



Quick Start Manual

Carbon X

Getting started with the Carbon X

Assemble and prepare the system. Take out parts from the travel case and double check the contents with the packing list, making sure everything is present.

This quick-start guide provides you with the resources to get started on the Carbon X 3D scanner system.

CARBON X CONTENTS: INSIDE TRAVEL CASE

3D Scanner

- Carbon X Scanner ScanBox
- Active USB Cable (A to B Cable)
- x2 USB 3.0 (A to Micro-B Cable)
- x2 Camera Trigger Cable

Hardware

- Mounting Rail
- x2 Cameras
- x5 M6 Allen Key Head Screws
- x4 M6 Washers
- x2 Allen Keys (M2.5 + M6)
- Tripod with Tripod Head

Power Supply

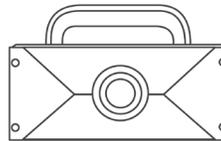
- x1 DC Power Supply Cord
- x1 Power Extension Cable

Other Accessories

- FlexScan 3D License Dongle
- x4 Calibration Board: 5mm, 10mm, 15mm, 20+25mm
- x2 Calibration Board Holder: Small, Large

WHAT'S INCLUDED

x 1



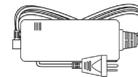
Carbon X Scanner ScanBox

x 1



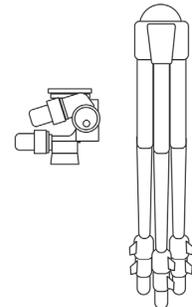
Mounting Rail with Scanner Cameras

x 1



DC Power Supply with Extension Cable

x 1



Tripod with Tripod Head

x 2



USB 3.0 Cable (A to Micro B)

x 2



Camera Trigger Cable (4 Prong Notched)

x 1



Active USB 3.0 Cable (A to B Cable)

x 1



USB License Dongle

x 1



Hardware Set (M2.5, M6)

SCAN TO DOWNLOAD FLEXSCAN3D



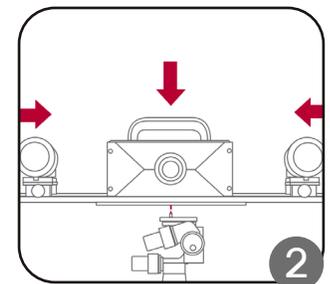
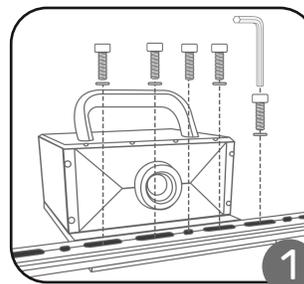
<https://www.polyga.com/my-account/downloads/>

DOWNLOAD

1

STEP 1: ASSEMBLE SCANNER BOX

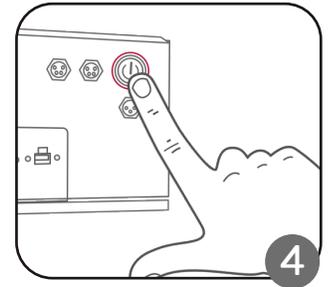
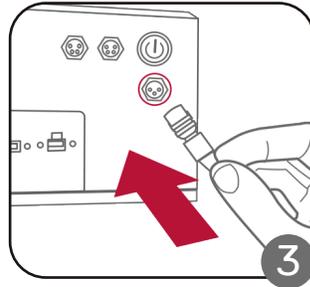
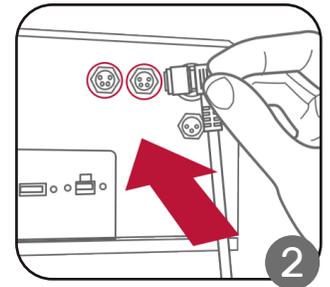
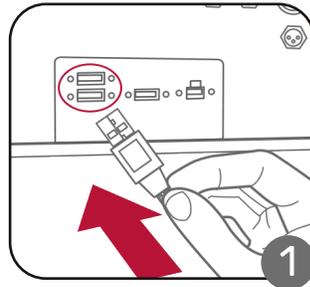
- Mount Camera Rail onto Scanner Body using x5 M6 screws, x4 washers, with Allen Key found in Hardware Kit.
- Line up threads and mount Scanner Body assembly onto Tripod Head and Tripod.
- Slide x2 Cameras onto Camera Rail and secure by turning Camera mounting brackets clockwise until snug making sure cameras are in symmetrical positions on rail.



