



**CDK700 TELESCOPE  
INSTALLATION MANUAL**

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# 1. UNPACKING AND STAGING

## 1.1. OVERVIEW

The CDK700 ships in 3 crates. The largest crate contains the fork mount, and the bottom cage of the optical tube with the primary mirror installed. The second crate contains the upper cage including the secondary mirror. The third crate contains the electronics enclosure and the cables.

Depending on the accessories ordered with the telescope, additional small parts may be packed in each crate or in a fourth crate as necessary.



Figure 1 Shipping crates

Crate	Dimensions (in)	Weight (lbs)
CDK700 Fork and Base	50x54x74	1600
CDK700 Upper Cage	43x43x54	400
CDK700 Electronics	41x45x24	400

Table 1 Crate specifications (approximate)

## 1.2. UNCRATING

### 1.2.1. Fork and Base

To uncrate the telescope mount (the large crate), begin by removing the front cover of the crate. Note that the front cover is attached with screws in the locations shown in Figure 2. Note that the screws along the top are installed vertically through the top panel of the crate.



Figure 2 Removing the front panel

After removing the front cover, remove the screws along the bottom edges of all the other sides and slide the entire remaining part of the crate off the pallet base. Remove any accessories packed in the crate and set them aside.



Figure 3 Removing the sides/top

Using a  $\frac{3}{4}$ " socket or wrench, remove the 8 lag bolts holding the shipping brackets to the pallet.



*Figure 4 Detaching the shipping brackets from the pallet*

The Fork section is now ready to be lifted into place, as described later in this document.

### 1.2.2. Upper Cage

The upper cage (in the middle sized crate) includes the secondary mirror, so care should be taken to prevent jarring the assembly or making contact with the mirror surface. The crate can be unpacked in two ways, depending on the equipment available:

**Option 1:** By hand: Remove the front panel of the crate and any wooden braces securing the upper cage in place. Slide the upper cage assembly out by hand and set it in a secure location.



*Figure 5 Upper cage crate with front panel removed*

**Option 2: By Crane:** Remove the top cover of the crate and any wooden braces securing the upper cage in place. Attach lifting straps to the upper ring and lift the assembly out of the crate using a hoist or crane. Place it in a secure location.



Figure 6 Upper cage ready to be lifted out of crate

### 1.2.3. Control Box

Remove the top cover of the control box crate and any wood bracing securing the control box in the crate. Remove any accessories or cables packed in the crate and set them aside. With two or three people, lift the control box out of the crate and place it at the install location.



Figure 7 Unpacking the control box

## 2. PIER PREPARATIONS

The pier should have three threaded rods coming out of its top surface. We recommend these to be  $\frac{3}{4}$ "-10 threads extending at least 5-6" above the pier. Put a nut and washer on each threaded rod the same distance from the top (at least 2"). The telescope base will be set directly onto these washers and the nuts will be used for leveling later in this procedure. Leave

enough space below the nuts to have access for running cables. If you want to set the telescope all the way down onto the pier, you will need to run the cables up through the center of the telescope while the crane is still holding the telescope up off of the pier.

If the telescope control cables will be run through a conduit in the pier, they should be installed before lifting the telescope into place. Pull the six control cables, one USB cable and cables for any other accessories (optionally including an AC extension cord) through the conduit, leaving approximately 2-3 feet of cable to make the connections to the telescope. Note: the female ends of the cables connect to the telescope and the male ends to the control cabinet.



*Figure 8 Pier with cable conduit*



*Figure 9 Pier without cable conduit (the cables will be run along the floor under the telescope)*

### **3. INSTALLATION**

#### **3.1. BASE AND FORK**

Attach the provided D-shackles and straps to the lifting points at the top of the fork arms. Lift the telescope with a crane or hoist and move it into position over the pier. Avoid jarring the assembly or contaminating the optics with rain, dust, oil, etc. (The corrector lenses, primary mirror and tertiary mirror are installed.)



Figure 10 Rigging the fork for lifting



Figure 11 Lifting the fork into position

Rotate the Fork assembly to correctly align the No Wrap Position. If the install site is in the northern hemisphere, the label that says “NO WRAP” should point approximately South. For sites in the southern hemisphere, the label should point approximately North. The alignment of the No Wrap Position does not need to be precise;  $\pm 20^\circ$  is sufficient.



