LYTRO ILLUM

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.

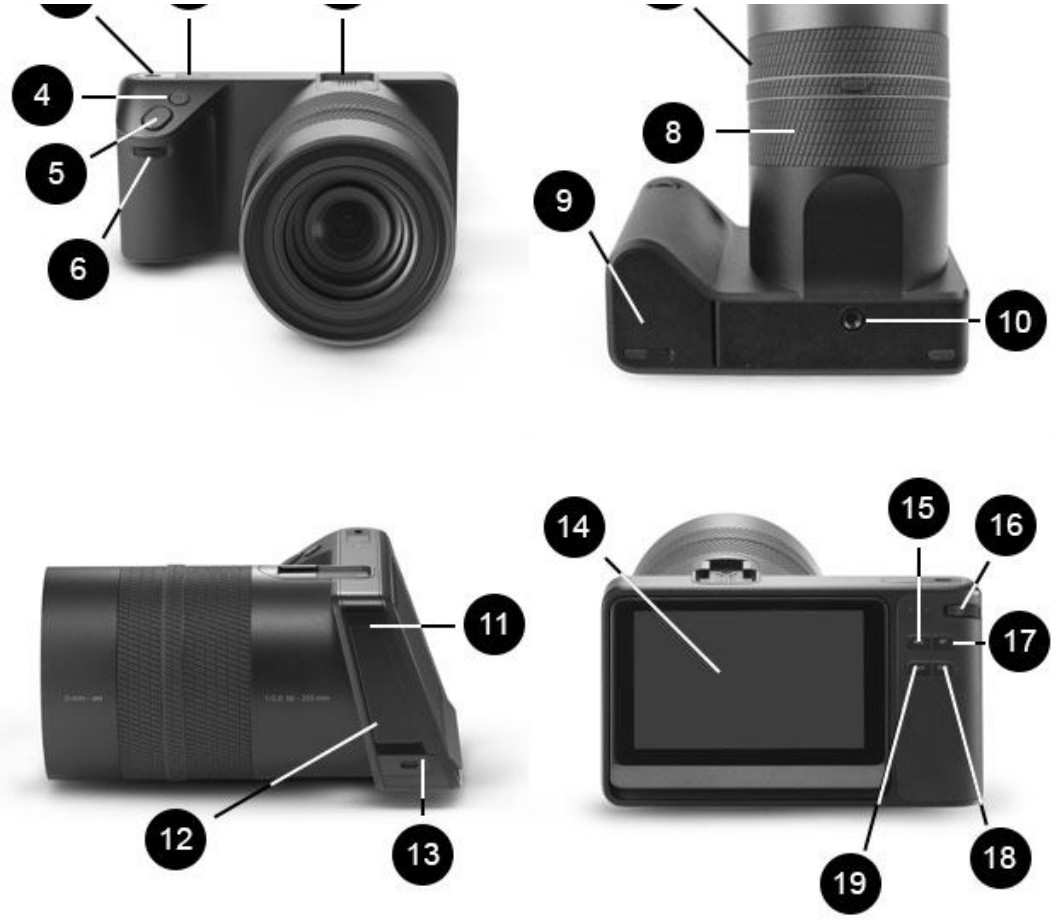
Visit training.lytro.com to get in-depth information in the following categories:

- 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*
0. *Tripod mount*
1. *Micro-USB 3.0*
2. *Port cover*
3. *Strap point*
4. *Touchscreen*
5. *AF button**
6. *Rear dial*
7. *AEL button**
8. *Fn button*
9. *Hyperfocal button*

In the box

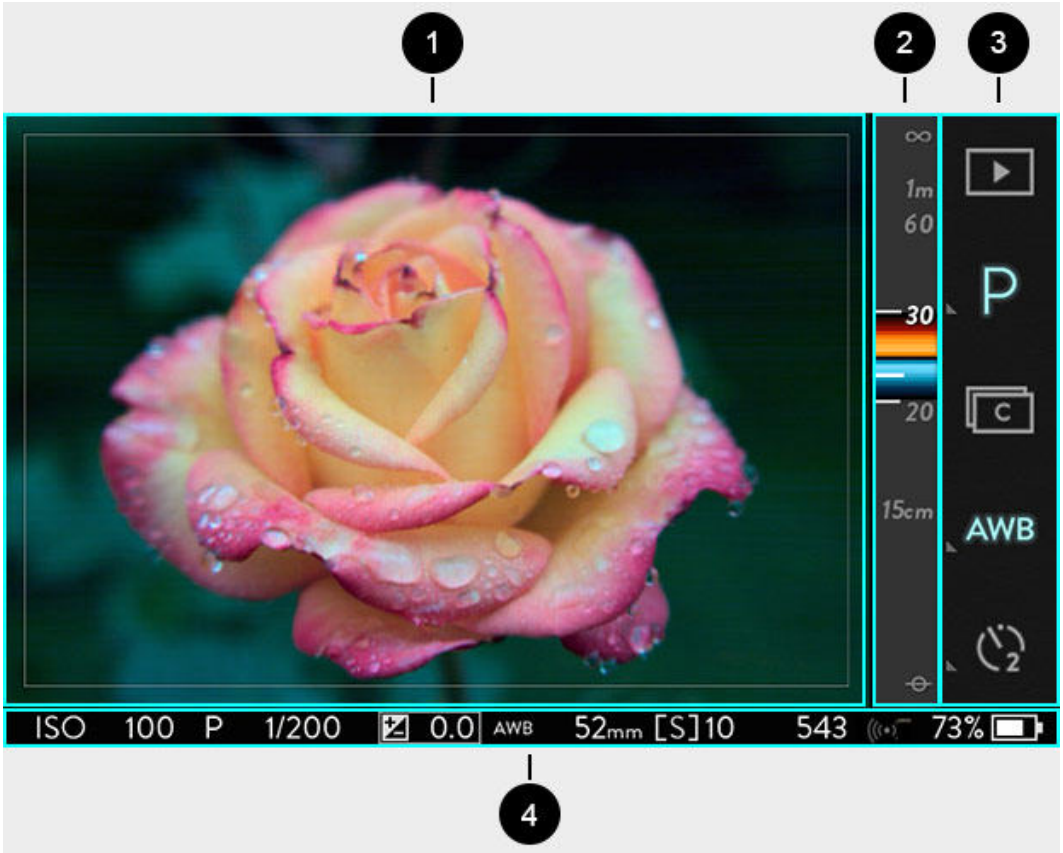
- LYTRO ILLUM Camera
- LYTRO ILLUM Quick Start Guide
- LYTRO ILLUM Quick Charger

- 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 (not included)
- **Minimum:**
  Mac OS X 10.8.5 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



