descSPIM construction procedures

(ver. 230520)

Provided by Department of Biochemistry and Systems Biomedicine,
Graduate School of Medicine, Juntendo University.

Screws

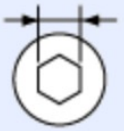
descSPIM adopts "metric" screw threads

*Most components (provided by Thorlabs) are designed with both "inch" and "metric"
(metric model: "part number" + "/M")

Major two screws for construction

Capscrew
(Hexagonal bolt)

Setscrew

Hex. wrench (mm) 	Screw type	
	 Capscrew (Hexagonal bolt)	 Setscrew
0.71mm		M1.4, M1.6, M1.7
0.89mm		M2
1.27mm	M1.4	M2.5, M2.6
1.5mm	M1.6, M2	M3
2mm	M2.5, M2.6	M4
2.5mm	M3	M5
3mm	M4	M6
4mm	M5	M8
5mm	M6, W1/4	M10

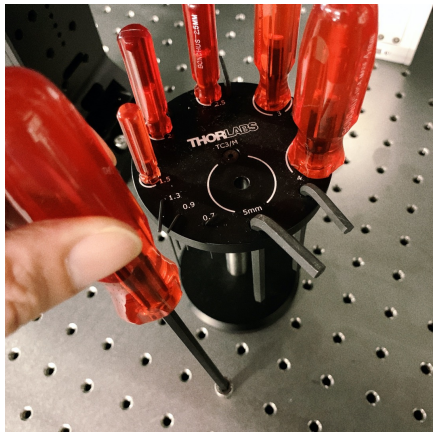
Modified table from NEJI-SHOP (JP) website

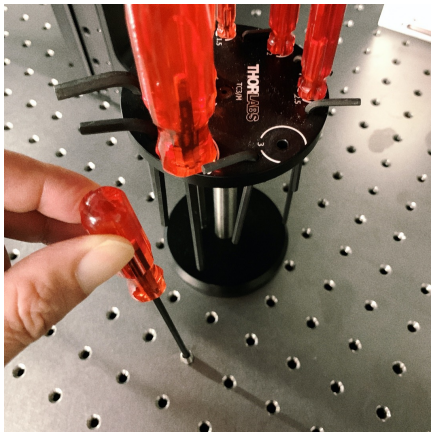
*Note that the numbers on the screws are different with the numbers on the hex. wrench. ☞Next page

Screws

*the numbers on the screws are generally different with the numbers on the hex. wrench.

e.g. M6 capscrews matche with 5 mm wrench, setscrew matches with 3 mm wrench

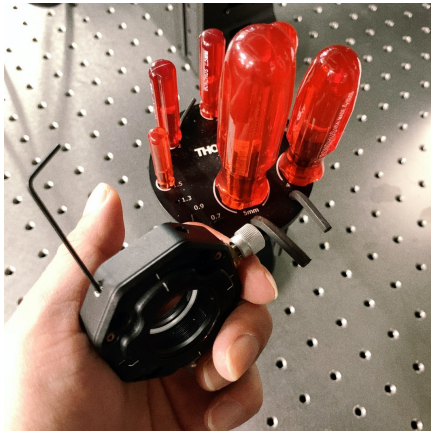




Other thread standards used in descSPIM
*large apertures

SM1:	1 inch lens tube
SM2:	2 inch lens tube
c-mount:	Camera port
M25:	Objective lens

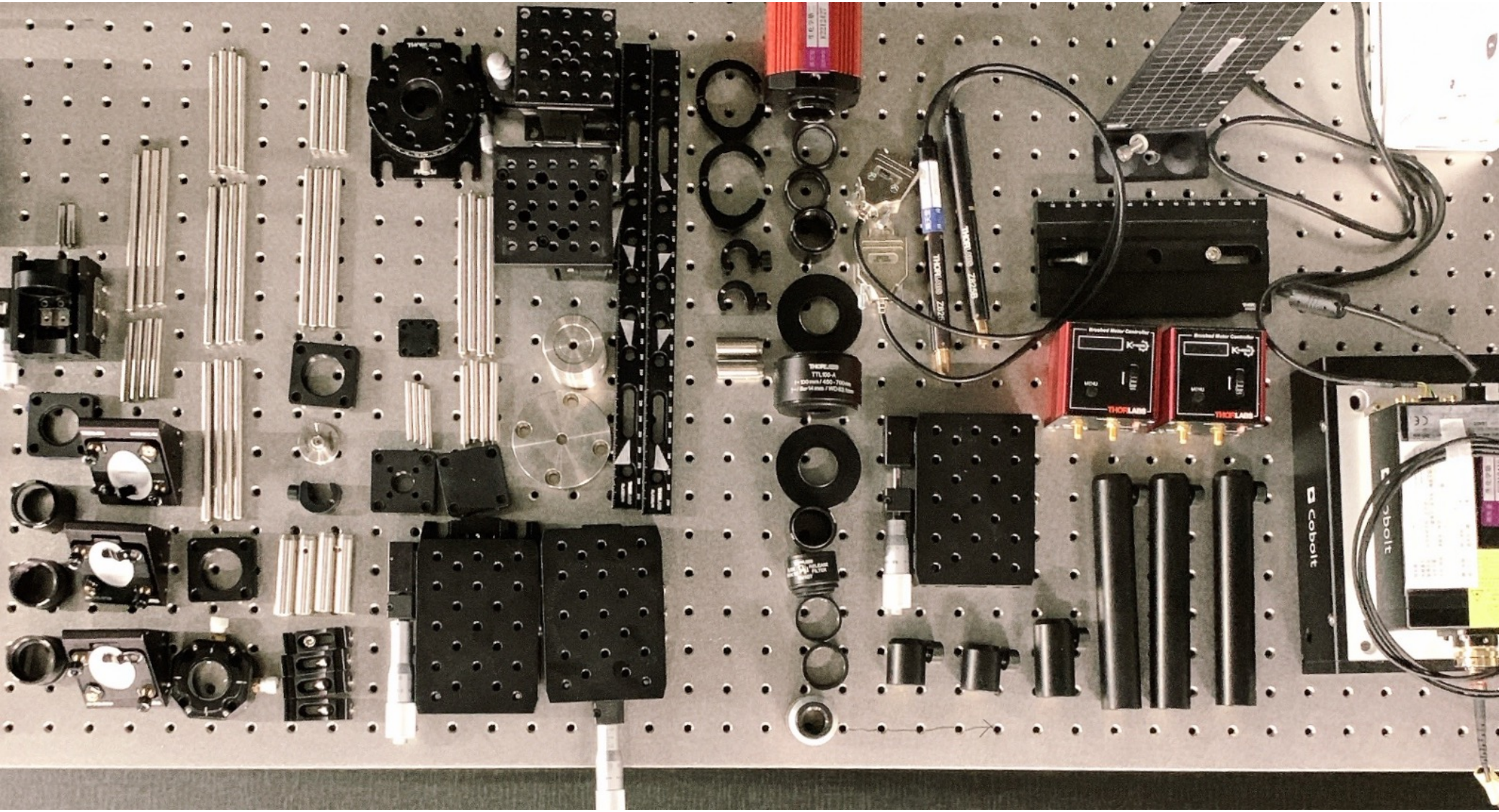
*Although metric parts, some setscrews included are inch-standard.
(metric wrenches can be used in case).



1.3 mm wrench fits with #4-40 setscrew
(Left) Cage assembly rod
(center) Ø25 mm to Ø25.4 mm (Ø1") optical elements
XY movement mount for 30 mm cage system

