

Phase One  
iXA-R/iXA  
Aerial Camera System  
Installation Guide

# Phase One iXA-R/iXA

## Aerial Camera System

### Installation Guide

This guide is designed to assist you with the installation of your new Phase One iXA-R or Phase One iXA system. Consult the iXA User Guide for more detailed instructions.

As new features are introduced through firmware updates, we change the downloadable version of this document, which is available from the Downloads section of <http://industrial.phaseone.com>.

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# 1. What's in the Box?

## iXA Camera

- iXA camera
- Secure Lens Holder for LS lens
- iXA 24 V DC power supply with international outlet adapters
- Power cable, 2 m
- Phase One control cable, 2 m
- USB 3.0 cable, 3 m
- FireWire 800-800 cable, 4.5 m
- Mini-USB 2.0 cable
- 1.5 mm hex screwdriver
- 2.5 mm hex bit
- Sensor cleaning kit
- LCC calibration plate
- Microfiber cloth
- USB drive with documentation for Phase One cameras
- iXA installation guide
- Warranty certificate, classic/value added
- Suitcase for iXA camera

## iXA-R Camera

- iXA-R camera
- iXA 24 V DC power supply with international outlet adapters
- Power cable, 2 m
- Phase One control cable, 2 m
- USB 3.0 cable, 3 m
- FireWire 800-800 cable, 4.5 m
- Mini-USB 2.0 cable
- Sensor cleaning kit
- LCC calibration plate
- Front and rear lens caps
- Microfiber cloth
- USB drive with documentation for Phase One cameras
- iXA-R installation guide
- Warranty certificate, classic/value added
- Suitcase for iXA-R camera

## Optional Accessories – iXA

- Schneider-Kreuznach 28 mm F4.5 LS FS Lens (73018)
- Schneider-Kreuznach 55 mm F2.8 LS FS Lens (73003)
- Schneider-Kreuznach 80 mm F2.8 LS FS Lens (73004)
- Schneider-Kreuznach 110 mm F2.8 LS FS Lens (73005)
- Schneider-Kreuznach 150 mm F3.5 LS FS Lens (73006)
- Schneider-Kreuznach 240 mm F4.5 LS FS Lens (73007)
- Secure Lens Holder for 28 mm LS Lens (73021)
- Secure Lens Holder for 240 mm LS Lens (73011)
- Secure Lens Holder for 55 mm, 80 mm, 110 mm, 150 mm LS Lens (73001)
- Phase One control cable, 3 m (70312)
- iXA Multi-sync cable, 1 m (70307)
- iXU to iXA sync cable, 1 m (70341000)
- IR Cutoff filter Ø72 mm (70720)

## Optional Accessories – iXA-R

- Rodenstock 40 mm Lens/Shutter kit (73039)
- Rodenstock 50 mm Lens/Shutter kit (73038)
- Rodenstock 70 mm Lens/Shutter kit (73048)
- Phase One control cable, 3 m (70312)
- iXA Multi-sync cable, 1 m (70307)
- IR Cutoff filter Ø67 mm (73035)

## 2. Overview

### iXA Camera System

1. iXA camera body
2. Pod mounting threaded holes (4)
3. Secure Lens Holder threaded holes (2)
4. Lens release button
5. 3/8 inch tripod sockets (2)
6. Lens mount alignment mark
7. Mini-USB port
8. Sensor module
9. CompactFlash card slot
10. USB 3.0 port



11. Camera on/off button
12. Camera LED indicator
13. Power terminal
14. Data terminal A
15. Data terminal B
16. Sensor module on/off button
17. FireWire 800 port



### iXA Secure Lens Holder

1. Lens clamping screw
2. Locking screws (4)
3. Lens holder screws (2)
4. Distance scale window
5. Secure Lens Holder covers (2)
6. Alignment dot
7. Clamping ring (shown in blue)



## iXA-R Camera System

1. iXA camera body
2. Pod mounting threaded holes (4)
3. Lens assembly
4. Lens screws (3)
5. 3/8 inch tripod sockets (2)
6. Mini-USB port
7. Sensor module
8. CompactFlash card slot
9. USB 3.0 port



10. Camera on/off button
11. Camera LED indicator
12. Power terminal
13. Data terminal A
14. Data terminal B
15. Sensor module on/off button
16. FireWire 800 port



# 3. Preflight Planning

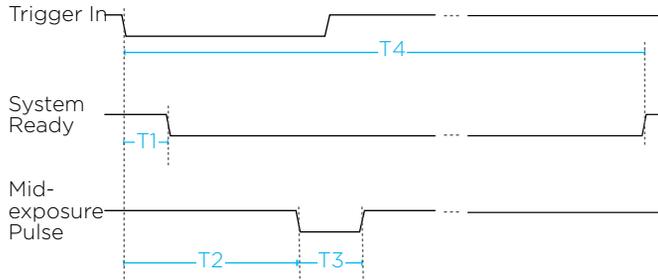


Figure 1: Exposure Sequence

## Exposure Sequence

To learn more about the capabilities of the iXA-R/iXA cameras, consult the iXA User Guide as well as other documents, which are found on the USB drive that comes with the camera and the Downloads section of the industrial.phaseone.com website.

## Understanding the Exposure Sequence

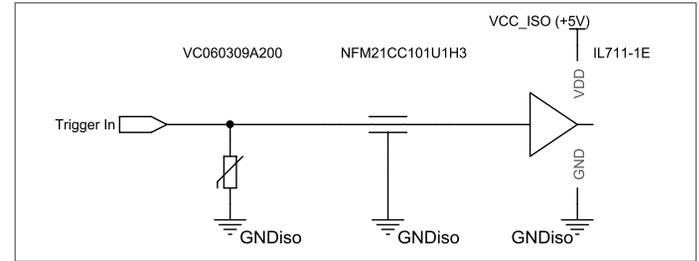
There are three signals that are used to communicate with and control iXA-R/iXA cameras:

- Trigger in: The FMS signals the iXA-R/iXA to take an image.
- System ready: Camera ready/busy signal.
- Mid-exposure pulse: A signal indicates the midpoint of the exposure time.