1. *Image View Area*
2. *Depth Assist Bar*
3. *Menu Bar*

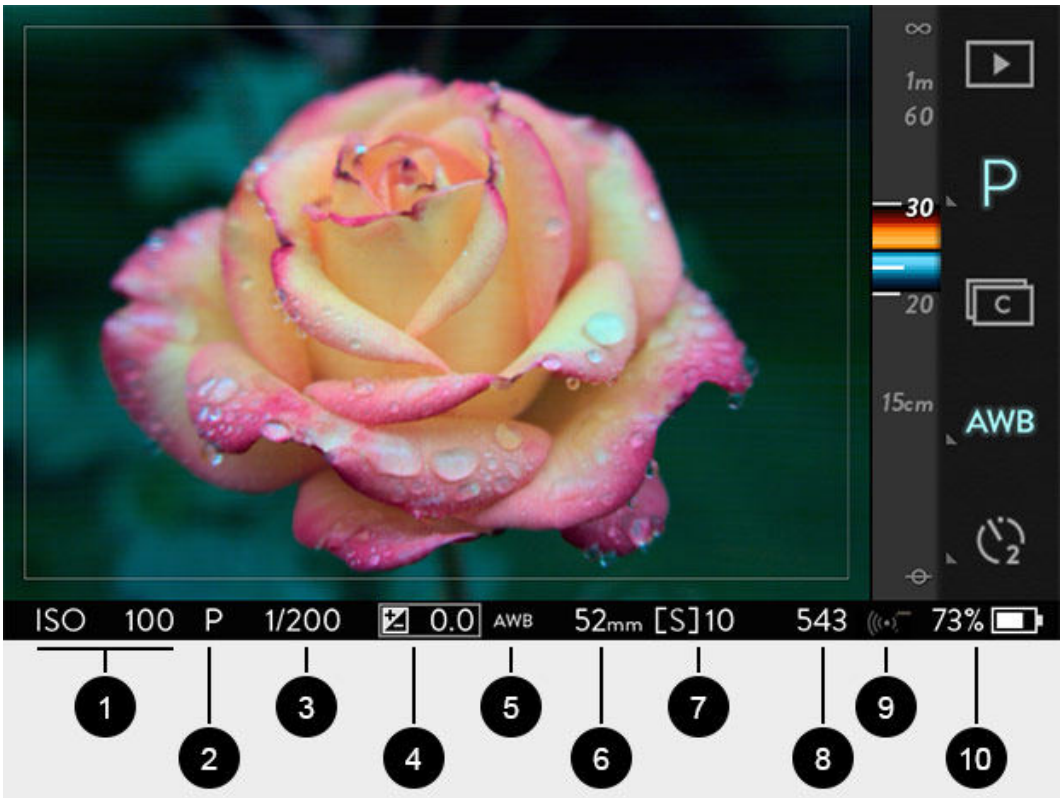
4. Information Bar

Image View Area

1. Sensor crop region

2. Live view area

Information Bar

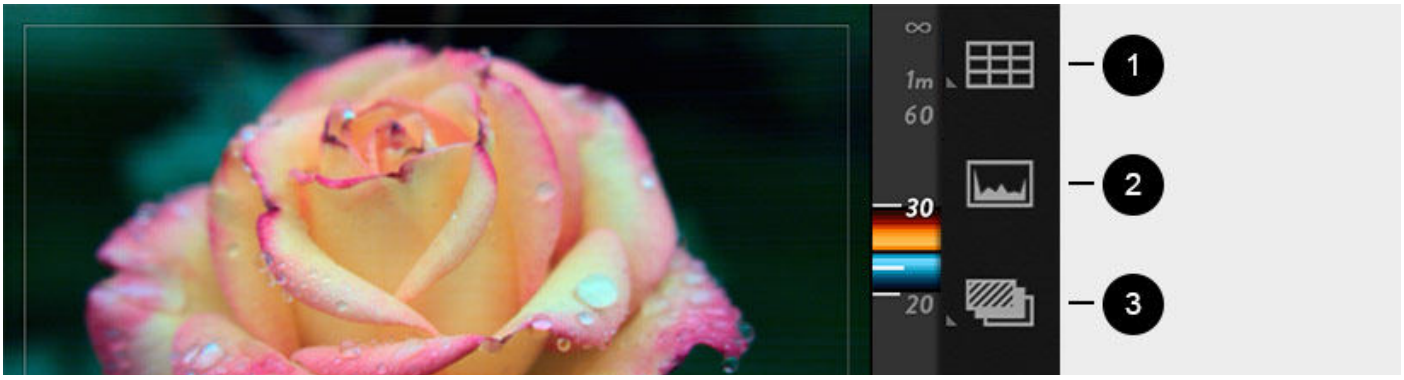


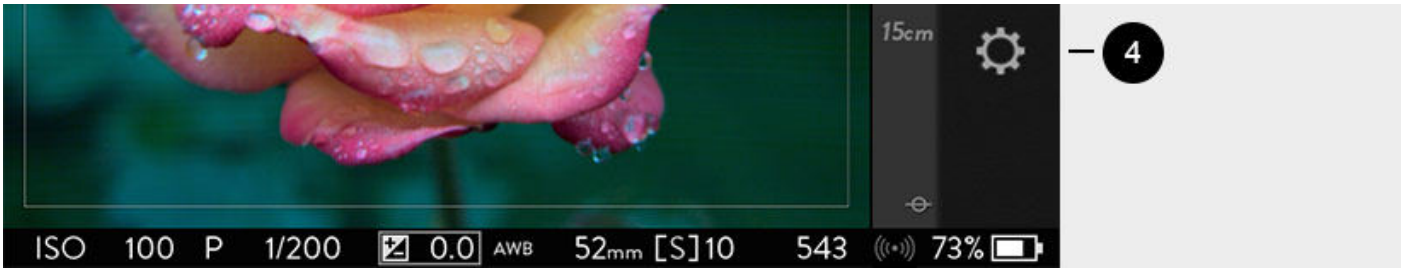
1. *ISO*
2. *Exposure mode*
3. *Shutter speed*
4. *EV compensation*
5. *White balance*
6. *Focal length (35mm equiv.)*
7. *Shutter mode and shot buffer*
8. *Shots remaining*
9. *Wi-Fi (iOS Connect)*
0. *Battery remaining*

Menu Bar, page 1

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

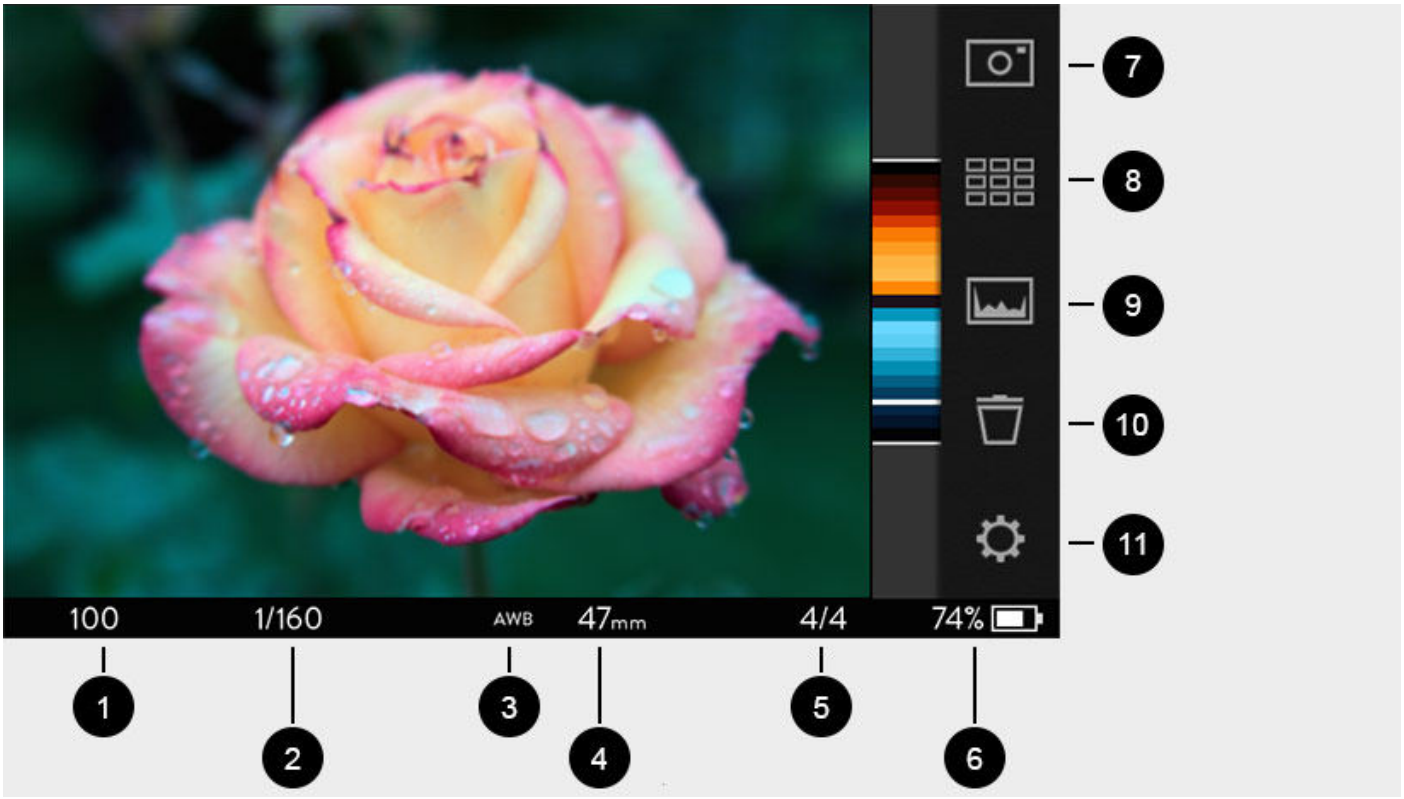
Menu Bar, page 2





1. *Grid overlay*
2. *Exposure histogram*
3. *Exposure bracketing*
4. *Settings*

Touchscreen layout in Playback Mode



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

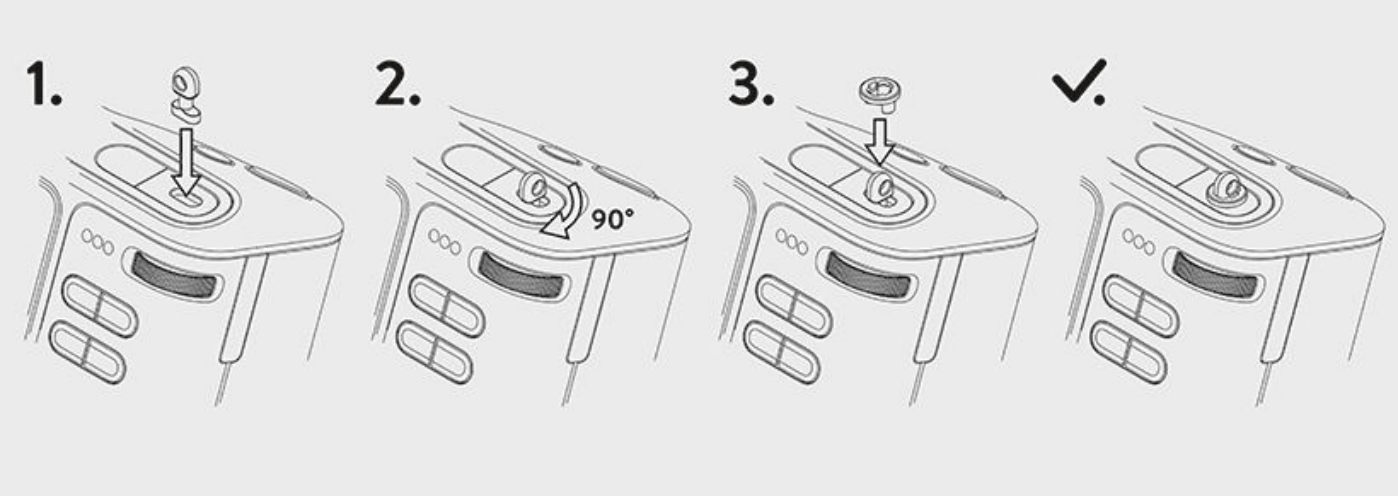
During charging, the LED on the charger will illuminate. When charging is complete, the LED will turn off. A blinking LED indicates a power or connection problem, such as the battery not being inserted properly.

