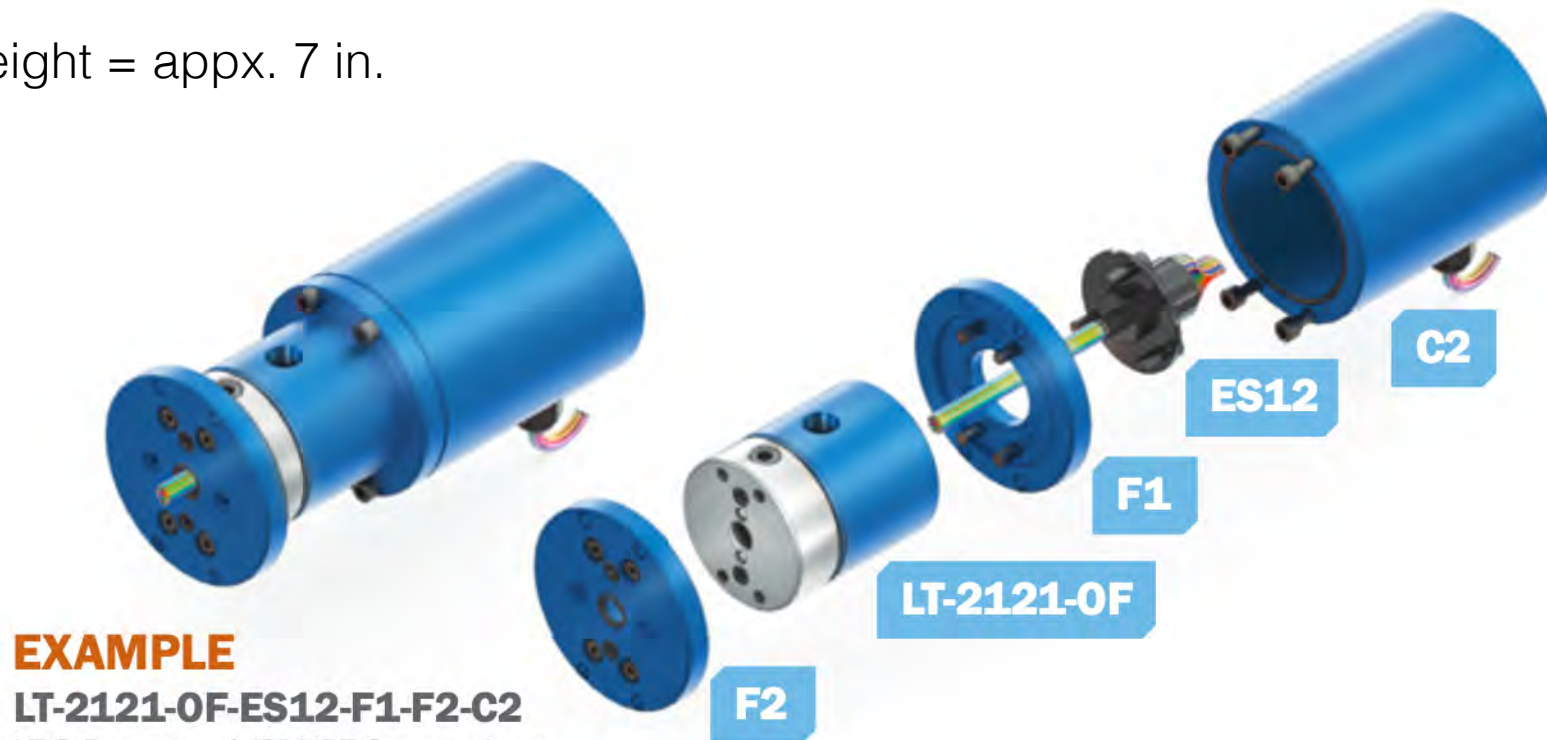


# Additional behavioral rig construction details

Supplementary material for Currier & Nagel, *Current Biology*, 2018

## DSTI P/N LT-2141-OF-ES12-F1-F2-C2 (Rotary Union / Slip Ring)

total height = appx. 7 in.



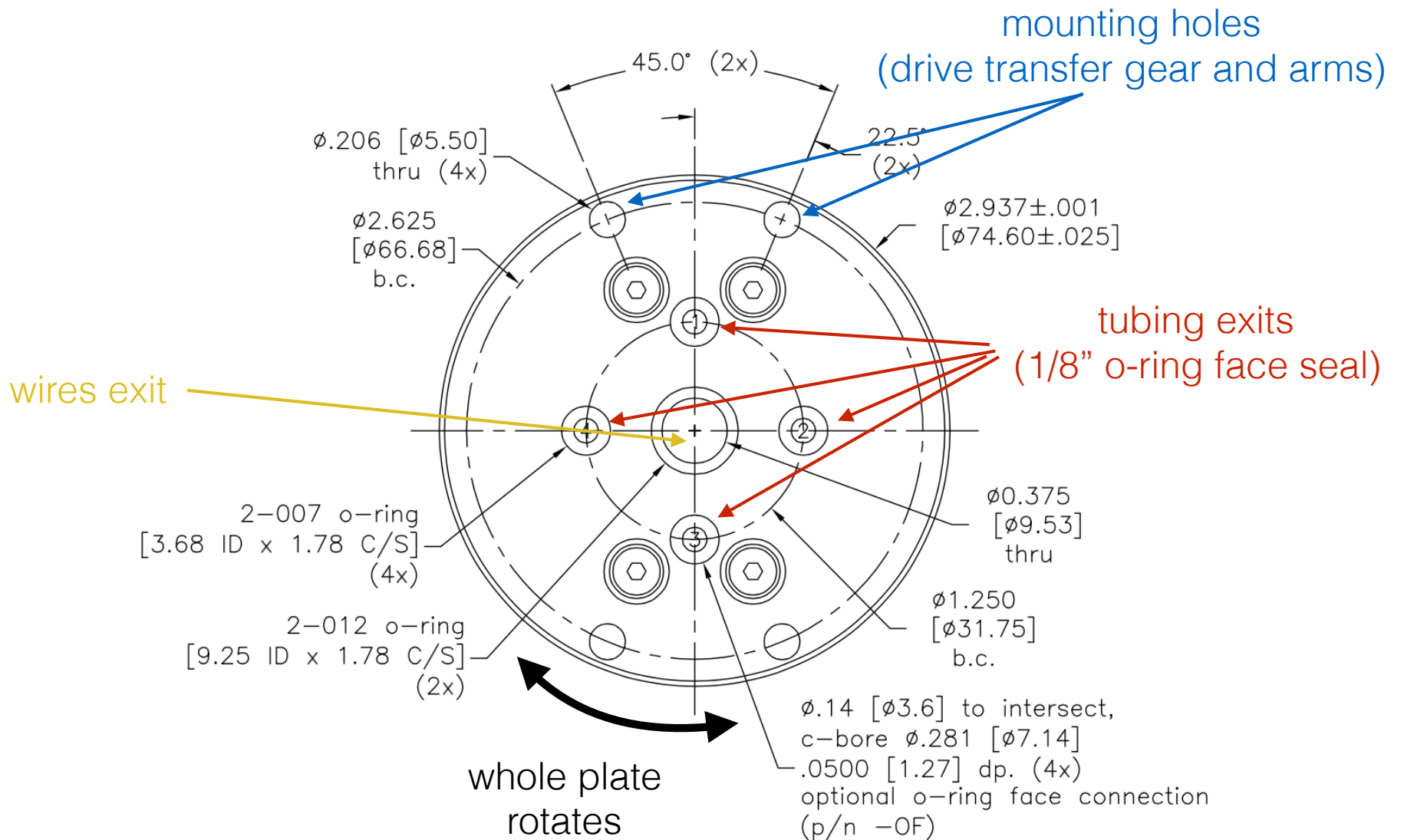
### EXAMPLE

#### LT-2121-OF-ES12-F1-F2-C2

LT 2 Passage, 1/8" NPT Connections,  
Optional O-ring Face Seal, ES12 Electrical Slip Ring  
w/ (C2) Cover and Required (F1) Housing Mounting  
Flange, Additional (F2) Shaft Mounting Flange