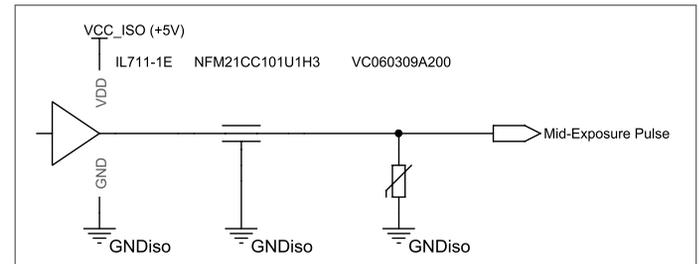
## Electrical Interfaces

There are three signals that are used to communicate with and control the iXA-R/iXA camera:

**Trigger in:** The FMS signals the camera to take an image.



**Mid-exposure pulse:** A signal indicates the midpoint of the exposure time.



**System ready:** Camera ready/busy signal.

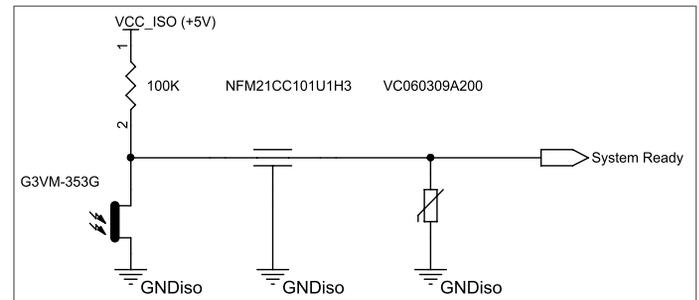


Figure 2: Electrical Interfaces

Table 1 - iXA Exposure Sequence

<b>LS/D Lenses Typical Values</b>	<b>Description</b>	<b>FPS Shutter</b>	<b>Mixed Shutter*</b>	<b>LS Shutter</b>
T1	Trigger IN - SysRdy (Low)	20 uSec	20 uSec	20 uSec
T2	Trigger IN - Mid Exposure	140 mSec + 1/2 Exp. Time	140 mSec + 1/2 Exp. Time	110 mSec + 1/2 Exp. Time
T3	Mid Exp. Width	1/2 Exp. Time	1/2 Exp. Time + 1.1 mSec	1/2 Exp. Time + 1.1 mSec
T4 (iXA 180)	Trigger IN - SysRdy (High)	1400 mSec	1400 mSec	1800 mSec
T4 (iXA 160)	Trigger IN - SysRdy (High)	1250 mSec	1250 mSec	1600 mSec
<b>FS Lenses Typical Values</b>				
T1	Trigger IN - SysRdy (Low)	20 uSec	20 uSec	20 uSec
T2	Trigger IN - Mid Exposure	140 mSec + 1/2 Exp. Time	160 mSec + 1/2 Exp. Time	130 mSec + 1/2 Exp. Time
T3	Mid Exp. Width	1/2 Exp. Time	1/2 Exp. Time + 1.1 mSec	1/2 Exp. Time + 1.1 mSec
T4 (iXA 180)	Trigger IN - SysRdy (High)	1400 mSec	1400 mSec	1800 mSec
T4 (iXA 160)	Trigger IN - SysRdy (High)	1250 mSec	1250 mSec	1600 mSec

Table 2 - iXA-R Exposure Sequence

<b>iXA-R</b>	<b>Description</b>	<b>1 to 1/1600 sec</b>	<b>1/2000 to 1/4000 sec</b>
T1	Trigger IN - SysRdy (Low)	20 uSec	20 uSec
T2	Trigger IN - Mid Exposure	110 mSec + 1/2 Exp. Time	140 mSec + 1/2 Exp. Time
T3	Mid Exp. Width	1/2 Exp. Time + 1.1 mSec	1/2 Exp. Time
T4 (iXA-R 180)	Trigger IN - SysRdy (High)	1400 mSec	1400 mSec
T4 (iXA-R 160)	Trigger IN - SysRdy (High)	1250 mSec	1250 mSec

\* Not applicable to iXA-R

## Wiring a Control Cable

Table 3 - Camera Control Cable Description

Connector Pin	Color	Name	Description	Direction	Level	Notes
1	Orange	Reserved	Reserved	Reserved	Reserved	Reserved
2	Green	System Ready	iXA-R/iXA system ready for next capture	Out	VOH, min = 4.0 V (I <sub>o</sub> = -10uA) VOL, max = 0.8 V (I <sub>o</sub> = 4mA)	Isolated 5 Volt Level Pull up resistor 100K Ohms to +5 V
3	Red	Reserved	Reserved	Reserved	Reserved	Reserved
4	Purple	Trigger In	Trigger the iXA-R/iXA for new capture cycle	In	VIH, min = 2.4 V VIL, max = 0.8 V tiF, tiR < 1uSec	Isolated, active low (For manual triggering, activate by short to common signal, otherwise leave floating.)
5	Blue	RS232 RX	External system can send specific information to iXA-R/iXA system	In	RS232 input level +/- 15 V (VIT+ max=2.4 V VIT-min=0.8 V)	RS232 Voltage Level Isolated For baud rate and additional information, see the Phase One GPS User Guide
6	Yellow	RS232 TX	iXA-R/iXA system can send specific information to external system	Out	VOH at RL=3 kΩ to GND + 5.4 V VOL at RL=3 kΩ to GND -5.4 V	
7	White	Mid-exposure pulse	Midpoint of the exposure time	Out	VOH, min = 4.0 V (I <sub>o</sub> = -4mA) VOL, max = 0.8 V (I <sub>o</sub> = 4mA)	Isolated 5 Volt Level
8	Gray	Reserved	Reserved	In		Short to pin 9*
9	Black	Common		Common		

VIL — maximum voltage level that is interpreted as a '0' by a input.

VIH — minimum voltage level that is interpreted as a '1' by a input.

VOL — guaranteed maximum voltage level that appears on output set to '0'.

VOH — guaranteed minimum voltage level that appears on output set to '1'.

VIT+ — input threshold voltage when the input voltage is rising.

VIT- — input threshold voltage when the input voltage is falling

\*For iXU-R/iXU cameras, this connection is mandatory. The connection is not necessary for iXA-R/iXA cameras.

## Wiring the Camera Control Cable

External devices are connected to the camera with are connected to the camera with a Phase One control cable (supplied with the camera kit). This cable has a LEMO-secured connector on one side for the camera and an open side with nine (28 AWG) wires for connection to your system.

The iXA-R/iXA camera shoots in single mode. In single mode, the FMS triggers the camera. This mode is recommended for synchronizing flight speed and capture rate.

The table below describes the functionality of the wires in the camera control cable.

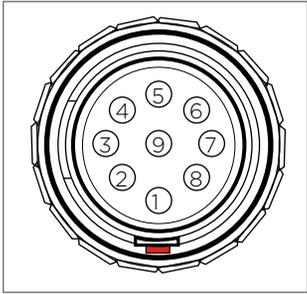


Figure 3: Communication Connector Cable Plug Pinout

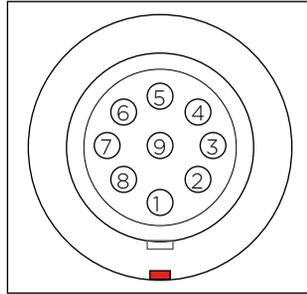


Figure 4: iXA-R/iXA Camera Socket Pinout

## Understanding Black Reference

A black reference is the process of reading the sensor output during an exposure without the sensor being exposed to light. This black reference data is written to the camera and used to subtract from the regular capture.

Updating the black reference data whenever it is possible enhances the image quality, in particular when shooting in conditions where the temperature of the camera changes. If the exposure time varies a lot, the black calibration reference data should be updated.

It is advisable to make a black reference capture before starting your first flight line and if the exposure settings or ISO have been changed. This ensures the accuracy of exposures. The best time to do this is before starting a new flight line, when images are not being captured.

## Software Activation of Black Reference

The Phase One iXA-R/iXA camera can perform a black reference sequence by using the iX Capture application. When using iX Capture, simply click Black Ref on the iX Capture dashboard to update the black reference.