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 theses 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.

Physical controls

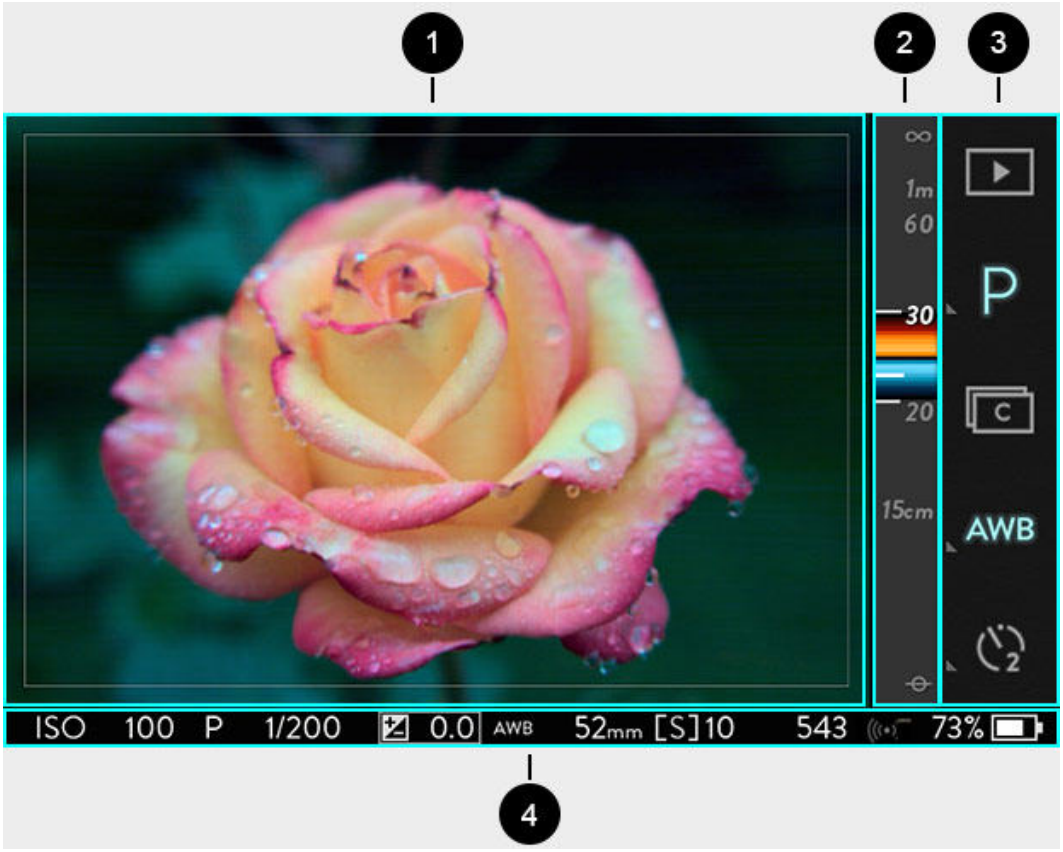
*Note that these are the default behaviors of the controls. Many can be customized in Settings (see **Camera controls**).*

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*
0. *AEL button*
1. *Hyperfocal button*
2. *Fn button*

- Power button — when the camera is off, a brief press turns it on; when the camera is on, a brief press turns it off
- 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
- Shutter button — a half-press engages auto exposure lock (AEL); a full-press releases the shutter
- Front dial — sets the ISO (in ISO Priority Mode); sets Shutter Speed (in Shutter Speed Priority Mode and Manual Mode)
- Zoom ring — adjusts the focal length of the lens
- Focus ring — adjusts the focus of the lens
- Rear dial — sets the EV compensation in Program, ISO Priority, and Shutter Speed Priority Modes; sets the ISO in Manual Mode
- AF button — activates autofocus when pressed
- AEL button — locks the exposure at the current setting while held down
- Hyperfocal button — sets the focus of the lens to the light field hyperfocal position (moves the far end of the refocusable range to infinity)
- Fn — toggles between Capture Mode and Playback Mode

Touchscreen layout in Capture Mode



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

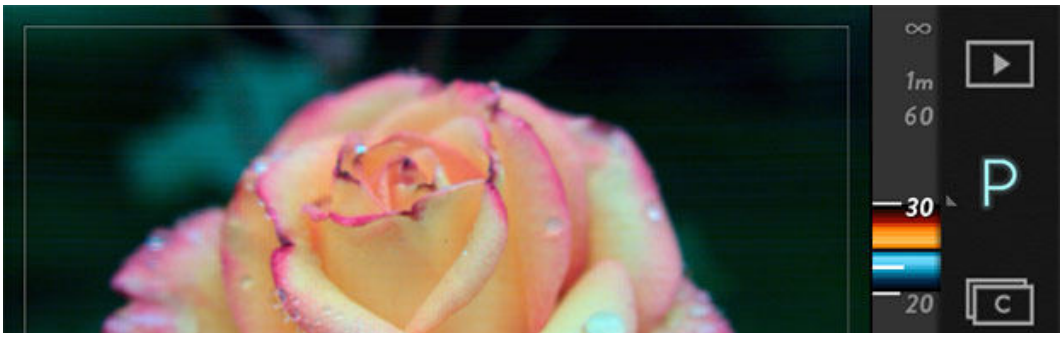
- Image view area — displays the live view; sensor crop region is indicated by the thin gray frame
- Depth Assist Bar — displays the refocusable range (indicated by the colored bands) for a Living Picture captured at the current settings
- Menu Bar — displays touch control icons (swipe up to scroll to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

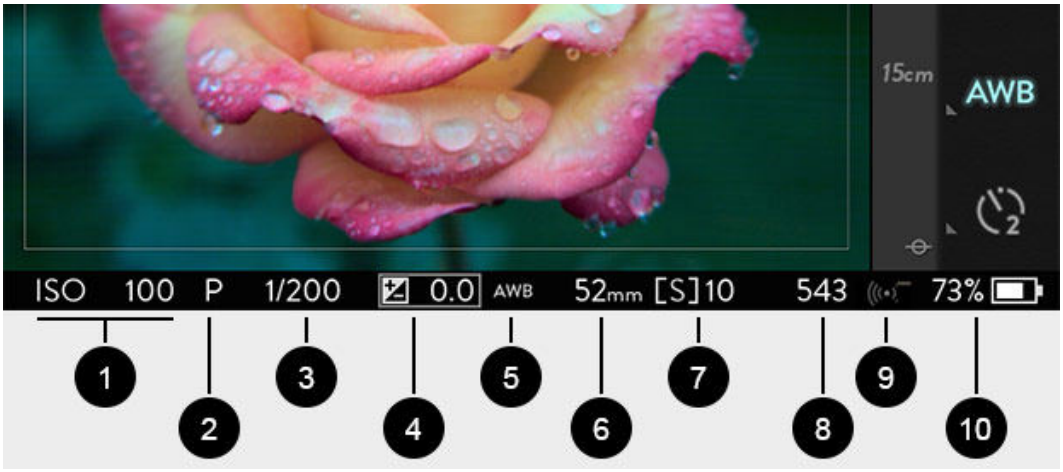
Image View Area

1. *Sensor crop region*
2. *Live view area*

- Live view area – displays the live view of the camera
- 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