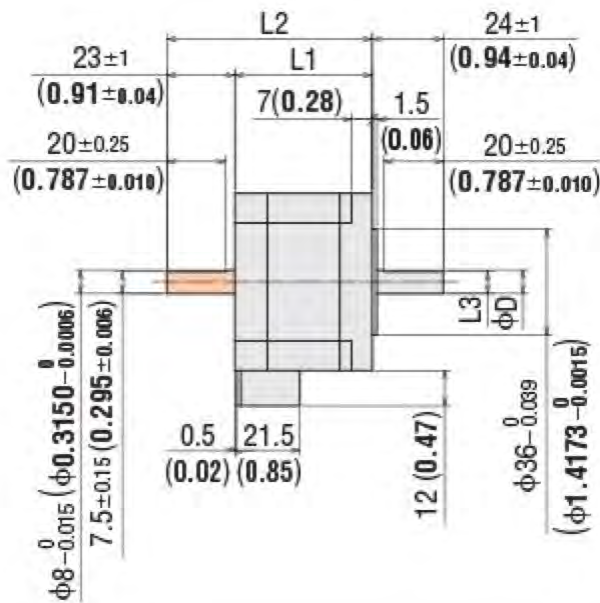
(ours has 4 ports instead of 2)

## "F2" face plate



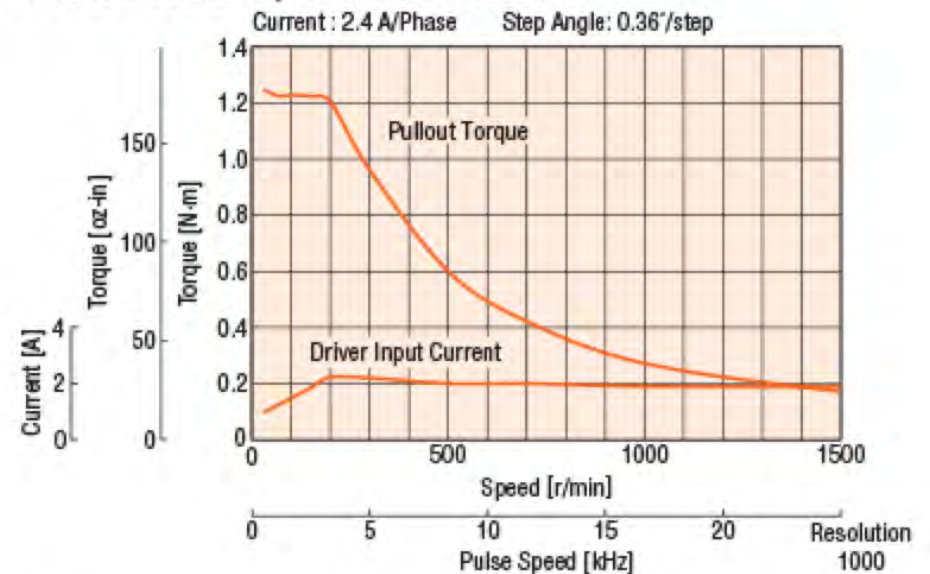
## (oriental motor) CV566FMAK (includes DC driver)

<http://catalog.orientalmotor.com/item/packages-stepping-motor-driver-packages-0-36-0-72/otor-driver-packages-0-36-0-72-cvk5-stepper-motors/cvk566fmak?&plpver=11&origin=keyword&by=prod&filter=0>



## Speed - Torque Characteristics

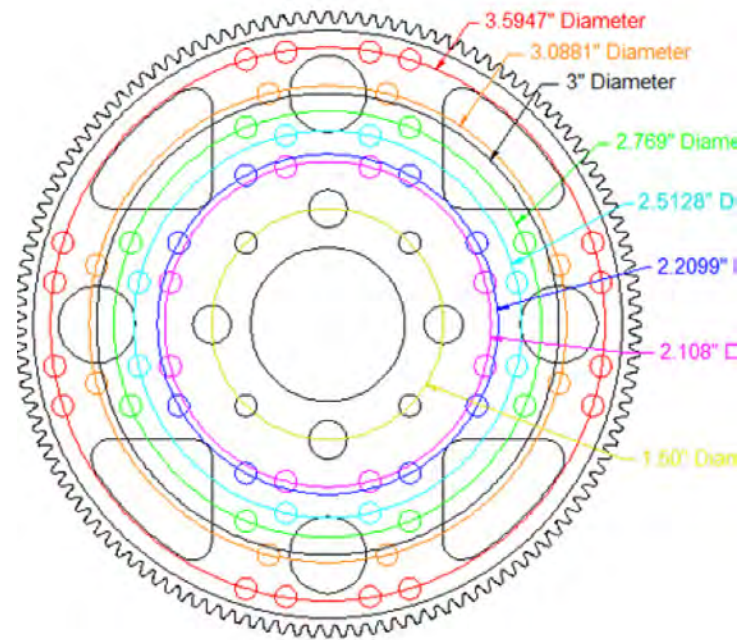
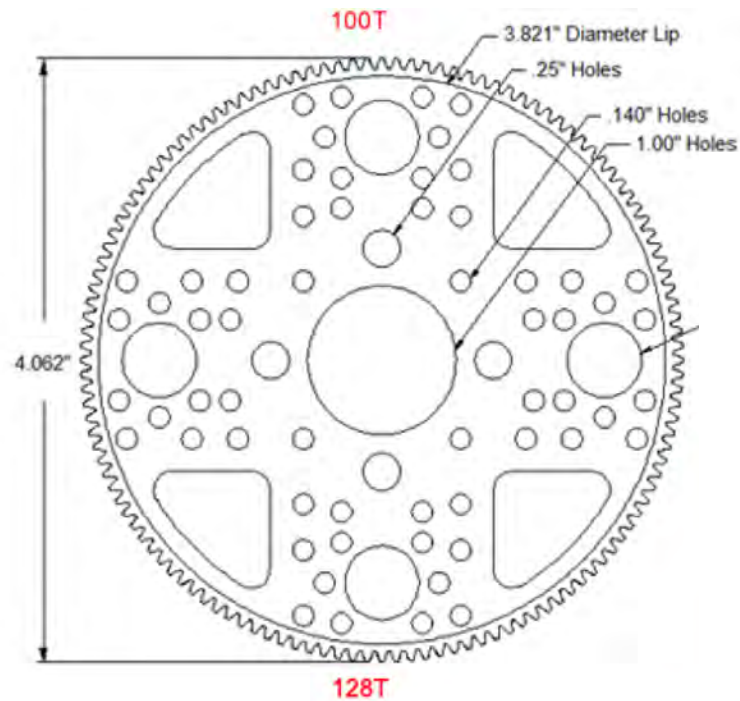
### CVK566FMAK/CVK566FMBK



● The pulse input circuit responds up to 1 MHz with a pulse duty of 50%.