## Wiring the Power Cable

The camera is connected to the aircraft's power bus with a power cable. Wire the Power Cable using the information in the table below.

Table 4 - Power Cable Description

Connector Pin	Color	Name	Description	Direction	Level	Notes
1	White or yellow	DC In +	Provides positive power	Input	12 - 30 V DC	Should provide up to 30W
2	Black	DC In - (common)	(common)	Input		

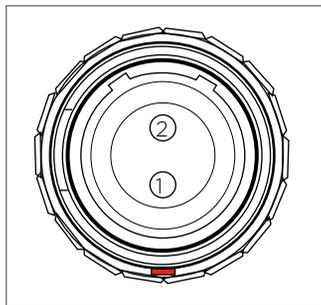


Figure 5:  
Power Cable Plug Pinout

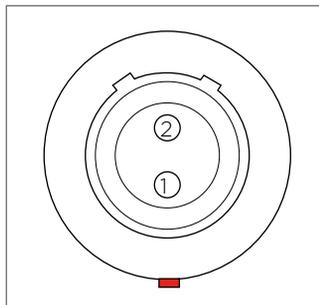


Figure 6:  
Camera Socket Pinout

Note: The iXA-R and iXA cameras must only be powered by a limited fused power source, up to 8 A single fault condition.

La caméra iXA-R/iXA doit être alimentée par une source d'alimentation protégée par un fusible, d'une capacité maximale de 8 Ampères.

# 4. Preparing the Camera

## Mounting a Lens and Secure Lens Holder on an iXA

Note: If your secure lens holder is a model without locking screws, or is for a 240 mm lens, refer to the Downloads section of the website for instructions.

1. Push the lens release button inward.



2. Rotate the front body cap counterclockwise and lift out.



3. Remove the front and rear lens caps.

4. Align the white alignment dot of the lens with the white lens alignment dot of the camera and fit the lens into place.



5. Rotate lens clockwise until it locks into place.



6. Set the focusing selector ring on the lens to Auto Focus (AF).



7. Slide the clamping ring (shown in blue) onto the lens. The hole on the clamping ring should be aligned over the white alignment dot of the lens and the opening of the clamping ring should enable you to read the distance scale on the lens.



8. Check to make sure that the clamping and Locking screws are not tightened. Slide the back of the Secure Lens Holder over the front of the lens, aligning the lens distance scale in the distance scale window of the Secure Lens Holder. Push the Secure Lens Holder as far as it can go onto the lens so there is no gap between the Secure Lens Holder and the camera.



9. Tighten both Lens holder screws into the threaded holes on the front of iXA camera with a hex tool using a torque of 75 cNm.



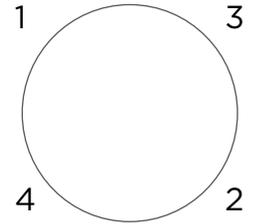
10. Tighten the clamping screw with a hex tool using a torque of 75 cNm.



11. Unscrew and remove the Secure Lens Holder covers (shown in blue) on either side of the lens focusing ring with a hex tool.
12. Perform ground calibration until optimal infinity focus has been achieved.



13. Tighten the four locking screws as follows:
- Gently tighten each locking screw in the order displayed in the illustration.
  - Tighten the locking screws a second time, again following the same order, using a torque of 10 cNm.
  - Verify that the ground calibration is accurate.



Order of tightening of locking screws

14. Replace and attach both Secure Lens Holder covers with the washers and screws using a torque of 30 cNm.



## Dismounting a Lens and Secure Lens Holder from an iXA

To dismount a lens from an iXA camera:

1. Unscrew both Lens holder screws from the threaded holes on the front of iXA camera with a hex tool.



2. Push the lens release button inward.
3. Rotate the Secure Lens Holder with the lens locked inside counterclockwise and lift out.



**Note:**

Ensure that the iXA camera body is protected with either a front body cap or a lens.

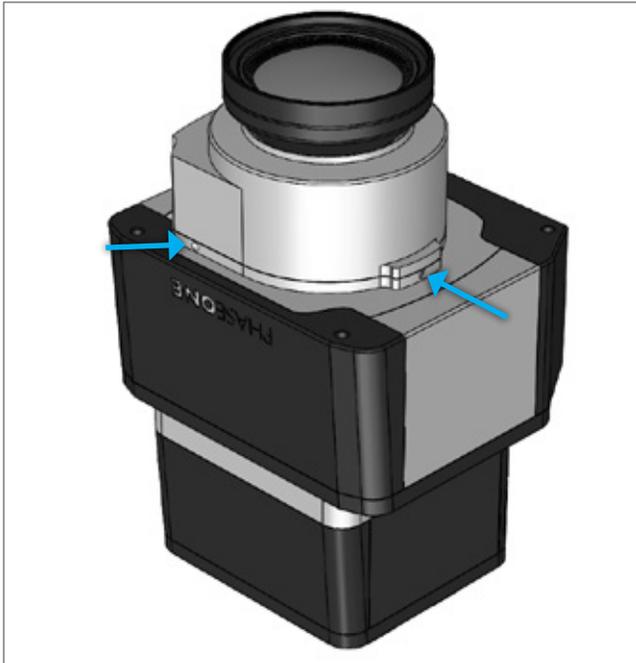
## Dismounting a Lens from an iXA-R

Lenses on the iXA-R series of cameras are easily dismounted. Ensure that you only dismount lenses in a clean environment.

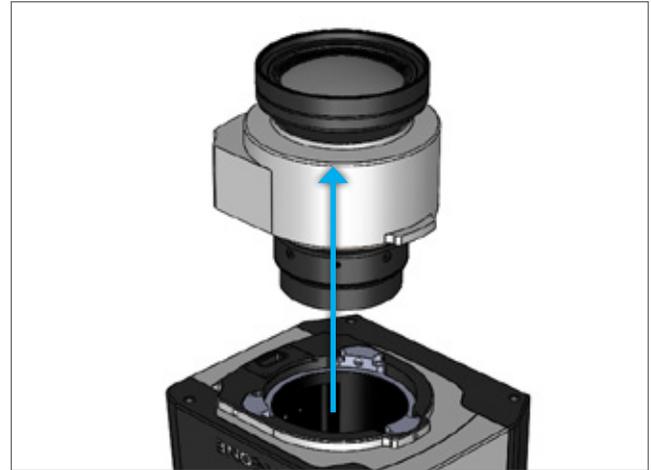
Place a soft cloth down on the table to avoid scratching the LCD and a lens cap on the lens.

To dismount the lens:

1. With a 2 mm hex key, unscrew the three lens screws. The screws remain attached to the camera.



2. Pull the lens assembly away from the camera.



3. Place a rear cap on the lens.

**Note:** If another lens is not being mounted on the camera, ensure that the camera is stored in a way to protect it from dust, moisture and other damage.

## Mounting a Lens on an iXA-R

Lenses on the iXA-R series of cameras are easily mounted. Ensure that you only mount lenses in a clean environment.

