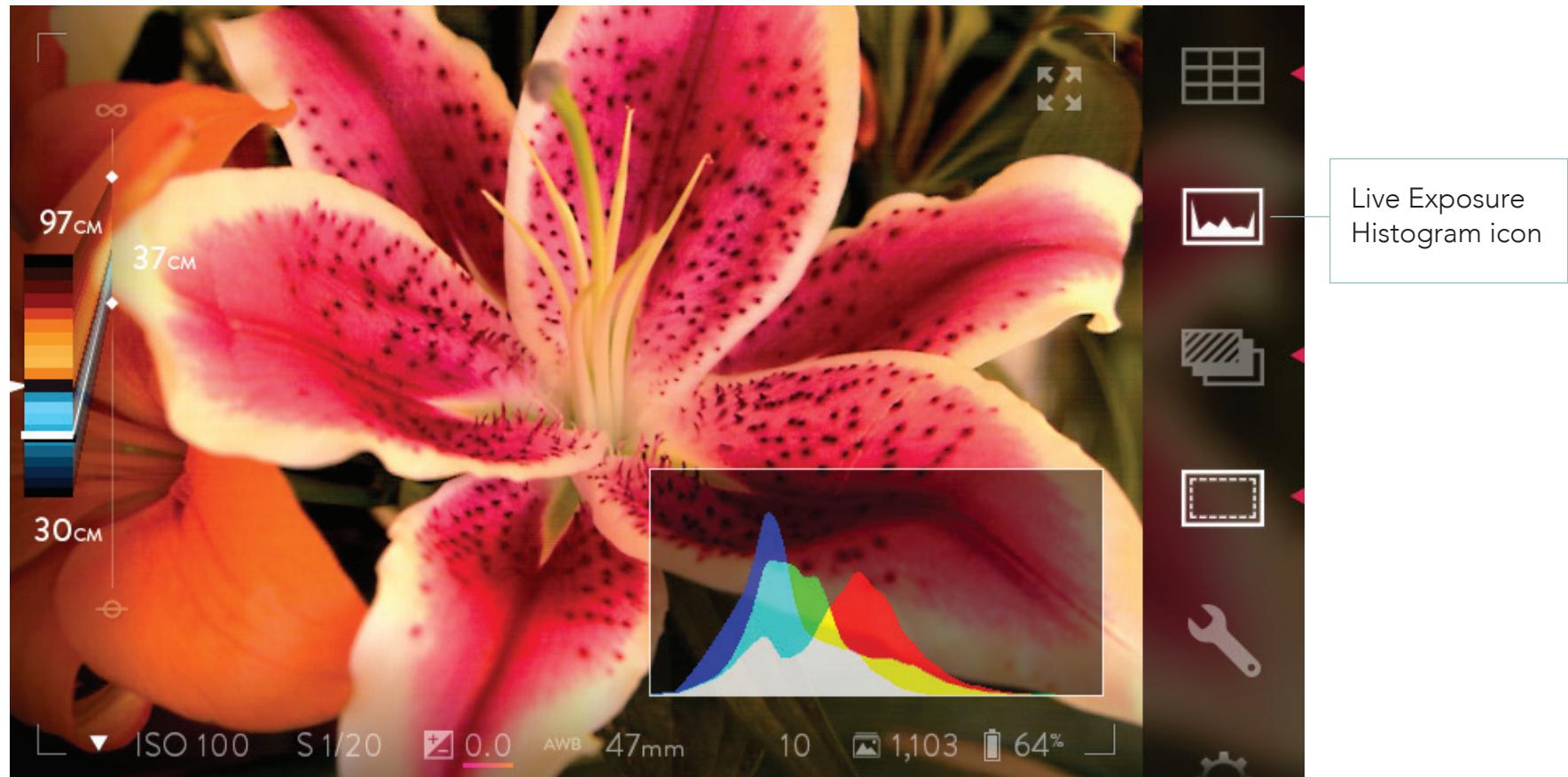
Applying a grid overlay



Activate the rule-of-thirds grid view.

Using the live exposure histogram

To view an exposure histogram for the live view, tap the Exposure Histogram icon in the Menu Bar at the right-hand edge of the screen. The icon will illuminate, and the histogram will be displayed in the lower left-hand corner of the screen. To close the histogram, tap the icon again.



Activate the live exposure histogram to evaluate a potential shot.

Adjusting the optical offset

See Optical offset in Depth composition features.



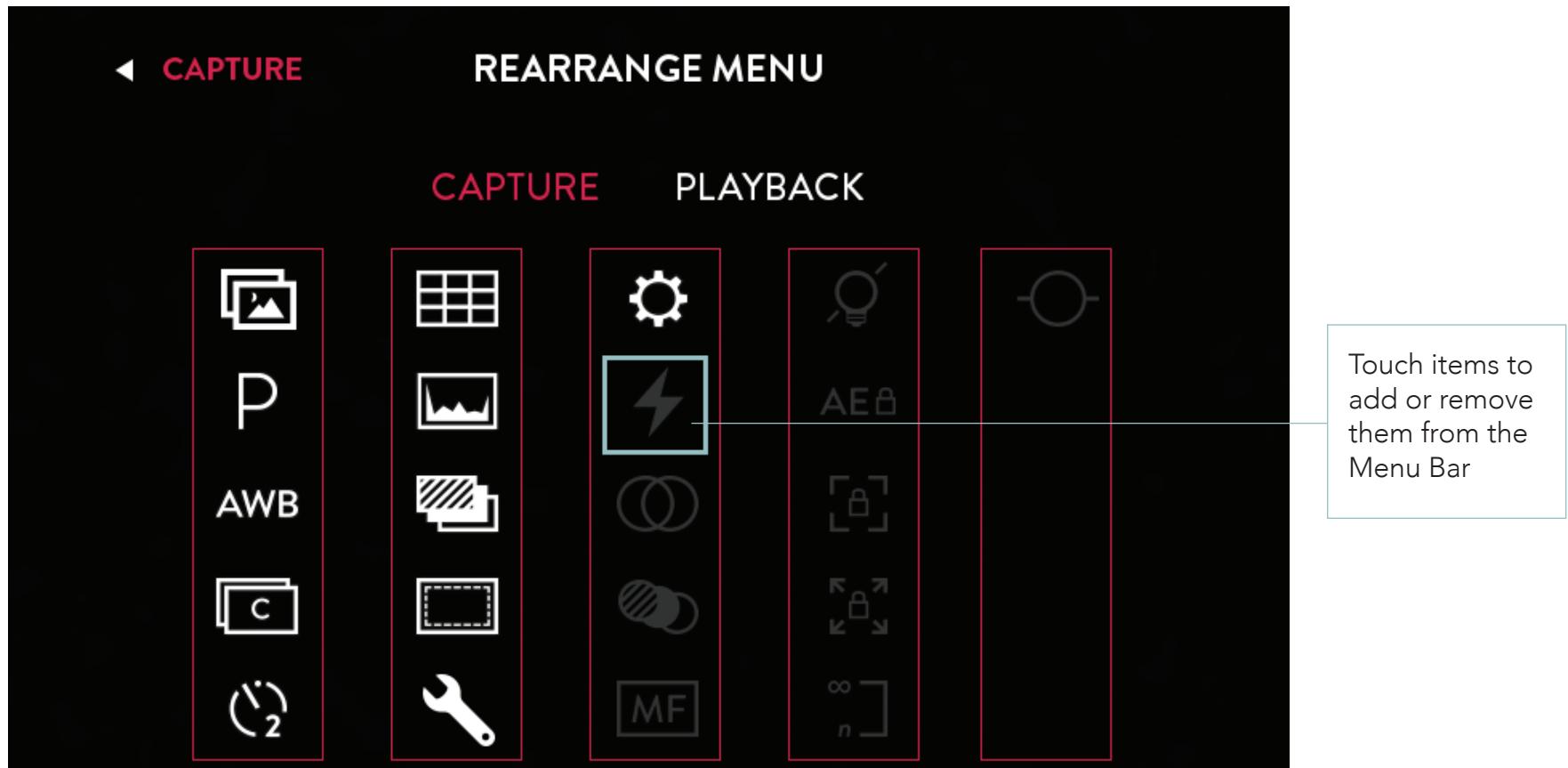
Adjusting the Settings Menu

Open the Settings menu by tapping the Settings icon in the Menu Bar. The menu will replace the live view. For details on each of the available Settings, see the Settings section. To close the menu and return to Capture Mode and the live view, tap on the word CAPTURE at the top left of the screen, or press the shutter button halfway.



Opening the Rearrange Menu

Open the Rearrange menu by tapping the wrench icon in the Menu Bar. The menu will allow you to select ILLUM features which will appear in the Menu bar.



The default Menu Bar features are shown in the illustration above. Features which currently show on the Menu Bar are indicated in white. Touch grayed out items to add them to the Menu Bar. Touch white items to remove them from the Menu Bar.

Rearrange Menu features

Use the Rearrange Menu to add the following non-default camera features to the Capture and Playback Menu Bar:

- Flash
- Optical Offset
- Focus Bracketing
- Lights Out
- Auto Exposure Lock
- Focus Lock
- Zoom Lock
- Hyperfocal Mode
- Level Gauge

Using Lights-Out

When manual focus is engaged, the screen is turned off while the camera is fully functional. To exit lights-out, tap and hold the touch screen.



Using Manual Focus

When manual focus is selected, autofocus is automatically disabled. Set the focus by rotating the focus ring. Manual focus is selected by tapping the Manual Focus icon, which can be added to the Menu Bar (see Rearrange Menu).



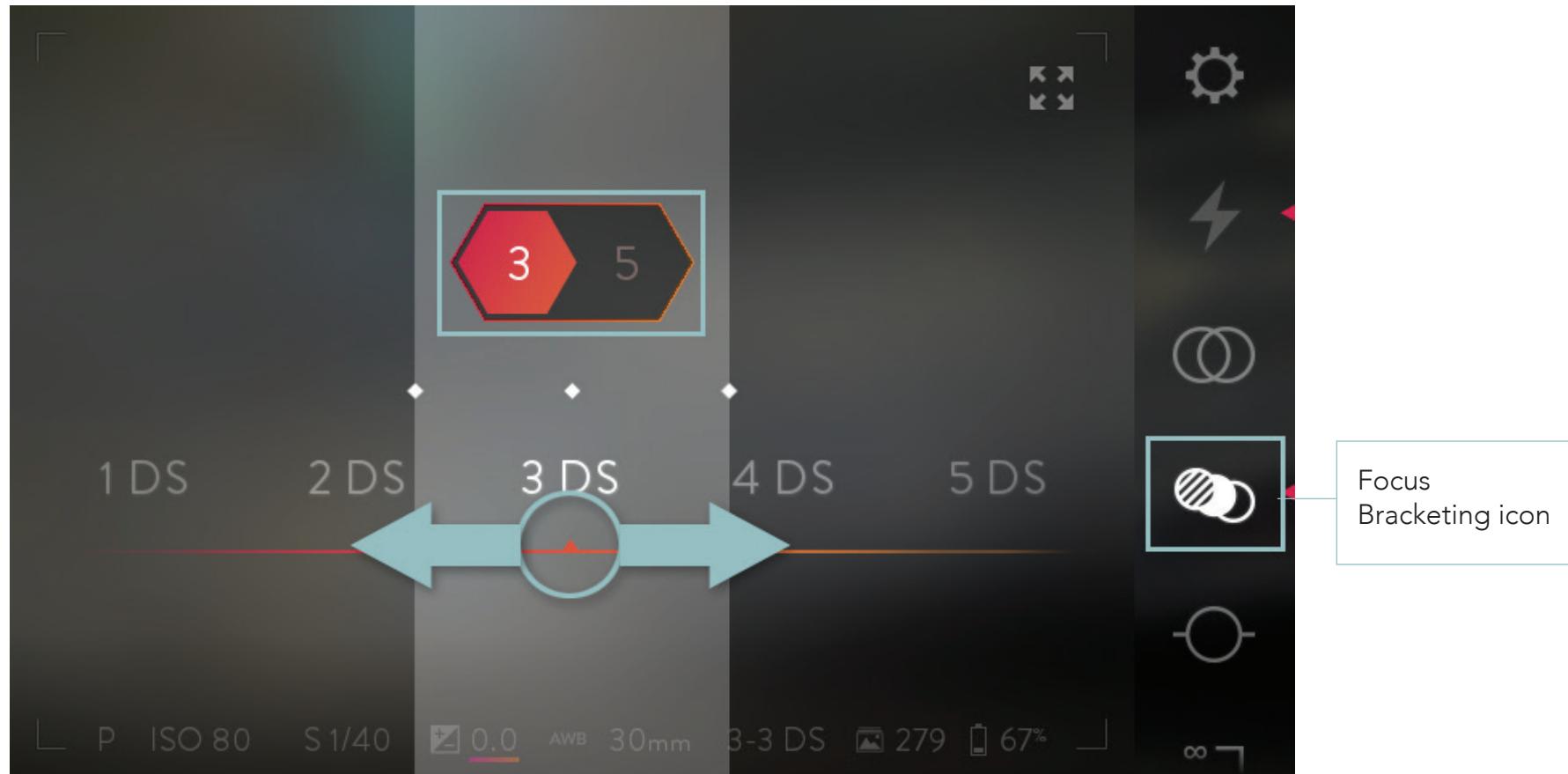
Applying Focus Bracketing

When focus bracketing is active, each time the shutter button is pressed, the camera will take a series of pictures, varying the focus for each. (For a more detailed explanation, see Focus bracketing) To activate focus bracketing and set the parameters, tap and hold the Focus Bracketing icon, which can be added to the Menu Bar (see Rearrange Menu).



