Phase One iXU-RS 1900

Aerial Camera System

Installation Guide

This guide is designed to assist you
with the installation of your new
Phase One iXU-RS 1900

As new features are introduced through firmware
updates, a downloadable version
is now available in the Downloads section of
http://industrial.phaseone.com/downloads-guides.aspx

Contents

1. What's in the Box?

- Phase One iXU-RS 1900 camera
- Two Rodenstock RS-90mm Lenses
- Two sets of 24 V DC power supply with international outlet adapters
- Two iXU RA power cables, 2 m
- iXU RA control cable, 2 m
- iXU multi-sync cable 30 cm
- Two USB3 Shield cable, 2 m
- 2 mm hex screwdriver
- Microfiber cloth
- Sensor cleaning kit
- USB drive with documentation
- iXU-RS 1900 Installation guide
- Warranty certificate
- Suitcase for iXU-RS 1900 camera

Optional Accessories

- iXU RA control cable, 3 m (70360)
- iXU RA multi-sync cable, 1 m (70362)
- iXU to iXA multi-sync cable, 1 m (70341)
- USB3 Shield Cable for iXU (1m) (73126)
- USB3 Shield Cable for iXU (3m) (73128)

2. Overview

iXU-RS 1900 Camera System

1. Pod mounting threaded holes (6)
2. Lens secure cams (6)

3. Setup button
4. Navigation Button
5. Power terminal
6. Data terminal A
7. Data terminal B
8. USB 3.0 port screw
9. USB 3.0 port cover
10. Play button
11. Menu button
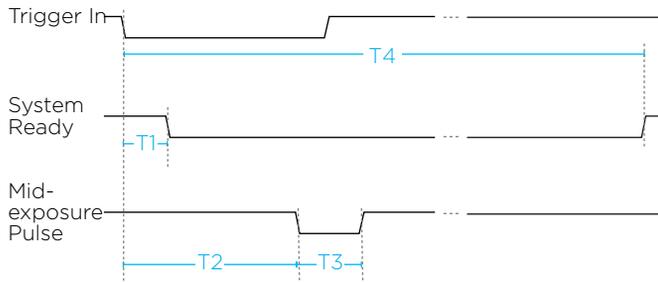
3. Preflight Planning

Figure 1: Exposure Sequence

Table 1 – Exposure sequence

Typical Values	RS lenses
T1 Trigger IN – SysRdy (Low)	2 mSec
T2 Trigger IN – Mid Exposure	~20 mSec + 1/2 Exp. Time
T3 Mid Exposure Width	1/2 Exp. Time + 1.1 mSec
T4 (iXU 1900) Trigger IN – SysRdy (High)	600 mSec

Exposure Sequence

To learn more about the capabilities of the iXU-RS 1900 camera, consult the http://industrial.phaseone.com/Aerial_Systems.aspx website and the document files saved on the USB drive provided with the camera.

Understanding the Exposure Sequence

There are three signals that are used to communicate with and control the iXU-RS 1900 exposure sequence:

- Trigger in: The Flight Management System (FMS) signals the iXU-RS 1900 to take an image.
- System ready: Camera ready/busy signal.
- Mid-exposure pulse: A signal indicates the midpoint of the exposure time.

Wiring a Control Cable

Table 2 – Camera Control Cable Description

Pin	Color	Name	Description	Direction	Level	Notes
1	Orange	Reserved	Reserved	Reserved	Reserved	Reserved
2	Green	System Ready	iXU-RS 1900 system ready for next capture	Out	VOH, min = 4.0 V (Io = -10uA) VOL, max = 0.8 V (Io = 4mA)	Isolated 5 Volt Level Pull up resistor 100K Ohms to +5 V
3	Red	Black Reference Control	Indicates a black reference sequence is required	In	VIH, min = 2.4 V VIL, max = 0.8 V tiF, tiR < 1uSec	Isolated, active low See 'Understanding Black Reference' on page 12
4	Purple	Trigger In	Trigger the iXU-RS 1900 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 iXU-RS 1900 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 GNSS User Guide*
6	Yellow	RS232 TX	iXU-RS 1900 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 (Io= -4mA) VOL, max = 0.8 V (Io= 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