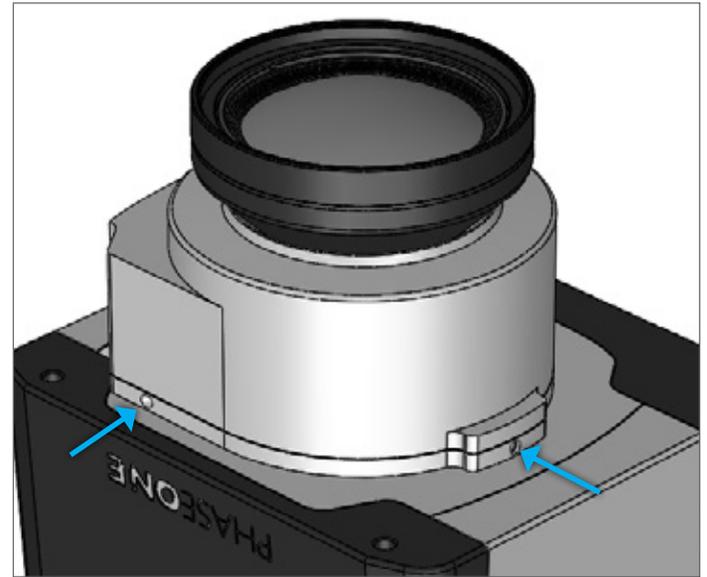
Place a soft cloth down on the table to avoid scratching the LCD and a lens cap on the lens.

Ensure that you remove the rear lens cap (if attached) before mounting the lens.

1. Place a lens assembly on the iXA-R body.



2. With a 2 mm hex key, secure the lens assembly onto the iXA-R by gently tightening each locking screw.
3. Tighten the locking screws a second time using a torque of 70 cNm.



# 5. Connecting a Camera

## Attaching a Camera to a Pod

Attach the camera to a pod using M4 bolts.

Note: Do not insert bolts deeper than 8 mm into the threaded holes on the front of the camera.

## Connecting a Phase One Control Cable

Phase One control cables have Lemo connectors on one end and the other end has open wires. Before connecting a control cable, read the wiring information on "Wiring the Camera Control Cable" on page 18.

Note: The two data terminals are not interchangeable. Connect devices to data terminal A or B depending on the specific device. See details in "Wiring the Camera Control Cable" on page 18.

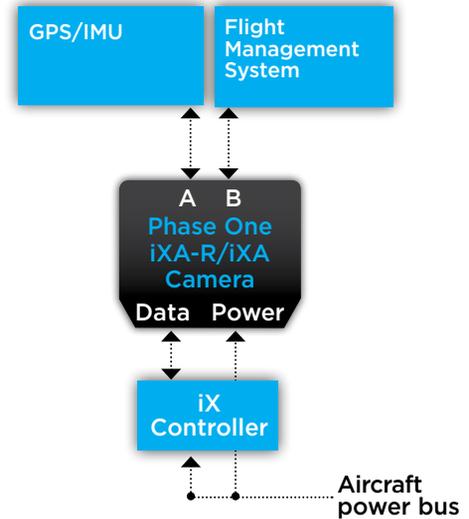
1. Connect the camera control cable to the data terminal of the iXA-R/iXA camera body.
2. Connect the other end of the Phase One control cable to an external device.



## Connecting Phase One Control Cables to Devices

Depending on how you choose to configure your iXA-R/iXA, the camera can be connected to the following devices:

- Flight Management System
- GPS/IMU



To connect your iXA-R/iXA to external devices:

1. Connect the end of the Phase One control cable into the GPS/IMU.

2. Insert the other end of the Phase One control cable into data terminal A (the left data terminal) of the camera body.



3. Insert a LEMO-secured Phase One control cable into data terminal B (right data terminal).



4. Connect the other end of the Phase One control cable into your Flight Management System.

## Connecting a GPS/IMU

Connecting a Phase One camera to a GPS/IMU involves three steps:

- Physical connection of the camera to the GPS
- Configuring the camera
- Configuring the GPS/IMU

In order to facilitate communication between your Phase One aerial camera and a GPS receiver, the parameters in your GPS receiver and camera must match.

Note: The GPS receiver must use the same baud rate as the camera.

A comprehensive guide to connecting Phase One aerial cameras with a GPS receiver is available for download from <http://industrial.phaseone.com/downloads>.

## Connecting the Power Cable

1. Connect the power cable to the power input of the iXA-R/iXA camera.
2. Connect the other end of the power cable to an iX Controller or the aircraft's power bus.



### Note:

- When not in use, shut off the power to the camera or turn off the camera by pressing the on/off button on the camera body.
- Powering camera on and off requires a long press of the camera body's on/off button.

## Configuring the Sensor Module

The iXA-R/iXA cameras are preset at the factory with specific settings. Read the iXA User Guide, which is on the USB drive that came with the camera, and select the setting most appropriate for your use.

**Note:** The camera does not take black calibration images unless commanded by the application software.

## Storing Images

Images can be saved to an iX Controller or onboard computer running iX Capture, Phase One SDK or Capture One using USB 3.0. An alternative method is to work in portable mode using a CF card as your storage device.

## Checking Compatibility of USB 3.0 Cards

For a list of USB 3.0 cards for Windows computers that have been tested with the iXU-R/iXU cameras, read the USB 3.0 Compatibility document available in the Downloads section of <http://industrial.phaseone.com>.

## Checking Compatibility of FireWire Cards

For a list of FireWire/IEEE 1394 cards for Windows computers that we tested, consult the Phase One Knowledge base article:  
[www.phaseone.com/Search/Article.aspx?articleid=1767&languageid=1](http://www.phaseone.com/Search/Article.aspx?articleid=1767&languageid=1)

Other cards may also work as long as they conform to the IEEE 1394/FireWire OHCI standards.

If using a Windows computer, update the driver for your FireWire card from the manufacturer's website.

## Connecting a USB 3.0 Cable

1. Insert the end of the USB 3.0 cable into the USB 3.0 port on the sensor module.



2. Connect the other end of the USB 3.0 cable into a USB port on an iX Controller or the back of your onboard computer or laptop.

## Connecting a FireWire Cable

1. Insert the end of the FireWire cable into the FireWire port on the sensor module.

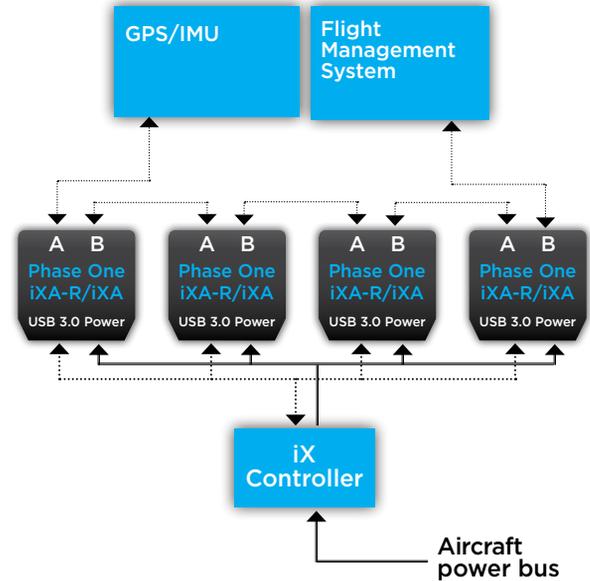


2. Connect the other end of the FireWire cable into the FireWire port on the back of your onboard computer.

## Connecting Cables for Multiple Camera Configuration

Multiple iXA-R/iXA cameras can be synchronized to shoot simultaneously. When using iXA cameras, ensure that you have mounted Schneider-Kreuznach fast sync [S] lenses on the cameras. The first camera in the daisy-chain is triggered with a control cable.