Applying Focus Bracketing

Two selection bands will open across the middle of the screen, with the current settings at the center. The upper band shows the number of pictures that will be taken, 3 or 5. The lower band shows the increment that will be applied, from 1 to 10, in 'Depth Steps'. Swipe the bands to change the settings. Double-tap a selection band to return to the initial setting.



Once selections have been made, tap the screen anywhere outside of the selection bands to close them. A half press of the shutter button will also close the selection bands. A full press will close them and take a series of pictures using the new settings.

To turn off focus bracketing, tap the icon again. The camera will remember your selected settings the next time focus bracketing is activated.

Applying Exposure Bracketing

When exposure bracketing is active, the camera will take pictures at a range of exposure compensation values each time the shutter button is pressed. To activate exposure bracketing and set the parameters, tap and hold the exposure bracketing icon, which can then be added to the Menu Bar (see Rearrange Menu).



Applying Exposure Bracketing

Two selection bands will open across the middle of the screen, with the current settings at the center. The upper band shows the number of pictures that will be taken, 3 or 5. The lower band shows the exposure value increment that will be applied, 1/3 EV, 2/3 EV, 1EV, or 2 EV. Swipe the bands to change the settings. Double-tap on a selection band returns it to the initial setting.



Once selections are made, tap the screen anywhere outside of the selection bands to close them. A half press of the shutter button will also close the selection bands. A full press will close them and take a series of pictures using the new settings.

To turn off exposure bracketing, tap the icon again. The camera will remember your selected settings the next time exposure bracketing is activated.

Using Focus Lock

When focus lock is selected, input from the focus ring is disabled.



Using Zoom Lock

When zoom lock is selected, input from the zoom ring is disabled.



Using Hyperfocal mode

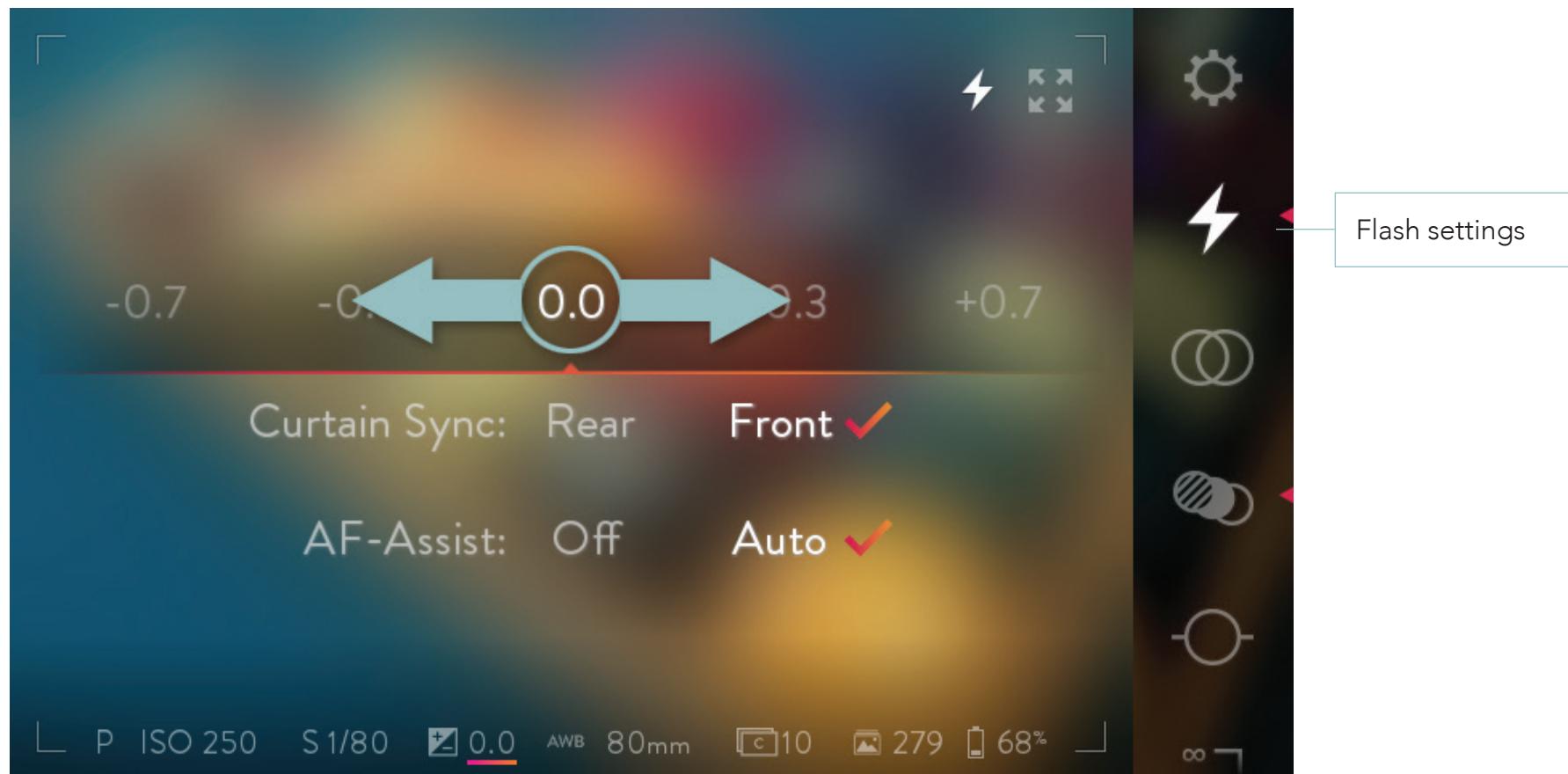
Touch the Hyperfocal icon to refocus and adjust Optical Offset. This feature replicates the Hyperfocal button functionality. See Optical Offset for more information.



Using a flash

The ILLUM provides full support for the Viltrox JY680L TTL Flash. In the ILLUM Menu, the flash interface controls allow you to select exposure compensation, choose front or rear curtain sync and enable auto focus assist.

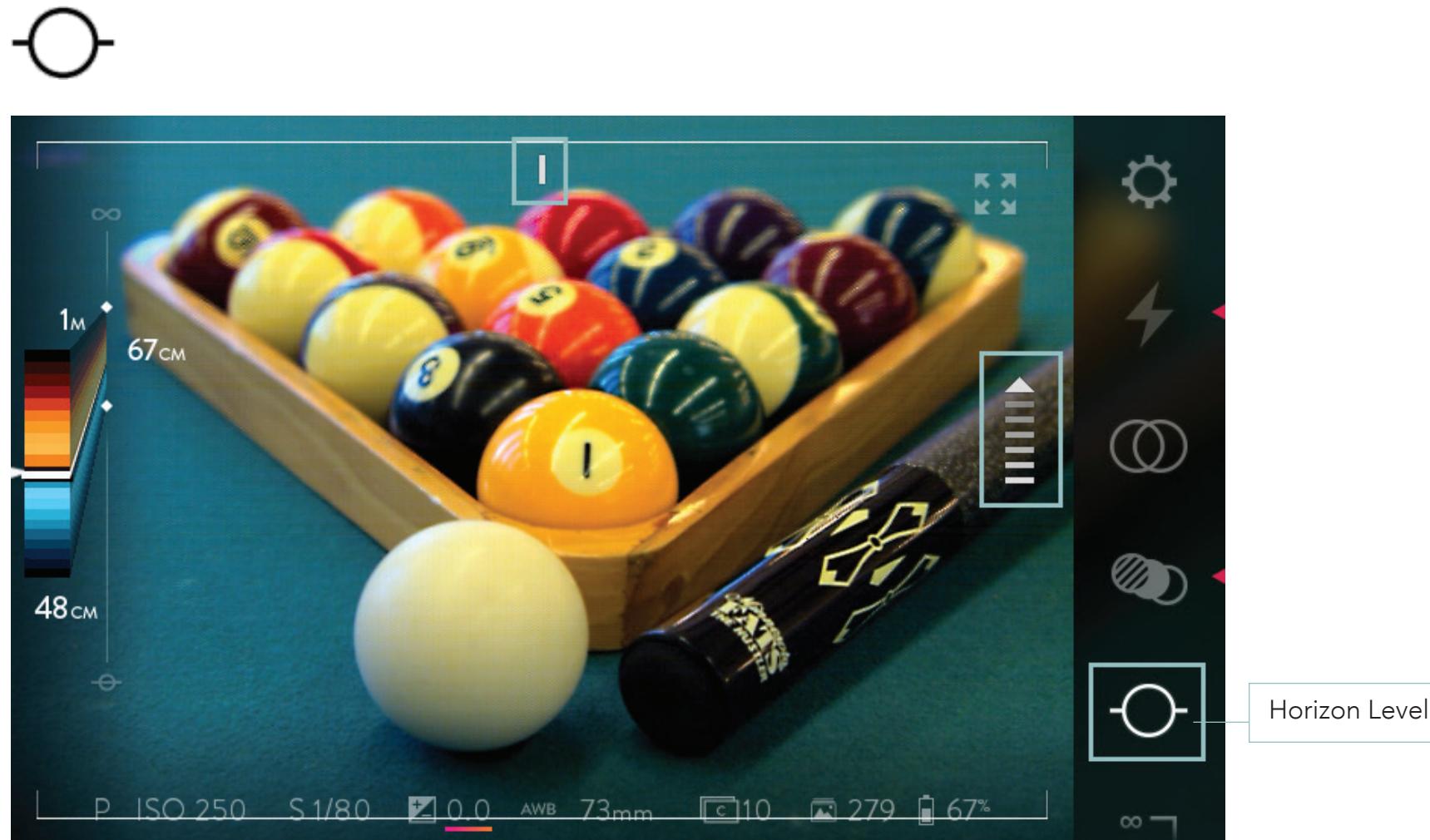
A standard flash can be mounted to the camera's hot shoe, allowing basic flash synchronization. The flash will be triggered each time the shutter opens. The sync speed (the fastest shutter speed at which you can use a flash) is 1/250.



With the Viltrox JY680L TTL flash mounted to the ILLUM hot shoe and powered on, touch the Flash icon to open the flash control interface. Swipe left or right to adjust TTL compensation values. Tap again to close the control interface.

