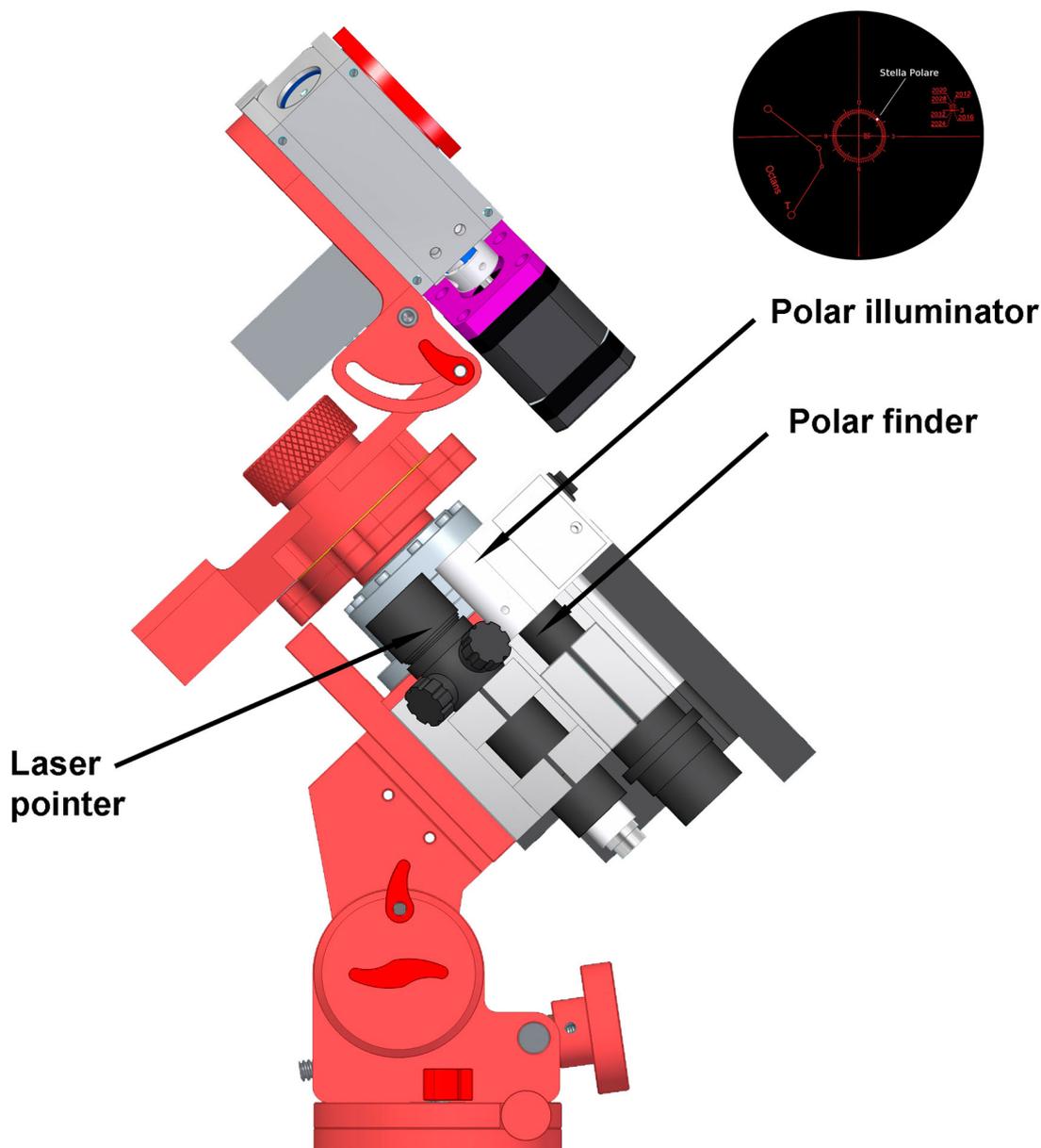
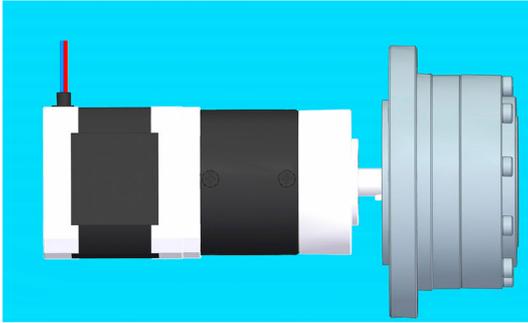


After retiring at 67, I had the time to dedicate myself to something I liked — time-lapse photography — and I built myself a 3-axis slider. I bought the controller from Black Forest Motion. The Pine R is an older model, but it works well. It also has a function that allows me to control the right ascension axis correctly. Once I had solved the mechanical problem, I found it easy to think of building an EQ head, but then I had to figure out how to control the two axes. After some searching, I found a Chinese manufacturer called Terrans Industry which uses open-source OnStep and makes fairly inexpensive controllers. This was the ideal solution for me, as I wouldn't have to invent anything. However, I'm unsure how to adapt a product designed to fit standard kits with settings built for those on sale.