2

STEP 2: CONNECT POWER CABLES

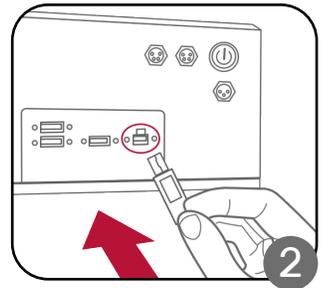
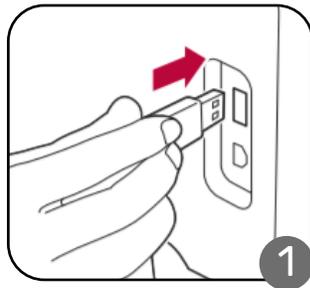
- Connect x2 Camera Cables from Cameras to back of Scanbox.
- Connect Camera Trigger Cables to back of Scanner Box.
Note: Make sure to line up notches on connector.
- Connect DC Power supply to back of Scanner Box.
- Press the power button. The LED will turn and stay blue once the scanner is booted up correctly.



3

STEP 3: DOWNLOAD FLEXSCAN3D

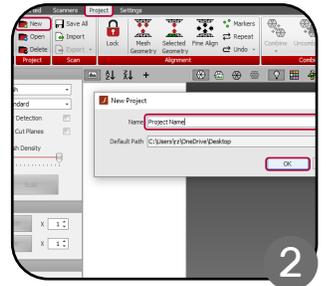
- Plug in the USB license dongle that comes with the scanner system into PC. (Can be found in the travel case)
- Log into Polyga account page and download the latest version of FlexScan3D Software.
- Connect Active USB Cable from PC to back of Scanner Box.
- ❗ Carbon X will not work with FlexScan3D Version 3.5.5.4 or older.



4

STEP 4: CREATE NEW PROJECT

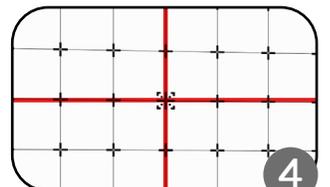
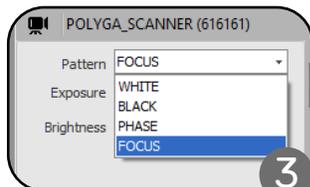
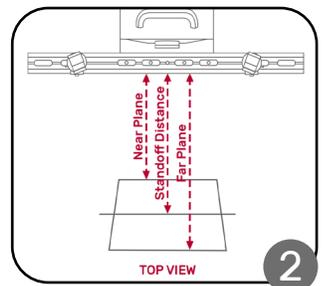
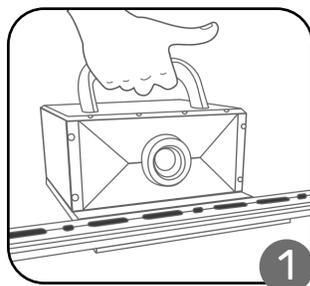
- Open FlexScan3D Software. Go to the Scanners tab. Click New. Select Compact/Carbon type from dropdown menu.
- Go to the Project tab. Create a new project and name it something you can remember.
- ❗ Leave Z-index Configuration (Depth of field) at default.



5

STEP 5: PLACE SCANNER

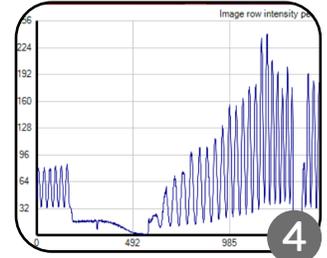
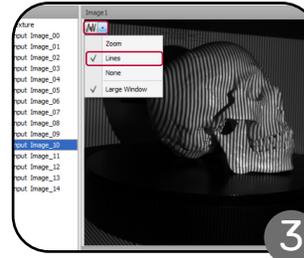
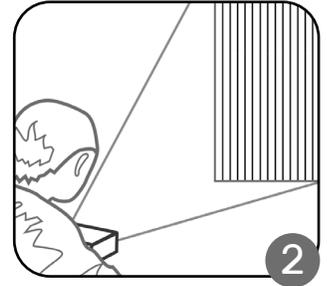
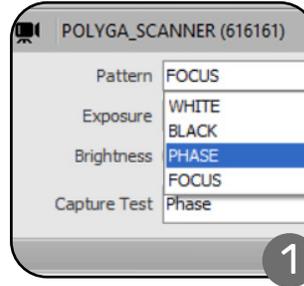
- For the first time using the scanner, place the object at the default calibration medium standoff distance of 700mm measured from front of rail. Cameras should always be in a symmetrical distance on rail from each other.
- Change projection pattern to focus from the Scanner window. If the red crosshairs are aligned with the projection centre, it can be verified that the object is in perfect focus. If not, move the object and scanner closer or farther apart to align them.
- For different object sizes, the camera positioning and focus need to be adjusted, and a recalibration is required whenever any adjustment is made.
- ❗ Carbon X is calibrated from the factory but Calibration is needed whenever cameras are moved. See Step 7 for the calibration steps.



