

FLIR Vue[®] TZ20

User Manual



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Introduction

FLIR Vue® TZ20

High Resolution Gimbalized Dual Thermal Zoom Payload

The dual-Boson® FLIR Vue® TZ20 plug-and-play payload is designed to add new capabilities to your missions and is fully integrated with the DJI Matrice™ M200 v2 and M300 airframes. This system provides a wide 95-degree field of view for maximum situational awareness and a narrow 18-degree field of view to put more pixels on target when needed. With 20X zoom capabilities, the FLIR Vue TZ20 allows drone pilots from the public safety and industrial inspection sectors to gain field of view flexibility for improved image detail and magnification to assess situations and make critical decisions.

20X THERMAL ZOOM FOR SITUATIONAL AWARENESS

Features wide field of view to cover large areas in a single flight or narrow in on a target with 2x to 20x zoom for enhanced image detail

HIGH RESOLUTION DUAL FLIR BOSON CAMERAS

Factory calibrated dual 640 × 512 Boson thermal cameras equipped with expandable infrared video streaming at 30 Hz

READY TO FLY OUT OF THE BOX

Plug and play model quickly connects with Skyport V2.0 gimbal and is compatible with DJI M200 V2 and M300 airframes



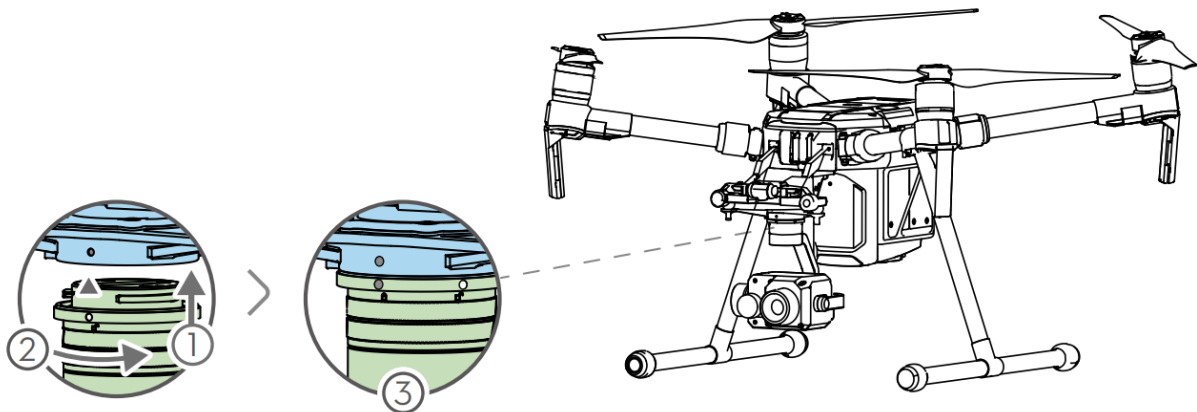
1. DJI Skyport Connector
2. DJI X-Port Pan Motor
3. LED Indicator
4. Dual Micro SD port and USB Type-C port
5. DJI X-Port Tilt Motor
6. DJI X-Port Roll Motor
7. WFOV Boson
8. NFOV Boson

Quick Start Guide

The TZ20 is a ready-to-go, plug-and-play camera.

1. Remove the gimbal cap and connect it to your airframe
2. Rotate gimbal connector to unlocked position then insert into gimbal. Rotate the connector to locked position to secure it.
3. Check if the TZ20 is mounted securely. Hold the gimbal firmly and apply a firm rotating force when attaching or detaching the gimbal.

Power up airframe and remote controller, open DJI Pilot Application, ready to fly.



Using DJI Pilot App

Compatible Devices

Requires Android 5.0 or above.

Matrice 300 RTK: [v1.9.0R](#)

Matrice 200 V2: [v1.8.0](#)

How to Install

In the Google Play store, search “DJI Pilot” and install the app onto your device.

<https://www.dji.com/downloads/djiapp/dji-pilot>

Note: refer to the website above for compatibility with your mobile device(s).



