



# Multi-Camera Solution

# PTZOptics

For streaming and recording

*This document will walk you through the process of setting up your new PTZOptics Multi-Camera Solution for use with numerous cameras. This system is comprised of the core Multi-Camera solution, as well as (3) Add-On kits. If you have not purchased the add-on kit(s) the steps will be the same just for a single camera.*

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## General Overview

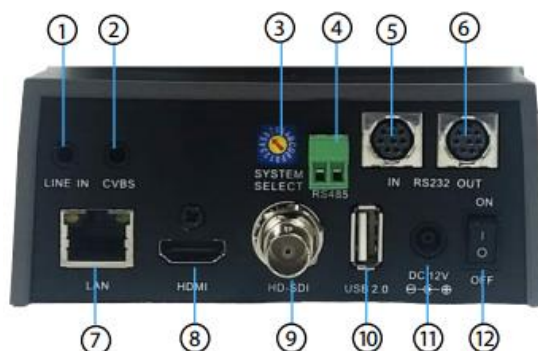
There are many ways to design a multi-camera system; this article will focus on building a system that is easy to deploy and provides reliable results.

We will cover set up of the cameras for both video and control.

This guide will assume that there is an existing audio system, mixing board or microphone(s) available.

## Camera Connections

The PTZOptics 3G-SDI camera has multiple connections for video, control, and power. See the image below.



- 1. Audio Line In**  
Used for embedding line level audio over HDMI, RTSP, & RTMP stream.
- 2. CVBS – Composite Video**  
System Select Dial must be on D or E / Non simultaneous output.
- 3. Rotary / Systems Select Dial**  
Allows for resolution adjustment of HDMI & SDI output
- 4. RS-485 Control Port**
- 5. RS-232 IN Control Port**
- 6. RS-232 OUT Control Port**  
Used for daisy-chaining cameras for multiple camera control.
- 7. Ethernet / RJ45 port**  
Allows for connection to LAN for Web Interface, Control, RTSP, & RTMP streaming.
- 8. HDMI Output**
- 9. 3G-SDI**
- 10. USB 2.0 Port**
- 11. 12VDC Power Connection**
- 12. On / Off Power Switch**

## Camera Control via Serial Control

The cameras can be controlled through VISCA control via RS-485 or RS-232. This kit includes the HuddleCamHD HC-JOY-G3 for control, and RS-232 extension cables.



The PTZOptics cameras have three (3) different ways to gain control of the camera.

- Serial Control
  - RS-232
  - RS-485
- IR Control (IR Remote included with camera)
- IP Control

We will be using RS-232 for these camera connection(s) because it provides the most reliable, flexible, and responsive control method to your camera. The core kit includes a 100' / 30m extension cable, and each add-on kit includes a 100' / 30m “cascade” cable for daisy-chaining. VISCA control allows for up to 7) cameras.

Each PTZOptics camera includes a DB9 – 8pin mini-din cable for connecting the camera to the joystick. For large installs we include a 100' | 30m extension cable for making the initial connection. Connect the cable to the RS-232 IN port on your camera to make the connection. To daisy-chain the cameras, you will need the VISCA-100 cable included with the Add-On kits. Connect the VISCA-100 cable to the RS-232 OUT of the first camera and connect it to the RS-232 IN on the second camera. From there, change the VISCA address of camera 2 to address 2 to gain control of the second camera.

*Note: failing to change camera 2's address will result in both cameras being controlled simultaneously when on control channel 1.*

## PC Recommendation (Lower End)

The Multi-Camera solution does not include a PC. Instead, we recommend building your own PC for video mixing, streaming, editing, and recording. Below are the specs we recommend for a 4-camera setup.

### Key Minimum Requirements

- Windows 8.1 or 10
- Intel Core i7 Processor 3GHz+
- 8GB DDR4 RAM
- 256SSD (Solid State Drive)
- Two (2) available USB 3.0 ports for Magewell SDI to USB converters
- One (1) available USB 2.0 port for Shure Motiv
- Intel HD Graphics 4600 / 520 / 620
- 10/100/1000 Mbps Ethernet
- Thunderbolt 3/USB 3.1 via USB-C (required for connecting to Producer+)



PC Recommendation Capabilities	
Camera Inputs	4 SDI cameras
Streaming	Up to 1080p 20Mbps
NDI	4 NDI sources up to HD 1080p
Recording	Up to 1080p 75Mbps MP4

PC Recommendation Parts	
Motherboard	Asus Prime X570 Pro
Graphics Card	NVIDIA GeForce GTX 1660
Case	Corsair Case Series 100R Mid Tower
SDD	Samsung 850 EVO 500GB
PSU	500W ATX PSU
Capture Card	Magewell Capture Card (Included in kit)
CPU	AMDRyzen 5 3600X w/ Wraith Spire (6 cores / 12 threads 3.8 GHz)
RAM	16GB (2x8GB) DDR4
Operating System	Windows 10

## PC Recommendation (Higher End)

The Multi-Camera solution does not include a PC. Instead, we recommend building your own PC for video mixing, streaming, editing, and recording. Below are the specs we recommend for a 8-camera setup.