Figure 12 No Wrap position label

Lower the base of the telescope onto the threaded rods until it rests on the mounting nuts/washers. Confirm that there is enough space between the pier and telescope base for cable access. Adjust the mounting nuts up or down on the threaded rods if necessary.



Figure 13 Lowering the base/fork assembly onto the threaded rods

Use a bubble level and adjust the 3 mounting nuts until the telescope is approximately level. The telescope will function without being accurately leveled, but there are small advantages to having the telescope nearly level. Install and tighten 3 nuts on top of the telescope base plate to secure it in position.



Figure 14 Leveling and securing the base

Remove the D-shackles and lifting straps before proceeding to the next section.

### 3.2. UPPER CAGE

Remove the Primary Dust Cover that is taped to the top of the mid-ring. Lift and install the upper cage onto the mid-ring of the telescope. This can be done by hand with 2-4 people or more easily with a crane or hoist. The orientation of the upper cage is set by two pins in the mid-ring, one large and one small. Note the orientation of the pins and corresponding holes in the upper cage before lowering it into place.



*Figure 15 Lifting the upper cage into place*

When lowering the upper cage into place make sure that the cables and connectors for the secondary temperature sensors and dew heaters are not pinched between the two surfaces. These cables run inside of corresponding poles in the upper and lower truss. Once the upper cage is secured in place, these cables should be connected and tucked away out of the light path.



*Figure 16 Temperature sensor and dew heater cables*

Secure the upper cage in place with eight ½"-13 button head bolts (provided).



*Figure 17 Securing the upper cage*

Reinstall the Primary Dust Cover over the mid-ring.



*Figure 18 Installing the primary dust cover*

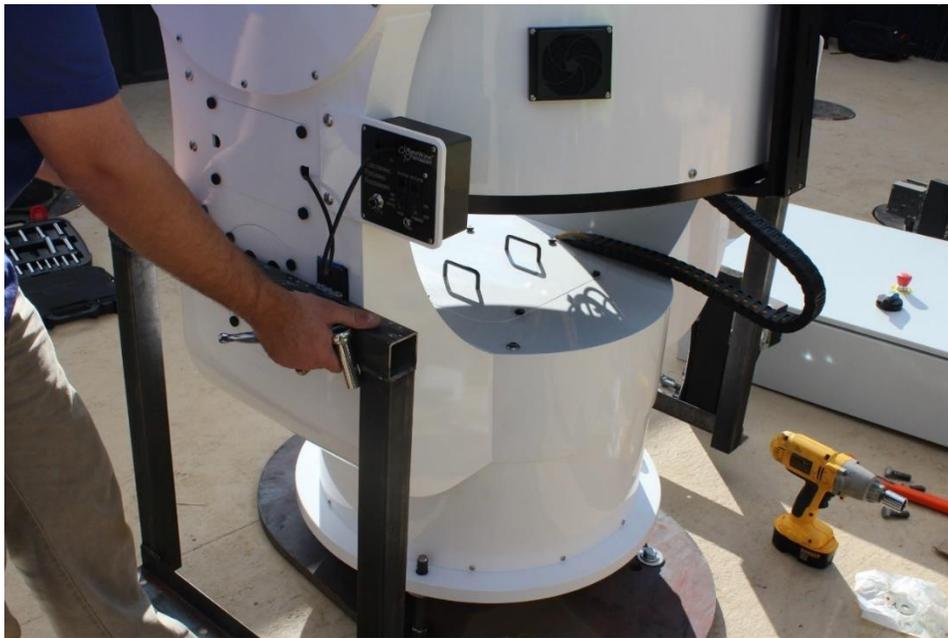
### **3.3. REMOVE SHIPPING FIXTURES**

Loosen and remove the two shipping straps from the telescope. These straps prevent motion of the altitude axis. Verify that the altitude axis is close to balanced, i.e. it does not quickly accelerate up or down on its own.