Information Bar

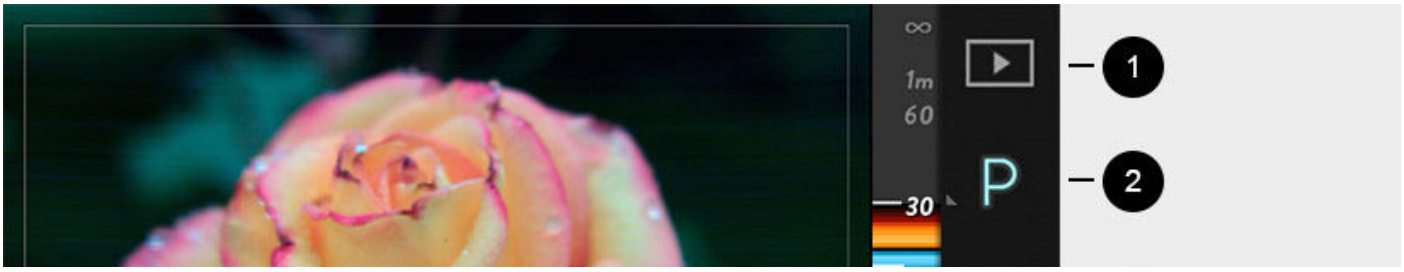


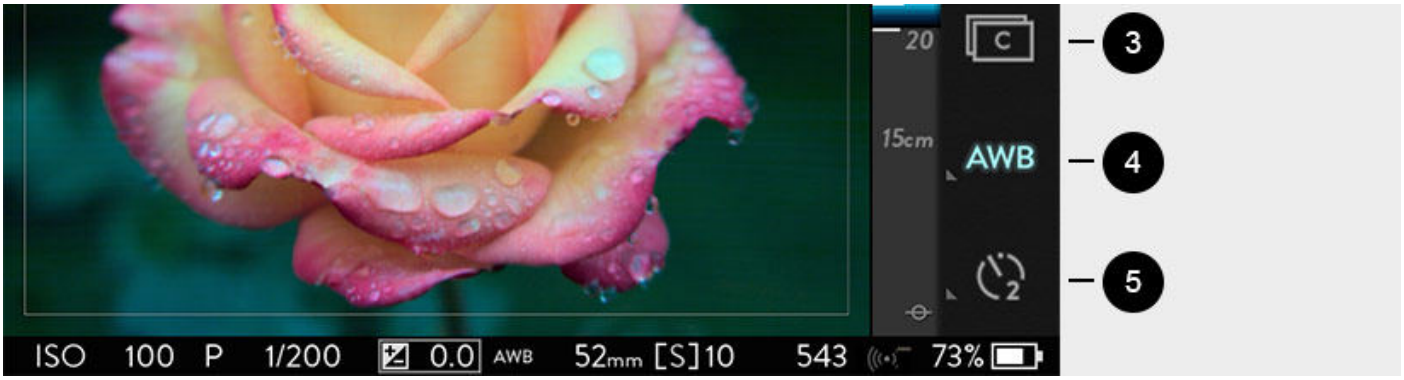


1. *ISO*
2. *Exposure mode*
3. *Shutter speed*
4. *EV compensation*
5. *White balance*
6. *Focal length (35mm equiv.)*
7. *Shutter mode and shot buffer*
8. *Shots remaining*
9. *Wi-Fi (iOS Connect)*
0. *Battery remaining)*

- ISO indicator — displays the current ISO; tap to set ISO in ISO Priority Mode and Manual Mode
- Shutter speed indicator — displays the current shutter speed; tap to set speed in Shutter Priority Mode and Manual Mode
- EV compensation indicator — displays the compensation currently selected; tap to set compensation (not available in Manual Mode)
- 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
- White balance indicator — displays the current white balance setting
- Focal length indicator — displays the current focal length (35mm equivalent)
- Shutter mode indicator — displays S for single and C for continuous shutter setting; replaced by self-timer indicator when self-timer is activated
- 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
- 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
- Wi-Fi (iOS Connect) indicator — visible only when the camera is enabled as an access point in Settings, iOS Connect
- Battery remaining indicator — displays the battery's remaining charge

Menu Bar, page 1



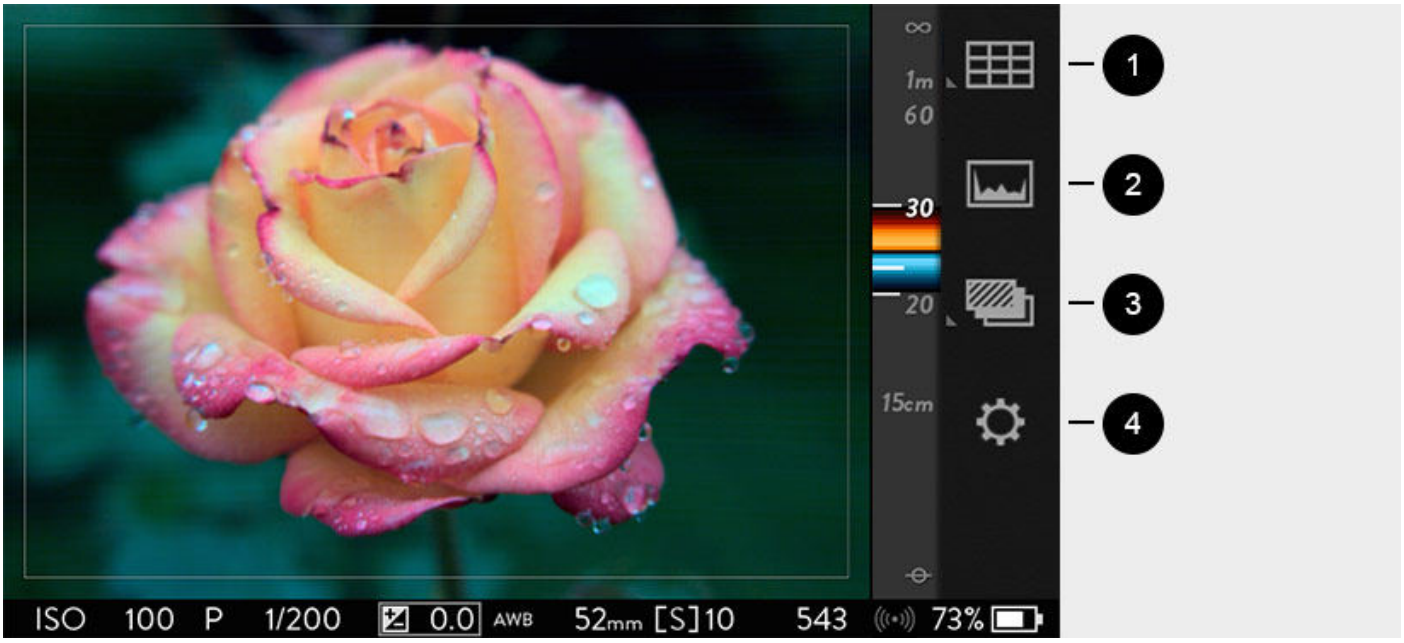


*Note that the order of the icons in the Menu Bar may be customized and additional icons may be added (see **Rearrange Menu**). The default order is referenced here.*

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

- Playback Mode icon — tap to open Playback Mode, displaying the most recent Living Picture
- Exposure Mode icon — tap to open the submenu for setting the mode; icon changes to reflect the current mode
- White Balance icon — tap to open the submenu for setting the white balance; icon changes to reflect the current setting
- Continuous Shutter icon — activates continuous shutter when tapped/illuminated
- 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

Menu Bar, page 2



1. *Grid overlay*
2. *Exposure histogram*
3. *Exposure bracketing*

- 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
- Exposure Histogram icon — displays the live exposure histogram on screen when tapped/illuminated
- 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
- 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.

- 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

Using the Depth Assist Bar

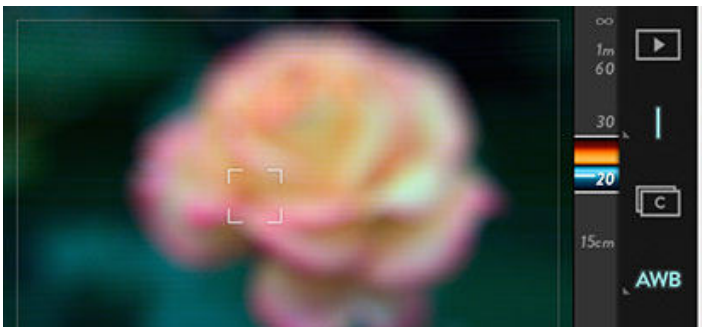
See Depth Assist Bar in Depth composition features.

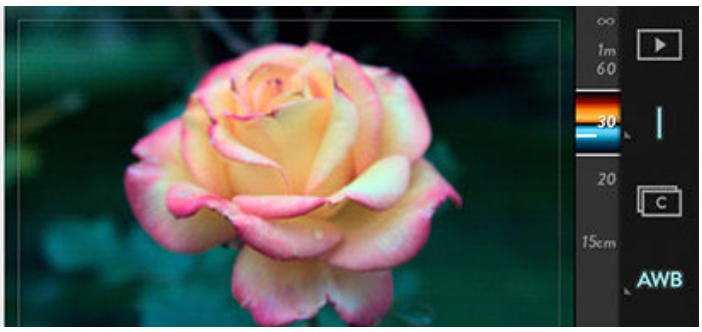
Using autofocus

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 tapping the screen.

Hiding and displaying the Menu Bar and Information Bar

The Menu Bar can be hidden from view by swiping it to the right. To display it again, swipe left from the right edge of the screen. The Information Bar can be hidden from view by swiping it down. To display it again, swipe up from the bottom edge of the screen.

Choosing an exposure mode

P I S M

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.

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

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

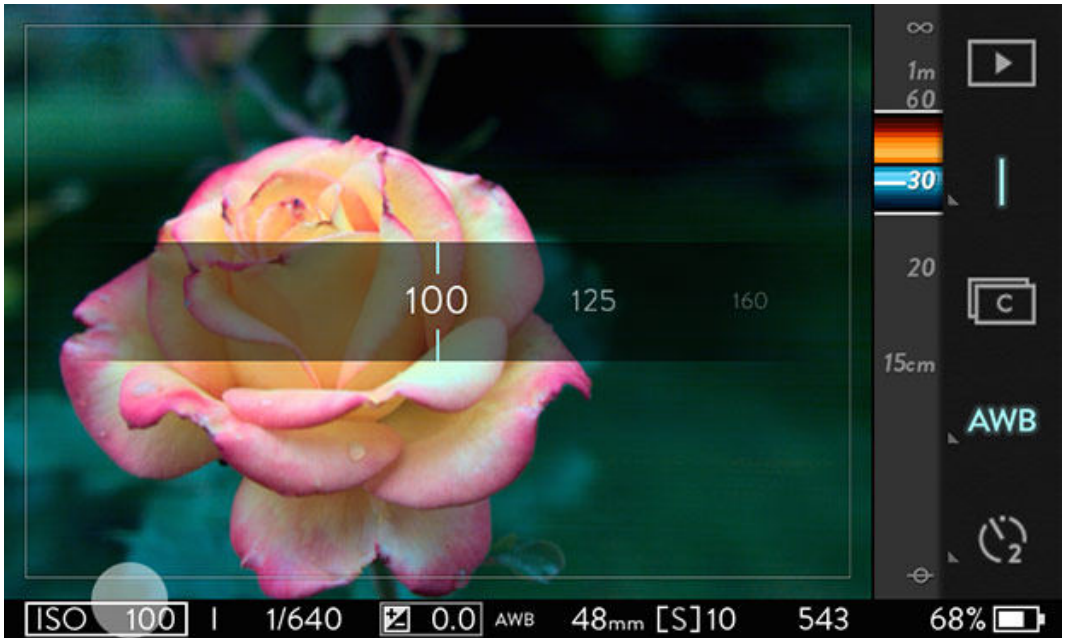
Tap on one of the letter options to set the exposure mode. The submenu will close, and the new selection will now be

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 one of the four options in the submenu to set the exposure 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 speedEV compensation indicator in the Information Bar at the bottom of the screen will change to display the current setting.