6

STEP 6: TAKE SCANS

- Change projection pattern to phase. Make sure the object is not overexposed or underexposed in the live view.
- Take a test scan. Right click on the scan thumbnail -> View Images.
- Change the view mode from Zoom to Lines to access intensity map. If the light intensity is saturating on some of the images, increase or decrease the exposure time / brightness accordingly.
- !** Repeat step 7 if a different object with different color or texture is being scanned, or the ambient lighting condition changed.

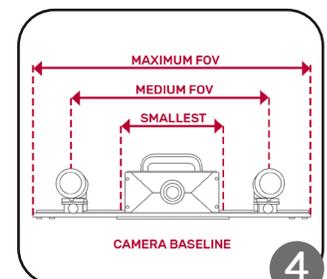
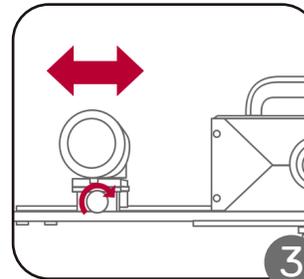


7A

STEP 7A: CALIBRATION POSITION

- Add the scanner as Advanced type from the Scanners tab.
- Select Projector from dropdown in Projector window.
- Change the distance between the two cameras or Camera Baseline based on size of the object to be scanned. Cameras should always be in a symmetrical distance on rail from each other.
- !** See reference table below for suitable FOV and object size.

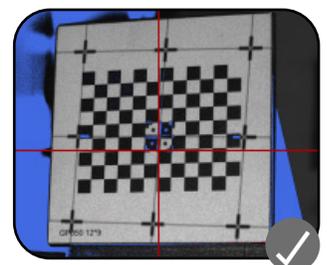
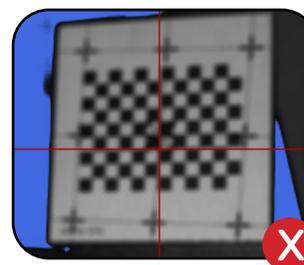
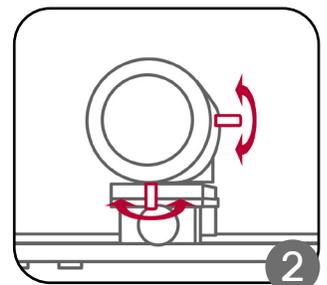
Field of View	Camera Baseline	Object Size (cm)
Minimum - 220 mm \varnothing	12 cm	5 to 15
Medium - 555 mm \varnothing	25 cm	15 to 40
Maximum - 975 mm \varnothing	43 cm	80+



7B

STEP 7B: ADJUST APERTURE/FOCUS

- Using a white surface and focus pattern, adjust the projector by turning the projector lens until focus pattern is sharp.
- Choose a reference object and any projection pattern. Any object can be used including a calibration board as seen in example.
- Adjust the aperture (front knob) and focus (back knob) by turning knobs counter-clockwise to loosen. Adjust camera lens. Aperture knob will turn with barrel.
- Both cameras should have the same brightness. Adjust the foci until the sharpest images are seen.
- Turn knobs clockwise to secure adjustments once complete so settings do not move.
- !** Repeat step 7 if a different object with different color or texture is being scanned, or the ambient lighting condition changed.