8 mm SINGLE shaft (L1=L2=56 mm)

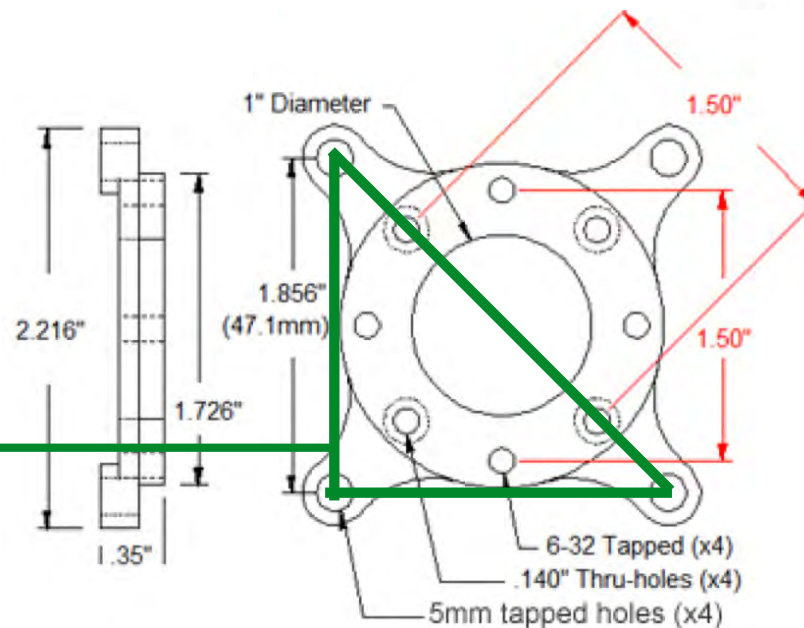
Motor drive transferred from gear to NEMA23 mount to rotary union



$$1.5 \cdot \sqrt{2} = 2.62"$$

1.856"

1.856"

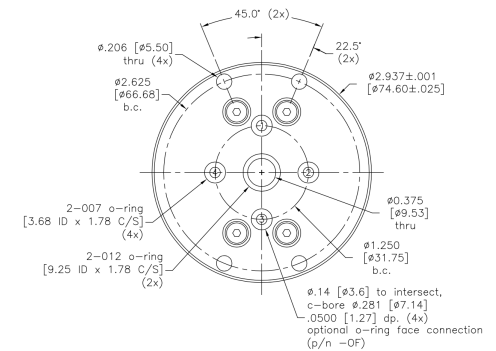


[https://www.servocity.com/html/32\\_pitch\\_hub\\_gears\\_1\\_bore\\_.html#.VyfXvsqul1g](https://www.servocity.com/html/32_pitch_hub_gears_1_bore_.html#.VyfXvsqul1g)

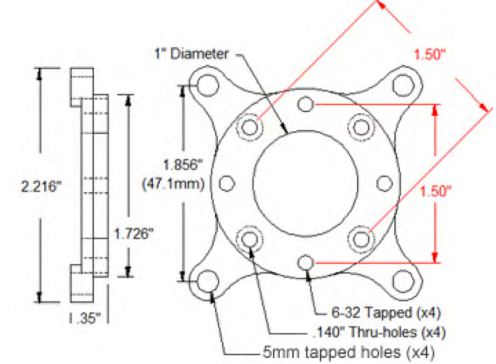
[https://www.servocity.com/html/stepper\\_motor\\_mounts.html#.Vyi9BsquK9h](https://www.servocity.com/html/stepper_motor_mounts.html#.Vyi9BsquK9h)



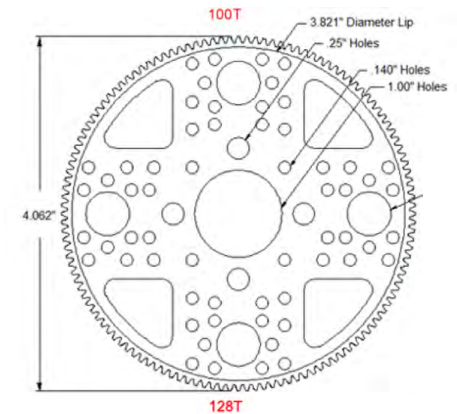
F2 couples rotary union to NEMA23 mounting hub



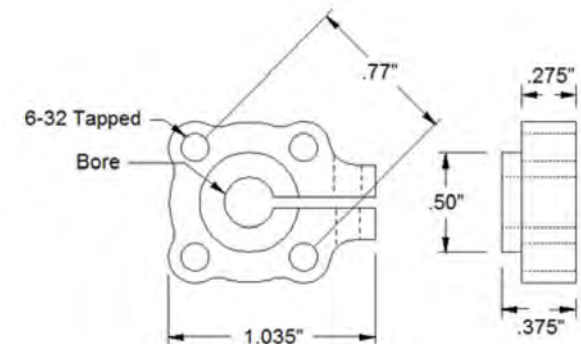
128T gear A couples NEMA23 hub to direct driven 128T gear B