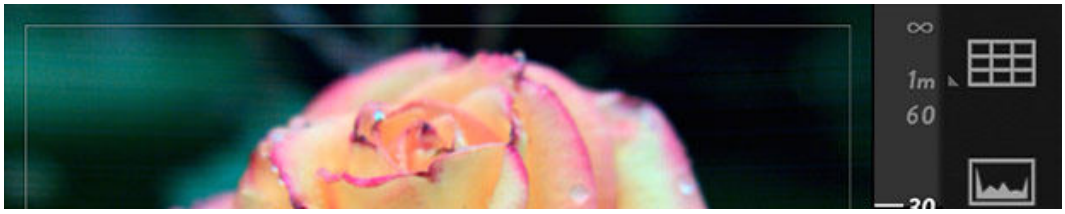
*Note that the functions assigned to the front and rear dials in the various exposure modes can be changed (see Camera controls). The default assignments are referenced here.

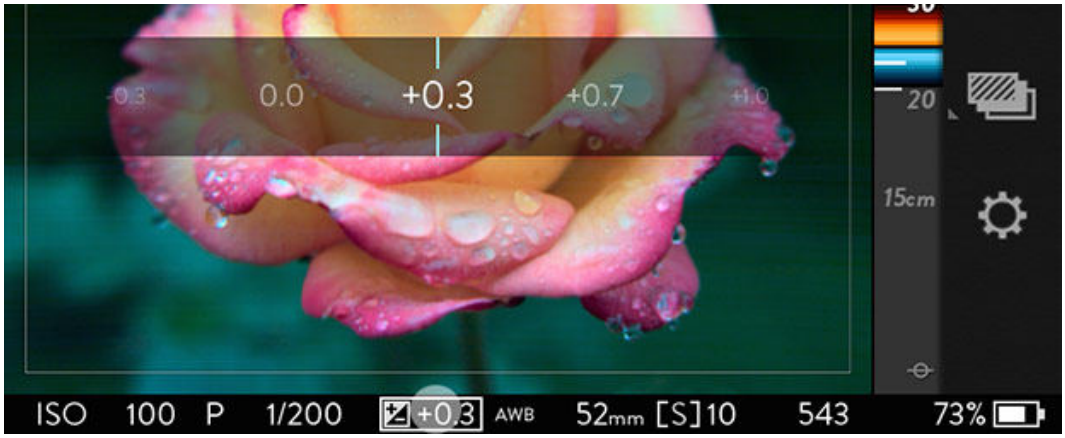
Setting the EV compensation

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.

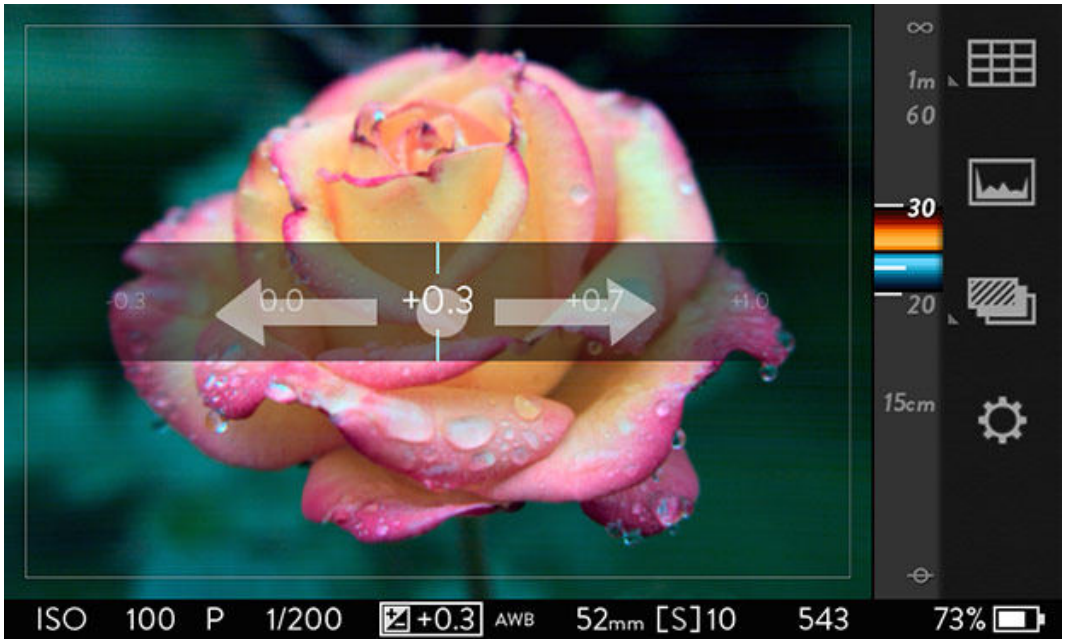
Swipe the band from right to left to increase the compensation, or from left to right to lower it. Tap on any value visible in the selection band to go directly to that setting. Double-tap on the selection band to return to the initial compensation setting.

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.





Tap the EV compensation indicator to open the selection band.



Swipe the selection band to set the EV compensation.

Set the EV compensation using the rear dial while in Program, ISO Priority, and Shutter Priority Modes*. 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 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.

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.

Activate the rule-of-thirds grid view

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

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.

Opening 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.

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.

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).

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).

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 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).

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 a flash

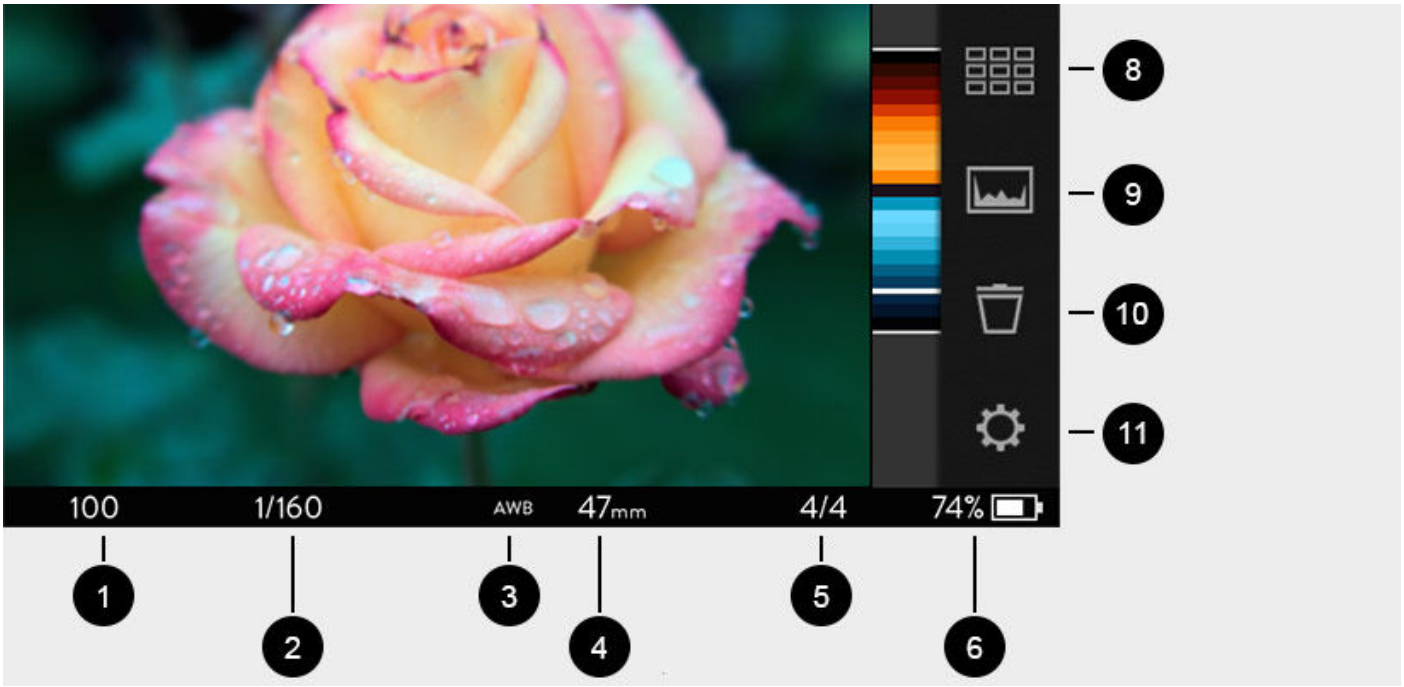
A standard flash can be mounted to the camera's hot shoe, allowing basic flash synchronization. The flash will be triggered each time the shutter opens. The synch speed (the fastest shutter speed at which you can use a flash) is 1/250. Lytro will offer a fully compatible flash with TTL flash metering beginning in late 2014.