*A comprehensive guide to connecting Phase One aerial cameras with a GNSS receiver is available for download from http://industrial.phaseone.com/downloads-guides.aspx

**This connection is mandatory.

Wiring a Control Cable for an iXU-RS1900

External devices are connected to the camera with an iXU RA 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 table below describes the functionality of the wires in the iXU RA control cable.
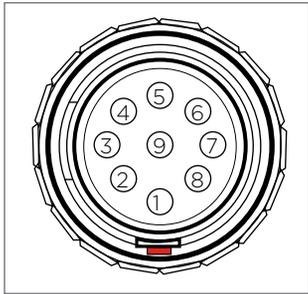
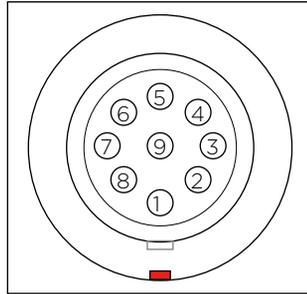Figure 2: iXU-RS 1900 Control Cable Plug Pinout

Figure 3: iXU-RS 1900 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 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.

Note: Black reference is performed automatically on taking the first shot after switching the camera on.

Software Activation of Black Reference

The Phase One iXU-RS 1900 camera can perform a black reference sequence by using the iX Capture application, the Phase One SDK, the Flight Management System or through an iX Link API.

When using iX Capture, simply click Black Ref on the iX Capture dashboard to update the black reference.
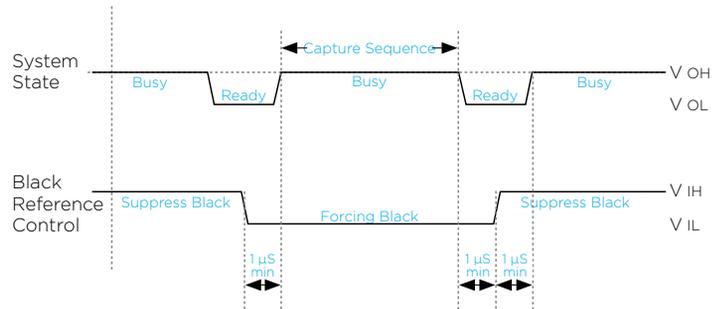
Black Reference Sequence

Figure 2 : Black Reference Timing

Hardware Activation of Black Reference

If you are building your own hardware control box, you can update the black reference data in the camera. The black reference control signal should be kept low while an image capture cycle is initiated. The signal must remain low for the full capture cycle. This makes it possible to create a black reference whenever it is convenient (i.e. when turning an aircraft around or between flight lines). When the force black signal is kept high, the camera uses the last updated black reference data.

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 3 – Power Cable Description

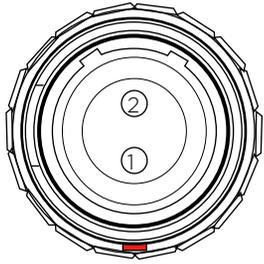| Pin	Color	Name	Description	Direction	Level	Notes
1	Red	DC In +	Provides positive power	Input	12 - 30 V DC	Should provide up to 30 W
2	Black	DC In -	(Common)	Input		

Figure 4:
iXU-RS 1900 Camera
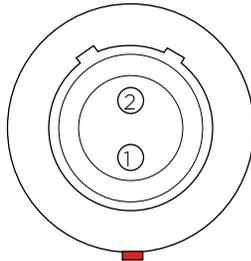Power Cable Plug Pinout

Figure 5:
iXU-RS 1900
Camera Power Socket Pinout

Note: The iXU-RS 1900 camera must only be powered by a limited fused power source, up to 8 A single fault condition.

La iXU-RS 1900 caméra doit être alimentée par une source d'alimentation protégée par un fusible, d'une capacité maximale de 8 Ampères.