1. Insert a LEMO-secured Phase One control cable into data terminal A (left one) on an iXA-R/iXA camera.
2. Connect the other end of the Phase One control cable into the GPS/IMU.
3. Insert a LEMO-secured multi-sync cable into the camera's other data terminal (terminal B, the right one).
4. Connect the other end of the multi-sync cable to data terminal A (left one) of the second camera.
5. Repeat for additional cameras.
6. Connect a Phase One control cable from data terminal B (the right one) of the last camera in the daisy-chain.
7. Connect the other end of the Phase One control cable to the flight management system or other device.



## Identifying a Fast Sync Lens

When shooting with multiple iXA cameras or with the Forward Motion Compensation option on an iXA, ensure that you are using Schneider-Kreuznach fast sync lenses. Schneider-Kreuznach fast sync [S] lenses can be identified by [S] on the side of the lens.

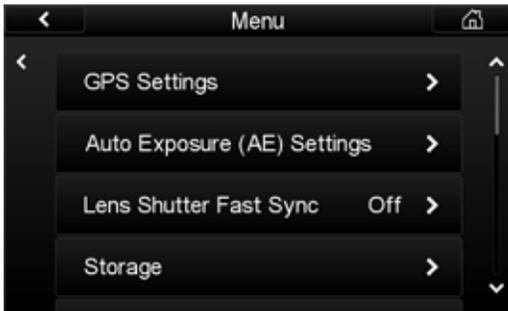


## Activating Fast Sync Mode

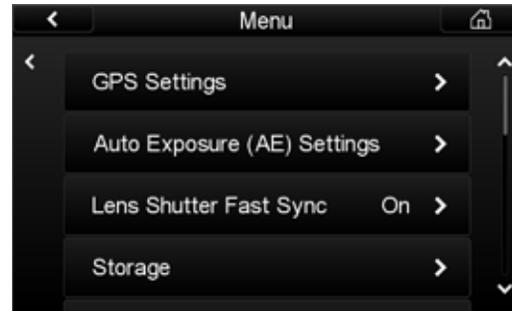
Use Fast Sync Mode when you are using two or more synchronized cameras in the same array. Ensure that Fast Sync Mode is set according to your preference. To deactivate Fast Sync Mode, follow the "Deactivating Fast Sync Mode" on page 43.

To activate Fast Sync Mode:

1. Go to Menu > Lens Shutter Fast Sync.  
The Lens Shutter Fast Sync screen appears.



2. From the Lens Shutter Fast Sync screen, select On.  
The Menu appears with On displayed.



## Deactivating Fast Sync Mode

To deactivate Fast Sync Mode:

1. Go to Menu > Lens Shutter Fast Sync.  
Lens Shutter Fast Sync appears.



2. From the Lens Shutter Fast Sync screen, select Off.  
The Menu appears with Off displayed.

## Connecting iXU-R/iXU and iXA-R/iXA Cameras in the Same Array

iXU-R/iXU and iXA-R/iXA cameras can be connected to capture simultaneously in the same array. When mixing iXU-R/iXU and iXA-R/iXA cameras, iXU-R/iXU cameras must be connected to each other to form a group and iXA-R/iXAs must be connected to each other to form another group. These two groups are connected to each other with a special sync cable (iXU to iXA sync cable p/n 70341).

Note: iXU to iXA sync cables have gray hoods.

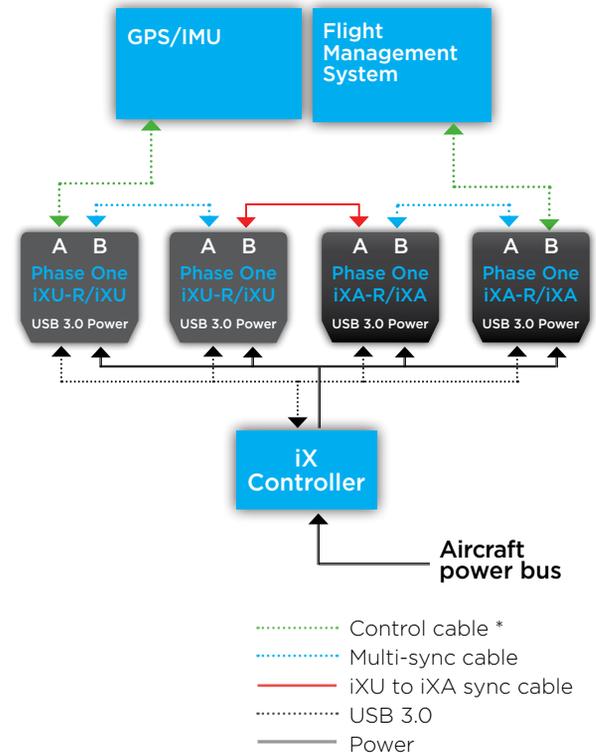
Ensure that you have mounted Schneider-Kreuznach fast sync [S] lenses on the iXA and iXU cameras.

Before connecting, ensure that all iXU-R/iXU cameras in the array do not have iX Link activated. See "Deactivating iX Link" in the iXU-R/iXU Installation Guide.

To create an array of iXU-R/iXU and iXA-R/iXA cameras:

1. Insert a LEMO-secured Phase One control cable into data terminal A (left one) on an iXU-R/iXU camera.
2. Connect the other end of the Phase One control cable into the GPS/IMU.
3. If the next camera in the array is an iXU-R/iXU:
  - a. Insert a LEMO-secured multi-sync cable into the iXU-R/iXU's data terminal B (right one).
  - b. Insert the other end into data terminal A of the next iXU-R/iXU.
  - c. Repeat for additional iXU-R/iXU cameras.
4. If the next camera is an iXA-R/iXA:
  - a. Insert a LEMO-secured iXU to iXA sync cable into the iXU-R/iXU's data terminal B.
  - b. Insert the other end of the iXU to iXA sync cable into data terminal A of the first iXA-R/iXA.
5. If the next camera is another iXA-R/iXA camera:
  - f. Connect a Phase One multi-sync cable from data terminal B of the iXA-R/iXA.
  - g. Insert the other end into data terminal A of the next iXA-R/iXA.
  - h. Repeat for additional iXA-R/iXA cameras.

6. Connect a Phase One control cable from data terminal B of the last camera in the iXA-R/iXA group.
7. Connect the other end of the Phase One control cable to the flight management system or other device.



\* For iXA-R/iXA cameras, see "Wiring the Camera Control Cable" on page 18.

For iXU-R/iXU cameras, see "Wiring an iXU Control Cable" in the iXU-R/iXU Installation Guide.