Main View

DJI Pilot app is the one and only way to control the TZ20. User controls for the TZ20 appear on the right in the DJI Pilot app. In the default screen, users have the option to toggle between recording modes.

Note: TZ20 does not support viewing recorded imagery on the SD from the Pilot app.



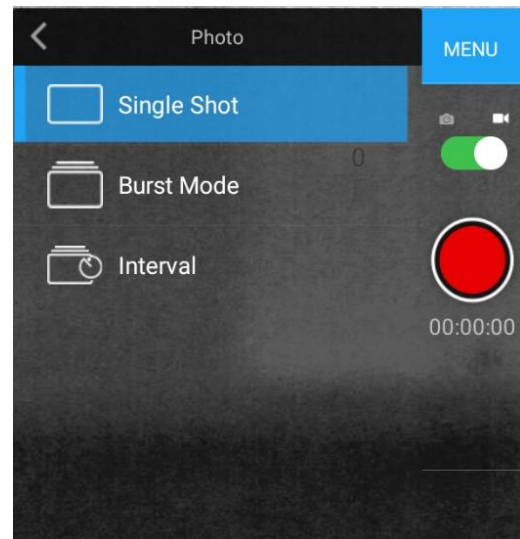
Menu

In the menu selection, user can toggle recording mode between photo and video, start and stop recording, and select what photo mode to be in.

Currently (in FW 2.2.11) burst mode is not supported.

Periodic capture can be set in interval mode (1s – 30s)

File format changing type can be done in the [settings](#) menu.



Flat Field Correction (FFC)

A flat field correction is an offset calibration that is triggered at powerup, after a certain change in temperature, and periodically throughout the camera operation. The purpose of the calibration is to compensate for certain errors that build up during camera operation. Ultimately, this improve the image quality by removing noise and other artefacts that may appear during use. The TZ20 is always in auto FFC mode, but a manual trigger can be triggered by pressing the button.



AGC Lock/Unlock

The AGC Lock allows the image to hold a constant temperature-to-color pallet in a dynamic moving scene. This allows the user to identify objects in the camera field of view with specific IR radiation and facilitates locating items in specific scenes.



See section 6.5 of [Boson Engineering Datasheet](#) for more details.