*Figure 19 Removing the shipping straps*

Remove the steel shipping brackets from the sides of the fork arms. Each bracket is held by four bolts that require a 9/16" socket or wrench.



*Figure 20 Removing the shipping brackets*

The azimuth axis is shipped with a lock in place to prevent rotation or damage during transport. To unlock the axis, first remove the 4 button head screws (1/2"-20) on the base of the fork. These screws are only used as covers to prevent contaminants from entering the access holes.



Figure 21 Removing the access hole covers

Then take the 5/16" T-handle Allen wrench provided with the telescope and place it in one of the four holes to access the locking mechanism. Turn counter-clockwise until you feel the resistance increase significantly (do not exceed two full turns). Do this for all four access holes. Note that one of the access holes is located under the cable guide. The guide can be lifted away to provide better axis to this hole (the altitude axis can be moved to make this easier). Verify that the azimuth axis turns freely by hand. (Internally there is a ring that is being pulled up by four bolts which locks the motor in place. When you loosen the bolts you are loosening the ring which allows the axis to turn.)

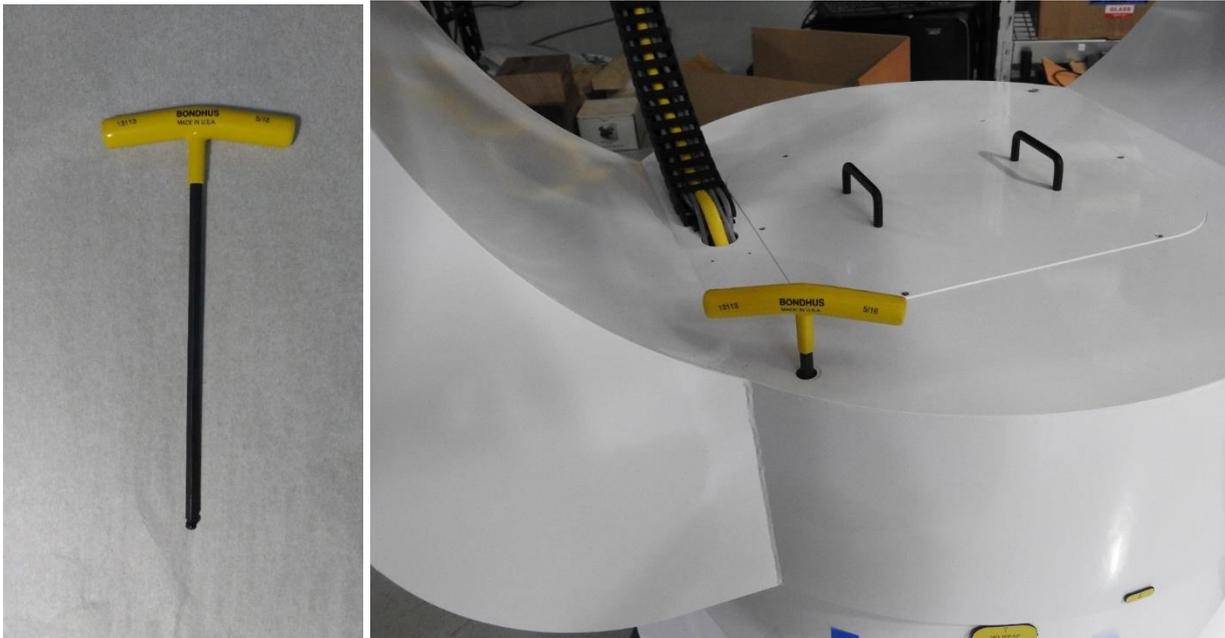


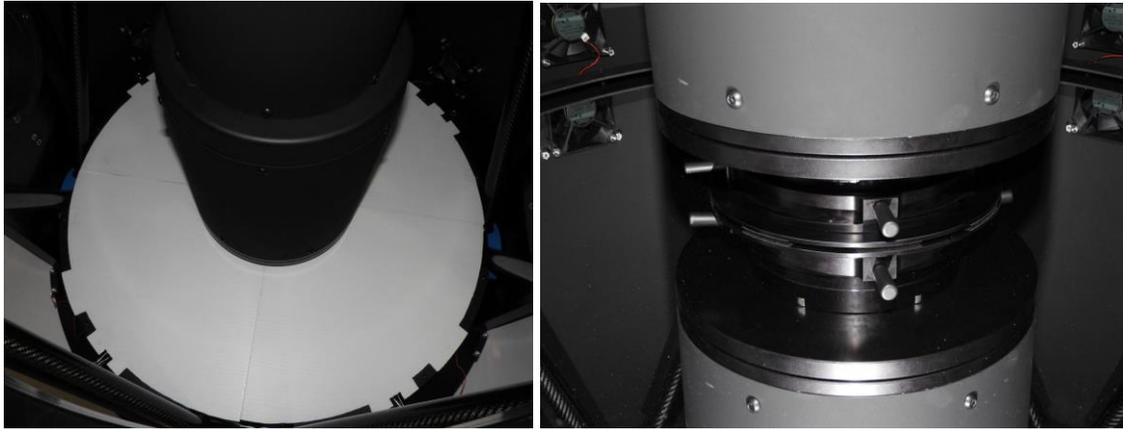
Figure 22 Loosening the azimuth locking ring

Replace the four cover bolts in the access holes.

### 3.4. LOOSENING THE PRIMARY RETAINING RING

During shipping the primary mirror retaining ring is tightened down (hand tight) to pin the primary mirror against the primary mirror whiffle tree. Once the telescope has arrived safely and

is unpacked, the primary mirror retaining ring needs to be loosened so it does not pinch the optics. First, unclip and carefully remove each of the four plastic primary mirror covers. Then, put a hand down on each side of the primary baffle under the lip of the baffle. Reach in and loosen the retaining ring by rotating it counter clockwise about ½ a turn. The ring should now be just barely above the surface of the primary mirror.



*Figure 23 Primary mirror covers and the primary retaining ring*

### 3.5. CONTROL BOX AND CABLES

Move the control box to the desired location for your particular observatory. It may be mounted vertically on a wall, laying horizontally on the floor, or attached to a custom stand.



*Figure 24 Control box mounting options*

The telescope is controlled with a standard computer that connects to the control box via Ethernet. Six Turck cables that run between the control box and the telescope carry power and control signals. A USB cable is also run between the telescope and control computer for communication with accessories such as focusers, field de-rotators, CCD cameras and autoguiders. See Figure 25 for an overview of the cabling layout.