#8-32 setscrew accepts 2 mm wrench
(Right) 30 mm cage with SM1 thread Plate

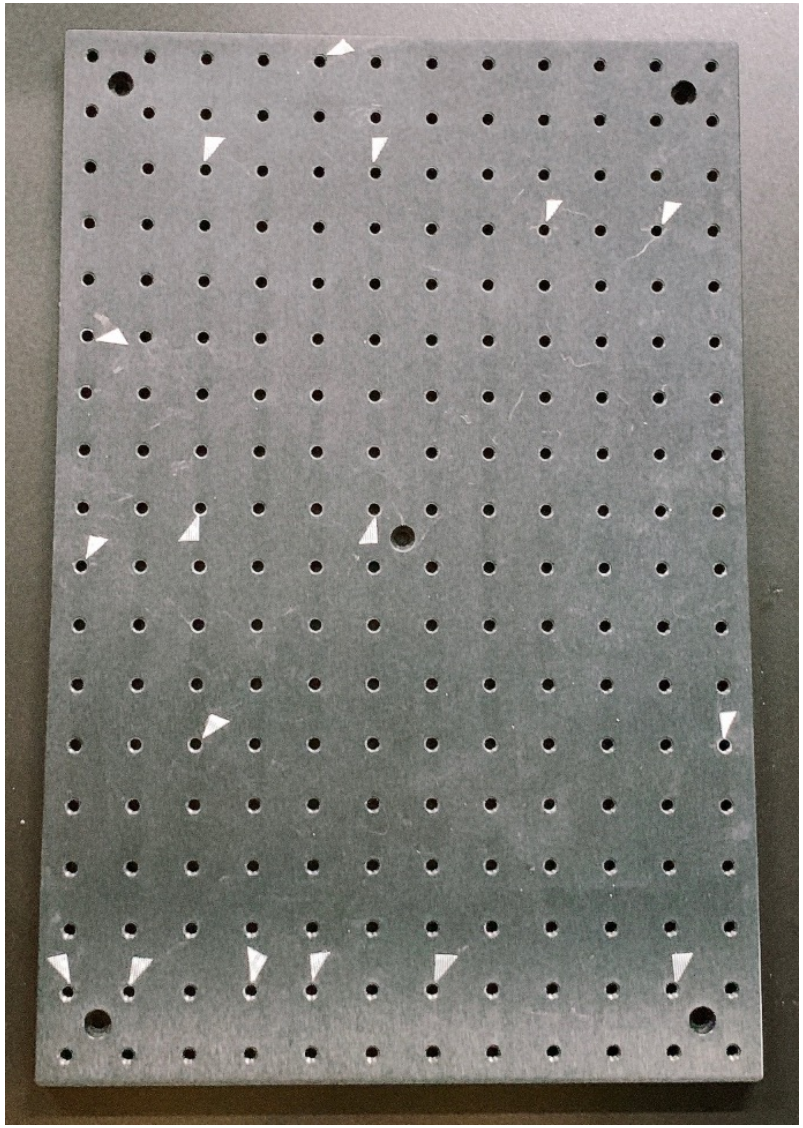
1. Parts check



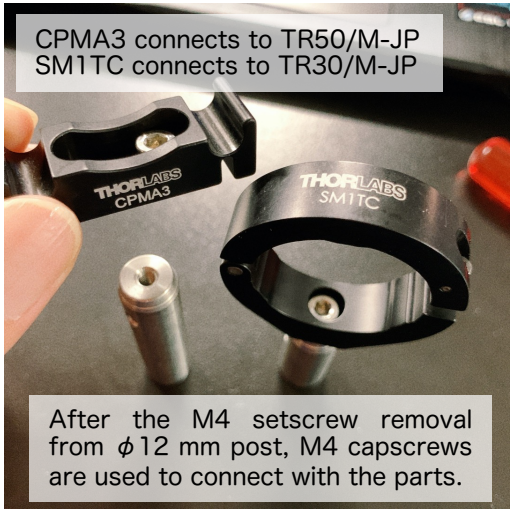
+ Screws, Wrenches, Breadboards

2. Prep. before constructions

・Mark thread positions on the Breadboard (MB3045/M) just in case



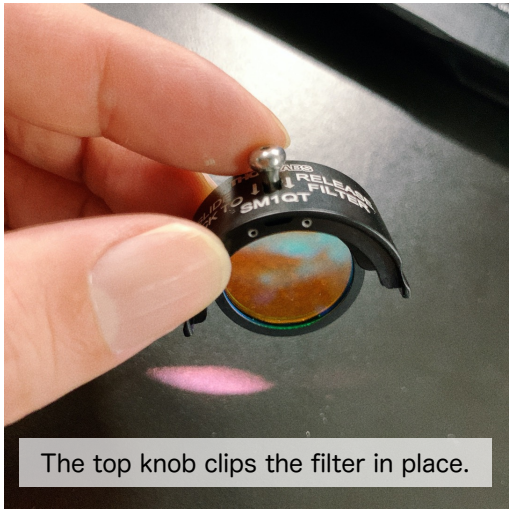
・Connect CPMA3 and SM1TC on ϕ12 mm post



CPMA3 connects to TR50/M-JP
SM1TC connects to TR30/M-JP

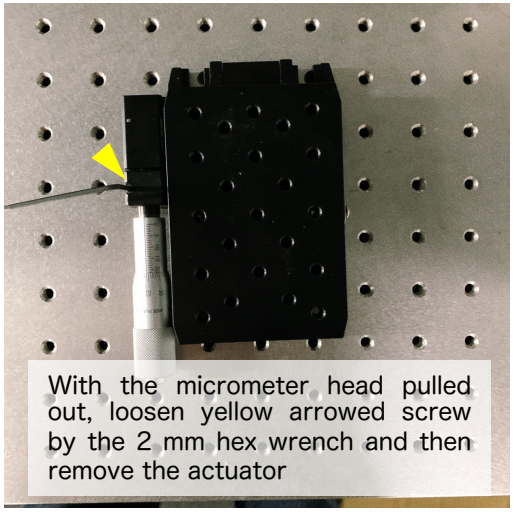
After the M4 setscrew removal from ϕ12 mm post, M4 capscrews are used to connect with the parts.

・Set emission filter to filter exchanger carriage (SM1QT)

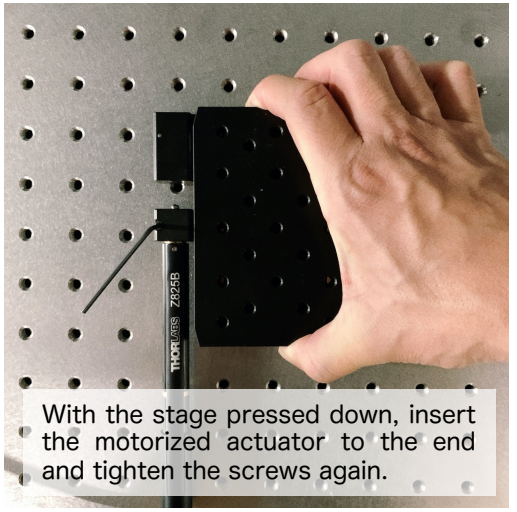


The top knob clips the filter in place.

・Replace the actuators of single-axis stages (XR25P/M; 2 out of 3) from micrometer heads to motorized ones (Z825B)



With the micrometer head pulled out, loosen yellow arrowed screw by the 2 mm hex wrench and then remove the actuator

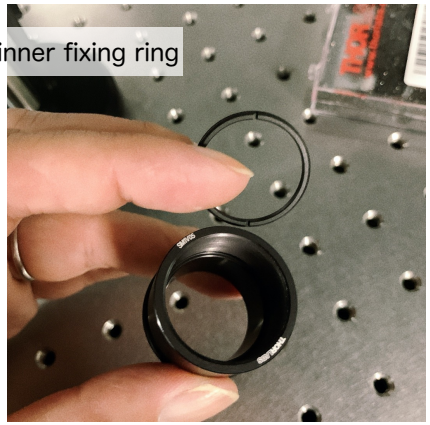


With the stage pressed down, insert the motorized actuator to the end and tighten the screws again.

2. Prep. before constructions

Set elliptical mirrors (BBE1-E02) to mirror mounts (KCB1EC/M) (x 3)

- Cylindrical lenses (LJ1144RM-A, ACY254-150-A) mounted on adjustable lens tube (SM1V05)
  ＊As for ACY254-150-A (thicker than SM1V05), set into SM1L10 and then connect to SM1V05



SPW602: optional for
setting inner fixing ring

Similarly, set the achromatic lens (AC254-100-A) into the XY movement mount (CXY1A) for the 30 mm cage system; set a fiber adapter (SM1FCA) into the 30 mm cage plate (CP33/M) with SM1 thread.

3. Installing the parts directly onto the breadboard

Post Holder
(PH150/M)

Laser light source (Cobolt Skyra)

CRITICAL

DO NOT BENT the optical fiber
(Sealed glass tubes with a diameter same with a hair)

Single-axis stages
(XR25P/M, Z825B)

Safety Screen
(TPSM1/M)

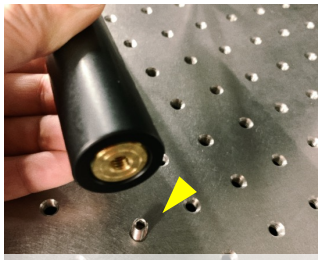
Post Holder
(PH50/M)

Pedestal of
KDC101

DC Servo Controller
(KDC101)

Dovetail Optical Rail
(XR25DR2)