Using the Horizon Level

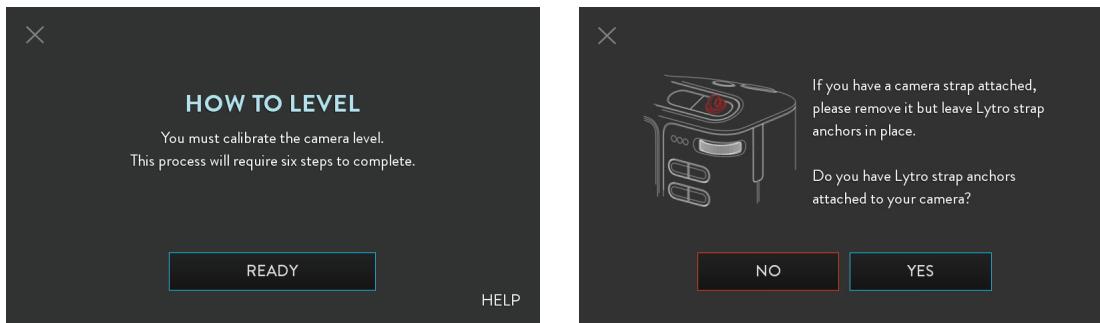
When the Horizon Level icon is touched, vertical axis and horizontal axis level gauges are shown in the preview. The levels use a graduated scale to indicate which direction to rotate the camera, side to side or front to back. When the camera is level on either axis the graduated scale transforms into a solid white bar.



Tap the Level Gauge icon to enable

Calibrating the Horizon Level

The first time you tap the Horizon Level icon, your ILLUM's level may need to be calibrated. Follow the 6 simple on-screen steps to properly calibrate your ILLUM. You can also follow the steps below if you ever need to recalibrate the level in the camera.



Follow the on-screen guide to calibrate the ILLUM level. You must remove the ILLUM lens hood and camera strap before calibrating. If you have attached the Lytro strap anchors to the ILLUM, click YES when prompted. If you have not attached the Lytro strap anchors, click NO. The 6 step calibration process is ready to start.



Place the ILLUM on a flat, level surface like a table. Touch the Start Now button on the screen. As prompted, rotate the ILLUM in the direction indicated by the arrow and place the ILLUM on that same flat table surface. You will be instructed to rotate and replace the ILLUM in the new orientation six times to complete the process. If you rotate the camera the wrong direction or skip a step when instructed, the calibration process will not complete.

Playback Mode

To enter Playback Mode from Capture Mode, tap the Playback Mode icon at the top of the Menu Bar, press the Fn button, or swipe the screen from left to right. The last Living Picture taken will be displayed, a new set of icons will appear in the Menu Bar at the right edge of the screen, and the contents of the Information Bar will also change. To view an older picture, simply swipe the screen from left to right. To go back to the first picture displayed, swipe from right to left.

To return to Capture Mode, tap the Capture Mode icon at the top of the Menu Bar, press the Fn button, or swipe the screen from right to left when the most recent picture is displayed. Press shutter button halfway to return to Capture Mode.

Touchscreen layout in Playback Mode



Playback Mode Layout

1. ISO
2. Shutter mode
3. Shutter speed
4. White balance
5. Focal length
(35mm eq.)
6. Picture number /
total pictures
7. Battery charge
8. Capture Mode
9. Grid view
10. Exposure
histogram
11. Delete
12. Rotate image
13. Full screen
preview

Information Bar

- ISO review — shows the ISO at which the currently displayed picture was taken
- Shutter speed review — shows the shutter speed at which the currently displayed picture was taken
- White balance review — shows the white balance setting at which the currently displayed picture was taken
- Focal length review — displays the focal length (35mm equivalent) at which the currently displayed picture was taken
- Picture number / total pictures indicator — shows the number of the picture currently displayed and the total number of pictures on the SD card
- Wi-Fi (iOS Connect) indicator — visible only when the camera is enabled as an access point in Settings, iOS Connect
- Battery charge indicator — displays the battery's remaining charge

Menu Bar

- Capture Mode icon — tap to return the camera to Capture Mode
- Grid View icon — tap to display a thumbnail grid of the pictures stored on the SD card
- Exposure Histogram icon — when tapped/illuminated, an exposure histogram for the picture currently displayed is shown
- Delete icon — tap to delete the picture currently displayed
- Settings icon — tap to open the Settings menu (this will close Playback Mode)

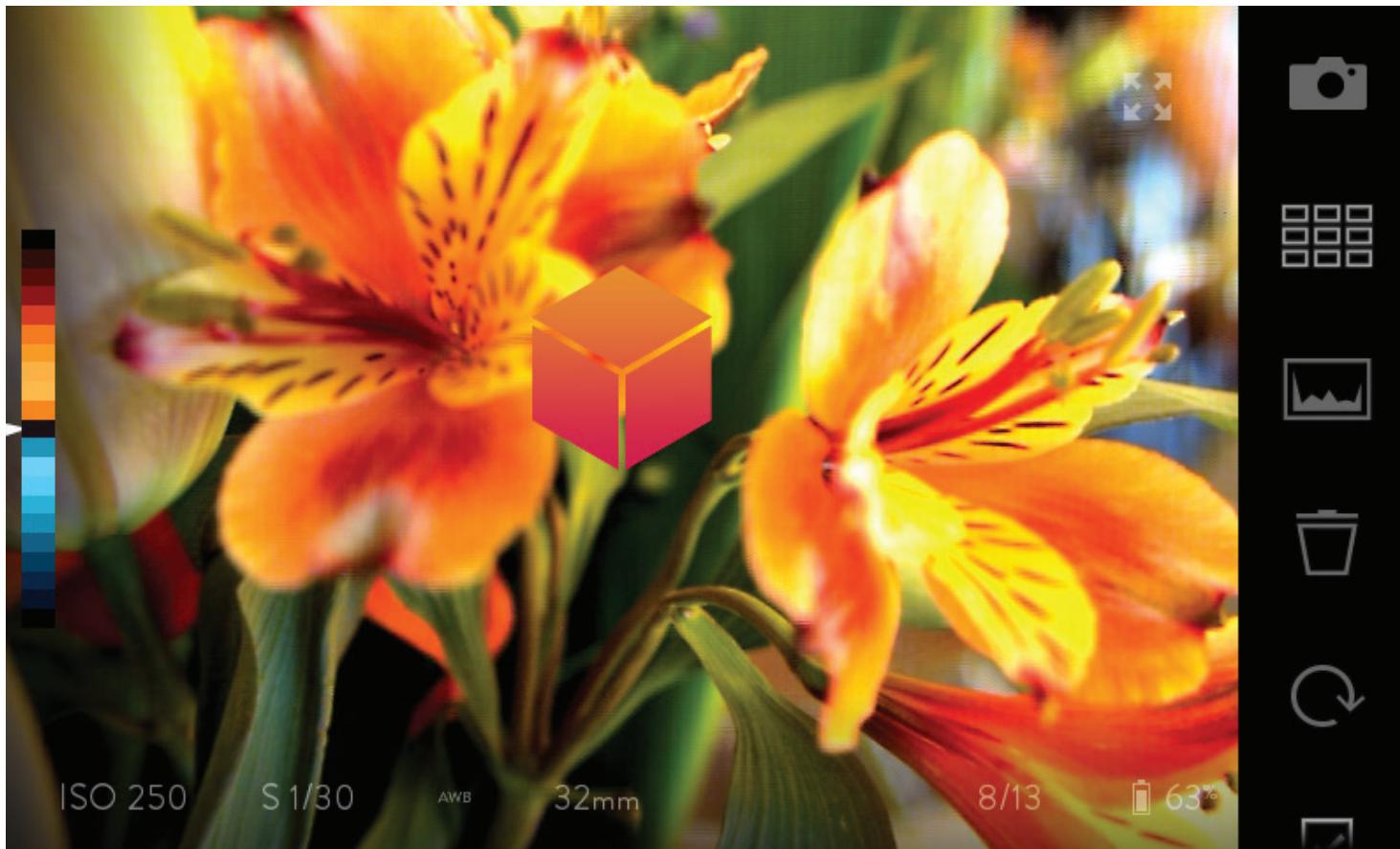
Depth Assist Bar

- Depth value indicator – displays the depth value for the focus of picture currently being displayed

Processing a Living Picture for refocusing

A Living Picture can be refocused by simply tapping the screen, but the camera has to process the picture first. The first time a picture is viewed, it will automatically be processed for refocusing.

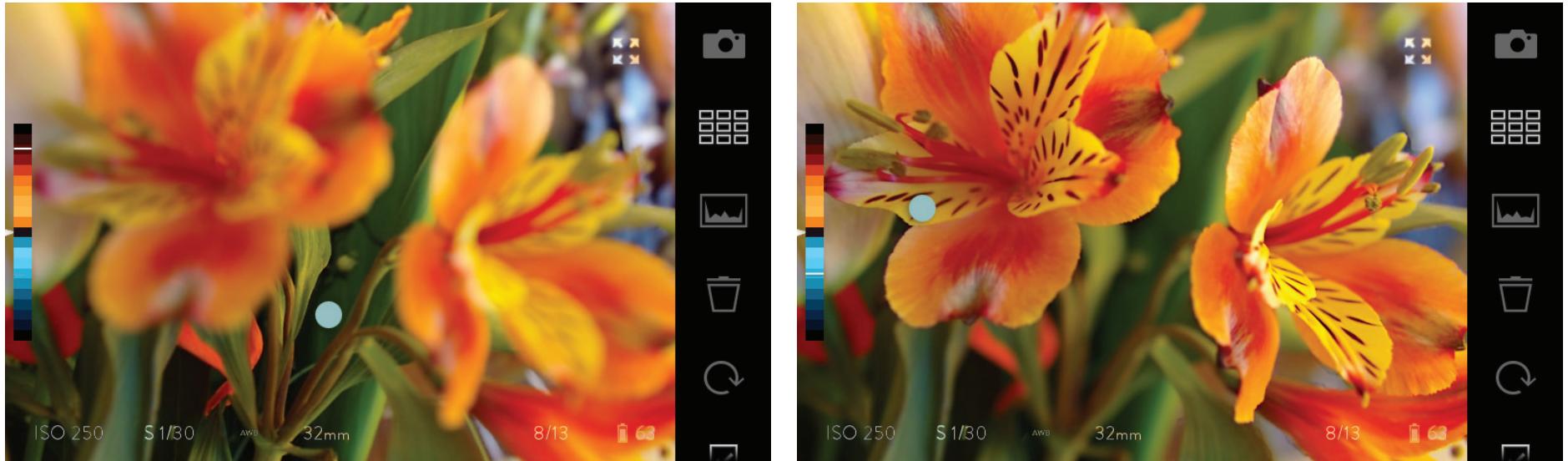
A small animated progress icon will appear over the center of the picture during processing. When the progress icon disappears — usually in just a second or two — the picture is ready to be refocused by tapping the screen.



Indicator of a Living Picture being processed

Refocusing a Living Picture

Once a picture has been processed, refocus it by just tapping the screen. The camera will re-center the focus as closely as possible to the spot tapped. Depending on the composition of the picture, some areas may fall outside the refocusable range — essentially the maximum range in which the picture can be refocused sharply.