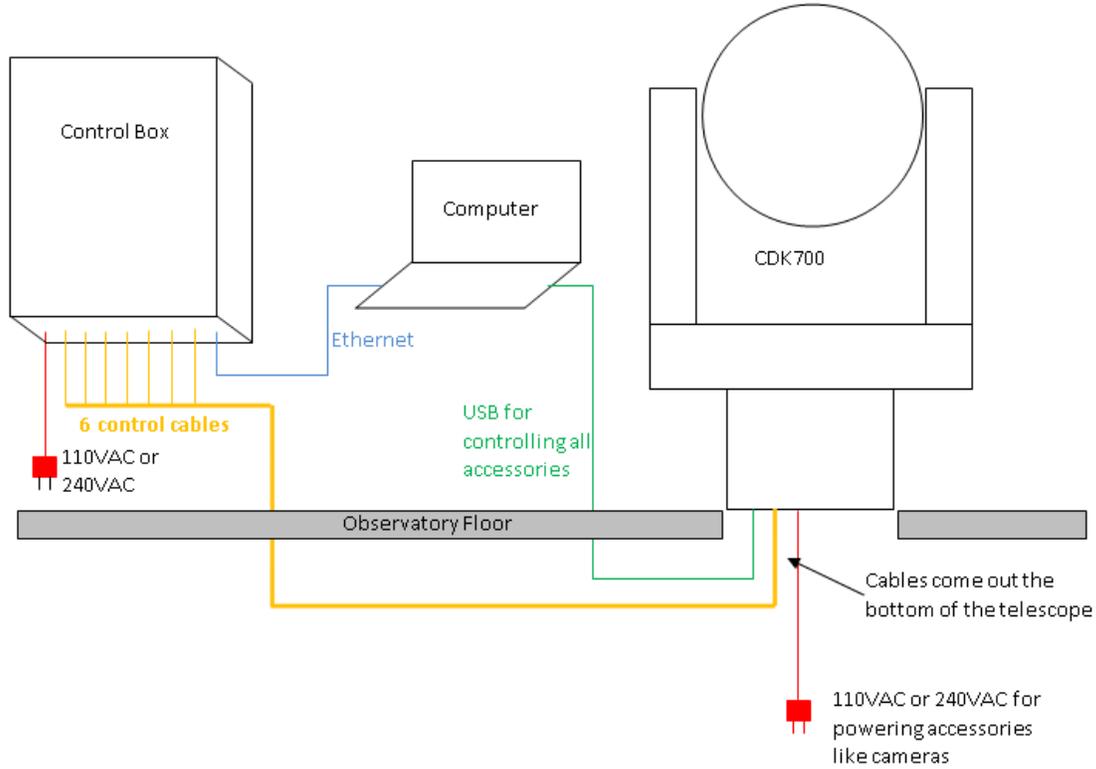


Figure 25 Cabling overview

Connect the six control cables to the control box according to the corresponding labels. Remove