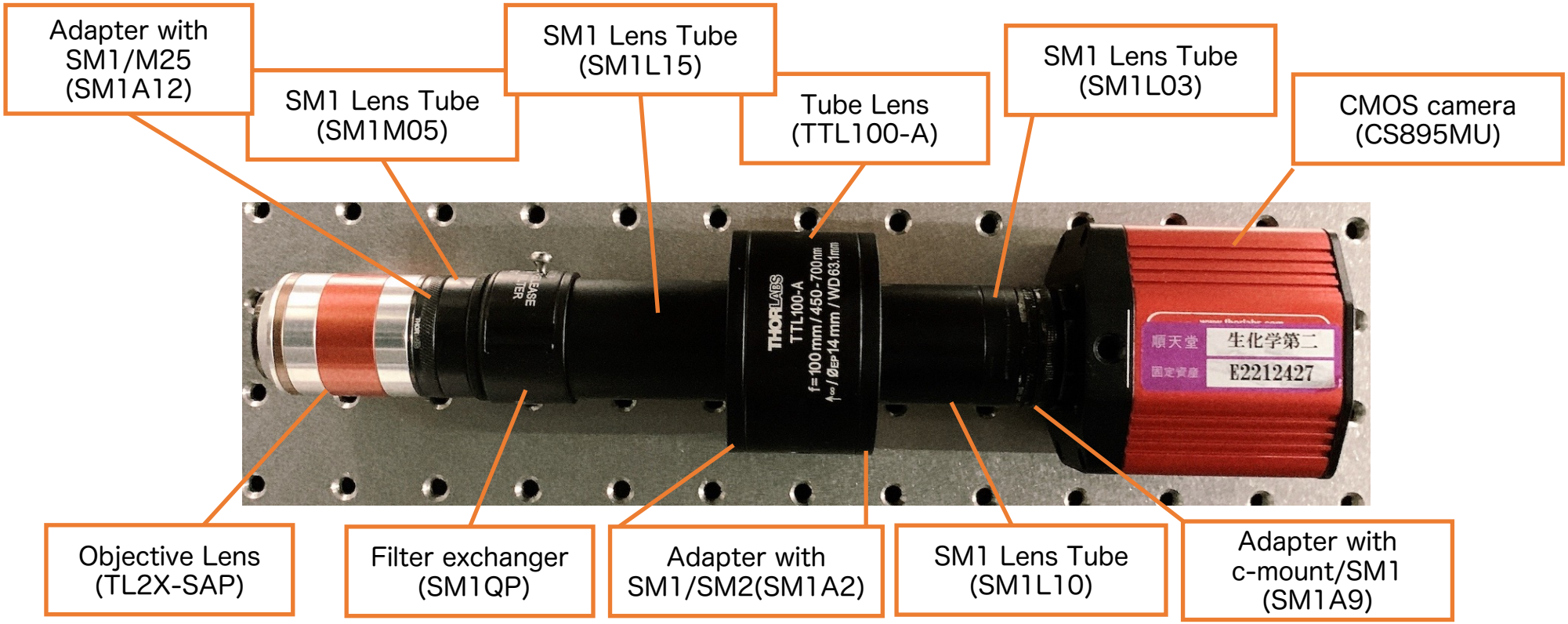
To place post holders

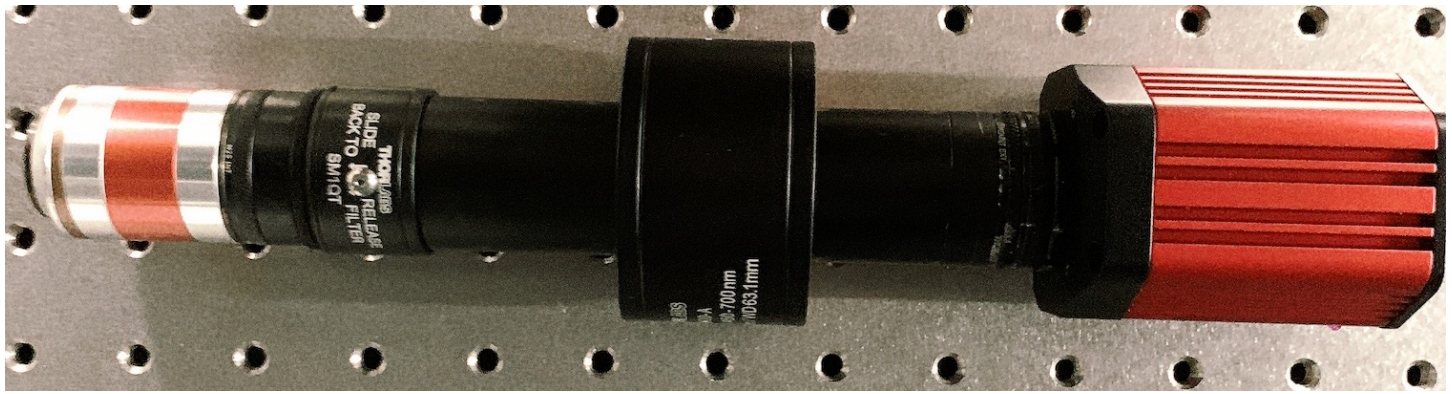


Insert a M6 capscrew to breadboard about 2 turns with screw hole facing up

Push and turn the post holder against the setscrew

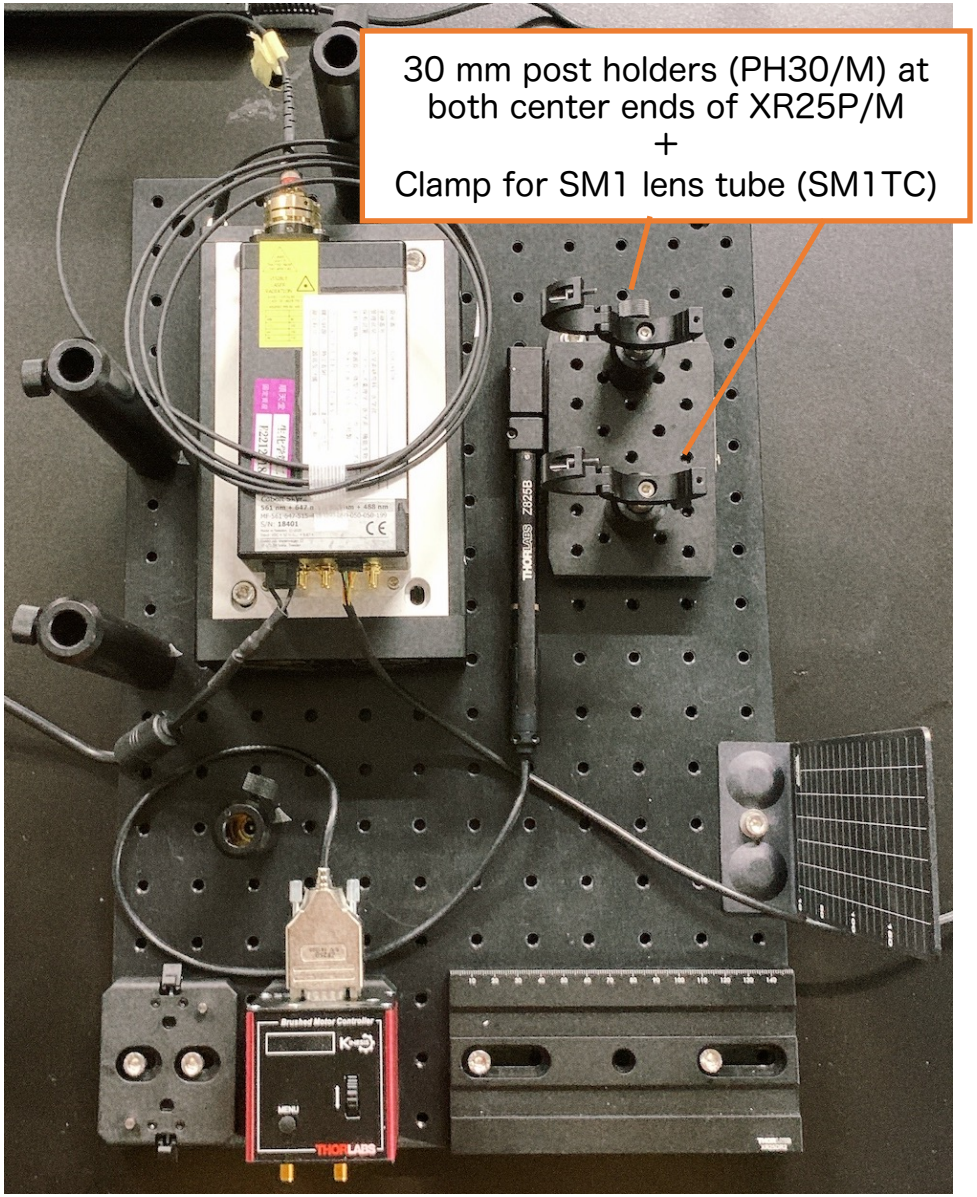
4. Assembly of detection optics

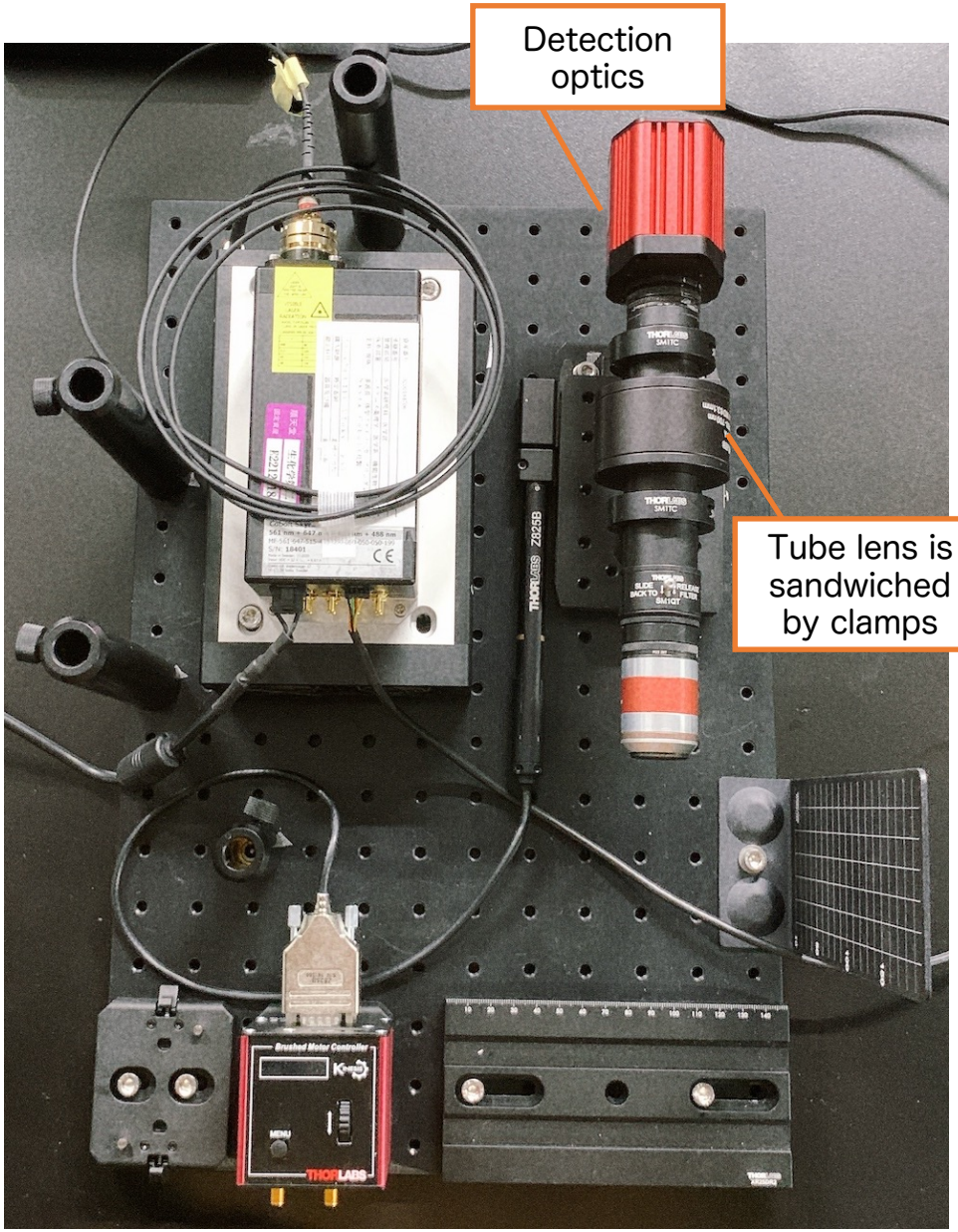




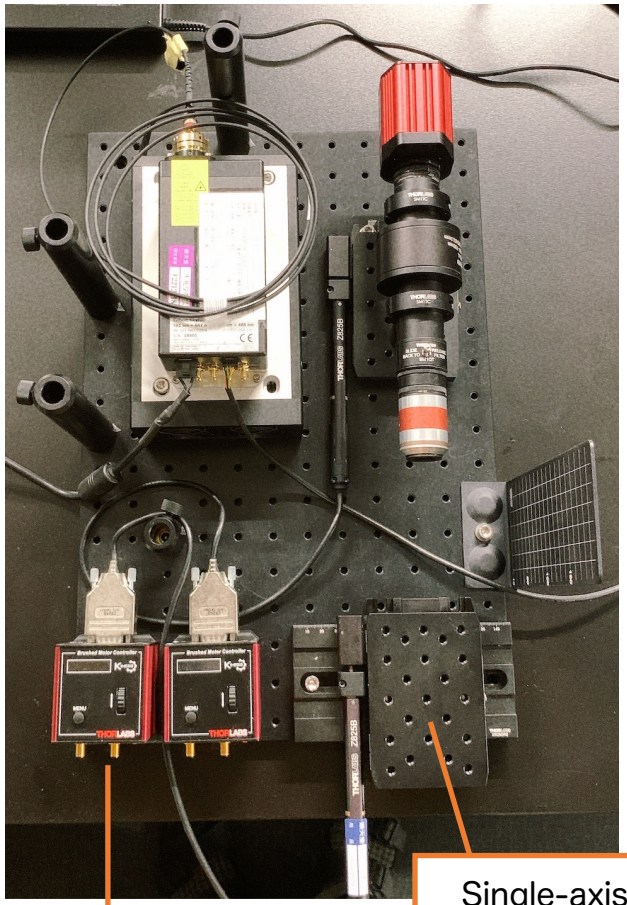