### Key Minimum Requirements

- Windows 10
- Intel Core i7 Processor 3GHz+
- 16GB DDR4 RAM
- 256SSD (Solid State Drive)
- 1) available USB 2.0 port for Shure Motiv
- NVIDIA GeForce 1050
- 10/100/1000 Mbps Ethernet
- Thunderbolt 3/USB 3.1 via USB-C (required for upgrading to Producer+)



Recommendation PC Capabilities	
Camera Inputs	8 SDI cameras 1080p
Streaming	Up to 1080p 20Mbps
NDI	4 NDI sources up to HD 1080p
Recording	Up to 1080p 75Mbps MP4

Recommended PC Parts	
Motherboard	Gigabyte Z390 AORUS PRO Intel Z390 or Z370 motherboard
Graphics Card	NVIDIA GeForce GTX 1660 TI
Case	ATX SilverStone Redline RL05 Case
SDD	Samsung 960 EVO NVMe M.2 1TB
PSU	600W ATX PSU
Capture Card	External Magewell Quad Capture Card
CPU	Intel Core i7 9700K 3.6GHz+ Cooler Master MasterLiquid 120 Liquid CPU Cooler
RAM	32GB (2x16GB) DDR4
Operating System	Windows 10

## 3G-SDI Connection

To connect the 3G-SDI connection to your system, you can go about that one of three (3) ways depending on the solution purchase.

1. **PT-MULTICAMERA-\_\_\_KIT-USB-NOPC** - Magewell SDI to USB converter
2. **PT-MULTICAMERA-\_\_\_KIT-TB3-NOPC** - External PCIe enclosure with Magewell Quad SDI PCIe (Connected via Thunderbolt3)
3. **PT-MULTICAMERA-\_\_\_KIT-PCIE-NOPC** - Internal Magewell Quad SDI PCIe

*Note: The “\_\_\_” in the SKUs above is the camera model. E.g. 12X, 20X, & 30X.*

### SDI to USB converter

First, connect the USB cable from the Magewell converter to the PC and converter. Then, connect the micro-SDI cable to the converter. Lastly, connect the SDI cable to the micro-SDI cable from the converter, and to the SDI port on the back of the camera.

### SDI to Thunderbolt3

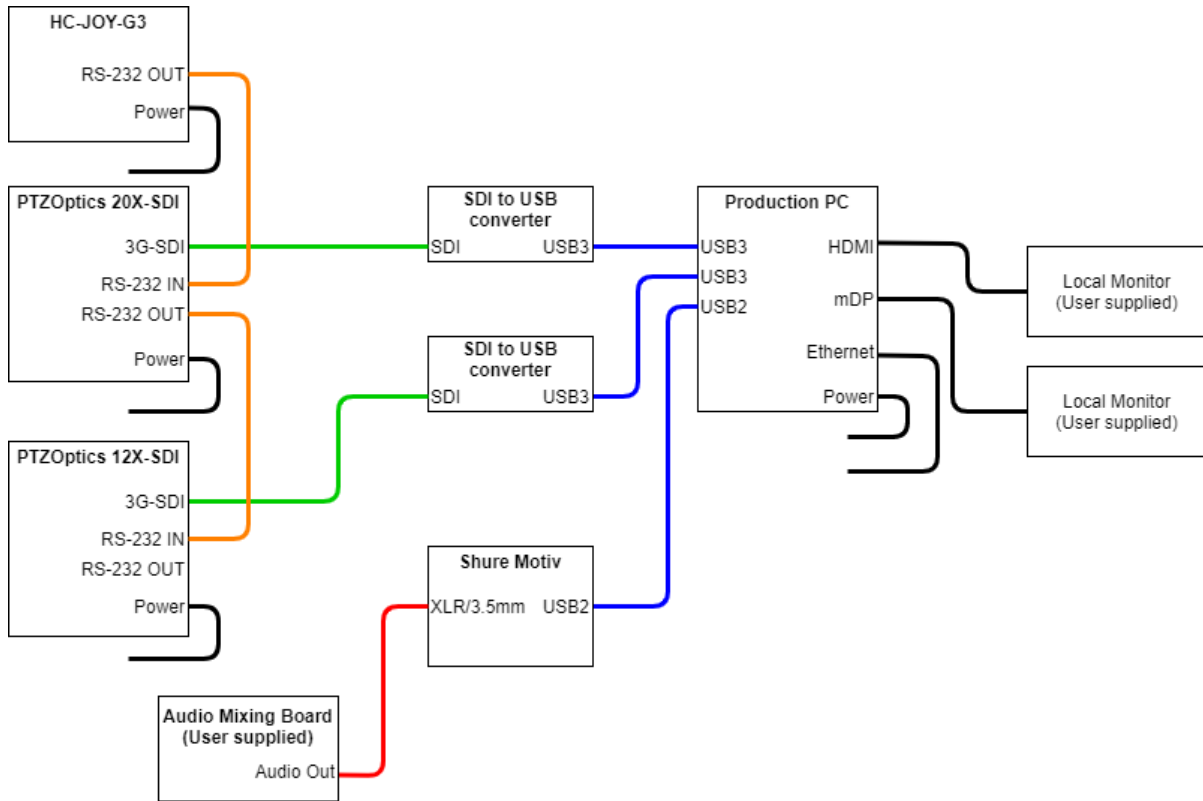
First, connect the Thunderbolt3 cable from the external enclosure to the computer's Thunderbolt3 port. Then, go to the computers task bar and select the external enclosure from the drop-down menu. Connect the SDI cable to the SDI port on the PCIe card inside the external enclosure and to the SDI port on the back of the camera.