# 6. Using Auto Exposure

The camera's exposure parameters can be controlled manually or with auto exposure by adjusting the settings on the camera's LCD screen or with iX Capture.

Auto exposure controls the camera's three exposure parameters:

- ISO
- Aperture
- Shutter speed

When auto exposure is activated, the camera reads the histogram of each image after it is captured and adjusts the exposure parameters for the next image. The adjustments are in third stop increments.

To use Auto Exposure Mode, do the following:

- Select Auto Exposure Range
- Select Auto Exposure Priority
- Activate Auto Exposure Mode
- Adjust Auto Exposure Bias (if needed)

The camera uses the following parameters for the first exposure:

- ISO — Value selected in Auto Exposure Minimum.
- Aperture — Average aperture between Auto Exposure Minimum and Maximum.
- Shutter speed — Value set in Auto Exposure Maximum.

When using auto exposure, the camera uses the parameters listed above for the first exposure. Capture a few images before your first flight line in order for auto exposure to set the optimum exposure.

If the camera has FMC activated, Auto Exposure Mode only controls ISO and aperture. The shutter speed is controlled manually.

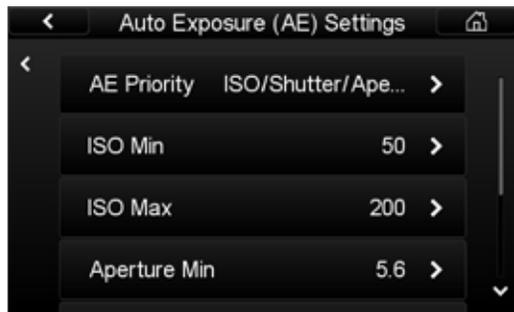
When Auto Exposure mode is activated, the exposure parameters (ISO, aperture and shutter speed) are grayed out.

## Selecting Auto Exposure Range

To keep your exposure parameters within the range you prefer, set Auto Exposure Minimums and Maximums.

The default auto exposure range is set based on the optimum settings for each camera and sensor. You can choose to use the default settings or to create your own.

1. Go to Menu > Auto Exposure (AE) Settings.  
The Auto Exposure (AE) Settings screen appears.



2. From the Auto Exposure (AE) Settings screen tap ISO Min.  
The ISO Min screen appears.
3. From the ISO Min screen, select the minimum ISO you want Auto Exposure Mode to use.  
A green check mark appears beside your selection.
4. Tap ISO Maximum.  
The ISO Max screen appears.
5. From the ISO Max screen, select the maximum ISO you want Auto Exposure Mode to use.  
A green check mark appears beside your selection.
6. A green check mark appears next to your selection and the Auto Exposure (AE) screen appears.
7. Repeat the procedure and select the minimums and maximums for Aperture and Shutter Speed.

The default auto exposure range settings are:

	<b>iXA 180/160 iXA-R 180/160</b>	<b>iXA 160 Achromatic iXA-R 160 Achromatic</b>
ISO Min	50	200
ISO Max	200	800
Aperture Min	F/5.6	F/5.6
Aperture Max	F/11	F/11
Shutter speed Min	1/1000	1/1000
Shutter speed Max	1/1600	1/1600

Note: Once the ranges are selected, they become the camera's new default range for auto exposure.

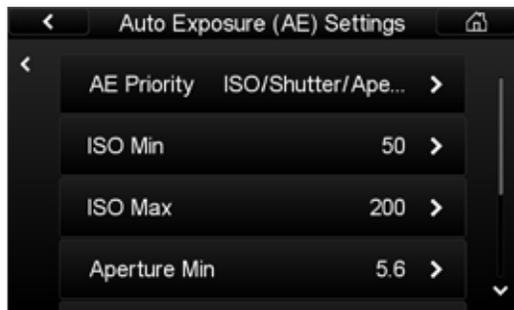
## Selecting Auto Exposure Priority

Auto Exposure Priority is the method in which the camera adjusts the three exposure parameters (ISO, aperture and shutter speed) to ensure proper exposure. When in Auto Exposure Mode, if an exposure adjustment is needed, the camera adjusts the first parameter until it reaches the minimum or maximum that you choose, then goes to the second parameter and if needed, continues to the third.

The camera adjusts the exposure using the minimums and maximums of the three exposure parameters in the order that you set. If you want to ensure that a specific value is chosen, set the minimum and maximum for the specific value.

### To select Auto Exposure Priority:

1. From the Home screen, tap Menu > Auto Exposure (AE) Settings  
The Auto Exposure (AE) Settings screen appears.



2. Click AE Priority.  
The AE Priority screen appears.



3. From the AE Priority screen, select the AE Priority that you want to use.
4. Select one of the following:
  - ISO/Aperture/Shutter
  - ISO/Shutter/Aperture
  - Aperture/ISO/Shutter
  - Aperture/Shutter/ISO
  - Shutter/Aperture/ISO
  - Shutter/ISO/Aperture

A green check mark appears beside your selection and the Menu screen appears.

## Activating Auto Exposure Mode

To activate Auto Exposure Mode:

1. From the Home screen, tap Setup > Exposure Mode.  
The Exposure Mode screen appears.



2. From the Exposure Mode screen, tap Auto to activate auto exposure mode or Manual to deactivate Auto Exposure mode.



A green check mark appears next to your selection and the Setup screen appears.

## Adjusting Auto Exposure Bias

Auto exposure settings can be adjusted to add or remove exposure bias (compensation). Some users prefer to use the bias to underexpose slightly.

The adjustments are made in 1/3 stop increments with a range of +/- three F stops.

Note: Exposure Bias (EV) is grayed out until Auto Exposure mode is activated.

To adjust Exposure Bias:

1. From the Home screen, tap Setup > Exposure Bias (EV).  
The Exposure Bias (EV) screen appears.



2. Tap the number that corresponds with the exposure bias you want to use.  
A green check mark appears beside your selection and the Setup screen appears.



# 7. Shutters

## iXA Shutter Modes

The iXA camera system can make use of two shutters, depending on the selection of lens. The camera, with its internal focal plane shutter, uses Schneider-Kreuznach LS lenses and Phase One Digital Lenses.

The three shutter modes Mixed, Leaf Shutter (LS) and Focal Plane Shutter (FPS), enable you to select which shutter is given the highest priority. If Leaf shutter mode is selected, when the camera uses exposure times outside of the leaf shutter range, it automatically uses the focal plane shutter.

When shooting with a lens not equipped with a leaf shutter, all images are taken with the focal plane shutter.

Note: The factory settings and recommended shutter mode is Leaf Shutter.

### Properties of iXA Shutter Modes

Mixed	<ul style="list-style-type: none"><li>• The iXA utilizes the internal focal plane shutter as well as the leaf shutter.</li><li>• Automatically switches between Focal Plane and Leaf depending on the shutter speed selected.</li><li>• Uses both shutters together between 1 to 1/1600 sec.</li></ul>
Leaf	<ul style="list-style-type: none"><li>• Covers the range from 1 to 1/1600 sec.</li><li>• Automatically switches to Focal Plane if a shutter speed is selected outside of the leaf shutter range.</li></ul>
Focal Plane	<ul style="list-style-type: none"><li>• Covers the range from maximum exposure to 1/4000 second.</li><li>• Used to obtain the fastest total capture rate.</li></ul>

Note: The maximum leaf shutter speed of the LS 240 mm lens is 1/1000 second.