*Align the long axis of the CMOS camera same direction to the filter exchanger knob by the fixing screw on the camera.

5. Installing detection optics

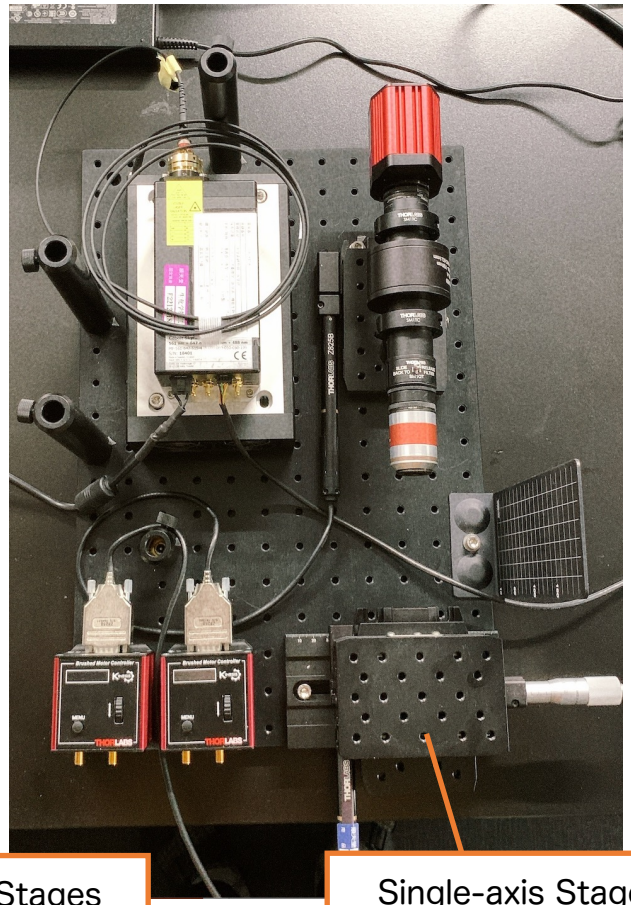




6. Sample stage construction



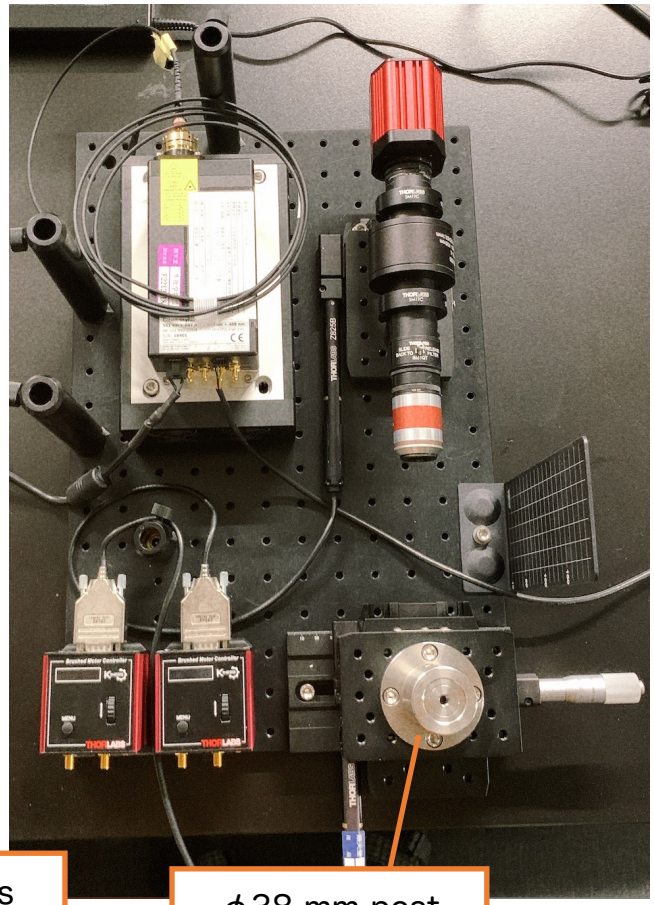
DC Servo Controller (KDC101)



Single-axis Stages (XR25P/M, Z825B)

＊Fine z-axis stages

＊Coarse x axis Stages (Dovetail rail)