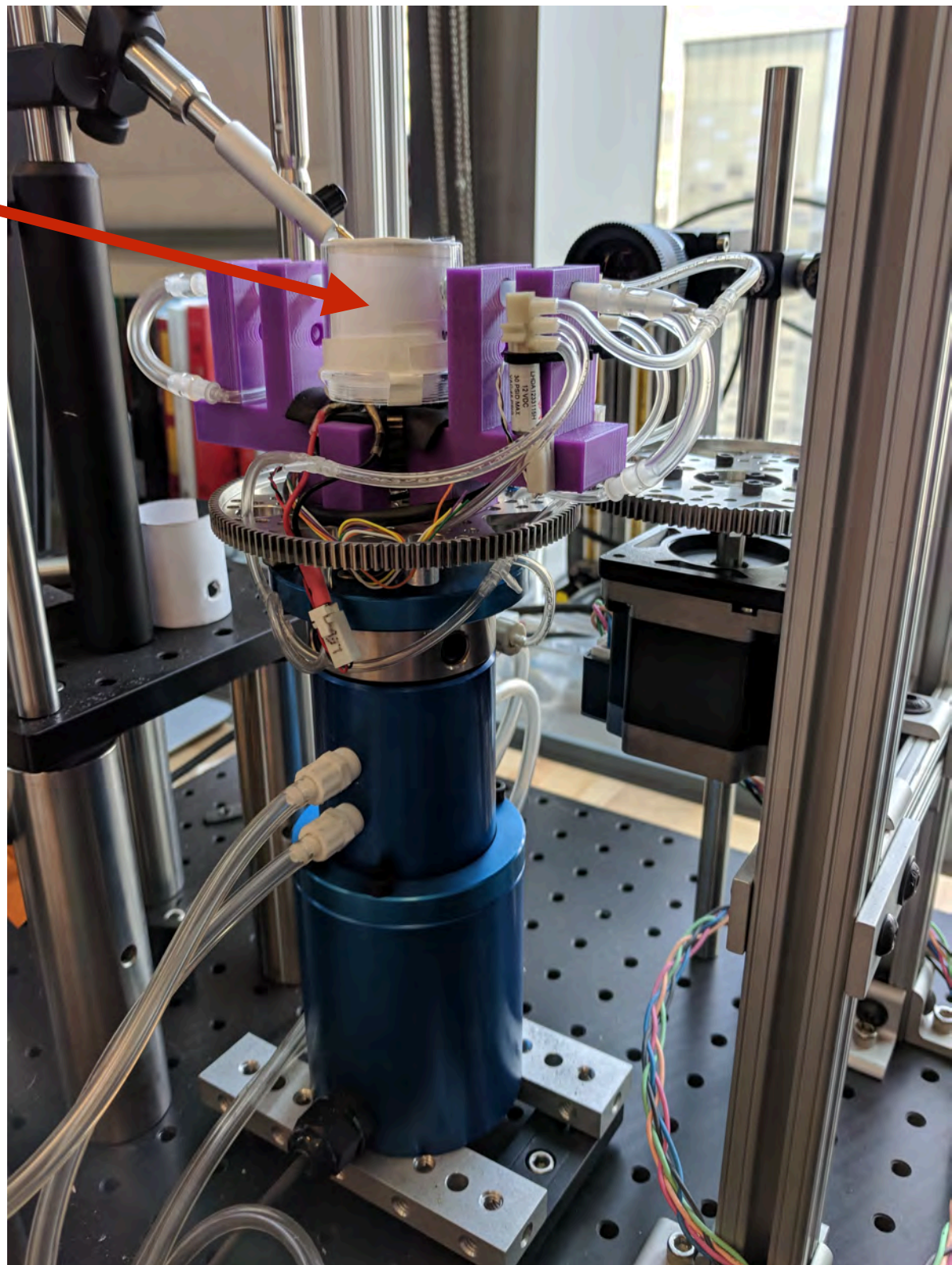
128T gear A also carries mount for stimulus arena



128T gear B mounted to clamping flange attached to stepper motor



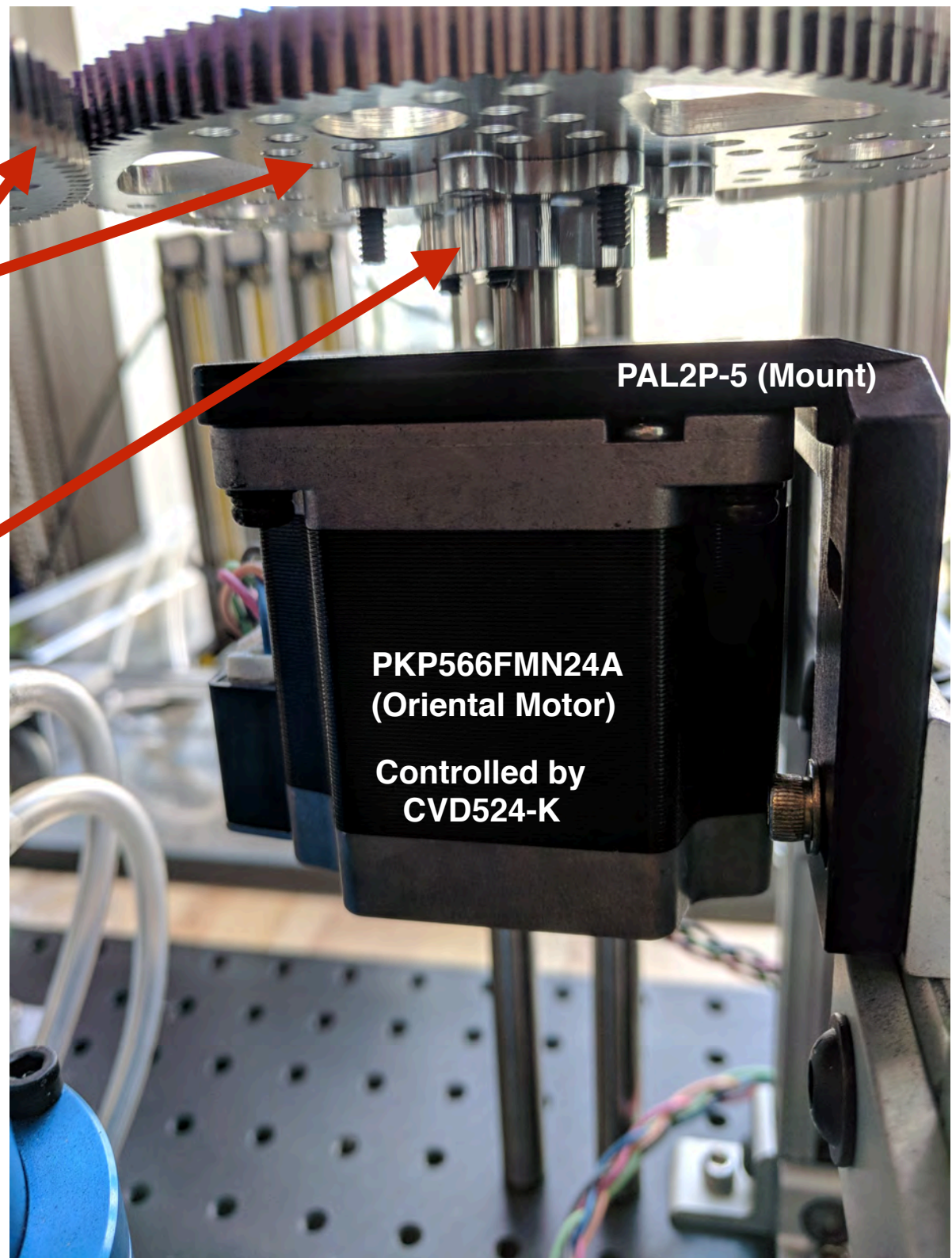
Full apparatus with stimulus arena





128T/32P/20°PA Gears (x2)  
[servocity.com](http://servocity.com) # 615238

Clamping hub flange  
[servocity.com](http://servocity.com) # 545624





Vials (clean vs. odorized air —  
not used in CurrierNagel2018)