Palettes

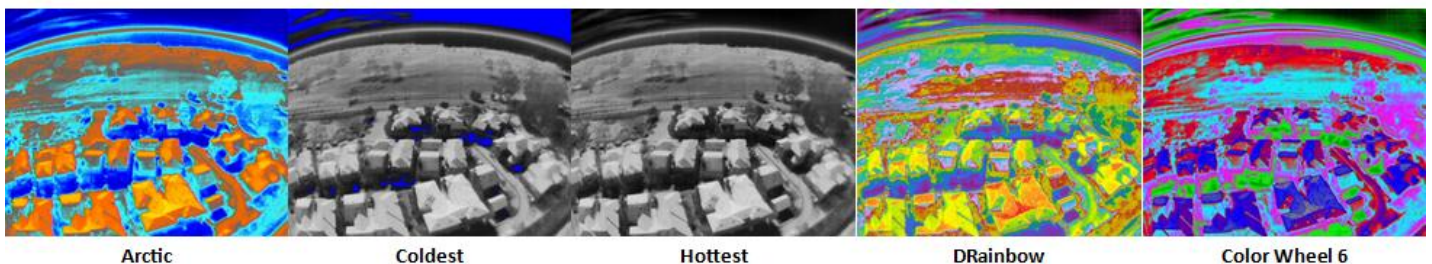
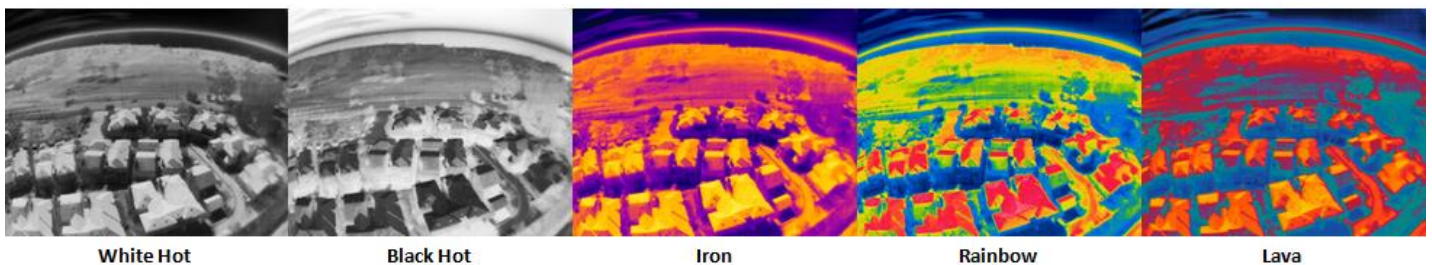
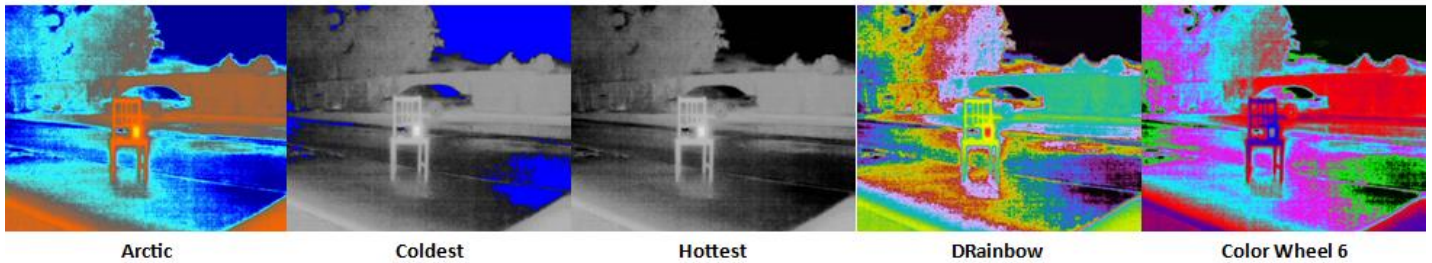
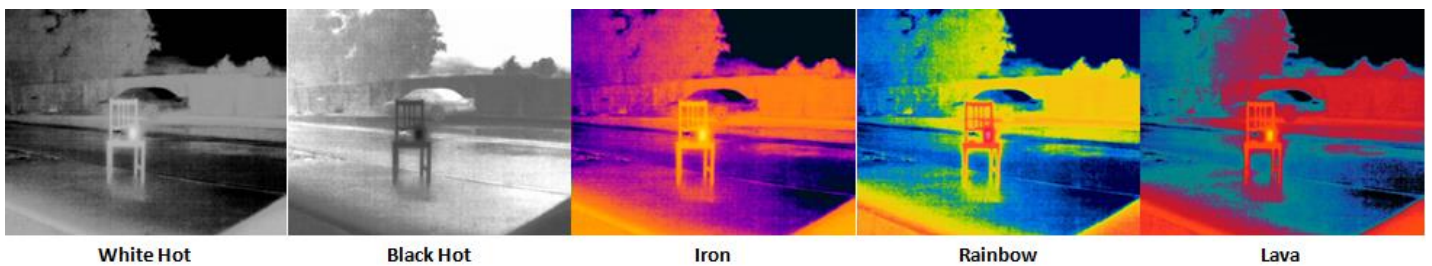
The following Color Palettes are available on the FLIR Vue® TZ20. The user desired color palette is saved with JPG and MOV files, but not with the TIFF files.

(Icon on the right depicts current color pallet being used)



User may select color palette to their preference. A different palette can aid in interpreting the images differently. Follow the link below for more details regarding color palettes.