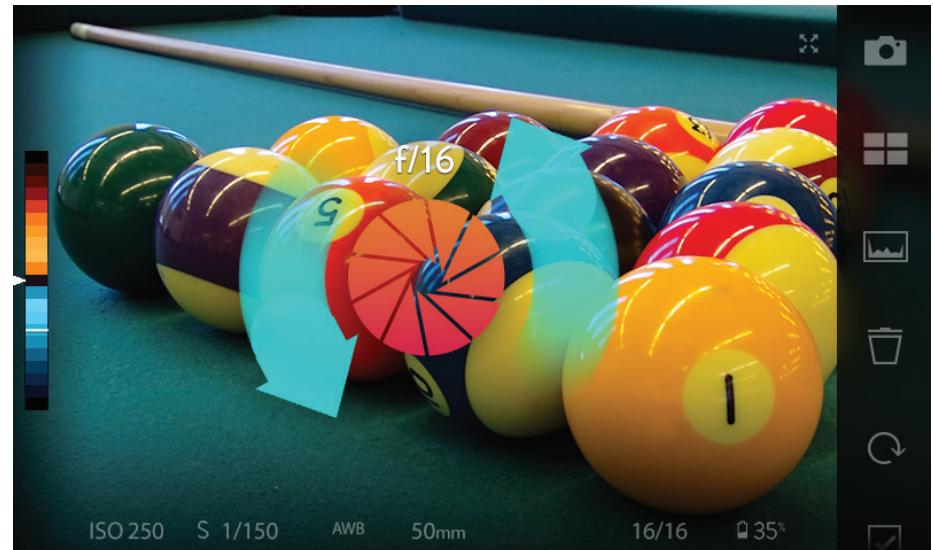
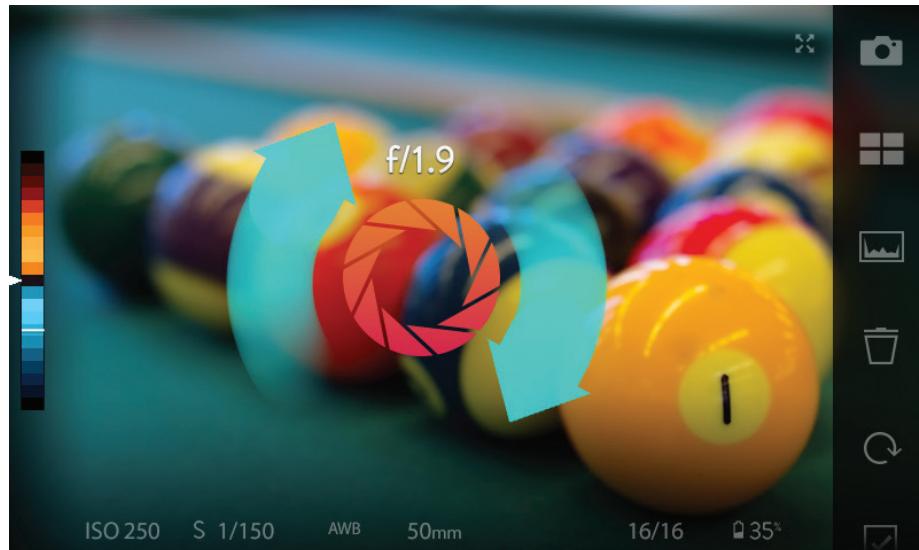


Refocus a Living Picture by tapping the touchscreen.

As the focus of the picture changes, the depth value for that focus is displayed in the Depth Assist Bar as a white line.

Virtual Aperture in a Living Picture

You can interactively change the Virtual Aperture in Living Pictures. With two fingers touching the screen, twist clockwise or counter-clockwise to tighten or open the virtual aperture. The range is from f/1 to f/16.

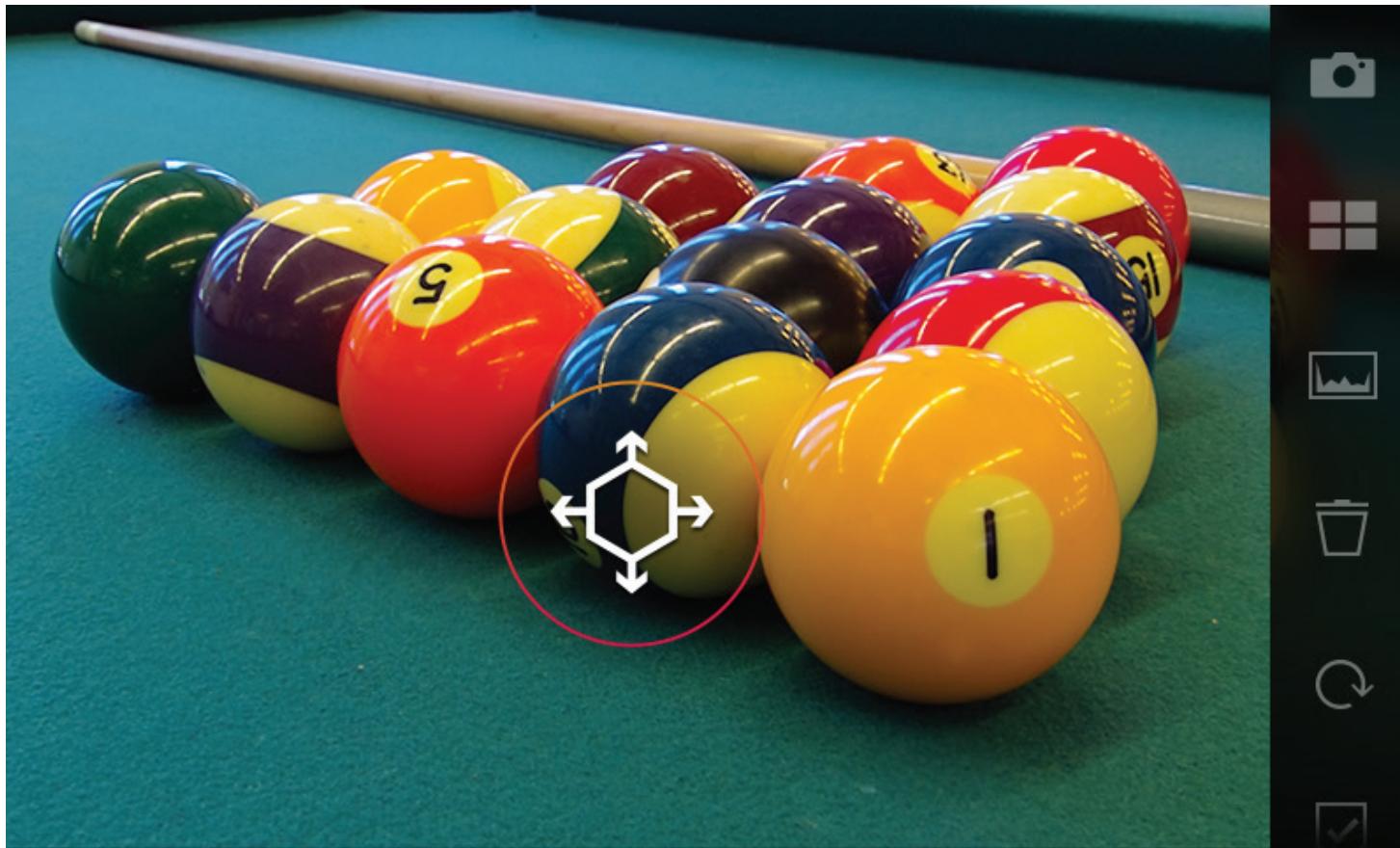


Use two finger gestures to change the Virtual Aperture

ILLUM 2.0 processes your Light Field captures into Living Pictures that support Lytro's interactive Virtual Aperture. A clockwise two-finger gesture on the camera's Playback Screen opens the aperture to a maximum of f1; the opposite counter clockwise gesture tightens the Virtual Aperture to f16.

Interactive Perspective Shift in a Living Picture

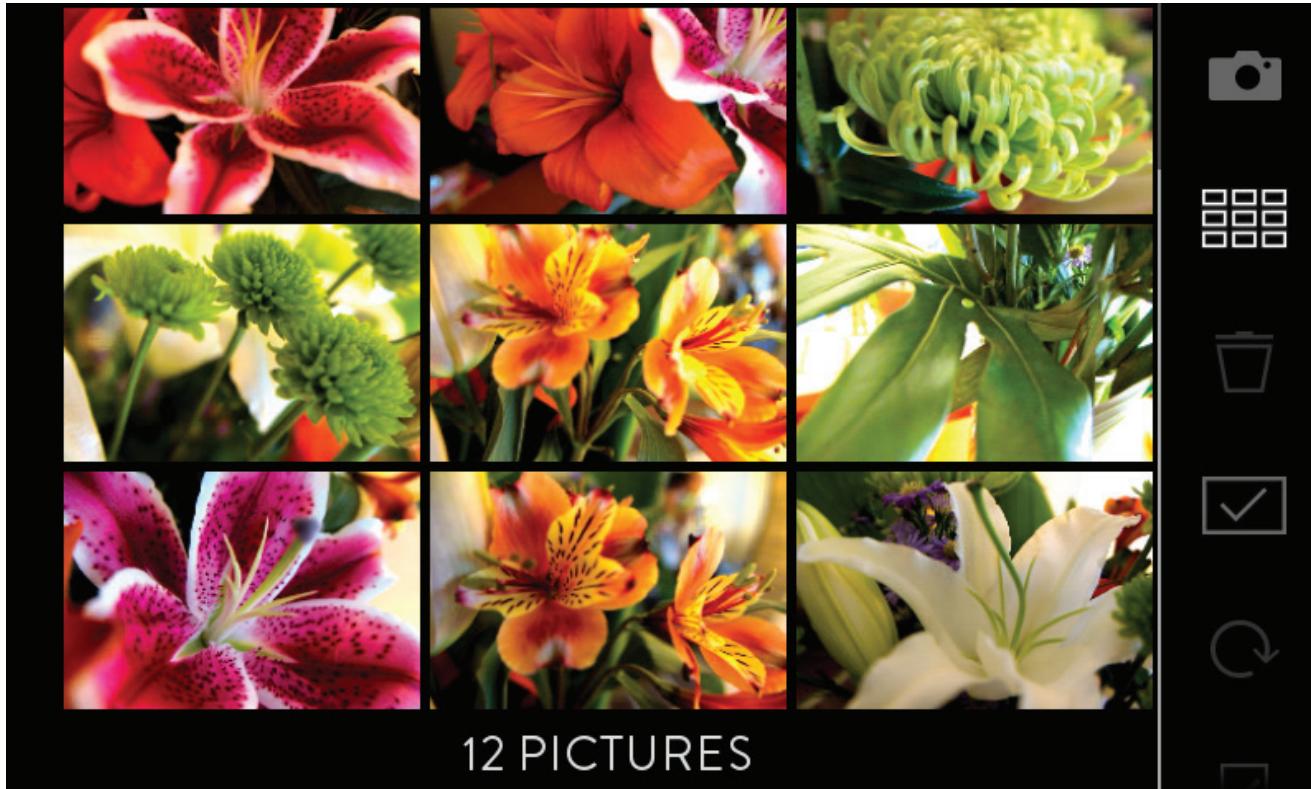
Living Pictures permit you to shift and preview the perspective in your image. Touch the screen, pause a moment and wait for the four way arrow to appear, then with your finger still pressing the screen, move the cursor in the image preview to shift perspective interactively.



Living Pictures in ILLUM 2.0 support Perspective Shift in the Playback Screen. A single finger gesture can be used to select your refocus area. Pause slightly while touching the screen to start the Perspective Shift mode. By dragging on the Living Picture, the image's perspective will interactively shift on screen.

Using grid view

To sort through the Living Pictures on the SD card more quickly, select grid view. Tap the Grid View icon in the Menu Bar at the right-hand edge of the screen. The icon will illuminate, and a thumbnail grid of 9 pictures will replace the single-picture view.



Tap the Grid View icon to display 9 pictures from the images on your SD card at a time.

Swipe the screen from top to bottom to view older pictures, or from bottom to top to view newer ones. At any time, swiping from right to left will return the camera to Capture Mode. Tap the thumbnail to select one or more pictures. If any of the thumbnails are double-tapped, the picture will expand to fill the screen, closing Grid View.

Using the review exposure histogram

To view an exposure histogram for each picture as it is displayed, tap the histogram icon in the Menu Bar. The icon will illuminate and the histogram will appear in the lower left-hand corner of the screen. To close the histogram, tap the icon again.



Deleting a picture

To delete the picture currently displayed, tap the Delete icon in the Menu Bar at the right-hand edge of the screen. A window will open with two options: OK or CANCEL. Tap OK to delete the picture.



Deleting one or more pictures in Grid View

To delete one or more pictures in grid view, first tap on the thumbnails to select the pictures. Delete the pictures by tapping the Delete icon in the Menu Bar at the right-hand edge of the screen. A window will open with two options: OK or CANCEL. Tap OK to delete the picture.

Opening the Settings menu

You can open the Settings menu by tapping the Settings icon in the Menu Bar. The Settings menu will display, closing Playback Mode. For details on each of the available Settings, see the Settings section.



To close the Settings menu, tap CAPTURE at the top left of the screen, or press the shutter button halfway. The camera will always return to Capture Mode when exiting Settings. To get back to Playback Mode, tap the Playback Mode icon in the Menu Bar again, press the Fn button, or swipe the screen from left to right.