128T/32P/20°PA Gears (x2)  
[servocity.com](http://servocity.com) # 615238

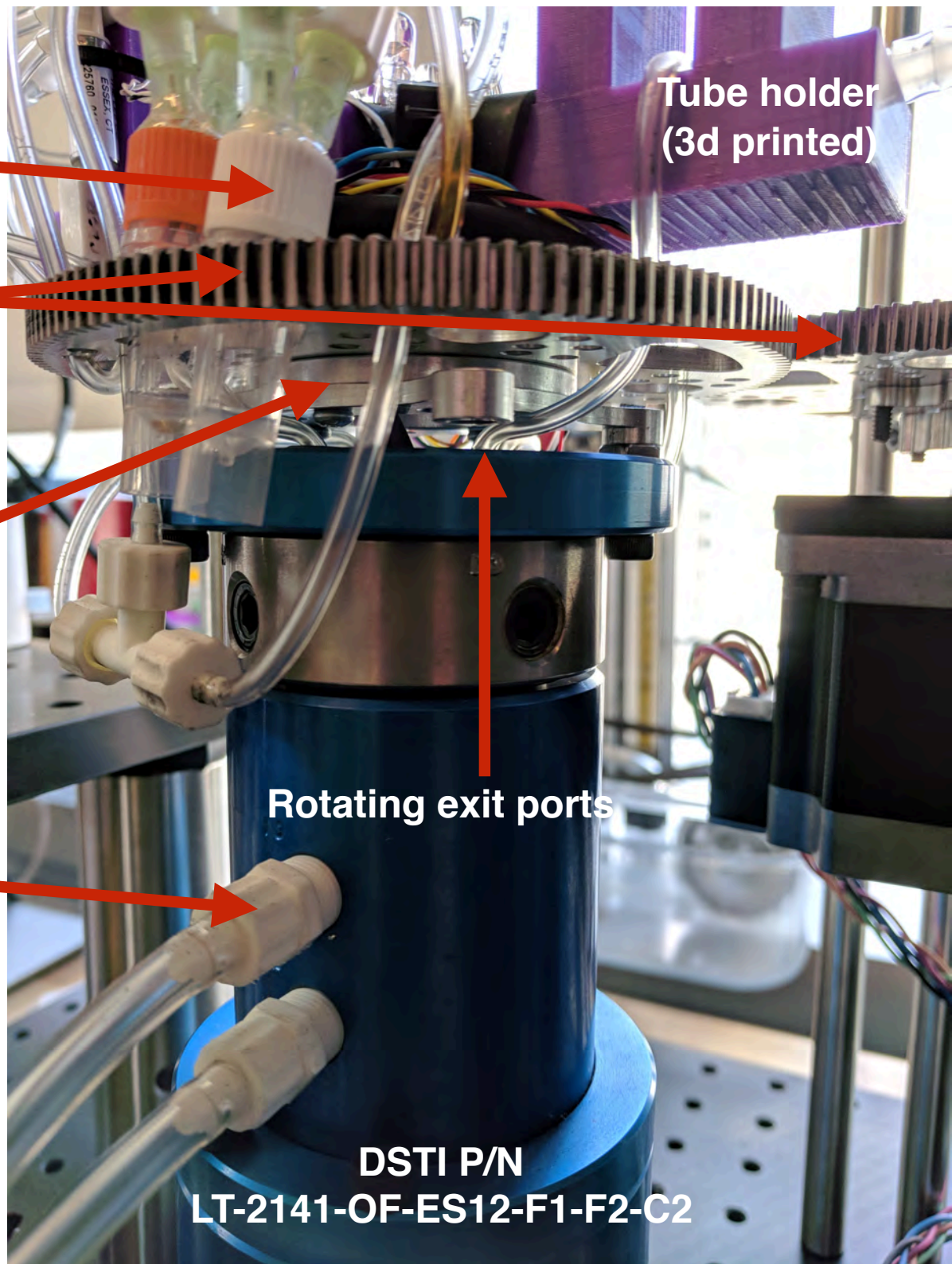
NEMA23 mount

Stationary inlet ports

Tube holder  
(3d printed)