<https://www.flir.com/discover/ots/outdoor/your-perfect-palette/>



Zoom

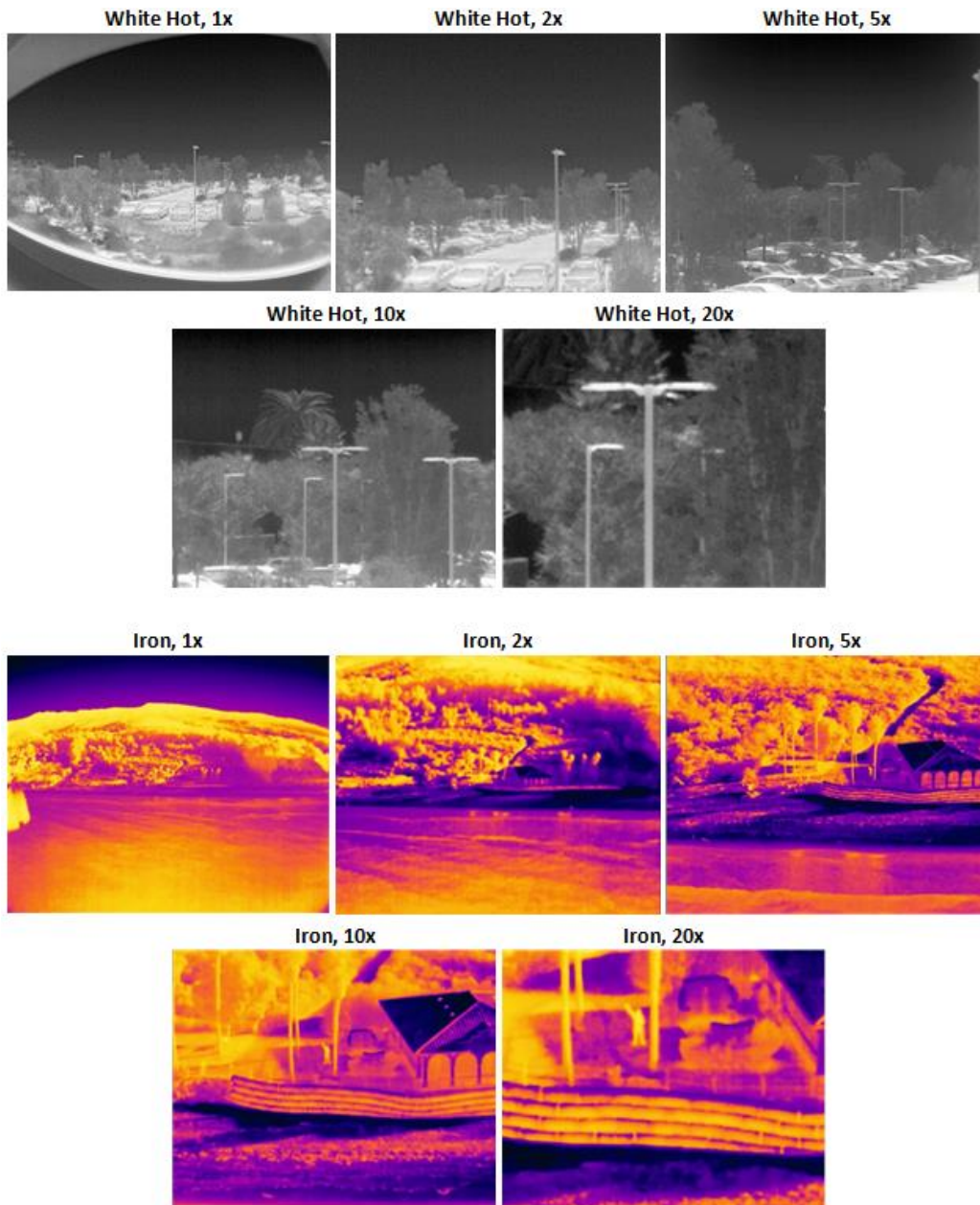
The FLIR Vue® TZ20 is capable of 20x thermal zoom. The app allows the user to zoom in increments of 1x, 2x, 5x, 10x, and 20x. The capabilities of thermal zoom allow the user to improve situational awareness with two Fields of View (FOV). The user can maintain a wide FOV to cover a large area and quickly hone in on target of interest when necessary.



Zoom levels 1x and 2x utilize the WFOV Boson, with a 95° HFOV (2x is digital zoom)

Zoom levels 5x, 10x and 20x utilize the NFOV Boson, with a 18° HFOV (10x, 20x is digital zoom)

TIFF images are saved without the zoom applied. JPEG and MOV are saved with zoom and colorized.