the fork cover at the base of the fork. This is secured by four 10-32 thumb screws.

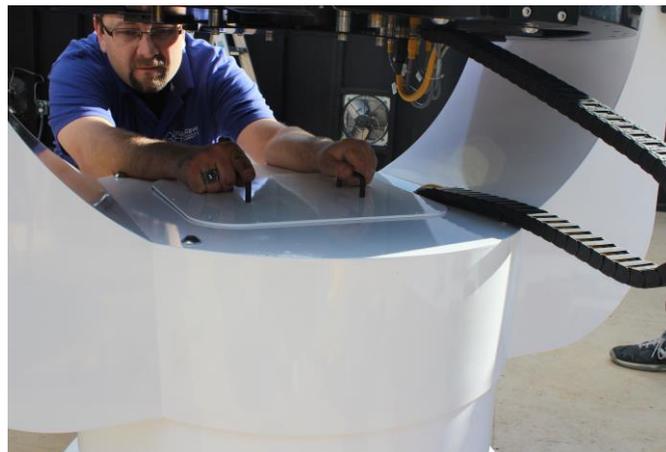
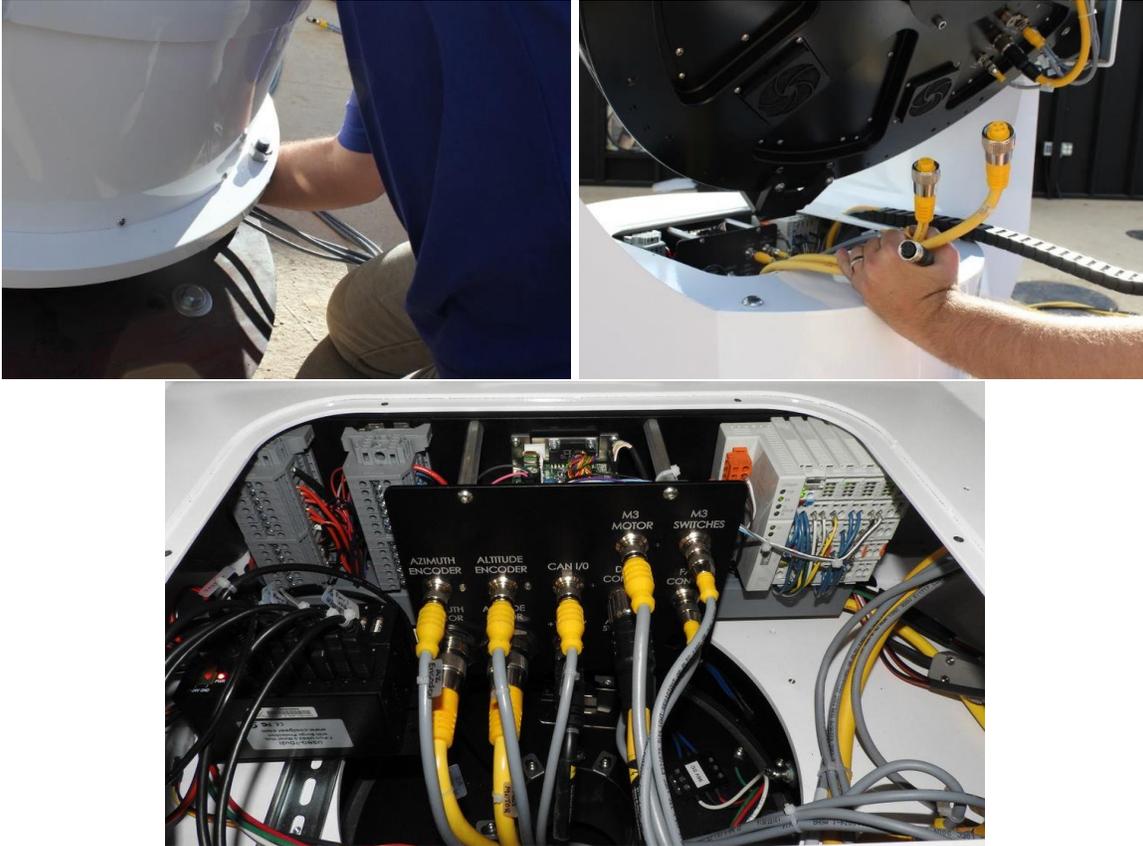