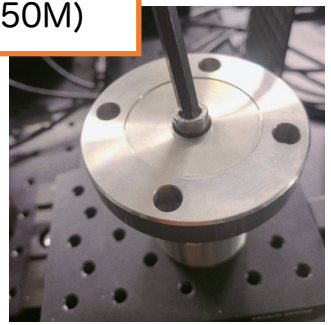


Single-axis Stages (XR25P/M)*Manual

＊Fine x-axis Stages

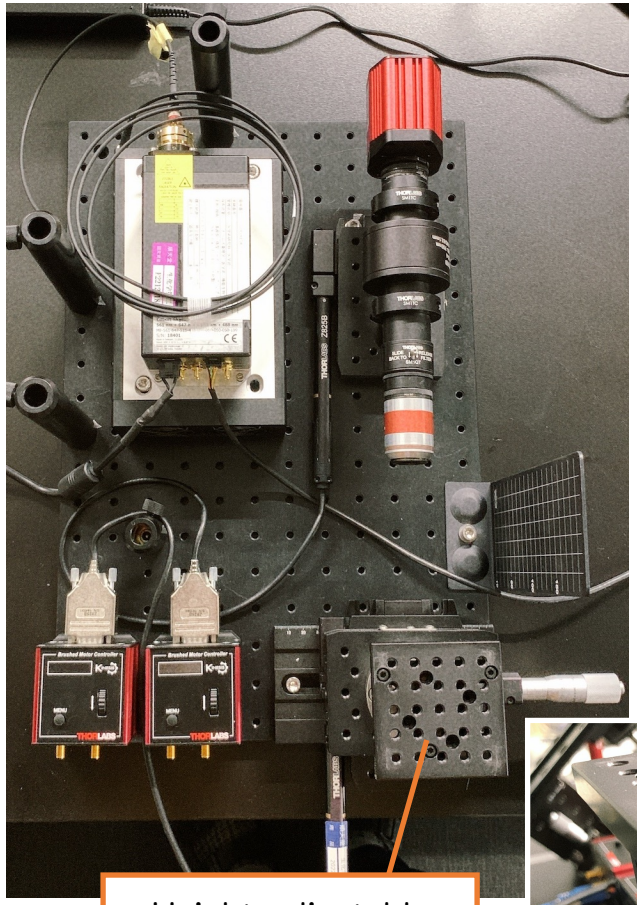
＊Coarse z axis Stages (Dovetail rail)

ϕ38 mm post (PB1+P50M)



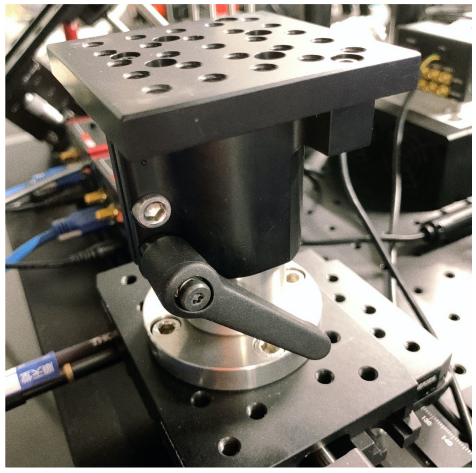
＊Connect with M6 capscrew

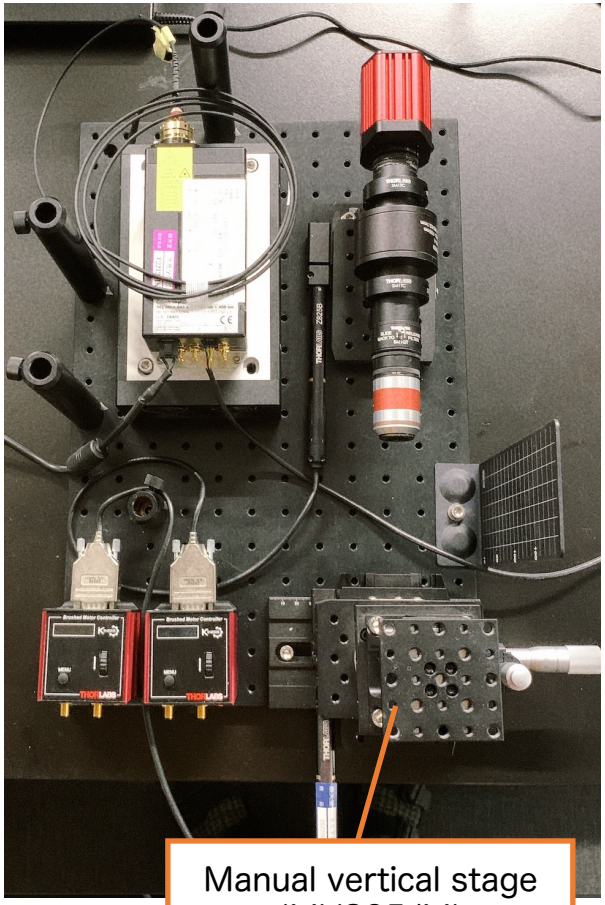
6. Sample stage construction



Height-adjustable platform (C1519/M)

＊ Coarse y-axis stage

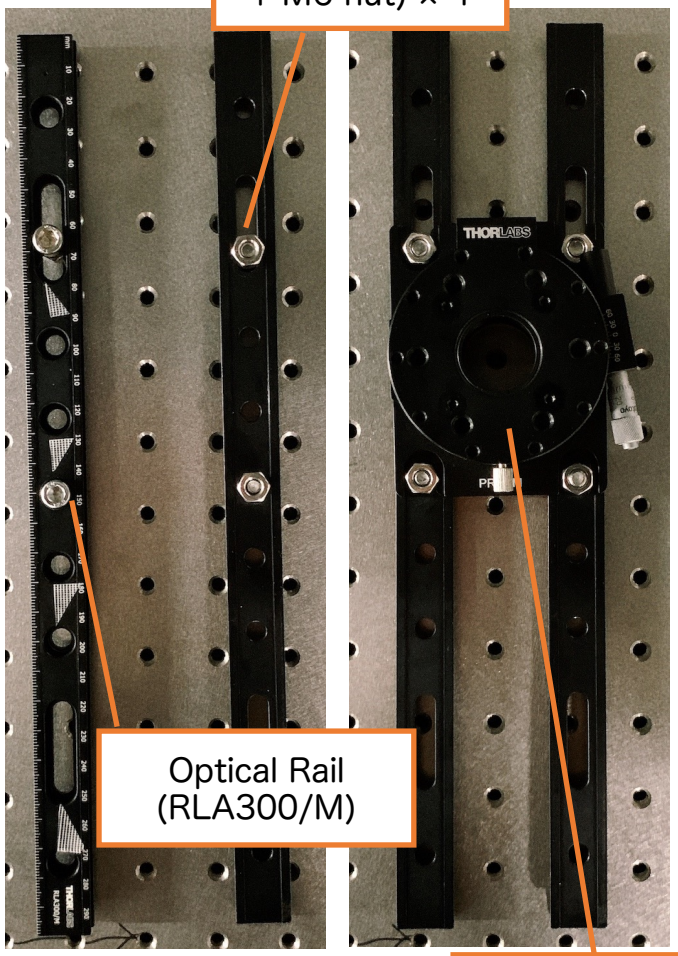




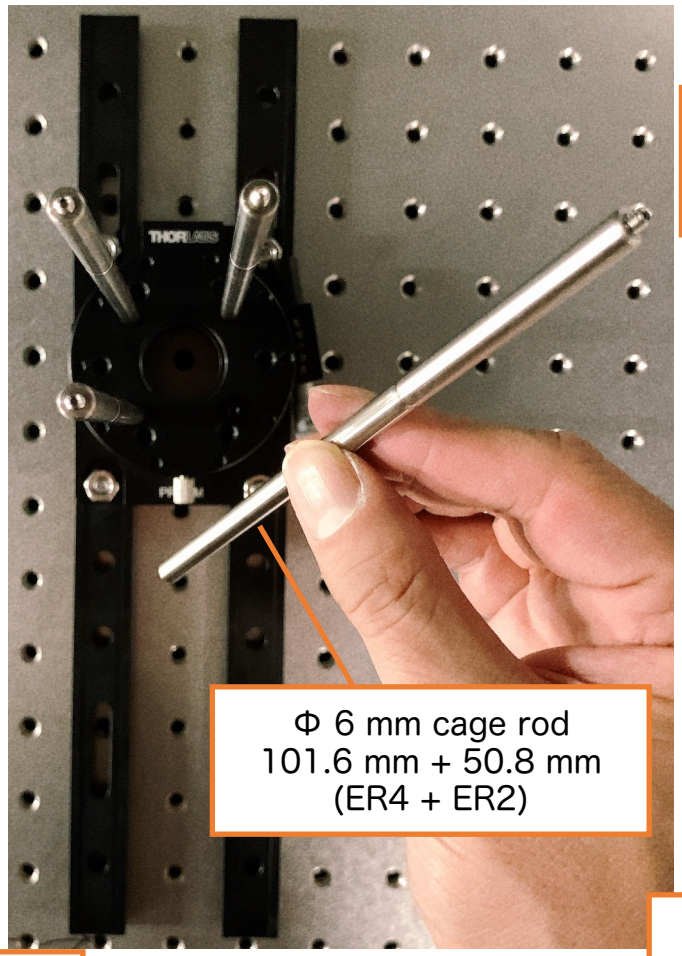
Manual vertical stage (MVS05/M)