Settings

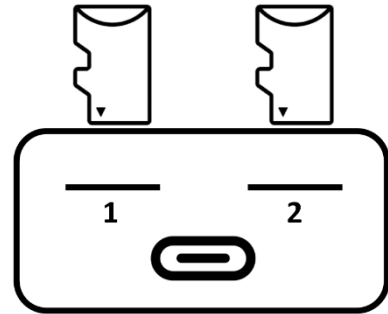
Access the payload [settings](#) menu.



SD Cards

Both SD cards must be inserted to operate the unit. SD cards can be inserted using the orientation diagram on the right.

Each SD card can be viewed as a storage device using the TZ20. To view the contents on the SD cards, simply plug in the TZ20 with a USB-C connector to a computer. The user will be able to copy or transfer files accordingly.



Note: On the X-Port gimbal, there is an empty SD card slot under a protective lid. This port is intended for storing logs by DJI and will NOT save any files from the TZ20.

File Naming Convention

Folders on the SD cards are named with the following convention

Image_20210126_231251

<u>Contents</u>	<u>Date Folder Created</u>	<u>Time Folder Created</u>
Image: JPEGs & TIFFs	Format: YYYYMMDD	Format: HHMMSS
MOV: MOVs		
SEQ: Multipage TIFFs		

Saved images and videos are named with the following convention

20210126_231253_2x_8b.JPG

<u>Date File Created</u>	<u>Time File Created</u>	<u>Suffix & Extension</u>
Format: YYYYMMDD	Format: HHMMSS	JPG: Zoom Level ("1x", "2x", "5x", "10x" or "20x"), 8-bit color
		TIFF: "NFOV" or "WFOV"
		MOV: "STR"
		SEQ: "NFOV" or "WFOV"

Note: GPS data is required to sync date and time. If GPS data is unavailable, then the file names will report a default time of 1970 (ex: Image_19700101_000027)

This can be prevented by ensuring that the airframe is connected to GPS prior to taking a capture.

Tested SD Cards

The validated SD cards that are supported by the TZ20 are shown below. Working SD cards are not limited to this list.

SanDisk Extreme PRO U3	XC	64G
Kingston C10	HC	8G
SanDisk Extreme PRO U3	XC	32G
SanDisk Extreme PRO U3	XC	128G
SanDisk Ultra U1 C10	HC	32G
SanDisk Ultra C10	XC	16G, 64G
SAMSUNG EVO Plus U3	XC	64G
SAMSUNG EVO+ Plus U3	XC	256G

Supported file mounting:

vfat
exfat

Recording

When data is recorded, they are saved as two files on the SD card. Folders are created when the first file is saved.

SD1: WFOV TIFF, WFOV Multipage TIFF, MOV

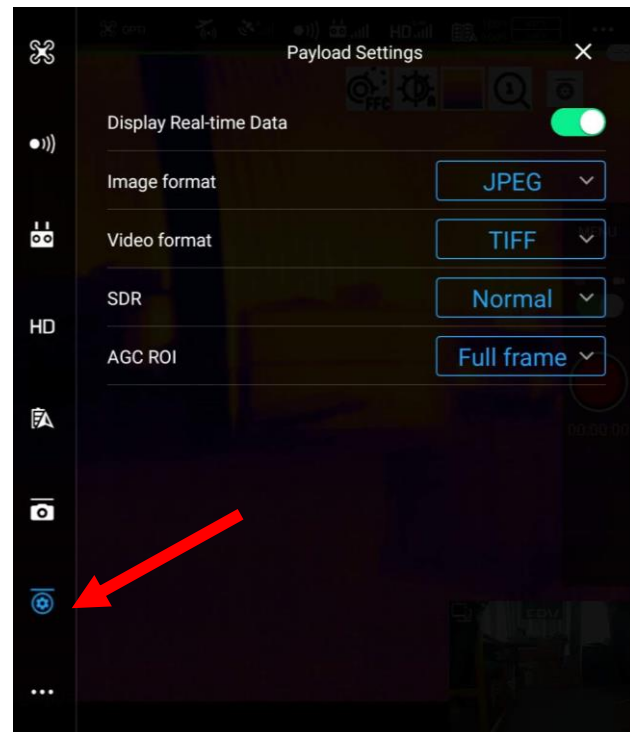
SD2: NFOV TIFF, NFOV Multipage TIFF, JPEG