Rotating exit ports

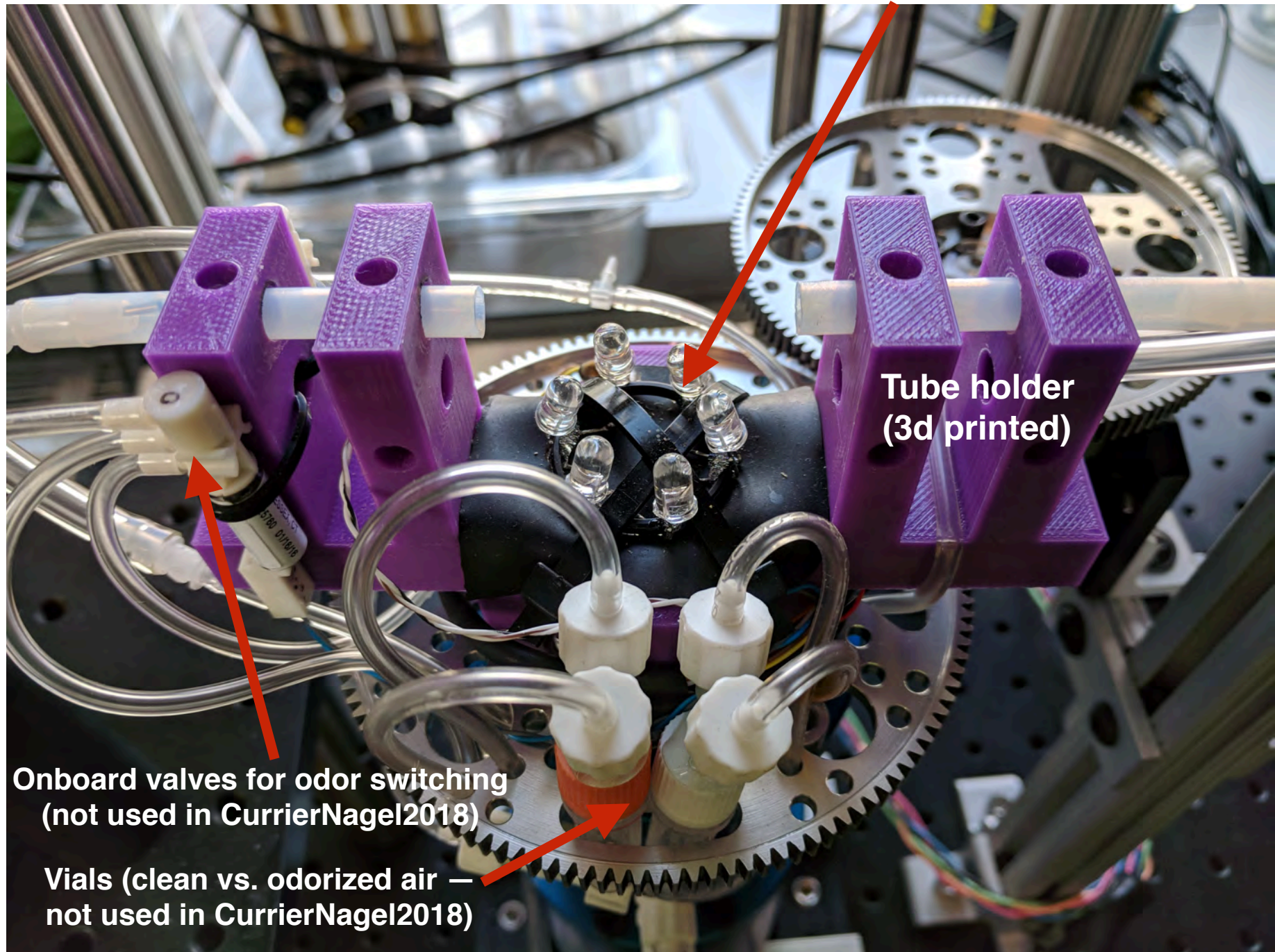
DSTI P/N  
LT-2141-OF-ES12-F1-F2-C2





With stimulus arena removed

IR LEDs





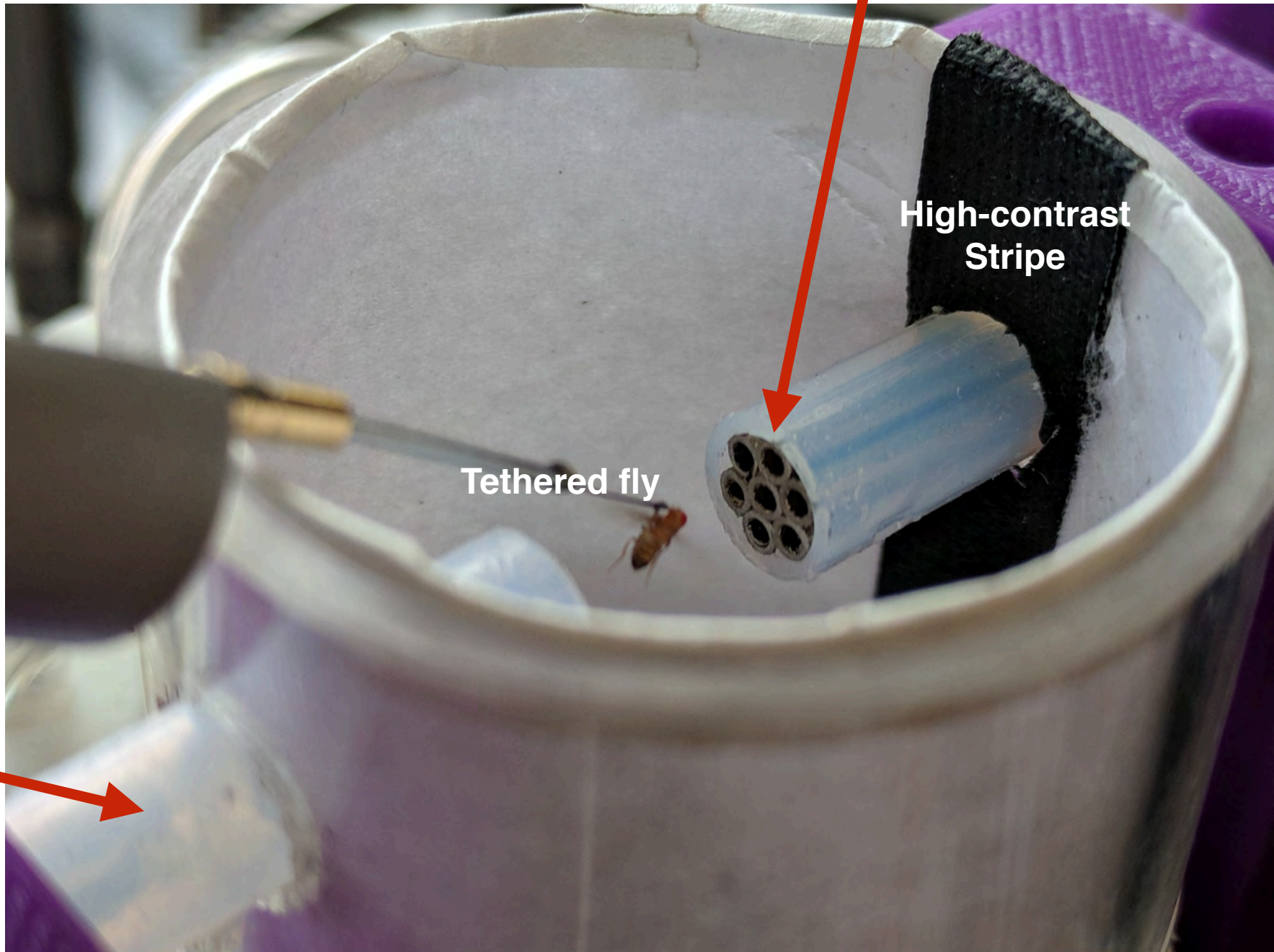
Close-up of stimulus arena

Upwind tube packed with metal straws

**High-contrast  
Stripe**

**Tethered fly**

Downwind  
tube