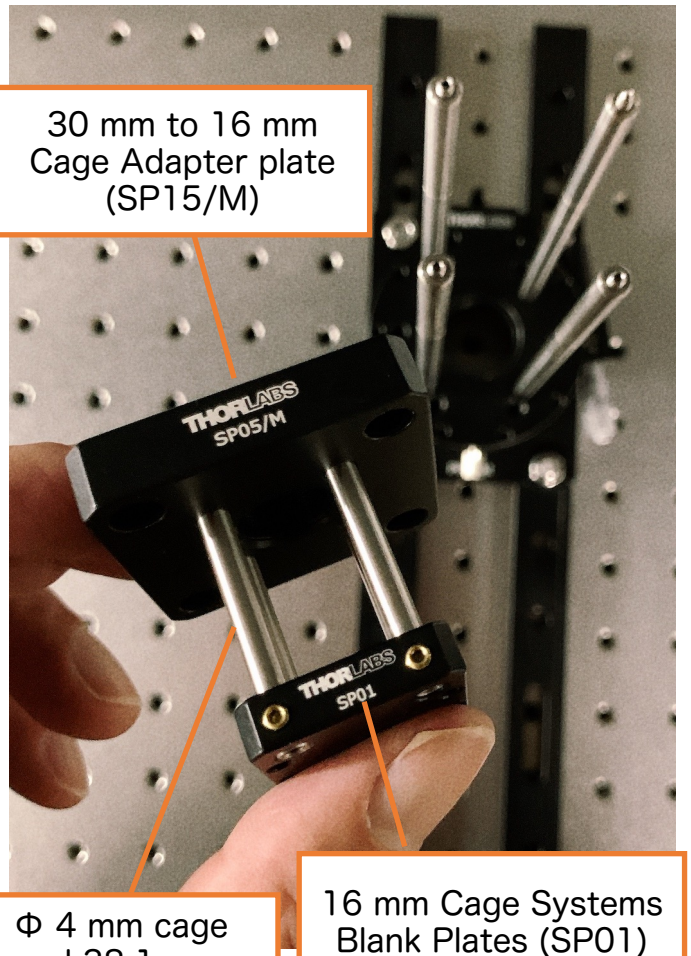
＊ Fine y-axis Stages

6. Sample stage construction

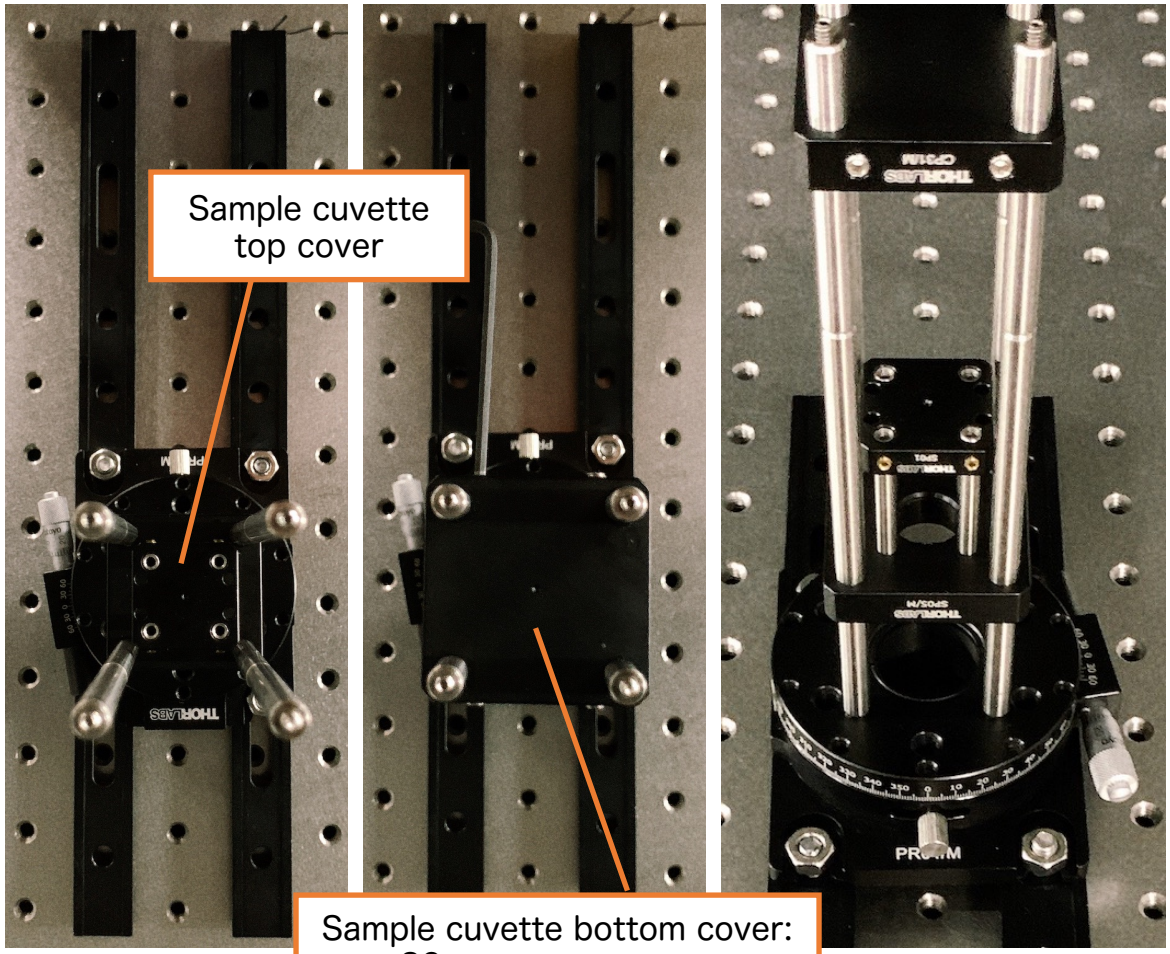


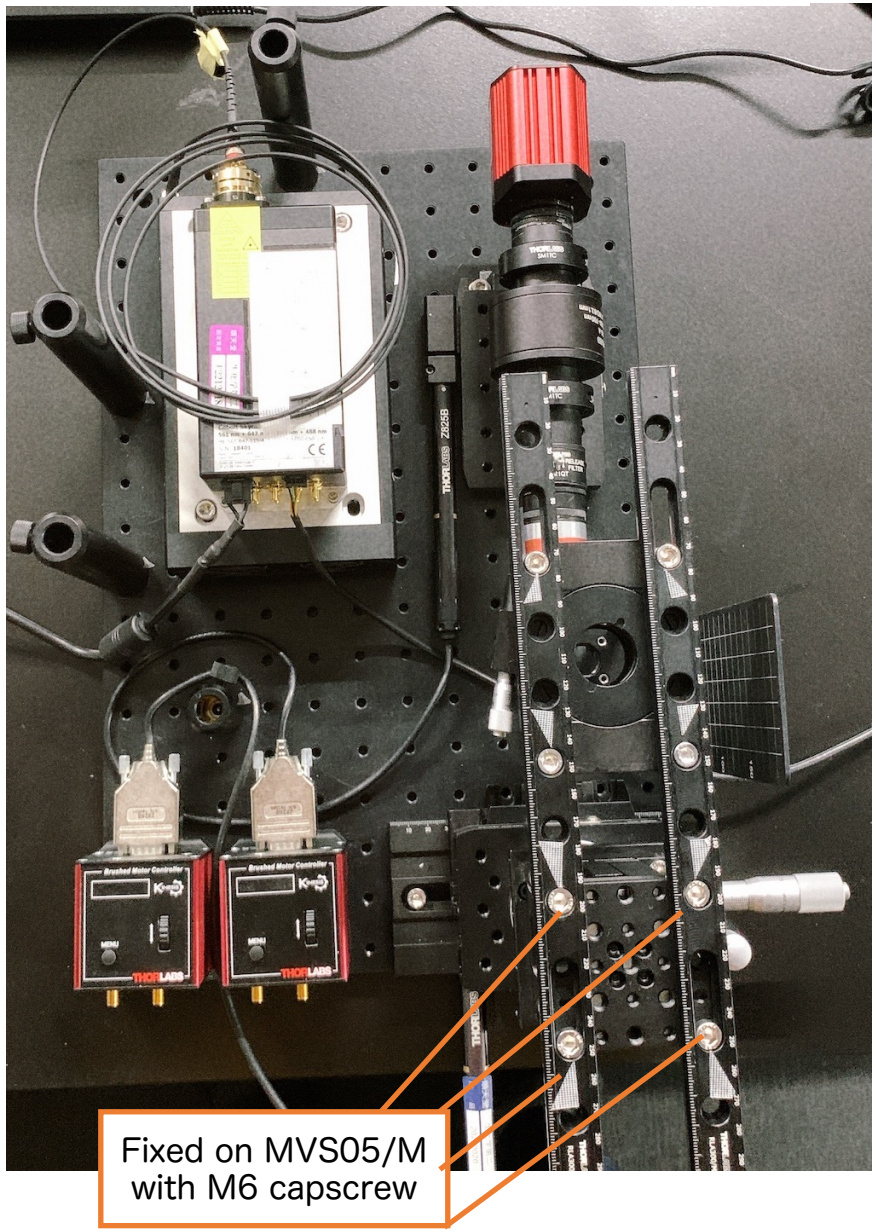
∗ Coarse/Fine θ-stage



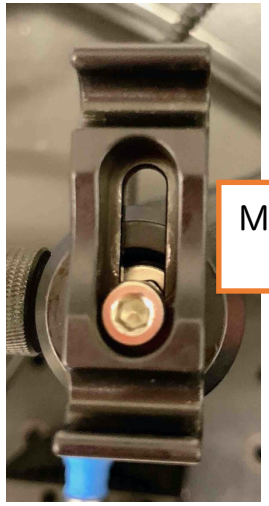


6. Sample stage construction



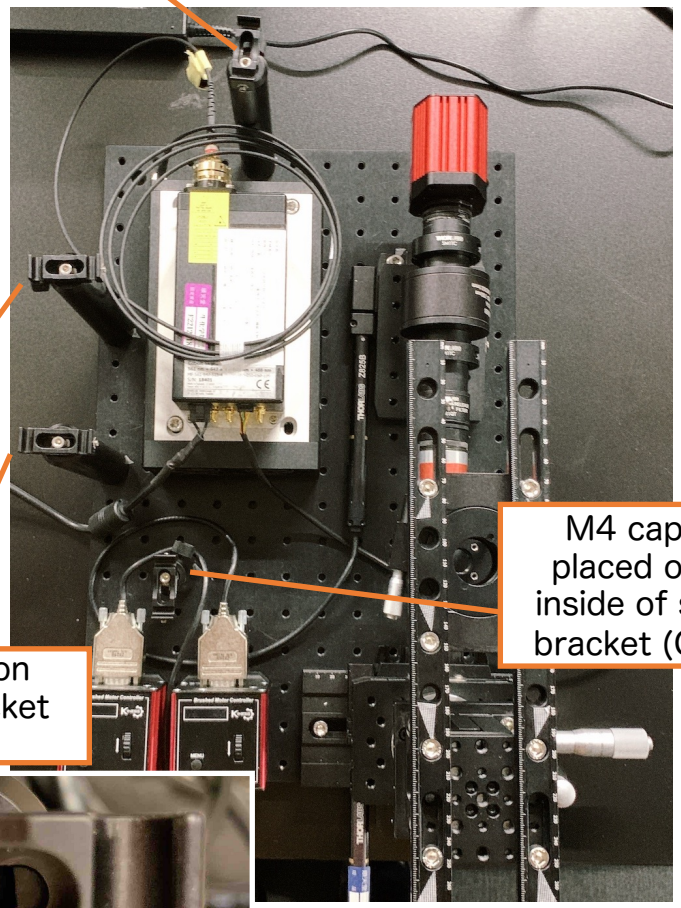


7. Installing excitation optics



＊Insert ϕ12 mm post fully so that snap-on bracket directly attached above ϕ12 mm post holder