- Still Images
 - Can be saved in TIFF and JPEG format.
 - TIFF files contain raw data from the FLIR Boson camera. Both WFOV and NFOV images are saved.
 - JPEG contains a colorized image of what is displayed on screen. Standard JPEG compression is applied, and selected color pallet will remain.
 - Note: These are not radiometric JPEG since TZ20 is not a radiometric camera
- Periodic Capture
 - The camera can capture images at a set interval ranging from 1s-30s
- Video
 - Video footage is recorded from both FLIR Boson® cameras simultaneously and will save as separate files. Video formats can be saved as TIFF at 10Hz or MOV at 30Hz.
 - Saving MOV video will also save an SRT file with the same file name. The SRT is a subtitle file format that logs video information updated every 1 second. This information includes date and time, GPS coordinates, altitude, and TZ20 zoom increment.

Settings

The DJI pilot payload settings can be found by tapping the “...” icon on the top right of the screen then tapping the payload icon.

The user can also directly access the payload setting by tapping the Payload Setting Icon in the quick menu.



In this menu, the user will have the option to modify various capture settings.

- Image format
 - JPEG: still images that are saved onto SD 2 in the “Image” folder. They have gone through AGC and are colorized. It is what is displayed on the user’s screen.
 - TIFF: still images from both WFOV and NFOV camera and saved in the “Image” folder on SD 1 and SD 2 respectively. Both images are synchronized. Images are in 16bit so no AGC or color palette is applied. Good format for analytics.
- Video format
 - MOV: H264 encoded 640x512 30Hz video of what is shown on the user’s screen. Saved onto SD 1 in the “Mov” folder.
 - TIFF: 10Hz video saved as multipage TIFF images in the “Seq” folder from both WFOV and NFOV camera saved onto SD 1 and SD 2 respectively. Frames are synchronized. New Multipage TIFF is created every 3 minutes to avoid large files.

- Color Palette
 - See [Palettes](#)
 - Scene Dynamic Range
 - Changes the scene temperature range (gain mode) of both cameras
 - Hot (Low gain mode): range for higher temperatures extremes, -40°C to 550°C
 - Normal (High gain mode): range for lower temperatures extremes, -25°C to 135°C
 - AGC Region of interest
 - Allows the user to optimize the AGC for a subset of the total field of view.
 - E.g.: If the user wants to image a scene that contain a lot a sky in the field of view, the user can change the region of interest to the lower portion of that field of view in order to enhance contrast on objects in interest. This enhances the details by providing more color resolution on the target(s) of interest instead of applying the AGC on the entire frame.
 - See section 6.5.9 of [Boson Engineering Datasheet](#) for more details.
- The TZ20 provides three Region of Interest (ROI) options
- Full Frame
 - Lower 67%
 - Lower 50%

Specifications

OVERVIEW	
Dimensions	Payload: 75 × 70 × 55 mm With gimbal: 128 × 154 × 141 mm
Pixel Pitch	12 μm LWIR
Thermal Sensitivity	85 mK @ F/1.0
Weight	640 g
Zoom	5x optical (WFOV/NFOV), 4x digital Effective zoom: 1x (95°), 2x, 5x (4.5°), 10x, 20x
Ground Control	DJI Pilot App
Airframe Compatibility	DJI Matrice 200 v2 and Matrice 300 series
ELECTRICAL & MECHANICAL	
Mechanical Interface	Skyport 2.0
ENVIRONMENTAL & APPROVALS	
Storage	2 micro SD™ cards
Operational Temperature	-20°C to 45°C (-4°F to 113°F)
Storage Temperature	-20°C to 60°C (-4°F to 140°F)
Certifications	FCC/CE, REACH, RoHS, WEEE
Environmental Sealing	IP44
IMAGING & OPTICAL	
Array format	2 FLIR Boson® 640 × 512
Streaming Video	640 × 512 @ 30 Hz
IR Camera Optics	Wide FOV: 95° HFOV, 4.9 mm EFL Narrow FOV: 18° HFOV, 24 mm EFL
METER DATA	
Recording	Still: JPEG, TIFF (WFOV and NFOV) Video: MOV (same as streaming) Multipage TIFF: (WFOV and NFOV)
POWER	
Electrical Interface	Skyport 2.0, 13.6 V/4 A
Power consumption	Typically <8W