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



1. *ISO*
2. *Shutter speed*
3. *White balance*
4. *Focal length (35mm eq.)*
5. *Picture number / total pictures*
6. *Battery charge*
7. *Capture Mode*
8. *Grid view*
9. *Exposure histogram*
10. *Delete*
11. *Settings*

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)

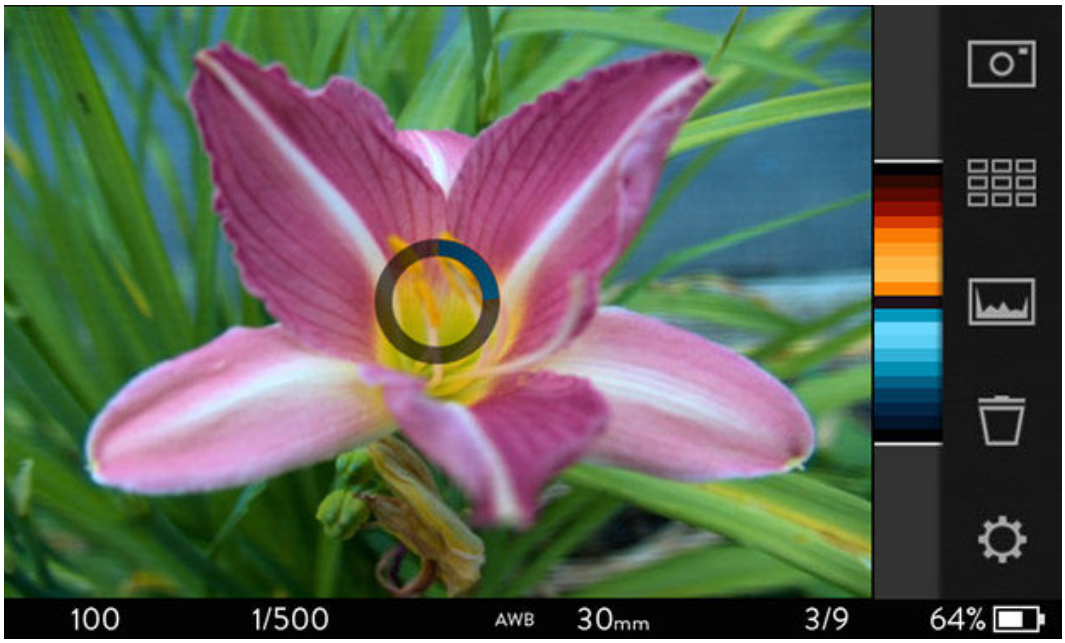
Depth Assist Bar

- Depth value indicator – displays the depth value for the 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.

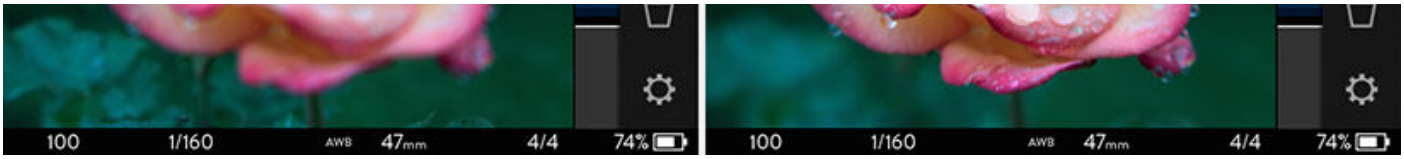
A small progress window will appear over the center of the picture during processing. When the progress window disappears — usually in just a second or two — the picture is ready to be refocused by tapping the screen.



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.

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 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 the 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.

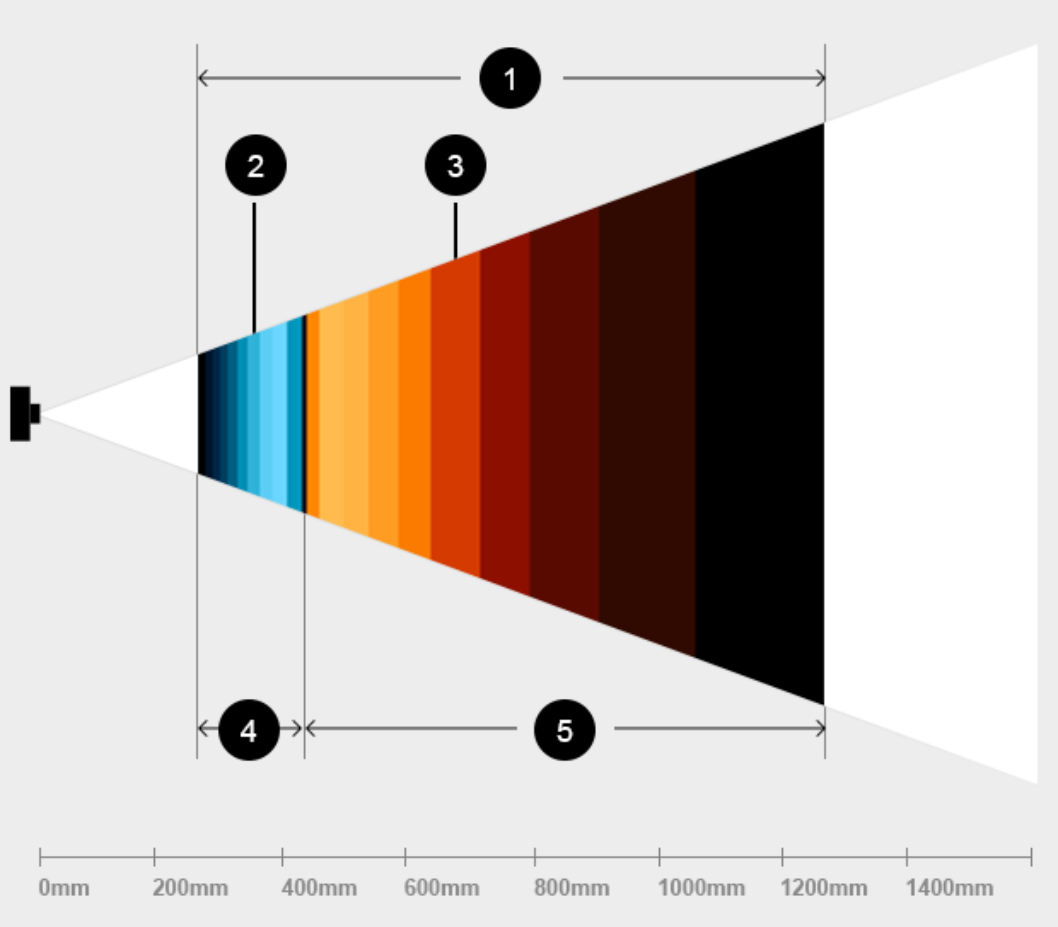
Depth Composition Features

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 who which the image is refocused.

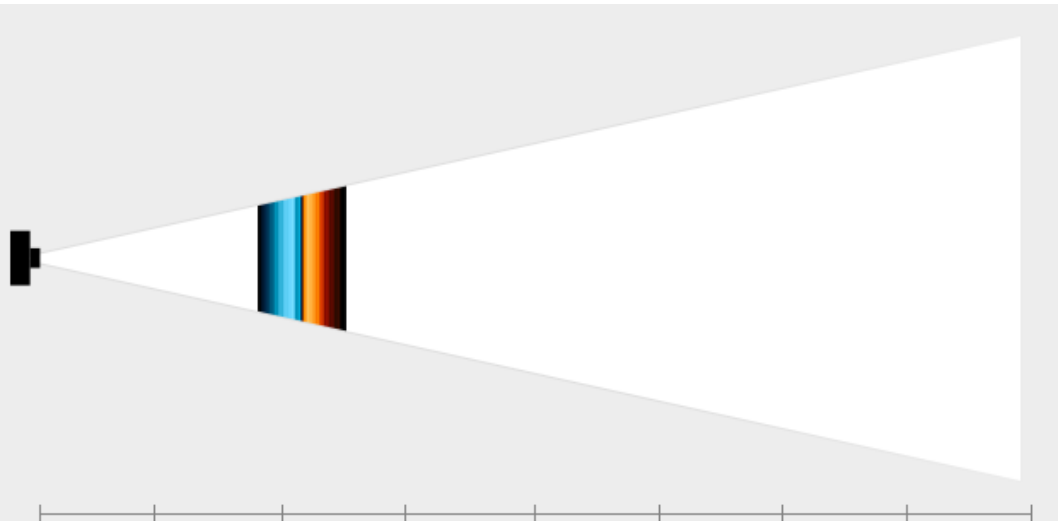
In the illustrations below, the brighter the shade of the blue or orange band, the sharper objects at that distance will appear when refocused. The brightest band in each component range is its peak — where objects will appear sharpest when refocusing.

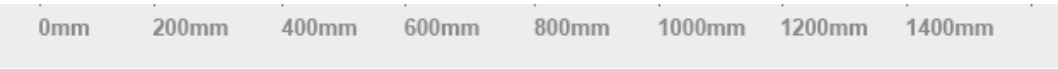


The refocusable range with the lens zoomed to a 50mm focal length (35mm equivalent) and the optical focus at approximately 42cm. Physical distances from the camera are shown in gray.