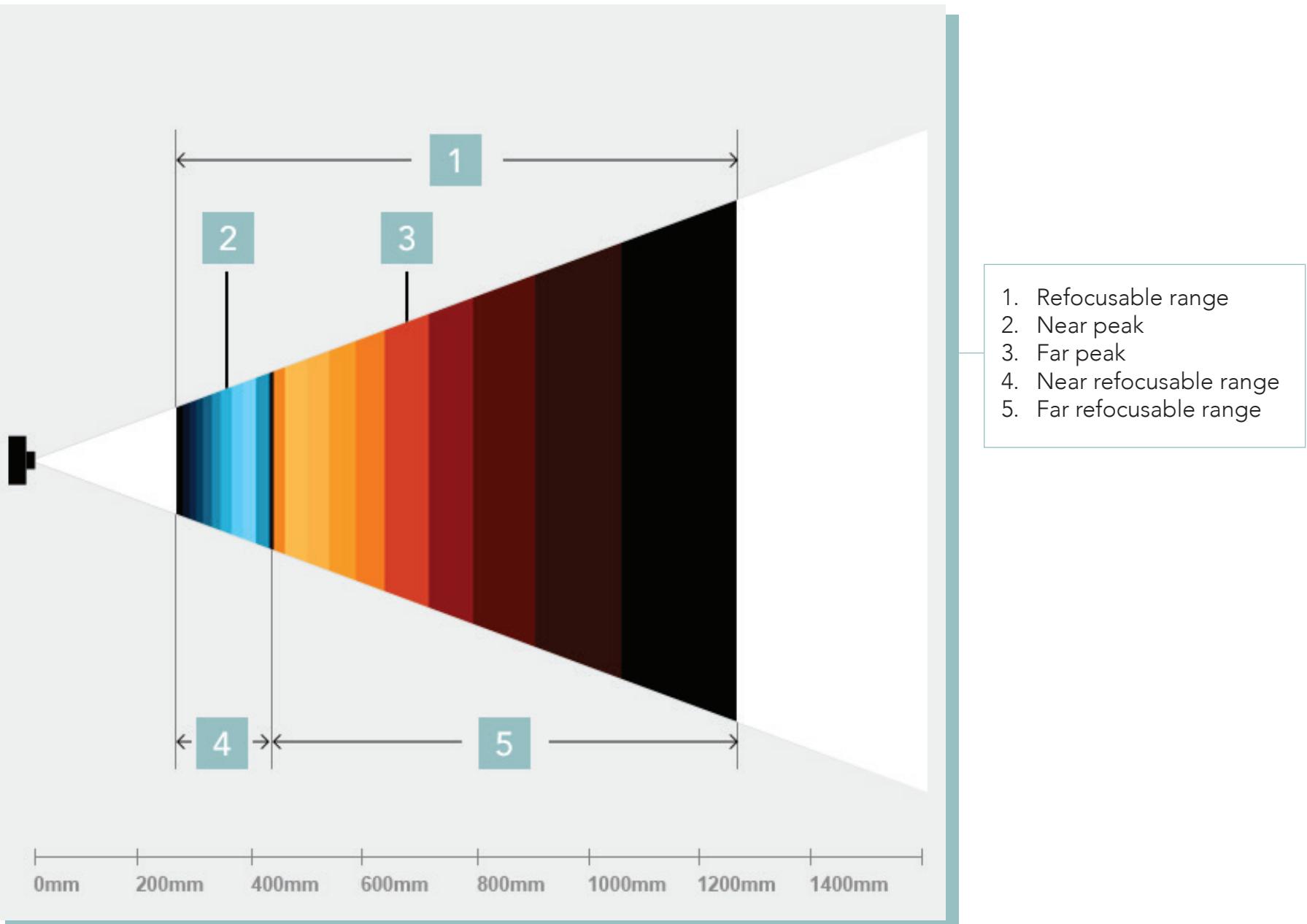
Depth Composition Features

The refocusable range

The Living Pictures captured with the Lytro ILLUM can be refocused, just by tapping. This ability to refocus is remarkable, but it does have limits — what we call the refocusable range — for every picture. The refocusable range comprises all the points brought into relatively sharp focus after a picture is captured.

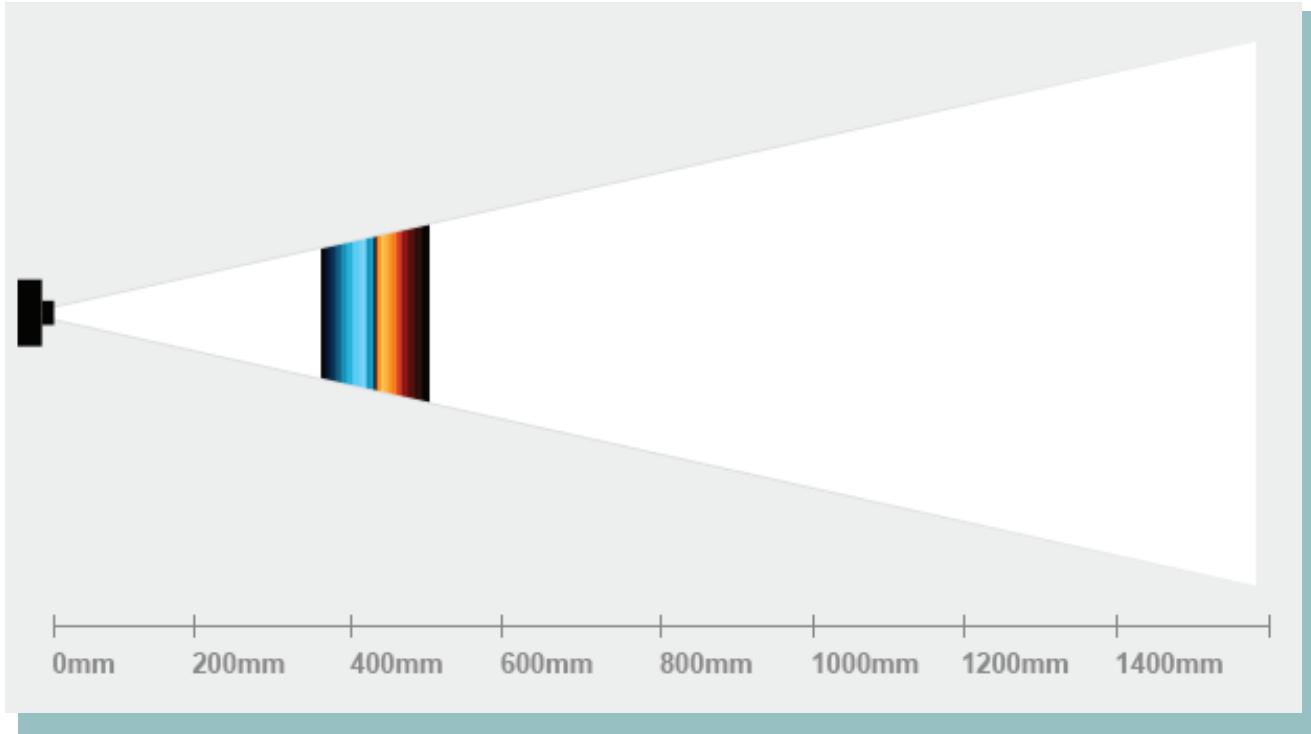
The refocusable range is made up of two component ranges: the near refocusable range, which is closer to the camera, and the far refocusable range, which is further away. Each offers a spectrum of relative sharpness, depending on the depth to which the image is refocused.

In the illustrations that follow, the brighter the shade of the blue or orange band, the sharper objects at that distance will appear when refocused. The brightest band in each component range is its peak — where objects will appear sharpest when refocusing.



The refocusable range with the lens zoomed to a 50mm focal length (35mm equivalent) and the optical focus at approximately 42cm. Physical distances from the camera are shown in gray.

The refocusable range varies widely, depending on the zoom and focus positions of the camera when a picture is captured.



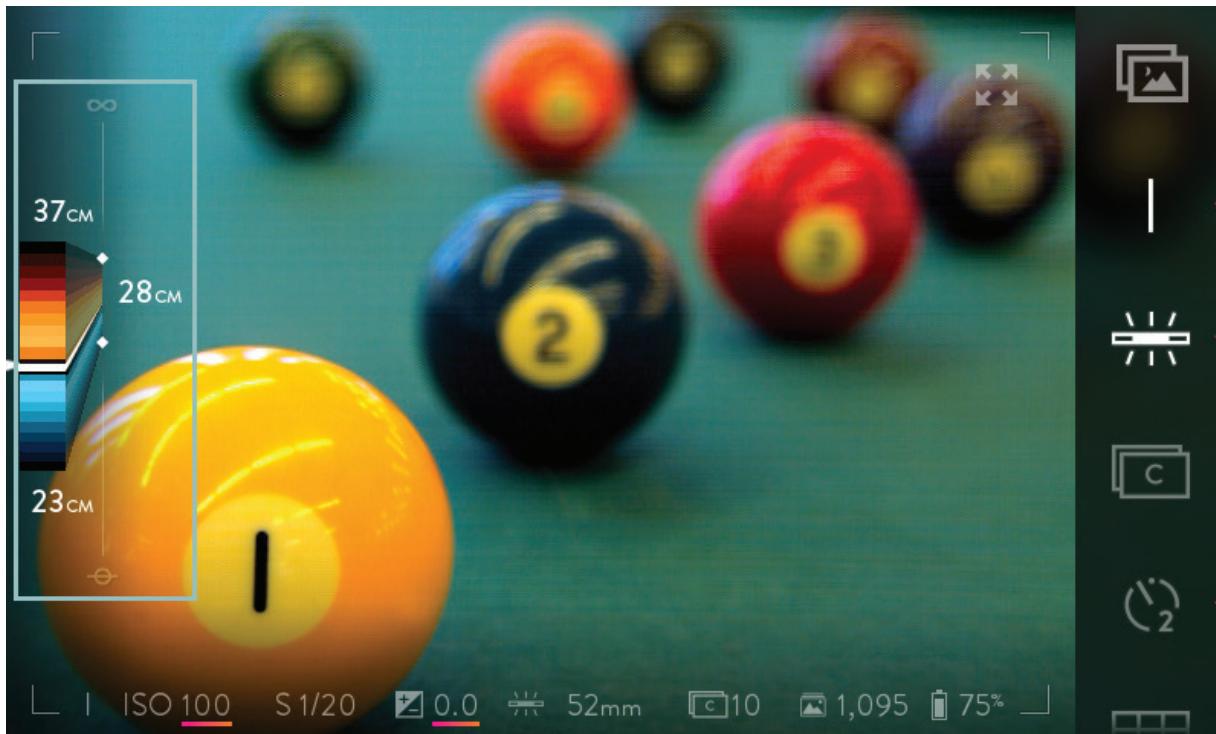
The refocusable range with the lens zoomed to a 100mm focal length (35mm equivalent) and the optical focus at approximately 42cm. Note the relative size of the refocusable range.

Effective use of the refocusable range and the depth composition features on the Lytro ILLUM is the key to creating extraordinary Living Pictures. To find out how to best leverage these tools, visit training.Lytro.com for in depth education and training.

Depth Assist Bar

The Depth Assist Bar appears as a column near the right edge of the screen. The orange and blue bands within the bar show where the current refocusable range falls in terms of distances from the camera. The objects within that range are the ones that can be refocused on after the Living Picture is captured.

Each of the colored bands represents one slice of the depth within the refocusable range, called Depth Steps. The brighter the color of a Depth Step, the sharper the objects at that distance will appear when it is refocused.