Warranty

The standard warranty for the Vue TZ20 UAS payload is **one year** from date of delivery to the customer. This covers evaluation and repair or replacement of nonconforming components. Please note that the warranty does NOT cover:

- Vue TZ20 units that have been repaired or modified in any manner by anyone other than FLIR or FLIR's authorized designee
- Defects due to normal wear and tear
- Buyer's failure to properly store, install, operate, or maintain the Vue TZ20
- Operating the payload outside of its specified parameters.

The buyer is responsible for the costs of shipping the payload to FLIR, and FLIR pays the return shipping costs. Any product returned to FLIR, whether it is under warranty or not, must use FLIR's Return Merchandise Authorization (RMA) process. To obtain an RMA number, please contact our technicians at SBA-CameraRepair@flir.com Please do not return any payloads or camera products to FLIR without an RMA number. Packages not clearly marked with the RMA# may be delayed in being received by FLIR and turned around promptly.

Troubleshooting

LED Indication Table

Boot up – Yellow flashing slow	The LED will flash Yellow when the TZ20 is booting up.
Not connected - Blue solid	The LED appears solid blue when the TZ20 is powered but not able to connect to UAS, and both SD cards are. Normally occurs when TZ20 is connected to a computer.
Operating - Green solid	The LED appears solid green when the TZ20 is powered up and ready to record/stream.
Recording - Green flashing slow	The LED appears flashing green when streaming video is being recorded to the storage.
Warning - Orange blinking fast	The LED will flash orange when there is an error but the TZ20 is still running. Reasons for this kind of warning include: <ul style="list-style-type: none"> - Fail to record (no SD card, or SD card full) - Camera error (but TZ20 can communicate with Camera)
Fatal error - Red flashing fast	The LED will flash red when there is a fatal error in the TZ20. That includes: <ul style="list-style-type: none"> - Cannot boot - Cannot communicate with the FLIR Boson® camera(s).
Upgrade - Purple flashing slow	The LED will flash purple when the firmware upgrade process is active.
LED indicator priority	When two or more conditions are fulfilled at the same time the priority shall be as follows. The condition that is first met shall be indicated. <ol style="list-style-type: none"> 1. Fatal error 2. Boot up 3. Upgrade 4. Warning 5. Recording 6. Not connected 7. Operating

Firmware upgrade/downgrade

Firmware upgrade procedure

- Download the latest FW from FLIR website: flir.com/tz20
 - Note: upgrade will occur if version number is higher than the currently installed version
- Copy file onto the provided microSD card
- With the TZ20 powered OFF, insert the SD card into any slot (Other SD slot can remain empty)
- Power the TZ20
 - Update will occur if power source can provide 5V/2A. Airframe or computer may work
 - **CAUTION: do not disconnect power supply from TZ20 during update procedure, this may lead to a malfunctioned unit and will render the TZ20 unusable.**
- The TZ20 LED will blink purple during the upgrade timespan
- The TZ20 will automatically power cycle, the user will see the LED flash orange for power up, then will turn solid green or blue. LED may still be flashing if only one SD is inserted.
 - The update file (.ITM) will be automatically removed if the update was successful

Forced firmware downgrade procedure

- Rename the desired FW update file to "Focus_I_V0.0.0.ITM"
- Using that renamed file, user should follow the upgrade procedures described above