M4 capscrew placed on edge inside of snap-on bracket (CPMA3)

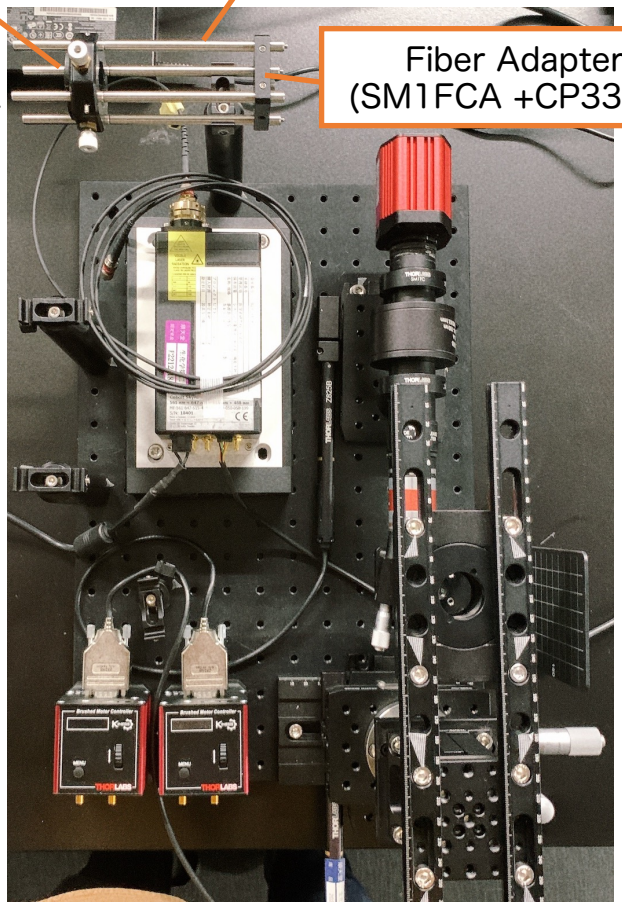


＊ca. 100 mm from output position of SMF to the central position of the lens

Collimating lens (AC254-100A +CXY1A)

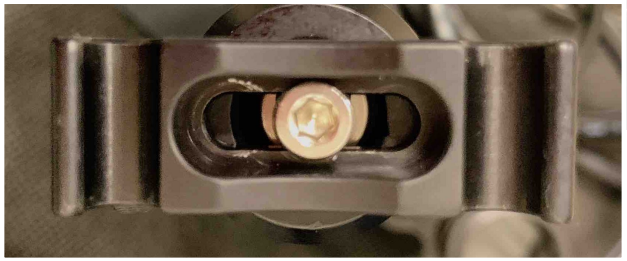
Φ 6 mm cage rod 101.6 mm + 50.8 mm (ER4 + ER2)

Fiber Adapter (SM1FCA +CP33/M)



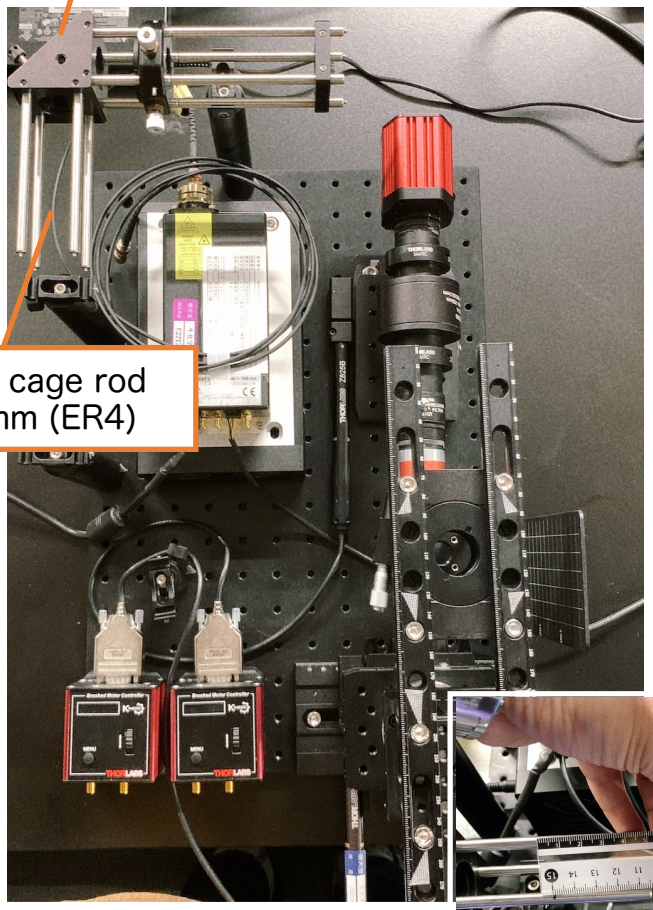
M4 capscrew placed on edge inside of snap-on bracket (CPMA3)

M4 capscrew placed on center of snap-on bracket (CPMA3)