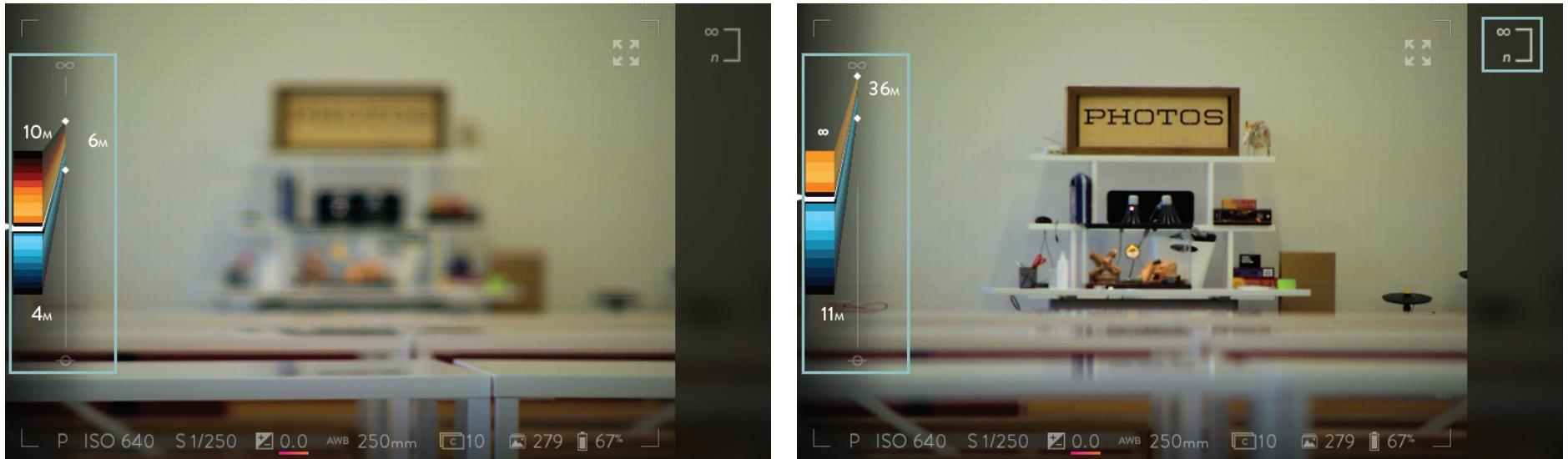
In the Depth Assist Bar, the orange and blue bands, or Depth Steps, represent the refocusable range. The numbers indicate the physical distances from the camera.

The distances are measured from the sensor plane symbol, , visible on the right side of the camera's exterior. While the measurements are mostly accurate, they are not perfect. Think them as useful guide, there to give a good sense of where the refocusable range is located.

Light field Hyperfocal position

When the lens is set to the light field hyperfocal position, the refocusable range extends from optical infinity (the horizon) to a close focus distance. More specifically, objects at or near optical infinity are at a depth near the peak of the far refocusable range, while the entire near refocusable range extends closer to the camera.

The close focus distance depends on the current focal length of the camera. At wide angle, the close focus distance is approximately 25cm from the sensor plane. At maximum zoom, the close focus distance is approximately 10m.



Click the Hyperfocal icon to enable

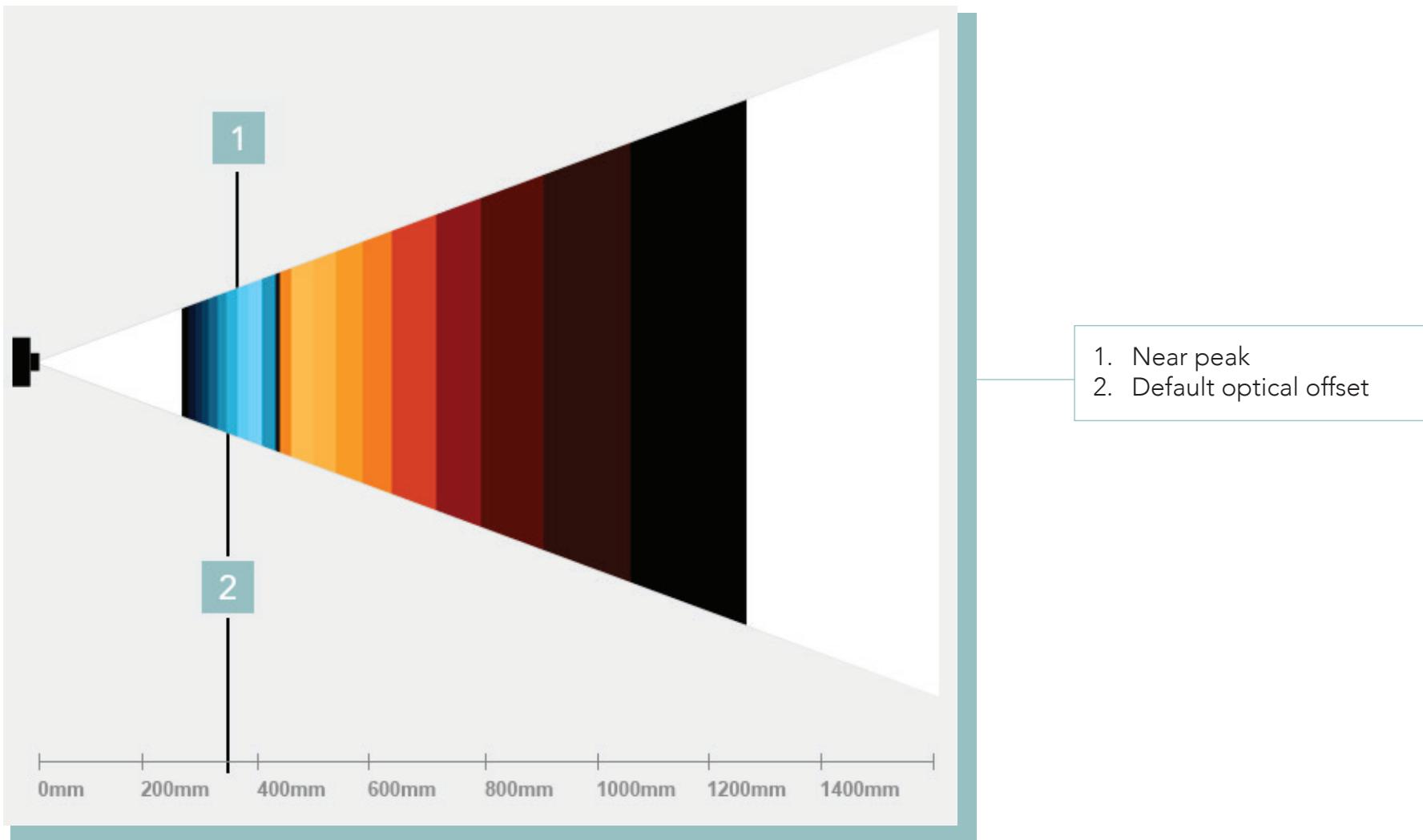
Optical Offset

When looking at the live view, the shallow depth of field is due to the f /2.0 main lens. There is much more in the refocusable range than what appears sharp in the live view. The optical offset plots the optical focus position used in the live view (and for autofocus) to the refocusable range — and can be adjusted to suit the style of Living Picture being captured.

When the optical offset is at the default setting, objects at the peak of the near refocusable range will appear sharply focused in the live view. This means that a Living Picture can be refocused on whatever looked sharp in the live view when it was taken, as well as on objects further away, since most of the refocusable range will fall beyond that point.

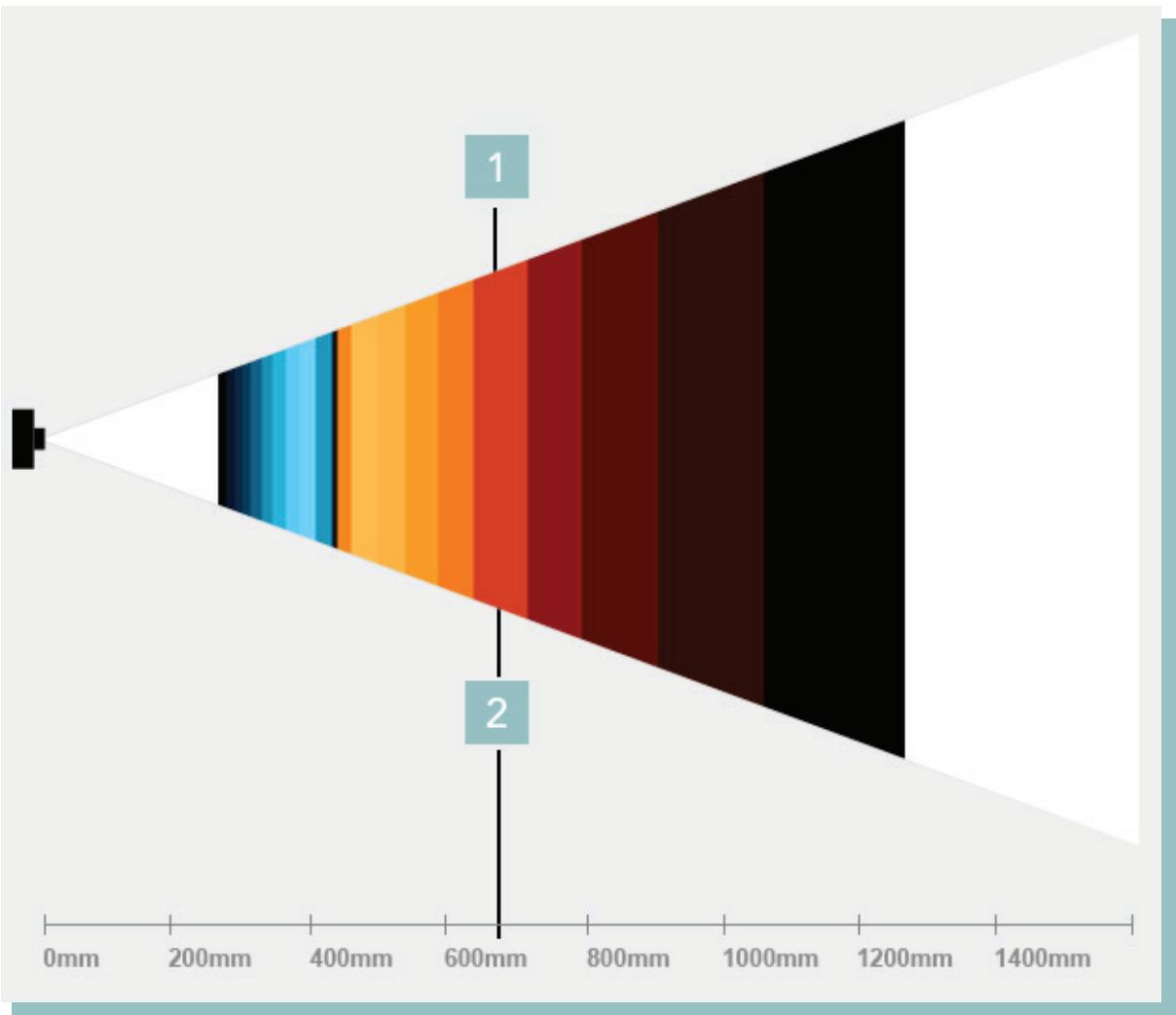
In the illustrations that follow, the brighter the shade of the blue or orange band, the sharper objects at that distance will appear when refocused. The brightest band in each component range is its peak — where objects will appear sharpest when refocusing.

The refocusable range varies widely, depending on the zoom and focus positions of the camera when a picture is captured.



The default optical offset, with the focus position used for the live view and for autofocus set at the peak of the near refocusable range

Depending on the style of photography and the subjects being shot, it may be advantageous to relocate the optical offset position. As an example, when shooting landscapes, set the optical offset to the peak of the far refocusable range. Then, when composing a shot by focusing on a distant object, most of the refocusable range would be available for closer objects.