1. *Refocusable range*
2. *Near peak*
3. *Far peak*
4. *Near refocusable range*
5. *Far refocusable range*

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

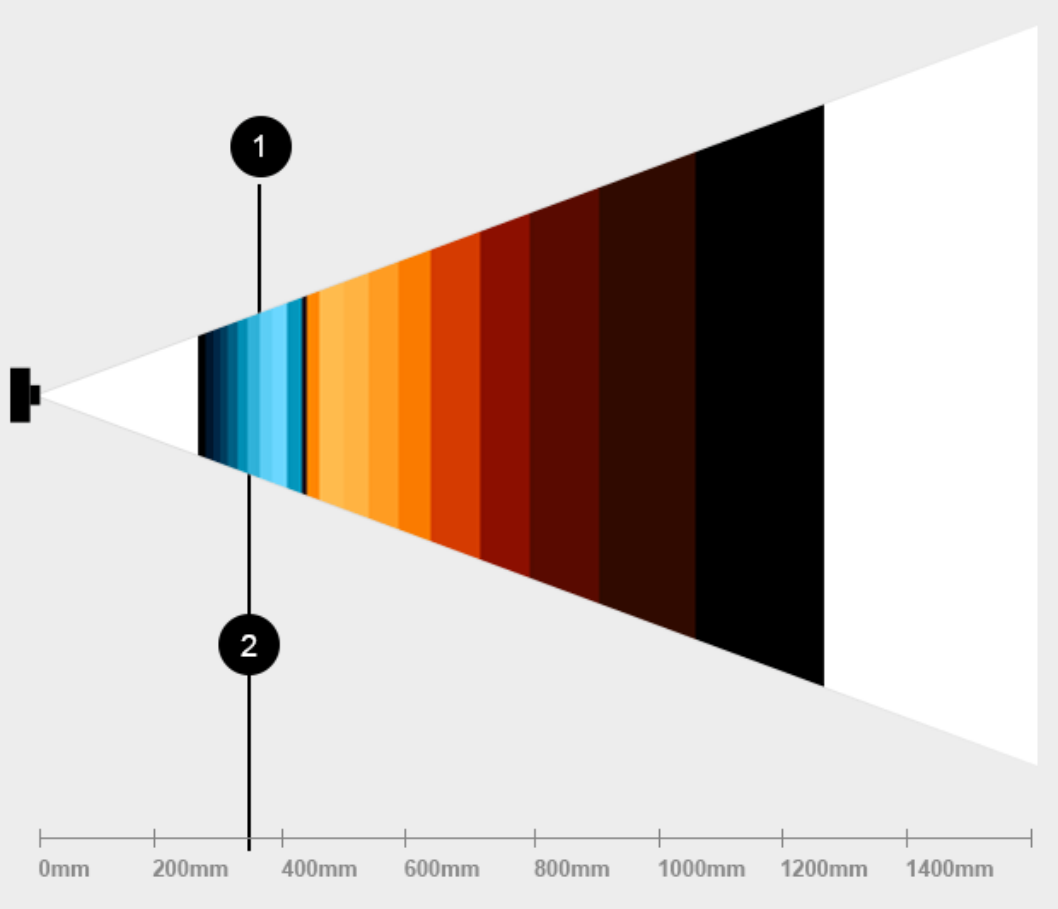
When the lens is set to the light field hyperfocal position, the refocusable range extends from optical infinity (the horizon) to a close focus distance. More specifically, objects at or near optical infinity are at a depth near the peak of the far refocusable range, while the entire near refocusable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

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.

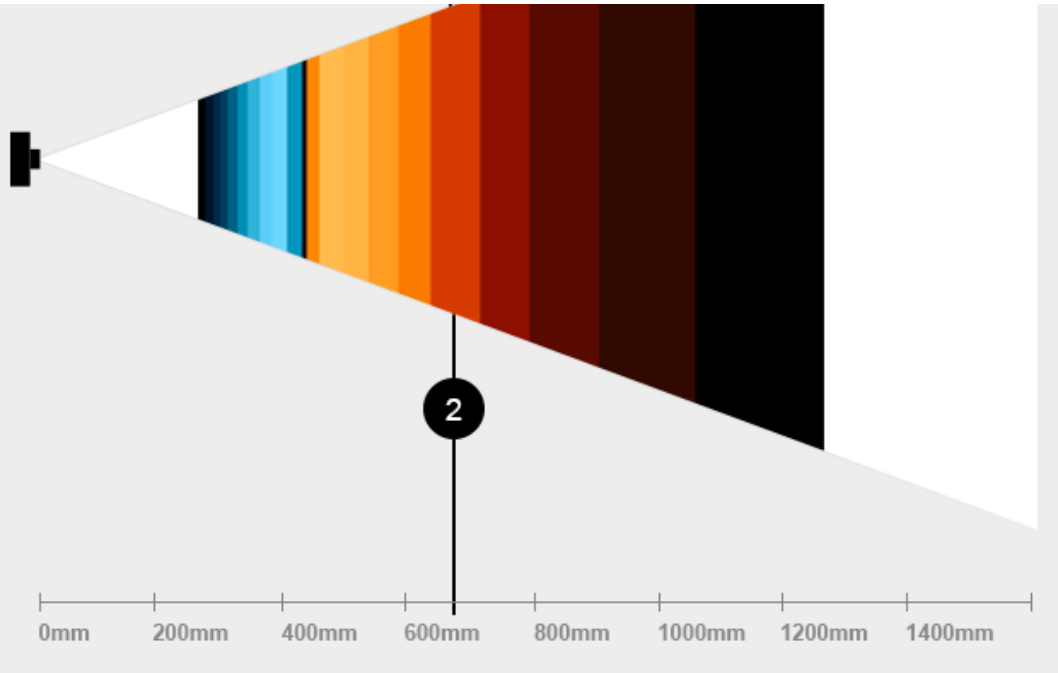
When the optical offset is at the default setting, objects at the peak of the near refocusable range will appear sharply focused in the live view. This means that a Living Picture can be refocused on whatever looked sharp in the live view when it was taken, as well as on objects further away, since most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



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

1. *Near peak*
2. *Default optical offset*

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.



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

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

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.

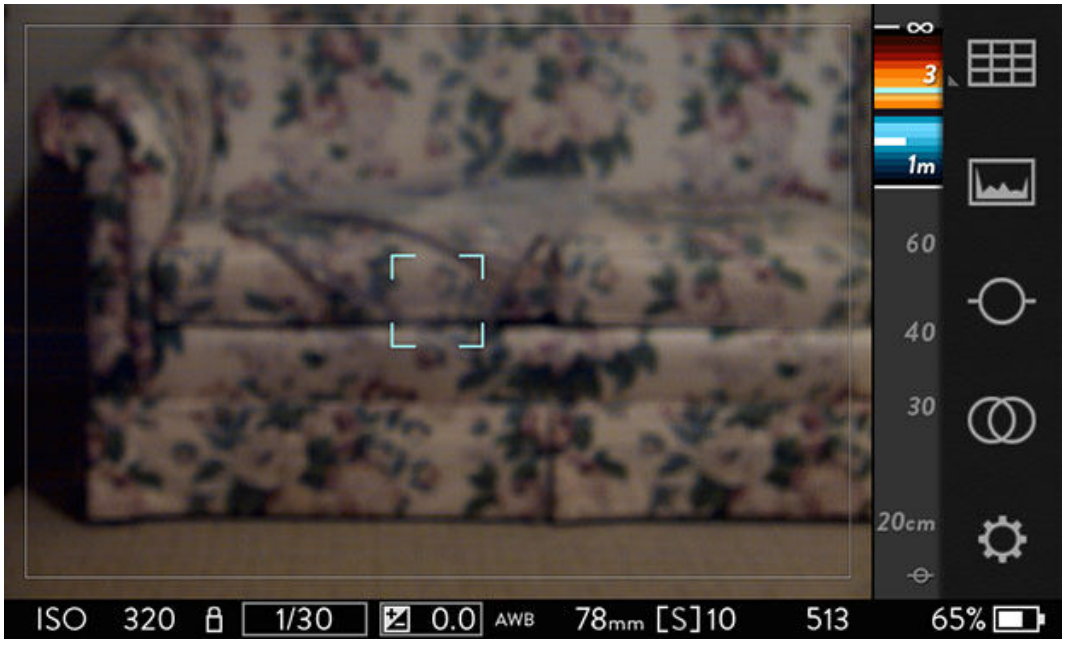
Rotate the front dial to adjust the optical offset.

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.

Spot Depth Feedback

Spot Depth Feedback allows you to check the distance of the object at the center of the live view. Press the Lytro button halfway to activate it. A light blue band will appear on the Depth Assist Bar, representing the distance of the object from the camera. It is then easy to see if the object falls within the focusable range, indicated by the orange and blue Depth Steps. Activating Spot Depth Feedback does not affect the focus of the camera.