Electrical Interfaces

There are four signals that are used to communicate with and control an iXU-RS 1900 camera:

Trigger in	Triggers the iXU-RS 1900 for new capture cycle
Black reference	Triggers the iXU-RS 1900 for a black reference sequence
Mid-exposure pulse	A signal indicates the midpoint of the exposure time.
System ready	Camera ready/busy signal

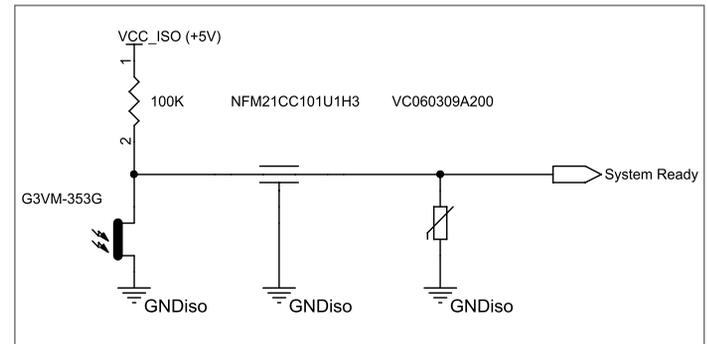The schematic drawings below contain component part numbers for reference.

Trigger in, Black Reference
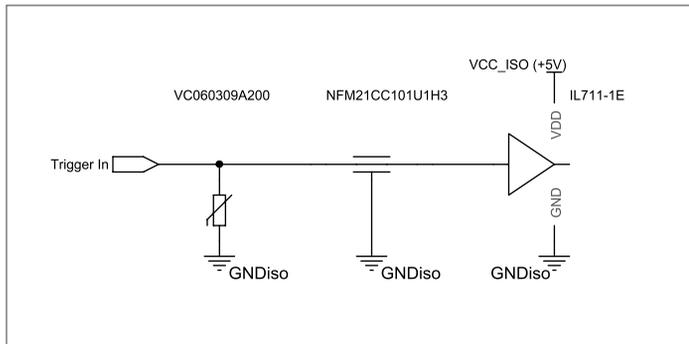
Mid-exposure pulse
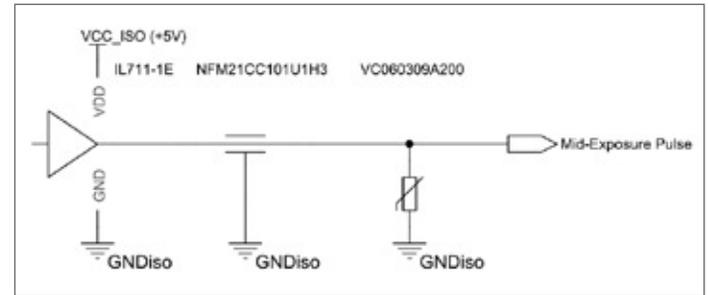
System ready

5. Connecting a Camera

Attaching the Camera to a Pod

Attach the iXU-RS 1900 camera to a pod using six M4 bolts. Note: Do not insert bolts deeper than 6 mm into the threaded holes on the front of the camera.

Connecting a Control Cable

1. Insert an iXU RA control cable into data terminal A of the left sensor module, on an iXU-RS 1900 camera.

2. Connect the other end of the iXU RA control cable to an external device (GNSS and/or FMS).

3. Insert an iXU RA 30 cm multi-sync cable into the sensor module's data terminal B (left sensor module).

Note: The two data terminals are not interchangeable.

Connecting the Power Cable

To connect the camera to the aircraft's power bus:

1. Insert the iXU RA power cables to the power input of the two sensor modules of the iXU-RS 1900.

2. Connect the other end of both iXU RA power cables to the aircraft's power bus.
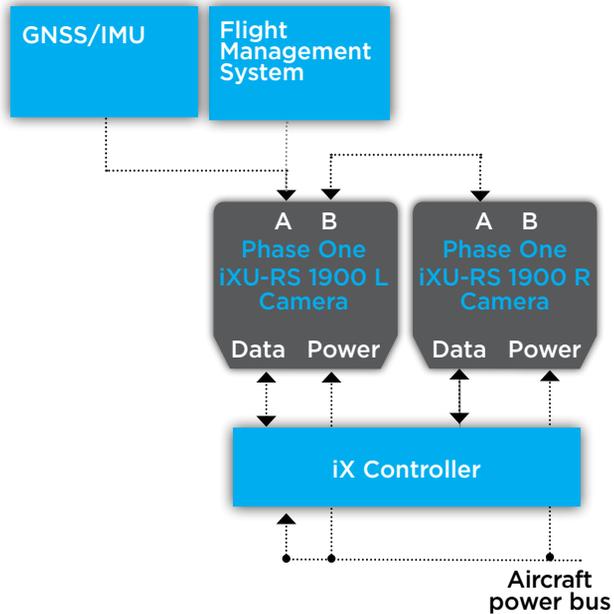
Note: When not in use, disconnect the power from the sensor modules.

Connecting Control Cables to Devices

Depending on how you choose to configure your iXU-RS 1900, the camera can be connected to the following:

- Flight Management System
- GNSS/IMU

To connect your iXU-RS 1900 to external devices:

1. Insert the iXU RA control cable into data terminal A of the left iXU-RS 1900 camera body.
2. Connect the other end of the iXU RA control cable into the GNSS/FMS.

Note: ensure that the camera and all connected devices are connected to a power source.

Connecting Cables for Multiple Camera Configuration

When using iXU-RS cameras, the first camera in the daisy-chain is triggered with an iXU RA control cable.

1. Insert an iXU RA control cable into data terminal A of the left sensor module, on an iXU-RS 1900 camera.

2. Connect the other end of the iXU RA control cable into the GNSS/IMU.

3. Insert an iXU RA 30 cm multi-sync cable into the sensor module's data terminal B (left sensor module).

4. Connect the other end of the iXU RA multi-sync cable to data terminal A of the second sensor module (right sensor module).

5. Connect an iXU RA multi-sync cable (not included in the box - should be purchased separately) to data terminal B of the second sensor module (right sensor module).

6. Connect the other end of the iXU RA multi-sync cable to the next iXU camera in the daisy chain.

7. Repeat for additional cameras.

8. Connect an iXU RA control cable (not included in the box - should be purchased separately) to data terminal B of the last camera in the daisy-chain.

9. Connect the other end of the iXU RA control cable to the flight management system or other device.

Note: for multiple cameras setup (including iXU-RS 1900 camera) do not use trigger or black reference from iX Capture. Use only hardware signals.
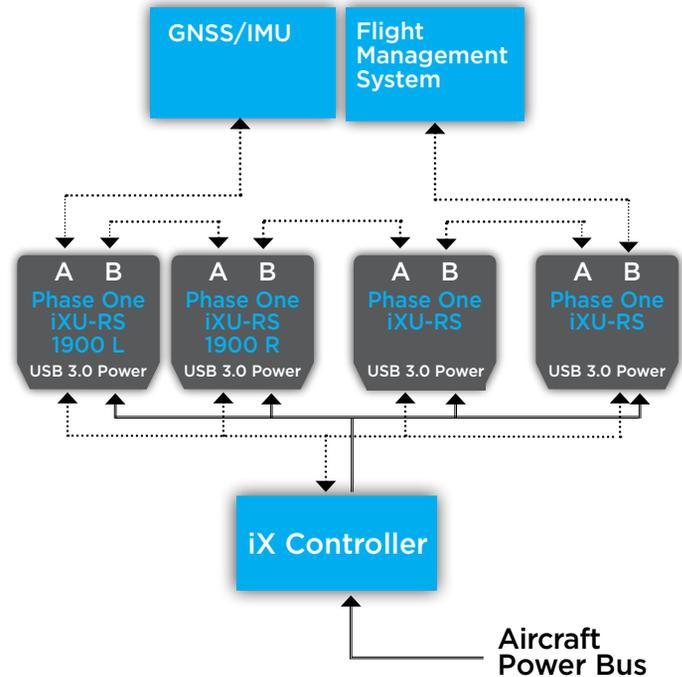
Connecting a USB 3.0 Cable to an Onboard Computer

To connect a USB 3.0 cable to a computer:

1. Using a 2 mm hex key, unscrew the screw on the cover of the USB 3.0 port.

2. Remove the cover with screw and store it.

3. Insert the end of the USB 3.0 cable into the USB 3.0 port on the camera.

4. Using a 2 mm hex key, tighten the screw on the USB 3.0 cable lock into the camera.

5. Connect the other end of the USB 3.0 cable into the USB port of your iX Controller or on the back of your onboard computer.