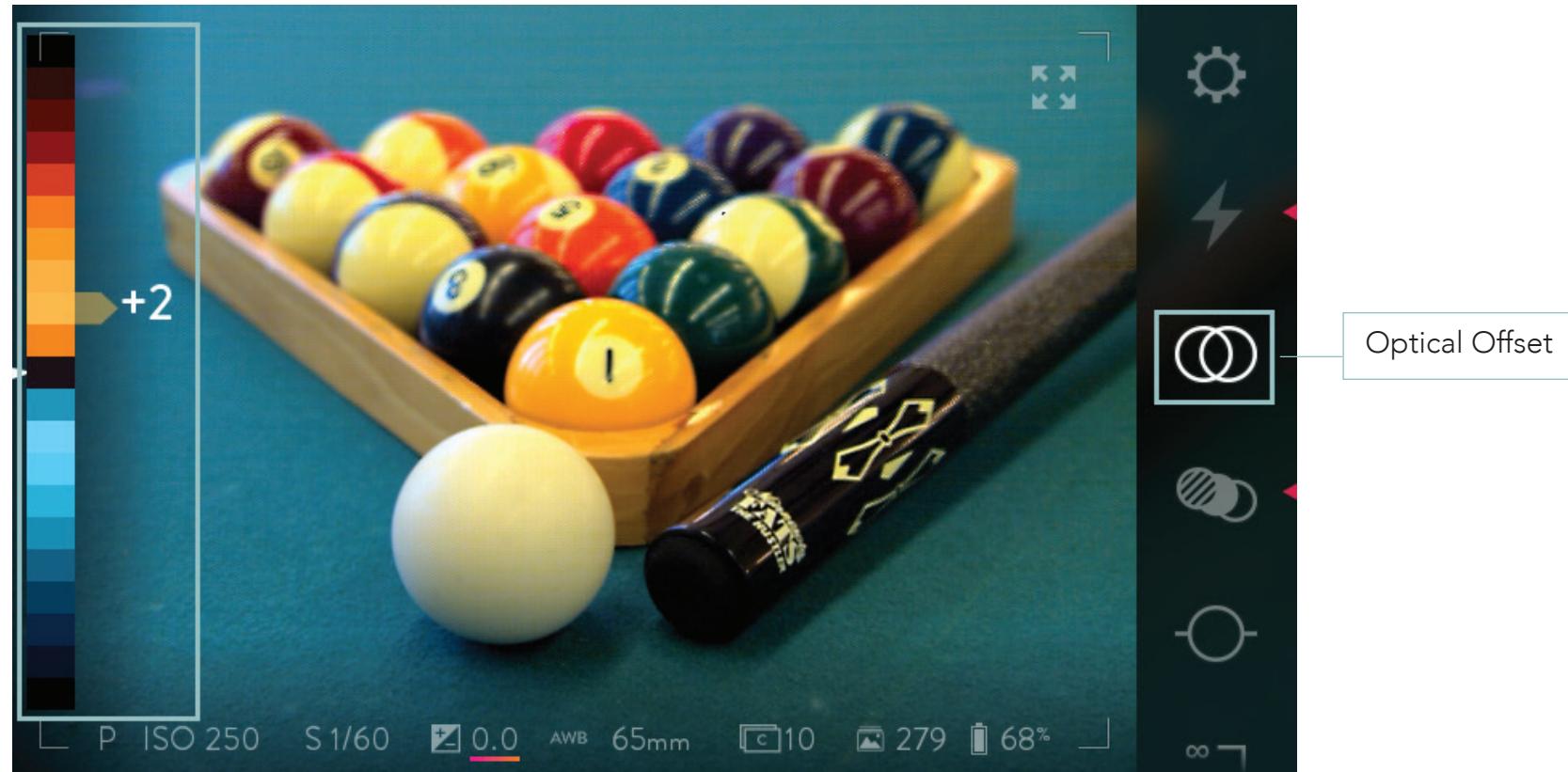
1. Far peak
2. Example optical offset for landscape photography

An adjusted optical offset position that might be used for landscape photography

Adjusting Optical Offset

To adjust the optical offset, add the Optical Offset icon to the Menu Bar (see Rearrange Menu), then tap it. The Menu Bar will be hidden, and a depth scale will be displayed.

Bands in shades of blue represent the near refocusable range, and bands in shades of orange represent the far refocusable range. The current optical offset position is indicated by a white band (the default position is -4). Rotate the front dial to relocate the optical offset closer or further away in the refocusable range.



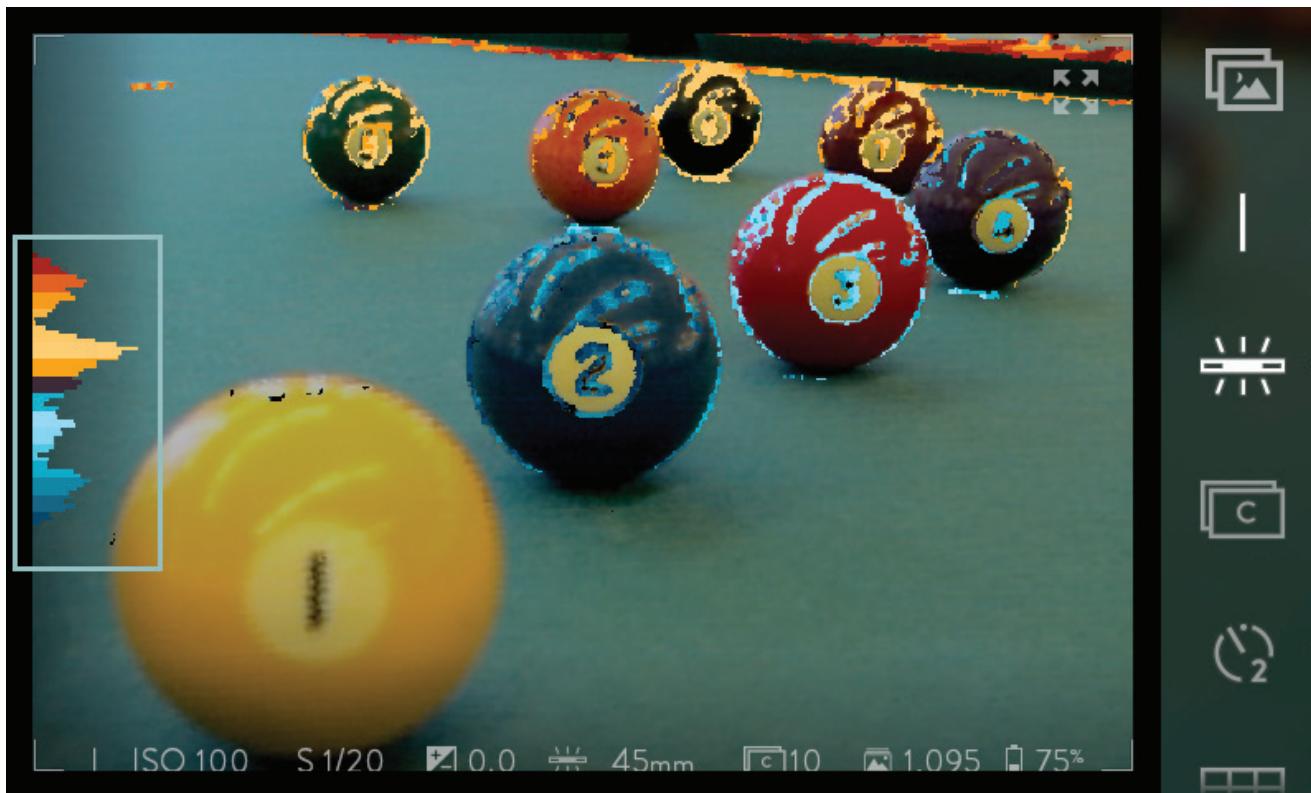
Rotate the front dial to adjust the optical offset.

To close the depth scale, unhide the Menu Bar by swiping left from the right edge of the screen. The optical offset will remain at the new setting until it is changed using these same steps.

Depth Histogram and Depth Overlay

The Lytro ILLUM offers live, interactive depth analysis in the form of the Depth Histogram and Depth Overlay. Both provide feedback on where subjects fall relative to the refocusable range. To activate them, fully press the Lytro button.

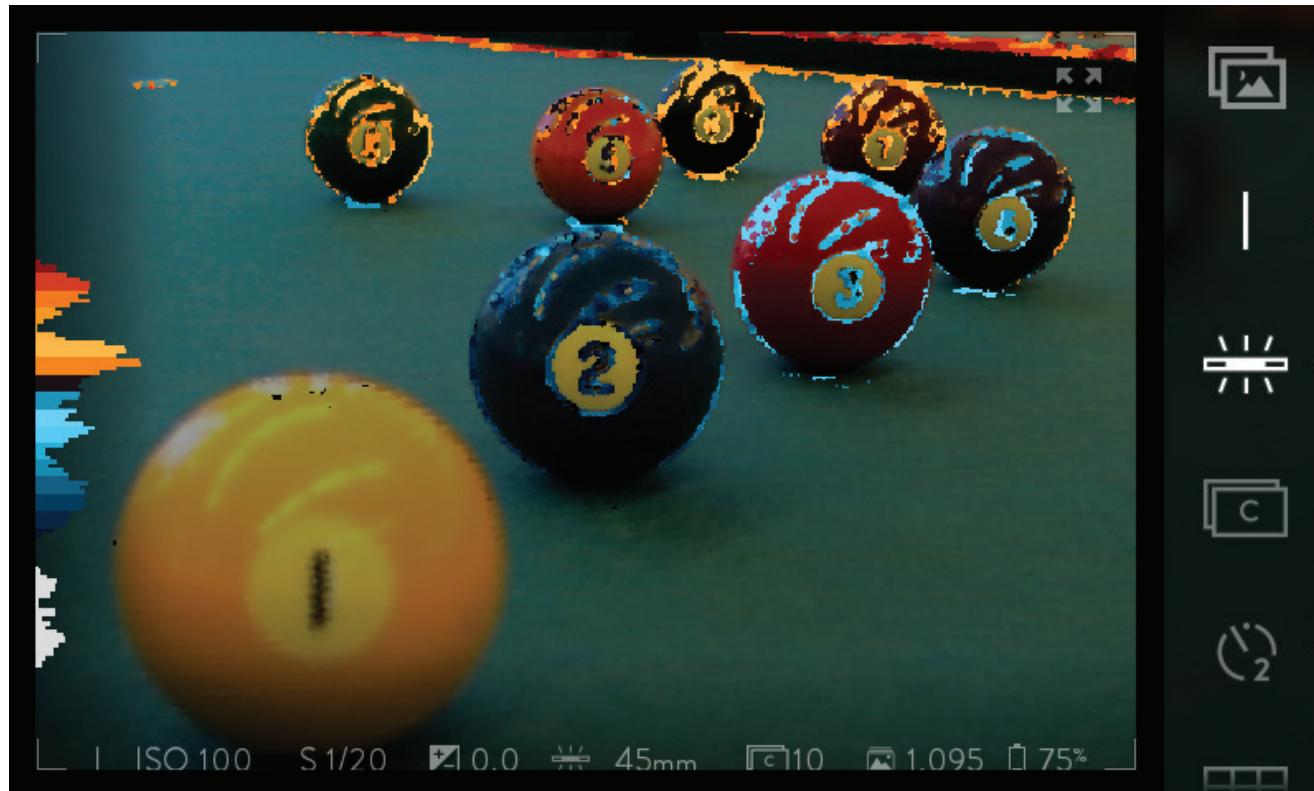
The Depth Histogram consists of bands extending out to the right of a depth scale. Bands in shades of blue represent the near refocusable range, and bands in shades of orange represent the far refocusable range. The more there is available to refocus on at a given depth, the further the band beside it will extend to the right.



Evaluate a potential shot using the Depth Histogram. The large wave in the near refocusable range (blue) corresponds to the subject in the foreground. The wave in the far refocusable range (orange) corresponds to the subject in the background. A well structured Living Picture with a full range of interactivity will have a balanced histogram of blue and orange when composed and captured.

Glancing at the histogram can tell if you have a substantial subject within the refocusable range. To maximize the impact of refocusing, it is ideal to have a significant histogram wave in both the near refocusable range and the far refocusable range. Waves outside of the refocusable range correspond to objects in the background or foreground that can not be refocused.

The Depth Overlay provides the same kind of information as the Depth Histogram, but displays it as an overlay on objects in the live view. Objects that fall within the near refocusable range are edged with blue. Objects that fall within the far refocusable are edged with orange. Instantly see whether there is enough subject matter in each of the ranges to provide good refocusing possibilities.