### SDI to PCIe

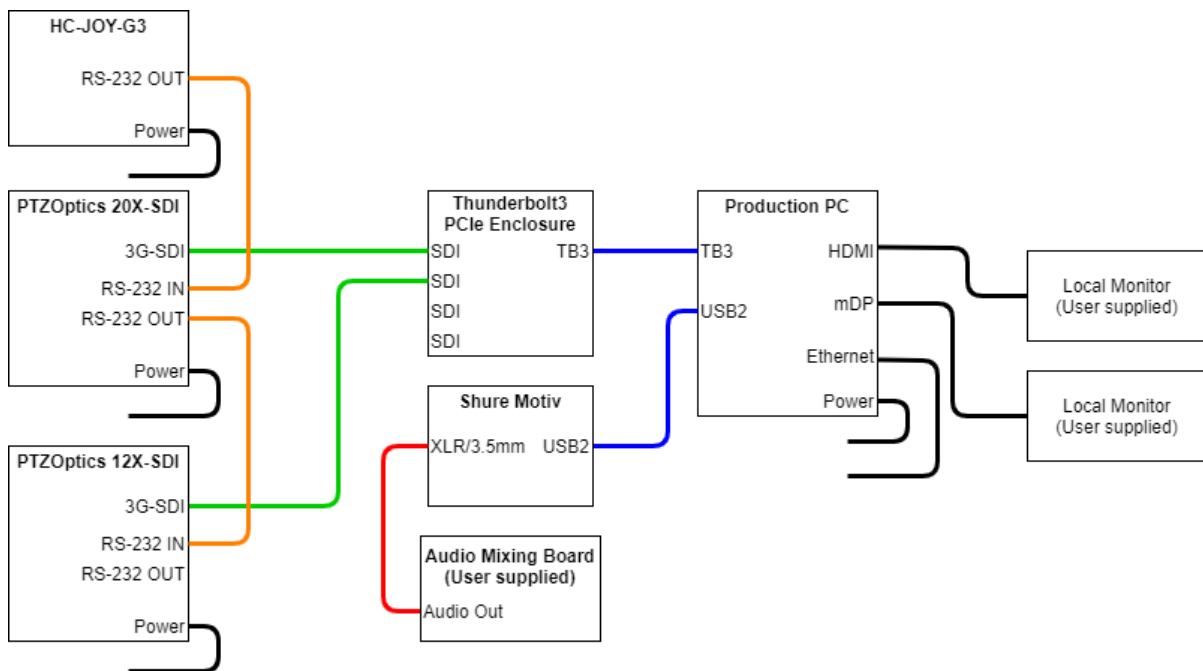
First, connect the SDI cable to the SDI port on the PCIe card. Then connect the other end of the cable to the SDI port on the back of the camera.