# Top-down view of stimulus arena

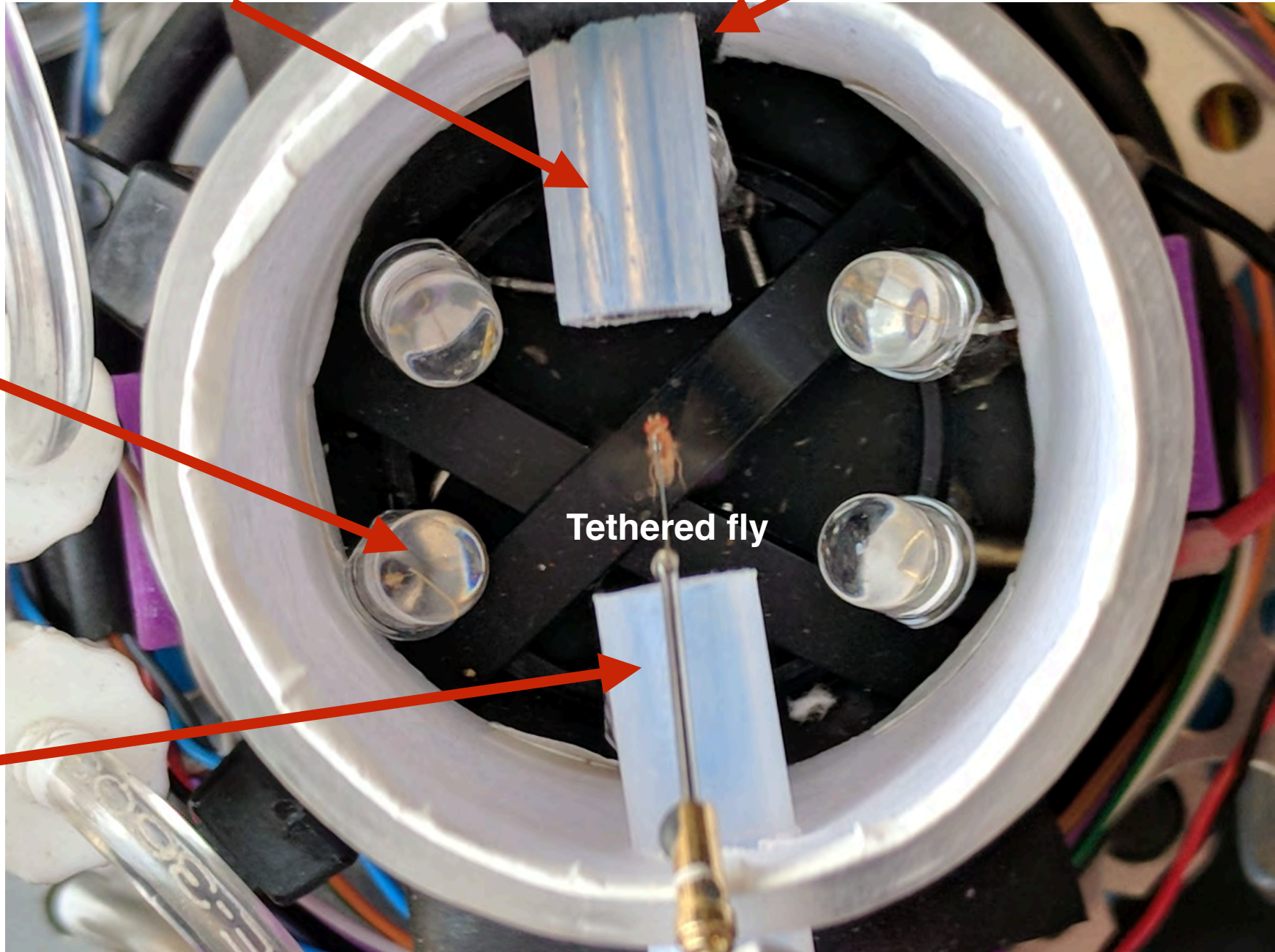
Upwind tube packed with metal straws

High-contrast stripe

IR LEDs

Tethered fly

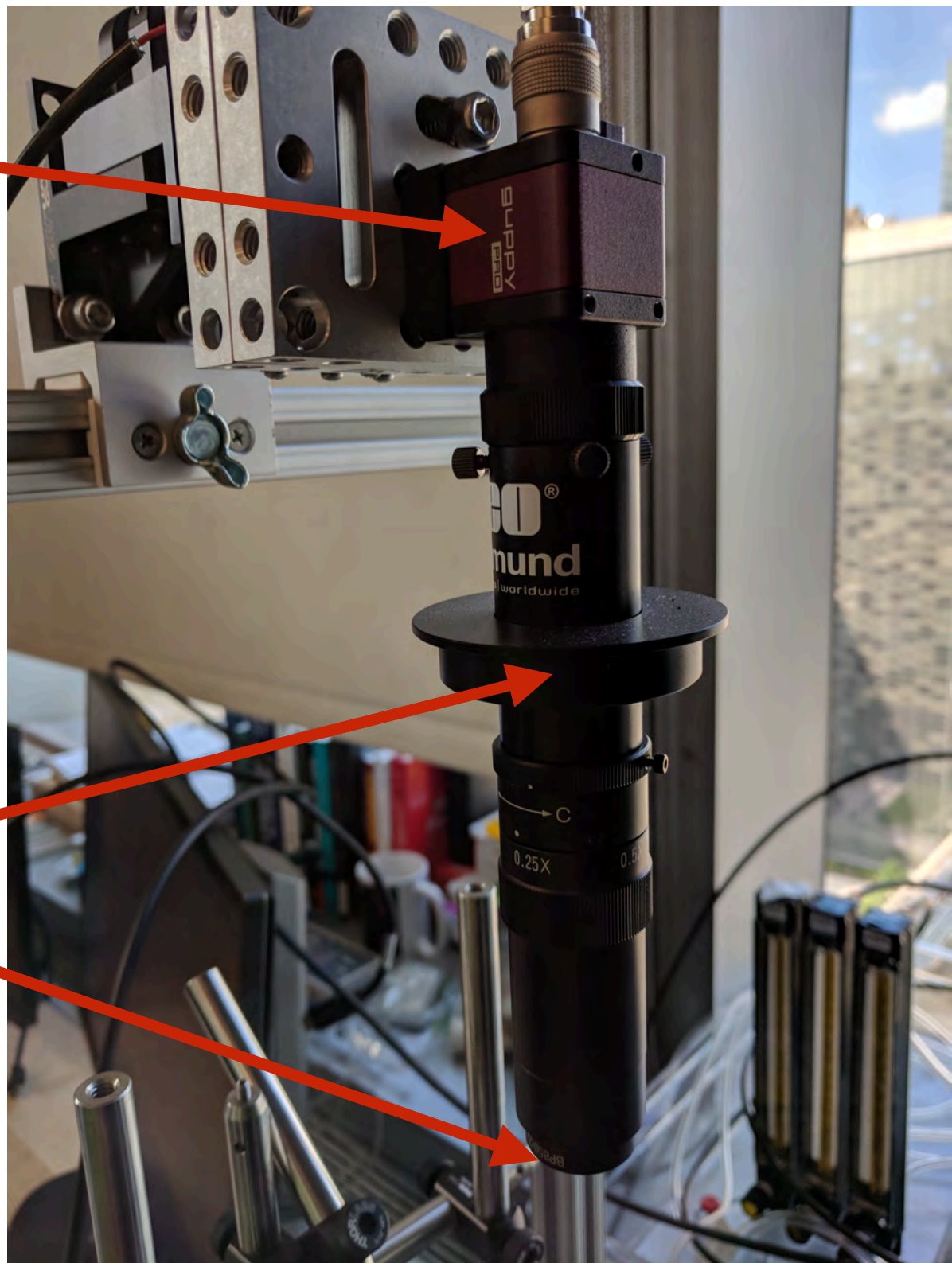
Downwind tube





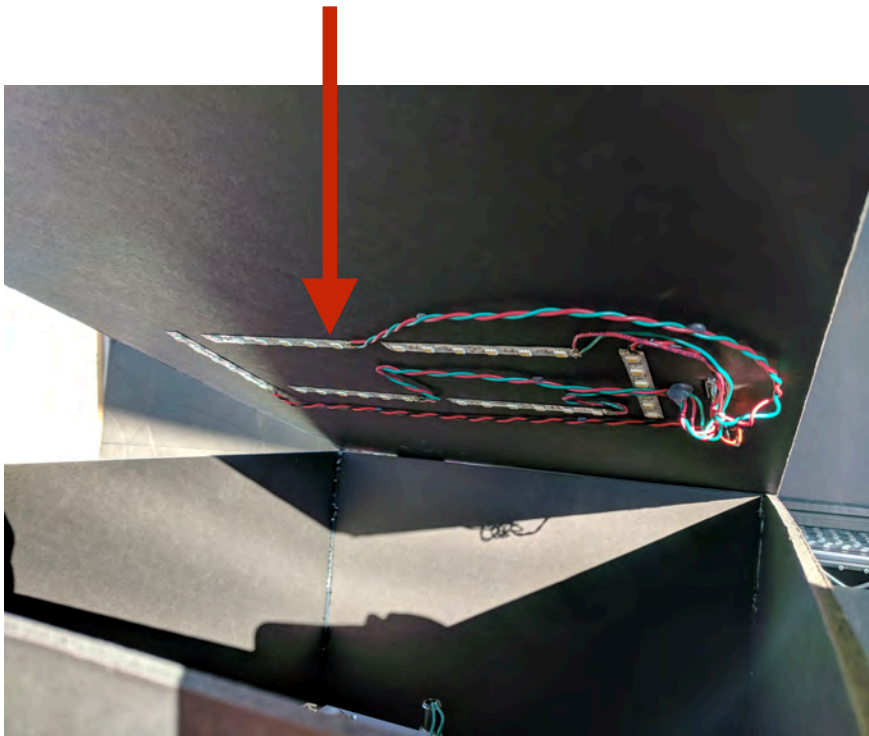
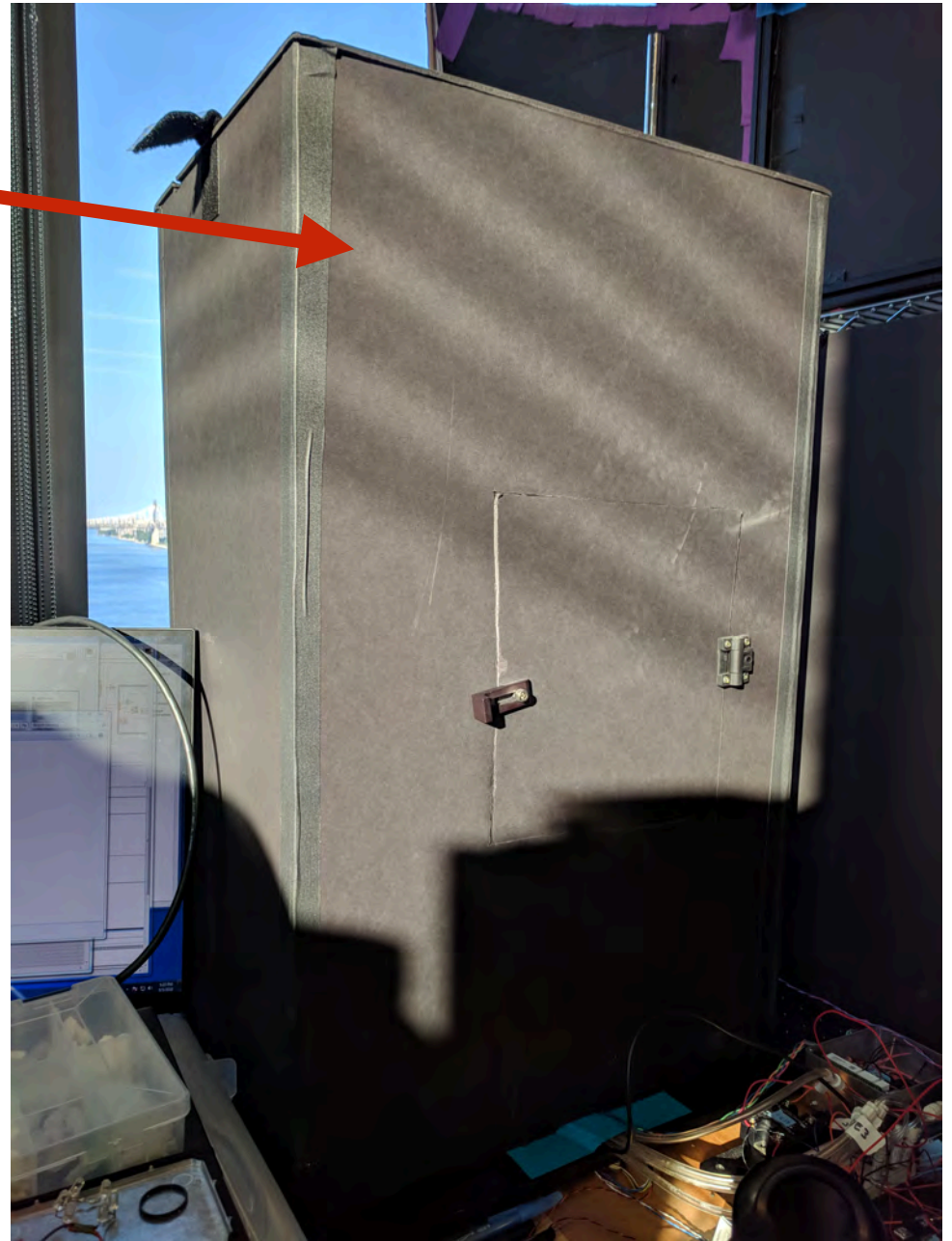
Above stimulus arena —  
Camera for wingbeat monitoring  