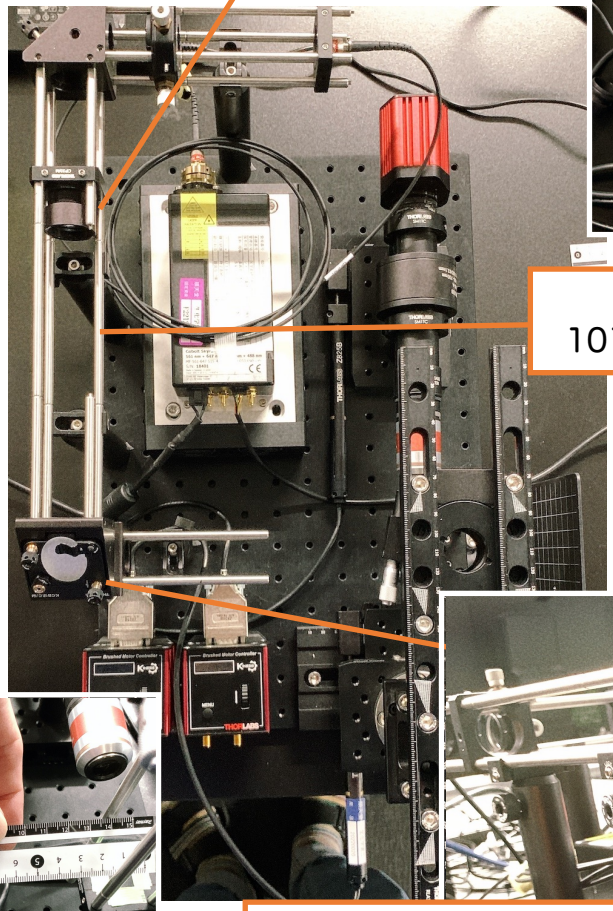
7. Installing excitation optics

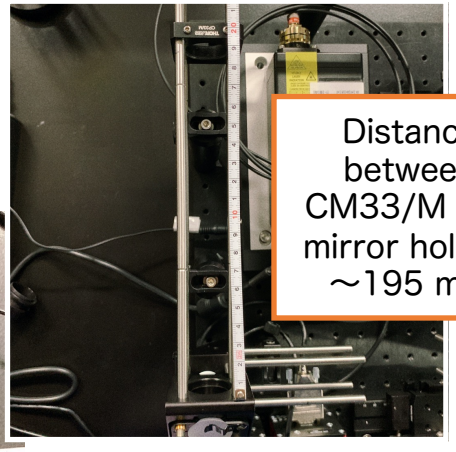
Elliptical mirror
(BBE-E02+KCB1EC/M)



Φ 6 mm cage rod
101.6 mm (ER4)

Cage plate with SM1 thread (CP33/M)
for setting of f = 500 cylindrical lens



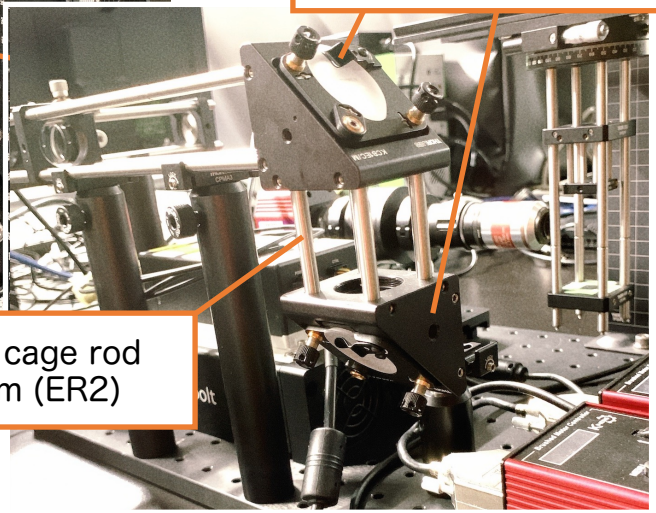


Distance
between
CM33/M and
mirror holder:
～195 mm

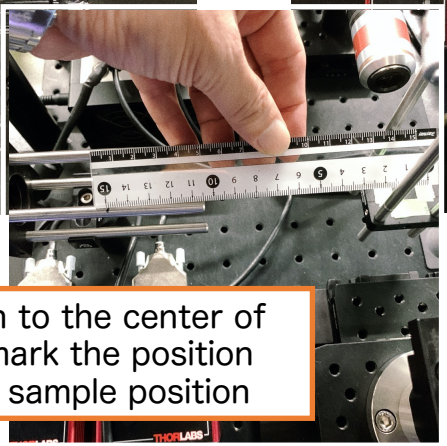
Φ 6 mm cage rod
101.6 mm + 76.2 mm (ER4+ER3)

＊ Remove one rod for f = 500 mm
cylindrical lens exchanging

Elliptical mirror
(BBE-E02+KCB1EC/M

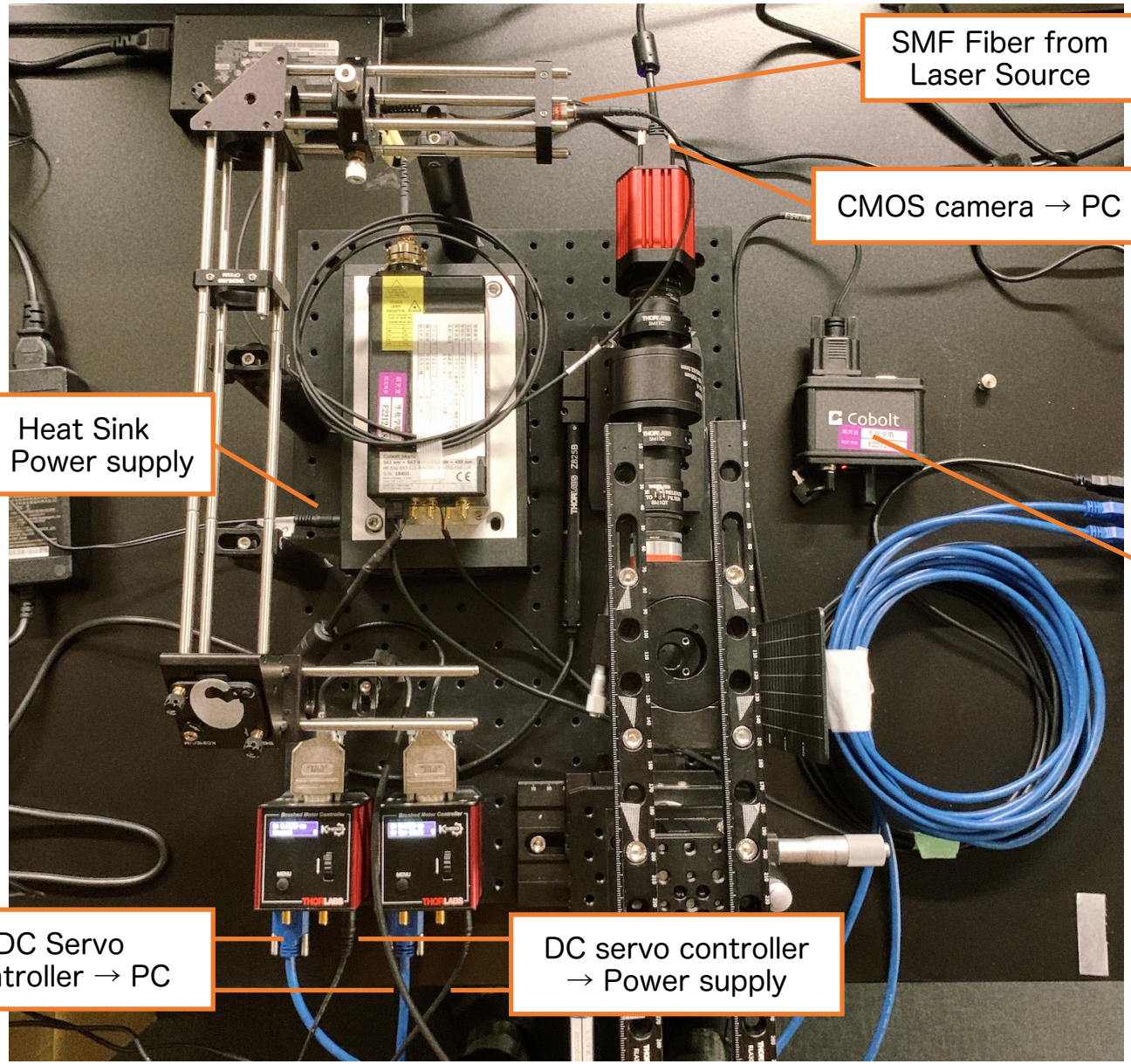


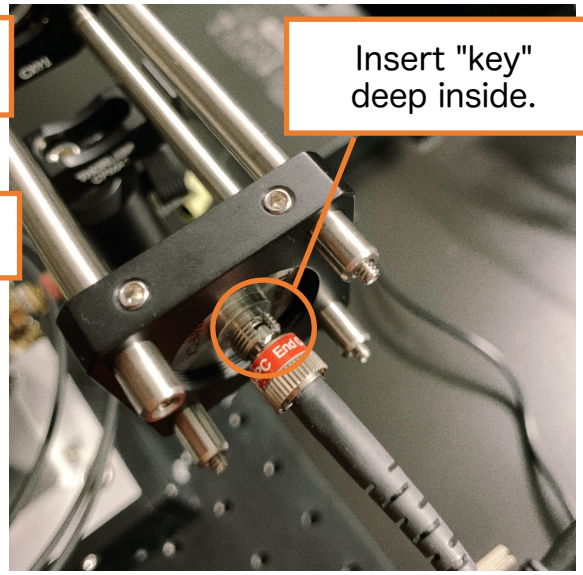
Φ 6 mm cage rod
50.8 mm (ER2)



Move the sample position to the center of
the objective lens, and mark the position
about 150 mm from the sample position

8. Cable connections





＊Correctly install and adjust the cylindrical lenses when the optical axis alignment