## Selecting the iXA Shutter Mode

To manually select the shutter mode:

1. Go to Setup > Shutter Mode.



2. Select Mixed, Leaf or Focal Plane.

The Shutter Mode is saved automatically.



## iXA Camera Shutter Modes

Shutter Mode	Max exposure to 1.3 sec	1 to 1/1600 sec	1/2000 to 1/4000
Mixed	FPS	LS+FPS	FPS
Leaf Shutter with Leaf Shutter Lens	FPS	LS	FPS
Focal Plane	FPS	FPS	FPS

The table below describes the differences in capture frame rates based on the Shutter Mode.

Camera Model	Focal Plane Shutter/ Mix	Leaf Shutter
iXA 180	1.5 sec/frame	1.8 sec/frame
iXA 160	1.3 sec/frame	1.6 sec/frame

## iXA-R Camera Shutters

The iXA-R camera, with its internal focal plane shutter and central leaf shutter, automatically selects which shutter to use based on the shutter speed selected.

1 to 1/1600 sec	1/2000 to 1/4000 sec
LS	FPS

The table below shows the maximum capture frame rate for each iXA-R model.

Camera model	Frame rate
iXA-R 180	1.5 sec/frame
iXA-R 160	1.3 sec/frame

# 8. Firmware

The sensor module displays technical information about the hardware and embedded firmware of both the camera body and sensor module. This is especially useful if support is needed or if you want to check if Phase One is offering a newer firmware update. Please make a note of the firmware menu contents before contacting your dealer or Phase One Support.

## Checking the Firmware Versions

In order to determine if you have the latest camera and sensor module firmware versions installed:

1. Go to Menu > About System.



2. Check to see if the firmware version installed on the camera is the same as the latest version available in the Downloads section of [industrial.phaseone.com](http://industrial.phaseone.com) website.



## About the Phase One Firmware Updater Application

The Phase One Firmware Updater application is used to update your Phase One iXA-R/iXA camera body and sensor module with new firmware. The Firmware Updater is available in the Downloads section of [industrial.phaseone.com](http://industrial.phaseone.com) website.

The Firmware Updater does not in itself contain any firmware — it detects the camera attached, checks online for the latest firmware and retrieves and installs the firmware packages for your device.

Check the Firmware Updater Application Installation Guide for detailed instructions on offline methods of firmware updating.

## Installing the Firmware Updater Application

To install the Phase One Firmware Updater Application, download it from the Downloads section of the [industrial.phaseone.com](http://industrial.phaseone.com) website and do the following:

1. Open the zip file, extract and store the FWUpdater.msi.
2. Double-click FWUpdater.msi to start the Firmware Updater Setup Wizard.
3. When installation completes, click Start > Phase One > Firmware Updater.

## Updating the Camera Body Firmware

Before starting, ensure that:

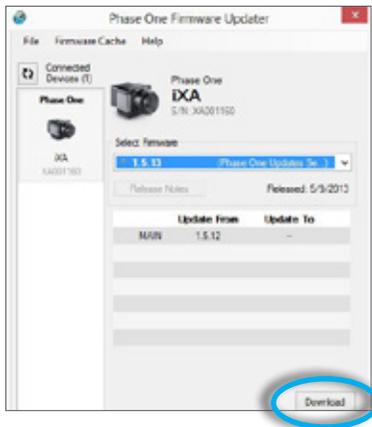
- The camera is powered off and is disconnected from the power supply.
- USB 3.0 or FireWire cables are not connected to the sensor module.
- Your computer has the Firmware Updater application installed and the computer is connected to the Internet.

To update the iXA-R/iXA firmware:

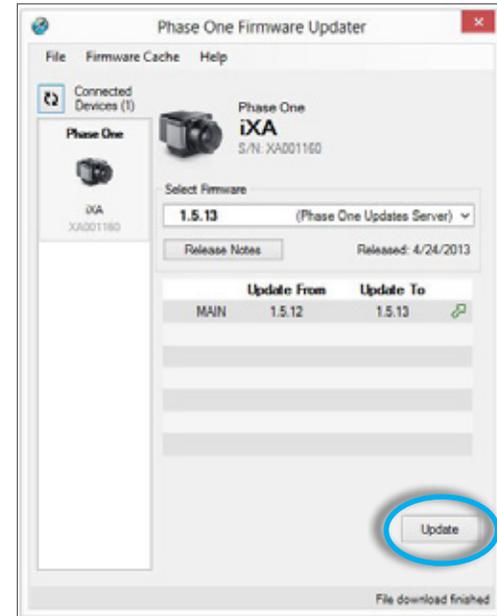
1. Connect the camera to the computer with a mini-USB cable. The camera LED lights up orange.



2. Start the Firmware Updater application.
3. The Firmware Updater automatically checks online for a new version of camera firmware and displays a download button if your camera requires an update.



4. If displayed, click the link to download the firmware. The firmware is saved locally.
5. From the Select Firmware dropdown menu, select the firmware that you want to update.
6. After downloading the new firmware, the Release Notes button is no longer grayed out.



7. Click the Release Notes button to download the release notes for the newest firmware.
8. To update the camera to the latest firmware, click Update. The firmware is written to the camera and a gear icon ⚙️ is displayed next to the MAIN component and a progress bar displays the progress of the update.
9. Upon a successful completion of the update, the MAIN component is marked with a green check mark icon.
10. If the update fails, disconnect the mini-USB cable and reconnect it again, and repeat the procedure described above.

## Updating the Sensor Module Firmware

It is important to keep the sensor module's firmware up-to-date to ensure you get new features and remove any bugs or errors from previous firmware versions.

Before starting, ensure that:

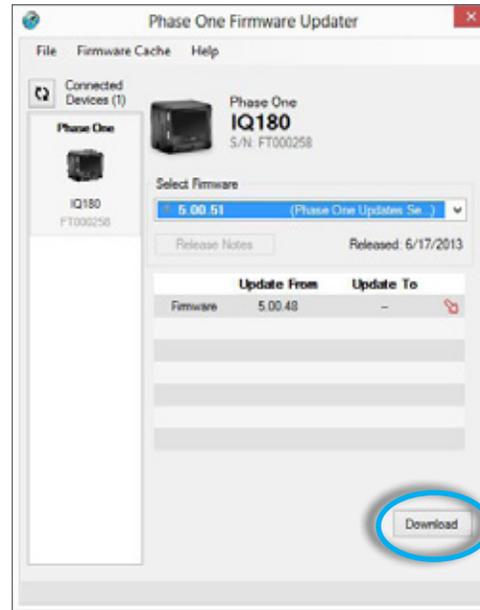
- The camera is connected to a power supply and is powered on.
- Your computer has the Firmware Updater application installed and the computer is connected to the Internet.