# Connection Diagrams

## SDI to USB Converters

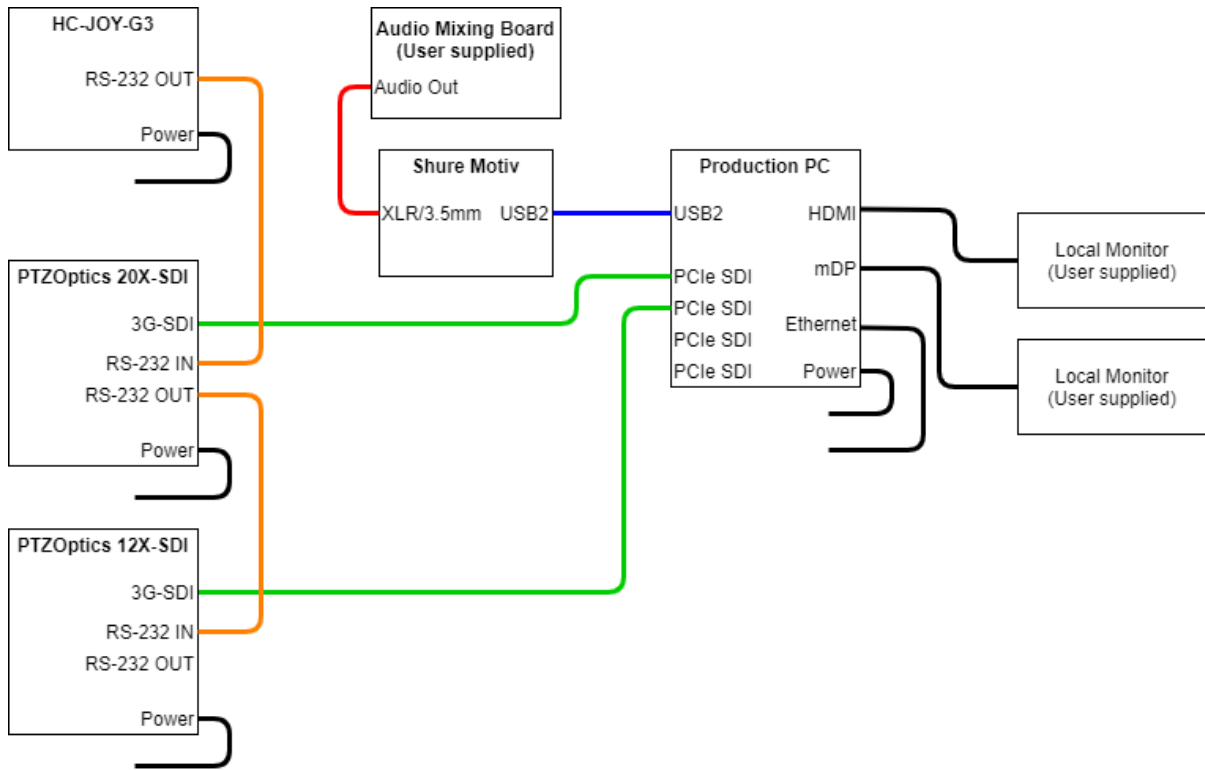


## SDI to Thunderbolt3





# SDI to PCIe



# Troubleshooting

## No Image

- Check whether the power cord is connected, voltage is OK, Power lamp is lit.
- Check whether the camera can “self-test” after startup (camera will do a brief pan-tilt tour and return to the home position. If preset 0 is set, the camera will return to the preset 0 position).
- Check that the SDI cable is connected properly.
- Check that any drivers are installed for your equipment.
  - Go to [magewell.com/downloads](http://magewell.com/downloads) for your initial driver installation.

## Abnormal display of image

- Check that the rotary dial is set properly to match your software choices.

## Image is shaky or vibrating

- Check whether the camera is mounted solidly or sitting on a steady horizontal and level surface.
- Check the building and any supporting furniture for vibration. Ceiling mounts are often affected by building vibration more than wall mounts.
  - Any external vibration that is affecting the camera will be more apparent when the tele zoom (zoomed in) settings.

## No camera control from joystick

- Check that LCD is in the Main Menu. Press the “Esc” key to return to main menu if needed.
  - Repeated presses may be required depending on how deep you are in a menu.
- Check that the power is properly connected and the red power indicator is solid red.
- Check that the joystick settings match the camera settings (Camera address/ID, protocol, baud rate)
- Check that the VISCA cables are properly connected to the joystick and camera.
  - Check that the VISCA cable is connected to the correct port on the camera.

## Abnormal control of cameras

- Controlling more than one camera at once.
  - Check that the cameras each have a unique address.
- Camera is going to full pan, tilt, or zoom limit.
  - Joystick may be in OSD Control mode. Press the OSD button and close the menu to exit.
  - In certain situations, it may be simplest to power cycle the joystick

Go to [help.ptzoptics.com/](http://help.ptzoptics.com/) for helpful articles. If you cannot fix your issue, submit a ticket by emailing [support@ptzoptics.com](mailto:support@ptzoptics.com).