Once the hardware issues are resolved, how will I manage the movements? I will have to learn to think differently to how I have up to now. Here is the project and a photo of what I have done so far.



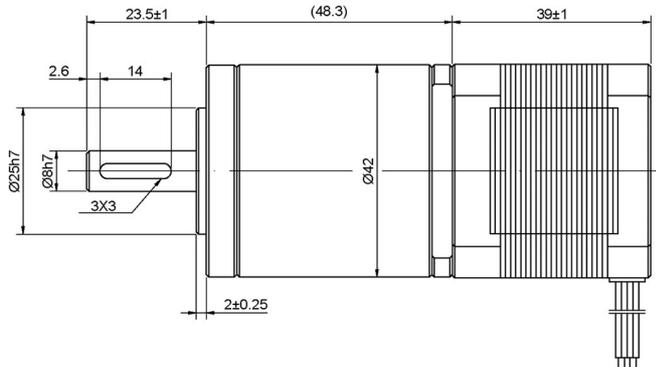
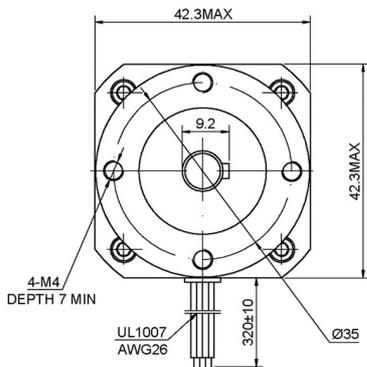
Harmonic  
 17HS15-1684S-HG20 drive  
 Gear ratio 1:20 X 1:50 = 1:1000  
 overall reduction  
 of the system



MODEL NO. 17HS15-1684S-HG20 DWG NO. A0709

CUSTOMER'S MODEL: NO MODEL  
 END COVER COLOR: GRAY

REV.	REVISION RECORD	BY	DATE
0	ORIGIN	HW	5.17.2024



SPECIFICATION	CONNECTION	BIPOLAR
AMPS/PHASE		1.68
RESISTANCE/PHASE(Ohms)@25°C		1.60±10%
INDUCTANCE/PHASE(mH)@1KHz		3.20±20%
HOLDING TORQUE w/o GEARBOX(Nm)[lb-in]		0.39[3.45]
STEP ANGLE w/o GEARBOX(°)		1.80±5.00%
GEAR RATIO		20
MAX.PERMISSIBLE TORQUE(Nm)		10.00
MOMENT PERMISSIBLE TORQUE(Nm)		15.00
EFFICIENCY		85%
BACKLASH@NO-LOAD(arcmin)		<=50
LIFE(h)		6000
AMBIENT TEMPERATURE		-10°C~50°C[14°F~122°F]
INSULATION CLASS		B 130°C[266°F]
TEMPERATURE RISE		MAX.80°C

COMMENT:  
 1.DYNAMIC AXIAL LOAD: 50N MAX  
 2.DYNAMIC RADIAL LOAD @ SHAFT LENGTH 20mm: 100N MAX  
 3.TMBF 6000h OR MORE @ 24V/300RPM  
 4.INSULATION RESISTANCE (NORMAL TEMPERATURE AND HUMIDITY): 100 Mohm  
 5.DIELECTRIC STRENGTH 500VAC FOR 1MIN.(BETWEEN THE MOTOR COILS AND THE MOTOR CASE )