Figure 26 Removing the fork cover

The cables from the control box and a USB cable from the computer can now be pulled from under the telescope through the hole in the azimuth axis. The cable may be coming up through conduit in the middle of your pier or they might be run along the floor under the telescope. Either way, it is usually easiest to position the cables under the access hole of the mount and then pull them up from the top. Plug in the six Turck cables to the proper connectors according to the labels on the connector panel and cables. Also, plug the USB-B connector into the port on one of the USB hubs inside of the fork.



*Figure 27 Control cable routing*

Depending on the instrumentation and accessories that will be used with the telescope, it may be useful to run an AC extension cord through the azimuth axis as well. This is often used to power cameras or additional accessories that do not use the available USB ports or 12 VDC supply.

Connect the control box to AC power (110 VAC or 240 VAC). Finally, connect the Ethernet and USB cables to the control computer. A USB-to-Ethernet adapter is included with the telescope for cases where a direct Ethernet connection to the computer is not available or desired.

#### **4. ACCESSORIES**

The CDK700 comes standard with one IRF90 for the primary Nasmyth port and a visual adapter with FeatherTouch Focuser for the second Nasmyth port. Some customers will choose to order a second IRF90 to have instruments on both ports.

## 4.1. IRF90

Remove the Nasmyth Port Cover from Port 1.



Figure 28 Removing the Nasmyth port covers

Unpack the IRF90 and install it onto the Nasmyth Port.



Figure 29 Installing the IRF90

Plug in the power cable from the EFA to one of the two 12VDC power jacks on the side of the fork. Plug in the CAT5 control cable to the port labeled PC on the EFA panel. On the port 1 side of the telescope, also plug the yellow tipped Turck cable into the EFA. The CAT5 and Turck cables should be visible just sticking out of one of the cable pass throughs. If they are not visible, remove the circular cover and run the cables through one of the panel openings.



Figure 30 EFA connections

Connect the Focus and Rotate ports on the IRF90 to the corresponding ports on the EFA using the blue-ended CAT5 cables provided with the IRF90.