To update the sensor module firmware:

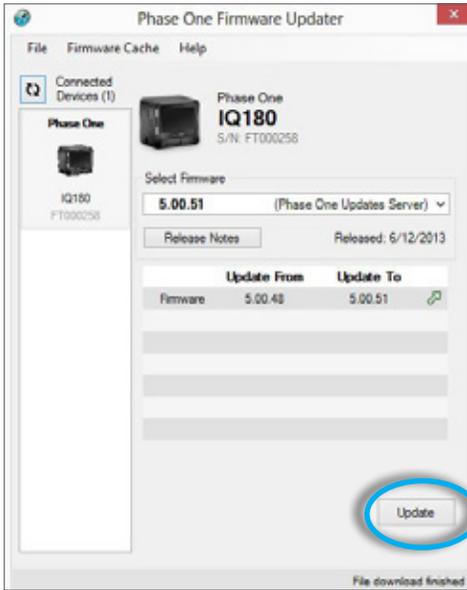
1. Connect the sensor module to the computer with a USB 3.0 or FireWire cable.



2. Start the Firmware Updater application.
3. The Firmware Updater automatically checks online for a new version of sensor module firmware and displays a download button if your camera requires an update.



4. From the Select Firmware dropdown menu, select the firmware that you want to update.
5. If displayed, click the link to download the firmware. The firmware is saved locally.
6. After downloading the new firmware, the Release Notes button becomes is no longer grayed out.



7. Click the Release Notes button to download the release notes for the newest firmware.

8. To update the camera to the latest firmware, click Update. The firmware is written to the camera and a gear icon is displayed next to the MAIN component and a progress bar displays the progress of the update.

Upon a successful completion of the update, the MAIN component is marked with a green check mark icon.

If the update fails, disconnect the USB 3.0 or FireWire cable and reconnect it again, and repeat the procedure described above.

## Restoring the Sensor Module Firmware

In the event you need to restore the sensor module's firmware to the factory version. (Camera settings are not affected):

1. Go to Menu > Firmware.



2. Select Restore Firmware.

The original firmware is installed.

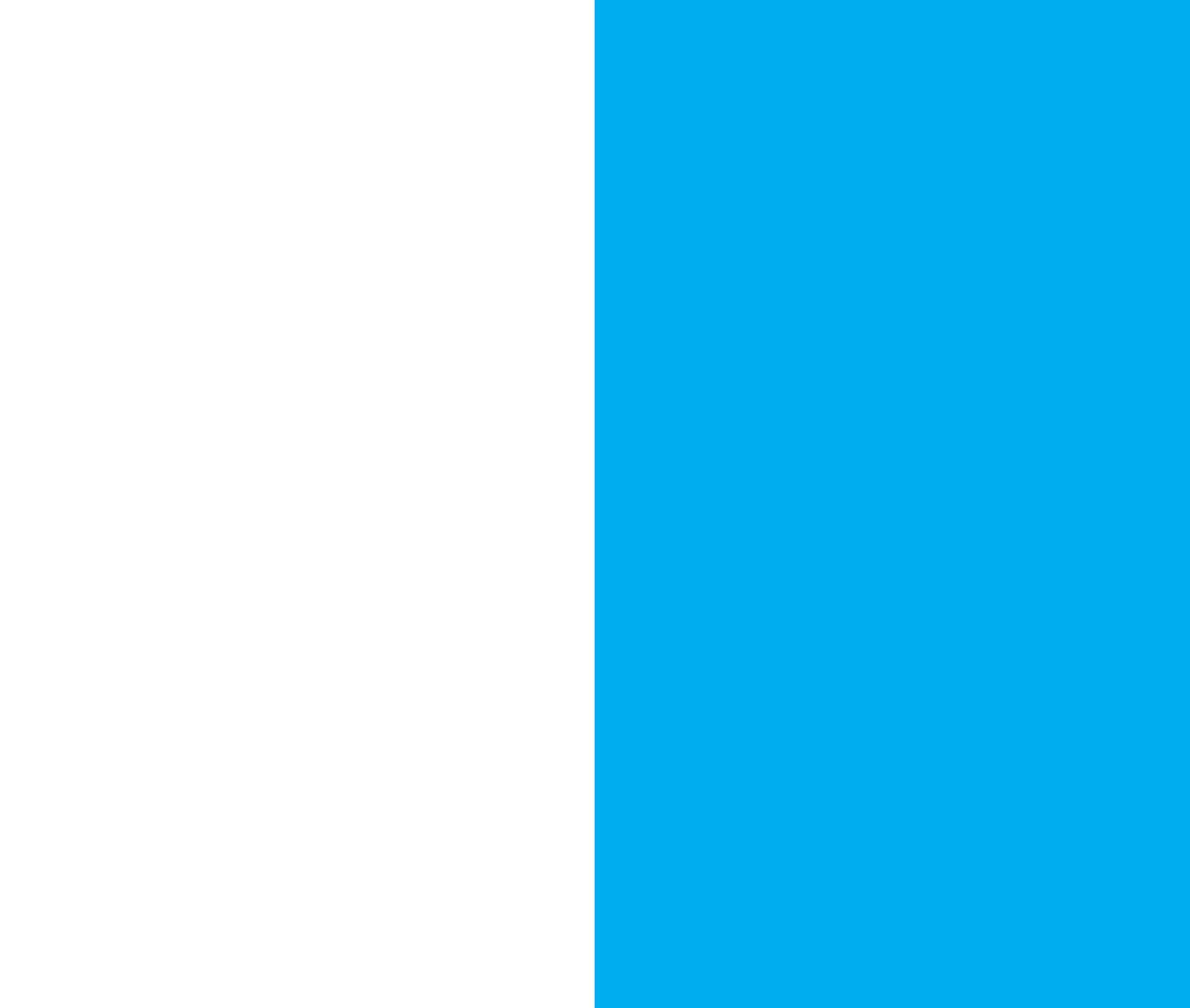


# 9. Status and Troubleshooting

The LED indicator on the iXA-R/iXA camera body indicates the status of the camera.

LED Indicator State	Status	Action/Comments
Orange steady	Camera is in boot mode	Camera ready for firmware update
Orange blinking	Firmware is being updated	Allow firmware upgrade to finish and do not unplug the mini-USB cable until it is completed
Green blinking	Camera is powered but unable to shoot Possible reasons: <ul style="list-style-type: none"> <li>• FireWire or USB cable has been disconnected from sensor module</li> <li>• CF card is full or missing</li> <li>• During exposure</li> <li>• In a multi-sync setup, one or more of the cameras is not ready to shoot, causing all cameras to blink green</li> </ul>	Ensure that: <ul style="list-style-type: none"> <li>• Sensor module is turned on</li> <li>• Cables are connected</li> <li>• Sufficient room on formatted CF card (portable mode only)</li> </ul>

LED Indicator State	Status	Action/Comments
Green steady	Ready to shoot	Commence shooting
Red steady	Hardware malfunction	Send for service
Red blinking	Software malfunction	Upgrade firmware, if upgrade does not solve issue, send for service
Red blinking	Lens hardware error	Replace lens and send for service





Visit the website for additional information  
[industrial.phaseone.com](http://industrial.phaseone.com)