(Allied, # GPF 031B)

Zoom lens (Edmund Optics, # 59-805)  
w/ IR filter (MidOpt, # BP850-22.5)

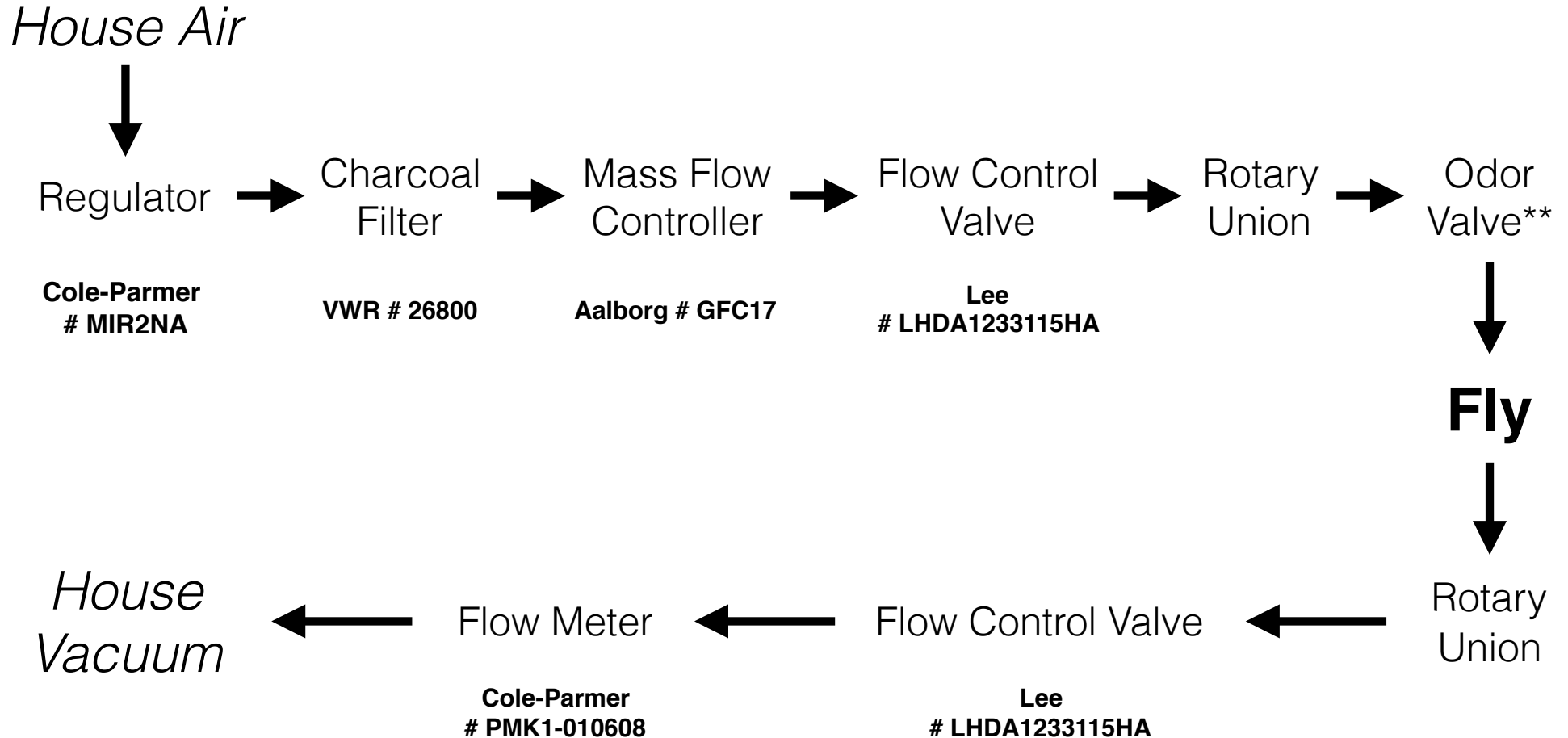


Entire apparatus enclosed in light-tight box  
foam-core (ULINE, # S-12859)

...with white LEDs in the roof  
(HitLights, # LS3528\_WW600, 36 SMDs)



## Flow diagram



**\*\*NOT USED IN PRESENT STUDY**