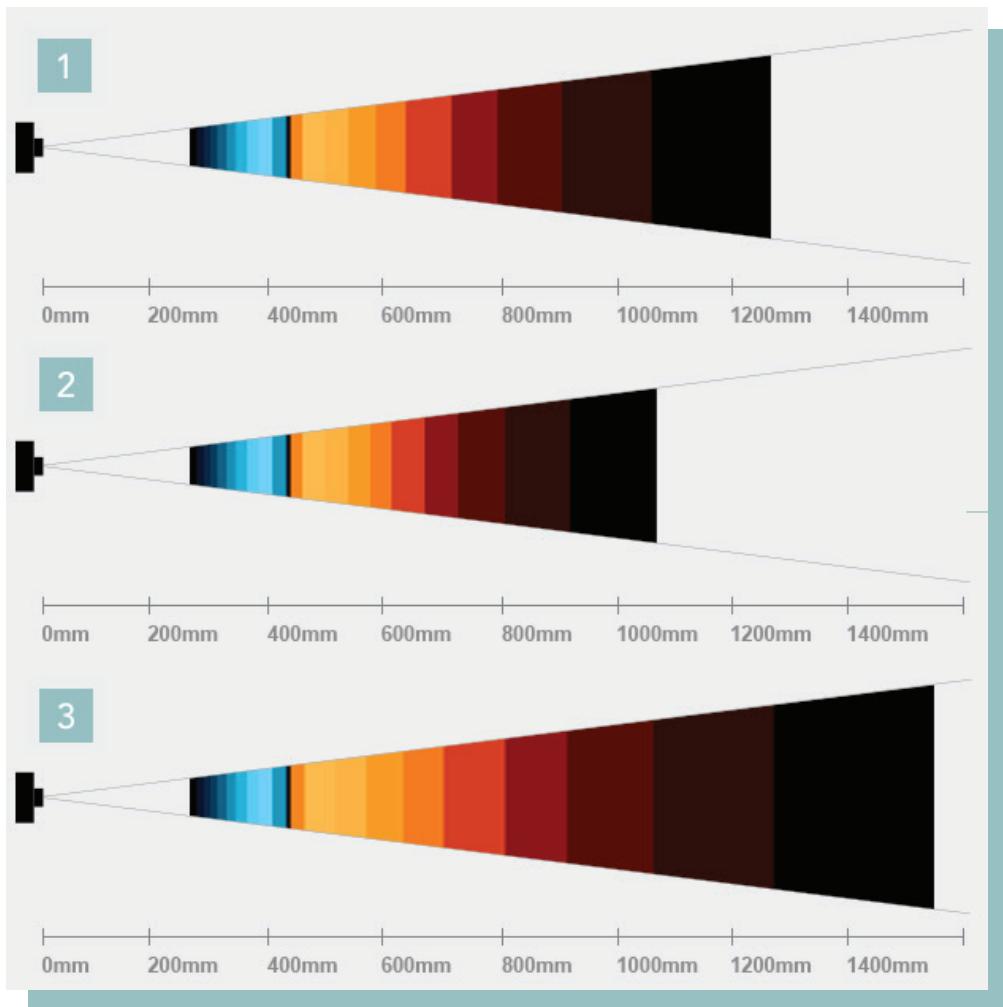


Objects in the near refocusable range are edged in blue; those in the far refocusable range are edged in orange. White in the histogram represents the elements in the scene which will be outside the refocusable range in your Living Picture, and can not be focused on when interacting with the image.

Focus bracketing

Like the more familiar exposure bracketing, focus bracketing causes the camera to take a series of pictures each time the shutter button is pressed. But instead of varying the exposure between each picture, the camera varies the focus. That means the refocusable range is shifting, too, so there is a better chance of capturing a picture with great possibilities for refocusing.

The change in focus between each picture is expressed in Depth Steps. Choose the number of Depth Steps, from 1 to 10, between each picture. One can choose 3 or 5 pictures.



The refocusable range as captured with focus bracketing set to 3 pictures and 1 Depth Step (DS).

1. Refocusable range, original
2. Refocusable range, -1 DS
3. Refocusable range, +1 DS

To use focus bracketing, add it to the Menu Bar (see Rearrange Menu). Then activate it and set the number of pictures that will be taken and the number of Depth Steps between each picture. For help setting those parameters, see Applying focus bracketing.

Settings

You can open the Settings menu from either Capture or Playback Mode by tapping the Settings icon in the Menu Bar. The Settings menu will fill the screen, replacing whatever was displayed. Swipe the touchscreen to scroll up or down through the menu.



To close the Settings menu, tap CAPTURE at the top left of the screen, or press the shutter button halfway. The camera will always return to Capture Mode when exiting Settings. To return to Playback Mode, tap the Playback Mode icon in the Menu Bar again, press the Fn button, or swipe the screen from left to right.

Format SD card

For best performance, format your SD card in the Lytro ILLUM after transferring the Pairing data to the Lytro Desktop, and again after using it in any other device. Please note that formatting the card will erase any data stored on it. To begin, tap FORMAT SD CARD in the Settings menu. A window will open with two options: FORMAT or CANCEL. To continue with formatting, tap FORMAT. When formatting is complete, tap DONE to return to the Settings menu.

Brightness

Adjust the brightness of the screen by tapping BRIGHTNESS in the Settings menu and dragging the slider. Or slide the AUTO-BRIGHTNESS selector to the ON position, and the camera will automatically adjust the brightness to the lighting conditions.

Sounds

Tap SOUNDS in the Settings menu, and by dragging the slider, adjust the volume of the sounds produced by the camera. Turn off either all sounds or just the touch sounds by sliding the appropriate selector to the OFF position.

Exposure simulation

The live view can be set to simulate the exposure that will result if a Living Picture is captured using the current settings. To activate exposure simulation, open the Settings menu, look for EXPOSURE SIMULATION, and slide the selector to the AUTO position.

Clipping warning

When clipping warning is turned on, pulsing stripes will indicate any areas of the Live View that will be overexposed if a Living Picture is captured using the current settings. To activate clipping warning, open the Settings menu, look for CLIPPING WARNING, and slide the selector to the ON position.

Instant preview

Set the duration of the instant preview from 1 to 15 seconds or turn instant preview off. Open the Settings menu, and tap INSTANT PREVIEW. Swipe up to see additional duration options. Tap on a selection to set the duration. A half press of the shutter button dismisses the preview and immediately restores the live view.

File format

You can select which file format the camera records in, Lytro RAW or Lytro XRAW. Tap FILE FORMAT in the Settings menu, then tap on your selection.

Lytro RAW files contain the raw light field picture data and can only be viewed on the camera or on a computer running a copy of Lytro Desktop that has been paired with the camera. Lytro XRAW files contain the raw light field picture data as well as the pairing data required to properly process the light field. Lytro XRAW can be viewed using any copy of Lytro Desktop, but is a much larger file.

iOS Connect

To connect your iOS device to the Lytro ILLUM over Wi-Fi, open the Settings menu and tap iOS CONNECT. Set ACCESS POINT to ON.

On your iOS device, go to Settings, Wi-Fi. Make sure Wi-Fi is activated. Under CHOOSE A NETWORK, tap OTHER. Enter the network name as displayed on the camera (be sure to use uppercase and lowercase letters exactly as shown). Select WPA security, and enter the password as displayed on the camera. If the iOS device is within range, it should connect to the camera's network.

Long exposure noise reduction

Activate this feature to reduce noise in Living Pictures taken with long exposure times. Look for LONG EXPOSURE NOISE REDUCTION in the Settings menu and slide the selector to the ON position. Then, whenever a long exposure time is selected (either manually or automatically), the camera will take a second picture using the same settings, but with the shutter closed — recording only noise. Because the noise recorded in the two pictures will be very similar, the camera can use the second picture to identify the noise and suppress it in the picture.

Camera controls

Many of the physical camera controls can be assigned different functions, others can have their functions modified in one way or another. Tap CAMERA CONTROLS in the Settings menu to open the camera controls submenu containing the options below.

Shutter Half-press

Tap to display the five functions that may be assigned to the half press of the shutter button: AEL (autoexposure lock), AF (engage autofocus), AF + AEL (engage autofocus and autoexposure lock), and OFF. Tap an option to select it.

Exposure Dials

Tap to display the two options, DEFAULT and ALTERNATE, for the functions assigned to each dial in the various exposure modes. Tap an option to select it. The assignments for each dial in each exposure mode are shown below.

Exposure Dial Assignments

DEFAULT	P : Program Mode	I : ISO Priority Mode	S : Shutter Priority Mode	M : Manual Mode
Front Dial	NA	Shutter Speed	ISO	Shutter Speed
Rear Dial	EV Compensation	EV Compensation	EV Compensation	ISO

ALTERNATE	P : Program Mode	I : ISO Priority Mode	S : Shutter Priority Mode	M : Manual Mode
Front Dial	EV Compensation	EV Compensation	ISO	ISO
Rear Dial	NA	Shutter Speed	EV Compensation	Shutter Speed

Lens Rings

Tap to display the two options, DEFAULT and ALTERNATE, for behavior of the lens rings. Tap an option to select it.

Rearrange Menu

Tap to display all of the touch control icons that can be assigned to the Menu Bar. The pages of the Menu Bar are shown as columns from left to right. Icons are shown in their current positions, and those that are currently assigned are illuminated. To relocate an assigned icon, tap and drag it to a new location.

To assign an icon to the Menu Bar, double-tap it. The icon will illuminate and is now available to tap and drag to relocate it.

Remap Buttons

Tap to assign any of a range of functions to each of the four physical buttons on the back of the camera. There is an illustration of the four buttons, labeled A, B, C, and D. To the right appears the same four letters, each followed by the function currently assigned to it. Tap one of these to assign a different function.

A list of options will be displayed. Swipe up to scroll to additional options. The current function is indicated by a checkmark, and options that are currently assigned to one of the other three buttons are indicated by the letter of that button. Tap a function to assign it, and then the first screen appears.

AEL

Tap to display the three options for behavior of the AEL button, then tap an option to select it. Select WHILE PRESSED, and auto exposure will be locked only while the AEL button is pressed. Select CONTINUOUS, and pressing the AEL button will lock auto exposure until the button is pressed again. Select ONE SHOT, and pressing the AEL button will lock auto exposure until the shutter has been triggered.

General

Tap GENERAL in the Settings menu to open the submenu containing the options below.

Date & Time

Tap to display the selection wheels for the date and time. Swipe up or down to change any selection. Choose the 24-hour clock option by swiping the selector to the ON position.

Time Zone

Tap to display a list of locations and their respective time zones. Swipe up to scroll to additional locations/zones. Tap to make a selection.

Language

Tap to display the options for the language used by the camera. Tap to make a selection.

Distance Measurements

To change the unit of measurement used by the camera, slide this selector from feet to meters or vice versa.

About

Tap to display information about the camera. This information includes the Firmware version currently installed on the camera.

Update Firmware

Tap to update the camera firmware, which takes several minutes. A window will open with two options: CANCEL or UPDATE. To continue with the update, tap UPDATE.

Transfer Pairing Data to SD Card

Tap to transfer the camera Pairing data to the SD card, which may take a few minutes. A window will appear with two options: CANCEL or TRANSFER. To continue with the transfer, tap TRANSFER.

The Pairing data is required by the Lytro Desktop to optimally process pictures, and will be automatically copied off of the SD card by the Lytro Desktop the first time pictures are imported from that card. The Pairing data requires approximately 2GB of free space on the SD card.

Help

Replay the walk-through of the camera's most unique controls and features that played during initial set-up. Tap HELP, then tap FIRST TIME USER HELP.

Reset

Reset the camera to factory settings. The default functions will be restored for all buttons and controls, and only the default touch control icons will be assigned to the Menu Bar. Tap RESET. A window will open with two options: RESET or CANCEL. To continue with the reset, tap RESET.

Icon Glossary

 AE Auto-Exposure Lock

 AF Auto Focus

 Capture Mode

 C Continuous Shutter

 Delete

 EV Compensation

 ISO Priority Exposure Mode

 M Manual Exposure Mode

P Program Exposure Mode

S Shutter Speed Priority Mode



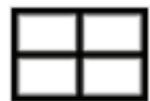
Exposure Bracketing



Focus Bracketing



Focus Lock



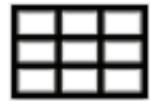
Center Cross Grid Overlay



Golden Ratio Grid Overlay



Square Grid Overlay



Rule of Thirds Grid Overlay



Histogram



Hyperfocal Mode



Level Guide



Lights Out Mode



Optical Offset



Playback Mode



Self-Timer: 2 Seconds



Self-Timer: 10 Seconds



Self-Timer



Settings

AWB Auto White Balance



Cloudy White Balance



Daylight White Balance



Flash White Balance



Fluorescent White Balance



Manual White Balance



Shade White Balance



Tungsten White Balance



Zoom Lock

Resources

- Lytro website — www.Lytro.com
- Training — training.Lytro.com
- Lytro Desktop — www.Lytro.com/downloads
- Lytro Support — support.Lytro.com

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