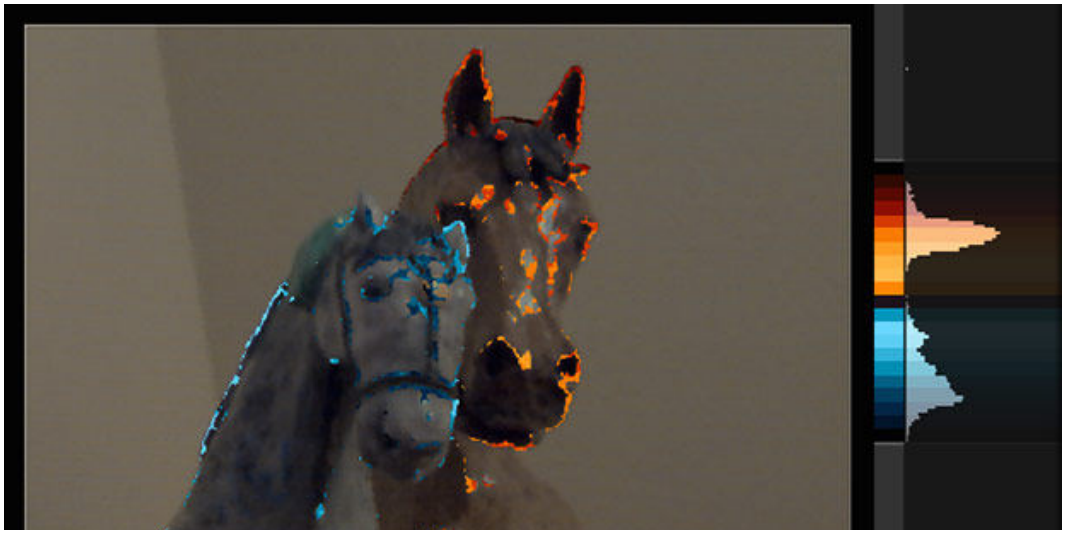


The light blue band shows that the [object name] at the center of the live view is about [distance] feet from the camera — and is within the near refocusable range.

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.

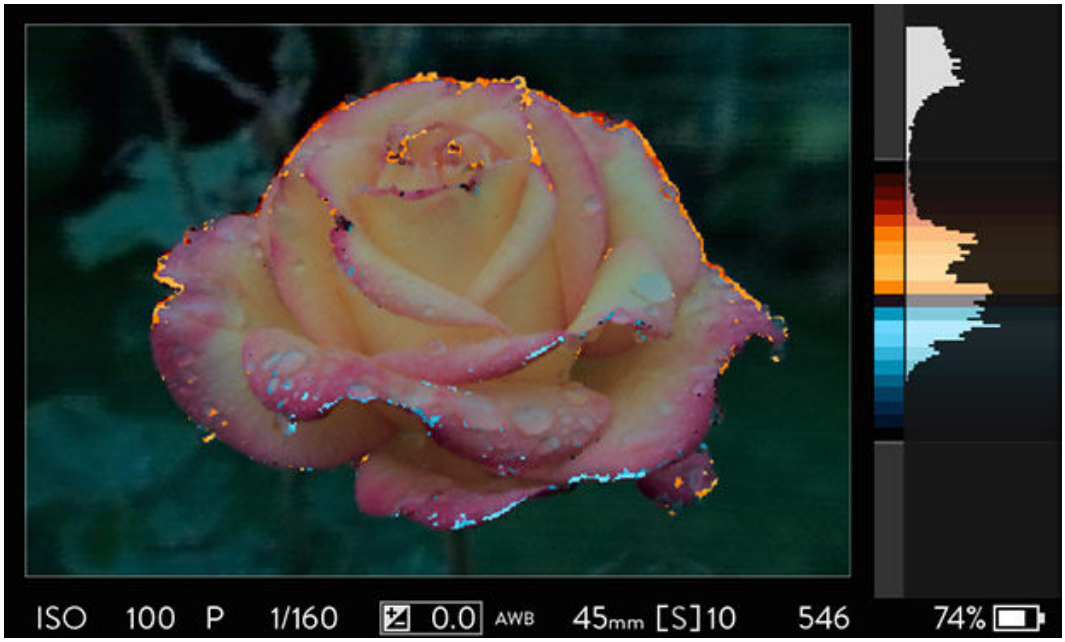
The Depth Histogram consists of bands extending out to the right of a depth scale. Bands in shades of blue represent the near refocusable range, and bands in shades of orange represent the far refocusable range. The more there is available to refocus on at a given depth, the further the band beside it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

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.

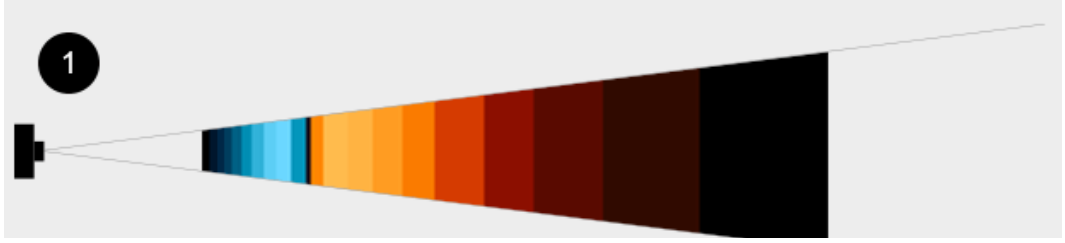


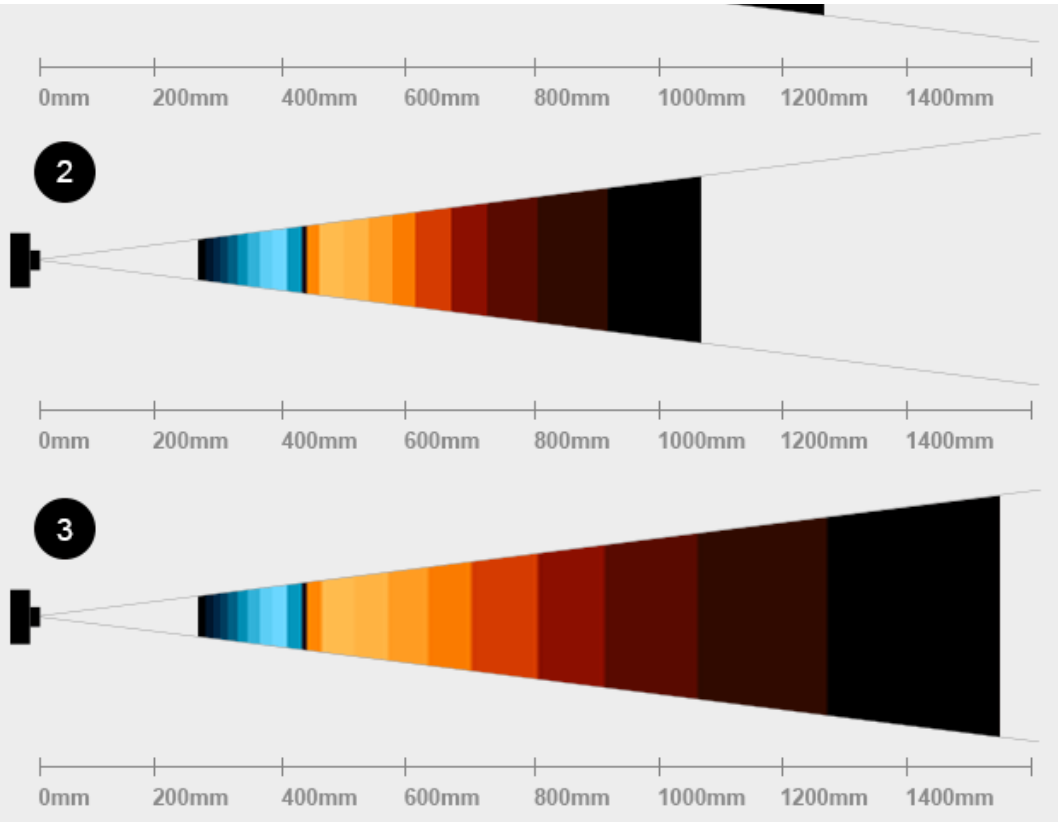
Evaluate a potential shot using the Depth Overlay. Objects in the near refocusable range are edged in blue; those in the far refocusable range are edged in orange.

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 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.

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				
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 autoexposure will be locked only while the AEL button is pressed. Select CONTINUOUS, and pressing the AEL button will lock autoexposure until the button is pressed again. Select ONE SHOT, and pressing the AEL button will lock autoexpsoure 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

	**Auto-Exposure Lock**
	**Autofocus**
	**Capture Mode**
	**Continuous Shutter**
	**Delete**
	**EV Compensation**
	ISO Priority Exposure Mode
	**Manual Exposure Mode**
	**Program Exposure Mode**
	**Shutter Speed Priority Exposure Mode**
	**Exposure Bracketing**
	**Focus Bracketing**
	**Focus Lock**
	**Center Cross Grid Overlay**
	**Fibonacci Spiral Grid Overlay**
	**Horizontal Fibonacci Spiral Grid Overlay**
	**Vertical Fibonacci Spiral Grid Overlay**

Vertical & Horizontal Fibonacci Spiral Grid Overlay

Golden Ratio Grid Overlay

Square Grid Overlay

Rule of Thirds Grid Overlay

Grid Overlay

Histogram

Lights Out Mode

Optical Offset

Playback Mode

Self-Timer: 2 Seconds

Self-Timer: 10 Seconds

Self-Timer

Settings

Auto White Balance

Cloudy White Balance

Daylight White Balance

Flash White Balance

Fluorescent 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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