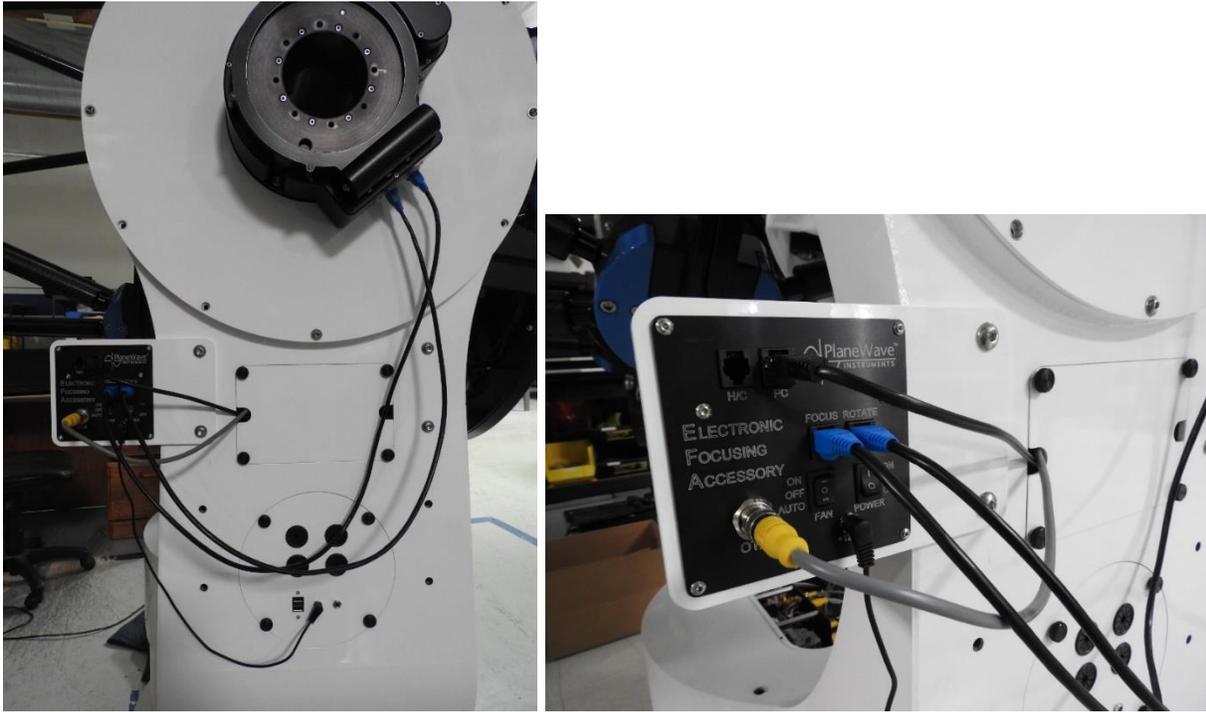


Figure 31 IRF90 connections

## 4.2. FEATHERTOUCH FOCUSER

A FeatherTouch focuser and adapter tube is typically provided to accommodate the use of an eyepiece on Nasmyth Port 2. Remove the Nasmyth Port Cover from Port 2 and attach the adapter tube to the Nasmyth Port. Connect the FeatherTouch Focuser using the supplied set screws.

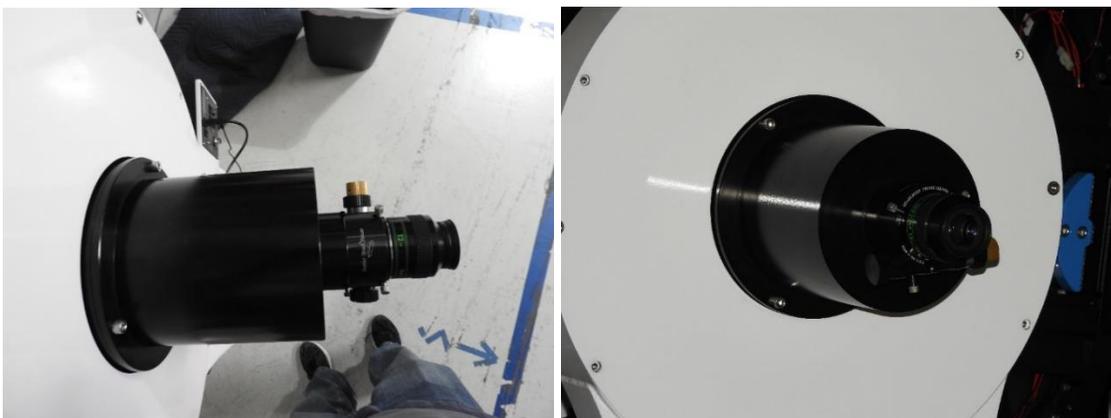


Figure 32 FeatherTouch Focuser

## 5. SOFTWARE SETUP

See the “CDK700 Software Guide” for instructions on setting up the software and controlling the telescope.