7c

STEP 7C: TAKE CALIBRATION IMAGES

- Choose either white, phase or focus pattern and depth of field while making sure the camera preview at the front and back planes are not blurry.
- Choose the calibration board size that is most suitable for your field of view (Approximately $\frac{1}{3}$ - $\frac{1}{2}$ of the camera width).
- Place the chosen calibration board within the field of view. Move the board around to cover 9 positions in the front-mid-far planes for a total of 27 positions.
- !** Make sure to have some overlap between neighboring positions shown in red (figure 3) for full coverage.
- Press capture button to take calibration images. Take 3 different angles of each position facing left, right, and forward for a total of 81 images.

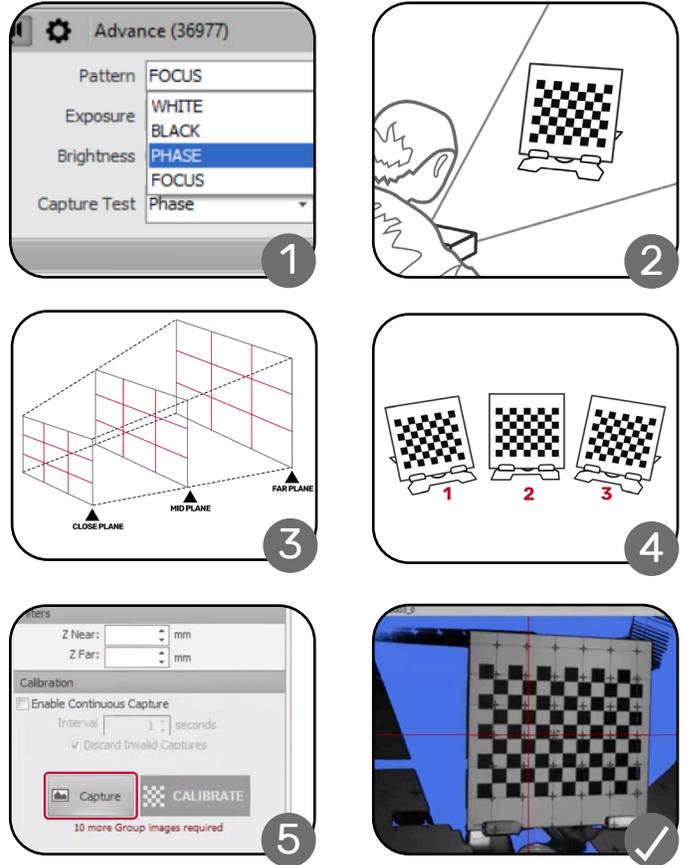
WATCH OUR STEP BY STEP CALIBRATION VIDEO





WATCH NOW

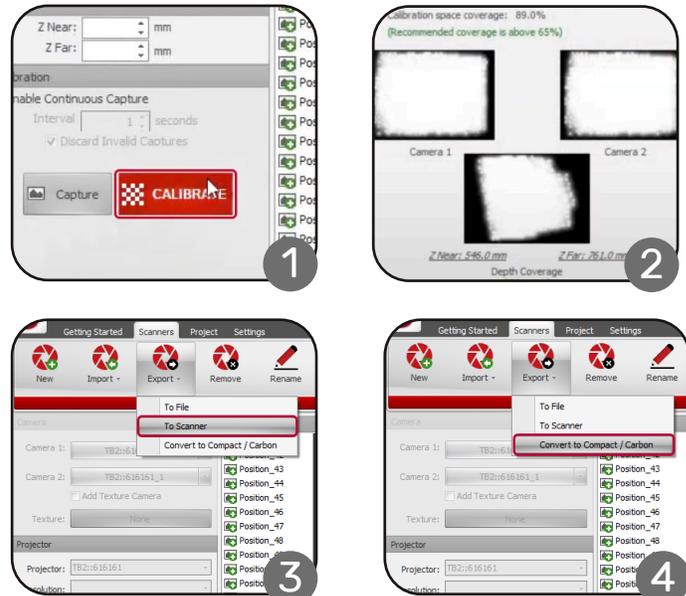
https://www.youtube.com/watch?v=LHvZgtB_YHM



7D

STEP 7D: SAVE RESULTS TO SCANNER

- After capturing all planes, click calibrate to see results. Ideally the Calibration space coverage should be over 80%.
- Upload the calibration to the scanner: Export -> To Scanner
- Exit Advance mode: Export -> Convert to Compact / Carbon
- Success! Scanner should be fully calibrated and ready to scan. Return to step 6 to take new scans.



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