6. Repeat for the second sensor module.

Connecting a GNSS/IMU

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

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

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

Note: The GNSS receiver must use the same baud rate as the camera (9600, 19200, 57600 or 115200).

A comprehensive guide to connecting Phase One aerial cameras with a GNSS receiver is available for download from http://industrial.phaseone.com/downloads-guides.aspx

9. Firmware

The camera's LCD screen displays technical information about the hardware and embedded firmware of the camera. 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 Version

In order to determine if you have the latest firmware 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 website.

About the Phase One Firmware Updater Application

The Phase One Firmware Updater application is used to update your Phase One aerial camera with new firmware. The Firmware Updater is available in the Downloads section of the 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 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.
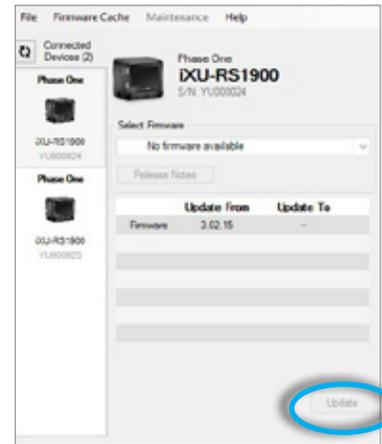
Updating the Firmware

Before starting, ensure that:

• The sensor modules are connected to power supplies and are powered on.

• Your computer has the Firmware Updater application installed and the computer is connected to the Internet.

To update the iXU-RS 1900 firmware:

1. Connect the sensor modules to a computer with USB 3.0 cables.

2. Start the Firmware Updater application.

3. The Firmware Updater automatically checks online for a new version of 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.
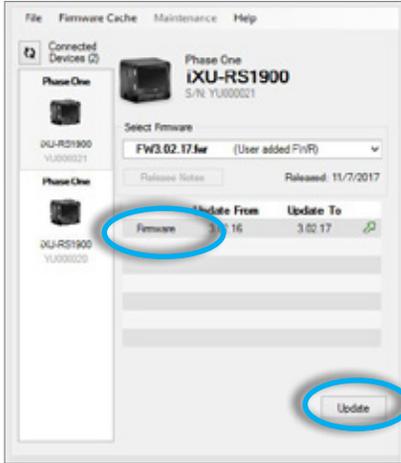
7. Click the Release Notes button to download the release notes for the newest firmware.

8. To update the sensor module to the latest firmware, click Update.
The firmware is written to the sensor module 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 USB 3.0 cable, reconnect it, and repeat the procedure described above.

11. Repeat the same for the second sensor module.

Warning: Don't disconnect the USB or Power cables before firmware update is completed"

Restoring the Firmware

In the event you need to restore the sensor module's firmware to the factory version. (sensor module settings are not affected):
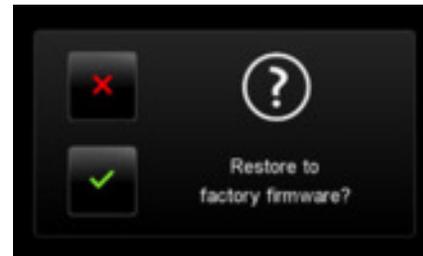
1. Go to Menu > Firmware.
The Firmware screen appears.

2. Select Restore Firmware.

3. Click Restore to Factory Default.

The original factory firmware is installed.

PHASE**ONE**

IMAGING BEYOND IMAGINATION

Visit the website for additional information
industrial.phaseone.com