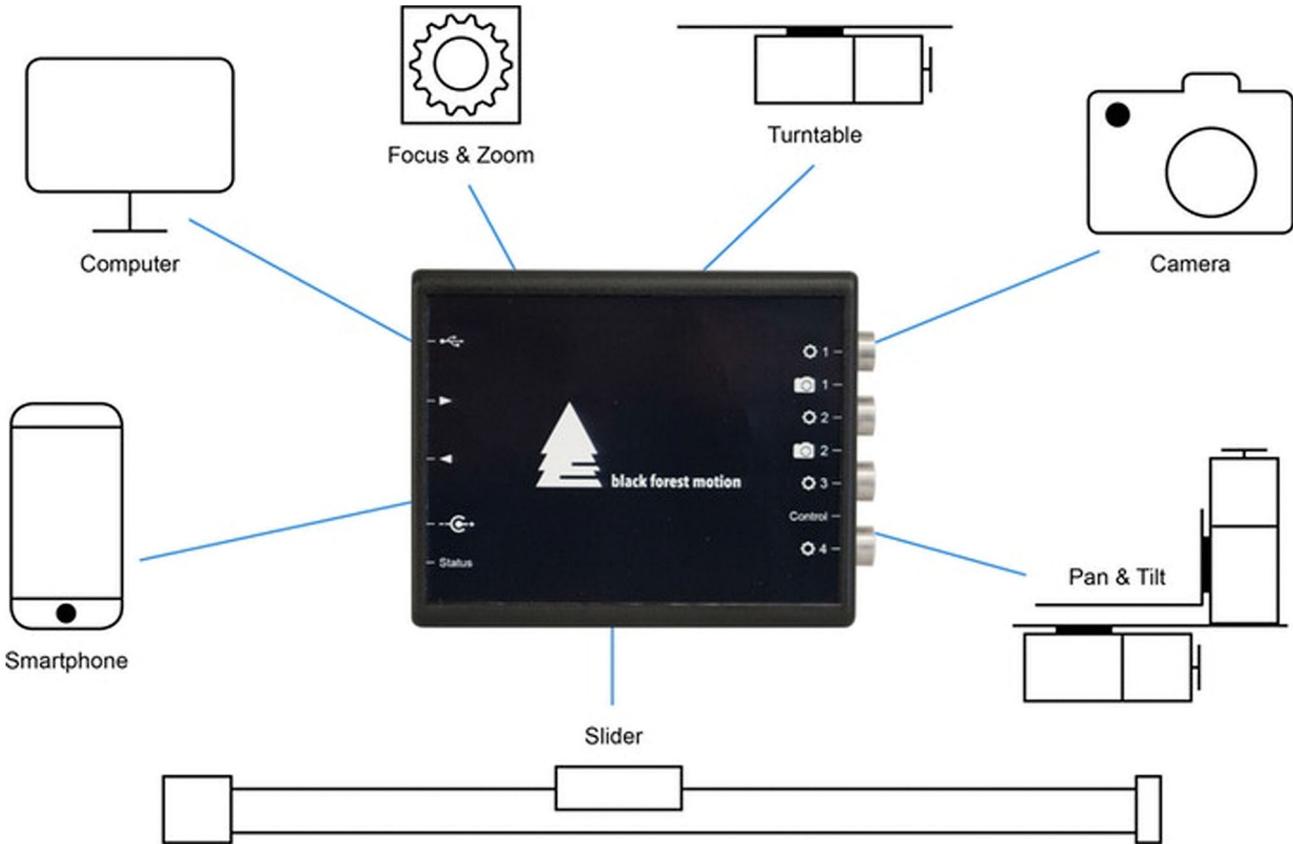
MOTOR CONNECTION(EHR-6)			
PIN NO	BIPOLAR	LEADS	WINDING
1	A+	BLK	
2	A-	GRN	
3	B+	RED	
4	B-	BLU	

FULL STEP 2 PHASE-Ex. WHEN FACING MOUNTING END (X)					DIMENSIONS ARE IN MILLIMETERS.	
STEP	A+	B+	A-	B-	CCW	TOLERANCES AS BELOW:
1	+	+	-	-		DECIMALS ANGLES
2	-	+	+	-		X ±0.5 ±2°
3	-	-	+	+		X.X ±0.25 ±2°
4	+	-	-	+		X.XX ±0.13 ±2°
					THIRD ANGLE PROJECTION	
THIS DOCUMENT SHALL NOT BE REPRODUCED NOR SHALL THE INFORMATION CONTAINED HEREIN BE USED BY OR DISCLOSED TO OTHERS UNLESS EXPRESSLY AUTHORIZED IN BY WRITING STEPPERONLINE.					SIGNATURE	DATE
					DRN HW	5.17.2024
					APVD SY	5.20.2024