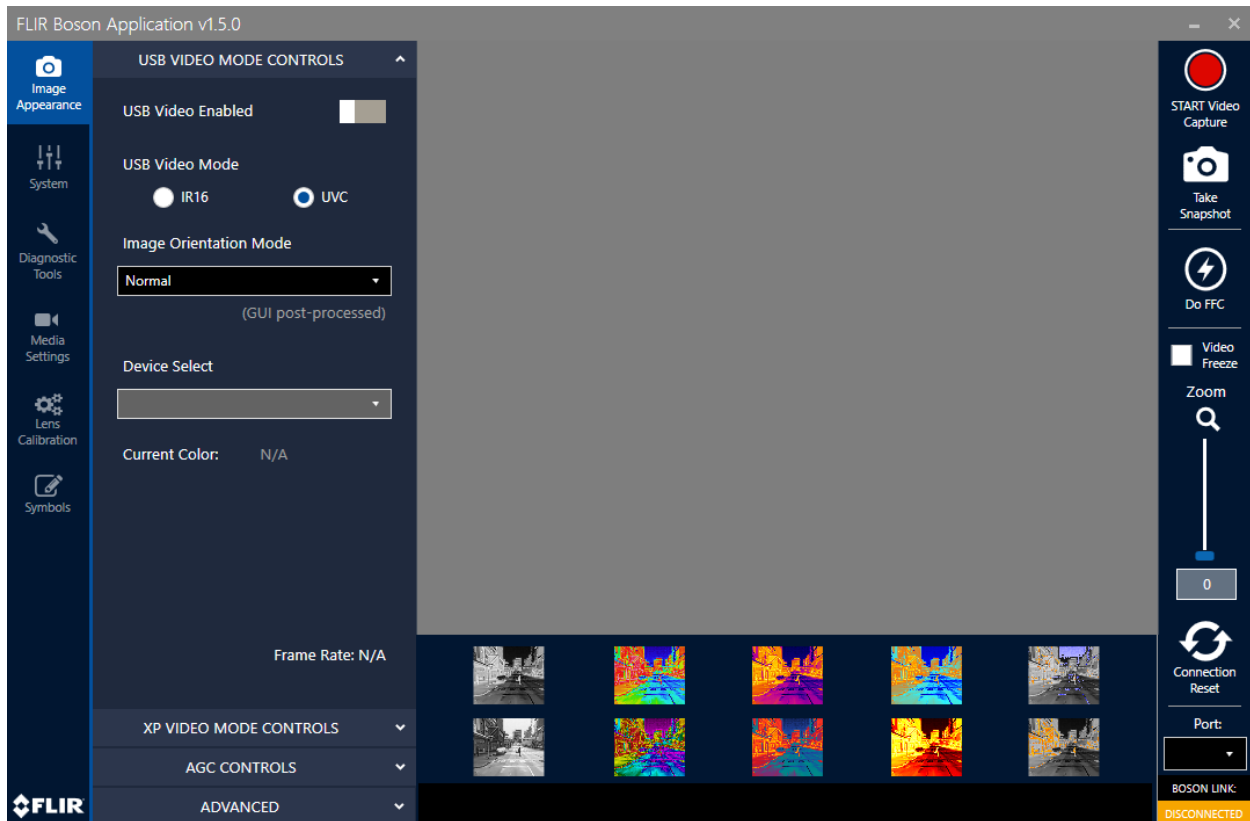
USB to Boson Application

FLIR Boson User app download link (also referred as Boson GUI or GUI)

<https://www.flir.com/support-center/oem/camera-controller-gui-for-boson/>

To view the camera streams, user will need to plug the camera to the PC using a USB-C cable. User can then view both FLIR Boson video streams using the FLIR Boson App. Under the “Device Select” drop down menu, the user can choose which stream to view.

Note: FLIR Boson GUI will only display one stream at a time. To view both streams simultaneously, user would need to open a separate FLIR Boson GUI window and select each FLIR Boson under “Device Select.”



FLIR Support

If you have questions about your Vue TZ20 camera, visit the OEM support portal at flir.custhelp.com.

To ask a question to a product specialist, you can open a ticket by clicking “Ask a Question” and filling out the form.