<b>STEPPERONLINE®</b>						
STEPPER MOTOR						
17HS15-1684S-HG20						
REV.	0	SCALE	1:1	DWG NO.	A0709	

<https://blackforestmotion.com>

## PINE R Controller



<https://www.terransindustry.com>



TERRANS INDUSTRY

### Onstep V5 telescope upgrade controller unit

\$135.60

Version: ONSTP EXOS2 V5 PRO CONTROLLER UNIT

Onstp EXOS2 V5 Pro controller unit

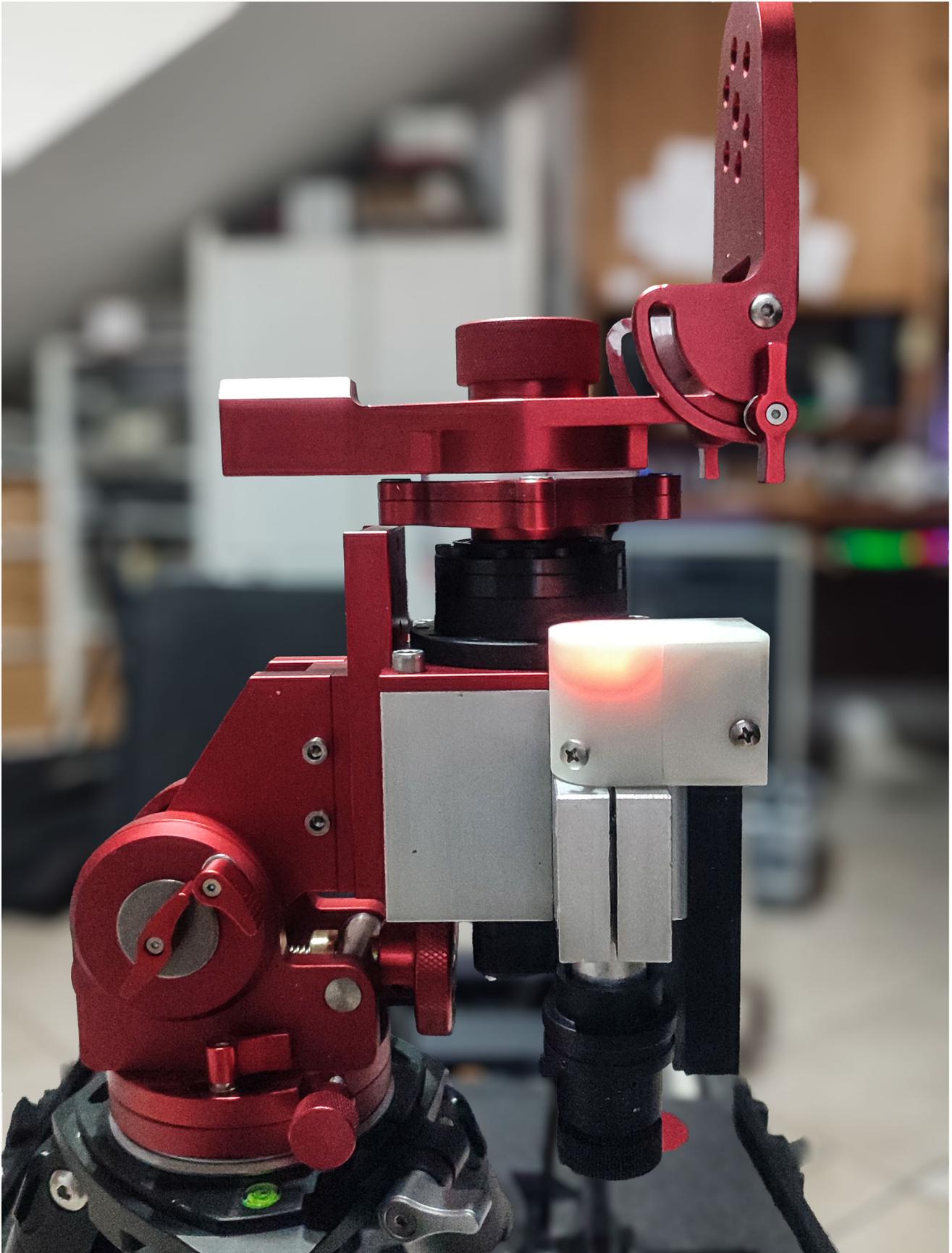
Quantity

- 1 +

Add to Cart

Share     

**I just need to finish building the laser mount;  
the mechanical part is complete.**



I also designed and built this one. It's simple electromechanics, and I didn't encounter any major problems during the construction process. To be honest, I experienced a few short circuits with the batteries, but luckily the consequences were minimal.



Battery charger from the mains and solar



Powerbox



24V 7S3P 18650 10Ah lithium battery